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

May 2, 2013

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-op Test Instructions**

The following approved WBN Unit 2 Pre-op Test Instructions (PTIs) are enclosed:

PTI NUMBER	Rev.	TITLE
2-PTI-070-02A	0	Component Cooling System Unit 2 Train A Flow Balance
2-PTI-070-02B	0	Component Cooling System Unit 2 Train B Flow Balance

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

Enclosures

D030
NRR

cc (Enclosures):

U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

NRC Resident Inspector Unit 2
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

WATTS BAR NUCLEAR PLANT
UNIT 2 PREOPERATIONAL TEST

TITLE: Component Cooling System
Unit 2 Train A Flow Balance

Instruction No: 2-PTI-070-02A

Revision No: 0000

PREPARED BY: JOSEPH CARDOZA Joseph Cardoza DATE: 12-13-12
PRINT NAME / SIGNATURE

REVIEWED BY: Jimmy E. Kiker / Jimmy E. Kiker DATE: 12-13-12
PRINT NAME / SIGNATURE

INSTRUCTION APPROVAL

JTG MEETING No: 2-12-023

JTG CHAIRMAN: [signature] DATE: 12/13/12

APPROVED BY: [signature] DATE: 12/13/12
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	12/13/12	ALL	Initial Issue

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1.0 INTRODUCTION

1.1 Test Objectives

A. To demonstrate that the Component Cooling System (CCS) has the ability to provide adequate flow for Unit 2, Train A components required to meet design basis criteria.

B. To demonstrate Component Cooling System Thermal Barrier Booster Pumps (TBBP) hydraulic performance meets design requirements.

C. To demonstrate that the Unit 2 Component Cooling System alarms and instrumentation will function as designed.

1.2 Scope

The CCS flow to Unit 2, Train A equipment will be adjusted as necessary to ensure adequate flow to satisfy the LOCA-Recirculation, STARTUP (from Cold Shutdown), and NORMAL (Power Operation) modes of operation. The flows to the Spent Fuel Pit Heat Exchanger B and the Waste Gas Compressor B Heat Exchanger will be re-adjusted during this test instruction. The flow to the Radiation Monitor is routinely adjusted by maintenance instruction and is not adjusted by this test instruction.

The Unit 2 TBBPs performance will be tested to verify adequate operating head in accordance with the vendor supplied pump performance curve.

The newly installed Unit 2 Train A CCS alarms and instrumentation will be tested to verify function and operability. The Digital Control System (Foxboro I/A) will be utilized to display and gather data from permanent plant instruments during this test instruction.

Date _____

2.0 REFERENCES

2.1 Performance References

A. SMP-9.0, Conduct of Test

B. 2-SOI-70.01, Unit 2 - A Train Component Cooling Water (CCS) System

C. SOI-70.01, Unit 1 - Component Cooling Water (CCS) System

D. TI-31.14, Piping Vibration Measurements

E. TI 31.08, Flow Balancing Valves Setpoint Positions

2.2 Developmental References

A. Final Safety Analysis Report (FSAR), thru Amendment 109

1. Section 9.2.2,
2. Table 14.2-1, pages 7 and 8

B. Drawings

1. 1-47W859-1, Component Cooling System, Rev.54
   a. DCA 53413-004 R0
   b. DCA 53413-005 R0
   c. DCA 53413-041 R0
2. 2-47W859-1, Component Cooling System, Rev. 10
   a. DRA 54782-013 R0
   b. DRA 55337-147 R0
   c. DRA 55337-148 R0
   d. DRA 55337-149 R0

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2.2 Developmental References (continued)

3. 1-47W859-3, Component Cooling System, Rev.23
   a. DCA 55050-038 R0
   b. DCA 56035-054 R0
   c. DCA 56035-055 R0
   d. DCA 56035-056 R0
   e. DCA 56035-058 R0
   f. DCA 56035-059 R0
4. 2-47W859-3, Component Cooling System, Rev. 15
   a. DRA 53343-002 R0
   b. DRA 53352-001 R0
   c. DRA 53352-002 R1
   d. DRA 53352-003 R0
   e. DRA 53421-002 R2
   f. DRA 53537-001 R0
   g. DRA 53537-002 R1
   h. DRA 53537-004 R2
   i. DRA 53537-006 R0
   j. DRA 53537-010 R0
   k. DRA 53537-353 R0
   l. DRA 53580-009 R0
   m. DRA 53995-700 R0
   n. DRA 54782-001 R0
   o. DRA 54782-016 R0

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2.2 Developmental References (continued)

p. DRA 55337-003 R0

q. DRA 55337-004 R0

5. 1-47W859-4, Component Cooling System, Rev.25

   a. DCA 53413-001 R0

   b. DCA 53413-003 R0

6. 2-47W859-4, Component Cooling System, Rev.11

   a. DRA 53537-009 R0

   b. DRA 53590-163 R0

   c. DRA 55337-005 R0

   d. DRA 55337-006 R0

7. 1-47W610-70-1, Component Cooling Water System, Rev.28

   a. DCA 53413-006 R0

   b. DCA 53413-007 R0

   c. DCA 53413-008 R0

   d. DCA 52376-007 R0

8. 1-47W610-70-1A, Component Cooling Water System, Rev.11

   a. DCA 52376-005 R0

9. 1-47W610-70-2A, Component Cooling Water System, Rev.19

   a. DCA 52376-014 R0

   b. DCA 52857-053 R0

   c. DCA 53111-056 R0

   d. DCA 53111-066 R0

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2.2 Developmental References (continued)

10. 2-47W610-70-2, Component Cooling Water System, Rev.3
    a. DRA 52378-487 R2
    b. DRA 52378-488 R2
    c. DRA 52671-018 R1
    d. DRA 53421-401 R1
    e. DRA 53580-624 R0
    f. DRA 54782-203 R0
    g. DRA 55337-150 R0
11. 2-47W610-70-3, Component Cooling Water System, Rev.1
    a. DRA 52378-489 R1
    b. DRA 52378-490 R0
    c. DRA 52378-491 R1
    d. DRA 52427-005 R2
    e. DRA 53343-003 R0
    f. DRA 54782-206 R0
    g. DRA 54782-207 R0
    h. DRA 54782-209 R0
12. 1-45B655-27D, MCR Annunciator Inputs Window Box XA-55-27D, Rev.2
    a. DRA 52630-152 R0
    b. DRA 52630-162 R0
    c. DRA 52630-166 R0
    d. DRA 52630-167 R0

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2.2 Developmental References (continued)

13. 1-45B655-E27D, Electrical Annunciator Window Box XA-55-E27D Engraving, Rev.0

    a. DCA 52630-151 R0

    b. DCA 52630-163 R0

    c. DCA 56360-175 R1

14. 2-47W611-70-2 Electrical Logic Diagram, Rev.2

    a. DRA 52421-415 R1

    b. DRA 53580-625 R0

    c. DRA 55337-013 R0

15. DIGITAL CONTROL SYSTEM, FOXBORO INVENSYS (I/A)

    a. 08F802403-FD-2827-1, BOP RCP1/RCP2 Thermal Barrier Differential Pressure, R2

    b. 08F802403-FD-2827-2, BOP RCP3/RCP4 Thermal Barrier Differential Pressure, R2

    c. 08F802403-FD-2828-1, BOP Excess Let-Down Waste Gas Compressor Heat Exchanger Outlet Temperature, R2

    d. 08F802403-FD-2829-1, BOP Reactor Cooling Pump Oil Cooler Return Temperatures, R2

    e. 08F802403-FD-2830-1, BOP Seal Water Heat Exchanger A Outlet Temperature, R2

    f. 08F802403-FD-2831-1, BOP Sample Heat Exchanger Outlet Header Temperature, R2

    g. 08F802403-FD-2832-1, BOP Letdown Heat Exchanger Outlet Temperature, R2

    h. 08F802403-FD-2833-1, BOP Waste Gas Compressor A Outlet Flow, R2

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2.2 Developmental References (continued)

i. 08F802403-FD-2834-1, BOP Letdown & Excess Letdown Heat Exchanger Outlet Flow, R3

DRA 52378-565 R0

j. 08F802403-FD-2835-1, BOP Reactor Coolant Pump Thermal Barrier & Upper /Lower Oil Cooler, R4

k. 08F802403-FD-2835-2, BOP Reactor Coolant Pump Thermal Barrier & Upper /Lower Oil Cooler, R4

l. 08F802403-FD-2835-3, BOP Reactor Coolant Pump Thermal Barrier & Upper /Lower Oil Cooler, R4

m. 08F802403-FD-2835-4, BOP Reactor Coolant Pump Thermal Barrier & Upper /Lower Oil Cooler, R4

n. 08F802403-FD-2836-1, BOP Seal Water Heat Exchanger Outlet Header Flow, R2

o. 08F802403-FD-2837-1, BOP Sample Heat Exchanger Outlet Header Flow, R2

p. 08F802403-FD-2838-1, BOP Cent Charge Pump A-A Mech Seal Heat Exhanger Flow, R2

q. 08F802403-FD-2839-1, BOP Safety Injection System Pump A-A Mech Seal Heat Exhanger Flow, R2

r. 08F802403-FD-2840-1, BOP Containment Spray Pump A-A Mech Seal Heat Exchanger Outlet Flow R2

s. 08F802403-FD-2841-1, BOP Reheater Pump A-A Mech Seal Heat Exchanger Outlet Flow, R2

t. 08F802403-FD-2842-1, BOP Reheater Exchanger A Flows and Temperature, R3

u. 08F802403-FD-2845-1, BOP Reactor Bldg Misc Equipment Supply Header Flows, R2

v. 08F802403-FD-2971-1, BOP CCS Hx B Inlet Press ACR B, R2

w. 08F802403-FD-2972-1, CCS Surge Tank A Level ACR A, R2

Date _____

2.2 Developmental References (continued)

x. 08F802403-FD-2973-1, CCS Surge Tank B Level ACR B, R2

y. 08F802403-FD-2974-1, Misc Equip Header CCS Flow ACR B, R3

z. 08F802403-FD-2976-1, ESF EQ A-A Sup Header Flow A ACR A, R3

16. ANALOG CONTROL SYSTEM, FOXBORO INVENSYS (Spec 200)

a. 08F826663-FD-2106-1, Surge Tank Demin Water Inlet, 2-LPL-70-63A, R0

b. 08F826663-FD-2107-1, RHR Htx 2A-A Supply Hdr Flow, 2-LPF-70-159A, R0

c. 08F826663-FD-2108-1, CCS Heat Exchanger B Outlet Temp, 2-LPT-70-161, R1

d. 08F826663-FD-2114-1, Thermal Barrier Header Diff Flow, 2-LPF-70-81A and 81E, R1

e. 08F826663-FD-2115-1, Sample Heat Exchanger Hdr Diff Flow, 2-LPF-70-215A and 215B, R1

f. 08F826663-FD-2206-1, Surge Tank Demin Water Outlet Level, 2-LPL-70-99A, R0

g. 08F826663-FD-2207-1, CCS Heat Exchanger B Inlet Press, 2-LPP-70-17A, R1

h. 08F826663-FD-2213-1, Thermal Barrier Header Diff Flow, 2-LPF-70-81B and 81D, R1

17. 2-45W2671-3, Wiring Diagrams BOP Instr Racks, R0

a. DRA 52427-260 R0

18. 45W2673-4, Wiring Diagrams BOP Instr Racks RH

a. DRA 52378-365 R3

C. Documents

1. 2-TSD-70-1, Test Scoping Document, Component Cooling System, Rev.2

2. 2-PTI-70-01, Component Cooling Water Pump/Valve Logic Test, Rev.0

Date _____

2.2 Developmental References (continued)

3. 2-PTI-70-02B, Component Cooling System Unit 2 Train B Flow Balance, Rev.0
4. VTD-D088-0020 R5, Vendor Manual Delaval Single Stage Centrifugal Pumps
5. VTD-G200-0400, Vendor Manual Thermal Barrier Booster Pumps, EDCR-2-53352, VR#WBC0579 R0
6. PO-290692, Rosemount Calculation Data Sheet, 485 Annubar Primary Element (WBN-2-FE-70-216 and WBN-2-FE-70-217), 08/02/2011
7. PO-833799, Annubar Flow Calculations, ANR-61(2-FE-70-218), 08/31/83
8. Scaling and Setpoint Documents
    a. SSD-2-FI-70-200, CCS Htx B Inlet Flow, Rev.0, 4/10/91
    b. SSD-2-FIS-70-81, Thermal Barrier Header Flow, Rev. 0, 2/7/2012
    c. SSD-2-FS-70-190, Letdown Htx Outlet Lo flow, Rev.0, 10/15/2012
    d. SSD-2-LPF-70-21, Waste Gas Compressor B Outlet Flow, Rev. 4, 12/17/2009; DCN 53111 Stage 8
    e. SSD-2-LPF-70-81A, Thermal Barrier Return Header Flow, Rev. 0, 4/12/2012
    f. SSD-2-LPF-70-84, Excess Letdown Htx Outlet Flow, Rev. 1, 2/7/2012
    g. SSD-2-LPF-70-95, RCP #3 Thermal Barrier Outlet Flow, Rev. 1, 9/26/2011
    h. SSD-2-LPF-70-96, RCP #3 Upper Oil Cooler Outlet Flow, Rev. 0, 9/26/2011
    i. SSD-2-LPF-70-98,RCP #3 Lower Oil Cooler Outlet Flow, Rev. 1, 9/26/2011
    j. SSD-2-LPF-70-105, RCP #2 Thermal Barrier Outlet Flow, Rev. 1, 7/13/2011
    k. SSD-2-LPF-70-106, RCP #2 Upper Oil Cooler Outlet Flow, Rev. 1, 7/13/2011

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2.2 Developmental References (continued)

l. SSD-2-LPF-70-108, RCP #2 Lower Oil Cooler Outlet Flow, Rev. 1, 7/13/2011

m. SSD-2-LPF-70-115, RCP #1 Thermal Barrier Outlet Flow, Rev. 1, 7/13/2011

n. SSD-2-LPF-70-116, RCP #1 Upper Oil Cooler Outlet Flow, Rev. 1, 7/13/2011

o. SSD-2-LPF-70-119, RCP #1 Lower Oil Cooler Outlet Flow, Rev. 1, 7/13/2011

p. SSD-2-LPF-70-124, RCP #4 Thermal Barrier Outlet Flow, Rev. 1, 7/13/2011

q. SSD-2-LPF-70-125, RCP #4 Upper Oil Cooler Outlet Flow, Rev. 1, 7/13/2011

r. SSD-2-LPF-70-128, RCP #4 Lower Oil Cooler Outlet Flow, Rev. 1, 7/13/2011

s. SSD-2-LPF-70-142, Reactor Bldg Supply Hdr Flow, Rev. 1, 7/13/2011

t. SSD-2-LPF-70-146, CCP 2A-A Mech Seal Htx Outlet Flow, Rev. 1, 2/7/2012

u. SSD-2-LPF-70-147, SIS Pump 2A-A Mech Seal Htx Outlet Flow, Rev. 2, 2/7/2012

v. SSD-2-LPF-70-150, Cntmt Spray Pump 2A-A Mech Seal Htx Outlet Flow, Rev. 2, 2/7/2012

w. SSD-2-LPF-70-151, RHR Pump 2A-A Mech Seal Htx Outlet Flow, Rev. 1, 2/7/2012

x. SSD-2-LPF-70-158, RHR Htx 2A-A Outlet Flow, Rev. 2, 10/15/2012

y. SSD-2-LPF-70-159A, RHR Htx 2A-A Supply Hdr Flow, Rev. 2, 8/4/1999; DCN 52376 Stage 6

z. SSD-2-LPF-70-159C, RHR Htx 2A-A Supply Hdr Flow, Rev. 1, 8/4/1999; DCN 53111 Stage 2

aa. SSD-2-LPF-70-164A, Misc Equip Supply Header Flow, Rev. 2, 9/26/2011

Date _____

2.2 Developmental References (continued)

bb. SSD-2-LPF-70-164C, Misc Equip Supply Header Flow, Rev. 3, 9/26/2011

cc. SSD-2-LPF-70-176, Seal Water Htx A Outlet Flow, Rev. 0, 9/26/2011

dd. SSD-2-LPF-70-181, Sample Htx Outlet Hdr Flow, Rev. 1, 7/13/2011

ee. SSD-2-LPF-70-190, Letdown Htx Outlet Flow, Rev. 0 8/23/2012

ff. SSD-2-LPF-70-215, Sample Htx Hdr Diff Flow, Rev. 0, 9/26/2011

gg. SSD-2-LPP-70-17A, CCS Htx B Inlet Pressure, Rev. 5, 11/25/2008; DCN 52376 Stage 12

hh. SSD-2-LPPD-70-94, RCP #3 Thermal Barrier Diff Pressure, Rev. 0, 9/26/2011

ii. SSD-2-LPPD-70-104, RCP #2 Thermal Barrier Diff Pressure, Rev. 1, 9/26/2011

jj. SSD-2-LPPD-70-117, RCP #1 Thermal Barrier Diff Pressure, Rev. 1, 9/26/2011

kk. SSD-2-LPPD-70-126, RCP #4 Thermal Barrier Diff Pressure, Rev. 1, 9/26/2011

ll. SSD-2-LPR-90-123-S, Component Cooling System Liquid Effluent Monitor, Rev. 14, 6/14/2012

mm. SSD-2-LPT-70-157, RHR Htx 2A-A Outlet Temp, Rev. 1, 9/3/2003

nn. SSD-2-LPT-70-161, CCS Htx B Outlet Temp, Rev. 5, 6/18/2009

oo. SSD-2-LPT-70-175, Seal Water Htx A Outlet Temp, Rev. 0, 9/26/2011

pp. SSD-2-LPT-70-182, Sample Htx Outlet Hdr Temp, Rev. 0, 7/13/2011

qq. SSD-2-LPT-70-191, Letdown Htx Outlet Temp, Rev. 0, 9/26/2011

rr. SSD-0-LPF-70-6, Spent Fuel Pit Htx B Outlet Flow, Rev. 5, 11/25/2008

9. IMI-90.006, 18 Month Flow Instrument Calibration of the General Atomic Liquid Radiation Monitor Flow Loops, R11, 6/22/2012

Date _____

3.0 PRECAUTIONS AND LIMITATIONS

A. Standard precautions shall be followed for working around energized electrical equipment in accordance with TVA Safety Procedure 1021.

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 wires removed/lifted from a terminal shall be identified and taped or covered with an insulator to prevent personnel or equipment hazard and possible spurious initiations. The wires should be grouped together and labeled with the work implementing document number that required them to be lifted if left unattended.

E. All open problems (including non Tech Spec testing acceptance criteria) are to be tracked by a corrective action document and entered on the appropriate system punchlist.

F. 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.

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

H. Ensure there are no adverse effects to the operation of Unit 1 structures, systems, or components.

I. Test personnel will coordinate with Unit 1 Operations when manipulating Unit 1equipment if required.

Date _____

3.0 PRECAUTIONS AND LIMITATIONS (continued)

J. During the performance of this procedure visual observation of piping and components is required. This includes steady state and transient operations with visual confirmation that vibration is not excessive.

K. If the vibration is determined to be excessive the Test Engineer shall initiate a Test Deficiency Notice (TDN).

L. In the balanced flow condition, the CCS pumps shall be limited to 6800 GPM each. However, it is permissible to exceed this pump limit while establishing the balanced conditions and during pump performance testing as long as pump cavitation is not observed. This limit prevents excessive overloading of the CCS pump motors during operations.

M. The Component Cooling System surge tanks shall be kept at normal operating levels throughout the performance of this test.

N. During flow balancing, special precautions (Pre-operational Testing in Progress tags) shall be taken to ensure that once a throttle valve position is established in a particular operating mode, that subsequent testing will not result in valve repositioning that would prevent the component from receiving the minimum required flow in any other operating mode.

O. Spent Fuel Pit Cooling System should be aligned to Spent Fuel Pit A Heat Exchanger for the duration of this Pre-Operational Test Instruction.

Date _____

3.0 PRECAUTIONS AND LIMITATIONS (continued)

P. The following flow limits shall be observed and vibration shall be monitored if flow limits are approached or exceeded during this test.

COMPONENT	FLOW LIMIT
RHR Heat Exchanger 2A	6250 GPM
Centrifugal Charging Pump 2A	36 GPM
Safety Injection Pump 2A	30 GPM
RHR Pump 2A	15 GPM
Containment Spray Pump 2A	4 GPM
Waste Gas Compressor B	95 GPM
Letdown Heat Exchanger	1250 GPM
Seal Water Heat Exchanger	250 GPM
Sample Heat Exchanger B	49 GPM
Sample Heat Exchanger A	42 GPM
Hot Sample Chiller	50 GPM
Excess Letdown Heat Exchanger	290 GPM
RCP Upper Oil Coolers	184 GPM
RCP Lower Oil Cooler	10 GPM
RCP Thermal Barrier	60 GPM
Radiation Monitor	10 GPM
Spent Fuel Pit Heat Exchanger B	3750 GPM

Date _____

4.0 PREREQUISITE ACTIONS

NOTE
Preliminary action steps may be performed in any order at Test Directors discretion.

4.1 Preliminary Actions

[1] **VERIFY** 2-PTI-70-01, Component Cooling System Pump/Valve Logic Test, has been completed. _____

[2] **VERIFY** the test/performance copy of this Preoperational Test Instruction (PTI) is the current revision including any change notices and as needed, each test person assisting in this test has the current revision including any change notices. _____

[3] **OBTAIN** copies of the applicable forms from the latest revision of SMP-9.0 **AND**

ATTACH to this PTI for use during the performance of this PTI. _____

[4] **ENSURE** components contained within the boundaries of this test are under the jurisdictional control of Preoperational Startup Engineering (PSE) and/or Plant Operations. _____

[5] **ENSURE** required Component Testing has been completed prior to start of test. _____

[6] **VERIFY** System cleanness as required for the performance of this test has been completed in accordance with SMP-7.0. _____

[7] **ENSURE** surveillance performance testing of the CCS 2A & 2B Pumps has been implemented and relative strength of the pumps can be determined (weaker/stronger). _____

[8] **ENSURE** DCN 53413 Stages 5 & 6 have been implemented, returned to operation (RTO), and Unit 1 Operating procedures are available for dual unit system alignment. _____

Date _____

4.1 Preliminary Actions (continued)

[9] **ENSURE** outstanding Design Change Notices (DCN's), Engineering Document Construction Releases (EDCR's) or Temporary Alterations (TA's) do NOT adversely impact testing **AND**

ATTACH documentation of DCN's, EDCR's and TA's that were reviewed to the data package. _____

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

[11] **EVALUATE** open items in Watts Bar Integrated Task Equipment List (WITEL), **AND**

ENSURE they will NOT adversely affect the test performance and results. _____

[12] **EVALUATE** outstanding Clearances for impact to the test performance, **AND**

RECORD in Appendix B, Temporary Condition Log if required. _____

[13] **ENSURE** all piping supports required for testing are installed and adjusted as required. _____

[14] **VERIFY** plant instruments, listed on Appendix C, Permanent Plant Instrumentation Log, are placed in service and are within their calibration interval. _____

[15] **ENSURE** System 98, Digital Control System trends and displays are established as required to gather data in support of this test instruction. _____

[16] **ENSURE** System 55, Annunciator and Sequential Events Recording System applicable TBK switches are ON, the applicable Master Switches are ON, and window software input (s) are ENABLED for the following Annunciator windows

A. 0-XA-55-27D, 258-D, RHR HX 2A-A RET FLOW LO _____

B. 0-XA-55-27D, 258-E, RHR HX 2A-A RET TEMP HI _____

Date _____

4.1 Preliminary Actions (continued)

C. 0-XA-55-27D, 256-E, RHRP 2A-A MECH SEAL HX FLOW LO _____

D. 0-XA-55-27D, 254-E, SIP 2A-A OIL CLR FLOW LO _____

E. 0-XA-55-27D, 256-D, CSP 2A-A OIL CLR FLOW LO _____

F. 0-XA-55-27D, 254-D, CCP 2A-A GEAR & OIL CLR FLOW LO _____

G. 0-XA-55-27D, 254-A, MISC EQUIP SUPPLY HDR FLOW LO _____

H. 0-XA-55-27D, 257-A, WG COMPR B RET FLOW LO _____

I. 0-XA-55-27D, 257-B, WG COMPR B RET TEMP HI _____

J. 0-XA-55-27D, 259-A, RCP SEAL WTR HX RET FLOW LO _____

K. 0-XA-55-27D, 259-B, RCP SEAL WTR HX RET TEMP HI _____

L. 0-XA-55-27D, 260-A, LTDN HX RET FLOW LO _____

M. 0-XA-55-27D, 260-B, LTDN HX RET TEMP HI _____

N. 0-XA-55-27D, 255-A, SAMPLE HXS RET HDR FLOW LO _____

O. 0-XA-55-27D, 255-B, SAMPLE HXS RET HDR TEMP HI _____

P. 0-XA-55-27D, 264-E, RX BLDG SUPPLY HDR FLOW LO _____

Q. 0-XA-55-27D, 263-D, EXC LTDN HX & GFFD RET FLOW LO _____

R. 0-XA-55-27D, 263-E, EXC LTDN HX & GFFD RET TEMP HI _____

S. 0-XA-55-27D, 261-C, RCP 1 OIL CLRS RET FLOW LO _____

T. 0-XA-55-27D, 262-C, RCP 2 OIL CLRS RET FLOW LO _____

U. 0-XA-55-27D, 263-C, RCP 3 OIL CLRS RET FLOW LO _____

V. 0-XA-55-27D, 264-C, RCP 4 OIL CLRS RET FLOW LO _____

Date _____

4.1 Preliminary Actions (continued)

W. 0-XA-55-27D, 262-D, RCP OIL CLRS RET HDR TEMP HI _____

X. 0-XA-55-27D, 261-B, RCP 1 THERM BAR RET FLOW LO _____

Y. 0-XA-55-27D, 261-A, RCP 1 THRM BAR ΔP HI _____

Z. 0-XA-55-27D, 262-B, RCP 2 THERM BAR RET FLOW LO _____

AA. 0-XA-55-27D, 262-A, RCP 2 THRM BAR ΔP HI _____

BB. 0-XA-55-27D, 263-B, RCP 3 THERM BAR RET FLOW LO _____

CC. 0-XA-55-27D, 263-A, RCP 3 THRM BAR ΔP HI _____

DD. 0-XA-55-27D, 264-B, RCP 4 THERM BAR RET FLOW LO _____

EE. 0-XA-55-27D, 264-A, RCP 4 THRM BAR ΔP HI _____

FF. 0-XA-55-27D, 261-E, RCP THRM BAR RET HDR FLOW LO _____

GG. 0-XA-55-27D, 261-D, RCP THRM BAR RET HDR TEMP HI _____

[17] **PERFORM** a pretest walkdown on equipment to be tested to ensure no conditions exist that will impact test performance. _____

[18] **INFORM** Predictive Maintenance (PDM) personnel of requirement to measure vibration data on rotating equipment. _____

[19] **INFORM** Preoperational Startup Engineering personnel of requirement to monitor piping and components for vibration during periods of testing. _____

[20] **CONDUCT** a pretest briefing with Test and Operations personnel in accordance with SMP-9.0. _____

[21] **ESTABLISH** communications in areas where testing is to be conducted. _____

Date _____

4.2 Special Tools, Measuring and Test Equipment, Parts and Supplies

[1] 4 Pressure Gages, 0-200 psig , +/- 0.20% accuracy

[2] 3 Differential Pressure Gage, 0-20" H_2O, +/- 0.20% accuracy

4.3 Field Preparations

[1] **ENSURE** the following systems are in service or operable to the extent necessary to perform this test:

A. Digital Control System (System No. 098) _____

B. Plant Annunciator System (System No. 055) _____

C. 120 VAC Vital Power System (System No. 235) _____

D. 125 VDC Vital Power System (System No. 236) _____

E. 480V Reactor MOV Boards (System No. 213) _____

F. 480V Shutdown Power System (System No. 212) _____

G. Control Air System (System No. 032) _____

H. Essential Raw Cooling Water System (System No. 067) _____

I. Demineralized Water System (System No. 059) _____

[2] **ENSURE** CCS supply is aligned to the Spent Fuel Pit Heat Exchanger A in accordance with SOI-70.01. _____

[3] **ENSURE** CCS supply is aligned to the Waste Gas Compressor A in accordance with SOI-70.01 and the Waste Gas Compressor B is removed from service to allow the CCS 2A Pump to be shut down. _____

[4] **ENSURE** Component Cooling System is aligned in accordance with all checklists in 2-SOI-70.01, or equivalent. _____

[5] **ENSURE** Component Cooling System is filled and vented in accordance with 2-SOI-70.01, or equivalent. _____

Date _____

4.3 Field Preparations (continued)

[6] **ENSURE** Unit 2 Train A CCS Pumps are **NOT** in operation:

A. COMPONENT COOLING WATER PUMP 2A-A at 2-HS-70-59A on 0-M-27B. _____

B. COMPONENT COOLING WATER PUMP 2B-B at 2-HS-70-33A on 0-M-27B. _____

[7] **FAIL OPEN** 2-TCV-70-192, LETDOWN HX CCS OUT TEMP CNTL, by isolating the air supply 2-ISV-32-3247 and bleeding control air at the diaphragm connection. _____

_____
CV

[8] **PERFORM** valve alignment per Attachment 1, Valve Checklist. _____

[9] **RECORD** the Full Stroke Number of Turns from Full OPEN position to Full CLOSED position on Attachment 3 as specified in Step 1.0 **AND**

ENSURE Throttle Valves on Attachment 3 are in the OPEN position. _____

[10] **INSTALL** Measuring and Test Equipment (M&TE) at test connections for instrument locations listed in accordance with Appendix E. _____

[11] **VERIFY** M&TE required for test performance has been (as required) filled, vented, and placed in service in accordance with Appendix D. _____

[12] **VERIFY** M&TE calibration due dates will support the completion of this test performance. _____

Date _____

4.4 Approvals and Notifications

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

_____ _____
Preoperational Startup Manager Signature — Date

[2] Prior to start of the test; **OBTAIN** the Unit 2 Operations Supervisor's (US/SRO) or Shift Manager's (SM) authorization.

_____ _____
US/SRO/SM Signature — Date

[3] Prior to start of the test; **OBTAIN** the Unit 1 Operations Supervisor's (US/SRO) or Shift Manager's (SM) authorization.

_____ _____
US/SRO/SM Signature — Date

Date _____

5.0 ACCEPTANCE CRITERIA

A. Unit 2 CCS Train A alarms and instrumentation will be verified to function and operate as designed (Section 6.1).

B. CCS Thermal Barrier Pumps 2A-A and 2B-B meet pump hydraulic performance requirements of producing 160 gpm at greater than or equal to 130 ft. TDH (Steps 6.2.1[27], 6.2.2[21]).

C. The Component Cooling water flow distribution to the non-safety related and safety related loads in LOCA-Recirculation, STARTUP, and NORMAL, modes are in accordance with design as specified in Attachments 4,5,and 6 (Reference 2.2.C.1).

COMPONENT	FLOW CRITERIA	STEPS VERIFIED
RHR Heat Exchanger 2A	≥ 5000 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16], 6.3.2[19]
Centrifugal Charging Pump 2A	≥ 28 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]
Safety Injection Pump 2A	≥ 15 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16],6.3.2[19] 6.3.3[6],6.3.3[11]
RHR Pump 2A	≥ 10 GPM	6.3.1[22],6.3.1[25] 6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]
Containment Spray Pump 2A	≥ 2 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]
Waste Gas Compressor B	≥ 50 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16],6.3.2[19] 6.3.3[6], 6.3.3[11]

Date _____

5.0 ACCEPTANCE CRITERIA (continued)

COMPONENT	FLOW CRITERIA	STEPS VERIFIED
Letdown Heat Exchanger	≥ 1000 GPM	6.3.1[22],6.3.1[25] 6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]
Seal Water Heat Exchanger	≥ 200 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16],6.3.2[19] 6.3.3[6],6.3.3[11]
Sample Heat Exchanger B	≥ 28 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]
Sample Heat Exchanger A	≥ 20 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16] 6.3.2[19] 6.3.3[6], 6.3.3[11]
Hot Sample Chiller	≥ 22 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]
Radiation Monitor	≥ 6 GPM	6.3.1[22], 6.3.1[25] 6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]
Spent Fuel Pit Heat Exchanger B	≥ 3000 GPM	6.3.2[16], 6.3.2[19] 6.3.3[6],6.3.3[11]
Excess Letdown Heat Exchanger	≥ 232 GPM	6.3.2[16],6.3.2[19]
RCP Upper Oil Coolers	≥ 150 GPM	6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]
RCP Lower Oil Cooler	≥ 5 GPM	6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]
RCP Thermal Barrier	≥ 40 GPM	6.3.2[16], 6.3.2[19] 6.3.3[6], 6.3.3[11]

Date _____

6.0 PERFORMANCE

6.1 Component Cooling System Annunciator Functional Test

NOTE

Foxboro I/A workstations will be used to help perform some of the following steps. Ensure Foxboro I/A System Engineer or a qualified individual is available for this portion of the test.

6.1.1 RHR 2A-A Heat Exchanger Flow Alarm

[1] **VERIFY** annunciator 258-D (0-XA-55-27D), RHR HX 2A-A RET FLOW LO, is CLEAR. _____

[2] **OPEN** 2-FCV-70-156, RHR HTX 2A-A OUTLET VLV using 2-HS-70-156A on 0-M-27B. _____

[3] **VERIFY** annunciator 258-D (0-XA-55-27D), RHR HX 2A-A RET FLOW LO, ALARMS. _____

[4] **PLACE** 2-FS-70-158 (W2BOP_070:2FS0700158) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[5] **TOGGLE** 2-FS-70-158 (W2BOP_070:2FS0700158) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 258-D CLEARS. _____

B. Unit 2 Event Display monitor indicates 258-D RHR HX 2A-A RET FLOW LO (2-FS-70-158) returns to NORMAL. _____

[7] **TOGGLE** 2-FS-70-158 (W2BOP_070:2FS0700158) to the CLOSED position using a Foxboro I/A workstation. _____

[8] **VERIFY** the following:

A. Annunciator 258-D ALARMS. _____

B. Unit 2 Event Display monitor indicates 258-D RHR HX 2A-A RET FLOW LO (2-FS-70-158) is in ALARM. _____

Date _____

6.1.1 RHR 2A-A Heat Exchanger Flow Alarm (continued)

[9] **PLACE** 2-FS-70-158 (W2BOP_070:2FS0700158) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

[10] **CLOSE** 2-FCV-70-156, RHR HTX 2A-A OUTLET VLV using 2-HS-70-156A on 0-M-27B. _____

[11] **VERIFY** annunciator 258-D (0-XA-55-27D), RHR HX 2A-A RET FLOW LO, CLEARS _____

6.1.2 RHR 2A-A Heat Exchanger Temperature Alarm

[1] **VERIFY** annunciator 258-E (0-XA-55-27D), RHR HX 2A-A RET TEMP HI, is CLEAR. _____

[2] **PLACE** 2-TS-70-157 (W2BOP_070:2TS0700157) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-TS-70-157 (W2BOP_070:2TS0700157) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 258-E ALARMS. _____

B. Unit 2 Event Display monitor indicates 258-E RHR HX 2A-A RET TEMP HI (2-TS-70-157) is in ALARM. _____

[5] **TOGGLE** 2-TS-70-157 (W2BOP_070:2TS0700157) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 258-E CLEARS. _____

B. Unit 2 Event Display monitor indicates 258-E RHR HX 2A-A RET TEMP HI (2-TS-70-157) returns to NORMAL. _____

[7] **PLACE** 2-TS-70-157 (W2BOP_070:2TS0700157) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.3 RHR Pump 2A-A Seal Water Heat Exchanger Flow Alarm

[1] **VERIFY** annunciator 256-E (0-XA-55-27D), RHRP 2A-A MECH SEAL HX FLOW LO, is in ALARM. _____

Date _____

6.1.3 RHR Pump 2A-A Seal Water Heat Exchanger Flow Alarm (continued)

[2] **PLACE** 2-FS-70-151 (W2BOP_070:2FS0700151) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-151 (W2BOP_070:2FS0700151) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 256-E CLEARS _____

B. Unit 2 Event Display monitor indicates 256-E RHRP 2A-A MECH SEAL HX FLOW LO (2-FS-70-151) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-151 (W2BOP_070:2FS0700151) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 256-E ALARMS. _____

B. Unit 2 Event Display monitor indicates 256-E RHRP 2A-A MECH SEAL HX FLOW LO (2-FS-70-151) is in ALARM. _____

[7] **PLACE** 2-FS-70-151 (W2BOP_070:2FS0700151) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.4 Safety Injection Pump Oil Cooler 2A-A Flow Alarm

[1] **VERIFY** annunciator 254-E (0-XA-55-27D), SIP 2A-A OIL CLR FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-147 (W2BOP_070:2FS0700147) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-147 (W2BOP_070:2FS0700147) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 254-E CLEARS _____

B. Unit 2 Event Display monitor indicates 254-E SIP 2A-A OIL CLR FLOW LO (2-FS-70-147) returns to NORMAL. _____

Date _____

6.1.4 Safety Injection Pump Oil Cooler 2A-A Flow Alarm (continued)

[5] **TOGGLE** 2-FS-70-147 (W2BOP_070:2FS0700147) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 254-E ALARMS. _____

B. Unit 2 Event Display monitor indicates 254-E SIP 2A-A OIL CLR FLOW LO (2-FS-70-147) is in ALARM. _____

[7] **PLACE** 2-FS-70-147 (W2BOP_070:2FS0700147) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.5 Containment Spray Pump 2A-A Oil Cooler Flow Alarm

[1] **VERIFY** annunciator 256-D (0-XA-55-27D), CSP 2A-A OIL CLR FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-150 (W2BOP_070:2FS0700150) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-150 (W2BOP_070:2FS0700150) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 256-D CLEARS _____

B. Unit 2 Event Display monitor indicates 256-D CSP 2A-A OIL CLR FLOW LO (2-FS-70-150) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-150 (W2BOP_070:2FS0700150) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 256-D ALARMS. _____

B. Unit 2 Event Display monitor indicates 256-D CSP 2A-A OIL CLR FLOW LO (2-FS-70-150) is in ALARM. _____

[7] **PLACE** 2-FS-70-150 (W2BOP_070:2FS0700150) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.1.6 Centrifugal Charging Pump 2A-A Oil Cooler Flow Alarm

[1] **VERIFY** annunciator 254-D (0-XA-55-27D), CCP 2A-A GEAR & OIL CLR FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-146 (W2BOP_070:2FS0700146) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-146 (W2BOP_070:2FS0700146) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 254-D CLEARS. _____

B. Unit 2 Event Display monitor indicates 254-D CCP 2A-A GEAR & OIL CLR FLOW LO (2-FS-70-146) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-146 (W2BOP_070:2FS0700146) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 254-D ALARMS. _____

B. Unit 2 Event Display monitor indicates 254-D CCP 2A-A GEAR & OIL CLR FLOW LO (2-FS-70-146) is in ALARM. _____

[7] **PLACE** 2-FS-70-146 (W2BOP_070:2FS0700146) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.7 Misc Equipment Supply Header Flow Alarm

[1] **VERIFY** annunciator 254-A (0-XA-55-27D), MISC EQUIP SUPPLY HDR FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-164A (W2BOP_070:2FS0700164A) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-164A (W2BOP_070:2FS0700164A) to the OPEN position using a Foxboro I/A workstation. _____

Date _____

6.1.7 Misc Equipment Supply Header Flow Alarm (continued)

[4] **VERIFY** the following:

A. Annunciator 254-A CLEARS. _____

B. Unit 2 Event Display monitor indicates 254-A MISC EQUIP SUPPLY HDR FLOW LO (2-FS-70-164A) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-164A (W2BOP_070:2FS0700164A) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 254-A ALARMS. _____

B. Unit 2 Event Display monitor indicates 254-A MISC EQUIP SUPPLY HDR FLOW LO (2-FS-70-164A) is in ALARM. _____

[7] **PLACE** 2-FS-70-164A (W2BOP_070:2FS0700164A) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.8 Waste Gas Compressor B Heat Exchanger Flow Alarm

[1] **VERIFY** annunciator 257-A (0-XA-55-27D), WG COMPR B RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-21 (W2BOP_070:2FS0700021) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-21 (W2BOP_070:2FS0700021) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 257-A CLEARS. _____

B. Unit 2 Event Display monitor indicates 257-A WG COMPR B RET FLOW LO (2-FS-70-21) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-21 (W2BOP_070:2FS0700021) to the CLOSED position using a Foxboro I/A workstation. _____

Date _____

6.1.8 Waste Gas Compressor B Heat Exchanger Flow Alarm (continued)

[6] **VERIFY** the following:

A. Annunciator 257-A ALARMS. _____

B. Unit 2 Event Display monitor indicates 257-A WG COMPR B RET FLOW LO (2-FS-70-21) is in ALARM. _____

[7] **PLACE** 2-FS-70-21 (W2BOP_070:2FS0700021) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.9 Waste Gas Compressor B Heat Exchanger Temperature Alarm

[1] **VERIFY** annunciator 257-B (0-XA-55-27D), WG COMPR B RET TEMP HI, is CLEAR. _____

[2] **PLACE** 2-TS-70-007 (W2BOP_070:2TS0700007) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-TS-70-007 (W2BOP_070:2TS0700007) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 257-B ALARMS. _____

B. Unit 2 Event Display monitor indicates 257-B, WG COMPR B RET TEMP HI (2-TS-70-007) is in ALARM. _____

[5] **TOGGLE** 2-TS-70-007 (W2BOP_070:2TS0700007) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 257-B CLEARS. _____

B. Unit 2 Event Display monitor indicates 257-B, WG COMPR B RET TEMP HI (2-TS-70-007) returns to NORMAL. _____

[7] **PLACE** 2-TS-70-007 (W2BOP_070:2TS0700007) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.1.10 RCP Seal Water Heat Exchanger Flow Alarm

[1] **VERIFY** annunciator 259-A (0-XA-55-27D), RCP SEAL WTR HX RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-176 (W2BOP_070:2FS0700176) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-176 (W2BOP_070:2FS0700176) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 259-A CLEARS. _____

B. Unit 2 Event Display monitor indicates 259-A RCP SEAL WTR HX RET FLOW LO (2-FS-70-176) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-176 (W2BOP_070:2FS0700176) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 259-A ALARMS. _____

B. Unit 2 Event Display monitor indicates 259-A RCP SEAL WTR HX RET FLOW LO (2-FS-70-176) is in ALARM. _____

[7] **PLACE** 2-FS-70-176 (W2BOP_070:2FS0700176) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.11 RCP Seal Water Heat Exchanger Temperature Alarm

[1] **VERIFY** annunciator 259-B (0-XA-55-27D), RCP SEAL WTR HX RET TEMP HI, is CLEAR. _____

[2] **PLACE** 2-TS-70-175 (W2BOP_070:2TS0700175) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-TS-70-175 (W2BOP_070:2TS0700175) to the CLOSED position using a Foxboro I/A workstation. _____

Date _____

6.1.11 RCP Seal Water Heat Exchanger Temperature Alarm (continued)

[4] **VERIFY** the following:

A. Annunciator 259-B ALARMS. _____

B. Unit 2 Event Display monitor indicates 259-B RCP SEAL WTR HX RET TEMP HI (2-TS-70-175) is in ALARM. _____

[5] **TOGGLE** 2-TS-70-175 (W2BOP_070:2TS0700175) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 259-B CLEARS. _____

B. Unit 2 Event Display monitor indicates 259-B RCP SEAL WTR HX RET TEMP HI (2-TS-70-175) returns to NORMAL. _____

[7] **PLACE** 2-TS-70-175 (W2BOP_070:2TS0700175) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.12 Letdown Heat Exchanger Flow Alarm

[1] **VERIFY** annunciator 260-A (0-XA-55-27D), LTDN HX RET FLOW LO, is in ALARM. _____

[2] **MOMENTARILY LIFT** wire M689 from terminal block TB-C-133 terminal point 9 inside panel 2-R-126. _____ 1st _____ CV

[3] **VERIFY** the following:

A. Annunciator 260-A CLEARS. _____

B. Unit 2 Event Display monitor indicates 260-A LTDN HX RET FLOW LO (2-FS-70-190) returns to NORMAL. _____

[4] **TERMINATE** wire M689 to terminal block TB-C-133 terminal point 9 inside panel 2-R-126. _____ 1st _____ CV

Date _____

6.1.12 Letdown Heat Exchanger Flow Alarm (continued)

[5] **VERIFY** the following:

A. Annunciator 260-A ALARMS. _____

B. Unit 2 Event Display monitor indicates 260-A LTDN HX RET FLOW LO (2-FS-70-190) is in ALARM. _____

6.1.13 Letdown Heat Exchanger Temperature Alarm

[1] **VERIFY** annunciator 260-B (0-XA-55-27D), LTDN HX RET TEMP HI, is CLEAR. _____

[2] **PLACE** 2-TS-70-191 (W2BOP_070:2TS0700191) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-TS-70-191 (W2BOP_070:2TS0700191) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 260-B ALARMS. _____

B. Unit 2 Event Display monitor indicates 260-B LTDN HX RET TEMP HI (2-TS-70-191) is in ALARM. _____

[5] **TOGGLE** 2-TS-70-191 (W2BOP_070:2TS0700191) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 260-B CLEARS. _____

B. Unit 2 Event Display monitor indicates 260-B LTDN HX RET TEMP HI (2-TS-70-191) returns to NORMAL. _____

[7] **PLACE** 2-TS-70-191 (W2BOP_070:2TS0700191) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.14 Sample Heat Exchangers Flow Alarm

[1] **VERIFY** annunciator 255-A (0-XA-55-27D), SAMPLE HXS RET HDR FLOW LO, is in ALARM. _____

Date _____

6.1.14 Sample Heat Exchangers Flow Alarm (continued)

[2] **PLACE** 2-FS-70-181 (W2BOP_070:2FS0700181) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-181 (W2BOP_070:2FS0700181) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 255-A CLEARS. _____

B. Unit 2 Event Display monitor indicates 255-A SAMPLE HXS RET HDR FLOW LO (2-FS-70-181) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-181 (W2BOP_070:2FS0700181) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 255-A ALARMS. _____

B. Unit 2 Event Display monitor indicates 255-A SAMPLE HXS RET HDR FLOW LO (2-FS-70-181) is in ALARM. _____

[7] **PLACE** 2-FS-70-181 (W2BOP_070:2FS0700181) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.15 Sample Heat Exchangers Temperature Alarm

[1] **VERIFY** annunciator 255-B (0-XA-55-27D), SAMPLE HXS RET HDR TEMP HI, is CLEAR. _____

[2] **PLACE** 2-TS-70-182 (W2BOP_070:2TS0700182) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-TS-70-182 (W2BOP_070:2TS0700182) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 255-B ALARMS. _____

B. Unit 2 Event Display monitor indicates 255-B SAMPLE HXS RET HDR TEMP HI (2-TS-70-182) is in ALARM. _____

Date _____

6.1.15 Sample Heat Exchangers Temperature Alarm (continued)

[5] **TOGGLE** 2-TS-70-182 (W2BOP_070:2TS0700182) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 255-B CLEARS. _____

B. Unit 2 Event Display monitor indicates 255-B SAMPLE HXS RET HDR TEMP HI (2-TS-70-182) returns to NORMAL. _____

[7] **PLACE** 2-TS-70-182 (W2BOP_070:2TS0700182) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.16 Reactor Building Supply Header Flow Alarm

[1] **VERIFY** annunciator 264-E (0-XA-55-27D), RX BLDG SUPPLY HDR FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-142 (W2BOP_070:2FS0700142) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-142 (W2BOP_070:2FS0700142) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 264-E CLEARS. _____

B. Unit 2 Event Display monitor indicates 264-E RX BLDG SUPPLY FLOW LO (2-FS-70-142) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-142 (W2BOP_070:2FS0700142) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 264-E ALARMS. _____

B. Unit 2 Event Display monitor indicates 264-E RX BLDG SUPPLY FLOW LO (2-FS-70-142) is in ALARM. _____

[7] **PLACE** 2-FS-70-142 (W2BOP_070:2FS0700142) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.1.17 Excess Letdown Heat Exchanger Flow Alarm

[1] **VERIFY** annunciator 263-D (0-XA-55-27D), EXC LTDN HX & GFFD RET FLOW LO, is CLEAR _____

[2] **OPEN** 2-FCV-70-143, EXCESS LTDN HTX CONT INLET ISOL VLV using 2-HS-70-143A on 0-M-27B. _____

[3] **VERIFY** annunciator 263-D (0-XA-55-27D), EXC LTDN HX & GFFD RET FLOW LO, is in ALARM. _____

[4] **PLACE** 2-FS-70-84 (W2BOP_070:2FS0700084) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[5] **TOGGLE** 2-FS-70-84 (W2BOP_070:2FS0700084) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 263-D CLEARS. _____

B. Unit 2 Event Display monitor indicates 263-D EXC LTDN HX & GFFD RET FLOW LO (2-FS-70-84) returns to NORMAL. _____

[7] **TOGGLE** 2-FS-70-84 (W2BOP_070:2FS0700084) to the CLOSED position using a Foxboro I/A workstation. _____

[8] **VERIFY** the following:

A. Annunciator 263-D ALARMS. _____

B. Unit 2 Event Display monitor indicates 263-D EXC LTDN HX & GFFD RET FLOW LO (2-FS-70-84) is in ALARM. _____

[9] **PLACE** 2-FS-70-84 (W2BOP_070:2FS0700084) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

[10] **CLOSE** 2-FCV-70-143, RHR HTX 2A-A OUTLET VLV using 2-HS-70-143A on 0-M-27B. _____

[11] **VERIFY** annunciator 263-D (0-XA-55-27D), EXC LTDN HX & GFFD RET FLOW LO, CLEARS _____

Date _____

6.1.18 Excess Letdown Heat Exchanger Temperature Alarm

[1] **VERIFY** annunciator 263-E (0-XA-55-27D), EXC LTDN HX & GFFD RET TEMP HI, is CLEAR. _____

[2] **PLACE** 2-TS-70-86 (W2BOP_070:2TS0700086) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-TS-70-86 (W2BOP_070:2TS0700086) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 263-E ALARMS. _____

B. Unit 2 Event Display monitor indicates 263-E EXC LTDN HX & GFFD RET TEMP HI (2-TS-70-86) is in ALARM. _____

[5] **TOGGLE** 2-TS-70-86 (W2BOP_070:2TS0700086) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 263-E CLEARS. _____

B. Unit 2 Event Display monitor indicates 263-E EXC LTDN HX & GFFD RET TEMP HI (2-TS-70-86) returns to NORMAL. _____

[7] **PLACE** 2-TS-70-86 (W2BOP_070:2TS0700086) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.19 RCP 1 Oil Cooler Flow Alarm

[1] **VERIFY** annunciator 261-C (0-XA-55-27D), RCP 1 OIL CLRS RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-119 (W2BOP_070:2FS0700119) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-119 (W2BOP_070:2FS0700119) to the OPEN position using a Foxboro I/A workstation. _____

Date _____

6.1.19 RCP 1 Oil Cooler Flow Alarm (continued)

[4] **VERIFY** the following:

A. Annunciator 261-C CLEARS (remains LIT). _____

B. Unit 2 Event Display monitor indicates 261-C RCP 1 LWR OIL COOLER RET FLOW LO (2-FS-70-119) returns to NORMAL. _____

[5] **PLACE** 2-FS-70-116 (W2BOP_070:2FS0700116) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[6] **TOGGLE** 2-FS-70-116 (W2BOP_070:2FS0700116) to the OPEN position using a Foxboro I/A workstation. _____

[7] **VERIFY** the following:

A. Annunciator 261-C CLEARS. _____

B. Unit 2 Event Display monitor indicates 261-C RCP 1 UPR OIL COOLER RET FLOW LO (2-FS-70-116) returns to NORMAL. _____

[8] **TOGGLE** 2-FS-70-116 (W2BOP_070:2FS0700116) to the CLOSED position using a Foxboro I/A workstation. _____

[9] **VERIFY** the following:

A. Annunciator 261-C ALARMS. _____

B. Unit 2 Event Display monitor indicates 261-C RCP 1 UPR OIL COOLER RET FLOW LO (2-FS-70-116) is in ALARM. _____

[10] **TOGGLE** 2-FS-70-119 (W2BOP_070:2FS0700119) to the CLOSED position using a Foxboro I/A workstation. _____

[11] **VERIFY** the following:

A. Annunciator 261-C ALARMS (reflash). _____

B. Unit 2 Event Display monitor indicates 261-C RCP 1 LWR OIL COOLER RET FLOW LO (2-FS-70-119) is in ALARM. _____

[12] **PLACE** 2-FS-70-119 (W2BOP_070:2TS0700119) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.1.19 RCP 1 Oil Cooler Flow Alarm (continued)

[13] **PLACE** 2-FS-70-116 (W2BOP_070:2TS0700116) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.20 RCP 2 Oil Cooler Flow Alarm

[1] **VERIFY** annunciator 262-C (0-XA-55-27D), RCP 2 OIL CLRS RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-108 (W2BOP_070:2FS0700108) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-108 (W2BOP_070:2FS0700108) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 262-C CLEARS (remains LIT). _____

B. Unit 2 Event Display monitor indicates 262-C RCP 2 LWR OIL COOLER RET FLOW LO (2-FS-70-108) returns to NORMAL. _____

[5] **PLACE** 2-FS-70-106 (W2BOP_070:2FS0700106) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[6] **TOGGLE** 2-FS-70-106 (W2BOP_070:2FS0700106) to the OPEN position using a Foxboro I/A workstation. _____

[7] **VERIFY** the following:

A. Annunciator 262-C CLEARS. _____

B. Unit 2 Event Display monitor indicates 262-C RCP 2 UPR OIL COOLER RET FLOW LO (2-FS-70-106) returns to NORMAL. _____

[8] **TOGGLE** 2-FS-70-106 (W2BOP_070:2FS0700106) to the CLOSED position using a Foxboro I/A workstation. _____

[9] **VERIFY** the following:

A. Annunciator 262-C ALARMS. _____

B. Unit 2 Event Display monitor indicates 262-C RCP 2 UPR OIL COOLER RET FLOW LO (2-FS-70-106) is in ALARM. _____

Date _____

6.1.20 RCP 2 Oil Cooler Flow Alarm (continued)

[10] **TOGGLE** 2-FS-70-108 (W2BOP_070:2FS0700108) to the CLOSED position using a Foxboro I/A workstation. _____

[11] **VERIFY** the following:

A. Annunciator 262-C ALARMS (reflash). _____

B. Unit 2 Event Display monitor indicates 262-C RCP 2 LWR OIL COOLER RET FLOW LO (2-FS-70-108) is in ALARM. _____

[12] **PLACE** 2-FS-70-108 (W2BOP_070:2TS0700108) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

[13] **PLACE** 2-FS-70-106 (W2BOP_070:2TS0700106) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.21 RCP 3 Oil Cooler Flow Alarm

[1] **VERIFY** annunciator 263-C (0-XA-55-27D), RCP 3 OIL CLRS RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-98 (W2BOP_070:2FS0700098) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-98 (W2BOP_070:2FS0700098) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 263-C CLEARS (remains LIT). _____

B. Unit 2 Event Display monitor indicates 263-C RCP 3 LWR OIL COOLER RET FLOW LO (2-FS-70-98) returns to NORMAL. _____

[5] **PLACE** 2-FS-70-96 (W2BOP_070:2FS0700096) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[6] **TOGGLE** 2-FS-70-96 (W2BOP_070:2FS0700096) to the OPEN position using a Foxboro I/A workstation. _____

Date _____

6.1.21 RCP 3 Oil Cooler Flow Alarm (continued)

[7] **VERIFY** the following:

A. Annunciator 263-C CLEARS. _____

B. Unit 2 Event Display monitor indicates RCP 3 UPR OIL COOLER RET FLOW LO (2-FS-70-96) returns to NORMAL. _____

[8] **TOGGLE** 2-FS-70-96 (W2BOP_070:2FS0700096) to the CLOSED position using a Foxboro I/A workstation. _____

[9] **VERIFY** the following:

A. Annunciator 263-C ALARMS. _____

B. Unit 2 Event Display monitor indicates RCP 3 UPR OIL COOLER RET FLOW LO (2-FS-70-96) is in ALARM. _____

[10] **TOGGLE** 2-FS-70-98 (W2BOP_070:2FS0700098) to the CLOSED position using a Foxboro I/A workstation. _____

[11] **VERIFY** the following:

A. Annunciator 263-C ALARMS (reflash). _____

B. Unit 2 Event Display monitor indicates 263-C RCP 3 LWR OIL COOLER RET FLOW LO (2-FS-70-98) is in ALARM. _____

[12] **PLACE** 2-FS-70-98 (W2BOP_070:2TS0700098) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

[13] **PLACE** 2-FS-70-96 (W2BOP_070:2TS0700096) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.22 RCP 4 Oil Cooler Flow Alarm

[1] **VERIFY** annunciator 264-C (0-XA-55-27D), RCP 4 OIL CLRS RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-128 (W2BOP_070:2FS0700128) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-128 (W2BOP_070:2FS0700128) to the OPEN position using a Foxboro I/A workstation. _____

Date _____

6.1.22 RCP 4 Oil Cooler Flow Alarm (continued)

[4] **VERIFY** the following:

A. Annunciator 264-C CLEARS (remains LIT). _____

B. Unit 2 Event Display monitor indicates 264-C RCP 4 LWR OIL COOLER RET FLOW LO (2-FS-70-128) returns to NORMAL. _____

[5] **PLACE** 2-FS-70-125 (W2BOP_070:2FS0700125) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[6] **TOGGLE** 2-FS-70-125 (W2BOP_070:2FS0700125) to the OPEN position using a Foxboro I/A workstation. _____

[7] **VERIFY** the following:

A. Annunciator 264-C CLEARS. _____

B. Unit 2 Event Display monitor indicates 264-C RCP 4 UPR OIL COOLER RET FLOW LO (2-FS-70-125) returns to NORMAL. _____

[8] **TOGGLE** 2-FS-70-125 (W2BOP_070:2FS0700125) to the CLOSED position using a Foxboro I/A workstation. _____

[9] **VERIFY** the following:

A. Annunciator 264-C ALARMS. _____

B. Unit 2 Event Display monitor indicates 264-C RCP 4 UPR OIL COOLER RET FLOW LO (2-FS-70-125) is in ALARM. _____

[10] **TOGGLE** 2-FS-70-128 (W2BOP_070:2FS0700128) to the CLOSED position using a Foxboro I/A workstation. _____

[11] **VERIFY** the following:

A. Annunciator 264-C ALARMS (reflash). _____

B. Unit 2 Event Display monitor indicates 264-C RCP 4 LWR OIL COOLER RET FLOW LO (2-FS-70-128) is in ALARM. _____

[12] **PLACE** 2-FS-70-128 (W2BOP_070:2TS0700128) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.1.22 RCP 4 Oil Cooler Flow Alarm (continued)

[13] **PLACE** 2-FS-70-125 (W2BOP_070:2TS0700125) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.23 RCP Oil Cooler Return Header Temperature Alarm

[1] **VERIFY** annunciator 262-D (0-XA-55-27D), RCP OIL CLRS RET HDR TEMP HI, is CLEAR. _____

[2] **PLACE** 2-TS-70-91 (W2BOP_070:2TS0700091) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-TS-70-91 (W2BOP_070:2TS0700091) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 262-D ALARMS. _____

B. Unit 2 Event Display monitor indicates 262-D RCP OIL CLRS RET HDR TEMP HI (2-TS-70-91) is in ALARM. _____

[5] **TOGGLE** 2-TS-70-91 (W2BOP_070:2TS0700091) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 262-D CLEARS. _____

B. Unit 2 Event Display monitor indicates 262-D RCP OIL CLRS RET HDR TEMP HI (2-TS-70-91) returns to NORMAL. _____

[7] **PLACE** 2-TS-70-91 (W2BOP_070:2TS0700091) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.24 RCP 1 Thermal Barrier Flow Alarm

[1] **VERIFY** annunciator 261-B (0-XA-55-27D), RCP 1 THERM BAR RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-115 (W2BOP_070:2FS0700115) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.1.24 RCP 1 Thermal Barrier Flow Alarm (continued)

[3] **TOGGLE** 2-FS-70-115 (W2BOP_070:2FS0700115) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 261-B CLEARS. _____

B. Unit 2 Event Display monitor indicates 261-B RCP 1 THRM BAR RET FLOW LO (2-FS-70-115) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-115 (W2BOP_070:2FS0700115) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 261-B ALARMS. _____

B. Unit 2 Event Display monitor indicates 261-B RCP 1 THRM BAR RET FLOW LO (2-FS-70-115) is in ALARM. _____

[7] **PLACE** 2-FS-70-115 (W2BOP_070:2FS0700115) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.25 RCP 1 Thermal Barrier Differential Pressure Alarm

[1] **VERIFY** annunciator 261-A (0-XA-55-27D), RCP 1 THRM BAR ΔP HI, is CLEAR. _____

[2] **PLACE** 2-PdS-70-117 (W2BOP_070:2PDS0700117) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-PdS-70-117 (W2BOP_070:2PDS0700117) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 261-A ALARMS. _____

B. Unit 2 Event Display monitor indicates 261-A RCP 1 THRM BAR DP HI (2-PdS-70-117) is in ALARM. _____

[5] **TOGGLE** 2-PdS-70-117 (W2BOP_070:2PDS0700117) to the OPEN position using a Foxboro I/A workstation. _____

Date _____

6.1.25 RCP 1 Thermal Barrier Differential Pressure Alarm (continued)

[6] **VERIFY** the following:

A. Annunciator 261-A CLEARS. _____

B. Unit 2 Event Display monitor indicates 261-A RCP 1 THRM BAR DP HI (2-PdS-70-117) returns to NORMAL. _____

[7] **PLACE** 2-PdS-70-117 (W2BOP_070:2PDS0700117) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.26 RCP 2 Thermal Barrier Flow Alarm

[1] **VERIFY** annunciator 262-B (0-XA-55-27D), RCP 2 THERM BAR RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-105 (W2BOP_070:2FS0700105) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-105 (W2BOP_070:2FS0700105) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 262-B CLEARS. _____

B. Unit 2 Event Display monitor indicates 262-B RCP 2 THRM BAR RET FLOW LO (2-FS-70-105) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-105 (W2BOP_070:2FS0700105) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 262-B ALARMS. _____

B. Unit 2 Event Display monitor indicates 262-B RCP 2 THRM BAR RET FLOW LO (2-FS-70-105) is in ALARM. _____

[7] **PLACE** 2-FS-70-105 (W2BOP_070:2FS0700105) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.1.27 RCP 2 Thermal Barrier Differential Pressure Alarm

[1] **VERIFY** annunciator 262-A (0-XA-55-27D), RCP 2 THRM BAR ΔP HI, is CLEAR. _____

[2] **PLACE** 2-PdS-70-104 (W2BOP_070:2PDS0700104) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-PdS-70-104 (W2BOP_070:2PDS0700104) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 262-A ALARMS. _____

B. Unit 2 Event Display monitor indicates 262-A RCP 2 THRM BAR DP HI (2-PdS-70-104) is in ALARM. _____

[5] **TOGGLE** 2-PdS-70-104 (W2BOP_070:2PDS0700104) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 262-A CLEARS. _____

B. Unit 2 Event Display monitor indicates 262-A RCP 2 THRM BAR DP HI (2-PdS-70-104) returns to NORMAL. _____

[7] **PLACE** 2-PdS-70-104 (W2BOP_070:2PDS0700104) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.28 RCP 3 Thermal Barrier Flow Alarm

[1] **VERIFY** annunciator 263-B (0-XA-55-27D), RCP 3 THERM BAR RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-95 (W2BOP_070:2FS0700095) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-95 (W2BOP_070:2FS0700095) to the OPEN position using a Foxboro I/A workstation. _____

Date _____

6.1.28 RCP 3 Thermal Barrier Flow Alarm (continued)

[4] **VERIFY** the following:

A. Annunciator 263-B CLEARS. _____

B. Unit 2 Event Display monitor indicates 263-B RCP 3 THRM BAR RET FLOW LO (2-FS-70-95) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-95 (W2BOP_070:2FS0700095) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 263-B ALARMS. _____

B. Unit 2 Event Display monitor indicates 263-B RCP 3 THRM BAR RET FLOW LO (2-FS-70-95) is in ALARM. _____

[7] **PLACE** 2-FS-70-95 (W2BOP_070:2FS0700095) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.29 RCP 3 Thermal Barrier Differential Pressure Alarm

[1] **VERIFY** annunciator 263-A (0-XA-55-27D), RCP 3 THRM BAR ΔP HI, is CLEAR. _____

[2] **PLACE** 2-PdS-70-94 (W2BOP_070:2PDS0700094) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-PdS-70-94 (W2BOP_070:2PDS0700094) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 263-A ALARMS. _____

B. Unit 2 Event Display monitor indicates 263-A RCP 3 THRM BAR DP HI (2-PdS-70-94) is in ALARM. _____

[5] **TOGGLE** 2-PdS-70-94 (W2BOP_070:2PDS0700094) to the OPEN position using a Foxboro I/A workstation. _____

Date _____

6.1.29 RCP 3 Thermal Barrier Differential Pressure Alarm (continued)

[6] **VERIFY** the following:

A. Annunciator 263-A CLEARS. _____

B. Unit 2 Event Display monitor indicates 263-A RCP 3 THRM BAR DP HI (2-PdS-70-94) returns to NORMAL. _____

[7] **PLACE** 2-PdS-70-94 (W2BOP_070:2PDS0700094) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.30 RCP 4 Thermal Barrier Flow Alarm

[1] **VERIFY** annunciator 264-B (0-XA-55-27D), RCP 4 THERM BAR RET FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-124 (W2BOP_070:2FS0700124) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-124 (W2BOP_070:2FS0700124) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 264-B CLEARS. _____

B. Unit 2 Event Display monitor indicates 264-B RCP 4 THRM BAR RET FLOW LO (2-FS-70-124) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-124 (W2BOP_070:2FS0700124) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 264-B ALARMS. _____

B. Unit 2 Event Display monitor indicates 264-B RCP 4 THRM BAR RET FLOW LO (2-FS-70-124) is in ALARM. _____

[7] **PLACE** 2-FS-70-124 (W2BOP_070:2FS0700124) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.1.31 RCP 4 Differential Pressure Alarm

[1] **VERIFY** annunciator 264-A (0-XA-55-27D), RCP 4 THRM BAR ΔP HI, is CLEAR. _____

[2] **PLACE** 2-PdS-70-126 (W2BOP_070:2PDS0700126) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-PdS-70-126 (W2BOP_070:2PDS0700126) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 264-A ALARMS. _____

B. Unit 2 Event Display monitor indicates 264-A RCP 4 THRM BAR DP HI (2-PdS-70-126) is in ALARM. _____

[5] **TOGGLE** 2-PdS-70-126 (W2BOP_070:2PDS0700126) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 264-A CLEARS. _____

B. Unit 2 Event Display monitor indicates 264-A RCP 4 THRM BAR DP HI (2-PdS-70-126) returns to NORMAL. _____

[7] **PLACE** 2-PdS-70-126 (W2BOP_070:2PDS0700126) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.1.32 RCP Thermal Barrier Return Header Flow Alarm

[1] **VERIFY** annunciator 261-E (0-XA-55-27D), RCP THRM BAR RET HDR FLOW LO, is in ALARM. _____

[2] **MOMENTARILY LIFT** wire M698 from terminal block TB-4 terminal point 21 inside 2-R129. _____ 1st _____ CV

[3] **VERIFY** the following:

A. Annunciator 261-E CLEARS. _____

B. Unit 2 Event Display monitor indicates 261-E RCP THRM BAR RET HDR FLOW LO (2-FS-70-81A) returns to NORMAL. _____

[4] **TERMINATE** wire M698 to terminal block TB-4 terminal point 21 inside 2-R-129. _____ 1st _____ CV

[5] **VERIFY** the following:

A. Annunciator 261-E ALARMS. _____

B. Unit 2 Event Display monitor indicates 261-E RCP THRM BAR RET HDR FLOW LO (2-FS-70-81A) is in ALARM. _____

6.1.33 RCP Thermal Barrier Return Header Temperature Alarm

[1] **VERIFY** annunciator 261-D (0-XA-55-27D), RCP THRM BAR RET HDR TEMP HI, is CLEAR. _____

[2] **PLACE** 2-TS-70-88 (W2BOP_070:2TS0700088) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-TS-70-88 (W2BOP_070:2TS0700088) to the CLOSED position using a Foxboro I/A workstation. _____

Date _____

6.1.33 RCP Thermal Barrier Return Header Temperature Alarm (continued)

[4] **VERIFY** the following:

A. Annunciator 261-D ALARMS. _____

B. Unit 2 Event Display monitor indicates 261-D RCP THRM BAR RET HDR TEMP HI (2-TS-70-88) is in ALARM. _____

[5] **TOGGLE** 2-TS-70-88 (W2BOP_070:2TS0700088) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 261-D CLEARS. _____

B. Unit 2 Event Display monitor indicates 261-D RCP THRM BAR RET HDR TEMP HI (2-TS-70-88) returns to NORMAL. _____

[7] **PLACE** 2-TS-70-88 (W2BOP_070:2TS0700088) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.2 RCP Thermal Barrier Booster Pumps Performance Test

NOTE

Vibration data will be taken by representatives from the Predictive Maintenance Engineering Group per TI-31.14 at each level of flow. A copy of the data obtained will become an attachment to this procedure as part of the data package.

6.2.1 Thermal Barrier Booster Pump 2A (2-PMP-70-131-A) Performance Test

[1] **ENSURE** prerequisites in Subsection 4.0 have been completed. _____

[2] **ENSURE** an initial flowpath for Train A is established per Attachment 1, Valve Checklist. _____

[3] **PLACE** the Thermal Barrier Booster Pump handswithes in STOP PULL TO LOCK: on 0-M-27B.

[3.1] 2-HS-70-131A, THRM BAR BSTR PUMP 2A _____

[3.2] 2-HS-70-130A, THRM BAR BSTR PUMP 2B _____

[4] **ENSURE** each of the following throttle valves is OPEN:

[4.1] 2-THV-70-684A, RCP 1 THERMAL BARRIER CCS RETURN THROTTLE, _____

[4.2] 2-THV-70-684B, RCP 2 THERMAL BARRIER CCS RETURN THROTTLE, _____

[4.3] 2-THV-70-684C, RCP 3 THERMAL BARRIER CCS RETURN THROTTLE, _____

[4.4] 2-THV-70-684D, RCP 4 THERMAL BARRIER CCS RETURN THROTTLE. _____

[5] **ENSURE** 2-ISV-70-677B, CCS THERM BAR BSTR PUMP 2B DISCH ISOLATION, is CLOSED. _____

[6] **OPEN** 2-FCV-70-156, RHR Heat Exchanger 2A CCS OUTLET using 2-HS-70-156A on 0-M-27B. _____

Date _____

6.2.1 Thermal Barrier Booster Pump 2A (2-PMP-70-131-A) Performance Test (continued)

[7] **OPEN** 2-FCV-70-4, MISCELLANEOUS EQUIPMENT CCS SUPPLY HEADER using 2-HS-70-4 on 0-M-27B. _____

CAUTION

Upon startup of any CCS pump, flow should be adjusted above the recommended minimum flow of 900 gpm.

[8] **START** one of the following CCS Pump in accordance with 2-SOI-70.01, from its applicable handswitch located on 0-M-27B, and CIRCLE the pump started:

2-HS-70-59A, CCS Pump 2A-A

2-HS-70-33A, CCS Pump 2B-B. _____

[9] **THROTTLE** 2-THV-70-546A, RHR HEAT EXCHANGER 2A-A CCS THROTTLE to obtain a minimum of 5000 gpm CCS flow on 2-FI-70-158, 0-M-27B. _____

[10] **OPEN** to mid-position 2-ISV-70-677A, CCS THERM BAR BSTR PUMP 2A-A DISCH ISOLATION. _____

[11] **START** THERMAL BARRIER BOOSTER PUMP 2A-A from handswitch 2-HS-70-131A on 0-M-27B. _____

[12] **ADJUST** 2-ISV-70-677A, CCS THERM BAR BSTR PUMP 2A-A DISCH ISOLATION, until 140 (+/- 2) gpm is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[13] **ENSURE** vibration readings for Thermal Barrier Booster Pump 2A-A are obtained by Predictive Maintenance after approximately a 15 minute run period. _____

[14] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2A-A on Data Sheet 1 from M&TE installed at the following instruments:

A. 2-PI-70-136, 2-L-24

B. 2-PI-70-137, 2-L-24

C. 2-FIS-70-81, 2-L-290. _____

Date _____

6.2.1 Thermal Barrier Booster Pump 2A (2-PMP-70-131-A) Performance Test (continued)

[15] **ADJUST** 2-ISV-70-677A, CCS THERM BAR BSTR PUMP 2A-A DISCH ISOLATION, until 150 gpm (+/-2) is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[16] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2A-A on Data Sheet 1 from M&TE installed at the following instruments:

A. 2-PI-70-136, 2-L-24

B. 2-PI-70-137, 2-L-24

C. 2-FIS-70-81, 2-L-290. _____

[17] **ADJUST** 2-ISV-70-677A, CCS THERM BAR BSTR PUMP 2A-A DISCH ISOLATION, until 160 (+/-2) gpm is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[18] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2A-A on Data Sheet 1 from M&TE installed at the following instruments:

A. 2-PI-70-136, 2-L-24

B. 2-PI-70-137, 2-L-24

C. 2-FIS-70-81, 2-L-290. _____

[19] **ADJUST** 2-ISV-70-677A, CCS THERM BAR BSTR PUMP 2A-A DISCH ISOLATION, until 170 (+/-2) gpm is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[20] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2A-A on Data Sheet 1 from M&TE installed at the following instruments:

A. 2-PI-70-136, 2-L-24

B. 2-PI-70-137, 2-L-24

Date _____

6.2.1 Thermal Barrier Booster Pump 2A (2-PMP-70-131-A) Performance Test (continued)

C. 2-FIS-70-81, 2-L-290. _____

[21] **ADJUST** 2-ISV-70-677A, CCS THERM BAR BSTR PUMP 2A-A DISCH ISOLATION, until 180 (+/-2) gpm is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[22] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2A-A on Data Sheet 1 from M&TE installed at the following instruments:

A. 2-PI-70-136, 2-L-24

B. 2-PI-70-137, 2-L-24

C. 2-FIS-70-81, 2-L-290. _____

[23] **STOP** THERMAL BARRIER BOOSTER PUMP 2A-A **AND**

PLACE handswitch 2-HS-70-131A on 0-M-27B in STOP PULL TO LOCK. _____

[24] **CLOSE** 2-ISV-70-677A, CCS THERM BAR BSTR PUMP 2A-A DISCH ISOLATION. _____

[25] **CALCULATE** and **RECORD** TDH for the flow rates obtained above on Data Sheet 1. _____

[26] **PLOT** the flow versus TDH points for THERMAL BARRIER BOOSTER PUMP 2A-A in Data Sheet 2, TBBP 2A-A pump curve. _____

[27] **VERIFY** the hydraulic performance for the THERMAL BARRIER BOOSTER PUMP 2A-A plotted in Data Sheet 2 is greater than or equal to 130 feet TDH at a flow rate of 160 gpm **[Acc Crit]**. _____

_____

IV

Date _____

6.2.2 Thermal Barrier Booster Pump 2B (2-PMP-70-130-B) Performance Test

[1] **ENSURE** CCS Pump started in Step 6.2.1 [8] is in service. _____

[2] **ENSURE** 2-ISV-70-677A, CCS THERM BAR BSTR PUMP 2A DISCH ISOLATION, is CLOSED. _____

[3] **OPEN** to mid-position 2-ISV-70-677B, CCS THERM BAR BSTR PUMP 2B-B DISCH ISOLATION. _____

[4] **START** THERMAL BARRIER BOOSTER PUMP 2B-B from its remote handswitch 2-HS-70-130A on 0-M-27B. _____

[5] **ADJUST** 2-ISV-70-677B, CCS THERM BAR BSTR PUMP 2B-B DISCH ISOLATION, until 140 (+/-2) gpm is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[6] **ENSURE** vibration readings for THERMAL BARRIER BOOSTER PUMP 2B-B are obtained by Predictive Maintenance after approximately a 15 minute run period. _____

[7] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2B-B on Data Sheet 3 from M&TE installed at the following instruments:

A. 2-PI-70-135, 2-L-24

B. 2-PI-70-138, 2-L-24

C. 2-FIS-70-81, 2-L-290. _____

[8] **ADJUST** 2-ISV-70-677B, CCS THERM BAR BSTR PUMP 2B-B DISCH ISOLATION, until 150 (+/-2) gpm is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[9] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2B-B on Data Sheet 3 from M&TE installed at the following instruments:

A. 2-PI-70-135, 2-L-24

B. 2-PI-70-138, 2-L-24

C. 2-FIS-70-81, 2-L-290. _____

Date _____

6.2.2 Thermal Barrier Booster Pump 2B (2-PMP-70-130-B) Performance Test (continued)

[10] **ADJUST** 2-ISV-70-677B, CCS THERM BAR BSTR PUMP 2B-B DISCH ISOLATION, until 160 (+/-2) gpm is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[11] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2B-B on Data Sheet 3 from M&TE installed at the following instruments:

A. 2-PI-70-135, 2-L-24

B. 2-PI-70-138, 2-L-24

C. 2-FIS-70-81, 2-L-290. _____

[12] **ADJUST** 2-ISV-70-677B, CCS THERM BAR BSTR PUMP 2B-B DISCH ISOLATION, until 170 (+/-2) gpm is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[13] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2B-B on Data Sheet 3 from M&TE installed at the following instruments:

A. 2-PI-70-135, 2-L-24

B. 2-PI-70-138, 2-L-24

C. 2-FIS-70-81, 2-L-290. _____

[14] **ADJUST** 2-ISV-70-677B, CCS THERM BAR BSTR PUMP 2B-B DISCH ISOLATION, until 180 (+/-2) gpm is obtained on flow indicator 2-FIS-70-81, 2-L-290. _____

[15] **RECORD** data for THERMAL BARRIER BOOSTER PUMP 2B-B on Data Sheet 3 from M&TE installed at the following instruments:

A. 2-PI-70-135, 2-L-24

B. 2-PI-70-138, 2-L-24

C. 2-FIS-70-81, 2-L-290. _____

Date _____

6.2.2 Thermal Barrier Booster Pump 2B (2-PMP-70-130-B) Performance Test (continued)

[16] **STOP** THERMAL BARRIER BOOSTER PUMP 2B-B **AND**

PLACE handswitch 2-HS-70-130A on 0-M-27B in STOP PULL TO LOCK. _____

[17] **CLOSE** 2-ISV-70-677B, CCS THERM BAR BSTR PUMP 2B-B DISCH ISOLATION. _____

[18] **STOP** the CCS PUMP in service at 0-M-27B. _____

[19] **CALCULATE** and **RECORD** TDH for the flow rates obtained above on Data Sheet 3. _____

[20] **PLOT** the flow versus TDH points for THERMAL BARRIER BOOSTER PUMP 2B-B on Data Sheet 4, TBBP 2B-B pump curve. _____

[21] **VERIFY** the hydraulic performance for the THERMAL BARRIER BOOSTER PUMP 2B-B plotted on Data Sheet 4 is greater than or equal to 130 feet TDH at a flow rate of 160 gpm **[Acc Crit]**. _____

_____
IV

Date _____

6.3 Component Cooling System Train 2A Flow Balance

NOTES

1) Any required valve manipulations not specifically addressed in this procedure may be performed with concurrence by the Test Director and the Unit 2 US/SRO and entered in the Chronological Test Log.
2) System piping and components will be visually monitored during transients and steady state modes. Further evaluation of piping vibration may be performed to confirm if piping vibration is excessive. If excessive vibration is observed, then a TDN shall be initiated for engineering to evaluate.

6.3.1 CCS Train 2A Flow Balance Under Simulated LOCA-Recirculation Condition

NOTE

This test is to be performed using one pump operation, preferably CCS pump 2A-A. CCS pump 2B-B may be used if previous pump tests show it does not perform better than 2A-A.

[1] **ENSURE** prerequisites in Subsection 4.0 have been completed. _____

[2] **ENSURE** an initial flowpath for Train A is established per Attachment 1, Valve Checklist. _____

[3] **VERIFY** 0-FCV-70-194, SFP HEAT EXCHANGER B CCS SUPPLY is CLOSED at 0-HS-70-194A on 0-M-27B. _____

[4] **ENSURE** 2-TCV-70-192, LETDOWN HX CCS OUT TEMP CNTL, is full OPEN as shown by the stem position indicator. _____

[5] **ENSURE** 2-FCV-70-4, MISCELLANEOUS EQUIPMENT CCS SUPPLY HEADER, is OPEN at 2-HS-70-4 on 0-M-27B. _____

[6] **ENSURE** 2-FCV-70-156-A, RHR HTX 2A-A OUTLET VLV is OPEN at 2-HS-70-156A on 0-M-27B. _____

Date _____

6.3.1 CCS Train 2A Flow Balance Under Simulated LOCA-Recirculation Condition (continued)

CAUTION

1) Upon startup of any CCS pump, flow should be adjusted above the recommended **Minimum Flow of 900 gpm** and should be below the maximum of 6800 gpm.
2) As flow to each header and component is initiated, immediately **Monitor for Vibration** as flow rates may approach flow limits described in 3.0.N and Attachment 4.

[7] **ENSURE** weaker of the CCS Pumps in service, in accordance with SOI-70.01, from its applicable remote handswitch located on 0-M-27B, and CIRCLE the pump in-service:

2-HS-70-59A, CCS Pump 2A-A

2-HS-70-33A, CCS Pump 2B-B _____

[8] **THROTTLE** the associated discharge valve to achieve a minimum of 6400 gpm on 2-FI-70-200 located on 1-L-214, and CIRCLE the valve:

2-ISV-70-505A, CCS PUMP 2A-A DISCHARGE ISOLATION

2-ISV-70-505B, CCS PUMP 2B-B DISCHARGE ISOLATION. _____

[9] **THROTTLE** 2-THV-70-546A, RHR HEAT EXCHANGER 2A-A CCS THROTTLE to obtain a minimum of 5000 gpm CCS flow on 2-FI-70-158 on 0-M-27B. _____

[10] **VERIFY** annunciator 258-D (0-XA-55-27D), RHR HX 2A-A RET FLOW LO, is CLEAR. _____

[11] **OPEN** 2-ISV-70-557A, CCP 2A-A OIL COOLER CCS OUTLET ISOLATION. _____

[12] **THROTTLE** 2-THV-70-554A, CCP 2A-A OIL COOLERS CCS OUTLET THROTTLE to obtain a minimum of 28 gpm CCS flow on 2-FI-70-146, 0-M-27B. _____

[13] **VERIFY** annunciator 254-D (0-XA-55-27D), CCP 2A-A GEAR & OIL CLR FLOW LO, is CLEAR. _____

[14] **OPEN** 2-ISV-70-725A, CS/RHR/SIS PUMP 2A-A CCS RETURN ISOLATION. _____

Date _____

6.3.1 CCS Train 2A Flow Balance Under Simulated LOCA-Recirculation Condition (continued)

[15] **ADJUST** the CCS flow to the ESF Pumps with the following valves:

[15.1] **THROTTLE** 2-THV-70-590A, SI PUMP 2A-A LUBE OIL CLR CCS OUTLET THROTTLE, to obtain a minimum of 15 gpm on 2-FI-70-147 on 0-M-27B. _____

[15.2] **VERIFY** annunciator 254-E (0-XA-55-27D), SIP 2A-A OIL CLR FLOW LO, is CLEAR. _____

[15.3] **THROTTLE** 2-THV-70-566A, RHR PMP 2A-A SEAL WATER HX CCS OUTLET THROTTLE, to obtain a minimum of 10 gpm on 2-FI-70-151 on 0-M-27B. _____

[15.4] **VERIFY** annunciator 256-E (0-XA-55-27D), RHRP 2A-A MECH SEAL HX FLOW LO, is CLEAR. _____

[15.5] **THROTTLE** 2-THV-70-571A, CS PUMP 2A-A OIL HX CCS OUTLET THROTTLE to obtain a minimum of 2 gpm on 2-FI-70-150 on 0-M-27B. _____

[15.6] **VERIFY** annunciator 256-D (0-XA-55-27D), CSP 2A-A OIL CLR FLOW LO, is CLEAR. _____

[16] **ADJUST** the CCS flow to the MISC Equipment with the following valves:

[16.1] **THROTTLE** 2-THV-70-577, CVCS LETDOWN HX 2A CCS OUTLET THROTTLE, to obtain a minimum of 1000 gpm on 2-FI-70-190 on 0-M-27B. _____

[16.2] **VERIFY** annunciator 260-A (0-XA-55-27D), LTDN HX RET FLOW LO, is CLEAR. _____

[16.3] **THROTTLE** 2-THV-70-586, CVCS SEAL WATER HX 2A CCS OUTLET THROTTLE, to obtain a minimum of 200 gpm on 2-FI-70-176 on 0-M-27B. _____

[16.4] **VERIFY** annunciator 259-A (0-XA-55-27D), RCP SEAL WTR HX RET FLOW LO, is CLEAR. _____

[16.5] **THROTTLE** 2-THV-70-519, WASTE GAS COMPR B HX CCS THROTTLE, to obtain a minimum of 50 gpm on 2-FI-70-21 on 0-M-27B. _____

Date _____

6.3.1 CCS Train 2A Flow Balance Under Simulated LOCA-Recirculation Condition (continued)

[16.6] **VERIFY** annunciator 257-A (0-XA-55-27D), WG COMP B RET FLOW LO, is CLEAR. _____

[17] **ADJUST** the CCS flows to the HOT Sample Room equipment:

[17.1] **OPEN** 2-ISV-70-727B, SAMPLE HX 2B CCS INLET ISOLATION. _____

[17.2] **THOTTLE** 2-THV-70-731B, SAMPLE HX 2B CCS OUTLET THROTTLE, to obtain a minimum of 28 gpm on 2-FE-70-181. _____

[17.3] **CLOSE** 2-ISV-70-727B, SAMPLE HX 2B CCS INLET ISOLATION. _____

[17.4] **OPEN** 2-ISV-70-727A, SAMPLE HX 2A CCS INLET ISOLATION. _____

[17.5] **THROTTLE** 2-THV-70-731A, SAMPLE HX 2A CCS OUTLET THROTTLE, to obtain a minimum of 20 gpm on 2-FE-070-181. _____

[17.6] **CLOSE** 2-ISV-70-727A, SAMPLE HX 2A CCS INLET ISOLATION. _____

[17.7] **OPEN** 2-ISV-70-739, HOT SAMPLE CHILLER CCS INLET ISOLATION. _____

[17.8] **THROTTLE** 2-THV-070-740, HOT SAMPLE CHILLER CCS OUTLET THROTTLE, to obtain a minimum of 22 gpm on 2-FE-70-181. _____

[17.9] **OPEN** 2-ISV-70-727A, SAMPLE HX 2A CCS INLET ISOLATION. _____

[17.10] **OPEN** 2-ISV-70-727B, SAMPLE HX 2B CCS INLET ISOLATION. _____

[17.11] **VERIFY** annunciator 255-A (0-XA-55-27D), SAMPLE HXS RET HDR FLOW LO, is CLEAR. _____

[18] **VERIFY** annunciator 254-A (0-XA-55-27D), MISC EQUIP SUPPLY HDR FLOW LO, is CLEAR. _____

Date _____

6.3.1 CCS Train 2A Flow Balance Under Simulated LOCA-Recirculation Condition (continued)

[19] **OPEN** the associated discharge valve for the CCS Pump in-service and CIRCLE the valve:

2-ISV-70-505A, CCS PUMP 2A-A DISCHARGE ISOLATION

2-ISV-70-505B, CCS PUMP 2B-B DISCHARGE ISOLATION. _____

[20] **ADJUST** the Throttle Valves listed on Attachment 4 to obtain the design flow requirements for each Component using the method described Step 2.0 of Attachment 2, Flow Balance Instructions. _____

[21] **DETERMINE** final Throttle Valve Set Point positions for the LOCA Mode using the method described in Step 2.0 of Attachment 3, **AND**

RECORD number of turns from OPEN and CLOSED on Attachment 3. _____

[22] **RECORD** the CCS Pump in service and component flow rates on Attachment 4 using the method described in Step 3.0 of Attachment 2, **AND**

VERIFY the corrected Flows [8] on Attachment 4 meet design flow requirements. **[Acc Crit]**. _____

[23] **PLACE** the idle CCS Pump in service, in accordance with 2-SOI-70.01, from its applicable handswitch located on 0-M-27B, and CIRCLE the pump started:

2-HS-70-59A, CCS Pump 2A-A

2-HS-70-33A, CCS Pump 2B-B _____

[24] **STOP** the CCS Pump placed in service in Step 6.3.1[8] using its applicable handswitch located on 0-M-27B. _____

[25] **RECORD** the CCS Pump in service and component flow rates on Attachment 4 using the method described in Step 3.0 of Attachment 2 **AND**

VERIFY the corrected Flows [8] on Attachment 4 meet design flow requirements. **[Acc Crit]**. _____

Date _____

6.3.1 CCS Train 2A Flow Balance Under Simulated LOCA-Recirculation Condition (continued)

[26] **VERIFY** flow annunciators associated with components listed in Attachment 4 remain CLEAR. _____

Date _____

6.3.2 CCS Train 2A Flow Balance Under Simulated STARTUP Condition

CAUTION

1) Upon startup of any CCS pump, flow should be adjusted above the recommended **Minimum Flow of 900 gpm** and should be below the maximum of 6800 gpm.
2) As flow to each header and component is initiated, immediately **Monitor for Vibration** as flow rates may approach flow limits described in 3.0.N and Attachment 5.

NOTE

Adjustment of component throttle valve positions set in Section 6.3.1, LOCA mode, requires a RETEST of Section 6.3.1, LOCA mode.

[1] **ENSURE** each of the following CCS Pumps in service, in accordance with 2-SOI-70.01, from its applicable remote handswitch located on 0-M-27B.

[1.1] 2-HS-70-59A, CCS Pump 2A-A _____

[1.2] 2-HS-70-33A, CCS Pump 2B-B _____

[2] **OPEN** 0-FCV-70-194, SFP HEAT EXCHANGER B CCS SUPPLY at 0-HS-70-194A on 0-M-27B. _____

[3] **THROTTLE** 0-THV-070-0530B, Spent Fuel Pit Heat Exchanger B flow to a minimum of 3000 gpm on 0-FI-70-6 on 0-M-27B. _____

[4] **OPEN** 2-FCV-70-140, RCP OIL COOLER CCS SUPPLY, at 2-HS-70-140A on 0-M-27B. _____

[5] **ADJUST** the CCS flow to the RCP OIL Coolers with the following valves:

[5.1] **THROTTLE** 2-THV-70-696A, RCP 1 UPPER OIL CLR CCS THROTTLE, to obtain a minimum of 150 gpm on 2-FI-70-116 on 0-M-27B. _____

Date _____

6.3.2 CCS Train 2A Flow Balance Under Simulated STARTUP Condition (continued)

[5.2] **THROTTLE** 2-THV-70-695A, RCP 1 LOWER OIL CLR CCS THROTTLE, to obtain a minimum of 5 gpm on 2-FI-70-119 on 0-M-27B. _____

[5.3] **VERIFY** annunciator 261-C (0-XA-55-27D), RCP 1 OIL CLRS RET FLOW LO, is CLEAR. _____

[5.4] **THROTTLE** 2-THV-70-696B, RCP 2 UPPER OIL CLR CCS THROTTLE, to obtain a minimum of 150 gpm on 2-FI-70-106 on 0-M-27B. _____

[5.5] **THROTTLE** 2-THV-70-695B, RCP 2 LOWER OIL CLR CCS THROTTLE, to obtain a minimum of 5 gpm on 2-FI-70-108 on 0-M-27B. _____

[5.6] **VERIFY** annunciator 262-C (0-XA-55-27D), RCP 2 OIL CLRS RET FLOW LO, is CLEAR. _____

[5.7] **THROTTLE** 2-THV-70-696C, RCP 3 UPPER OIL CLR CCS THROTTLE, to obtain a minimum of 150 gpm on 2-FI-70-96 on 0-M-27B. _____

[5.8] **THROTTLE** 2-THV-70-695C, RCP 3 LOWER OIL CLR CCS THROTTLE, to obtain a minimum of 5 gpm on 2-FI-70-98 on 0-M-27B. _____

[5.9] **VERIFY** annunciator 263-C (0-XA-55-27D), RCP 3 OIL CLRS RET FLOW LO, is CLEAR. _____

[5.10] **THROTTLE** 2-THV-70-696D, RCP 4 UPPER OIL CLR CCS THROTTLE, to obtain a minimum of 150 gpm on 2-FI-70-125 on 0-M-27B. _____

[5.11] **THROTTLE** 2-THV-70-695D, RCP 4 LOWER OIL CLR CCS THROTTLE to obtain a minimum of 5 gpm on 2-FI-70-128 on 0-M-27B. _____

[5.12] **VERIFY** annunciator 264-C (0-XA-55-27D), RCP 4 OIL CLRS RET FLOW LO, is CLEAR. _____

[6] **OPEN** 2-FCV-70-143, EXCESS LTDN HTX CONT INLET ISOL VLV at 2-HS-70-143A on 0-M-27B. _____

Date _____

6.3.2 CCS Train 2A Flow Balance Under Simulated STARTUP Condition (continued)

[7] **THROTTLE** 2-THV-70-702 to obtain a minimum of 232 gpm on 2-FI-70-84. _____

[8] **VERIFY** annunciator 263-D (0-XA-55-27D), EXC LTDN HX & GFFD RET FLOW LO, is CLEAR _____

[9] **OPEN** 2-ISV-70-677A, CCS THRM BAR BSTR PUMP 2A-A DISCH ISOLATION. _____

[10] **OPEN** 2-ISV-70-677B, CCS THRM BAR BSTR PUMP 2B-B DISCH ISOLATION _____

[11] **START** the weaker Thermal Barrier Booster Pump, identified in Section 6.2 in accordance with 2-SOI-70.01, or equivalent, and CIRCLE the pump started:

2-HS-70-131A, TBBP 2A-A

2-HS-70-130A, TBBP 2B-B _____

[12] **ADJUST** the RCP Thermal Barrier flows with the following valves:

[12.1] **THROTTLE** 2-THV-70-684A, RCP 1 THERMAL BARRIER CCS RETURN THROTTLE, to obtain a minimum of 40 gpm on 2-FI-70-115 on 0-M-27B. _____

[12.2] **VERIFY** annunciator 261-B (0-XA-55-27D), RCP 1 THERM BAR RET FLOW LO, is CLEAR. _____

[12.3] **THROTTLE** 2-THV-70-684B, RCP 2 THERMAL BARRIER CCS RETURN THROTTLE, to obtain a minimum of 40 gpm on 2-FI-70-105 on 0-M-27B. _____

[12.4] **VERIFY** annunciator 262-B (0-XA-55-27D), RCP 2 THERM BAR RET FLOW LO, is CLEAR _____

[12.5] **THROTTLE** 2-THV-70-684C, RCP 3 THERMAL BARRIER CCS RETURN THROTTLE, to obtain a minimum of 40 gpm on 2-FI-70-95 on 0-M-27B. _____

[12.6] **VERIFY** annunciator 263-B (0-XA-55-27D), RCP 3 THERM BAR RET FLOW LO, is CLEAR. _____

Date _____

6.3.2 CCS Train 2A Flow Balance Under Simulated STARTUP Condition (continued)

[12.7] **THROTTLE** 2-THV-70-684D, RCP 4 THERMAL BARRIER CCS RETURN THROTTLE, to obtain a minimum of 40 gpm on 2-FI-70-124 on 0-M-27B. _____

[12.8] **VERIFY** annunciator 264-B (0-XA-55-27D), RCP 4 THERM BAR RET FLOW LO, is CLEAR. _____

[13] **VERIFY** annunciator 261-E (0-XA-55-27D), RCP THRM BAR RET HDR FLOW LO, is CLEAR. _____

[14] **ADJUST** the Throttle Valves listed on Attachment 5 to obtain the design flow requirements for each Component using the method described in Step 2.0 of Attachment 2, Flow Balance Instructions. _____

[15] **DETERMINE** final Throttle Valve Set Point positions for the STARTUP Mode using the method described in Step 2.0 of Attachment 3 **AND**

RECORD number of turns from OPEN and CLOSED on Attachment 3. _____

[16] **RECORD** the Thermal Barrier Booster Pump in service and component flow rates on Attachment 5 using the method described in Step 3.0 of Attachment 2, **AND**

VERIFY the corrected Flows [8] on Attachment 5 meet design flow requirements **[Acc Crit]**. _____

[17] **START** the idle Thermal Barrier Booster Pump, in accordance with 2-SOI-70.01, and CIRCLE the pump started:

2-HS-70-131A, TBBP 2A-A

2-HS-70-130A, TBBP 2B-B _____

[18] **STOP** the Thermal Barrier Booster Pump placed in service in Step 6.3.2.[11] using its applicable handswitch located on 0-M-27B. _____

Date _____

6.3.2 CCS Train 2A Flow Balance Under Simulated STARTUP Condition (continued)

[19] **RECORD** the Thermal Barrier Booster Pump in service and component flow rates on a duplicate Attachment 5 using the method described in Step 3.0 of Attachment 2, **AND**

VERIFY the corrected Flows [8] on Attachment 5 meet design flow requirements **[Acc Crit]**. _____

[20] **VERIFY** flow annunciators associated with components listed in Attachment 5 remain CLEAR. _____

Date _____

6.3.3 CCS Train 2A Flow Balance Under Simulated NORMAL Condition

NOTES

1) Adjustment of component throttle valves set in previous sections requires a RETEST of the previous sections.
2) System piping and components will be visually monitored during transients and steady state modes. Further evaluation of piping vibration may be performed to confirm if piping vibration is excessive. If excessive vibration is observed, then a TDN shall be initiated for engineering to evaluate.

[1] **STOP** CCS Thermal Barrier Booster Pump 2B-B from its handswitch, 2-HS-70-130A on 0-M-27B. _____

[2] **STOP** CCS Pump 2B-B using 2-HS-70-33A on 0-M-27B. _____

[3] **CLOSE** 2-FCV-70-143, EXCESS LTDN HTX CONT INLET ISOL VLV at 2-HS-70-143A on 0-M27B. _____

[4] **CLOSE** 2-FCV-70-156, RHR HTX 2A-A OUTLET VLV at 2-HS-70-156A on 0-M-27B. _____

[5] **VERIFY** annunciator 260-A (0-XA-55-27D), LTDN HX RET FLOW LO, is CLEAR. _____

[6] **RECORD** the pumps in service (CCS Pump 2A-A, TBBP 2A-A) and the flow data on Attachment 6, when the flows are balanced and stabilized, using the method described in Step 3.0 of Attachment 2, **AND**

VERIFY the corrected Flows [8] on Attachment 6 meet design flow requirements **[Acc Crit]**. _____

[7] **START** CCS Pump 2B-B, in accordance with 2-SOI-70.01, using handswitch 2-HS-70-33A on 0-M-27B. _____

[8] **STOP** CCS Pump 2A-A, using 2-HS-70-59A on 0-M-27B. _____

[9] **START** CCS Thermal Barrier Booster Pump 2B-B in accordance with 2-SOI-70.01 using handswitch, 2-HS-70-130A on 0-M-27B. _____

Date _____

6.3.3 CCS Train 2A Flow Balance Under Simulated NORMAL Condition (continued)

[10] **STOP** CCS Thermal Barrier Booster Pump 2A-A from its handswitch, 2-HS-70-131A on 0-M-27B. _____

[11] **RECORD** the pumps in service (CCS Pump 2B-B, TBBP 2B-B) and the flow data on a duplicate Attachment 6, when the flows are balanced and stabilized, using the method described in Step 3.0 of Attachment 2, **AND**

VERIFY the corrected Flows [8] on Attachment 6 meet design flow requirements **[Acc Crit]**. _____

[12] **RESTORE** 2-TCV-70-192, LETDOWN HX CCS OUT TEMP CNTL by opening the control air supply, 2-ISV-32-3247. _____

[13] **VERIFY** flow annunciators associated with components listed in Attachment 6 remain CLEAR. _____

[14] **RESTORE** THVs to as found positions per SOI-70.01 or as directed by Unit 1 US/SRO. _____

[15] **LEAVE** CCS in service per 2-SOI-70.01, or equivalent, or as directed by Unit 2 US/SRO. _____

Date _____

7.0 POST PERFORMANCE ACTIVITY

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

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

[3] **VERIFY** that post-test calibration of the M&TE used to record quantitative acceptance criteria has been satisfactorily performed and the results RECORDED on Measuring and Test Equipment (M&TE) Log, Appendix D in SMP-9.0. _____

[4] **VERIFY** the post-test calibration of permanent plant instruments used to record quantitative acceptance criteria has been satisfactorily performed and the results RECORDED on Appendix C, Permanent Plant Instrumentation Log (N/A if NOT required). _____

[5] **REMOVE** M&TE in accordance with Appendix E that was installed in Step 4.3[10]. _____

[6] **UPDATE** SOI-70.01 and TI-31.08 as appropriate or as directed by Operations. _____

Date _____

8.0 RECORDS

A. QA Records

Completed Test Package

B. Non-QA Records

None

Appendix A
(Page 1 of 1)

TEST PROCEDURES/INSTRUCTIONS REFERENCE REVIEW

Date _____

NOTE

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

PROCEDURE/INSTRUCTION	REVISION/ CHANGES	IMPACT Yes/No	INITIAL AND DATE. (N/A for no change)

Appendix B
(Page 1 of 1)

TEMPORARY CONDITION LOG

Date _____

NOTE

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

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

Appendix C
(Page 1 of 4)

PERMANENT PLANT INSTRUMENT LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	CAL DUE DATE	*FILLED AND VENTED	PLACED IN SERVICE *	USED FOR QUANTITATIVE ACC CRIT		POST-TEST** CAL DATE	**POST-TEST CALIBRATION ACCEPTABLE INITIAL/DATE
		INIT/DATE	INIT/DATE	YES	NO		
2-PI-70-135							
2-PI-70-136							
2-PI-70-137							
2-PI-70-138							
0-FI-70-6							
2-FI-70-21							
2-FIS-70-81							
2-FI-70-81							
2-FI-70-84							
2-FI-70-95							

Appendix C
(Page 2 of 4)

PERMANENT PLANT INSTRUMENT LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	CAL DUE DATE	*FILLED AND VENTED	PLACED IN SERVICE *	USED FOR QUANTITATIVE ACC CRIT		POST-TEST** CAL DATE	**POST-TEST CALIBRATION ACCEPTABLE INITIAL/DATE
2-FI-70-96							
2-FI-70-98							
2-FI-70-105							
2-FI-70-106							
2-FI-70-108							
2-FI-70-115							
2-FI-70-116							
2-FI-70-119							
2-FI-70-124							

Appendix C
(Page 3 of 4)

PERMANENT PLANT INSTRUMENT LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	CAL DUE DATE	*FILLED AND VENTED	PLACED IN SERVICE *	USED FOR QUANTITATIVE ACC CRIT		POST-TEST** CAL DATE	**POST-TEST CALIBRATION ACCEPTABLE INITIAL/DATE
2-FI-70-125							
2-FI-70-128							
2-FI-70-142							
2-FI-70-146							
2-FI-70-147							
2-FI-70-150							
2-FI-70-151							
2-FI-70-158							
2-FI-70-159A							

Appendix C
(Page 4 of 4)

PERMANENT PLANT INSTRUMENT LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	CAL DUE DATE	*FILLED AND VENTED	PLACED IN SERVICE *	USED FOR QUANTITATIVE ACC CRIT		POST-TEST** CAL DATE	**POST-TEST CALIBRATION ACCEPTABLE INITIAL/DATE
2-FI-70-164A							
2-FI-70-176							
2-FI-70-181							
2-FI-70-190							
2-FI-70-200							

*These items may be initialed and dated by personnel performing the task. Instrumentation NOT required to be filled and vented may be identified as NOT Applicable (NA).

**May be identified as NA if instrument was NOT used to verify/record quantitative acceptance criteria data.

Appendix D
(Page 1 of 2)

MEASURING AND TEST EQUIPMENT

Date _____

Instrument	Range	Accuracy	M&TE#	Cal Due Date	Location Used	Init/Date
Press. Gage	0-200 psig	+/-0.20%			2-PI-70-136	
Press. Gage	0-200 psig	+/-0.20%			2-PI-70-137	
Press. Gage	0-200 psig	+/-0.20%			2-PI-70-135	
Press. Gage	0-200 psig	+/-0.20%			2-PI-70-138	
Diff Press Gage	0-20 iwc	+/-0.20%			2-FE-70-216	
Diff Press Gage	0-20 iwc	+/-0.20%			2-FE-70-217	
Diff Press Gage	0-20 iwc	+/-0.20%			2-FE-70-218	

Appendix D
(Page 2 of 2)

MEASURING AND TEST EQUIPMENT

Date _____

Instrument	Range	Accuracy	M&TE#	Cal Due Date	Location Used	Init/Date

Appendix E
(Page 1 of 2)

M&TE INSTALLATION/REMOVAL

Date _____

Install test instruments at each of the following instrument panel test connections. Ensure test pressure gages are mounted on the same elevation as permanent plant gages. Ensure permanent plant and test instruments are filled and vented and placed in-service upon installation and removal of M&TE.

Instrument	Installation		Removal	
	Init/Date	CV/Date	Init/Date	CV/Date
2-PI-70-135				
2-PI-70-136				
2-PI-70-137				
2-PI-70-138				
2-FE-70-216				
2-FE-70-217				
2-FE-70-218				

Appendix E
(Page 2 of 2)

M&TE INSTALLATION/REMOVAL

Date _____

Instrument	Installation		Removal	
	Init/Date	CV/Date	Init/Date	CV/Date

Attachment 1
(Page 1 of 9)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-FCV-70-78	CCS PUMP 2A-A / 2B-B TO C-S SUCT XTIE	CLOSED		
2-FCV-70-39	CCS PUMP 2A-A / 2B-B SUCTION CROSSTIE	OPEN		
2-ISV-70-503A	CCS PUMP 2A-A SUCTION ISOLATION	OPEN		
2-ISV-70-503B	CCS PUMP 2B-B SUCTION ISOLATION	OPEN		
2-ISV-70-501	MISCELLANEOUS EQUIPMENT CCS RETURN HEADER ISOL	OPEN		
2-FCV-70-28	CCS PUMP 2A-A / 2B-B TO C-S DISCH XTIE	CLOSED		
2-FCV-70-29	CCS PMP 2A-A / 2B-B TO C-S DISCH XTIE	CLOSED		
2-ISV-70-507	CCS PUMP 2A-A / 2B-B DISCHARGE XTIE	OPEN		
2-FCV-70-14	CCS HEAT EXCHANGER B & C INLET CROSSTIE	CLOSED		
2-FCV-70-18	CCS HEAT EXCHANGER B/C INLET CROSSTIE	CLOSED		

Attachment 1
(Page 2 of 9)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-FCV-70-16	CCS HEAT EXCHANGER B INLET	OPEN		
2-ISV-70-510	CCS HEAT EXCHANGER B INLET ISOLATION	OPEN		
2-FCV-70-15	CCS HEAT EXCHANGER B OUTLET	OPEN		
2-FCV-70-2	2A ESF EQUIPMENT CCS SUPPLY HEADER	OPEN		
2-FCV-70-4	MISCELLANEOUS EQUIPMENT CCS SUPPLY HEADER	CLOSED		
2-ISV-70-516	REACTOR BUILDING CCS SUPPLY ISOLATION	OPEN		
2-FCV-70-195	CCS HEAT EXCHANGER B/C OUTLET CROSSTIE	CLOSED		
2-FCV-70-196	CCS HEAT EXCHANGER B/C OUTLET CROSSTIE	CLOSED		
0-FCV-70-194	SFP HEAT EXCHANGER B CCS SUPPLY	CLOSED		
0-ISV-70-515A	SFP ERCW SUPPLY CCS ISOLATION	CLOSED		

Attachment 1
(Page 3 of 9)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-ISV-70-518	WASTE GAS COMPR B HX CCS INLET ISOLATION	OPEN		
2-ISV-70-520	WASTE GAS COMPRESSOR HX OUTLET ISOLATION	OPEN		
0-ISV-70-524B	SFP HEAT EXCHANGER B CCS ISOLATION	OPEN		
0-ISV-70-529B	SFP HEAT EXCHANGER B ISOLATION	OPEN		
2-FCV-70-143	EXCESS LETDOWN HX CCS SUPPLY	CLOSED		
2-FCV-70-85	EXCESS LETDOWN HX CCS OUTLET	OPEN		
2-ISV-70-705	EXCESS LETDOWN HX CCS RETURN ISOLATION	OPEN		
2-FCV-70-100	RCP OIL COOLER SUPPLY	OPEN		
2-FCV-70-140	RCP OIL COOLER CCS SUPPLY	CLOSED		
2-ISV-070-789	RCP OIL CLR HDR CCS SUPPLY ISOL	OPEN		

Attachment 1
(Page 4 of 9)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-ISV-70-693	RCP OIL COOLER CCS SUP HDR ISOLATION	OPEN		
2-ISV-70-734	RCP OIL COOLER CCS RET HDR ISOLATION	OPEN		
2-FCV-70-89	RCP OIL COOLER RETURN	OPEN		
2-FCV-70-92	RCP OIL COOLER CCS RETURN	OPEN		
2-ISV-70-700	RCP OIL COOLER CCS RETURN ISOLATION	OPEN		
2-ISV-70-673A	CCS THERM BAR BSTR PUMP 2A SUCT ISOLATION	OPEN		
2-ISV-70-673B	CCS THERM BAR BSTR PUMP 2B SUCT ISOLATION	OPEN		
2-ISV-70-677A	CCS THERM BAR BSTR PUMP 2A DISCH ISOLATION	CLOSED		
2-ISV-70-677B	CCS THERM BAR BSTR PUMP 2B DISCH ISOLATION	CLOSED		
2-FCV-70-133	THERMAL BARRIER CCS SUPPLY	OPEN		

Attachment 1
(Page 5 of 9)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-FCV-70-134	THERMAL BARRIER CCS SUPPLY	OPEN		
2-ISV-70-680	RCP THERMAL BARRIER CCS SUP HDR ISOLATION	OPEN		
2-ISV-70-736	RCP THERMAL BARRIER CCS RET HDR ISOLATION	OPEN		
2-FCV-70-87	THERMAL BARRIER CCS RETURN	OPEN		
2-FCV-70-90	THERMAL BARRIER CCS RETURN	OPEN		
2-ISV-70-690	RCP THERMAL BARRIER CCS RET HDR ISOLATION	OPEN		
2-ISV-70-773	CCS ISLN FOR POST ACD SMPLG RETURN	CLOSED		
2-ISV-70-688	RCP THRM BAR ERCW FLOOD MODE RET ISOL	CLOSED		
2-ISV-70-588	CVCS PDP 2C OIL COOLER CCS INLET ISOLATION	CLOSED		
2-ISV-70-581	CVCS SEAL WATER HX 2A CCS OUTLET ISOLATION	OPEN		

Attachment 1
(Page 6 of 9)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-ISV-70-573	SAMPLE HX CCS SUPPLY ISOLATION	OPEN		
2-ISV-70-574	CVCS LETDOWN HX 2A CCS INLET ISOLATION	OPEN		
2-ISV-070-637	BORIC ACID EVAP PKG B CCS SUPPLY ISOLATION	CLOSED		
2-ISV-70-600	PDP PUMP 2C OIL COOLER CCS OUTLET ISOLATION	CLOSED		
2-ISV-70-661	BORIC ACID EVAP PKG B CCS RETURN ISOLATION	CLOSED		
2-ISV-70-585	CVCS SEAL WATER HX 2A CCS OUTLET ISOLATION	OPEN		
2-ISV-70-587	SEAL WATER / LETDOWN HX CCS OUTLET ISOLATION	OPEN		
2-TCV-70-192	LETDOWN HX CCS OUT TEMP CNTL	OPEN		
2-FCV-70-215	SAMPLE HEAT EXCHANGER CCS INLET	OPEN		
2-ISV-70-739	SAMPLE CHILLER CCS INLET ISOLATION	CLOSED		

Attachment 1
(Page 7 of 9)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-ISV-70-1506	HOT SAMPLE CHILLER CCS OUTLET ISOL	OPEN		
2-ISV-70-727A	SAMPLE HX 2A CCS INLET ISOLATION	CLOSED		
2-ISV-70-727B	SAMPLE HX 2B CCS INLET ISOLATION	CLOSED		
2-FCV-70-183	SAMPLE HEAT EXCHANGER CCS OUTLET	OPEN		
2-ISV-70-670	SAMPLE HX RETURN ISOLATION	OPEN		
2-ISV-70-545A	RHR HEAT EXCHANGER 2A-A INLET ISOLATION	OPEN		
2-FCV-70-156	RHR HEAT EXCHANGER 2A CCS OUTLET	CLOSED		
2-ISV-70-552A	CCP 2A-A OIL COOLERS CCS INLET ISOLATION	OPEN		
2-ISV-70-553A	CCP 2A-A OIL COOLERS CCS INLET ISOLATION	OPEN		
2-ISV-70-800	CCP 2A-A GEAR OIL CLR CCS INLET ISOLATION	OPEN		
2-ISV-70-801	CCP 2A-A LUBE OIL CLR INLET ISOLATION	OPEN		

Attachment 1
(Page 8 of 9)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-ISV-70-557A	CCP 2A-A OIL COOLERS CCS OUTLET ISOLATION	CLOSED		
2-ISV-70-558A	SI PUMP 2A-A LUBE OIL COOLER CCS INLET ISOL	OPEN		
2-ISV-70-564A	RHR PMP 2A-A SEAL WATER HX CCS INLET ISOL	OPEN		
2-ISV-70-569A	CS PUMP 2A-A OIL HX CCS INLET ISOLATION	OPEN		
2-ISV-70-572A	CS PUMP 2A-A OIL HX CCS OUTLET ISOLATION	OPEN		
2-ISV-70-567A	RHR PMP 2A-A SEAL WATER HEAT EXCHANGER OUT ISOL	OPEN		
2-ISV-70-562A	SI PUMP 2B-B LUBE OIL COOLER CCS OUT ISOL	OPEN		
2-ISV-70-725A	CS/RHR/SIS PUMP 2A-A CCS RETURN ISOLATION	CLOSED		
2-ISV-70-544A	ESF CCS HEADER 2A SURGE TANK ISOL	OPEN		
2-ISV-70-544C	ESF CCS HEADER 2A SURGE TANK OUTLET	OPEN		

Attachment 1
(Page 9 of 9)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-ISV-70-544B	ESF CCS HEADER 2B SURGE TANK OUTLET	OPEN		
2-LCV-70-63	CCS SURGE TANK B MAKEUP	OPERABLE		
2-ISV-70-540	UNIT 2 CCS SURGE TANK DEMIN WATER MAKEUP ISOL	OPEN		
2-ISV-70-543	UNIT 2 CCS SURGE TANK MAKEUP ISOLATION	OPEN		
2-ISV-70-542	ERCW FLOOD MODE UNIT 2 SURGE TANK SUP	CLOSED		

Attachment 2
(Page 1 of 2)
FLOW BALANCE INSTRUCTIONS

Date _____

1.0 GENERAL

Flow balancing is an iterative process. The steps to balance each component may be repeated several times to align flow for all components on the attachments. No initials, dates or calculations will be completed until the Final Balance described in Section 3.0 is performed. (Reference to Sections 6.3.1, 6.3.2, and 6.3.3)

When a ΔP gage is required, connect at the flow element test connections. When an Ultrasonic Flowmeter is required, install it on the component piping per the flowmeter instruction. Permanent plant flow indicators will be utilized for the initial flow readings as they meet accuracy and calibration requirements for flow balance. Data acquired by the DCS (Foxboro I/A) from the permanent plant flow transmitters, or M&TE, will be recorded on Attachments 4, 5, and 6.

2.0 FLOW BALANCING

Adjust flows to the Components listed in Column [1] in the CCS FLOW BALANCE Attachments, WITHOUT making any entries on Attachments 4, 5, or 6:

[1] **VERIFY/INSTALL** (where applicable) a ΔP gage or ultrasonic flowmeter with a range as indicated in column [3] of the Attachment.

[2] **RECORD** M&TE information on Appendix D and E, as needed.

NOTE

Throttle valve in the CLOSED direction to set flow. If flow is initially too low, OPEN valve until an increase in flow above the setpoint is observed, then CLOSE down on the valve to attain proper flow.

[3] **THROTTLE** the valve listed in column [2] of the Attachment to obtain the Target Value Flow or ΔP as indicated on the first line in column [4] of the Attachment.

[4] **REPEAT** Steps 2[1] through 2[3] for each component on the Attachment.

[5] **REPEAT** the entire Attachment until all Target Values in column [4] are obtained without any throttle valve adjustment.

Attachment 2
(Page 2 of 2)
FLOW BALANCE INSTRUCTIONS

Date _____

3.0 FINAL BALANCE

Document the Final flow balance for all Components in the Attachments 4, 5 and 6 as follows:

[1] **RECORD** the ΔP or Flow in column [5].

[2] **IF** the flow device in column [2] is an FI, FT or ultrasonic flowmeter:

A. **MULTIPLY** the value in column [5] by the Correction Multiplier (second line in column [4]), and

B. **RECORD** the result in column [8], Flow (corrected) line.

[3] **IF** the Flow device in column [2] is an FE:

A. **MULTIPLY** the value in column [5] by the Correction Multiplier (second line in column [4]), and

B. **RECORD** the result on 1st line in column [6], ΔP (corrected).

C. **CALCULATE** the square root of this value, and

D. **RECORD** on the second line in column [6].

E. **MULTIPLY** this result by the 'C' value in column [7], and

F. **RECORD** the result in column [8], Flow (corrected) line.

Attachment 3
(Page 1 of 5)

TRAIN A THROTTLE VALVE SETPOINTS

Date _____

APPLICATION

Use this attachment only for the valves adjusted in the flow mode applicable to the subsection of the procedure being performed (i.e. only valves applicable to the Startup Mode are completed with Subsection 6.3.2.)

PROCEDURE

1.0 Throttle valve Full Stroke Number of Turns (Reference 4.3.9)

A. **DETERMINE** number of TURNS from Full OPEN to Full CLOSED on each Throttle valve listed **AND**

RECORD the number of TURNS on pages 2 and 3.

B. **OPEN** each Throttle valve to the Full OPEN stop.

2.0 Throttle Valve Set Points (Reference 6.3.1 and 6.3.2)

A. **THROTTLE** the valve while counting the number of turns until the desired flow is achieved as stated on the attachment.

B. **RECORD** the number of TURNS on pages 4 and 5 from the full OPEN stop to the desired flow position to the nearest 1/4 turn. DO NOT discount any handwheel movement as valve slack, count ALL turns. For plug valves (0-90° travel) record the position to the nearest 15°.

C. **CLOSE** the valve fully.

D. **OPEN** the valve while counting the number of TURNS until the flow returns to that previously recorded on the attachment.

E. **RECORD** the number of TURNS on pages 4 and 5 from full closed position to the desired flow position to the nearest 1/4 turn. DO NOT discount any handwheel movement as valve slack, count ALL turns. For plug valves (0-90° travel) record the position to the nearest 15°

Attachment 3
(Page 2 of 5)

TRAIN A THROTTLE VALVE SETPOINTS

Date _____

Throttle Valve	DESCRIPTION	LOC	TURNS from Full OPEN to Full CLOSED	Initial/Date	CV/Date
0-THV-70-530B	SFP HEAT EXCHANGER B CCS OUT THROTTLE	A5W/737			
2-THV-70-546A	RHR HEAT EXCHANGER 2A-A CCS THROTTLE	A9V/713			
2-THV-70-554A	CCP 2A-A OIL COOLERS CCS OUTLET THROTTLE	A9T/692			
2-THV-70-590A	SI PUMP 2A-A LUBE OIL CLR CCS OUTLET THROTTLE	A8V/692			
2-THV-70-566A	RHR PMP 2A-A SEAL WATER HX CCS OUTLET THROTTLE	A9V/676			
2-THV-70-571A	CS PUMP 2A-A OIL HX CCS OUTLET THROTTLE	A9U/676			
2-THV-70-519	WASTE GAS COMPR B HX CCS THROTTLE	A4Q/713			
2-THV-70-577	CVCS LETDOWN HX 2A CCS OUTLET THROTTLE	A10T/737			
2-THV-70-586	CVCS SEAL WATER HX 2A CCS OUTLET THROTTLE	A10T/713			
2-THV-70-731A	SAMPLE HX 2A CCS OUTLET THROTTLE	A10W/713			
2-THV-70-731B	SAMPLE HX 2B CCS OUTLET THROTTLE	A9W/713			
2-THV-70-740	HOT SAMPLE CHILLER CCS OUTLET THROTTLE	A10W/713			
2-THV-70-702	EXCESS LETDOWN HX CCS SUPPLY THROTTLE	A11W/713			

Attachment 3
(Page 3 of 5)

TRAIN A THROTTLE VALVE SETPOINTS

Date _____

Throttle Valve	DESCRIPTION	LOC	TURNS from Full OPEN to Full CLOSED	Initial/Date	CV/Date
2-THV-70-696A	RCP 1 UPPER OIL CLR CCS THROTTLE	AZ43/702			
2-THV-70-696B	RCP 2 UPPER OIL CLR CCS THROTTLE	AZ130/703			
2-THV-70-696C	RCP 3 UPPER OIL CLR CCS THROTTLE	AZ218/702			
2-THV-70-696D	RCP 4 UPPER OIL CLR CCS THROTTLE	AZ315/702			
2-THV-70-695A	RCP 1 LOWER OIL CLR CCS THROTTLE	AZ43/702			
2-THV-70-695B	RCP 2 LOWER OIL CLR CCS THROTTLE	AZ130/702			
2-THV-70-695C	RCP 3 LOWER OIL CLR CCS THROTTLE	AZ218/702			
2-THV-70-695D	RCP 4 LOWER OIL CLR CCS THROTTLE	AZ313/702			
2-THV-70-684A	RCP 1 THERMAL BARRIER CCS RETURN THROTTLE	AZ43/702			
2-THV-70-684B	RCP 2 THERMAL BARRIER CCS RETURN THROTTLE	AZ131/702			
2-THV-70-684C	RCP 3 THERMAL BARRIER CCS RETURN THROTTLE	AZ210/702			
2-THV-70-684D	RCP 4 THERMAL BARRIER CCS RETURN THROTTLE	AZ309/702			

Attachment 3
(Page 4 of 5)

TRAIN A THROTTLE VALVE SETPOINTS

Date _____

Throttle Valve	Component	Mode Application	TURNS From		Initial/Date	CV/Date
			Full Open	Full Closed		
0-THV-70-530B	SPENT FUEL PIT HTX B	STARTUP				
2-THV-70-546A	RHR HTX 2A-A	LOCA				
2-THV-70-554A	CCP 2A-A LUBE & GEAR OIL COOLER	LOCA				
2-THV-70-590A	SIS PUMP 2A-A LUBE OIL COOLER	LOCA				
2-THV-70-566A	RHR PUMP 2A-A SEAL WTR HTX	LOCA				
2-THV-70-571A	CONT SPRAY PUMP 2A-A OIL HTX	LOCA				
2-THV-70-519	WASTE GAS CMPRSR B HTX	LOCA				
2-THV-70-577	NON-REGEN LETDN HTX 2A	LOCA				
2-THV-70-586	CVCS SEAL WTR HTX 2A	LOCA				
2-THV-70-731A	SAMPLE HTX 2A	LOCA				
2-THV-70-731B	SAMPLE HTX 2B	LOCA				
2-THV-70-740	SAMPLE CHILLER	LOCA				
2-THV-70-702	EXCESS LTDN HTX 2A	STARTUP				

Attachment 3
(Page 5 of 5)

TRAIN A THROTTLE VALVE SETPOINTS

Date _____

Throttle Valve	Component	Mode Application	TURNS From		Initial/Date	CV/Date
			Full Open	Full Closed		
2-THV-70-696A	RCP 1 UPPER OIL COOLER	STARTUP				
2-THV-70-696B	RCP 2 UPPER OIL COOLER	STARTUP				
2-THV-70-696C	RCP 3 UPPER OIL COOLER	STARTUP				
2-THV-70-696D	RCP 4 UPPER OIL COOLER	STARTUP				
2-THV-70-695A	RCP 1 LOWER OIL CLR	STARTUP				
2-THV-70-695B	RCP 2 LOWER OIL CLR	STARTUP				
2-THV-70-695C	RCP 3 LOWER OIL CLR	STARTUP				
2-THV-70-695D	RCP 4 LOWER OIL CLR	STARTUP				
2-THV-70-684A	RCP 1 THERMAL BARRIER	STARTUP				
2-THV-70-684B	RCP 2 THERMAL BARRIER	STARTUP				
2-THV-70-684C	RCP 3 THERMAL BARRIER	STARTUP				
2-THV-70-684D	RCP 4 THERMAL BARRIER	STARTUP				

Attachment 4
(Page 1 of 6)

CCS FLOW BALANCE UNDER LOCA-RECIRCULATION CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR HTX 2A-A	2-FT-70-158 2-THV-70-546A	_____ 0-100 "H_2O	5070-5310 gpm (0.993)		_____ _____	600 (2.2C.8.x)		**[≥5000]** 6250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCP 2A-A LUBE & GEAR OIL COOLER	2-FT-70-146 2-THV-70-554A	_____ 0-20 "H_2O	28.5-32 gpm (0.993)		_____ _____	7.83 (2.2C.8.t)		**[≥28]** 36
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SIS PUMP 2A-A LUBE OIL COOLER	2-FT-70-147 2-THV-70-590A	_____ 0-50 "H_2O	15.3-22 gpm (0.993)		_____ _____	2.83 (2.2C.8.u)		**[≥15]** 30
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 4
(Page 2 of 6)

CCS FLOW BALANCE UNDER LOCA-RECIRCULATION CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR PUMP 2A-A SEAL WTR HTX	2-FT-70-151 2-THV-70-566A	_____ 0-50 "H_2O	10.2-13 gpm (0.993)			2 (2.2C.8.w)		**[≥10]** 15
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CONT SPRAY PUMP 2A-A OIL HTX	2-FT-70-150 2-THV-70-571A	_____ 0-20 "H_2O	2.2-4.0 gpm (0.993)			2.83 (2.2C.8.v)		**[≥2]** 4
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
2A ESF SUPPLY HEADER	2-FT-70-159C NA	_____ 0-100 "H_2O	5055-5381 (0.993)			600 (2.2C.8.z)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 4
(Page 3 of 6)

CCS FLOW BALANCE UNDER LOCA-RECIRCULATION CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
WASTE GAS CMPRSR B HTX	2-FT-70-21 2-THV-70-519	_____ 0-100 "H_2O	50.3-55 gpm (0.993)			6.082 (2.2C.8.d)		**[≥50]** 95
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
NON-REGEN LETDN HTX 2A	2-FT-70-190 2-THV-70-577	_____ 0-200 "H_2O	1007-1065 gpm (0.993)			100 (2.2C.8.ee)		**[≥1000]** 1250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CVCS SEAL WTR HTX 2A	2-FT-70-176 2-THV-70-586	_____ 0-100 "H_2O	202-215 gpm (0.993)			25 (2.2C.8.cc)		**[≥200]** 250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 4
(Page 4 of 6)

CCS FLOW BALANCE UNDER LOCA-RECIRCULATION CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
SAMPLE HTX 2A*	2-FE-70-217 2-THV-70-731A	_____ 0-20 "H_2O	3.8-4.5 "H_2O (0.995)			10.25 (2.2C.6)		**[≥20]** 42
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SAMPLE HTX 2B*	2-FE-70-216 2-THV-70-731B	_____ 0-20 "H_2O	7.5-8.5"H_2O (0.995)			10.25 (2.2C.6		**[≥28]** 49
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SAMPLE CHILLER*	2-FE-70-218 2-THV-70-740	_____ 0-20 "H_2O	11.5-14.5"H_2O (0.995)			6.15 (2.2C.7)		**[≥22]** 50
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 4
(Page 5 of 6)

CCS FLOW BALANCE UNDER LOCA-RECIRCULATION CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
SAMPLE HXS/CHILLER (TOTAL)	2-FT-70-181 NA	_____ 0-50 "H_2O	70.5-75 gpm (0.993)		_____ _____	17.9 (2.2C.8.dd)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
MISC EQ SUPPLY HDR FLOW	2-FT-70-164A NA	_____ 0-150 "H_2O	1320-1410 gpm (0.993)		_____ _____	163.3 (2.2C.8.aa)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RAD MONITOR 2-RE-90-123/A	2-FI-90-123/A 2-ISIV-90-123D	NA	7-9 gpm +/-1 gpm		NA NA	NA (2.2C.8.ll)		**[≥6]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 4
(Page 6 of 6)

CCS FLOW BALANCE UNDER LOCA-RECIRCULATION CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
CCS HTX B INLET FLOW	2-FI-70-200 NA	_____ 0-300 "H_2O	6381-6800 gpm NA		NA NA	750.6 (2.2C.8.a)	NA	NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
*The test gage at 2-FT-70-181, SAMPLE HTX OUTLET HDR FLOW, reads total sample htx/chiller flow. Close respective inlet isolation valves as required to obtain individual HTX flow.								

Attachment 5
(Page 1 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR HTX 2A-A	2-FT-70-158 2-THV-70-546A	_____ 0-100 "H_2O	5070-6206 gpm (0.993)			600 (2.2C.8.x)		**[≥5000]** 6250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCP 2A-A LUBE & GEAR OIL COOLER	2-FT-70-146 2-THV-70-554A	_____ 0-20 "H_2O	28.5-35 gpm (0.993)			7.83 (2.2C.8.t)		**[≥28]** 36
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SIS PUMP 2A-A LUBE OIL COOLER	2-FT-70-147 2-THV-70-590A	_____ 0-50 "H_2O	15.3-29 gpm (0.993)			2.83 (2.2C.8.u		**[≥15]** 30
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 2 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR PUMP 2A-A SEAL WTR HTX	2-FT-70-151 2-THV-70-566A	_____ 0-50 "H_2O	10.2-14 gpm (0.993)			2 (2.2C.8.w)		**[≥10]** 15
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CONT SPRAY PUMP 2A-A OIL HTX	2-FT-70-150 2-THV-70-571A	_____ 0-20 "H_2O	2.2-4.0 gpm (0.993)			2.83 (2.2C.8.v)		**[≥2]** 4
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
2A ESF SUPPLY HEADER	2-FT-70-159C NA	_____ 0-100 "H_2O	5055-6335 gpm (0.993)			600 (2.2C.8.z)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 3 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
WASTE GAS CMPRSR B HTX	2-FT-70-21 2-THV-70-519	_____ 0-100 "H_2O	50.3-94 gpm (0.993)		_____	6.082 (2.2C.8.d)		**[≥50]** 95
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
NON-REGEN LETDN HTX 2A	2-FT-70-190 2-THV-70-577	_____ 0-200 "H_2O	1007-1241 gpm (0.993)		_____	100 (2.2C.8.ee)		**[≥1000]** 1250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CVCS SEAL WTR HTX 2A	2-FT-70-176 2-THV-70-586	_____ 0-100 "H_2O	202-248 gpm (0.993)		_____	25 (2.2C.8.cc)		**[≥200]** 250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 4 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
SAMPLE HTX 2A*	2-FE-70-217 2-THV-70-731A	_____ 0-20 "H_2O	3.8-16.8 "H_2O (0.995)			10.25 (2.2C.6)		**[≥20]** 42
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SAMPLE HTX 2B*	2-FE-70-216 2-THV-70-731B	_____ 0-20 "H_2O	7.5-22.8 "H_2O (0.995)			10.25 (2.2C.6)		**[≥28]** 49
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SAMPLE CHILLER*	2-FE-70-218 2-THV-70-740	_____ 0-20 "H_2O	11.5 66.1 "H_2O (0.995)			6.15 (2.2C.7)		**[≥22]** 50
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 5 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
SAMPLE HXS/CHILLER (TOTAL)	2-FT-70-181 NA	_____ 0-50 "H2O	70.5-140 gpm (0.993)			17.9 (2.2C.8.dd)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
MISC EQ SUPPLY HDR FLOW	2-FT-70-164A NA	_____ 0-150 "H_2O	1320-1736 gpm (0.993)			163.3 (2.2C.8.aa)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
EXCESS LTDN HTX 2A	2-FT-70-84 2-THV-70-702	_____ 0-50 "H_2O	234-288 gpm (0.993)			42.43 (2.2C.8.f)		**[≥232]** 290
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 6 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RCP 1 UPPER OIL COOLER	2-FT-70-116 2-THV-70-696A	_____ 0-50 "H_2O	151-182 gpm (0.993)			25.45 (2.2C.8.n)		**[≥150]** 184
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 2 UPPER OIL COOLER	2-FT-70-106 2-THV-70-696B	_____ 0-50 "H_2O	151-182 gpm (0.993)			25.45 (2.2C.8.k)		**[≥150]** 184
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 3 UPPER OIL COOLER	2-FT-70-96 2-THV-70-696C	_____ 0-50 "H_2O	151-182 gpm (0.993)			25.45 (2.2C.8.h)		**[≥150]** 184
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 7 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RCP 4 UPPER OIL COOLER	2-FT-70-125 2-THV-70-696D	_____ 0-50 "H_2O	151-182 gpm (0.993)			25.45 (2.2C.8.q)		**[≥150]** 184
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 1 LOWER OIL CLR	2-FT-70-119 2-THV-70-695A	_____ 0-50 "H_2O	5.0-9.9 gpm (0.993)			0.95 (2.2C.8.o)		**[≥5]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 2 LOWER OIL CLR	2-FT-70-108 2-THV-70-695B	_____ 0-50 "H_2O	5.0-9.9 gpm (0.993)			0.95 (2.2C.8.l)		**[≥5]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 8 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RCP 3 LOWER OIL CLR	2-FT-70-98 2-THV-70-695C	_____ 0-50 "H_2O	5.0-9.9 gpm (0.993)			0.95 (2.2C.8.i)		**[≥5]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 4 LOWER OIL CLR	2-FT-70-128 2-THV-70-695D	_____ 0-50 "H_2O	5.0-9.9 gpm (0.993)			0.95 (2.2C.8.r)		**[≥5]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 1 THERMAL BARRIER	2-FT-70-115 2-THV-70-684A	_____ 0-100 "H_2O	40.3-59 gpm (0.993)			5 (2.2C.8.m)		**[≥40]** 60
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 9 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RCP 2 THERMAL BARRIER	2-FT-70-105 2-THV-70-684B	_____ 0-100 "H_2O	40.3-59 gpm (0.993)			5 (2.2C.8.j)		**[≥40]** 60
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 3 THERMAL BARRIER	2-FT-70-95 2-THV-70-684C	_____ 0-100 "H_2O	40.3-59 gpm (0.993)			5 (2.2C.8.g)		**[≥40]** 60
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 4 THERMAL BARRIER	2-FT-70-124 2-THV-70-684D	_____ 0-100 "H_2O	40.3-59 gpm (0.993)			5 (2.2C.8.p)		**[≥40]** 60
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 10 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RB SUPPLY HDR FLOW	2-FT-70-142 NA	0-100 "H_2O	1012-1306 gpm (0.993)			120 (2.2C.8.s)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RAD MONITOR 2-RE-90-123/A	2-FI-90-123/A 2-ISIV-90-123D	NA	7-9 gpm +/-1 gpm		NA NA	NA (2.2C.8.ll)		**[≥6]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SPENT FUEL PIT HTX B	0-FI-70-6 0-THV-70-530B	_____ 0-50 "H_2O	3077-3656 gpm (0.975)			636.5 (2.2C.8.rr)		**[≥3000]** 3750
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 11 of 11)

CCS FLOW BALANCE UNDER STARTUP CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
CCS HTX B INLET FLOW	2-FI-70-200 NA	0-300 "H_2O	10393-13600 gpm NA		NA NA	750.6 (2.2C.8.a)	NA	NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

*The test gage at 2-FT-70-181, SAMPLE HTX OUTLET HDR FLOW, reads total sample htx/chiller flow. Close respective inlet isolation valves as required to obtain individual HTX flow.

Attachment 6
(Page 1 of 10)

CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
CCP 2A-A LUBE & GEAR OIL COOLER	2-FT-70-146 2-THV-70-554A	_____ 0-20 "H_2O	28.5-35 gpm (0.993)			7.83 (2.2C.8.t)		**[≥28]** 36
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SIS PUMP 2A-A LUBE OIL COOLER	2-FT-70-147 2-THV-70-590A	_____ 0-50 "H_2O	15.3-29 gpm (0.993)			2.83 (2.2C.8.u)		**[≥15]** 30
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RHR PUMP 2A-A SEAL WTR HTX	2-FT-70-151 2-THV-70-566A	_____ 0-50 "H_2O	10.2-14 gpm (0.993)			2 (2.2C.8.w)		**[≥10]** 15
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 2 of 10)

CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
CONT SPRAY PUMP 2A-A OIL HTX	2-FT-70-150 2-THV-70-571A	_____ 0-20 "H_2O	2.2-4.0 gpm (0.993)			2.83 (2.2C.8.v)		**[≥2]** 4
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
2A ESF SUPPLY HEADER	2-FT-70-159C NA	_____ 0-100 "H_2O	55-85 gpm (0.993)			600 (2.2C.8.z)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
WASTE GAS CMPRSR B HTX	2-FT-70-21 2-THV-70-519	_____ 0-100 "H_2O	50.3-94 gpm (0.993)			6.082 (2.2C.8.d)		**[≥50]** 95
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 3 of 10)

CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
NON-REGEN LETDN HTX 2A	2-FT-70-190 2-THV-70-577	_____ 0-200 "H2O	1007-1241 gpm (0.993)			100 (2.2C.8.ee)		**[≥1000]** 1250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CVCS SEAL WTR HTX 2A	2-FT-70-176 2-THV-70-586	_____ 0-100 "H2O	202-248 "H2O (0.993)			25 (2.2C.8.cc)		**[≥200]** 250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SAMPLE HTX 2A*	2-FE-70-217 2-THV-70-731A	_____ 0-20 "H2O	3.8-16.8 "H2O (0.995)			10.25 (2.2C.6)		**[≥20]** 42
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 4 of 10)

CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
SAMPLE HTX 2B*	2-FE-70-216 2-THV-70-731B	_____ 0-20"H2O	7.5-22.8 "H2O (0.995)			10.25 (2.2C.6)		**[≥28]** 49
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SAMPLE CHILLER*	2-FE-70-218 2-THV-70-740	_____ 0-20"H2O	11.5 66.1 "H2O (0.995)			6.15 (2.2C.7)		**[≥22]** 50
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SAMPLE HXS/CHILLER (TOTAL)	2-FT-70-181 NA	_____ 0-50"H2O	70.5-140 gpm (0.993)			17.9 (2.2C.8.dd)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 5 of 10)

CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
MISC EQ SUPPLY HDR FLOW	2-FT-70-164A NA	_____ 0-150 "H_2O	1320-1736 gpm (0.993)			163.3 (2.2C.8.aa)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 1 UPPER OIL COOLER	2-FT-70-116 2-THV-70-696A	_____ 0-50 "H_2O	151-182 gpm (0.993)			25.45 (2.2C.8.n)		**[≥150]** 184
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 2 UPPER OIL COOLER	2-FT-70-106 2-THV-70-696B	_____ 0-50 "H_2O	151-182 gpm (0.993)			25.45 (2.2C.8.k)		**[≥150]** 184
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 6 of 10)

CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RCP 3 UPPER OIL COOLER	2-FT-70-96 2-THV-70-696C	_____ 0-50 "H_2O	151-182 gpm (0.993)			25.45 (2.2C.8.h)		**[≥150]** 184
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 4 UPPER OIL COOLER	2-FT-70-125 2-THV-70-696D	_____ 0-50 "H_2O	151-182 gpm (0.993)			25.45 (2.2C.8.q)		**[≥150]** 184
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 1 LOWER OIL CLR	2-FT-70-119 2-THV-70-695A	_____ 0-50 "H_2O	5.0-9.9 gpm (0.993)			0.95 (2.2C.8.o)		**[≥5]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
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CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$ (gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RCP 2 LOWER OIL CLR	2-FT-70-108 2-THV-70-695B	_____ 0-50 "H_2O	5.0-9.9 gpm (0.993)			0.95 (2.2C.8.l)		**[≥5]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 3 LOWER OIL CLR	2-FT-70-98 2-THV-70-695C	_____ 0-50 "H_2O	5.0-9.9 gpm (0.993)			0.95 (2.2C.8.i)		**[≥5]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 4 LOWER OIL CLR	2-FT-70-128 2-THV-70-695D	_____ 0-50 "H_2O	5.0-9.9 gpm (0.993)			0.95 (2.2C.8.r)		**[≥5]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
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CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RCP 1 THERMAL BARRIER	2-FT-70-115 2-THV-70-684A	_____ 0-100 "H_2O	40.3-59 gpm (0.993)			5 (2.2C.8.m)		**[≥40]** 60
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 2 THERMAL BARRIER	2-FT-70-105 2-THV-70-684B	_____ 0-100 "H_2O	40.3-59 gpm (0.993)			5 (2.2C.8.j)		**[≥40]** 60
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RCP 3 THERMAL BARRIER	2-FT-70-95 2-THV-70-684C	_____ 0-100 "H_2O	40.3-59 gpm (0.993)			5 (2.2C.8.g)		**[≥40]** 60
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 9 of 10)

CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$ (gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RCP 4 THERMAL BARRIER	2-FT-70-124 2-THV-70-684D	_____ 0-100 "H_2O	40.3-59 gpm (0.993)			5 (2.2C.8.p)		**[≥40]** 60
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RB SUPPLY HDR FLOW	2-FT-70-142 NA	_____ 0-100 "H_2O	780-1016 gpm (0.993)			120 (2.2C.8.s)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RAD MONITOR 2-RE-90-123/A	2-FI-90-123/A 2-ISIV-90-123D	NA	7-9 gpm +/-1 gpm		NA NA	NA (2.2C.8.ll)		**[≥6]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 10 of 10)

CCS FLOW BALANCE UNDER SIMULATED NORMAL CONDITION

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #**	**Target Value** **(Corr. Mult.)**	**ΔP("H2O) or Flow(gpm)**	**ΔPcorrected** **(ΔP)1/2**	**C** **(Ref.)**	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
SPENT FUEL PIT HTX B	0-FI-70-6 0-THV-70-530B	_____ 0-50 "H_2O	3077-3656 (0.975)			636.5 (2.2C.8.rr)		**[≥3000]** 3750
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCS HTX B INLET FLOW	2-FI-70-200 NA	_____ 0-300 "H_2O	5161-6800 gpm NA		NA NA	750.6 (2.2C.8.a)	NA	NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

*The test gage at 2-FT-70-181, SAMPLE HTX OUTLET HDR FLOW, reads total sample htx/chiller flow. Close respective inlet isolation valves as required to obtain individual HTX flow.

Data Sheet 1
(Page 1 of 1)

THERMAL BARRIER BOOSTER PUMP 2A-A PERFORMANCE DATA AND CALCULATED TDH

Date _____

Differential Pressure Data				
Data Point	Suction Pressure(1) 2-PI-70-137	Discharge Pressure(2) 2-PI-70-136	Flow 2-FIS-70-81	ΔP (2) - (1).
6.2.1[14]				
6.2.1[16]				
6.2.1[18]				
6.2.1[20]				
6.2.1[22]				

Calculated Total Dynamic Head (TDH)		
Data Point	TDH = 2.31 X ΔP	TDH
6.2.1[14]		
6.2.1[16]		
6.2.1[18]		
6.2.1[20]		
6.2.1[22]		

Calculations performed by:

_____ Initials _____ Date

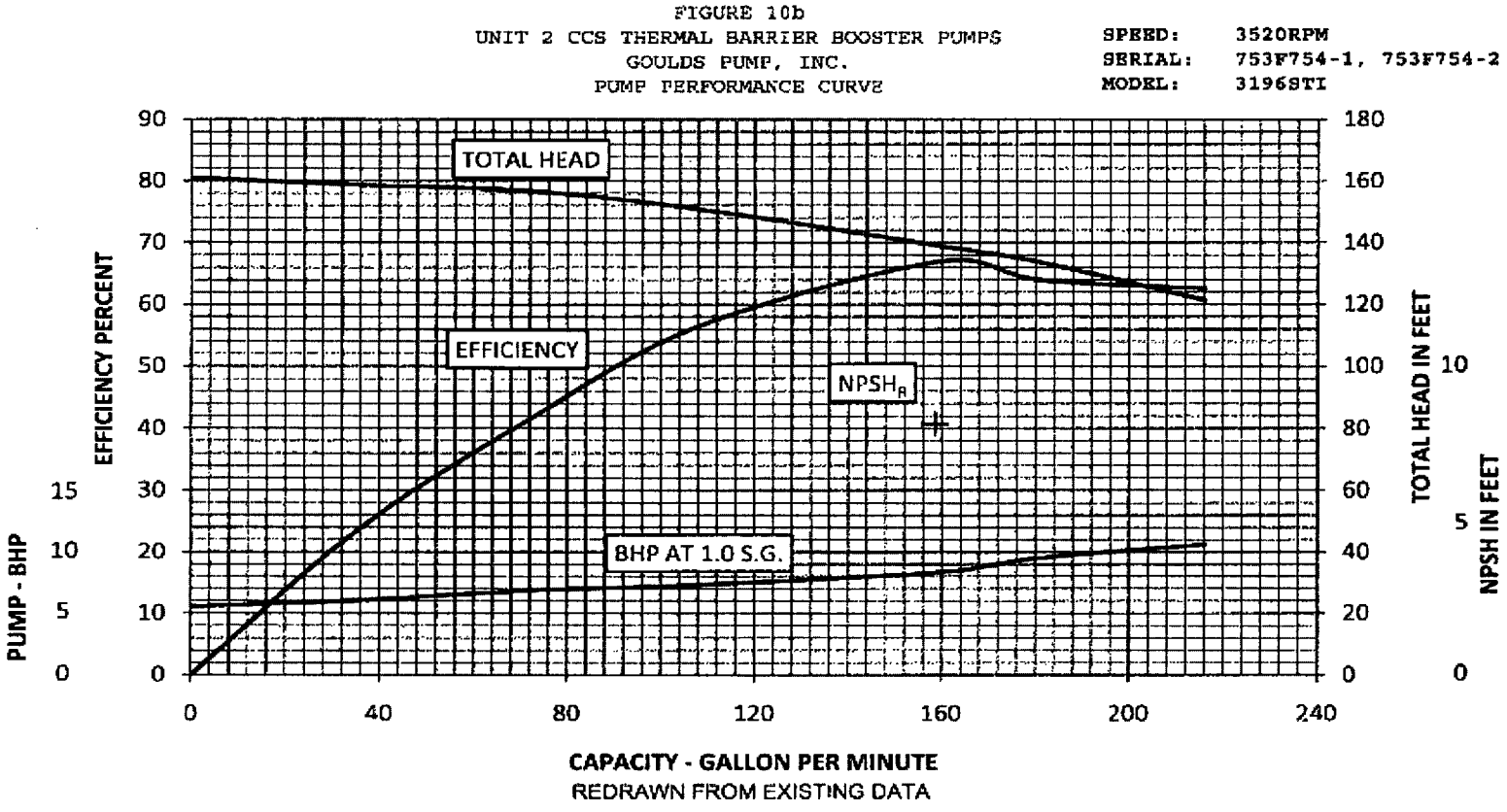
Calculations verified by:

_____ Initials _____ Date

Data Sheet 2
(Page 1 of 1)

THERMAL BARRIER BOOSTER PUMP 2A-A PUMP CURVE

Date _____



Data Sheet 3
(Page 1 of 1)

THERMAL BARRIER BOOSTER PUMP 2B-B PERFORMANCE DATA AND CALCULATED TDH

Date _____

Differential Pressure Data				
Data Point	Suction Pressure(1) 2-PI-70-138	Discharge Pressure(2) 2-PI-70-135	Flow 2-FIS-70-81	ΔP (2) - (1).
6.2.2[6]				
6.2.2[8]				
6.2.2[10]				
6.2.2[12]				
6.2.2[14]				

Calculated Total Dynamic Head (TDH)		
Data Point	TDH = 2.31 X ΔP	TDH
6.3.2[6]		
6.3.2[8]		
6.3.2[10]		
6.3.2[12]		
6.3.2[14]		

Calculations performed by:

_____ _____
Initials Date

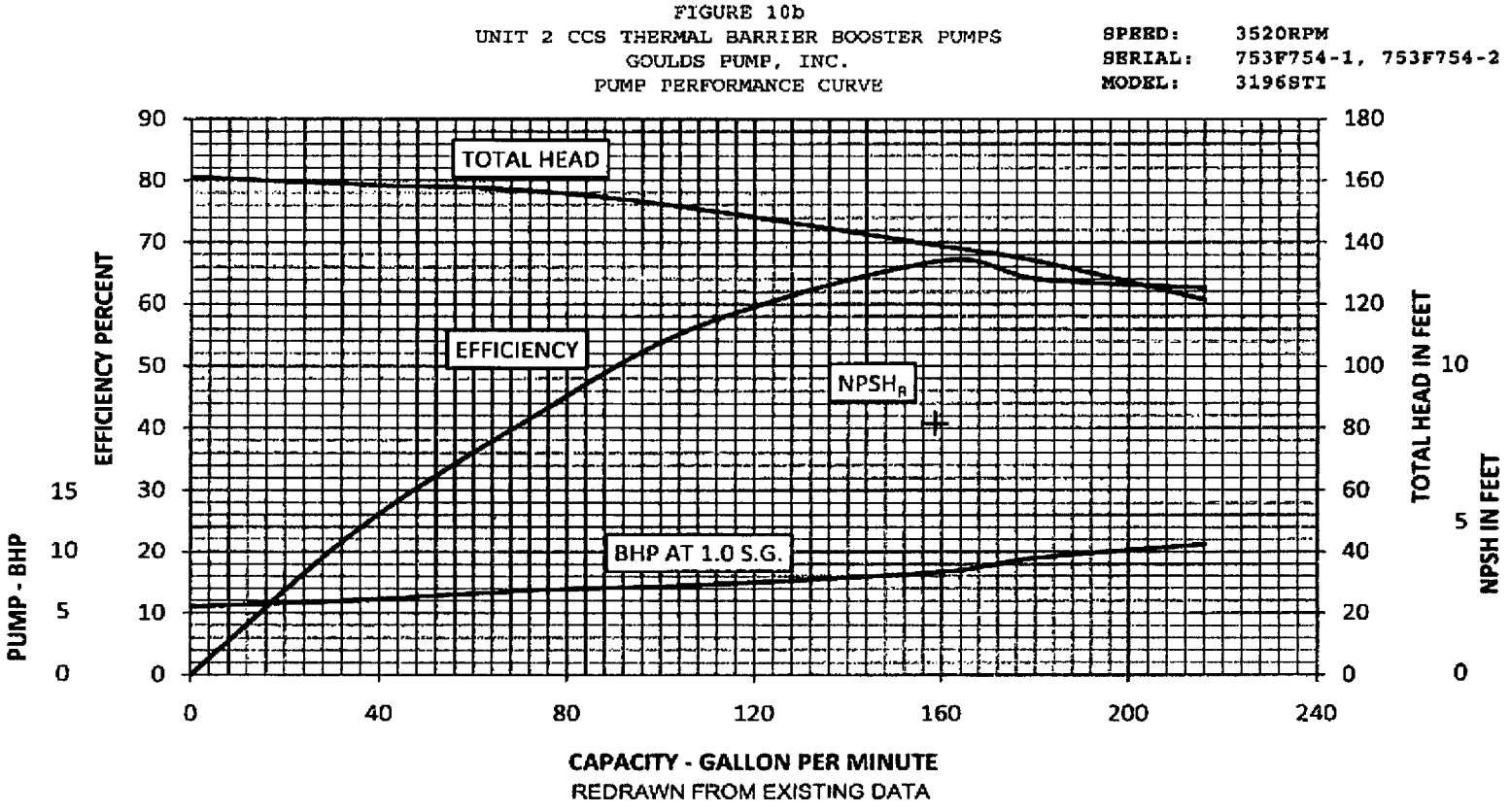
Calculations verified by:

_____ _____
Initials Date

Data Sheet 4
(Page 1 of 1)

THERMAL BARRIER BOOSTER PUMP 2B-B PUMP CURVE

Date _____



WATTS BAR NUCLEAR PLANT
UNIT 2 PREOPERATIONAL TEST

TITLE: Component Cooling System
Unit 2 Train B Flow Balance

Instruction No: 2-PTI-070-02B

Revision No: 0000

PREPARED BY: Joseph Cardoza Joe Cardoza DATE: 12-19-12
PRINT NAME / SIGNATURE

REVIEWED BY: Jimmy E. Kiber DATE: 12-19-12
PRINT NAME / SIGNATURE

INSTRUCTION APPROVAL

JTG MEETING No: 2-12-023

JTG CHAIRMAN: Mark A Welch DATE: 12/19/12

APPROVED BY : Mark A Welch DATE: 12/19/12
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	12/19/12	All	Initial Issue

Table of Contents

Table of Contents (continued)

Date _____

1.0 INTRODUCTION

1.1 Test Objectives

A. To demonstrate that the Component Cooling System (CCS) has the ability to provide adequate flow for Unit 1 & 2, Train B components required to meet design basis criteria.

B. To demonstrate that the Unit 2 Component Cooling System alarms and instrumentation will function as designed.

1.2 Scope

The CCS flow to Unit 1 & 2 Train B equipment will be adjusted as necessary to ensure adequate flow to satisfy the NORMAL (Power Operation)/STARTUP (from COLD Shutdown) and COLD Shutdown/LOCA-Recirculation modes of operation. The flow to the Radiation Monitor is routinely adjusted by maintenance instruction and is not adjusted by this test instruction.

The newly installed Unit 2 Train B CCS alarms and instrumentation will be tested to verify function and operability. The Digital Control System (Foxboro I/A) will be utilized to display and gather data from permanent plant instruments during this test instruction.

Date _____

2.0 REFERENCES

2.1 Performance References

A. SMP-9.0, Conduct of Test

B. 0-SOI-70-01, Common B Train Component Cooling Water (CCS System)

C. SOI-70.01, Unit 1 Component Cooling Water (CCS) System

D. TI-31.14, Piping Vibration Measurements

E. TI-31.08, Flow Balancing Valves Setpoint Positions

2.2 Developmental References

A. Final Safety Analysis Report (FSAR), thru Amendment, 109

1. Section 9.2.2
2. Table 14.2-1, pages 7 and 8

B. Drawings

1. 1-47W859-1, Component Cooling System, Rev. 54
   a. DCA 53413-004 R0
   b. DCA 53413-005 R0
   c. DCA 56035-057 R0
2. 2-47W859-1, Component Cooling System, Rev. 10
   a. DRA 54782-013 R0
   b. DRA 55337-002 R0
   c. DRA 55337-147 R1
   d. DRA 55337-148 R2
   e. DRA 55337-149 R1

Date _____

2.2 Developmental References (continued)

3. 1-47W859-4, Component Cooling System, Rev. 25
   a. 53413-012 R0
4. 2-47W859-4, Component Cooling System, Rev. 11
   a. DRA 53537-007 R0
   b. DRA 53537-008 R1
   c. DRA 55337-005 R0
5. 1-47W610-70-1, Component Cooling Water System, Rev. 28
   a. DCA 53413-006 R0
   b. DCA 53413-007 R0
   c. DCA 53413-008 R0
   d. DCA 53111-083 R0
6. 1-47W610-70-1A, Component Cooling Water System, Rev. 11
7. 1-47W610-70-2A, Component Cooling Water System, Rev. 19
8. 2-47W610-70-2, Component Cooling Water System, Rev. 3
   a. DRA 52378-488 R2
   b. DRA 52427-013 R0
   c. DRA 52671-018 R1
   d. DRA 54782-201 R0
   e. DRA 55337-010 R0
   f. DRA 55337-014 R0
   g. DRA 55337-150 R0

Date _____

2.2 Developmental References (continued)

9. 1-45B655-27D, MCR Annunciator Inputs Window Box XA-55-27D, Rev.2
   a. DRA 52630-166 R0
   b. DRA 52630-167 R0
10. 1-45B655-E27D, Electrical Annunciator Window Box XA-55-E27D Engraving, Rev.0
   a. DCA 56360-175 R1
11. 2-47W611-70-2 Electrical Logic Diagram, Rev.2
   a. DRA 55337-013 R1
12. DIGITAL CONTROL SYSTEM, FOXBORO INVENSYS (I/A)
   a. 08F802403-FD-2843-1, BOP Pump B-B Mech Seal Heat Exchanger, R2
   b. 08F802403-FD-2843-2, BOP Pump B-B Mech Seal Heat Exchanger, R2
   c. 08F802403-FD-2843-3, BOP Pump B-B Mech Seal Heat Exchanger, R2
   d. 08F802403-FD-2844-1, BOP RHR Heat Exchanger 2B Return Temperature, R2
   e. 08F802403-FD-2975-1, ESF EQ B-B Sup Header Flow ACR B, R2
13. ANALOG CONTROL SYSTEM, FOXBORO INVENSYS (Spec 200)
   a. 08F826663-FD-2214-1, RHR Htx 2B-B Supply Hdr Flow, 2-LPF-70-165A, R0

C. Documents

1. 2-TSD-70-1, Test Scoping Document, Component Cooling System, Rev.2
2. 2-PTI-70-01, Component Cooling Water Pump/Valve Logic Test, Rev.0
3. 2-PTI-70-02A, Component Cooling System Unit 2 Train A Flow Balance, Rev.0
4. WB-DC-40-31.16, Criteria for Vibration Qualification of Piping

Date _____

2.2 Developmental References (continued)

5. VTD-D088-0020 R.5, Vendor Manual Delaval Single Stage Centrifugal Pumps

6. Scaling and Setpoint Documents

   a. SSD-0-FI-70-200, CCS Htx C Inlet Flow, Rev.0, 4/10/91

   b. SSD-1-LPF-70-145, CCP 1B-B Mech Seal Htx Outlet Flow, Rev. 1, 10/18/1995

   c. SSD-1-LPF-70-148, SIS Pump 1B-B Mech Seal Htx Outlet Flow, Rev. 1, 10/18/1995

   d. SSD-1-LPF-70-149, Cntmt Pump 1B-B Mech Seal Htx Outlet Flow, Rev. 1, 10/25/2008

   e. SSD-1-LPF-70-152, RHR Pump 1B-B Mech Seal Htx Outlet Flow, Rev. 1, 11/25/2008

   f. SSD-1-LPF-70-155, RHR Htx 1B-B Outlet Flow, Rev. 4, 11/25/2008

   g. SSD-1-LPF-70-165A, RHR Pump 1B-B Supply Hdr Flow, Rev. 1, 02/11/2010

   h. SSD-2-LPF-70-145, CCP 2B-B Mech Seal Htx Outlet Flow, Rev. 1, 02/07/2012

   i. SSD-2-LPF-70-148, SIS Pump 1B-B Mech Seal Htx Outlet Flow, Rev. 2, 02/07/2012

   j. SSD-2-LPF-70-149, Cntmt Pump 2B-B Mech Seal Htx Outlet Flow, Rev. 1, 02/07/2012

   k. SSD-2-LPF-70-152, RHR Pump 2B-B Mech Seal Htx Outlet Flow, Rev. 2, 02/07/2012

   l. SSD-2-LPT-70-154, RHR Htx 2B-B Outlet Temp, Rev. 1, 02/07/2012

   m. SSD-2-LPF-70-155, RHR Htx 2B-B Outlet Flow, Rev. 3, 04/12/2012

Date _____

2.2 Developmental References (continued)

n. SSD-2-LPF-70-165A, RHR Pump 2B-B Supply Hdr Flow, Rev. 2, 09/26/2011

o. SSD-2-LPF-70-165C, RHR Pump 2B-B Supply Hdr Flow Rev.2, 09/26/11

p. SSD-0-LPR-90-123-S, Component Cooling System Liquid Effluent Monitor, Rev. 12, 10/23/2008

7. IMI-90.006, 18 Month Flow Instrument Calibration of the General Atomic Liquid Radiation Monitor Flow Loops, R11, 6/22/2012

Date _____

3.0 PRECAUTIONS AND LIMITATIONS

A. Standard precautions shall be followed for working around energized electrical equipment in accordance with TVA Safety Procedure 1021.

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 wires removed/lifted from a terminal shall be identified and taped or covered with an insulator to prevent personnel or equipment hazard and possible spurious initiations. The wires should be grouped together and labeled with the work implementing document number that required them to be lifted if left unattended.

E. All open problems (including non Tech Spec testing acceptance criteria) are to be tracked by a corrective action document and entered on the appropriate system punchlist.

F. 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.

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

H. Ensure there are no adverse effects to the operation of Unit 1 structures, systems, or components.

I. Test personnel will coordinate with Unit 1 Operations when manipulating Unit 1equipment if required.

Date _____

3.0 PRECAUTIONS AND LIMITATIONS (continued)

J. During the performance of this procedure visual observation of piping and components is required. This includes steady state and transient operations with visual confirmation that vibration is not excessive.

K. If the vibration is determined to be excessive the Test Engineer shall initiate a Test Deficiency Notice (TDN).

L. In the balanced flow condition, the CCS pumps shall be limited to 6800 GPM each. However, it is permissible to exceed this pump limit while establishing the balanced conditions and during pump performance testing as long as pump cavitation is not observed. This limit prevents excessive loading of the Emergency Diesel Generators by the CCS pump motors during operations with Loss of Offsite Power.

M. The Component Cooling System surge tanks shall be kept at normal operating levels throughout the performance of this test.

N. During flow balancing, special precautions (Pre-operational Testing in Progress tags) shall be taken to ensure that once a throttle valve position is established in a particular operating mode, that subsequent testing will not result in valve repositioning that would prevent the component from receiving the minimum required flow in any other operating mode.

O. The following flow limits shall be observed and vibration shall be monitored if flow limits are approached or exceeded during this test.

COMPONENT	FLOW LIMIT
RHR Heat Exchanger	6250 GPM
Centrifugal Charging Pump	36 GPM
Safety Injection Pump	30 GPM
RHR Pump	15 GPM
Containment Spray Pump	4 GPM
Radiation Monitor	10 GPM

Date _____

3.0 PRECAUTIONS AND LIMITATIONS (continued)

P. Operators should be alert for changes in system parameters, such as pressure, flow and surge tank levels, while initially valving in components (for example Section 6.2.1 initiates flow to RHR HX). Test Director should keep Operators informed as system configuration changes during this test instruction.

Date _____

4.0 PREREQUISITE ACTIONS

NOTE

Preliminary action steps may be performed in any order with Test Directors approval.

4.1 Preliminary Actions

[1] **VERIFY** 2-PTI-70-01, Component Cooling System Pump/Valve Logic Test, has been completed. _____

[2] **VERIFY** the test/performance copy of this Preoperational Test Instruction (PTI) is the current revision including any change notices and as needed, each test person assisting in this test has the current revision including any change notices. _____

[3] **OBTAIN** copies of the applicable forms from the latest revision of SMP-9.0 **AND**

ATTACH to this PTI for use during the performance of this PTI. _____

[4] **ENSURE** components contained within the boundaries of this test are under the jurisdictional control of Preoperational Startup Engineering (PSE) and/or Plant Operations. _____

[5] **ENSURE** required Component Testing has been completed prior to start of test. _____

[6] **VERIFY** System cleanness as required for the performance of this test has been completed in accordance with SMP-7.0. _____

[7] **ENSURE** DCN 53413 Stages 5 & 6 are implemented, returned to operation (RTO), and Unit 1 Operating procedures are available for dual unit system alignment. _____

[8] **ENSURE** that the Fire Protection Supervisor or Designee has reviewed this test instruction and the supporting operating instructions to determine if any Fire Protection Impairment Procedures (FPIP) are required and document. _____

Date _____

4.1 Preliminary Actions (continued)

[9] **ENSURE** outstanding Design Change Notices (DCN's), Engineering Document Construction Releases (EDCR's) or Temporary Alterations (TA's) do NOT adversely impact testing **AND**

ATTACH documentation of DCN's, EDCR's and TA's that were reviewed to the data package. _____

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

[11] **EVALUATE** open items in Watts Bar Integrated Task Equipment List (WITEL), **AND**

ENSURE they will NOT adversely affect the test performance and results. _____

[12] **EVALUATE** outstanding Clearances for impact to the test performance, **AND**

RECORD in Appendix B, Temporary Condition Log if required. _____

[13] **ENSURE** all piping supports required for testing are installed and adjusted as required. _____

[14] **VERIFY** plant instruments, listed on Appendix C, Permanent Plant Instrumentation Log, are placed in service and are within their calibration interval. _____

[15] **ENSURE** System 98, Digital Control System trends and displays are established as required to gather data in support of this test instruction. _____

Date _____

4.1 Preliminary Actions (continued)

[16] **ENSURE** System 55, Annunciator and Sequential Events Recording System applicable TBK switches are ON, the applicable Master Switches are ON, and window software input (s) are ENABLED for the following Annunciator windows

A. 0-XA-55-27D, 259-D, RHR HX 2B-B RET FLOW LO _____

B. 0-XA-55-27D, 259-E, RHR HX 2B-B RET TEMP HI _____

C. 0-XA-55-27D, 257-E, RHRP 2B-B MECH SEAL HX FLOW LO _____

D. 0-XA-55-27D, 255-E, SIP 2B-B OIL CLR FLOW LO _____

E. 0-XA-55-27D, 257-D, CSP 2B-B OIL CLR FLOW LO _____

F. 0-XA-55-27D, 255-D, CCP 2B-B GEAR & OIL CLR FLOW LO _____

[17] **PERFORM** a pretest walkdown on equipment to be tested to ensure no conditions exist that will impact test performance. _____

[18] **INFORM** Predictive Maintenance (PDM) personnel of requirement to measure vibration data on rotating equipment. _____

[19] **INFORM** Preoperational Startup Engineering personnel of requirement to monitor piping and components for vibration during periods of testing. _____

[20] **CONDUCT** a pretest briefing with Test and Operations personnel in accordance with SMP-9.0. _____

[21] **ESTABLISH** communications in areas where testing is to be conducted. _____

Date _____

4.2 Special Tools, Measuring and Test Equipment, parts and Supplies

[1] 1 Diff. Press. Gage, 0-10 "H2O, Accuracy ±1% _____

[2] 1 Diff. Press. Gage, 0-100 "H2O, Accuracy ±1% _____

4.3 Field Preparations

[1] **ENSURE** the following systems are in service or operating to the extent necessary to perform this test:

A. Digital Control System (System No. 098) _____

B. Plant Annunciator System (System No. 055) _____

C. 120 VAC Vital Power System (System No. 235) _____

D. 125 VDC Vital Power System (System No. 236) _____

E. 480V Reactor MOV Boards (System No. 213) _____

F. 480V Shutdown Power System (System No. 212) _____

G. Control Air System (System No. 032) _____

H. Essential Raw Cooling Water System (System No. 067) _____

I. Demineralized Water System (System No. 059) _____

[2] **ENSURE** Component Cooling System is aligned in accordance with all checklists in 0-SOI-70.01, or equivalent. _____

[3] **ENSURE** Component Cooling System is filled and vented in accordance with 0-SOI-70.01, or equivalent. _____

[4] **PERFORM** valve alignment per Attachment 1, Valve Checklist. _____

[5] **RECORD** the Full Stroke Number of Turns from Full OPEN position to Full CLOSED position on Attachment 3 as specified in Step 1.0 **AND**

ENSURE Unit 2 Throttle Valves on Attachment 3 are in the OPEN position. _____

Date _____

4.3 Field Preparations (continued)

[6] **INSTALL** Measuring and Test Equipment (M&TE) at test connections for instrument locations listed in accordance with Appendix E. _____

[7] **VERIFY** M&TE required for test performance has been (as required) filled, vented, and placed in service in accordance with Appendix D. _____

[8] **VERIFY** M&TE calibration due dates will support the completion of this test performance. _____

Date _____

4.4 Approvals and Notifications

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

_____	_____
Preoperational Startup Manager Signature	Date

[2] Prior to start of the test; **OBTAIN** the Unit 2 Operations Supervisor's (US/SRO) or Shift Manager's (SM) authorization.

_____	_____
US/SRO/SM Signature	Date

[3] Prior to start of the test; **OBTAIN** the Unit 1 Operations Supervisor's (US/SRO) or Shift Manager's (SM) authorization.

_____	_____
US/SRO/SM Signature	Date

Date _____

5.0 ACCEPTANCE CRITERIA

A. Unit 2 CCS Train B alarms and instrumentation will be verified to function and operate as designed (Section 6.1).

B. The Component Cooling water flow distribution to the nonsafety related and safety related loads and to safety related loads when non-safety related loads are isolated in Unit 1 NORMAL/Unit 2 STARTUP, Unit 1 STARTUP/Unit 2 NORMAL and Unit 1 COLD SHUTDOWN/ Unit 2 LOCA - Recirculation modes are in accordance with design as specified in Attachments 4, 5, and 6 (Reference 2.2.C.1).

COMPONENT	FLOW CRITERIA	STEPS VERIFIED
RHR Heat Exchanger	≥ 5000 GPM	6.2.1[11] 6.2.2[5] 6.2.3[4]
Centrifugal Charging Pump	≥ 28 GPM	6.2.1[11] 6.2.2[5] 6.2.3[4]
Safety Injection Pump	≥ 15 GPM	6.2.1[11] 6.2.2[5] 6.2.3[4]
RHR Pump	≥ 10 GPM	6.2.1[11] 6.2.2[5] 6.2.3[4]
Containment Spray Pump	≥ 2 GPM	6.2.1[11] 6.2.2[5] 6.2.3[4]
Radiation Monitor	≥ 6 GPM	6.2.1[11] 6.2.2[5] 6.2.3[4]

Date _____

6.0 PERFORMANCE

6.1 Component Cooling System Annunciator Test

NOTE

Foxboro I/A workstations will be used to help perform some of the following steps. Ensure Foxboro I/A System Engineer or a qualified individual is available for this portion of the test.

6.1.1 RHR Heat Exchanger 2B-B Flow Alarm

[1] **ENSURE** annunciator 259-D (0-XA-55-27D), RHR HX 2B-B RET FLOW LO, is CLEAR. _____

[2] **OPEN** 2-FCV-70-153, RHR HEAT EXCHANGER 2B CCS OUTLET. _____

[3] **VERIFY** annunciator 259-D (0-XA-55-27D), RHR HX 2B-B RET FLOW LO, ALARMS. _____

[4] **PLACE** 2-FS-70-155 (W2BOP_070:2FS0700155) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[5] **TOGGLE** 2-FS-70-155 (W2BOP_070:2FS0700155) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 259-D CLEARS. _____

B. Unit 2 Event Display monitor indicates 259-D RHR HX 2B-B RET FLOW LO (2-FS-70-155) returns to NORMAL. _____

[7] **TOGGLE** 2-FS-70-155 (W2BOP_070:2FS0700155) to the CLOSED position using a Foxboro I/A workstation. _____

[8] **VERIFY** the following:

A. Annunciator 259-D ALARMS. _____

B. Unit 2 Event Display monitor indicates 259-D RHR HX 2B-B RET FLOW LO (2-FS-70-155) is in ALARM. _____

Date _____

6.1.1 RHR Heat Exchanger 2B-B Flow Alarm (continued)

[9] **PLACE** 2-FS-70-155 (W2BOP_070:2FS0700155) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

[10] **CLOSE** 2-FCV-70-153, RHR HEAT EXCHANGER 2B CCS OUTLET. _____

[11] **VERIFY** annunciator 259-D (0-XA-55-27D), RHR HX 2B-B RET FLOW LO, CLEARS _____

6.1.2 RHR Heat Exchanger 2B-B Temperature Alarm

[1] **ENSURE** annunciator 259-E (0-XA-55-27D), RHR HX 2B-B RET TEMP HI, is CLEAR. _____

[2] **PLACE** 2-TS-70-154 (W2BOP_070:2TS0700154) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-TS-70-154 (W2BOP_070:2TS0700154) to the CLOSED position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 259-E ALARMS. _____

B. Unit 2 Event Display monitor indicates 259-E RHR HX 2B-B RET TEMP HI (2-TS-70-154) is in ALARM. _____

[5] **TOGGLE** 2-TS-70-154 (W2BOP_070:2TS0700154) to the OPEN position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 259-E CLEARS. _____

B. Unit 2 Event Display monitor indicates 259-E RHR HX 2B-B RET TEMP HI (2-TS-70-154) returns to NORMAL. _____

[7] **PLACE** 2-TS-70-154 (W2BOP_070:2TS0700154) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.3 RHR Pump 2B-B Seal Water Heat Exchanger Flow Alarm

[1] **ENSURE** annunciator 257-E (0-XA-55-27D), RHRP 2B-B MECH SEAL HX FLOW LO, is in ALARM. _____

Date _____

6.1.3 RHR Pump 2B-B Seal Water Heat Exchanger Flow Alarm (continued)

[2] **PLACE** 2-FS-70-152 (W2BOP_070:2FS0700152) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-152 (W2BOP_070:2FS0700152) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 257-E CLEARS _____

B. Unit 2 Event Display monitor indicates 257-E RHRP 2B-B MECH SEAL HX FLOW LO (2-FS-70-152) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-152 (W2BOP_070:2FS0700152) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 257-E ALARMS. _____

B. Unit 2 Event Display monitor indicates 257-E RHRP 2B-B MECH SEAL HX FLOW LO (2-FS-70-152) is in ALARM. _____

[7] **PLACE** 2-FS-70-152 (W2BOP_070:2FS0700152) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.4 Safety Injection Pump 2B-B Oil Cooler Flow Alarm

[1] **ENSURE** annunciator 255-E (0-XA-55-27D), SIP 2B-B OIL CLR FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-148 (W2BOP_070:2FS0700148) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-148 (W2BOP_070:2FS0700148) to the OPEN position using a Foxboro I/A workstation. _____

Date _____

6.1.4 Safety Injection Pump 2B-B Oil Cooler Flow Alarm (continued)

[4] **VERIFY** the following:

A. Annunciator 255-E CLEARS _____

B. Unit 2 Event Display monitor indicates 255-E SIP 2B-B OIL CLR FLOW LO (2-FS-70-148) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-148 (W2BOP_070:2FS0700148) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 255-E ALARMS. _____

B. Unit 2 Event Display monitor indicates 255-E SIP 2B-B OIL CLR FLOW LO (2-FS-70-148) is in ALARM. _____

[7] **PLACE** 2-FS-70-148 (W2BOP_070:2FS0700148) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.5 Containment Spray Pump 2B-B Oil Cooler Flow Alarm

[1] **ENSURE** annunciator 257-E (0-XA-55-27D), RHRP 2B-B MECH SEAL HX FLOW LO, is in ALARM (2-FS-70-149). _____

[2] **PLACE** 2-FS-70-149 (W2BOP_070:2FS0700149) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-149 (W2BOP_070:2FS0700149) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 257-D CLEARS _____

B. Unit 2 Event Display monitor indicates 257-D CSP 2B-B OIL CLR FLOW LO (2-FS-70-149) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-149 (W2BOP_070:2FS0700149) to the CLOSED position using a Foxboro I/A workstation. _____

Date _____

6.1.5 Containment Spray Pump 2B-B Oil Cooler Flow Alarm (continued)

[6] **VERIFY** the following:

A. Annunciator 257-D ALARMS. _____

B. Unit 2 Event Display monitor indicates 257-D CSP 2B-B OIL CLR FLOW LO (2-FS-70-149) is in ALARM. _____

[7] **PLACE** 2-FS-70-150 (W2BOP_070:2FS0700149) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

6.1.6 Centrifugal Charging Pump 2B-B Oil Cooler Flow Alarm

[1] **ENSURE** annunciator 255-D (0-XA-55-27D), CCP 2B-B GEAR & OIL CLR FLOW LO, is in ALARM. _____

[2] **PLACE** 2-FS-70-145 (W2BOP_070:2FS0700145) to MANUAL in FoxSelect using a Foxboro I/A workstation. _____

[3] **TOGGLE** 2-FS-70-145 (W2BOP_070:2FS0700145) to the OPEN position using a Foxboro I/A workstation. _____

[4] **VERIFY** the following:

A. Annunciator 255-D CLEARS. _____

B. Unit 2 Event Display monitor indicates 255-D CCP 2B-B GEAR & OIL CLR FLOW LO (2-FS-70-145) returns to NORMAL. _____

[5] **TOGGLE** 2-FS-70-145 (W2BOP_070:2FS0700146) to the CLOSED position using a Foxboro I/A workstation. _____

[6] **VERIFY** the following:

A. Annunciator 255-D ALARMS. _____

B. Unit 2 Event Display monitor indicates 255-D CCP 2B-B GEAR & OIL CLR FLOW LO (2-FS-70-145) is in ALARM. _____

[7] **PLACE** 2-FS-70-145 (W2BOP_070:2FS0700145) to AUTO in FoxSelect using a Foxboro I/A workstation. _____

Date _____

6.2 Component Cooling System Train B Flow Balance

NOTES

1) Any required valve manipulations not specifically addressed in this procedure may be performed with concurrence by the Test Director and the Unit 2 US/SRO and entered in the Chronological Test Log.
2) System piping and components will be visually monitored during transients and steady state modes. Further evaluation of piping vibration may be performed to confirm if piping vibration is excessive. If excessive vibration is observed, then a TDN shall be initiated for engineering to evaluate.

6.2.1 CCS Train B Flow Balance Under Unit 1 NORMAL and Unit 2 STARTUP Condition

[1] **ENSURE** prerequisites in Subsection 4.0 have been completed. _____

[2] **VERIFY** an initial flowpath for Train B is established per Attachment 1, Valve Checklist. _____

CAUTION

1) Upon startup of any CCS pump, flow should be adjusted above the recommended **Minimum Flow of 900 gpm** and should be below the maximum of 6800 gpm.
2) As flow to each header and component is initiated, immediately **Monitor for Vibration** as flow rates may approach flow limits described in 3.0.N and Attachment 4.

[3] **ENSURE** CCS Pump C-S is aligned and in-service to Train B, in accordance with SOI-70.01. _____

[4] **OPEN** 2-FCV-70-3, using 2-HS-70-3A on 0-M-27B. _____

[5] **DIVERT FLOW** to 2B ESF Header:

[5.1] **OPEN** 2-FCV-70-153, RHR HEAT EXCHANGER 2B CCS OUTLET, by holding 2-HS-70-153A in OPEN position on 0-M-27B, **AND** _____

Date _____

6.2.1 CCS Train B Flow Balance Under Unit 1 NORMAL and Unit 2 STARTUP Condition (continued)

[5.2] **CLOSE** 1-FCV-70-153, RHR HEAT EXCHANGER 1B CCS OUTLET by holding 1-HS-70-153A in CLOSED position on 0-M-27B. _____

[6] **THOTTLE** flow through RHR Heat Exchanger 2B-B using 2-THV-70-546B to obtain 5000 (+105/-0) gpm on 2-FI-155 on 0-M-27B. _____

[7] **VERIFY** annunciator 259-D (0-XA-55-27D), RHR HX 2B-B RET FLOW LO, is CLEAR _____

[8] **ADJUST** the CCS flow to the ESF Pumps with the following valves:

[8.1] **THROTTLE** 2-THV-70-554B, CCP 2B-B OIL COOLERS CCS OUTLET THROTTLE to obtain a minimum of 28 gpm CCS flow on 2-FI-70-146, 0-M-27B. _____

[8.2] **VERIFY** annunciator 255-D (0-XA-55-27D), CCP 2B-B GEAR & OIL CLR FLOW LO, is CLEAR. _____

[8.3] **THROTTLE** 2-THV-70-590B, SI PUMP 2B-B LUBE OIL CLR CCS OUTLET THROTTLE, to obtain a minimum of 15 gpm on 2-FI-70-147 on 0-M-27B. _____

[8.4] **VERIFY** annunciator 255-E (0-XA-55-27D), SIP 2B-B OIL CLR FLOW LO, is CLEAR. _____

[8.5] **THROTTLE** 2-THV-70-566B, RHR PMP 2B-B SEAL WATER HX CCS OUTLET THROTTLE, to obtain a minimum of 10 gpm on 2-FI-70-151 on 0-M-27B. _____

[8.6] **VERIFY** annunciator 257-E (0-XA-55-27D), RHRP 2B-B MECH SEAL HX FLOW LO, is CLEAR. _____

[8.7] **THROTTLE** 2-THV-70-571B, CS PUMP 2B-B OIL HX CCS OUTLET THROTTLE to obtain a minimum of 2 gpm on 2-FI-70-150 on 0-M-27B. _____

[8.8] **VERIFY** annunciator 257-E (0-XA-55-27D), RHRP 2B-B MECH SEAL HX FLOW LO, is CLEAR. _____

Date _____

6.2.1 CCS Train B Flow Balance Under Unit 1 NORMAL and Unit 2 STARTUP Condition (continued)

[9] **ADJUST** the Throttle Valves listed on Attachment 4 to obtain the design flow requirements for each Component using the method described Step 2.0 of Attachment 2, Flow Balance Instructions. _____

[10] **DETERMINE** final Throttle Valve Set Point positions for the U1 NORMAL/U2 STARTUP Mode using the method described in Step 2.0 of Attachment 3, **AND**

RECORD number of turns from OPEN and CLOSED on Attachment 3. _____

[11] **RECORD** component flow rates on Attachment 4 using the method described in Step 3.0 of Attachment 2, **AND**

VERIFY the corrected Flows [8] on Attachment 4 meet design flow requirements. **[Acc Crit]**. _____

[12] **VERIFY** flow annunciators associated with components listed in Attachment 4 remain CLEAR. _____

Date _____

6.2.2 CCS Train B Flow Balance Under Unit 1 STARTUP and Unit 2 NORMAL Condition

NOTE

Adjustment of component throttle valve positions set in Section 6.2.1, U1 NORMAL / U2 STARTUP requires a RETEST of Section 6.2.1.

[1] **DIVERT FLOW** to 1B ESF Header:

[1.1] **OPEN** 1-FCV-70-153, RHR HEAT EXCHANGER 1B CCS OUTLET, by holding 1-HS-70-153A in OPEN position on 0-M-27B, **AND** _____

[1.2] **CLOSE** 1-FCV-70-153, RHR HEAT EXCHANGER 1B CCS OUTLET by holding 2-HS-70-153A in CLOSED position on 0-M-27B. _____

[2] **THOTTLE** flow through RHR Heat Exchanger 1B-B using 1-THV-70-546B to obtain 5000 (+105/-0) gpm on 1-FI-155 on 0-M-27B. _____

[3] **ADJUST** the Throttle Valves listed on Attachment 5 to obtain the design flow requirements for each Component using the method described Step 2.0 of Attachment 2, Flow Balance Instructions. _____

[4] **DETERMINE** final Throttle Valve Set Point positions for the U1 STARTUP/U2 NORMAL Mode using the method described in Step 2.0 of Attachment 3, **AND**

RECORD number of turns from OPEN and CLOSED on Attachment 3. _____

[5] **RECORD** component flow rates on Attachment 5 using the method described in Step 3.0 of Attachment 2, **AND**

VERIFY the corrected Flows [8] on Attachment 5 meet design flow requirements. **[Acc Crit]**. _____

[6] **VERIFY** flow annunciators associated with components listed in Attachment 5 remain CLEAR. _____

Date _____

6.2.3 CCS Train B Flow Balance Under Unit 1 COLD SHUTDOWN and Unit 2 LOCA Recirc Condition

NOTE

1) Adjustment of component throttle valve positions set in Section 6.2.1 & 6.2.2 a RETEST of Section of 6.2.1 & 6.2.2.
2) Observe requirements noted in operating instructions when realigning CCS Pump 2B: "Appendix R breaker and valves which are repositioned should be tracked per OR-14.10."

[1] **ALIGN** CCS Pump 2B-B to B Train header in accordance with 0-SOI-70.01, or equivalent. _____

[2] **START** CCS Pump 2B-B in accordance with 0-SOI-70.01, or equivalent, from handswitch 2-HS-70-33A located on 0-M-27B. _____

[3] **OPEN** 2-FCV-70-153, RHR HEAT EXCHANGER 2B CCS OUTLET. _____

[4] **RECORD** component flow rates on Attachment 6 using the method described in Step 3.0 of Attachment 2, **AND**

VERIFY the corrected Flows [8] on Attachment 6 meet design flow requirements. **[Acc Crit]**. _____

[5] **VERIFY** flow annunciators associated with components listed in Attachment 6 remain CLEAR. _____

[6] **RESTORE** THVs to as found positions per SOI-70.01 or as directed by Unit 1 US/SRO. _____

[7] **LEAVE** CCS in service per 0-SOI-70.01, or equivalent, or as directed by Unit 1 US/SRO. _____

Date _____

7.0 POST PERFORMANCE ACTIVITY

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

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

[3] **VERIFY** that post-test calibration of the M&TE used to record quantitative acceptance criteria has been satisfactorily performed and the results RECORDED on Measuring and Test Equipment (M&TE) Log, Appendix D in SMP-9.0. _____

[4] **VERIFY** the post-test calibration of permanent plant instruments used to record quantitative acceptance criteria has been satisfactorily performed and the results RECORDED on Appendix C, Permanent Plant Instrumentation Log (N/A if NOT required). _____

[5] **REMOVE** M&TE in accordance with Appendix E that was installed in Step 4.3[6]. _____

[6] **UPDATE** SOI-70.01 and TI-31.08 as appropriate or as directed by Operations. _____

Date _____

8.0 RECORDS

A. QA Records

Completed Test Package

B. Non-QA Records

None

Appendix A
(Page 1 of 1)

TEST PROCEDURES/INSTRUCTIONS REFERENCE REVIEW

Date _____

NOTE

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

PROCEDURE/INSTRUCTION	REVISION/ CHANGES	IMPACT Yes/No	INITIAL AND DATE. (N/A for no change)

Appendix B
(Page 1 of 1)

TEMPORARY CONDITION LOG

Date _____

NOTE

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

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

Appendix C
(Page 1 of 2)

PERMANENT PLANT INSTRUMENT LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	CAL DUE DATE	*FILLED AND VENTED	PLACED IN SERVICE *	USED FOR QUANTITATIVE ACC CRIT		POST-TEST** CAL DATE	**POST-TEST CALIBRATION ACCEPTABLE INITIAL/DATE
		INIT/DATE	INIT/DATE	YES	NO		
0-FI-70-201							
1-FI-70-145							
1-FI-70-148							
1-FI-70-149							
1-FI-70-152							
1-FI-70-155							
1-FI-70-165A							
2-FI-70-145							
2-FI-70-148							
2-FI-70-149							

Appendix C
(Page 2 of 2)

PERMANENT PLANT INSTRUMENT LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	CAL DUE DATE	*FILLED AND VENTED	PLACED IN SERVICE *	USED FOR QUANTITATIVE ACC CRIT		POST-TEST** CAL DATE	**POST-TEST CALIBRATION ACCEPTABLE INITIAL/DATE
2-FI-70-152							
2-FI-70-155							
2-FI-70-165A							

*These items may be initialed and dated by personnel performing the task. Instrumentation NOT required to be filled and vented may be identified as NOT Applicable (NA).

**May be identified as NA if instrument was NOT used to verify/record quantitative acceptance criteria data.

Appendix D
(Page 1 of 1)

MEASURING AND TEST EQUIPMENT

Date _____

Instrument	Range	Accuracy	M&TE#	Cal Due Date	Location Used	Init/Date
1-FE-70-155						_____/_____
1-FE-70-149						_____/_____
						_____/_____
						_____/_____
						_____/_____
						_____/_____
						_____/_____
						_____/_____
						_____/_____
						_____/_____
						_____/_____
						_____/_____

Appendix E
(Page 1 of 1)

M&TE INSTALLATION/REMOVAL

Date ________

Install test instruments at each of the following instrument panel test connections. Ensure test pressure gages are mounted on the same elevation as permanent plant gages. Ensure permanent plant and test instruments are filled and vented and placed in-service upon installation and removal of M&TE.

Instrument	Installation		Removal	
	Init/Date	CV/Date	Init/Date	CV/Date
1-FE-70-155				
1-FE-70-149				

Attachment 1
(Page 1 of 5)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
1-FCV-70-75	1B ESF EQUIPMENT CCS RETURN HDR ISOL	OPEN		
2-FCV-70-75	2B ESF EQUIPMENT CCS RETURN HDR ISOL	OPEN		
0-SMV-70-716	CCS HEAT EXCHANGER C SAMPLE RETURN	OPEN		
1-FCV-70-74	CCS PUMP 1A-A/1B-B TO C-S SUCT XTIE	CLOSED		
2-FCV-70-76	CCS PUMPS 2A-A/2B-B TO C-S SUCT XTIE	CLOSED[2]		
2-FCV-70-78	CCS PUMPS 2A-A/2B-B TO C-S SUCT XTIE	CLOSED[2]		
2-FCV-70-39	CCS PUMP 2A-A/2B-B SUCTION CROSSTIE	OPEN[2]		
0-ISV-70-503	CCS PUMP C-S SUCTION ISOLATION	OPEN		
2-ISV-70-503B	CCS PUMP 2B-B SUCTION ISOLATION	OPEN		
0-ISV-70-505	CCS PUMP C-S DISCHARGE ISOLATION	OPEN		
1-ISV-70-505B	CCS PUMP 1B-B DISCHARGE ISOLATION	OPEN		
2-ISV-70-505B	CCS PUMP 2B-B DISCHARGE ISOLATION	OPEN		

Attachment 1
(Page 2 of 5)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
1-FCV-70-27	CCS PUMP 1A-A/1B-B TO C-S DISCH XTIE	CLOSED		
2-FCV-70-28	CCS PUMPS 2A-A/2B-B TO C-S DISCH XTIE	CLOSED[2]		
2-FCV-70-29	CCS PUMPS 2A-A/2B-B TO C-S DISCH XTIE	CLOSED[2]		
2-ISV-70-507	CCS PUMP 2A-A/2B-B DISCHARGE CROSSTIE	OPEN[2]		
0-FCV-70-22	CCS HEAT EXCHANGER C INLET	OPEN		
1-FCV-70-13	CCS HEAT EXCHANGERS A & C INLET CROSSTIE	CLOSED		
2-FCV-70-14	CCS HEAT EXCHANGER B & C INLET CROSSTIE	CLOSED		
0-ISV-70-510	CCS HTX C INLET ISOLATION	OPEN		
0-SMV-70-715	CCS HEAT EXCHANGER B OUTLET SAMPLE SUPPLY	OPEN		
0-FCV-70-12	CCS HEAT EXCHANGER C OUTLET	OPEN		
1-FCV-70-9	CCS HEAT EXCHANGER A & C OUTLET CROSSTIE	CLOSED		

Attachment 1
(Page 3 of 5)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-FCV-70-196	CCS HEAT EXCHANGER B/C OUTLET CROSSTIE	CLOSED		
1-FCV-70-3	1B ESF EQUIPMENT CCS SUPPLY HEADER	OPEN		
2-FCV-70-3	2B ESF EQUIPMENT CCS SUPPLY HEADER	CLOSED		
1-FCV-70-153	RHR HEAT EXCHANGER 1B CCS OUTLET	OPEN[1]		
2-FCV-70-153	RHR HEAT EXCHANGER 2B CCS OUTLET	CLOSED[1]		
1-ISV-70-545B	RHR HEAT EXCHANGER 1B-B CCS INLET ISOLATION	OPEN		
1-ISV-70-552B	CCP 1B-B OIL COOLERS CCS INLET ISOLATION	OPEN		
1-ISV-70-553B	CCP 1B-B OIL COOLERS CCS INLET ISOLATION	OPEN		
1-ISV-70-798	CCP 1B-B GEAR OIL CLR CCS INLET ISOLATION	OPEN		
1-ISV-70-799	CCP 1B-B LUBE OIL CLR CCS INLET ISOLATION	OPEN		
1-ISV-70-557B	CCP 1B-B OIL COOLERS CCS OUTLET ISOLATION	OPEN		

Attachment 1
(Page 4 of 5)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
1-ISV-70-558B	SI PUMP 1B-B LUBE OIL COOLER CCS INLET ISOL	OPEN		
1-ISV-70-562B	SI PUMP 1B-B LUBE OIL COOLER CCS OUT ISOL	OPEN		
1-ISV-70-725B	CS/RHR/SIS PMP 1B-B HX CCS RETURN ISOLATION	OPEN		
1-ISV-70-564B	RHR PMP 1B-B SEAL WATER HX CCS INLET ISOL	OPEN		
1-ISV-70-567B	RHR PMP 1B-B SEAL WATER HX CCS OUT ISOL	OPEN		
1-ISV-70-569B	CS PUMP 1B-B OIL HX CCS INLET ISOLATION	OPEN		
1-ISV-70-572B	CS PUMP 1B-B OIL HX CCS OUTLET ISOLATION	OPEN		
2-ISV-70-545B	RHR HEAT EXCHANGER 2B-B CCS INLET ISOLATION	OPEN		
2-ISV-70-552B	CCP 2B-B OIL COOLERS CCS INLET ISOLATION	OPEN		
2-ISV-70-553B	CCP 2B-B OIL COOLERS CCS INLET ISOLATION	OPEN		
2-ISV-70-798	CCP 2B-B GEAR OIL CLR CCS INLET ISOLATION	OPEN		

Attachment 1
(Page 5 of 5)

VALVE CHECKLIST

Date _____

Valve	Description	Required Position	Verified	Date
2-ISV-70-799	CCP 2B-B LUBE OIL CLR CCS INLET ISOLATION	OPEN		
2-ISV-70-557B	CCP 2B-B OIL COOLERS CCS OUTLET ISOLATION	OPEN		
2-ISV-70-558B	SI PUMP 2B-B LUBE OIL COOLER CCS INLET ISOL	OPEN		
2-ISV-70-562B	SI PUMP 2B-B LUBE OIL COOLER CCS OUT ISOL	OPEN		
2-ISV-70-725B	CS/RHR/SIS PMP 2B-B HX CCS RETURN ISOLATION	OPEN		
2-ISV-70-564B	RHR PMP 2B-B SEAL WATER HX CCS INLET ISOL	OPEN		
2-ISV-70-567B	RHR PMP 2B-B SEAL WATER HX CCS OUT ISOL	OPEN		
2-ISV-70-569B	CS PUMP 2B-B OIL HX CCS INLET ISOLATION	OPEN		
2-ISV-70-572B	CS PUMP 2B-B OIL HX CCS OUTLET ISOLATION	OPEN		
1. These valves may be throttled to maintain individual CCS pump flow rates and discharge pressure, as well as control temperature				
2. These valves are re-positioned per DCN-53413 to align CCS Pump 2B-B to the CCS HX B and the 2A Header.				

Attachment 2
(Page 1 of 2)

FLOW BALANCE INSTRUCTIONS

Date _____

1.0 GENERAL

Flow balancing is an iterative process. The steps to balance each component may be repeated several times to align flow for all components on the attachments. No initials, dates or calculations will be completed until the Final Balance described in Section 3.0 is performed. (Reference Sections 6.2.1 and 6.2.2)

When a ΔP gage is required, connect at the flow element test connections. When an Ultrasonic Flowmeter is required, install it on the component piping per the flowmeter instruction. Permanent plant flow indicators will be utilized for the initial flow readings as they meet accuracy and calibration requirements for flow balance. Data acquired by the DCS (Foxboro I/A) from the permanent plant flow transmitters, or M&TE, will be recorded on Attachments 4, 5, and 6.

2.0 FLOW BALANCING

Adjust flows to the Components listed in Column [1] in the CCS FLOW BALANCE Attachments, WITHOUT making any entries on Attachments 4, 5, or 6:

[1] **VERIFY/INSTALL** (where applicable) a ΔP gage or ultrasonic flowmeter with a range as indicated in column [3] of the Attachment.

[2] **RECORD** M&TE information on Appendix D and E, as needed.

NOTE

Throttle valve in the CLOSED direction to set flow. If flow is initially too low, OPEN valve until an increase in flow above the setpoint is observed, then CLOSE down on the valve to attain proper flow.

[3] **THROTTLE** the valve listed in column [2] of the Attachment to obtain the Target Value Flow or ΔP as indicated on the first line in column [4] of the Attachment.

[4] **REPEAT** Steps 2[1] through 2[3] for each component on the Attachment.

[5] **REPEAT** the entire Attachment until all Target Values in column [4] are obtained without any throttle valve adjustment.

Attachment 2
(Page 2 of 2)
FLOW BALANCE INSTRUCTIONS

Date _____

3.0 FINAL BALANCE

Document the Final flow balance for all Components in the Attachments 4,5,6 as follows:

[1] **RECORD** the ΔP or Flow in column [5].

[2] **IF** the flow device in column [2] is an FI, FT or ultrasonic flowmeter:

A. **MULTIPLY** the value in column [5] by the Correction Multiplier (second line in column [4]), and

B. **RECORD** the result in column [8], Flow (corrected) line.

[3] **IF** the Flow device in column [2] is an FE:

A. **MULTIPLY** the value in column [5] by the Correction Multiplier (second line in column [4]), and

B. **RECORD** the result on 1st line in column [6], ΔP (corrected).

C. **CALCULATE** the square root of this value, and

D. **RECORD** on the second line in column [6].

E. **MULTIPLY** this result by the 'C' value in column [7], and

F. **RECORD** the result in column [8], Flow (corrected) line.

Attachment 3
(Page 1 of 3)

TRAIN B THROTTLE VALVE SETPOINTS - UNITS 1 & 2

Date _____

APPLICATION

Use this data sheet only for the valves adjusted in the flow mode applicable to the subsection of the procedure being performed (i.e. only valves applicable to the U1 STARTUP / U2 NORMAL Mode are completed with Subsection 6.2.2.

PROCEDURE

1.0 Throttle Valve Number of Turns (Reference 4.3.5)

A. **DETERMINE** number of TURNS from Full OPEN to Full CLOSED on each Throttle valve listed AND

   RECORD the number of TURNS on page 2.

B. **OPEN** each Throttle valve to the Full OPEN stop.

2.0 Throttle Valve Set Points (Reference 6.2.1 and 6.2.2)

A. **THROTTLE** the valve while counting the number of turns until the desired flow is achieved as stated on the attachment.

B. **RECORD** the number of TURNS on page 3 from the full OPEN stop to the desired flow position to the nearest 1/4 turn. DO NOT discount any handwheel movement as valve slack, count ALL turns. For plug valves (0-90° travel) record the position to the nearest 15°.

C. **CLOSE** the valve fully.

D. **OPEN** the valve while counting the number of TURNS until the flow returns to that previously recorded on the attachment.

E. **RECORD** the number of TURNS on page 3 from full closed position to the desired flow position to the nearest 1/4 turn. DO NOT discount any handwheel movement as valve slack, count ALL turns. For plug valves (0-90° travel) record the position to the nearest 15°

Attachment 3
(Page 2 of 3)

TRAIN B THROTTLE VALVE SETPOINTS - UNITS 1 & 2

Date _____

CAUTION

Unit 1 THVs should remain in TI-31.08 position while performing Step 4.3[5]

Throttle Valve	DESCRIPTION	LOC	Turns from Full CLOSED to Full OPEN	Initial/Date	CV/Date
1-THV-70-546B	RHR HEAT EXCHANGER 1B-B CCS THROTTLE	A7U/713	NA	NA	NA
1-THV-70-571B	CS PUMP 1B-B OIL HX CCS OUTLET THROTTLE	A7T/676	NA	NA	NA
1-THV-70-554B	CCP 1B-B OIL COOLERS CCS OUTLET THROTTLE	A9T/692	NA	NA	NA
1-THV-70-590B	SI PUMP 1B-B LUBE OIL CLR CCS OUTLET THROTTLE	A7U/692	NA	NA	NA
1-THV-70-566B	RHR PMP 1B-B SEAL WATER HX CCS OUTLET THROTTLE	A7V/7676	NA	NA	NA
2-THV-70-546B	RHR HEAT EXCHANGER 2B-B CCS THROTTLE	A9U/713			
2-THV-70-571B	CS PUMP 2B-B OIL HX CCS OUTLET THROTTLE	A9T/676			
2-THV-70-554B	CCP 2B-B OIL COOLERS CCS OUTLET THROTTLE	A9T/692			
2-THV-70-590B	SI PUMP 2B-B LUBE OIL CLR CCS OUTLET THROTTLE	A9U/692			
2-THV-70-566B	RHR PMP 2B-B SEAL WATER HX CCS OUTLET THROTTLE	A9V/676			

Attachment 3
(Page 3 of 3)

TRAIN B THROTTLE VALVE SETPOINTS - UNITS 1 & 2

Date _____

Throttle Valve	Component	Mode Application	Turns From		Initial/Date	CV/Date
			Full Open	Full Closed		
1-THV-70-546B	RHR HTX 1B-B	U1 STARTUP U2 NORM				
1-THV-70-571B	CONT SPRAY PUMP 1B-B OIL HTX	U1 STARTUP U2 NORM				
1-THV-70-554B	CCP 1B-B LUBE & GEAR OIL COOLER	U1 STARTUP U2 NORM				
1-THV-70-590B	SIS PUMP1B-B LUBE OIL COOLER	U1 STARTUP U2 NORM				
1-THV-70-566B	RHR PUMP 1B-B SEAL WTR HTX	U1 STARTUP U2 NORM				
2-THV-70-546B	RHR HTX 2B-B	U1 NORM U2 STARTUP				
2-THV-70-571B	CONT SPRAY PUMP 2B-B OIL HTX	U1 NORM U2 STARTUP				
2-THV-70-554B	CCP 2B-B LUBE & GEAR OIL COOLER	U1 NORM U2 STARTUP				
2-THV-70-590B	SIS PUMP2B-B LUBE OIL COOLER	U1 NORM U2 STARTUP				
2-THV-70-566B	RHR PUMP 2B-B SEAL WTR HTX	U1 NORM U2 STARTUP				

Attachment 4
(Page 1 of 5)

Train B Flow Balance: Unit 1 NORMAL/Unit 2 STARTUP

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value (Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **(ΔP)1/2**	**C** (Ref.)	**$Flow_{corrected}$ (gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR HTX 1B-B	1-FE-70-155 1-THV-70-546B	_____ 0-100 "H_2O	0 "H_2O (0.990)			600 (2.2C.6.f)		**[0]** 6250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCP 1B-B LUBE & GEAR OIL COOLER	1-FI-70-145 1-THV-70-554B	_____ 0-20 "H_2O	29.75-32 gpm (0.975)			7.83 (2.2C.6.b)		**[≥28]** 36
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SIS PUMP 1B-B LUBE OIL COOLER	1-FI-70-148 1-THV-70-590B	_____ 0-50 "H_2O	16.5-18.5 gpm (0.975)			2.83 (2.2C.6.c)		**[≥15]** 30
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 4
(Page 2 of 5)

Train B Flow Balance: Unit 1 NORMAL/Unit 2 STARTUP

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value (Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **(ΔP)1/2**	**C** (Ref.)	**$Flow_{corrected}$ (gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR PUMP 1B-B SEAL WTR HTX	1-FI-70-152 1-THV-70-566B	_____ 0-50 "H_2O	11-12 gpm (0.975)			2.83 (2.2C.6.e)		**[≥10]** 15
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CONT SPRAY PUMP 1B-B OIL HTX	1-FE-70-149 1-THV-70-571B	_____ 0-10 "H_2O	1.0-2.0 "H_2O (0.990)			2.24 (2.2C.6.d)		**[≥2]** 4
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RHR 1B-B SUPPLY HDR	1-FI-70-165A NA	_____ 0-100 "H_2O	55-85 gpm (0.970)			600 (2.2C.6.g)		**NA**
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 4
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Train B Flow Balance: Unit 1 NORMAL/Unit 2 STARTUP

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value (Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$ (gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR HTX 2B-B	2-FT-70-155 2-THV-70-546B	_____ 0-100 "H_2O	5070-6206 gpm (0.993)		_____ _____	600 (2.2C.6.m)		**[≥5000]** 6250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCP 2B-B LUBE & GEAR OIL COOLER	2-FT-70-145 2-THV-70-554B	_____ 0-20 "H_2O	28.5-35 gpm (0.993)		_____ _____	7.83 (2.2C.6.h)		**[≥28]** 36
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SI PUMP 2B-B LUBE OIL COOLER	2-FT-70-148 2-THV-70-590B	_____ 0-50 "H_2O	15.3-29 gpm (0.993)		_____ _____	2.83 (2.2C.6.i)		**[≥15]** 30
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 4
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Train B Flow Balance: Unit 1 NORMAL/Unit 2 STARTUP

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value (Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$ (gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR PUMP 2B-B SEAL WTR HTX	2-FT-70-152 2-THV-70-566B	0-50 "H_2O	10.2-15 gpm (0.993)			2.83 (2.2C.6.k)		**[≥10]** 15
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CONT SPRAY PUMP 2B-B OIL HTX	2-FT-70-149 2-THV-70-571B	_____ 0-10 "H_2O	2.2-4.0 gpm (0.993)			2.24 (2.2C.6.j)		**[≥2]** 4
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RHR 2B-B SUPPLY HDR	2-FT-70-165C NA	_____ 0-100 "H_2O	5055-6335 gpm (0.993)			600 (2.2C.6.g)		**NA**
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 4
(Page 5 of 5)

Train B Flow Balance: Unit 1 NORMAL/Unit 2 STARTUP

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value (Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$ (gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RAD MONITOR 0-RE-90-123/A	0-FI-90-123/A 0-ISIV-90-123D	NA	7-9 gpm +/-1		NA NA	NA (2.2C.7)		[≥6] 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCS HTX C INLET FLOW	0-FI-70-201 NA	_____ 0-300 "H_2O	5116-6430 gpm NA		_____	750.6 (2.2C.6.a)		NA
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
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Train B Flow Balance: Unit 1 STARTUP / Unit 2 NORMAL

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O)** **or** **Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR HTX 1B-B	1-FE-70-155 1-THV-70-546B	_____ 0-100 "H_2O	74.5-79.5 "H2O (0.990)		_____ _____	600 (2.2C.6.f)		**[≥5000]** 6250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCP 1B-B LUBE & GEAR OIL COOLER	1-FI-70-145 1-THV-70-554B	_____ 0-20 "H_2O	29.75-32 gpm (0.975)		_____ _____	7.83 (2.2C.6.b)		**[≥28]** 36
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SI PUMP 1B-B LUBE OIL COOLER	1-FI-70-148 1-THV-70-590B	_____ 0-50 "H_2O	16.5-18.5 gpm (0.975)		_____ _____	2.83 (2.2C.6.c)		**[≥15]** 30
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
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Train B Flow Balance: Unit 1 STARTUP / Unit 2 NORMAL

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O)** **or** **Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR PUMP 1B-B SEAL WTR HTX	1-FI-70-152 1-THV-70-566B	_____ 0-50 "H_2O	11-12 gpm (0.975)	_____	_____ _____	2.24 (2.2C.6.e)		**[≥10]** 15
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CONT SPRAY PUMP 1B-B OIL HTX	1-FE-70-149 1-THV-70-571B	_____ 0-10 "H_2O	1.0-2.0 "H_2O (0.990)		_____ _____	2.83 (2.2C.6.d)		**[≥2]** 4
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RHR 1B-B SUPPLY HDR	1-FI-70-165A NA	_____ 0-100 "H_2O	5055-6335 gpm (0.970)		_____ _____	600 (2.2C.6.g)		**NA**
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
(Page 3 of 5)

Train B Flow Balance: Unit 1 STARTUP / Unit 2 NORMAL

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O)** **or** **Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR HTX 2B-B	2-FT-70-155 2-THV-70-546B	_____ 0-100 "H_2O	0 gpm (0.993)		_____ _____	600 (2.2C.6.m)		**[0]** 6250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCP 2B-B LUBE & GEAR OIL COOLER	2-FT-70-145 2-THV-70-554B	_____ 0-20 "H_2O	28.5-35 gpm (0.993)		_____ _____	7.83 (2.2C.6.h)		**[≥28]** 36
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SIS PUMP 2B-B LUBE OIL COOLER	2-FT-70-148 2-THV-70-590B	_____ 0-50 "H_2O	15.3-29 gpm (0.993)		_____ _____	2.83 (2.2C.6.i)		**[≥15]** 30
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
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Train B Flow Balance: Unit 1 STARTUP / Unit 2 NORMAL

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O)** **or** **Flow(gpm)**	**$\Delta P_{corrected}$** **(ΔP)1/2**	**C** (Ref.)	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR PUMP 2B-B SEAL WTR HTX	2-FT-70-152 2-THV-70-566B	_____ 0-50 "H_2O	10.2-15 gpm (0.993)			2 (2.2C.6.k)		**[≥10]** 15
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CONT SPRAY PUMP 2B-B OIL HTX	2-FT-70-149 2-THV-70-571B	_____ 0-10 "H_2O	2.2-4.0 gpm (0.993)			2.83 (2.2C.6.j)		**[≥2]** 4
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RHR 2B-B SUPPLY HDR	2-FT-70-165C NA	_____ 0-100 "H_2O	55-85 gpm (0.993)			600 (2.2C.6.o)		**NA**
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 5
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Train B Flow Balance: Unit 1 STARTUP / Unit 2 NORMAL

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O)** **or** **Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RAD MONITOR 0-RE-90-123/A	0-FI-90-123/A 0-ISIV-90-123D	NA	7-9 gpm +/-1		NA NA	NA (2.2C.7)		**[≥6]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCS HTX C INLET FLOW	0-FI-70-201 NA	_____ 0-300 "H_2O	5116-6430 gpm NA			600 (2.2C.6.a)		**NA**
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 1 of 5)

Train B Flow Balance: Unit 1 COLD SHUTDOWN and Unit 2 LOCA Recirc

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O)** **or** **Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR HTX 1B-B	1-FE-70-155 1-THV-70-546B	_____ 0-100"H_2O	74.5-79.5 "H2O (0.990)			600 (2.2C.6.f)		**[≥5000]** 6250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCP 1B-B LUBE & GEAR OIL COOLER	1-FI-70-145 1-THV-70-554B	_____ 0-20 "H_2O	29.75-32 gpm (0.975)			7.83 (2.2C.6.b)		**[≥28]** 36
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SIS PUMP 1B-B LUBE OIL COOLER	1-FI-70-148 1-THV-70-590B	_____ 0-50 "H_2O	16.5-18.5 gpm (0.975)			2.83 (2.2C.6.c)		**[≥15]** 30
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 2 of 5)

Train B Flow Balance: Unit 1 COLD SHUTDOWN and Unit 2 LOCA Recirc

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O)** **or** **Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR PUMP 1B-B SEAL WTR HTX	1-FI-70-152 1-THV-70-566B	_____ 0-50 "H_2O	11-12 gpm (0.975)		_____	2.83 (2.2C.6.e)		**[≥10]** 15
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CONT SPRAY PUMP 1B-B OIL HTX	1-FE-70-149 1-THV-70-571B	_____ 0-10 "H_2O	1.0-2.0 "H_2O (0.990)		_____	2.24 (2.2C.6.d)		**[≥2]** 4
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RHR 1B-B SUPPLY HDR	1-FI-70-165A NA	_____ 0-100 "H_2O	5055-6335 gpm (0.970)		_____	600 (2.2C.6.g)		**NA**
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 3 of 5)

Train B Flow Balance: Unit 1 COLD SHUTDOWN and Unit 2 LOCA Recirc

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O)** **or** **Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR HTX 2B-B	2-FT-70-155 2-THV-70-546B	_____ 0-100 "H_2O	5070-6206 gpm (0.993)			600 (2.2C.6.m)		**[≥5000]** 6250
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCP 2B-B LUBE & GEAR OIL COOLER	2-FT-70-145 2-THV-70-554B	_____ 0-20 "H_2O	28.5-35 gpm (0.993)			7.83 (2.2C.6.h)		**[≥28]** 36
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
SIS PUMP 2B-B LUBE OIL COOLER	2-FT-70-148 2-THV-70-590B	_____ 0-50 "H_2O	15.3-29 gpm (0.993)			2.83 (2.2C.6.i)		**[≥15]** 30
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 4 of 5)

Train B Flow Balance: Unit 1 COLD SHUTDOWN and Unit 2 LOCA Recirc

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value** **(Corr. Mult.)**	**ΔP("H_2O)** **or** **Flow(gpm)**	**$\Delta P_{corrected}$** **$(\Delta P)1/2$**	**C** (Ref.)	**$Flow_{corrected}$** **(gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RHR PUMP 2B-B SEAL WTR HTX	2-FT-70-152 2-THV-70-566B	_____ 0-50 "H_2O	10.2-15 gpm (0.993)		_____ _____	2 (2.2C.6.k)		**[≥10]** 15
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CONT SPRAY PUMP 2B-B OIL HTX	2-FT-70-149 2-THV-70-571B	_____ 0-10 "H_2O	2.2-4.0 gpm (0.993		_____ _____	2.83 (2.2C.6.j)		**[≥2]** 4
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
RHR 2B-B SUPPLY HDR	2-FT-70-165C NA	_____ 0-100 "H_2O	5055-6335 gpm (0.993)		_____ _____	600 (2.2C.6.o		**NA**
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			

Attachment 6
(Page 5 of 5)

Train B Flow Balance: Unit 1 COLD SHUTDOWN and Unit 2 LOCA Recirc

Date _____

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Component	**Flow Device** **Throttle Valve**	**M&TE Gage #** **Range**	**Target Value (Corr. Mult.)**	**ΔP("H_2O) or Flow(gpm)**	**$\Delta P_{corrected}$** **(ΔP)1/2**	**C** (Ref.)	**$Flow_{corrected}$ (gpm)**	**[ACC. CRIT.]** Flow Limit **(gpm)**
RAD MONITOR 0-RE-90-123/A	0-FI-90-123/A 2-THV-70-566B	NA	7-9 gpm +/-1		NA NA	NA (2.2C.6.p)		**[≥6]** 10
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			
CCS HTX C INLET FLOW	0-FI-70-201 NA	_____ 0-300 "H_2O	10116-12680 gpm (0.993)		_____ _____	600 (2.2C.6.a)		**NA**
Steps and calculations performed by: _____/_____					Calculations verified by: _____/_____			