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

March 11, 2014

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

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

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

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

PTI NUMBER	Rev.	TITLE
2-PTI-063-03	0	Safety Injection System - Charging, SI, and RHR Flow Balance Test

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

Respectfully,

R. A. Hruby, Jr.

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

Enclosure

D030
NRR

cc (Enclosure):

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: Safety Injection System Charging, SI, and RHR Flow Balance

Instruction No: 2-PTI-063-03

Revision No: 0

PREPARED BY: Curt Evans / Curt Evans DATE: 2-11-14
PRINT NAME / SIGNATURE

REVIEWED BY: Johann Reiter / Johann Reiter DATE: 2/11/14
PRINT NAME / SIGNATURE

INSTRUCTION APPROVAL

JTG MEETING No: 2-14-009

JTG CHAIRMAN: B D Bryant DATE: 3-3-14

APPROVED BY : Mark A Welch DATE: 3-3-14
PREOPERATIONAL STARTUP MANAGER

TEST RESULTS APPROVAL

JTG MEETING No: _____

JTG CHAIRMAN: _____ DATE: _____

APPROVED BY : _____ DATE: _____
PREOPERATIONAL STARTUP MANAGER

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0000	3/3/14	ALL	Initial Issue based on Unit 1's PTI-063-03 and Westinghouse's new methodology of balancing by hydraulic resistance.

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Table of Contents (continued)

Date _____

1.0 INTRODUCTION

1.1 TEST OBJECTIVES

This test is being performed to ensure the Centrifugal Charging Pumps, Safety Injection Pumps and Residual Heat Removal Pumps perform their design function and flow rates.

1.2 SCOPE

A. To demonstrate the ability of the centrifugal charging pumps to deliver required flows to the Reactor Coolant System (RCS) during injection phase and adjust flow to the branch lines to prevent charging pumps from exceeding run out conditions during injection or recirculation alignment.

B. To demonstrate the ability of the safety injection pumps to deliver required flows to the RCS during the injection phase (from the Refueling Water Storage Tank), and adjust flow to the branch lines to prevent safety injection pumps from exceeding run out conditions of both injection and recirculation alignments.

C. To demonstrate the ability of the Residual Heat Removal (RHR) pumps to deliver required flows to the RCS during the injection phase. The RHR cold leg flow testing ensures the RHR Pumps do not exceed their runout limits during both cold leg injection and recirculation alignments.

D. To demonstrate no excessive vibration of the piping system and components during transient and steady state operation.

Date _____

2.0 REFERENCES

2.1 Performance References

A. SMP-8.0, ADMINISTRATION OF PREOPERATIONAL TEST INSTRUCTIONS

B. SMP-9.0, CONDUCT OF TEST

C. TI-31.02, PLANT EQUIPMENT VIBRATION MONITORING & VIBRATION DIAGNOSTICS PROGRAM

D. N3C-945, PROCEDURE FOR EVALUATION AND QUALIFICATION OF PIPING SYSTEM VIBRATIONS

E. 2-TOP-63-02 R1, Safety Injection System Preoperational Tests

2.2 Developmental References

A. Final Safety Analysis Report

1. FSAR - Amendment 111

a. Table 14.2-1 Sheet 17, Residual Heat Removal System Test Summary

b. Table 14.2-1 Sheets 18 and 19, Chemical and Volume Control System Test Summary

c. Table 14.2-1 Sheets 22 thru 24, Safety Injection System Test Summary

d. Table 14.2-1 Sheet 80, Operational Vibration Tests Test Summary

e. Section 6.3, Emergency Core Cooling System

f. Section 3.9.2.1, Preoperational Vibration and Dynamic Effects Testing on Piping

Date _____

2.2 Developmental References (continued)

B. Drawings

1. Flow Diagrams

   a. 2-47W809-1 R25, Flow Diagram Chemical & Volume Control System

   b. 2-47W809-2 R14, Flow Diagram Chemical & Volume Control System and Boron Recovery System

   c. 2-47W810-1 R18, Flow Diagram Residual Heat Removal System

   d. 2-47W811-1 R32, Flow Diagram Safety Injection System

   e. 2-47W812-1 R23, Flow Diagram Containment Spray System

2. Electrical

   a. 2-47W610-63-1 R15, Electrical Control Diagram Safety Injection System

   b. 2-47W610-63-1A R12, Electrical Control Diagram Safety Injection System

   c. 2-47W610-63-2 R6, Electrical Control Diagram Safety Injection System

   d. 2-47W610-62-2 R13, Electrical Control Diagram Chemical & Volume Control System

   e. 2-47W610-70-2 R10, Electrical Control Diagram Component Cooling Water System

   f. 2-47W610-70-3 R9, Electrical Control Diagram Component Cooling Water System

   g. 2-47W610-72-1 R9, Electrical Control Diagram Containment Spray System

   h. 2-47W610-74-1 R12, Electrical Control Diagram Residual Heat Removal System

   i. 2-45W600-62-1 R6, Wiring Diagram Chemical & Volume Control System Schematic Diagram

   j. 2-45W600-62-4 R7, Wiring Diagram Chemical & Volume Control System Schematic Diagram

Date _____

2.2 Developmental References (continued)

k. 2-45W600-62-5 R9, Wiring Diagram Chemical & Volume Control System Schematic Diagram

l. 2-45W600-63-1 R5, Wiring Diagram Safety Injection System Schematic Diagram

m. 2-45W600-63-2 R3, Wiring Diagram Safety Injection System Schematic Diagram

n. 2-45W600-74 R3, Wiring Diagram Residual Heat Removal System Schematic Diagram

o. 2-45W760-62-1 R7, Wiring Diagram Chemical & Volume Control System Schematic Diagram

p. 2-45W760-62-2 R10, Wiring Diagrams Chemical & Volume Control System Schematic Diagram

q. 2-45W760-63-1 R5, Wiring Diagrams Safety Injection System Schematic Diagram

r. 2-45W760-63-3 R7, Wiring Diagrams Safety Injection System Schematic Diagram

s. 2-45W760-63-5 R6, Wiring Diagrams Safety Injection System Schematic Diagram

t. 2-45W760-74-2 R10, Wiring Diagrams Residual Heat Removal System Schematic Diagrams

u. 1-45W703-3 R46, Wiring Diagrams 125V Vital Battery Board III Single Line-Sheet 3

v. 1-45W703-4 R39, Wiring Diagrams 125V Vital Battery Board IV Single Line-Sheet 4

w. 2-45W724-3 R6, Wiring Diagrams 6900V Shutdown Board 2A-A Single Line

x. 2-45W724-4 R6, Wiring Diagrams 6900V Shutdown Board 2B-B Single Line

y. 1-45W703-7 R15, Wiring Diagrams 125V Vital Battery Board III PNL 4 Connection Diagram SHT 7

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2.2 Developmental References (continued)

z. 1-45W703-7A R14, Wiring Diagrams 125V Vital Battery Board III PNL 4 Connection Diagram SHT 7A

aa. 1-45W703-8 R15, Wiring Diagrams 125V Vital Battery Board IV PNL 4 connection Diagram SHT 8

bb. 1-45W703-8A R16, Wiring Diagrams 125V Vital Battery Board IV PNL 4 Connection Diagram SHT 8A

cc. 45N2632-8 R6, Wiring Diagram Miscellaneous Controls Connection Diagram Sheet 8

dd. 2-45N2676-4 R3, Solid State Protection Sys Train A Connection Diagram

ee. 45N2677-4 R18, Solid State Protection Sys Train B Connection Diagram

ff. 2-45W2656-5 R0, Wiring Diagram Unit Control Board Panel 2-M-21 Connection Diagram Sheet 5

gg. 1-45W706-1 R77, Wiring Diagram 120V AC Vital Inst Pwr Bds 1-I & 2-I Connection Diagram Sheet 1

hh. 1-45W706-2 R68, Wiring Diagram 120V AC Vital Inst Pwr Bds 1-II & 2-II Connection Diagram Sheet 2

3. Logic/Control

   a. 2-47W611-63-1 R1, Electrical Logic Diagram Safety Injection System

   b. 2-47W611-74-2 R4, Residual Heat Removal System Electrical Logic Diagram

4. Vendor Manuals

   a. WBN-VTM W120-0010, R23, CCP Vendor Manual, Contract No. 71C62-54114-1

   b. WBN-VTM W120-0720, R28, SIP Vendor Manual, Contract No. 71C62-54114-1

   c. WBN-VTM W120-0570, R13, RHRP Vendor Manual, Contract No. 71C62-54114-1

Date _____

2.2 Developmental References (continued)

5. Miscellaneous

   a. 2-TSD-63-3, R4 Safety Injection System: Centrifugal Charging Pump, RHR Pump, Safety Injection Pump and Related SIS Performance Test, and Flow Balance Test

   b. 2-45B655-6C R3, Main Control Room Annunciator Inputs Window Box XA-55-6C

   c. 08F802403-FD-2824 R3 SH1, BOP Refueling Water Storage Tank Temperature

   d. 08F802403-FD-2824 R3 SH2, BOP Refueling Water Storage Tank Temperature

   e. WBN2-63-4001 R3, Safety Injection System

   f. 2-TOP-63-02 R1, Safety Injection System Preoperational Tests

Date _____

3.0 PRECAUTIONS AND LIMITATIONS

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

Date _____

3.0 PRECAUTIONS AND LIMITATIONS (continued)

H. Observe the following pump/motor operating limitations:

1. Residual Heat Removal Pumps (RHR Pump)

COMPONENT	LIMITS	
MOTOR BEARINGS	MAX. 185°F FROM BEARING THERMOCOUPLE	
MOTOR STATOR	MAX. 138°F GREATER THAN AMBIENT	
VIBRATION	FILTERED READINGS AT PUMP RUNNING SPEED:	
	ACCEPTABLE RANGE	≤ 0.325 IN/SEC
	ALERT RANGE	> 0.325 TO ≤ 0.70 IN/SEC
	REQUIRED ACTION	> 0.70 IN/SEC

2. Safety Injection Pumps (SIP)

COMPONENT	LIMITS	
MOTOR BEARINGS	MAX. 194°F FROM BEARING THERMOCOUPLE	
MOTOR STATOR	MAX. 158°F GREATER THAN AMBIENT	
PUMP BEARINGS	MAX. 128°F BEARING OIL INLET TEMPERATURE	
	MAX. 155°F BEARING OIL OUTLET TEMPERATURE	
VIBRATION	FILTERED READINGS AT PUMP RUNNING SPEED:	
	ACCEPTABLE RANGE	≤ 0.325 IN/SEC
	ALERT RANGE	> 0.325 TO ≤ 0.70 IN/SEC
	REQUIRED ACTION	> 0.70 IN/SEC

Date _____

3.0 PRECAUTIONS AND LIMITATIONS (continued)

3. Centrifugal Charging Pumps (CCP)

COMPONENT	LIMITS	
MOTOR BEARINGS	MAX. 185°F FROM BEARING THERMOCOUPLE	
MOTOR STATOR	MAX. 158°F GREATER THAN AMBIENT	
PUMP BEARINGS	MAX. 128°F BEARING OIL INLET TEMPERATURE	
	MAX. 155°F BEARING OIL OUTLET TEMPERATURE	
VIBRATION	FILTERED READINGS AT PUMP RUNNING SPEED:	
	NORMAL OPS	≤ 0.40 IN/SEC
	ALERT RANGE	> 0.40 TO ≤ 0.70 IN/SEC
	SHUTDOWN PUMP	≥ 0.70 IN/SEC

I. Observe the following motor starting limitations:

1. Centrifugal Charging Pumps Permissible start per hour:

   a. Motor at ambient temperature - 3 consecutive starts

   b. Motor at operating temperature - 2 consecutive starts

   c. Subsequent starts with motor standing between starts - 45 minutes

2. Safety Injection Pumps

   a. Motor at ambient temperature - 3 consecutive starts

   b. Motor at operating temperature - 2 consecutive starts

   c. Subsequent starts with motor standing between starts - 45 minutes

Date _____

3.0 PRECAUTIONS AND LIMITATIONS (continued)

3. Residual Heat Removal Pumps

   a. Motor at ambient temperature-2 consecutive starts

   b. Motor at operating temperature-1 consecutive start

   c. Subsequent starts with motor standing between starts - 45 minutes

J. The minimum run time for the Safety Injection Pumps is 20 minutes.

K. The test may be stopped at any time to pump down the vessel. Administrative controls may be required to prevent gravity filling the vessel from the Refueling Water Storage Tank (RWST).

L. Do not operate without a flow path established. Either miniflow, local recirc, or vessel injection must be established before starting any pump to prevent dead head.

M. Following any test or procedure in which gas can enter a pump suction or discharge line, the line must be completely filled and vented.

N. Centrifugal Charging Pump (CCP) run out limit is 550 gpm.

O. Safety Injection Pump (SIP) run out limit is 650 gpm.

P. Residual Heat Removal Pump (RHR Pump) run out limit is 5000 gpm during injection mode, 4550 gpm in the Recirculation mode.

Q. TOPs utilized for system alignment will be recorded in the Chronological Test Log.

Date _____

3.0 PRECAUTIONS AND LIMITATIONS (continued)

R. 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.

Transients include pump starts and stops, or other fluid transients. Check valves should be observed for abnormal slam during startup or shutdown of pumps. Verification that transient conditions are not causing excessive vibration may be accomplished by observation during the transient or verification subsequent to the transient that damage has not resulted.

Steady state conditions include verification that flow control valves and orifices do not produce excessive cavitation induced vibrations. Verification that excessive vibration from other flow induced phenomena does not occur is also required.

If the vibration is determined to be excessive the Test Engineer shall initiate a Test Deficiency Notice (TDN) and submit the findings to Nuclear Engineering (NE).

S. Lube oil pressure for the CCPs and SIPs may be adjusted to meet design requirements to compensate for low Component Cooling System temperatures.

T. When running water into the reactor vessel or preparing to do so, the area is to be monitored constantly and the test can be stopped at the test director's discretion to pump the vessel down as needed. This test is allowed to overflow into the cavity, but the level must be kept at least 5 feet below the cavity ventilation.

Date _____

4.0 PREREQUISITE ACTIONS

4.1 Preliminary Actions

[1] **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. _____

[2] **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. _____

[3] **ENSURE** changes to the references listed on "Test Procedures/Instructions Reference Review", Appendix A, have been reviewed and determined **NOT** to adversely affect the test performance. _____

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

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

[5] **ENSURE** RCS loops are plugged. _____

Date _____

4.1 Preliminary Actions (continued)

[6] **EVALUATE** punchlist items on Watts Bar Integrated Task Equipment List (WITEL) **AND**

ENSURE that they will **NOT** adversely affect the test performance.

Subsection 6.1 _____

Subsection 6.2 _____

Subsection 6.3 _____

Subsection 6.4 _____

Subsection 6.5 _____

Subsection 6.6 _____

Subsection 6.7 _____

Subsection 6.8 _____

Subsection 6.9 _____

Subsection 6.10 _____

Subsection 6.11 _____

Date _____

4.1 Preliminary Actions (continued)

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

Subsection 6.1 _____

Subsection 6.2 _____

Subsection 6.3 _____

Subsection 6.4 _____

Subsection 6.5 _____

Subsection 6.6 _____

Subsection 6.7 _____

Subsection 6.8 _____

Subsection 6.9 _____

Subsection 6.10 _____

Subsection 6.11 _____

[8] **ENSURE** outstanding Design Change Notices (DCNs), Engineering Document Construction Releases (EDCRs) or Temporary Modifications (T-Mods) do **NOT** adversely impact testing, **AND**

ATTACH documentation of DCNs, EDCRs and T-Mods that were reviewed to the data package. _____

[9] **ENSURE** a review of outstanding Clearances has been coordinated with Operations for impact to the test performance, **AND**

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

Date _____

4.1 Preliminary Actions (continued)

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

A. Safety Injection System - Sys 063 _____

B. Chemical & Volume Control System - Sys 062 _____

C. Residual Heat Removal System - Sys 074 _____

D. Reactor Coolant System - Sys 068 _____

E. Containment Spray System - Sys 072 _____

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

Subsection 6.1 _____

Subsection 6.2 _____

Subsection 6.3 _____

Subsection 6.4 _____

Subsection 6.5 _____

Subsection 6.6 _____

Subsection 6.7 _____

Subsection 6.8 _____

Subsection 6.9 _____

Subsection 6.10 _____

Subsection 6.11 _____

Date _____

4.1 Preliminary Actions (continued)

[12] **VERIFY** 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. 2-XA-55-6C/126-D _____

B. 2-XA-55-6C/126-E _____

C. 2-XA-55-6C/127-B _____

D. 2-XA-55-6C/127-C _____

E. 2-XA-55-6C/127-D _____

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

A. System 063 _____

B. System 062 _____

C. System 074 _____

D. System 072 _____

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

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

[16] **ENSURE** that communications are available for areas where testing is to be conducted. _____

Date _____

4.1 Preliminary Actions (continued)

[17] **VERIFY** Unit 2 Plant Computer is available and the computer points listed on Appendix D are active and the description and status for each computer point has been verified.

Subsection 6.1 _____

Subsection 6.2 _____

Subsection 6.3 _____

Subsection 6.4 _____

Subsection 6.5 _____

Subsection 6.6 _____

Subsection 6.7 _____

Subsection 6.8 _____

Subsection 6.9 _____

Subsection 6.10 _____

Subsection 6.11 _____

NOTE

It is not necessary to install suction strainers after this test.

[18] **VERIFY** suction strainers have been removed at the following pumps:

A. Residual Heat Removal Pump 2A-A _____

B. Residual Heat Removal Pump 2B-B _____

C. Centrifugal Charging Pump 2A-A _____

D. Centrifugal Charging Pump 2B-B _____

E. Safety Injection Pump 2A-A _____

F. Safety Injection Pump 2B-B _____

Date _____

4.1 Preliminary Actions (continued)

[19] **VERIFY** Design Change Notices (DCNs) for Type 1 Supports identified for Systems 62, 63, 72 and 74 testing are issued.

_____
LEAD CIVIL ENG.

A. **VERIFY** DCNs for Type 1 Supports identified for Systems 62, 63, 72 and 74 testing are field work complete.

_____
MODIFICATIONS
MECHANICAL LEAD FE

B. **VERIFY** remaining supports required for Systems 62, 63, 72, and 74 testing are in place or an equivalent engineering approved temporary support is installed.

_____
MODIFICATIONS
MECHANICAL LEAD FE

C. **VERIFY** spring cans, identified, for Systems 62, 63, 72, and 74 are installed, unpinned, and on scale with no visual indication of damage, loose parts or interferences.

_____
STARTUP SUPPORT GROUP
MECHANICAL LEAD FE

D. **VERIFY** snubbers identified for Systems 62, 63, 72, and 74 are installed with no visual indication of damage, loose parts or interferences.

_____
STARTUP SUPPORT GROUP
MECHANICAL LEAD FE

Date _____

4.1 Preliminary Actions (continued)

[20] **VERIFY** the following systems are operational and have been placed in service to the extent necessary to perform this test:

A. System 213, Reactor Motor Operated Valve Power - 480V Reactor MOV Board 2A1-A, is energized.

_____
System Eng

B. System 213, Reactor Motor Operated Valve Power - 480V Reactor MOV Board 2B1-B, is energized.

_____
System Eng

C. System 212, 480V Shutdown Power - 480V Shutdown Board 2A1-A, is energized.

_____
System Eng

D. System 212, 480V Shutdown Power - 480V Shutdown Board 2B1-B, is energized.

_____
System Eng

E. System 211, 6.9KV Shutdown Power - 6900V Shutdown Board 2A-A, is energized.

_____
System Eng

F. System 211. 6.9KV Shutdown Power - 6900V Shutdown Board 2B-B, is energized.

_____
System Eng

G. System 236. 125 VDC Vital Power - Battery Board III, is energized.

_____
System Eng

H. System 236, 125 VDC Vital Power - Battery Board IV, is energized.

_____
System Eng

I. System 235, 120 VAC Vital Power - Vital Board 2-I, is energized.

_____
System Eng

J. System 235, 120 VAC Vital Power - Vital Board 2-II, is energized.

_____
System Eng

Date _____

4.1 Preliminary Actions (continued)

K. System 235, 120 VAC Vital Power - Vital Board 2-III, is energized.

_____
System Eng

L. System 235, 120 VAC Vital Power - Vital Board 2-IV, is energized.

_____
System Eng

M. System 055, Annunciator and Sequential Events Recording System

_____
System Eng

N. System 070, Component Cooling Water System is operating.

_____
System Eng

O. System 261, Process Computer

_____
System Eng

[21] **VERIFY** the Reactor Vessel head and upper and lower internals have been REMOVED. _____

[22] **VERIFY** the Reactor Vessel cavity is prepared to receive any potential vessel overflow. _____

[23] **VERIFY** the Reactor Vessel water level is below the nozzles by visual inspection. _____

[24] **VERIFY** provisions have been made to pump down the vessel, and cavity, as required during testing. _____

[25] **ENSURE** that the four Cold Leg Accumulators are vented. _____

[26] **ENSURE** at least one wide-range RWST level indicator is operable. _____

Date _____

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

[1] **ENSURE** the following M&TE or equivalent are available, within calibration due dates, and recorded in SMP-9.0, Measuring and Test Equipment (M&TE) Log:

A. 0-200°F Contact Thermometer (± 2.4% of full scale). _____

B. 0-10 psid differential pressure gauge (± 0.25% of span). _____

C. 0-13 psid differential pressure gauge (± 0.25% of span). _____

D. Two 0-30 psid differential pressure gauges (± 0.25% of span). _____

E. Two 0-20 psid differential pressure gauges (± 0.25% of span). _____

F. Four 0-35 psid differential pressure gauges (± 0.25% of span). _____

G. Four 0-50 psid differential pressure gauges (± 0.25% of span). _____

H. Four 0-110 psid differential pressure gauges (± 0.25% of span). _____

I. Two 0-60 psig pressure gauges (± 0.25% of span). _____

J. Two 0-300 psig pressure gauges (± 0.25% of span). _____

K. Two 0-2000 psig pressure gauges (± 0.25% of span). _____

L. Two 0-3000 psig pressure gauges (± 0.25% of span). _____

M. Strobotac, Digital, 0-24,000 rpm (± 2% of reading). _____

N. Watt Transducer, 0-1000 Watt (± 2% of reading). _____

O. Multimeter, Digital, 0-10mA (± 2% of reading). _____

P. Ultrasonic flow meter, capable of reading 0-4500 gpm (± 2% of range). _____

Date _____

4.2 Special Tools, Measuring and Test Equipment, Parts, and Supplies (continued)

[2] Twelve locking devices are available for injection throttle valves. _____

Date _____

4.3 Field Preparations

[1] **ENSURE** a 0-20 psid differential pressure gauge is installed across Miniflow Orifice 2-FE-62-257, CHARGING PUMP MINI FLOW ELEMENT.

A. Subsection 6.1

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.2

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

[2] **ENSURE** a 0-50 psid differential pressure gauge is installed across Orifice 2-FE-63-33, SIS BORON INJ TANK TO CL RCS LOOP 1.

A. Subsection 6.1

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.2

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[3] **ENSURE** a 0-50 psid differential pressure gauge is installed across Orifice 2-FE-63-31, SIS BORON INJ TANK TO CL RCS LOOP 2.

A. Subsection 6.1

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.2

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

[4] **ENSURE** a 0-50 psid differential pressure gauge is installed across Orifice 2-FE-63-29, SIS BORON INJ TANK TO CL RCS LOOP 3.

A. Subsection 6.1

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.2

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

[5] **ENSURE** a 0-50 psid differential pressure gauge is installed across orifice 2-FE-63-27, SIS BORON INJ TANK TO CL RCS LOOP 4.

A. Subsection 6.1

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.2

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[6] **ENSURE** a 0-10 psid differential pressure gauge is installed across Orifice 2-FE-63-170, CVCS CHG PMP TO BORON INJ.

A. Subsection 6.1

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.2

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

[7] **ENSURE** a 0-13 psid differential pressure gauge is installed across Orifice 2-FE-63-2, SIS PUMP DISCH FLOW TO RWST.

A. Subsection 6.4

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.5

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

[8] **ENSURE** a 0-35 psid differential pressure gauge is installed across Orifice 2-FE-63-122, SIS FLOW TO CL 1 FLOW ELEMENT.

A. Subsection 6.4

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.5

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[9] **ENSURE** a 0-35 psid differential pressure gauge is installed across Orifice 2-FE-63-123, SIS FLOW TO CL 2 FLOW ELEMENT.

A. Subsection 6.4

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.5

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

[10] **ENSURE** a 0-35 psid differential pressure gauge is installed across Orifice 2-FE-63-124, SIS FLOW TO CL 3 FLOW ELEMENT.

A. Subsection 6.4

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.5

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

[11] **ENSURE** a 0-35 psid differential pressure gauge is installed across Orifice 2-FE-63-125, SIS FLOW TO CL 4 FLOW ELEMENT.

A. Subsection 6.4

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.5

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[12] **ENSURE** a 0-20 psid differential pressure gauge is installed across Orifice 2-FE-63-151, SIS PMP A-A OUT FLOW.

A. Subsection 6.4

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.5

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

D. Subsection 6.7

M&TE _____ Cal Due Date _____ _____

E. Subsection 6.8

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[13] **ENSURE** a 0-20 psid differential pressure gauge is installed across Orifice 2-FE-63-20, SIS PMP B-B OUT FLOW.

A. Subsection 6.4

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.5

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

D. Subsection 6.7

M&TE _____ Cal Due Date _____ _____

E. Subsection 6.8

M&TE _____ Cal Due Date _____ _____

[14] **ENSURE** a 0-110 psid differential pressure gauge is installed across Orifice 2-FE-63-162, SIS PMP OUT TO LP 1 HL.

A. Subsection 6.7

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.8

M&TE _____ Cal Due Date _____ _____

[15] **ENSURE** a 0-110 psid differential pressure gauge is installed across Orifice 2-FE-63-160, SIS PMP OUT TO LP 2 HL.

A. Subsection 6.7

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.8

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[16] **ENSURE** a 0-110 psid differential pressure gauge is installed across Orifice 2-FE-63-161, SIS PMP OUT TO LP 3 HL.

A. Subsection 6.7

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.8

M&TE _____ Cal Due Date _____ _____

[17] **ENSURE** a 0-110 psid differential pressure gauge is installed across Orifice 2-FE-63-159, SIS PMP OUT TO LP 4 HL.

A. Subsection 6.7

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.8

M&TE _____ Cal Due Date _____ _____

[18] **ENSURE** a 0-30 psid differential pressure gauge is installed across Orifice 2-FE-74-12, RHR PMP A-A MINI FLOW VLV.

A. Subsection 6.9

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.10

M&TE _____ Cal Due Date _____ _____

[19] **ENSURE** a 0-30 psid differential pressure gauge is installed across Orifice 2-FE-74-24, RHR PMP B-B MINI FLOW VLV.

A. Subsection 6.9

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.10

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[20] **ENSURE** a 0-4500 gpm Ultrasonic Flow meter is installed upstream of 2-FCV-63-172, RHR TO HOT LEG 1&3 INJECTION ISOLATION.

A. Subsection 6.9

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.10

M&TE _____ Cal Due Date _____ _____

[21] **ENSURE** Refueling Water Storage Tank (RWST) level is greater than 25% as read on 2-LI-63-50, SIS RWST LEVEL IND, 2-LI-63-51, SIS RWST LEVEL IND, 2-LI-63-52, SIS RWST LEVEL IND, AND 2-LI-63-53, SIS RWST LEVEL IND. _____

[22] **ENSURE** motor operated isolation valves to the Containment Spray Headers are CLOSED with the associated breaker tagged OPEN.

A. 2-FCV-72-39 _____

B. 2-FCV-72-40 _____

C. 2-FCV-72-2 _____

D. 2-FCV-72-41 _____

Date _____

4.3 Field Preparations (continued)

[23] **ENSURE** the following flow measuring orifices are properly installed with "INLET" on the orifice tine on the upstream side:

A. 2-FE-62-257 _____

B. 2-FE-63-2 _____

C. 2-FE-63-27 _____

D. 2-FE-63-29 _____

E. 2-FE-63-31 _____

F. 2-FE-63-33 _____

G. 2-FE-63-20 _____

H. 2-FE-63-91 _____

I. 2-FE-63-92 _____

J. 2-FE-63-151 _____

K. 2-FE-63-170 _____

L. 2-FE-63-122 _____

M. 2-FE-63-123 _____

N. 2-FE-63-124 _____

O. 2-FE-63-125 _____

P. 2-FE-63-159 _____

Q. 2-FE-63-160 _____

R. 2-FE-63-161 _____

S. 2-FE-63-162 _____

T. 2-FE-74-12 _____

U. 2-FE-74-24 _____

Date _____

4.3 Field Preparations (continued)

NOTE

Pump suction and discharge test pressure gauges for each pump should be at the same elevation (within one foot) to avoid elevation corrections for Total Developed Head (TDH) calculations.

[24] **ENSURE** a 0-60 psig test gauge is installed at CCP 2A-A Suction Pressure Gauge, 2-PI-62-109.

A. Subsection 6.1

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

[25] **ENSURE** a 0-60 psig test gauge is installed at CCP 2B-B Suction Pressure Gauge, 2-PI-62-105.

A. Subsection 6.2

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

[26] **ENSURE** a 0-3000 psig test gauge is installed at CCP 2A-A Discharge Pressure Gauge, 2-PI-62-110.

A. Subsection 6.1

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[27] **ENSURE** a 0-3000 psig test gauge is installed at CCP 2B-B Discharge Pressure Gauge, 2-PI-62-106.

A. Subsection 6.2

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.3

M&TE _____ Cal Due Date _____ _____

[28] **ENSURE** a 0-60 psig test gauge is installed at SIP 2A-A Suction Pressure Gauge, 2-PI-63-9.

A. Subsection 6.4

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.7

M&TE _____ Cal Due Date _____ _____

[29] **ENSURE** a 0-60 psig test gauge is installed at SIP 2B-B Suction Pressure Gauge, 2-PI-63-14.

A. Subsection 6.5

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.8

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[30] **ENSURE** a 0-2000 psig test gauge is installed at SIP 2A-A Discharge - Pressure Gauge, 2-PT-63-149.

A. Subsection 6.4

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.7

M&TE _____ Cal Due Date _____ _____

[31] **ENSURE** a 0-2000 psig test gauge is installed at SIP 2B-B Discharge - Pressure Gauge, 2-PT-63-18.

A. Subsection 6.5

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.6

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.8

M&TE _____ Cal Due Date _____ _____

[32] **INSTALL** a 0-60 psig test gauge (accuracy of ± 0.25%) at RHR PUMP 2A-A Suction Pressure Gauge, 2-PI-74-4.

A. Subsection 6.9

M&TE _____ Cal Due Date _____ _____

[33] **INSTALL** a 0-60 psig test gauge (accuracy of ± 0.25%) at RHR PUMP 2B-B Suction Pressure Gauge, 2-PI-74-22.

A. Subsection 6.10

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

[34] **INSTALL** a 0-300 psig test gauge (accuracy of ± 0.25%) at RHR PUMP 2A-A Discharge Pressure Gauge, 2-PI-74-6.

A. Subsection 6.9

M&TE _____ Cal Due Date _____ _____

[35] **INSTALL** a 0-300 psig test gauge (accuracy of ± 0.25%) at RHR PUMP 2B-B Discharge Pressure Gauge, 2-PI-74-18.

A. Subsection 6.10

M&TE _____ Cal Due Date _____ _____

[36] **ENSURE** Normal Component Cooling System supply for CCP 2A-A and the seal water heat exchanger is in service.

A. Subsection 6.1 _____

B. Subsection 6.3 _____

[37] **ENSURE** Normal Component Cooling System supply for CCP 2B-B and the seal water heat exchanger is in service.

A. Subsection 6.2 _____

B. Subsection 6.3 _____

[38] **ENSURE** Normal Component Cooling System supply for SIP 2A-A in service.

A. Subsection 6.4 _____

B. Subsection 6.6 _____

C. Subsection 6.7 _____

[39] **ENSURE** Normal Component Cooling System supply for SIP 2B-B in service.

A. Subsection 6.5 _____

B. Subsection 6.6 _____

C. Subsection 6.8 _____

Date _____

4.3 Field Preparations (continued)

[40] **ENSURE** Normal Component Cooling System supply for RHR PUMP 2A-A Seal Cooler and RHR Heat Exchanger 2A-A in service.

A. Subsection 6.9 _____

[41] **ENSURE** Normal Component Cooling System supply for RHR PUMP 2B-B Seal Cooler and RHR Heat Exchanger 2A-A in service.

A. Subsection 6.10 _____

[42] **VERIFY** the Centrifugal Charging Pump 2A-A suction and discharge piping is FILLED and VENTED per 2-TOP-63-02.

A. Subsection 6.1 _____

B. Subsection 6.3 _____

[43] **VERIFY** the Centrifugal Charging Pump 2B-B suction and discharge piping is FILLED and VENTED per 2-TOP-63-02.

A. Subsection 6.2 _____

B. Subsection 6.3 _____

[44] **VERIFY** the SIP 2A-A suction and discharge piping is FILLED and VENTED per 2-TOP-63-02.

A. Subsection 6.4 _____

B. Subsection 6.6 _____

C. Subsection 6.7 _____

[45] **VERIFY** the SIP 2B-B suction and discharge piping is FILLED and VENTED per 2-TOP-63-02.

A. Subsection 6.5 _____

B. Subsection 6.6 _____

C. Subsection 6.8 _____

Date _____

4.3 Field Preparations (continued)

[46] **VERIFY** the RHR PUMP 2A-A suction and discharge piping is FILLED and VENTED per 2-TOP-63-02.

A. Subsection 6.9 _____

[47] **VERIFY** the RHR PUMP 2A-A Seal Cooler is VENTED per 2-TOP-63-02.

A. Subsection 6.9 _____

[48] **VERIFY** the RHR PUMP 2B-B suction and discharge piping is FILLED and VENTED per 2-TOP-63-02.

A. Subsection 6.10 _____

[49] **VERIFY** the RHR PUMP 2B-B Seal Cooler is FILLED and VENTED per 2-TOP-63-02.

A. Subsection 6.10 _____

[50] **PERFORM** the Switch Lineup listed in 2-TOP-63-02 for the applicable Subsection to be performed.

Subsection 6.1 _____

Subsection 6.2 _____

Subsection 6.3 _____

[51] **PERFORM** the Switch Lineup listed in 2-TOP-63-02 for the applicable Subsection to be performed.

Subsection 6.4 _____

Subsection 6.5 _____

Subsection 6.6 _____

Subsection 6.7 _____

Subsection 6.8 _____

Date _____

4.3 Field Preparations (continued)

[52] **PERFORM** the Switch Lineup listed in 2-TOP-63-02 for the applicable Subsection to be performed.

Subsection 6.9 _____

Subsection 6.10 _____

[53] **PERFORM** the Breaker Lineup listed in 2-TOP-63-02 for the applicable Subsection to be performed.

Subsection 6.1 _____

Subsection 6.2 _____

Subsection 6.3 _____

[54] **PERFORM** the Breaker Lineup listed in 2-TOP-63-02 for the applicable Subsection to be performed.

Subsection 6.4 _____

Subsection 6.5 _____

Subsection 6.6 _____

Subsection 6.7 _____

Subsection 6.8 _____

[55] **PERFORM** the Breaker Lineup listed in 2-TOP-63-02 for the applicable Subsection to be performed.

Subsection 6.9 _____

Subsection 6.10 _____

[56] **PERFORM** the Valve Lineup listed in 2-TOP-63-02 for the applicable Subsection to be performed.

Subsection 6.1 _____

Subsection 6.2 _____

Subsection 6.3 _____

Date _____

4.3 Field Preparations (continued)

[57] **PERFORM** the Valve Lineup listed in 2-TOP-63-02 for the applicable Subsection to be performed.

Subsection 6.4 _____

Subsection 6.5 _____

Subsection 6.6 _____

Subsection 6.7 _____

Subsection 6.8 _____

[58] **PERFORM** the Valve Lineup listed in 2-TOP-63-02 for the applicable Subsection to be performed.

Subsection 6.9 _____

Subsection 6.10 _____

[59] **VERIFY** Refueling Water Storage Tank (RWST) temperature is 70°F - 90°F as read on 2-TI-63-131 or 2-TI-63-132. _____

[60] **ENSURE** the required test equipment for determination of ECCS pump watt readings has been assembled by issue of a Work Order to the System Engineering, EIC, ELEC ENG PROT/REL as follows:

A. Work Order Number _____ _____

B. The test plug, watt transducer, and digital multimeter are interconnected and available for plugging into the associated ECCS pump breaker cubicle Watt-hour Meter test jack. _____

C. Multiplication constant "K" has been provided by the System Engineering, EIC, ELEC. ENG PROT/REL for calculation of watts on pump data sheets.

K = _____ _____

Date _____

4.3 Field Preparations (continued)

[61] **INSTALL** the transducer/multimeter assembly for pump motor power measurements by inserting the test plug into the Watt-hour Meter test jack on the front of the appropriate breaker compartment.

A. Subsection 6.1 SDB 2A-A Compt 18

Watt-Transducer

M&TE _____ Cal Due Date _____ _____

Multimeter

M&TE _____ Cal Due Date _____ _____

B. Subsection 6.2 SDB 2B-B Compt 18

Watt-Transducer

M&TE _____ Cal Due Date _____ _____

Multimeter

M&TE _____ Cal Due Date _____ _____

C. Subsection 6.4 SDB 2A-A Compt 15

Watt-Transducer

M&TE _____ Cal Due Date _____ _____

Multimeter

M&TE _____ Cal Due Date _____ _____

D. Subsection 6.5 SDB 2B-B Compt 15

Watt-Transducer

M&TE _____ Cal Due Date _____ _____

Multimeter

M&TE _____ Cal Due Date _____ _____

Date _____

4.3 Field Preparations (continued)

E. Subsection 6.9 SDB 2A-A Compt 14

Watt-Transducer

M&TE _____ Cal Due Date _____ _____

Multimeter

M&TE _____ Cal Due Date _____ _____

F. Subsection 6.10 SDB 2B-B Compt 14

Watt-Transducer

M&TE _____ Cal Due Date _____ _____

Multimeter

M&TE _____ Cal Due Date _____ _____

[62] **VERIFY** Measuring and Test Equipment (M&TE) required for test performance has been (as required) filled, vented, place in service and recorded on Measuring and Test Equipment Log.

Subsection 6.1 _____

Subsection 6.2 _____

Subsection 6.3 _____

Subsection 6.4 _____

Subsection 6.5 _____

Subsection 6.6 _____

Subsection 6.7 _____

Subsection 6.8 _____

Subsection 6.9 _____

Subsection 6.10 _____

Date _____

4.3 Field Preparations (continued)

[63] **VERIFY** Measuring and Test Equipment (M&TE) calibration due dates will support the completion of this test performance.

Subsection 6.1 _____

Subsection 6.2 _____

Subsection 6.3 _____

Subsection 6.4 _____

Subsection 6.5 _____

Subsection 6.6 _____

Subsection 6.7 _____

Subsection 6.8 _____

Subsection 6.9 _____

Subsection 6.10 _____

Date _____

4.4 Approvals and Notifications

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

Preoperational Startup Manager Signature	Date

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

U2 US/SRO/SM Signature	Date

Date _____

5.0 ACCEPTANCE CRITERIA

NOTES

1) Steps which determine acceptance criteria are designated by **(ACC. CRIT.)**.
2) If needed, the actual data points of the pump curve are tabled in the Safety Injection System Description, WBN2-63-4001.

[1] The CCPs deliver the required balanced flows with miniflow open during the injection phase:

[1.1] Total flow from one CCP is less than or equal to 503.7 gpm (Steps 6.3[27]C, 6.3[35]C).

[1.2] Total flow from one CCP is greater than or equal to 454.5 gpm (Steps 6.3[27]B, 6.3[35]B).

[1.3] The difference in the maximum and minimum injection line flows is less than or equal to 10 gpm (Steps 6.3[27]A, 6.3[35]A).

[1.4] Each CCP discharge resistance is between 0.01177 and 0.01245 ft/gpm^2 (Steps 6.3[29], 6.3[37]).

[1.5] Each CCP produces a miniflow resistance between 1.35 and 1.55 ft/gpm^2 (Steps 6.1[15], 6.2[15]).

[2] CCP head/flow data is greater than the FSAR curve and less than the maximum composite curve (Steps 6.1[42], 6.2[42]).

[3] CCPs will not trip out under minimum flow and maximum flow conditions (Steps 6.1[16], 6.2[16], 6.3[30], 6.3[38]).

Date _____

5.0 ACCEPTANCE CRITERIA (continued)

[4] The SIPs deliver the required balanced flows with miniflow open during the cold leg injection phase:

[4.1] Total flow from one SIP is less than or equal to 654.6 gpm (Steps 6.6[31]C, 6.6[41]C).

[4.2] Total flow from one SIP is greater than or equal to 605.9 gpm (Steps 6.6[31]B, 6.6[41]B).

[4.3] The difference in the highest and lowest injection line flows is less than or equal to 10 gpm (Steps 6.6[31]A, 6.6[41]A).

[4.4] Pump discharge resistance is between 0.004644 and 0.005326 ft/gpm^2 (Steps 6.6[33], 6.6[44]).

[4.5] Each SIP produces a miniflow resistance between 1.76 and 2.50 ft/gpm^2 (Steps 6.4[14], 6.5[14]).

[5] SIP head/flow data is greater than the FSAR curve and less than the maximum composite curve (Steps 6.4[46], 6.5[46]).

[6] The SIPs deliver the required balanced flows with miniflow isolated during the hot leg injection phase:

[6.1] Total flow from one SIP is greater than or equal to 558.3 gpm and less than or equal to 653.7 gpm (Steps 6.7[36], 6.8[36]).

[6.2] Pump discharge resistance is between 0.004717 and 0.006886 ft/gpm^2 (Steps 6.7[37], 6.8[37]).

[7] SIPs will not trip out under minimum and maximum conditions (Steps 6.4[15], 6.5[15], 6.6[34], 6.6[45]).

[8] Maximum flow through Valves 2-FCV-63-156 and 2-FCV-63-157 in the closed position is 10 gpm (Steps 6.7[21]C, 6.8[21]C).

Date _____

5.0 ACCEPTANCE CRITERIA (continued)

[9] The RHR Pumps perform as follows with miniflow isolated:

[9.1] Each RHR Pump capacity for cold leg injection is from 3866.8 to 4265.7 gpm (Steps 6.9[29]A, 6.10[29]A).

[9.2] Each RHR Pump discharge resistance for cold leg injection isolated is between 0.0000205 and 0.0000236 ft/gpm^2 (Steps 6.9[31], 6.10[31]).

[9.3] RHR Pump head/flow data is greater than the FSAR curve and less than the maximum composite curve (Steps 6.9[44], 6.10[44]).

[9.4] RHR Pumps will not trip out under minimum and maximum flow conditions (Steps 6.9[16], 6.9[30], 6.10[16], 6.10[30]).

[9.5] Each RHR Pump capacity for hot leg injection is from 3698 to 4120 gpm (Steps 6.9[37], 6.10[37]).

[9.6] Each RHR Pump discharge resistance for hot leg injection is between 0.0000226 and 0.0000264 ft/gpm^2 (Steps 6.9[38], 6.10[38]).

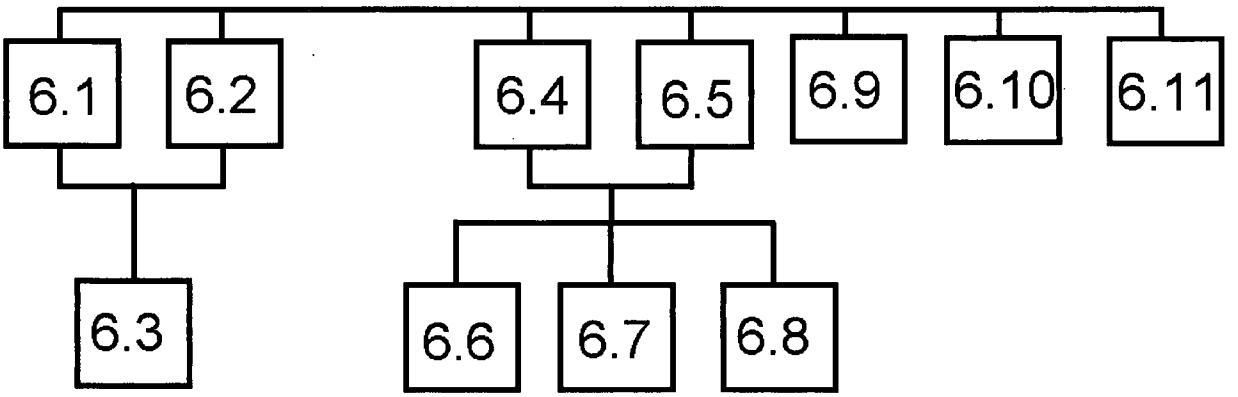
[10] No excessive vibration of the piping system and components is observed (Steps 6.1[44], 6.2[44], 6.3[43], 6.4[48], 6.5[48], 6.6[51], 6.7[43], 6.8[43], 6.9[45], 6.10[45])

Date _____

6.0 PERFORMANCE

NOTE

Subsections of this procedure shall be performed in the order specified by the below listed diagram.



NOTES

1) During the performance of this test instruction the test may be stopped to pump down the Reactor Vessel. Operating pumps should be stopped and applicable valve/valves closed to prevent gravity drain from the RWST while the vessel is being pumped down. After the vessel is pumped down, reestablish conditions to resume the test and record the actions taken in the test log.

2) All flows calculated from differential pressure through test gauges are to use Appendix S. Use as many copies of this form as needed and attach to the procedure.

3) All resistences calculated from differential pressure and pressure gauges through test gauges are to use Appendix T. Use as many copies of this form as needed and attach to the procedure.

4) Keeping track of throttle valve revolutions and noting them in the CTL will assist testing in later throttle valve manipulations as well as provide a reference point in case the valves must be full opened or closed in later testing.

5) For calculations, the value of 62.22 lb/ft^3 at 80°F was used for water density.

6) Any temporary equipment that will be used for the performance of 2-PTI-063-01 may be left in place and the removal step marked N/A.

Date _____

6.1 Centrifugal Charging Pump 2A-A Test Curve

NOTE

The following section requires monitoring of pump vibration data per TI-31.02 by Preventive and Diagnostic Maintenance, PDM.

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.1 have been completed. _____

[2] **ENSURE** the following valves are CLOSED:

A. 2-THV-63-582, COLD LEG 1 BORON INJ THROTTLE _____

B. 2-THV-63-583, COLD LEG 2 BORON INJ THROTTLE _____

C. 2-THV-63-584, COLD LEG 3 BORON INJ THROTTLE _____

D. 2-THV-63-585, COLD LEG 4 BORON INJ THROTTLE _____

[3] **VERIFY/FILL** the RWST to ≥ 25%.

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[4] **RECORD** the RWST temperature. (70°F - 90°F)

A. 2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

Date _____

6.1 Centrifugal Charging Pump 2A-A Test Curve (continued)

[5] **ENSURE** the following plant computer points are in scan:

A. T0703A, CENT CHG PMP A-A INBRD BRG _____

B. T0704A, CENT CHG PMP A-A OUTBRD BRG _____

C. T0705A, CENT CHG PMP A-A THRUST BRG _____

D. T0711A, CENT CHG PMP A-A MTR INBRD BRG _____

E. T0712A, CENT CHG PMP A-A MTR OUTBRD BRG _____

F. T0713A, CENT CHG PMP A-A MTR PH A WNDG _____

G. T0714A, CENT CHG PMP A-A MTR PH B WNDG _____

H. T0715A, CENT CHG PMP A-A MTR PH C WNDG _____

[6] **RECORD** ambient computer point temperatures on Appendix E. _____

[7] **RECORD** 2A-A 6.9kV Shutdown Board voltage.

2-EI-57-39 (2-M-1) _____ volts (expect 6900-7200 volts) _____

[8] **ENSURE** CCP miniflow path established. _____

[9] **VERIFY** CCP 2A-A suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-62-109 _____ psig _____

Date _____

6.1 Centrifugal Charging Pump 2A-A Test Curve (continued)

CAUTION

Closely observe pump operation under miniflow conditions for excessive vibration and overheating.

NOTE

During the performance of steps 6.1[10] through 6.1[16], visual observation of transient and steady state vibrations is required.

[10] **START** CCP 2A-A using 2-HS-62-108A, CCP A-A (ECCS) [2-M-5]. _____

[11] **RECORD** the time of the pump start. _____ _____

[12] **RECORD** time and computer point temperature data at approximately 10 minute intervals on Appendix E until three successive temperature readings differ by no more than 3 percent. _____

[13] **ENSURE** the test differential pressure gauge installed at 2-FE-62-257 is vented and in service. _____

[14] **RECORD** the miniflow through 2-FE-62-257, CHARGING PUMP MINI FLOW ELEMENT.

Miniflow _____ GPM

_____

[15] **PERFORM** calculation using Appendix T, **AND**

RECORD the pump miniflow resistance.
(ACC. CRIT. 5.0[1.5])

Kmin _____ ft/gpm^2 (> 1.35 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 1.55 ft/gpm^2)

_____

Date _____

6.1 Centrifugal Charging Pump 2A-A Test Curve (continued)

[16] **VERIFY** CCP 2A-A DID NOT TRIP. **(ACC. CRIT. 5.0[3])** _____

[17] **RECORD** pump operating data on Appendix E. _____

[18] **RECORD** the pump curve data for the miniflow target point on Appendix F. _____

[19] **OBTAIN** pump and motor vibration data per TI-31.02. _____

[20] **ATTACH** vibration data from the previous step to this procedure. _____

[21] **OPEN** the following valves one (1) turn open:

A. 2-THV-63-582, COLD LEG 1 BORON INJ THROTTLE _____

B. 2-THV-63-583, COLD LEG 2 BORON INJ THROTTLE _____

C. 2-THV-63-584, COLD LEG 3 BORON INJ THROTTLE _____

D. 2-THV-63-585, COLD LEG 4 BORON INJ THROTTLE _____

[22] **OPEN** the following valves:

A. 2-FCV-63-25, 2-HS-63-25A, BIT OUTLET [2-M-6]. _____

B. 2-FCV-63-26, 2-HS-63-26A, BIT OUTLET [2-M-6]. _____

[23] **CLOSE** the following valves:

A. 2-THV-63-582, COLD LEG 1 BORON INJ THROTTLE _____

B. 2-THV-63-583, COLD LEG 2 BORON INJ THROTTLE _____

C. 2-THV-63-584, COLD LEG 3 BORON INJ THROTTLE _____

D. 2-THV-63-585, COLD LEG 4 BORON INJ THROTTLE _____

Date _____

6.1 Centrifugal Charging Pump 2A-A Test Curve (continued)

[24] **VENT** the following test flow gauges and **PLACE** in service.

A. Installed at 2-FE-63-170 _____

B. Installed at 2-FE-63-27 _____

C. Installed at 2-FE-63-29 _____

D. Installed at 2-FE-63-31 _____

E. Installed at 2-FE-63-33 _____

[25] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 100 and 150 gpm. _____

[26] **CLOSE** 2-FCV-62-99, CHARGING PUMP 2A-A MIN FLOW, to close off miniflow. _____

[27] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 245 and 250 gpm. _____

[28] **RECORD** pump curve data for 250 gpm target point on Appendix F. _____

[29] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 345 and 355 gpm. _____

[30] **RECORD** pump curve data for 350 gpm target point on Appendix F. _____

[31] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 445 and 455 gpm. _____

Date _____

6.1 Centrifugal Charging Pump 2A-A Test Curve (continued)

[32] **RECORD** pump curve data for 450 gpm target point on Appendix F. _____

CAUTION

Do not exceed 550 gpm in total CCP 2A-A output through 2-FE-63-170.

[33] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 545 and 550 gpm. _____

[34] **RECORD** pump curve data for 550 gpm target point on Appendix F. _____

NOTE

The following steps verify that Check Valve 2-CKV-62-532, CCP B-B DISCHARGE CKV, is CLOSED.

[35] **CLOSE** 2-ISV-62-533, CCP B-B DISCHARGE ISOL. _____

[36] **VERIFY** flow rate is 545-550 gpm.

Flow Rate _____ GPM _____

[37] **OPEN** Valve 2-ISV-62-533, CCP B-B DISCHARGE. _____

[38] **STOP** CCP 2A-A using Hand switch 2-HS-62-108A, CCP A-A. _____

[39] **CLOSE** the following valves:

A. 2-FCV-63-25, 2-HS-63-25A, BIT OUTLET [2-M-6]. _____

B. 2-FCV-63-26, 2-HS-63-26A, BIT OUTLET [2-M-6]. _____

Date _____

6.1 Centrifugal Charging Pump 2A-A Test Curve (continued)

[40] **CLOSE** the following valves:

A. 2-THV-63-582, BORON INJ VALVE CL L1 _____

B. 2-THV-63-583, BORON INJ VALVE CL L2 _____

C. 2-THV-63-584, BORON INJ VALVE CL L3 _____

D. 2-THV-63-585, BORON INJ VALVE CL L4 _____

[41] **PERFORM** pump curve calculations for CCP 2A-A on Appendix F. _____

[42] **VERIFY** CCP 2A-A pump curve data is greater than the FSAR curve and less than the maximum composite curve from Appendix F. **(ACC. CRIT. 5.0[2])** _____

[43] **UNPLUG** the watt-transducer/multimeter from SDB 2A-A Compt 18. _____ 1st _____ CV

[44] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this Subsection was observed. **(ACC. CRIT. 5.0[10])** _____

Date _____

6.2 Centrifugal Charging Pump 2B-B Test Curve

NOTE

The following section requires monitoring of pump vibration data per TI-31.02 by Preventive and Diagnostic Maintenance, PDM.

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.2 have been completed. _____

[2] **ENSURE** the following valves are CLOSED:

A. 2-THV-63-582, BORON INJ VALVE CL L1 _____

B. 2-THV-63-583, BORON INJ VALVE CL L2 _____

C. 2-THV-63-584, BORON INJ VALVE CL L3 _____

D. 2-THV-63-585, BORON INJ VALVE CL L4 _____

[3] **VERIFY/FILL** the RWST to ≥ 25%.

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[4] **RECORD** the RWST temperature. (70°F - 90°F)

A. 2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

Date _____

6.2 Centrifugal Charging Pump 2B-B Test Curve (continued)

[5] **ENSURE** the following plant computer points are in scan:

A. T0700A, CENT CHG PMP B-B INBRD BRG _____

B. T0701A, CENT CHG PMP B-B OUTBRD BRG _____

C. T0702A, CENT CHG PMP B-B THRUST BRG _____

D. T0706A, CENT CHG PMP B-B MTR INBRD BRG _____

E. T0707A, CENT CHG PMP B-B MTR OUTBRD BRG _____

F. T0708A, CENT CHG PMP B-B MTR PH A WNDG _____

G. T0709A, CENT CHG PMP B-B MTR PH B WNDG _____

H. T0710A, CENT CHG PMP B-B MTR PH C WNDG _____

[6] **RECORD** ambient computer point temperatures on Appendix G. _____

[7] **RECORD** 2B-B 6.9kV Shutdown Board voltage.

2-EI-57-66 (2-M-1) _____ volts
(expected 6900-7200 volts) _____

[8] **ENSURE** CCP miniflow path established. _____

[9] **VERIFY** CCP 2B-B suction pressure greater than 14 psig.

Test gauge at 2-PI-62-105 _____ psig _____

Date _____

6.2 Centrifugal Charging Pump 2B-B Test Curve (continued)

CAUTION

Closely observe pump operation under miniflow conditions for excessive vibration and overheating.

NOTE

During the performance of steps 6.2[10] through 6.2[16], visual observation of transient and steady state vibrations is required.

[10] **START** CCP 2B-B using 2-HS-62-104A, CCP B-B (ECCS) [2-M-5]. _____

[11] **RECORD** the time of the pump start. _____ _____

[12] **RECORD** time and computer point temperature data at approximately 10 minute intervals on Appendix G until three successive temperature readings differ by no more than 3 percent. _____

[13] **VENT** the test flow gauge installed at 2-FE-62-257 and **PLACE** in service. _____

[14] **RECORD** the miniflow through 2-FE-62-257, CHARGING PUMP MINI FLOW ELEMENT.

Miniflow _____ GPM

_____

[15] **PERFORM** calculation using Appendix T, **AND**

RECORD the pump miniflow resistance.
(ACC. CRIT. 5.0[1.5])

Kmin _____ ft/gpm^2 (> 1.35 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 1.55 ft/gpm^2)

_____

Date _____

6.2 Centrifugal Charging Pump 2B-B Test Curve (continued)

[16] **VERIFY** CCP 2B-B DID NOT TRIP. **(ACC. CRIT. 5.0[3])** _____

[17] **RECORD** pump operating data on Appendix G. _____

[18] **RECORD** the pump curve data for the miniflow target point on Appendix H. _____

[19] **OBTAIN** pump and motor vibration data per TI-31.02. _____

[20] **ATTACH** vibration data from the previous step to this procedure. _____

[21] **OPEN** the following valves one (1) turn open:

A. 2-THV-63-582, COLD LEG 1 BORON INJ THROTTLE _____

B. 2-THV-63-583, COLD LEG 2 BORON INJ THROTTLE _____

C. 2-THV-63-584, COLD LEG 3 BORON INJ THROTTLE _____

D. 2-THV-63-585, COLD LEG 4 BORON INJ THROTTLE _____

[22] **OPEN** the following valves:

A. 2-FCV-63-25, 2-HS-63-25A, BIT OUTLET [2-M-6]. _____

B. 2-FCV-63-26, 2-HS-63-26A, BIT OUTLET [2-M-6]. _____

[23] **CLOSE** the following valves:

A. 2-THV-63-582, COLD LEG 1 BORON INJ THROTTLE _____

B. 2-THV-63-583, COLD LEG 2 BORON INJ THROTTLE _____

C. 2-THV-63-584, COLD LEG 3 BORON INJ THROTTLE _____

D. 2-THV-63-585, COLD LEG 4 BORON INJ THROTTLE _____

Date _____

6.2 Centrifugal Charging Pump 2B-B Test Curve (continued)

[24] **VENT** the following test flow gauges and **PLACE** in service.

A. Installed at 2-FE-63-170 _____

B. Installed at 2-FE-63-27 _____

C. Installed at 2-FE-63-29 _____

D. Installed at 2-FE-63-31 _____

E. Installed at 2-FE-63-33 _____

[25] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 100 and 150 gpm. _____

[26] **CLOSE** 2-FCV-62-99, CHARGING PUMP 2A-A MIN FLOW, to close off miniflow. _____

[27] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 245 and 255 gpm. _____

[28] **RECORD** pump curve data for 250 gpm target point on Appendix H. _____

[29] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 345 and 355 gpm. _____

[30] **RECORD** pump curve data for 350 gpm target point on Appendix H. _____

[31] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 445 and 455 gpm. _____

Date _____

6.2 Centrifugal Charging Pump 2B-B Test Curve (continued)

[32] **RECORD** pump curve data for 450 gpm target point on Appendix H. _____

CAUTION

Do not exceed 550 gpm in total CCP 2B-B output through 2-FE-63-170.

[33] **THROTTLE** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, 2-THV-63-585, BORON INJ VALVE CL L4, until the flow through 2-FE-63-170 is between 545 and 550 gpm. _____

[34] **RECORD** pump curve data for 550 gpm target point on Appendix H. _____

NOTE

The following steps verify that Check Valve 2-CKV-62-525, CCP A-A DISCHARGE CKV, is CLOSED.

[35] **CLOSE** 2-ISV-62-527, CCP A-A DISCHARGE. _____

[36] **VERIFY** flow rate is 545-550 gpm.

Flow Rate _____ GPM _____

[37] **OPEN** Valve 2-ISV-62-527, CCP A-A DISCHARGE. _____

[38] **STOP** CCP 2B-B using Hand switch 2-HS-62-104A, CCP B-B. _____

[39] **CLOSE** the following valves:

A. 2-FCV-63-25, 2-HS-63-25A, BIT OUTLET [2-M-6]. _____

B. 2-FCV-63-26, 2-HS-63-26A, BIT OUTLET [2-M-6]. _____

Date _____

6.2 Centrifugal Charging Pump 2B-B Test Curve (continued)

[40] **CLOSE** the following valves:

A. 2-THV-63-582, BORON INJ VALVE CL L1 _____

B. 2-THV-63-583, BORON INJ VALVE CL L2 _____

C. 2-THV-63-584, BORON INJ VALVE CL L3 _____

D. 2-THV-63-585, BORON INJ VALVE CL L4 _____

[41] **PERFORM** pump curve calculations for CCP 2B-B on Appendix H. _____

[42] **VERIFY** CCP 2B-B pump curve data is greater than the FSAR curve and less than the maximum composite curve from Appendix H. **(ACC. CRIT. 5.0[2])** _____

[43] **UNPLUG** the watt-transducer/multimeter from SDB 2B-B Compt 18. _____ 1st _____ CV

[44] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this Subsection was observed. **(ACC. CRIT. 5.0[10])** _____

Date _____

6.3 Centrifugal Charging Pumps Flow Balance

NOTE

RCP seal flow path should be isolated for the performance of this subsection.

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.3 have been completed. _____

[2] **VERIFY/FILL** the RWST level is ≥ 25%. (N/A any LIs not in service.)

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[3] **RECORD** the RWST temperature. (70°F - 90°F)

A. 2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

[4] **ENSURE** the following valves are CLOSED:

A. 2-THV-63-582, BORON INJ VALVE CL L1 _____

B. 2-THV-63-583, BORON INJ VALVE CL L2 _____

C. 2-THV-63-584, BORON INJ VALVE CL L3 _____

D. 2-THV-63-585, BORON INJ VALVE CL L4 _____

[5] **VERIFY** CCP 2A-A suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-62-109 _____ psig _____

[6] **ENSURE** CCP miniflow path established. _____

[7] **START** CCP 2A-A on miniflow using 2-HS-62-108A, CCP A-A on 2-M-5. _____

Date _____

6.3 Centrifugal Charging Pumps Flow Balance (continued)

[8] **VENT** the test flow gauge installed at 2-FE-62-257. _____

[9] **OPEN** the following valves one (1) turn open:

A. 2-THV-63-582, BORON INJ VALVE CL L1 _____

B. 2-THV-63-583, BORON INJ VALVE CL L2 _____

C. 2-THV-63-584, BORON INJ VALVE CL L3 _____

D. 2-THV-63-585, BORON INJ VALVE CL L4 _____

[10] **OPEN** the following valves:

A. 2-FCV-63-25, 2-HS-63-25A, BIT OUTLET [2-M-6]. _____

B. 2-FCV-63-26, 2-HS-63-26A, BIT OUTLET [2-M-6]. _____

[11] **VENT** the following test flow gauges, **AND**

PLACE in service:

A. 2-FE-63-27 (Acc Rm 4 724' 296°) _____

B. 2-FE-63-29 (Acc Rm 3 728' 216°) _____

C. 2-FE-63-31 (Acc Rm 2 729' 140°) _____

D. 2-FE-63-33 (Fan Rm 1 729' 0°) _____

E. 2-FE-63-170 (Aux 704 A11 V) _____

CAUTION

Do not exceed 550 gpm in total CCP 2A-A output through 2-FE-62-257 and 2-FE-63-170.

Date _____

6.3 Centrifugal Charging Pumps Flow Balance (continued)

NOTE

Per 2-TSD-63-3, Westinghouse has estimated in WBT-D-4376 that the cold leg injection flow would be 428.4, or 107.1 gpm per cold leg.

[12] **THROTTLE OPEN** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 2-THV-63-584, BORON INJ VALVE CL L3, and 2-THV-63-585, BORON INJ VALVE CL L4, until flow through 2-FE-63-170 reads between 423 and 433 gpm. _____

[13] **ADJUST** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 5-THV-63-584, BORON INJ VALVE CL L3, and 2-THV-63-585, BORON INJ VALVE CL L4, until the following conditions are met:

A. Difference between highest branch line flow and lowest branch line flow is less than or equal to 10 gpm.

Difference _____ GPM _____

B. Total CCP 2A-A flow through 2-FE-62-257 and 2-FE-63-170 is greater than or equal to 454.5 gpm.

Total CCP 2A-A Flow _____ GPM _____

C. Total CCP 2A-A flow through 2-FE-62-257 and 2-FE-63-170 is less than or equal to 503.7 gpm.

Total CCP 2A-A Flow _____ GPM _____

[14] **VERIFY** CCP 2B-B suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-62-105 _____ psig _____

[15] **START** CCP 2B-B using 2-HS-62-104A, CCP B-B (ECCS) [2-M-5]. _____

[16] **STOP** CCP 2A-A using 2-HS-62-108A, CCP A-A (ECCS) [2-M-5]. _____

Date _____

6.3 Centrifugal Charging Pumps Flow Balance (continued)

CAUTION

Do not exceed 550 gpm in total CCP 2B-B output through 2-FE-62-257 and 2-FE-63-170.

[17] **ADJUST** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 5-THV-63-584, BORON INJ VALVE CL L3, and 2-THV-63-585, BORON INJ VALVE CL L4, until the following conditions are met:

A. Difference between highest branch line flow and lowest branch line flow is less than or equal to 10 gpm.

Difference _____ GPM _____

B. Total CCP 2B-B flow through 2-FE-62-257 and 2-FE-63-170 is greater than or equal to 454.5 gpm.

Total CCP 2B-B Flow _____ GPM _____

C. Total CCP 2B-B flow through 2-FE-62-257 and 2-FE-63-170 is less than or equal to 503.7 gpm.

Total CCP 2B-B Flow _____ GPM _____

[18] **START** CCP 2A-A using 2-HS-62-108A, CCP A-A (ECCS) [2-M-5]. _____

[19] **STOP** CCP 2B-B using 2-HS-62-104A, CCP B-B (ECCS) [2-M-5]. _____

Date _____

6.3 Centrifugal Charging Pumps Flow Balance (continued)

[20] **ADJUST** Valves 2-THV-63-582, BORON INJ VALVE CL L1, 2-THV-63-583, BORON INJ VALVE CL L2, 5-THV-63-584, BORON INJ VALVE CL L3, and 2-THV-63-585, BORON INJ VALVE CL L4, until the following conditions are met:

A. Difference between highest branch line flow and lowest branch line flow is less than or equal to 10 gpm.

Difference _____ GPM _____

B. Total CCP 2A-A flow through 2-FE-62-257 and 2-FE-63-170 is greater than or equal to 454.5 gpm.

Total CCP 2A-A Flow _____ GPM _____

C. Total CCP 2A-A flow through 2-FE-62-257 and 2-FE-63-170 is less than or equal to 503.7 gpm.

Total CCP 2A-A Flow _____ GPM _____

NOTE

The following step is for information only and not for proof in regards to Acceptance Criteria.

[21] **CAPTURE** the current flow rates data, **AND**

ATTACH to WO. _____

[22] **STOP** CCP 2A-A using 2-HS-62-108A, CCP A-A (ECCS) [2-M-5]. _____

[23] **CLOSE** the following valves:

A. 2-FCV-63-25, 2-HS-63-25A, BORON INJ TK OUTLET. _____

B. 2-FCV-63-26, 2-HS-63-26A, BORON INJ TK OUTLET. _____

Date _____

6.3 Centrifugal Charging Pumps Flow Balance (continued)

NOTE

Do not move throttle valve position while installing valve position locking devices.

[24] **INSTALL** locking devices on the following valves:

A. 2-THV-63-582, BORON INJ VALVE CL L1 _____

B. 2-THV-63-583, BORON INJ VALVE CL L2 _____

C. 2-THV-63-584, BORON INJ VALVE CL L3 _____

D. 2-THV-63-585, BORON INJ VALVE CL L4 _____

[25] **OPEN** the following valves:

A. 2-FCV-63-25, 2-HS-63-25A, BIT OUTLET, on 2-M-6. _____

B. 2-FCV-63-26, 2-HS-63-26A, BIT OUTLET, on 2-M-6. _____

NOTE

During the performance of steps 6.3[26] thru 6.3[40] visual observation of transient and steady state vibrations is required.

[26] **START** CCP 2A-A using 2-HS-62-108A, CCP A-A. _____

Date _____

6.3 Centrifugal Charging Pumps Flow Balance (continued)

[27] **VERIFY** the following conditions:

A. Difference between highest branch line flow and lowest branch line flow is less than or equal to 10 gpm. **(ACC. CRIT. 5.0[1.3])**

Difference _____ GPM _____

B. Total CCP 2A-A flow through 2-FE-62-257 and 2-FE-63-170 is greater than or equal to 454.5 gpm. **(ACC. CRIT. 5.0[1.2])**

Total CCP 2A-A Flow _____ GPM _____

C. Total CCP 2A-A flow through 2-FE-62-257 and 2-FE-63-170 is less than or equal to 503.7 gpm. **(ACC. CRIT. 5.0[1.1])**

Total CCP 2A-A Flow _____ GPM _____

[28] **RECORD** CCP 2A-A discharge pressure, suction pressure, Flow Rate, motor current and mechanical data on Appendix I. _____

[29] **RECORD** the pump discharge resistance using Appendix T. **(ACC. CRIT. 5.0[1.4])**

Kmin _____ ft/gpm^2 (> 0.01177 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.01245 ft/gpm^2)

_____

[30] **VERIFY** CCP 2A-A DID NOT TRIP. **(ACC. CRIT. 5.0[3])** _____

[31] **VERIFY** reactor vessel level is below the nozzle centerline. _____

[32] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

[33] **START** CCP 2B-B using 2-HS-62-104A, CCP B-B. _____

[34] **STOP** CCP 2A-A using 2-HS-62-108A, CCP A-A. _____

Date _____

6.3 Centrifugal Charging Pumps Flow Balance (continued)

[35] **VERIFY** the following conditions:

A. Difference between highest branch line flow and lowest branch line flow is less than or equal to 10 gpm. **(ACC. CRIT. 5.0[1.3])**

Difference _____ GPM _____

B. Total CCP 2B-B flow through 2-FE-62-257 and 2-FE-63-170 is greater than or equal to 454.5 gpm. **(ACC. CRIT. 5.0[1.2])**

Total CCP 2B-B Flow _____ GPM _____

C. Total CCP 2B-B flow through 2-FE-62-257 and 2-FE-63-170 is less than or equal to 503.7 gpm. **(ACC. CRIT. 5.0[1.1])**

Total CCP 2B-B Flow _____ GPM _____

[36] **RECORD** CCP 2B-B discharge pressure, suction pressure, Flow Rate, motor current and mechanical data on Appendix I. _____

[37] **RECORD** the pump discharge resistance using Appendix T. **(ACC. CRIT. 5.0[1.4])**

Kmin _____ ft/gpm^2 (> 0.01177 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.01245 ft/gpm^2)

_____

[38] **VERIFY** CCP 2B-B DID NOT TRIP. **(ACC. CRIT. 5.0[3])** _____

[39] **VERIFY** reactor vessel level is below the nozzle centerline. _____

[40] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

[41] **STOP** CCP 2B-B using 2-HS-62-104A, CCP B-B. _____

Date _____

6.3 Centrifugal Charging Pumps Flow Balance (continued)

[42] **CLOSE** the following valves:

A. 2-FCV-63-25, 2-HS-63-25A, BORON INJ TK OUTLET. _____

B. 2-FCV-63-26, 2-HS-63-26A, BORON INJ TK OUTLET. _____

[43] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this Subsection was observed. **(ACC. CRIT. 5.0[10])** _____

NOTE

The remaining steps of this subsection are not a restraint to progressing to other subsections.

[44] **REMOVE** the differential pressure gauge connected across Miniflow Orifice 2-FE-62-257. _____ 1st _____ CV

[45] **REMOVE** the differential pressure gauge connected across Orifice 2-FE-63-33. _____ 1st _____ CV

[46] **REMOVE** the differential pressure gauge connected across Orifice 2-FE-63-31. _____ 1st _____ CV

[47] **REMOVE** the differential pressure gauge connected across Orifice 2-FE-63-29. _____ 1st _____ CV

Date _____

6.3 Centrifugal Charging Pumps Flow Balance (continued)

[48] **REMOVE** the differential pressure gauge connected across Orifice 2-FE-63-27.

_____ 1st

_____ CV

[49] **REMOVE** the differential pressure gauge connected across orifice 2-FE-63-170.

_____ 1st

_____ CV

[50] **REMOVE** a test gauge installed at CCP 2A-A Suction Pressure Gauge 2-PI-62-109.

_____ 1st

_____ CV

[51] **REMOVE** a test gauge installed at CCP 2A-A Discharge Pressure Gauge 2-PI-62-110.

_____ 1st

_____ CV

[52] **REMOVE** a test gauge installed at CCP 2B-B Suction Pressure Gauge 2-PI-62-105.

_____ 1st

_____ CV

[53] **REMOVE** a test gauge installed at CCP 2B-B Discharge Pressure Gauge 2-PI-62-106.

_____ 1st

_____ CV

Date _____

6.4 Safety Injection Pump 2A-A Test Curve

NOTE

The following section requires monitoring of pump vibration data per TI-31.02 by Preventive and Diagnostic Maintenance, PDM.

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.4 are completed. _____

[2] **ENSURE** the following valves are CLOSED:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[3] **VERIFY/FILL** the RWST level is ≥ 25%. (N/A any LIs not in service.)

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[4] **RECORD** the RWST temperature. (70°F - 90°F)

2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

Date _____

6.4 Safety Injection Pump 2A-A Test Curve (continued)

[5] **ENSURE** the following plant computer points are in scan:

A. T0150A, SIS PUMP A-A MOTOR PH A WNDG _____

B. T0151A, SIS PUMP A-A MOTOR PH B WNDG _____

C. T0152A, SIS PUMP A-A MOTOR PH C WNDG _____

D. T0153A, SIS PMP A-A MTR OUTBRD GUIDE BRG _____

E. T0154A, SIS PMP A-A MTR INBRD GUIDE BRG _____

[6] **RECORD** ambient computer point temperatures on Appendix J. _____

[7] **RECORD** 2A-A 6.9kV Shutdown Board voltage

2-EI-57-39 (2-M-1) _____ volts
(expect 6900 - 7200 volts) _____

[8] **VERIFY** SIP 2A-A suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-63-9 _____ psig _____

CAUTION

Closely observe pump operation under miniflow conditions for excessive vibration and overheating.

NOTE

During the performance of steps 6.4[9] through 6.4[15], visual observation of transient and steady state vibrations is required.

[9] **START** SIP 2A-A using 2-HS-63-10A, SI PMP A (ECCS), on 2-M-6. _____

[10] **RECORD** the time of the pump start. _____ _____

Date _____

6.4 Safety Injection Pump 2A-A Test Curve (continued)

[11] **RECORD** time and computer point temperature data at approximately 10 minute intervals on Appendix J until three successive temperature readings differ by no more than 3 percent. _____

[12] **VENT** the test flow gauge installed at 2-FE-63-2, and **PLACE** in service. _____

[13] **RECORD** the miniflow rate through 2-FE-63-2.

Miniflow _____ GPM

_____

[14] **PERFORM** calculation using Appendix T, **AND**

RECORD the pump miniflow resistance.
(ACC. CRIT. 5.0[4.5])

Kmin _____ ft/gpm^2 (> 1.76 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 2.50 ft/gpm^2)

_____

[15] **VERIFY** SIP 2A-A DID NOT TRIP. **(ACC. CRIT. 5.0[7])** _____

[16] **RECORD** pump operating data on Appendix J. _____

[17] **RECORD** the pump curve data for the miniflow target point on Appendix K. _____

[18] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

Date _____

6.4 Safety Injection Pump 2A-A Test Curve (continued)

[19] **OPEN** the following valves one (1) turn open:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[20] **OPEN** Valve 2-FCV-63-22 using 2-HS-63-22A, SI PMPS TO CL 1-2-3-4, on 2-M-6. _____

[21] **CLOSE** the following valves:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[22] **VENT** the following test flow gauges, **AND**

PLACE in service:

A. Installed at 2-FE-63-151 (Aux 713' A11 W) _____

B. Installed at 2-FE-63-122 (RXB 732' 38°) _____

C. Installed at 2-FE-63-123 (RXB 732' 145°) _____

D. Installed at 2-FE-63-124 (RXB 730' 210°) _____

E. Installed at 2-FE-63-125 (RXB 728' 324°) _____

[23] **THROTTLE** Valve 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE, until flow through 2-FE-63-151 is greater than 110 gpm. _____

[24] **CLOSE** SIP miniflow Valve 2-FCV-63-4 using 2-HS-63-4A, SI PMP A RECIRC TO RWST. _____

[25] **VERIFY** flow through 2-FE-63-151 is greater than 110 gpm. _____

Date _____

6.4 Safety Injection Pump 2A-A Test Curve (continued)

[26] **VERIFY** the miniflow through 2-FE-63-2 is less than one gpm. _____

[27] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-151 is between 245 and 255 gpm. _____

[28] **RECORD** pump curve data for 250 gpm target point on Appendix K. _____

[29] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-151 is between 345 and 355 gpm. _____

[30] **RECORD** pump curve data for 350 gpm target point on Appendix K. _____

[31] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-151 is between 445 and 455 gpm. _____

[32] **RECORD** pump curve data for 450 gpm target point on Appendix K. _____

[33] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-151 is between 545 and 555 gpm. _____

[34] **RECORD** pump curve data for 550 gpm target point on Appendix K. _____

CAUTION

Do not exceed 650 gpm in total SIP 2A-A output through 2-FE-63-151.

[35] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-151 is between 645 and 650 gpm. _____

Date _____

6.4 Safety Injection Pump 2A-A Test Curve (continued)

[36] **RECORD** pump curve data for 650 gpm target point on Appendix K. _____

NOTE

The following steps verify that Check Valve 2-CKV-63-526, SI PMP 2B-B DISCHARGE CKV, is CLOSED.

[37] **CLOSE** Valve 2-ISV-63-527, SI PMP 2B-B DISCHARGE ISOLATION. _____

[38] **VERIFY** total flowrate is 645-650 gpm through 2-FE-63-151.

Total Flowrate _____ GPM _____

[39] **OPEN** Valve 2-ISV-63-527, SI PMP 2B-B DISCHARGE ISOLATION. _____

[40] **ENSURE** SIP 2A-A has been running for at least 20 minutes as noted in step 6.4[10]. _____

[41] **STOP** SIP 2A-A using Hand Switch 2-HS-63-10A, SI PMP A (ECCS). _____

[42] **OPEN** SIP miniflow Valve 2-FCV-63-4 using 2-HS-63-4A, SI PMP A RECIRC TO RWST. _____

[43] **CLOSE** Valve 2-FCV-63-22 using 2-HS-63-22A, SI PMPS TO CL 1-2-3-4. _____

[44] **CLOSE** the following valves:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[45] **PERFORM** pump curve calculations for SIP 2A-A on Appendix K. _____

Date _____

6.4 Safety Injection Pump 2A-A Test Curve (continued)

[46] **VERIFY** SIP 2A-A head/flow pump curve data is greater than the FSAR curve and less than the maximum composite curve from Appendix K. **(ACC. CRIT. 5.0[5])** _____

[47] **UNPLUG** the watt-transducer/multimeter SDB 2A-A Compt 15. _____ 1st

_____ CV

[48] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this subsection was observed. **(ACC. CRIT. 5.0[10])** _____

Date _____

6.5 Safety Injection Pump 2B-B Test Curve

NOTE

The following section requires monitoring of pump vibration data per TI-31.02 by Preventive and Diagnostic Maintenance, PDM.

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.5 are completed. _____

[2] **ENSURE** the following valves are CLOSED:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[3] **VERIFY/FILL** the RWST level is ≥ 25%. (N/A any LIs not in service.)

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[4] **RECORD** the RWST temperature. (70°F - 90°F).

2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

Date _____

6.5 Safety Injection Pump 2B-B Test Curve (continued)

[5] **ENSURE** the following plant computer points are in scan:

A. T0155A, SIS PUMP B-B MOTOR PH A WNDG _____

B. T0156A, SIS PUMP B-B MOTOR PH B WNDG _____

C. T0157A, SIS PUMP B-B MOTOR PH C WNDG _____

D. T0158A, SIS PMP B-B MTR OUTBRD GUIDE BRG _____

E. T0159A, SIS PMP B-B MTR INBRD GUIDE BRG _____

[6] **RECORD** ambient computer point temperatures on Appendix L. _____

[7] **RECORD** 2B-B 6.9kV Shutdown Board voltage.

2-EI-57-66 (2-M-1) _____ volts
(expected 6900 - 7200 volts) _____

[8] **VERIFY** SIP 2B-B suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-63-14 _____ psig _____

CAUTION

Closely observe pump operation under miniflow conditions for excessive vibration and overheating.

NOTE

During the performance of steps 6.5[9] through 6.5[15], visual observation of transient and steady state vibrations is required.

[9] **START** SIP 2B-B using 2-HS-63-15A, SI PMP B (ECCS) [2-M-6]. _____

[10] **RECORD** the time of the pump start. _____ _____

Date _____

6.5 Safety Injection Pump 2B-B Test Curve (continued)

[11] **RECORD** time and computer point temperature data at approximately 10 minute intervals on Appendix L until three successive temperature readings differ by no more than 3 percent. _____

[12] **VENT** the test flow gauge installed at 2-FE-63-2 (Aux 692' A9 U), **AND**

PLACE in service. _____

[13] **RECORD** the miniflow rate through 2-FE-63-2.

Miniflow _____ GPM

_____

[14] **PERFORM** calculation using Appendix T, **AND**

RECORD the pump miniflow resistance. **(ACC. CRIT. 5.0[4.5])**

Kmin _____ ft/gpm^2 (> 1.76 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 2.50 ft/gpm^2)

_____

[15] **VERIFY** SIP 2B-B DID NOT TRIP. **(ACC. CRIT. 5.0[7])** _____

[16] **RECORD** pump operating data on Appendix L. _____

[17] **RECORD** the pump curve data for the miniflow target point on Appendix M. _____

[18] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

Date _____

6.5 Safety Injection Pump 2B-B Test Curve (continued)

[19] **OPEN** the following valves one (1) turn open:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[20] **OPEN** Valve 2-FCV-63-22 using 2-HS-63-22A, SI PMPS TO CL 1-2-3-4, on 2-M-6. _____

[21] **CLOSE** the following valves:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[22] **VENT** the following test flow gauges, **AND**

PLACE in service:

A. Installed at 2-FE-63-20 (Aux 721' A11 W) _____

B. Installed at 2-FE-63-122 (RXB 732' 38°) _____

C. Installed at 2-FE-63-123 (RXB 732' 145°) _____

D. Installed at 2-FE-63-124 (RXB 732' 210°) _____

E. Installed at 2-FE-63-125 (RXB 732' 324°) _____

[23] **THROTTLE** Valve 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE, until flow through 2-FE-63-20 is greater than 110 gpm. _____

[24] **CLOSE** SIP miniflow Valve 2-FCV-63-175 using 2-HS-63-175A, SI PMP B RECIRC TO RWST. _____

[25] **VERIFY** flow through 2-FE-63-20 is greater than 110 gpm. _____

Date _____

6.5 Safety Injection Pump 2B-B Test Curve (continued)

[26] **VERIFY** the miniflow through 2-FE-63-2 is less than one gpm. _____

[27] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-20 is between 245 and 255 gpm. _____

[28] **RECORD** pump curve data for 250 gpm target point on Appendix M. _____

[29] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-20 is between 345 and 355 gpm. _____

[30] **RECORD** pump curve data for 350 gpm target point on Appendix M. _____

[31] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-20 is between 445 and 455 gpm. _____

[32] **RECORD** pump curve data for 450 gpm target point on Appendix M. _____

[33] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-20 is between 545 and 555 gpm. _____

[34] **RECORD** pump curve data for 550 gpm target point on Appendix M. _____

CAUTION

Do not exceed 650 gpm in total SIP 2B-B output through 2-FE-63-20.

[35] **THROTTLE** Valves 2-THV-63-550, SIS L1 CL INJ VLV, 2-THV-63-552, SIS L2 CL INJ VLV, 2-THV-63-554, SIS L3 CL INJ VLV, and 2-THV-63-556, SIS L4 CL INJ VLV, until the total flow through 2-FE-63-20 is between 645 and 650 gpm. _____

Date _____

6.5 Safety Injection Pump 2B-B Test Curve (continued)

[36] **RECORD** pump curve data for 650 gpm target point on Appendix M. _____

NOTE

The following steps verify that Check Valve 2-CKV-63-524, SI PMP 2A-A DISCHARGE CKV, is CLOSED.

[37] **CLOSE** Valve 2-ISV-63-525, SI PMP 2A-A DISCHARGE ISOLATION. _____

[38] **VERIFY** total flowrate is 645-650 gpm through 2-FE-63-20.

Total Flowrate _____ GPM _____

[39] **OPEN** Valve 2-ISV-63-525, SI PMP 2A-A DISCHARGE. _____

[40] **ENSURE** SIP 2B-B has been running for at least 20 minutes as noted in step 6.5[10]. _____

[41] **STOP** SIP 2B-B using Hand Switch 2-HS-63-15A, SI PMP A. _____

[42] **OPEN** SIP miniflow Valve 2-FCV-63-175 using 2-HS-63-175A, SI PMP B RECIRC TO RWST. _____

[43] **CLOSE** Valve 2-FCV-63-22 using 2-HS-63-22A, SI PUMPS TO CL 1-2-3-4. _____

[44] **CLOSE** the following valves:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[45] **PERFORM** pump curve calculations for SIP 2B-B on Appendix M. _____

Date _____

6.5 Safety Injection Pump 2B-B Test Curve (continued)

[46] **VERIFY** SIP 2B-B head/flow pump curve data is greater than the FSAR curve and less than the maximum composite curve from Appendix M. **(ACC. CRIT. 5.0[5])** _____

[47] **UNPLUG** the watt-transducer/multimeter SDB 2B-B Compt 15. _____ 1st

_____ CV

[48] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this subsection was observed. **(ACC. CRIT. 5.0[10])** _____

Date _____

6.6 Safety Injection Pumps Flow Balance - Cold Leg Injection

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.6 are completed. _____

[2] **VERIFY/FILL** the RWST level is ≥ 25%. (N/A any LIs not in service.)

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[3] **RECORD** the RWST temperature. (70°F - 90°F)

2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

[4] **ENSURE** the following valves are CLOSED:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[5] **VERIFY** SIP 2A-A suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-63-9 _____ psig _____

[6] **START** Safety Injection Pump 2A-A on miniflow using 2-HS-63-10A, SI PMP A (ECCS), on 2-M-6. _____

[7] **RECORD** the time of the 2A-A pump start. _____ _____

Date _____

6.6 Safety Injection Pumps Flow Balance - Cold Leg Injection (continued)

[8] **OPEN** the following valves one (1) turn open:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[9] **OPEN** Valve 2-FCV-63-22 using 2-HS-63-22A, SI PMPS TO CL 1-2-3-4, on 2-M-6. _____

[10] **CLOSE** the following valves:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

[11] **VENT** the following test flow gauges, **AND**

PLACE in service:

A. 2-FE-63-122 (RXB 732' 38°) _____

B. 2-FE-63-123 (RXB 732' 145°) _____

C. 2-FE-63-124 (RXB 730' 210°) _____

D. 2-FE-63-125 (RXB 728' 324°) _____

CAUTION

Do not exceed 650 gpm in total SIP 2A-A output through 2-FE-63-2 and 2-FE-63-151.

Date _____

6.6 Safety Injection Pumps Flow Balance - Cold Leg Injection (continued)

NOTE

Per 2-TSD-63-3, Westinghouse has estimated in WBT-D-4376 that the cold leg injection flow would be 599.8, or 149.95 gpm per cold leg.

[12] **THROTTLE OPEN** Valves 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE, 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE, 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE, and 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE, until injection flow through 2-FE-63-151 is between 595 and 605 gpm. _____

[13] **ADJUST** Valves 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE, 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE, 2-THV-63-554, SIS L3 CL INJ VALVE, and 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE, until the following conditions are met:

A. Difference between highest branch Line flow and lowest branch line flow is less than or equal to 10 gpm.

Difference _____ GPM _____

B. Total SIP flow through 2-FE-63-2 and 2-FE-63-151is greater than or equal to 605.9 gpm.

Total SIP 2A-A Flow _____ GPM _____

C. Total SIP flow through 2-FE-63-2 and 2-FE-63-151 is less than or equal to 654.6 gpm.

Total SIP 2A-A Flow _____ GPM _____

[14] **START** SIP 2B-B using 2-HS-63-15A, SI PMP B (ECCS) [2-M-6]. _____

[15] **RECORD** the time of the 2B-B pump start. _____ _____

[16] **ENSURE** SIP 2A-A has been running for at least 20 minutes as noted in step 6.6[7]. _____

Date _____

6.6 Safety Injection Pumps Flow Balance - Cold Leg Injection (continued)

[17] **STOP** SIP 2A-A using 2-HS-63-10A, SI PMP A (ECCS) [2-M-6]. _____

CAUTION

Do not exceed 650 gpm in total SIP 2B-B output through 2-FE-63-2 and 2-FE-63-20.

[18] **ADJUST** Valves 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE, 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE, 2-THV-63-554, SIS L3 CL INJ VALVE, and 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE, until the following conditions are met:

A. Difference between highest branch Line flow and lowest branch line flow is less than or equal to 10 gpm.

Difference _____ GPM _____

B. Total SIP flow through 2-FE-63-2 and 2-FE-63-20 is greater than or equal to 605.9 gpm.

Total SIP 2B-B Flow _____ GPM _____

C. Total SIP flow through 2-FE-63-2 and 2-FE-63-20 is less than or equal to 654.6 gpm.

Total SIP 2B-B Flow _____ GPM _____

[19] **START** SIP 2A-A using 2-HS-63-10A, SI PMP A (ECCS) [2-M-6]. _____

[20] **RECORD** the time of the 2A-A pump start. _____ _____

[21] **ENSURE** SIP 2B-B has been running for at least 20 minutes as noted in step 6.6[15]. _____

[22] **STOP** SIP 2B-B using 2-HS-63-15A, SI PMP B (ECCS) [2-M-6]. _____

Date _____

6.6 Safety Injection Pumps Flow Balance - Cold Leg Injection (continued)

[23] **VERIFY** the following conditions:

A. Difference between highest branch Line flow and lowest branch line flow is less than or equal to 10 gpm.

Difference _____ GPM _____

B. Total SIP flow through 2-FE-63-2 and 2-FE-63-151 is greater than or equal to 605.9 gpm.

Total SIP 2A-A Flow _____ GPM _____

C. Total SIP flow through 2-FE-63-2 and 2-FE-63-151 is less than or equal to 654.6 gpm.

Total SIP 2A-A Flow _____ GPM _____

[24] **ENSURE** SIP 2A-A has been running for at least 20 minutes as noted in step 6.6[20]. _____

[25] **STOP** SIP 2A-A using 2-HS-63-10A, SI PMP A (ECCS) [2-M-6]. _____

[26] **CLOSE** Valve 2-FCV-63-22 using 2-HS-63-22A, SI PMPS TO CL 1-2-3-4. _____

NOTE

Do not move throttle valve position while installing valve position locking devices.

[27] **INSTALL** locking devices on the following valves:

A. 2-THV-63-550, COLD LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-552, COLD LEG 2 SAFETY INJ THROTTLE _____

C. 2-THV-63-554, COLD LEG 3 SAFETY INJ THROTTLE _____

D. 2-THV-63-556, COLD LEG 4 SAFETY INJ THROTTLE _____

Date _____

6.6 Safety Injection Pumps Flow Balance - Cold Leg Injection (continued)

[28] **OPEN** Valve 2-FCV-63-22 using 2-HS-63-22A, SI PMPS TO CL 1-2-3-4. _____

NOTE

During the performance of steps 6.6[29] through 6.6[49] visual observation of transient and steady state vibrations is required.

[29] **START** SIP 2A-A using 2-HS-63-10A, SI PMP A (ECCS) [2-M-6]. _____

[30] **RECORD** the time of the 2A-A pump start. _____ _____

[31] **VERIFY** the following conditions:

A. Difference between highest branch Line flow and lowest branch line flow is less than or equal to 10 gpm. **(ACC. CRIT. 5.0[4.3])**

Difference _____ GPM _____

B. Total SIP flow through 2-FE-63-2 and 2-FE-63-151 is greater than or equal to 605.9 gpm. **(ACC. CRIT. 5.0[4.2])**

Total SIP 2A-A Flow _____ GPM _____

C. Total SIP flow through 2-FE-63-2 and 2-FE-63-151 is less than or equal to 654.6 gpm. **(ACC. CRIT. 5.0[4.1])**

Total SIP 2A-A Flow _____ GPM _____

[32] **RECORD** SIP 2A-A discharge pressure, suction pressure, Flow Rate, motor current and mechanical data on Appendix N. _____

Date _____

6.6 Safety Injection Pumps Flow Balance - Cold Leg Injection (continued)

[33] **RECORD** the pump discharge resistance using Appendix T. **(ACC. CRIT. 5.0[4.4])**

Kmin _____ ft/gpm^2 (> 0.004644 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.005326 ft/gpm^2)

_____

[34] **VERIFY** SIP 2A-A DID NOT TRIP. **(ACC. CRIT. 5.0[7])** _____

[35] **VERIFY** Reactor Vessel level is below the nozzle centerline. _____

[36] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

[37] **START** SIP 2B-B using 2-HS-63-15A, SI PMP B (ECCS) [2-M-6]. _____

[38] **RECORD** the time of the 2B-B pump start. _____ _____

[39] **ENSURE** SIP 2A-A has been running for at least 20 minutes as noted in step 6.6[30]. _____

[40] **STOP** SIP 2A-A using 2-HS-63-10A, SI PMP A (ECCS) [2-M-6]. _____

Date _____

6.6 Safety Injection Pumps Flow Balance - Cold Leg Injection (continued)

[41] **VERIFY** the following conditions:

A. Difference between highest branch line flow and lowest branch Line flow is less than or equal to 10 gpm. **(ACC. CRIT. 5.0[4.3])**

Difference _____ GPM _____

B. Total SIP flow through 2-FE-63-2 and 2-FE-63-20 is greater than or equal to 605.9 gpm. **(ACC. CRIT. 5.0[4.2])**

Total SIP 2B-B Flow _____ GPM _____

C. Total SIP flow through 2-FE-63-2 and 2-FE-63-20 is less than or equal to 654.6 gpm. **(ACC. CRIT. 5.0[4.1])**

Total SIP 2B-B Flow _____ GPM _____

NOTE

The following step is for information only and not for proof in regards to Acceptance Criteria.

[42] **CAPTURE** the current flow rates data, **AND**

ATTACH to WO. _____

[43] **RECORD** SIP 2B-B discharge pressure, suction pressure, Flow Rate, motor current and mechanical data on Appendix N. _____

[44] **RECORD** the pump discharge resistance using Appendix T. **(ACC. CRIT. 5.0[4.4])**

Kmin _____ ft/gpm^2 (> 0.004644 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.005326 ft/gpm^2)

_____

[45] **VERIFY** SIP 2B-B DID NOT TRIP. **(ACC. CRIT. 5.0[7])** _____

[46] **VERIFY** reactor vessel level is below the nozzle centerline. _____

Date _____

6.6 Safety Injection Pumps Flow Balance - Cold Leg Injection (continued)

[47] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

[48] **ENSURE** SIP 2B-B has been running for at least 20 minutes as noted in step 6.6[38]. _____

[49] **STOP** SIP 2B-B using 2-HS-63-15A, SI PMP B (ECCS) [2-M-6]. _____

[50] **CLOSE** Valve 2-FCV-63-22 using 2-HS-63-22A, SI PMPS TO CL 1-2-3-4. _____

[51] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this subsection was observed. **(ACC. CRIT. 5.0[10])** _____

NOTE

The remaining steps of this subsection are not a restraint to progressing to other subsections.

[52] **REMOVE** the differential pressure gauge connected across Orifice 2-FE-63-122.

_____ 1st

_____ CV

[53] **REMOVE** the differential pressure gauge connected across Orifice 2-FE-63-123.

_____ 1st

_____ CV

[54] **REMOVE** the differential pressure gauge connected across Orifice 2-FE-63-124.

_____ 1st

_____ CV

[55] **REMOVE** the differential pressure gauge connected across Orifice 2-FE-63-125.

_____ 1st

_____ CV

Date _____

6.7 Safety Injection Pump 2A-A Flow Balance Hot Leg Recirculation

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.7 are completed. _____

[2] **ENSURE** the following valves are CLOSED:

A. 2-THV-63-542, HOT LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-544, HOT LEG 3 SAFETY INJ THROTTLE _____

[3] **RECORD** the RWST temperature. (70°F-90°F)

2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

[4] **VERIFY/FILL** the RWST level is ≥ 25%. (N/A any LIs not in service.)

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[5] **VERIFY** SIP 2A-A suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-63-9 _____ psig _____

[6] **START** SIP 2A-A on Miniflow using 2-HS-63-10A, SI PMP A (ECCS) [2-M-6]. _____

[7] **RECORD** the time of the 2A-A pump start. _____ _____

[8] **OPEN** the following valves one (1) turn open:

A. 2-THV-63-542, HOT LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-544, HOT LEG 3 SAFETY INJ THROTTLE _____

[9] **OPEN** Valve 2-FCV-63-156 using 2-HS-63-156A, SI PMP A TO HL 1 & 3. _____

Date _____

6.7 Safety Injection Pump 2A-A Flow Balance Hot Leg Recirculation (continued)

[10] **CLOSE** the following valves:

A. 2-THV-63-542, HOT LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-544, HOT LEG 3 SAFETY INJ THROTTLE _____

[11] **CLOSE** Valve 2-FCV-63-152 using 2-HS-63-152A, SI PMP A TO CL 1-2-3-4. _____

[12] **VENT** the following test flow gauges, **AND**

PLACE in service:

A. 2-FE-63-161 (Acc Rm 2 723' 135°) _____

B. 2-FE-63-162 (Acc Rm 1 731' 37°) _____

[13] **THROTTLE OPEN** Valve 2-THV-63-542, HOT LEG 1 SAFETY INJ THROTTLE, until flow through 2-FE-63-151 is greater than 110 gpm. _____

[14] **CLOSE** SIP Miniflow Valve 2-FCV-63-4 using 2-HS-63-4A, SI PMP A RECIRC TO RWST. _____

[15] **VERIFY** flow through 2-FE-63-151 is greater than 110 gpm. _____

[16] **VERIFY** flow through 2-FE-63-2 is less than one gpm. _____

NOTE

The following steps verify maximum flow through the hole drilled through the disk for Valve 2-FCV-63-157.

[17] **ENSURE** Valve 2-THV-63-546, SIS L2 HL INJ VALVE, is partially OPEN. _____

[18] **RECORD** injection flow through 2-FE-63-151.

Injection Flow _____ GPM _____

Date _____

6.7 Safety Injection Pump 2A-A Flow Balance Hot Leg Recirculation (continued)

[19] **OPEN** Valve 2-FCV-63-152 using 2-HS-63-152A, SI PMP A TO CL 1-2-3-4. _____

[20] **RECORD** injection flow through 2-FE-63-151.

Injection Flow _____ GPM _____

[21] **RECORD** Injection Flow through 2-FE-63-151 with Valve 2-FCV-63-152 OPEN and CLOSED, **AND**

CALCULATE difference in flow.

A. Valve 2-FCV-63-152 OPEN (6.7[18])

Injection Flow _____ GPM _____

B. Valve 2-FCV-63-152 CLOSED (6.7[20])

Injection Flow _____ GPM _____

C. Flow rate difference _____ gpm (less than or equal to 10 gpm) **(ACC. CRIT. 5.0[8])** _____

Calculation Performed By _____ _____
Initials Date

Calculation Verified By _____ _____
Initials Date

[22] **CLOSE** Valve 2-FCV-63-152 using 2-HS-63-152A, SI PMP A TO CL 1-2-3-4. _____

[23] **IF** Subsection 6.8 has been performed, **THEN**

MARK Step 6.7[24] N/A. _____

[24] **CLOSE** Valve 2-THV-63-546, SIS L2 HL INJ VALVE. _____

Date _____

6.7 Safety Injection Pump 2A-A Flow Balance Hot Leg Recirculation (continued)

CAUTION

Do not exceed 650 gpm for the Injection Flow through 2-FE-63-151.

[25] **THROTTLE OPEN** Valves 2-THV-63-542, HOT LEG 1 SAFETY INJ THROTTLE, and 2-THV-63-544, HOT LEG 3 SAFETY INJ THROTTLE, until Injection Flow through 2-FE-63-151 is between 558.3 and 653.7 gpm. _____

[26] **ADJUST** Valves 2-THV-63-542, SIS L1 HL I N J VLV and 2-THV-63-544, HOT LEG 3 SAFETY INJ THROTTLE, until the total injection flow is greater than or equal to 558.3 gpm and less than or equal to 653.7 gpm for Injection Flow through 2-FE-63-151.

Injection Flow _____ GPM _____

NOTE

The following step is for information only and not for proof in regards to Acceptance Criteria.

[27] **CAPTURE** the current flow rates data, **AND**

ATTACH to WO. _____

[28] **RECORD** SIP 2A-A discharge and suction pressure:

TEST GAUGE AT 2-PT-63-149 _____ psig (DISCHARGE) _____

TEST GAUGE AT 2-PI-63-9 _____ psig (SUCTION) _____

[29] **ENSURE** SIP 2A-A has been running for at least 20 minutes as noted in step 6.7[7]. _____

[30] **STOP** SIP 2A-A using 2-HS-63-10A, SI PMP A (ECCS). _____

[31] **CLOSE** Valve 2-FCV-63-156 using 2-HS-63-156A, SI PMP A TO HL 1 & 3. _____

Date _____

6.7 Safety Injection Pump 2A-A Flow Balance Hot Leg Recirculation (continued)

[32] **INSTALL** locking devices on the following valves:

A. 2-THV-63-542, HOT LEG 1 SAFETY INJ THROTTLE _____

B. 2-THV-63-544, HOT LEG 3 SAFETY INJ THROTTLE _____

[33] **OPEN** Valve 2-FCV-63-156 using 2-HS-63-156A, SI PMP A TO HL 1 & 3. _____

NOTE

During the performance of steps 6.7[34] through 6.7[38] visual observation of transient and steady state vibrations is required.

[34] **START** SIP 2A-A using 2-HS-63-10A, SI PMP A (ECCS). _____

[35] **RECORD** the time of the 2A-A pump start. _____ _____

[36] **VERIFY** the total injection flow is greater than or equal to 558.3 gpm and less than or equal to 653.7 gpm.
(ACC. CRIT. 5.0[6.1])

Injection Flow _____ GPM _____

[37] **RECORD** the pump discharge resistance using Appendix T.
(ACC. CRIT. 5.0[6.2])

Kmin _____ ft/gpm^2 (> 0.004717 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.006886 ft/gpm^2)

_____

[38] **ENSURE** SIP 2A-A has been running for at least 20 minutes as noted in step 6.7[35]. _____

[39] **STOP** SIP 2A-A using 2-HS-63-10A, SI PMP A (ECCS). _____

Date _____

6.7 Safety Injection Pump 2A-A Flow Balance Hot Leg Recirculation (continued)

[40] **OPEN** SIP Miniflow Valve 2-FCV-63-4 using 2-HS-63-4A, SI PMP A RECIRC TO RWST. _____

[41] **CLOSE** Valve 2-FCV-63-156 using 2-HS-63-156A, SI PMP A TO HL 1 & 3. _____

[42] **OPEN** Valve 2-FCV-63-152 using 2-HS-63-152A, SI PMP A TO CL 1-2-3-4. _____

[43] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this subsection was observed. **(ACC. CRIT. 5.0[10])** _____

NOTE

The remaining steps of this subsection are not a restraint to progressing to other subsections.

[44] **VERIFY/REMOVE** differential pressure gauge connected across Orifice 2-FE-63-161.

_____ 1st

_____ CV

[45] **VERIFY/REMOVE** differential pressure gauge connected across Orifice 2-FE-63-162.

_____ 1st

_____ CV

Date _____

6.8 Safety Injection Pump 2B-B Flow Balance Hot Leg Recirculation

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.8 are completed. _____

[2] **ENSURE** the following valves are CLOSED:

A. 2-THV-63-546, HOT LEG 2 SAFETY INJ THROTTLE _____

B. 2-THV-63-548, HOT LEG 4 SAFETY INJ THROTTLE _____

[3] **RECORD** the RWST temperature. (70°F-90°F)

2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

[4] **VERIFY/FILL** the RWST level is ≥ 25%. (N/A any LIs not in service.)

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[5] **VERIFY** SIP 2B-B suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-63-14 _____ psig _____

[6] **START** SIP 2B-B on Miniflow using 2-HS-63-15A, SI PMP B, on 2-M-6. _____

[7] **RECORD** the time of the 2B-B pump start. _____ _____

[8] **OPEN** the following valves one (1) turn open:

A. 2-THV-63-546, HOT LEG 2 SAFETY INJ THROTTLE _____

B. 2-THV-63-548, HOT LEG 4 SAFETY INJ THROTTLE _____

[9] **OPEN** Valve 2-FCV-63-157 using 2-HS-63-157A, SI PMP B TO HL 2 & 4. _____

Date _____

6.8 Safety Injection Pump 2B-B Flow Balance Hot Leg Recirculation (continued)

[10] **CLOSE** the following valves:

A. 2-THV-63-546, HOT LEG 2 SAFETY INJ THROTTLE _____

B. 2-THV-63-548, HOT LEG 4 SAFETY INJ THROTTLE _____

[11] **CLOSE** Valve 2-FCV-63-153, SI PMP B DISCH TO CL 4 using 2-HS-63-153A. _____

[12] **VENT** the following test flow gauges, **AND**

PLACE in service:

A. 2-FE-63-159 (Fan Rm 1 738' 0°) _____

B. 2-FE-63-160 (Fan Rm 2 729' 180°) _____

[13] **THROTTLE OPEN** Valve 2-THV-63-546, HOT LEG 2 SAFETY INJ THROTTLE, until flow through 2-FE-63-20 is greater than 110 gpm. _____

[14] **CLOSE** Valve 2-FCV-63-175 using 2-HS-63-175A, SI PMP B RECIRC TO RWST. _____

[15] **VERIFY** flow through 2-FE-63-20 is greater than 110 gpm. _____

[16] **VERIFY** flow through 2-FE-63-2 is less than one gpm. _____

NOTE

The following steps verify maximum flow through the hole drilled through the disk for Valve 2-FCV-63-156.

[17] **ENSURE** Valve 2-THV-63-542, SIS L1 HL INJ VALVE, is partially OPEN. _____

[18] **RECORD** injection flow through 2-FE-63-20.

Injection Flow _____ GPM _____

Date _____

6.8 Safety Injection Pump 2B-B Flow Balance Hot Leg Recirculation (continued)

[19] **OPEN** Valve 2-FCV-63-153 using 2-HS-63-153A, SI PMP B TO CL 1-2-3-4. _____

[20] **RECORD** injection flow through 2-FE-63-20.

Injection Flow _____ GPM _____

[21] **RECORD** Injection Flow through 2-FE-63-20 with Valve 2-FCV-63-153 OPEN and CLOSED, **AND**

CALCULATE difference in flow.

A. Valve 2-FCV-63-153 OPEN (6.8[18])

Injection Flow _____ GPM _____

B. Valve 2-FCV-63-153 CLOSED (6.8[20])

Injection Flow _____ GPM _____

C. Flow rate difference _____ gpm (less than or equal to 10 gpm). **(ACC. CRIT. 5.0[8])** _____

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

[22] **CLOSE** Valve 2-FCV-63-153 using 2-HS-63-153A, SI PMP B TO CL 1-2-3-4. _____

[23] **IF** Subsection 6.7 has been performed, **THEN**

MARK Step 6.8[24] N/A. _____

[24] **CLOSE** Valve 2-THV-63-542, SIS L1 HL INJ VALVE. _____

Date _____

6.8 Safety Injection Pump 2B-B Flow Balance Hot Leg Recirculation (continued)

CAUTION

Do not exceed 650 gpm for the Injection Flow through 2-FE-63-20.

[25] **THROTTLE OPEN** Valves 2-THV-63-546, HOT LEG 2 SAFETY INJ THROTTLE, and 2-THV-63-548, HOT LEG 4 SAFETY INJ THROTTLE, until Injection Flow through 2-FE-63-20 is between 558.3 and 653.7 gpm. _____

[26] **ADJUST** Valves 2-THV-63-546, HOT LEG 2 SAFETY INJ THROTTLE and 2-THV-63-548, HOT LEG 4 SAFETY INJ THROTTLE, until the total injection flow is greater than or equal to 558.3 gpm and less than or equal to 653.7 gpm for Injection Flow through 2-FE-63-20.

Injection Flow _____ GPM _____

NOTE

The following step is for information only and not for proof in regards to Acceptance Criteria.

[27] **CAPTURE** the current flow rates data, **AND**

ATTACH to WO. _____

[28] **RECORD** SIP 2B-B discharge and suction pressure:

TEST GAUGE AT 2-PT-63-18 _____ psig (DISCHARGE) _____

TEST GAUGE AT 2-PI-63-14 _____ psig (SUCTION) _____

[29] **ENSURE** SIP 2B-B has been running for at least 20 minutes as noted in step 6.8[7]. _____

[30] **STOP** SIP 2B-B using 2-HS-63-15A, SI PMP B. _____

[31] **CLOSE** Valve 2-FCV-63-157 using 2-HS-63-157A, SI PMP B TO HL 2 & 4. _____

Date _____

6.8 Safety Injection Pump 2B-B Flow Balance Hot Leg Recirculation (continued)

[32] **INSTALL** locking devices on the following valves:

A. 2-THV-63-546, HOT LEG 2 SAFETY INJ THROTTLE _____

B. 2-THV-63-548, HOT LEG 4 SAFETY INJ THROTTLE _____

[33] **OPEN** Valve 2-FCV-63-157 using 2-HS-63-157A, SI PMP B TO HL 2 & 4. _____

NOTE

During the performance of steps 6.8[34] through 6.8[38] visual observation of transient and steady state vibrations is required.

[34] **START** SIP 2B-B using 2-HS-63-15A, SI PMP B. _____

[35] **RECORD** the time of the 2B-B pump start. _____ _____

[36] **VERIFY** the total injection flow is greater than or equal to 558.3 gpm and less than or equal to 653.7 gpm.
(ACC. CRIT. 5.0[6.1])

Injection Flow _____ GPM _____

[37] **RECORD** the pump discharge resistance using Appendix T.
(ACC. CRIT. 5.0[6.2])

Kmin _____ ft/gpm^2 (> 0.004717 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.006886 ft/gpm^2)

_____

[38] **ENSURE** SIP 2B-B has been running for at least 20 minutes as noted in step 6.8[35]. _____

[39] **STOP** SIP 2B-B using 2-HS-63-15A, SI PMP B. _____

Date _____

6.8 Safety Injection Pump 2B-B Flow Balance Hot Leg Recirculation (continued)

[40] **OPEN** SIP Miniflow Valve 2-FCV-63-175 using 2-HS-63-175A, SI PMP B RECIRC TO RWST. _____

[41] **CLOSE** Valve 2-FCV-63-157 using 2-HS-63-157A, SI PMP B TO HL 2 & 4. _____

[42] **OPEN** Valve 2-FCV-63-153 using 2-HS-63-153A, SI PMP B TO CL 1-2-3-4. _____

[43] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this subsection was observed. **(ACC. CRIT. 5.0[10])** _____

NOTE

The remaining steps of this subsection are not a restraint to progressing to other subsections.

[44] **VERIFY/REMOVE** differential pressure gauge connected across Orifice 2-FE-63-159. _____ 1st _____ CV

[45] **VERIFY/REMOVE** differential pressure gauge connected across Orifice 2-FE-63-160. _____ 1st _____ CV

Date _____

6.9 RHR Pump 2A-A Cold & Hot Leg Injection Flow Rates

NOTE

The following section requires monitoring of pump vibration data per TI-31.02 by the Preventive and Diagnostic Maintenance, PDM.

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.9 are completed. _____

[2] **RECORD** the RWST temperature. (70°F-90°F)

2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

[3] **VERIFY/FILL** the RWST level is ≥ 25%. (N/A any LIs not in service.)

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[4] **ENSURE** the following plant computer points are in scan:

A. T0650A, RHR PUMP 1 MTR INBOARD BRG TEMP _____

B. T0651A, RHR PUMP 1 MTR OUTBOARD BRG TEMP _____

C. T0652A, RHR PUMP 1 MTR WINDING-PH A TEMP _____

D. T0653A, RHR PUMP 1 MTR WINDING-PH B TEMP _____

E. T0654A, RHR PUMP 1 MTR WINDING-PH C TEMP _____

[5] **RECORD** ambient computer point temperatures on Appendix O. _____

[6] **RECORD** 2A-A 6.9kV Shutdown Board voltage.

2-EI-57-39 (2-M-1) _____ Volts
(expected 6900-7200 volts) _____

Date _____

6.9 RHR Pump 2A-A Cold & Hot Leg Injection Flow Rates (continued)

[7] **OPEN** 2-FCV-74-3, using 2-HS-74-3A, RHR PMP A SUCTION, [2-M-6]. _____

[8] **VERIFY** RHR Pump 2A-A suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-74-4 _____ psig _____

CAUTION

Closely observe pump operation under miniflow conditions for excessive vibration and overheating.

NOTE

During the performance of steps 6.9[9] through 6.9[16], visual observation of transient and steady state vibrations is required.

[9] **START** RHR Pump 2A-A using 2-HS-74-10A, RHR PMP A (ECCS) [2-M-6]. _____

[10] **VERIFY** Valve 2-FCV-74-12, RHR PMP A MINI FLOW, OPENS. _____

[11] **RECORD** pump start time. _____ _____

[12] **RECORD** time and computer point temperature data at approximately 10 minute intervals on Appendix O until three successive temperature readings differ by no more than 3 percent. _____

[13] **RECORD** pump operating data on Appendix O. _____

[14] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

Date _____

6.9 RHR Pump 2A-A Cold & Hot Leg Injection Flow Rates (continued)

[15] **RECORD** miniflow through 2-FE-74-12 and pump curve data on Appendix P. _____

[16] **VERIFY** RHR Pump 2A-A DID NOT TRIP. **(ACC. CRIT. 5.0[9.4])** _____

[17] **CLOSE** Valve 2-FCV-74-16 using 2-HIC-74-16A, RHR HX A FLOW CONTROL, in MANUAL. _____

[18] **OPEN** Valve 2-FCV-63-93 using 2-HS-63-93A, RHR TO CL 2 & 3. _____

[19] **THROTTLE OPEN** Valve 2-FCV-74-16 using 2-HIC-74-16A, RHR HX A FLOW CONTROL, until Valve 2-FCV-74-12 CLOSES. _____

[20] **ADJUST** Valve 2-FCV-74-16 using 2-HIC-74-16A, RHR HX A FLOW CONTROL, until flow through 2-FE-74-12 is between 1350 and 1450 gpm. _____

[21] **RECORD** pump curve data for the 1400 gpm target point on Appendix P. _____

[22] **ADJUST** Valve 2-FCV-74-16 using 2-HIC-74-16A, RHR HX A FLOW CONTROL, until flow through 2-FE-74-12 is between 2950 and 3050 gpm. _____

[23] **RECORD** pump curve data for the 3000 gpm target point on Appendix P. _____

[24] **ADJUST** Valve 2-FCV-74-16 using 2-HIC-74-16A, RHR HX A FLOW CONTROL, until flow through 2-FE-74-12 is between 3950 and 4050 gpm. _____

[25] **RECORD** pump curve data for the 4000 gpm target point on Appendix P. _____

CAUTION

Closely observe pump operation above 4550 gpm to prevent equipment damage.

[26] **ADJUST** Valve 2-FCV-74-16 using 2-HIC-74-16A, RHR HX A FLOW CONTROL, until flow through 2-FE-74-12 is between 4950 and 5000 gpm or Valve 2-FCV-74-16 is FULL OPEN. _____

Date _____

6.9 RHR Pump 2A-A Cold & Hot Leg Injection Flow Rates (continued)

[27] **RECORD** pump curve data for the 5000 gpm target point on Appendix P. _____

NOTE

During the performance of steps 6.9[28] through 6.9[39] visual observation of transient and steady state vibrations is required.

[28] **ADJUST** Valve 2-FCV-74-16 using 2-HIC-74-I6A, RHR HX A FLOW CONTROL, until Valve 2-FCV-74-16 is FULL OPEN. _____

[29] **RECORD** the following data from the test gauges and ammeter, **AND**

RECORD pump mechanical data on Appendix P.

A. Total Flow _____ gpm (3866.8 - 4265.7 gpm) **(ACC. CRIT. 5.0[9.1])** _____

B. Pump discharge pressure _____ psig _____

C. Pump suction pressure _____ psig _____

D. Motor current (2-EI-74-5A, 2-M-6) _____ amps _____

E. Shutdown Board 2A-A Volts (2-EI-57-39, 2-M-1) _____ Volts _____

[30] **VERIFY** RHR Pump 2A-A DID NOT TRIP. **(ACC. CRIT. 5.0[9.4])** _____

Date _____

6.9 RHR Pump 2A-A Cold & Hot Leg Injection Flow Rates (continued)

[31] **PERFORM** calculation using Appendix T, **AND**

RECORD the pump discharge resistance. **(ACC. CRIT. 5.0[9.2])**

Kmin _____ ft/gpm^2 (> 0.0000205 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.0000236 ft/gpm^2)

_____

[32] **VERIFY** Reactor Vessel level is below the nozzle centerline. _____

[33] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

[34] **OPEN** 2-FCV-74-33 using 2-HS-74-33, RHR HEAT EXCHANGER 2A OUTLET CROSSTIE. _____

[35] **OPEN** 2-FCV-63-172 using 2-HS-63-172, RHR TO HOT LEG 1&3 INJECTION ISOLATION. _____

[36] **CLOSE** Valve 2-FCV-63-93 using 2-HS-63-93A, RHR TO CL 2 & 3. _____

NOTE

For the following step, the acceptance criteria range has been adjusted (from 3698-4120, to 3788-4030) to account for a ± 2% error over a 4500 gpm range for the ultrasonic flowmeter.

[37] **RECORD** the RHR Pump 2A-A flow rate using the ultrasonic flowmeter. **(ACC. CRIT. 5.0[9.5])**

_____ gpm (3788 - 4030 gpm) _____

Date _____

6.9 RHR Pump 2A-A Cold & Hot Leg Injection Flow Rates (continued)

[38] **RECORD** the pump discharge resistance using Appendix T. **(ACC. CRIT. 5.0[9.6])**

Kmin _____ ft/gpm^2 (> 0.0000226 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.0000264 ft/gpm^2)

_____

[39] **STOP** RHR Pump 2A-A using 2-HS-74-10A, RHR PMP A (ECCS) [2-M-6]. _____

[40] **CLOSE** 2-FCV-74-3, using 2-HS-74-3A, RHR PMP A SUCTION [2-M-6]. _____

[41] **CLOSE** 2-FCV-63-172 using 2-HS-63-172, RHR TO HOT LEG 1&3 INJECTION ISOLATION. _____

[42] **CLOSE** 2-FCV-74-33 using 2-HS-74-33, RHR HEAT EXCHANGER 2A OUTLET CROSSTIE. _____

[43] **PERFORM** pump curve calculations for RHR Pump 2A-A on Appendix P. _____

[44] **VERIFY** RHR Pump 2A-A head/flow pump curve data is greater than the FSAR curve and less than the maximum composite curve from Appendix P. **(ACC. CRIT. 5.0[9.3])** _____

[45] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this subsection was observed. **(ACC. CRIT. 5.0[10])** _____.

Date _____

6.9 RHR Pump 2A-A Cold & Hot Leg Injection Flow Rates (continued)

NOTE

The remaining steps of this subsection are not a restraint to progressing to other subsections.

[46] **REMOVE** the test gauge installed at RHR Pump 2A-A Discharge Pressure gauge 2-PI-74-4.

_____ 1st

_____ CV

[47] **REMOVE** the test gauge installed at RHR Pump 2A-A Discharge Pressure gauge 2-PI-74-6.

_____ 1st

_____ CV

[48] **VERIFY/REMOVE** test gauge installed at 2-FE-74-12.

_____ 1st

_____ CV

[49] **UNPLUG** the watts-transducer/multimeter from SDB 2A-A Compt 14.

_____ 1st

_____ CV

Date _____

6.10 RHR Pump 2B-B Cold & Hot Leg Injection Flow Rates

NOTE

The following section requires monitoring of pump vibration data per TI-31.02 by the Preventive and Diagnostic Maintenance, PDM.

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.10 are completed. _____

[2] **RECORD** the RWST temperature. (70°F-90°F)

2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

[3] **VERIFY/FILL** the RWST level is ≥ 25%. (N/A any LIs not in service.)

A. 2-LI-63-50, RWST LEVEL (2-M-6) _____% _____

B. 2-LI-63-51, RWST LEVEL (2-M-6) _____% _____

C. 2-LI-63-52, RWST LEVEL (2-M-6) _____% _____

D. 2-LI-63-53, RWST LEVEL (2-M-6) _____% _____

[4] **ENSURE** the following plant computer points are in scan:

A. T0655A, RHR PUMP 2 MTR INBOARD BRG TEMP _____

B. T0656A, RHR PUMP 2 MTR OUTBOARD BRG TEMP _____

C. T0657A, RHR PUMP 2 MTR WINDING-PH A TEMP _____

D. T0658A, RHR PUMP 2 MTR WINDING-PH B TEMP _____

E. T0659A, RHR PUMP 2 MTR WINDING-PH C TEMP _____

[5] **RECORD** ambient computer point temperatures on Appendix Q. _____

[6] **RECORD** 2B-B 6.9kV Shutdown Board voltage.

2-EI-57-66 (2-M-1) _____ Volts (expected 6900-7200 volts) _____

Date _____

6.10 RHR Pump 2B-B Cold & Hot Leg Injection Flow Rates (continued)

[7] **OPEN** 2-FCV-74-21, using 2-HS-74-21, RHR PMP B SUCTION [2-M-6]. _____

[8] **VERIFY** RHR Pump 2B-B suction pressure greater than 14 psig.

TEST GAUGE AT 2-PI-74-22 _____ psig _____

CAUTION

Closely observe pump operation under miniflow conditions for excessive vibration and overheating.

NOTE

During the performance of steps 6.10[9] through 6.10[16], visual observation of transient and steady state vibrations is required.

[9] **START** RHR Pump 2B-B using 2-HS-74-20A, RHR PMP B (ECCS) [2-M-6]. _____

[10] **VERIFY** Valve 2-FCV-74-24, RHR PMP B MINI FLOW, OPENS on 2-M-6. _____

[11] **RECORD** pump start time. _____ _____

[12] **RECORD** time and computer point temperature data at approximately 10 minute intervals on Appendix Q until three successive temperature readings differ by no more than 3 percent. _____

[13] **RECORD** pump operating data on Appendix Q. _____

[14] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

[15] **RECORD** miniflow through 2-FE-74-24 and pump curve data on Appendix R. _____

Date _____

6.10 RHR Pump 2B-B Cold & Hot Leg Injection Flow Rates (continued)

[16] **VERIFY** RHR Pump 2B-B DID NOT TRIP. **(ACC. CRIT. 5.0[9.4])** _____

[17] **CLOSE** Valve 2-FCV-74-28 using 2-HIC-74-28A, RHR HX B FLOW CONTROL in MANUAL, on 2-M-6. _____

[18] **OPEN** Valve 2-FCV-63-94 using 2-HS-63-94A, RHR TO CL 1 & 4, on 2-M-6. _____

[19] **THROTTLE OPEN** Valve 2-FCV-74-28 using 2-HIC-74-28A, RHR HX B BLOW CONTROL, until Valve 2-FCV-74-24 CLOSES. _____

[20] **ADJUST** Valve 2-FCV-74-28 using 2-HIC-74-28A, RHR HX B FLOW CONTROL, until flow through 2-FE-74-24 is between 1350 and 1450 gpm. _____

[21] **RECORD** pump curve data for the 1400 gpm target point on Appendix R. _____

[22] **ADJUST** Valve 2-FCV-74-28 using 2-HIC-74-28A, RHR HX B FLOW CONTROL, until flow through 2-FE-74-24 is between 2950 and 3050 gpm. _____

[23] **RECORD** pump curve data for the 3000 gpm target point on Appendix R. _____

[24] **ADJUST** Valve 2-FCV-74-28 using 2-HIC-74-28A, RHR HX B FLOW CONTROL, until flow through 2-FE-74-24 is between 3950 and 4050 gpm. _____

[25] **RECORD** pump curve data for the 4000 gpm target point on Appendix R. _____

CAUTION

Closely observe pump operation above 4550 gpm to prevent equipment damage.

[26] **ADJUST** Valve 2-FCV-74-28 using 2-HIC-74-28A, RHR HX B FLOW CONTROL, until flow through 2-FE-74-24 is between 4950 and 5050 gpm or Valve 2-FCV-74-28 is FULL OPEN. _____

Date _____

6.10 RHR Pump 2B-B Cold & Hot Leg Injection Flow Rates (continued)

[27] **RECORD** pump curve data for the 5000 gpm target point on Appendix R. _____

NOTE

During the performance of steps 6.10[28] through 6.10[39] visual observation of transient and steady state vibrations is required.

[28] **ADJUST** Valve 2-FCV-74-28 using 2-HIC-74-28A, RHR HX A FLOW CONTROL, until Valve 2-FCV-74-28 is FULL OPEN. _____

[29] **RECORD** the following data from the test gauges and ammeter, **AND**

RECORD pump mechanical data on Appendix R.

A. Total Flow _____ gpm (3866.8 - 4265.7 gpm) **(ACC. CRIT. 5.0[9.1])** _____

B. Pump discharge pressure _____ psig _____

C. Pump suction pressure _____ psig _____

D. Motor current (2-EI-74-17A, 2-M-6) _____ amps _____

E. Shutdown Board 2B-B Volts (2-EI-57-66, 2-M-1) _____ Volts _____

[30] **VERIFY** RHR Pump 2B-B DID NOT TRIP. **(ACC. CRIT. 5.0[9.4])** _____

Date _____

6.10 RHR Pump 2B-B Cold & Hot Leg Injection Flow Rates (continued)

[31] **PERFORM** calculation using Appendix T, **AND**

RECORD the pump discharge resistance. **(ACC. CRIT. 5.0[9.2])**

Kmin _____ ft/gpm^2 (> 0.0000205 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.0000236 ft/gpm^2) _____

[32] **VERIFY** Reactor Vessel level is below the nozzle centerline. _____

[33] **OBTAIN** pump and motor vibration data per TI-31.02, **AND ATTACH** to this procedure. _____

[34] **OPEN** 2-FCV-74-35 using 2-HS-74-35, RHR HEAT EXCHANGER 2B OUTLET CROSSTIE. _____

[35] **OPEN** 2-FCV-63-172 using 2-HS-63-172, RHR TO HOT LEG 1&3 INJECTION ISOLATION. _____

[36] **CLOSE** Valve 2-FCV-63-94 using 2-HS-63-94A, RHR TO CL 1 & 4. _____

NOTE

For the following step, the acceptance criteria range has been adjusted (from 3698-4120, to 3788-4030) to account for a ± 2% error over a 4500 gpm range for the ultrasonic flowmeter.

[37] **RECORD** the RHR Pump 2B-B flow rate using the ultrasonic flowmeter. **(ACC. CRIT. 5.0[9.5])**

_____ gpm (3788 - 4030 gpm) _____

Date _____

6.10 RHR Pump 2B-B Cold & Hot Leg Injection Flow Rates (continued)

[38] **RECORD** the pump discharge resistance using Appendix T. **(ACC. CRIT. 5.0[9.6])**

Kmin _____ ft/gpm^2 (> 0.0000226 ft/gpm^2)

Kmax _____ ft/gpm^2 (< 0.0000264 ft/gpm^2)

_____

[39] **STOP** RHR Pump 2B-B using 2-HS-74-20A, RHR PMP B (ECCS) [2-M-6]. _____

[40] **CLOSE** 2-FCV-74-21, using 2-HS-74-21, RHR PMP B SUCTION [2-M-6]. _____

[41] **CLOSE** 2-FCV-63-172 using 2-HS-63-172, RHR TO HOT LEG 1&3 INJECTION ISOLATION. _____

[42] **CLOSE** 2-FCV-74-35 using 2-HS-74-35, RHR HEAT EXCHANGER 2B OUTLET CROSSTIE. _____

[43] **PERFORM** pump curve calculations for RHR Pump 2B-B on Appendix R. _____

[44] **VERIFY** RHR Pump 2B-B head/flow pump curve data is greater than the FSAR curve and less than the maximum composite curve from Appendix R. **(ACC. CRIT. 5.0[9.3])** _____

[45] **VERIFY** no excessive vibration of the piping system and components associated with the performance of this subsection was observed. **(ACC. CRIT. 5.0[10])** _____

Date _____

6.10 RHR Pump 2B-B Cold & Hot Leg Injection Flow Rates (continued)

NOTE

The remaining steps of this subsection are not a restraint to progressing to other subsections.

[46] **REMOVE** the test gauge installed at RHR Pump 2B-B Discharge Pressure gauge 2-PI-74-22.

_____ 1st

_____ CV

[47] **REMOVE** the test gauge installed at RHR Pump 2B-B Discharge Pressure gauge 2-PI-74-18.

_____ 1st

_____ CV

[48] **VERIFY/REMOVE** test gauge installed at 2-FE-74-24.

_____ 1st

_____ CV

[49] **UNPLUG** the watts-transducer/multimeter from SDB 2B-B Compt 14.

_____ 1st

_____ CV

Date _____

6.11 RWST Level and Containment Sump Annunciators

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.

[1] **VERIFY** prerequisites listed in Section 4.0 for Subsection 6.11 have been completed. _____

[2] **VERIFY** RWST level greater than 30% as read on 2-LI-63-50, RWST LEVEL (2-M-6). _____

[3] **VERIFY** Annunciator Window 126-D, RWST LEVEL LO-LO, is CLEAR. _____

[4] **CLOSE** Valve 2-RTV-63-373A, 2-LT-63-50 ROOT. _____

[5] **REMOVE** the cap and **OPEN** Valve 2-DRIV-63-373B, 2-LT-63-50 DRAIN. _____

[6] **VERIFY** Annunciator Window 126-D ALARMS. _____

[7] **VERIFY** Unit 2 Event Displays Monitor indicates 126-D RWST LEVEL LO-LO (LS-63-50B), is in ALARM. _____

[8] **CLOSE** Valve 2-DRIV-63-373B, 2-LT-63-50 DRAIN, **AND**

REPLACE the cap. _____

[9] **OPEN** Valve 2-RTV-63-373A, 2-LT-63-50 ROOT, and **PLACE** 2-LPL-63-50 into service. _____

[10] **VERIFY** Annunciator Window 126-D is CLEAR. _____

[11] **VERIFY** Unit 2 Event Displays Monitor indicates 126-D RWST LEVEL LO-LO (LS-63-50B) is NORMAL. _____

[12] **CLOSE** Valve 2-RTV-63-374A, 2-LT-63-51 ROOT. _____

[13] **REMOVE** the cap and **OPEN** Valve 2-DRIV-63-374B, 2-LT-63-51 DRAIN. _____

Date _____

6.11 RWST Level and Containment Sump Annunciators (continued)

[14] **VERIFY** Annunciator Window 126-D ALARMS. _____

[15] **VERIFY** Unit 2 Event Displays Monitor indicates 126-D RWST LEVEL LO-LO (LS-63-51B) is in ALARM. _____

[16] **CLOSE** Valve 2-DRIV-63-374B, 2-LT-63-51 DRAIN, **AND**

REPLACE the cap. _____

[17] **OPEN** Valve 2-RTV-63-374A, 2-LT-63-51 ROOT, and **PLACE** 2-LPL-63-51 into service. _____

[18] **VERIFY** Annunciator Window.126-D is CLEAR. _____

[19] **VERIFY** Unit 2 Event Displays Monitor indicates 126-D RWST LEVEL LO-LO (LS-63-51B) is NORMAL. _____

[20] **CLOSE** Valve 2-RTV-63-375A, 2-LT-63-52 ROOT. _____

[21] **REMOVE** the cap and **OPEN** Valve 2-DRLV-63-375B, 2-LT-63-52 DRAIN. _____

[22] **VERIFY** Annunciator Window 126-D ALARMS. _____

[23] **VERIFY** Unit 2 Event Displays Monitor indicates 126-D RWST LEVEL LO-LO (LS-63-52B) is in ALARM. _____

[24] **CLOSE** Valve 2-DRIV-63-375B, 2-LT-63-52 DRAIN, **AND**

REPLACE the cap. _____

[25] **OPEN** Valve 2-RTV-63-375A, 2-LT-63-52 ROOT, and **PLACE** 2-LPL-63-52 into service. _____

[26] **VERIFY** Annunciator Window 126-D is CLEAR. _____

[27] **VERIFY** Unit 2 Event Displays Monitor indicates 126-D RWST LEVEL LO-LO (LS-63-52B) is NORMAL. _____

[28] **CLOSE** Valve 2-RTV-63-376A, 2-LT-63-53 ROOT. _____

[29] **REMOVE** the cap and **OPEN** Valve 2-DRIV-63-376B, 2-LT-63-53 DRAIN. _____

[30] **VERIFY** Annunciator Window 126-D ALARMS. _____

Date _____

6.11 RWST Level and Containment Sump Annunciators (continued)

[31] **VERIFY** Unit 2 Event Displays Monitor indicates 126-D RWST LEVEL LO-LO (LS-63-53B) is in ALARM. _____

[32] **CLOSE** Valve 2-DRIV-63-376B, 2-LT-63-53 DRAIN, **AND**

REPLACE the cap. _____

[33] **OPEN** Valve 2-RTV-63-376A, 2-LT-63-53 ROOT, and **PLACE** 2-LPL-63-53 into service. _____

[34] **VERIFY** Annunciator Window 126-D is CLEAR. _____

[35] **VERIFY** Unit 2 Event Displays Monitor indicates 126-D RWST LEVEL LO-LO (LS-63-53B) is NORMAL. _____

[36] **ENSURE** RWST level less than 90% as read on 2-LI-63-50, RWST LEVEL (2-M-6). _____

[37] **VERIFY** Annunciator Window 127-C, RWST LEVEL FULL, is CLEAR. _____

[38] **CALL UP** 2LT0630046A Block Detail Display from W210CP, W2BOP_063. _____

[39] **PLACE** point 2LT0630046A in Manual. _____

[40] **SELECT** the EU: 3228 field in the OUTPUT area. _____

[41] **SELECT** the Value Box. _____

[42] **INPUT** a value of 0380, **AND**

PRESS Enter. _____

[43] **VERIFY** Annunciator Window 127-C ALARMS. _____

[44] **VERIFY** Unit 2 Event Displays Monitor indicates 127-C RWST LEVEL FULL (LS-63-46A/49A) is in ALARM. _____

[45] **CALL UP** 2LT0630046A Block Detail Display from W210CP, W2BOP_063. _____

[46] **PLACE** point 2LT0630046A in Auto. _____

[47] **VERIFY** Annunciator Window 127-C CLEARS. _____

Date _____

6.11 RWST Level and Containment Sump Annunciators (continued)

[48] **VERIFY** Unit 2 Event Displays Monitor indicates 127-C RWST LEVEL FULL (LS-63-46A/49A) is NORMAL. _____

[49] **CALL UP** 2LT0630049A Block Detail Display from W210CP, W2BOP_063. _____

[50] **PLACE** point 2LT0630049A in Manual. _____

[51] **SELECT** the EU: 3232 field in the OUTPUT area. _____

[52] **SELECT** the Value Box. _____

[53] **INPUT** a value of 0380, **AND**

PRESS Enter. _____

[54] **VERIFY** Annunciator Window 127-C ALARMS. _____

[55] **VERIFY** Unit 2 Event Displays Monitor indicates 127-C RWST LEVEL FULL (LS-63-46A/49A) is in ALARM. _____

[56] **CALL UP** 2LT0630049A Block Detail Display from W210CP, W2BOP_063. _____

[57] **PLACE** point 2LT0630049A in Auto. _____

[58] **VERIFY** Annunciator Window 127-C CLEARS. _____

[59] **VERIFY** Unit 2 Event Displays Monitor indicates 127-C RWST LEVEL FULL (LS-63-46A/49A) is NORMAL. _____

[60] **VERIFY** Annunciator Window 127-D, RWST LEVEL START MAKEUP, is in ALARM. _____

[61] **VERIFY** Unit 2 Event Displays Monitor indicates 127-D RWST LEVEL START MAKEUP (LS-63-46B/49B) is in ALARM. _____

[62] **CALL UP** 2LT0630046B Block Detail Display from W210CP, W2BOP_063. _____

[63] **PLACE** point 2LT0630046B in Manual. _____

[64] **SELECT** the EU: 3229 field in the OUTPUT area. _____

[65] **SELECT** the Value Box. _____

Date _____

6.11 RWST Level and Containment Sump Annunciators (continued)

[66] **INPUT** a value of 0375, **AND**

PRESS Enter. _____

[67] **VERIFY** Annunciator Window 127-D is in ALARM. _____

[68] **CALL UP** 2LT0630049B Block Detail Display from W210CP, W2BOP_063. _____

[69] **PLACE** point 2LT0630049B in Manual. _____

[70] **SELECT** the EU: 3233 field in the OUTPUT area. _____

[71] **SELECT** the Value Box. _____

[72] **INPUT** a value of 0375, **AND**

PRESS Enter. _____

[73] **VERIFY** Annunciator Window 127-D CLEARS. _____

[74] **VERIFY** Unit 2 Event Displays Monitor indicates 127-D RWST LEVEL START MAKEUP (LS-63-46B/49B) is NORMAL. _____

[75] **CALL UP** 2LT0630046B Block Detail Display from W210CP, W2BOP_063. _____

[76] **PLACE** point 2LT0630046B in Auto. _____

[77] **VERIFY** Annunciator Window 127-D ALARMS. _____

[78] **VERIFY** Unit 2 Event Displays Monitor indicates 127-D RWST LEVEL START MAKEUP (LS-63-46B/49B) is in ALARM. _____

[79] **CALL UP** 2LT0630049B Block Detail Display from W210CP, W2BOP_063. _____

[80] **PLACE** point 2LT0630049B in Auto. _____

[81] **VERIFY** Annunciator Window 126-E, CTMT RECIRC SUMP FULL, is CLEAR. _____

[82] **INSTALL** a jumper across terminals for wire Nos. 2NM6D and 2M704 local terminal board on 2-LS-63-103 (Location AZ 268, EL 703 ft in Reactor Building). _____

Date _____

6.11 RWST Level and Containment Sump Annunciators (continued)

[83] **VERIFY** that Annunciator Window 126-E ALARMS. _____

[84] **VERIFY** Unit 2 Event Displays Monitor indicates 126-E CNTMT RECIRC SUMP FULL (LS-63-103/104) is in ALARM. _____

[85] **REMOVE** the jumper across terminals for wire Nos. 2NM6D and 2M704 local terminal board on 2-LS-63-103 (Location AZ 268, EL 703 ft in Reactor Building). _____ 1st _____ CV

[86] **VERIFY** Annunciator Window 126-E is CLEAR. _____

[87] **VERIFY** Unit 2 Event Displays Monitor indicates 126-E CNTMT RECIRC SUMP FULL (LS-63-103/104) is NORMAL. _____

[88] **INSTALL** a jumper across terminals for wire Nos. 2NM6D and 2M704 local terminal board on 2-LS-63-104 (Location AZ 268, EL 703 ft in Reactor Building). _____

[89] **VERIFY** that Annunciator Window 126-E ALARMS. _____

[90] **VERIFY** Unit 2 Event Displays Monitor indicates 126-E CNTMT RECIRC SUMP FULL (LS-63-103/104) is in ALARM. _____

[91] **REMOVE** the jumper across terminals for wire Nos. 2NM6D and 2M704 local terminal board on 2-LS-63-104 (Location AZ 268, EL 703 ft in Reactor Building). _____ 1st _____ CV

[92] **VERIFY** Annunciator Window 126-E is CLEAR. _____

[93] **VERIFY** Unit 2 Event Displays Monitor indicates 126-E CNTMT RECIRC SUMP FULL (LS-63-103/104) is NORMAL. _____

[94] **RECORD** the RWST temperature. (60°F - 100°F)

A. 2-TI-63-131, RWST TEMP (2-M-6) _____°F _____

B. 2-TI-63-132, RWST TEMP (2-M-6) _____°F _____

Date _____

6.11 RWST Level and Containment Sump Annunciators (continued)

[95] **VERIFY** Annunciator Window 127-B, RWST TEMP HI/LO, is CLEAR. _____

[96] **CALL UP** 2TS0630131A Block Detail Display from W210CP, W2BOP_063. _____

[97] **PLACE** point 2TS0630131A in Manual. _____

[98] **SELECT** the EU: 3222 field in the OUTPUT area. _____

[99] **SELECT** the Value Box. _____

[100] **INPUT** a value of 0110, **AND**

PRESS Enter. _____

[101] **VERIFY** Annunciator Window 127-B ALARMS. _____

[102] **VERIFY** Unit 2 Event Displays Monitor indicates 127-B RWST TEMP HI/LO (TS-63-132C, 132D, 131C, 131D) is in ALARM. _____

[103] **CALL UP** 2TS0630131A Block Detail Display from W210CP, W2BOP_063. _____

[104] **PLACE** point 2TS0630131A in Auto. _____

[105] **VERIFY** Annunciator Window 127-B, is CLEAR. _____

[106] **VERIFY** Unit 2 Event Displays Monitor indicates 127-B RWST TEMP HI/LO (TS-63-132C, 132D, 131C, 131D) is NORMAL. _____

[107] **CALL UP** 2TS0630131B Block Detail Display from W210CP, W2BOP_063. _____

[108] **PLACE** point 2TS0630131B in Manual. _____

[109] **SELECT** the EU: 3223 field in the OUTPUT area. _____

[110] **SELECT** the Value Box. _____

[111] **INPUT** a value of 0050, **AND**

PRESS Enter. _____

[112] **VERIFY** Annunciator Window 127-B ALARMS. _____

Date _____

6.11 RWST Level and Containment Sump Annunciators (continued)

[113] **VERIFY** Unit 2 Event Displays Monitor indicates 127-B RWST TEMP HI/LO (TS-63-132C, 132D, 131C, 131D) is in ALARM. _____

[114] **CALL UP** 2TS0630131B Block Detail Display from W210CP, W2BOP_063. _____

[115] **PLACE** point 2TS0630131B in Auto. _____

[116] **VERIFY** Annunciator Window 127-B, is CLEAR. _____

[117] **VERIFY** Unit 2 Event Displays Monitor indicates 127-B RWST TEMP HI/LO (TS-63-132C, 132D, 131C, 131D) is NORMAL. _____

[118] **CALL UP** 2TS0630132A Block Detail Display from W210CP, W2BOP_063. _____

[119] **PLACE** point 2TS0630132A in Manual. _____

[120] **SELECT** the EU: 3216 field in the OUTPUT area. _____

[121] **SELECT** the Value Box. _____

[122] **INPUT** a value of 0110, **AND**

PRESS Enter. _____

[123] **VERIFY** Annunciator Window 127-B ALARMS. _____

[124] **VERIFY** Unit 2 Event Displays Monitor indicates 127-B RWST TEMP HI/LO (TS-63-132C, 132D, 131C, 131D) is in ALARM. _____

[125] **CALL UP** 2TS0630132A Block Detail Display from W210CP, W2BOP_063. _____

[126] **PLACE** point 2TS0630132A in Auto. _____

[127] **VERIFY** Annunciator Window 127-B, is CLEAR. _____

[128] **VERIFY** Unit 2 Event Displays Monitor indicates 127-B RWST TEMP HI/LO (TS-63-132C, 132D, 131C, 131D) is NORMAL. _____

[129] **CALL UP** 2TS0630132B Block Detail Display from W210CP, W2BOP_063. _____

[130] **PLACE** point 2TS0630132B in Manual. _____

Date _____

6.11 RWST Level and Containment Sump Annunciators (continued)

[131] **SELECT** the EU: 3217 field in the OUTPUT area. _____

[132] **SELECT** the Value Box. _____

[133] **INPUT** a value of 0050, **AND**

PRESS Enter. _____

[134] **VERIFY** Annunciator Window 127-B ALARMS. _____

[135] **VERIFY** Unit 2 Event Displays Monitor indicates 127-B RWST TEMP HI/LO (TS-63-132C, 132D, 131C, 131D) is in ALARM. _____

[136] **CALL UP** 2TS0630132B Block Detail Display from W210CP, W2BOP_063. _____

[137] **PLACE** point 2TS0630132B in Auto. _____

[138] **VERIFY** Annunciator Window 127-B, is CLEAR. _____

[139] **VERIFY** Unit 2 Event Displays Monitor indicates 127-B RWST TEMP HI/LO (TS-63-132C, 132D, 131C, 131D) is NORMAL. _____

Date _____

7.0 POST-PERFORMANCE ACTIVITIES

NOTE

Any temporary equipment that will be used for the performance of 2-PTI-063-01 may be left in place and the removal step marked N/A.

[1] **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 in SMP-9.0 _____

[2] **VERIFY** that Post-test calibration of permanent plant instruments used to record quantitative acceptance criteria has been satisfactorily performed **AND**

RECORD the results on Appendix C, Permanent Plant Instrumentation Log. _____

[3] **VERIFY/REMOVE** test gauge installed at SIP 2A-A suction Pressure Gauge 2-PI-63-9. _____ 1st _____ CV

[4] **VERIFY/REMOVE** test gauge installed at SIP 2A-A discharge Pressure Transmitter 2-PT-63-149. _____ 1st _____ CV

[5] **VERIFY/REMOVE** test gauge installed at SIP 2B-B suction Pressure Gauge 2-PI-63-14. _____ 1st _____ CV

[6] **VERIFY/REMOVE** test gauge installed at SIP 2B-B discharge Pressure Transmitter 2-PT-63-18. _____ 1st _____ CV

Date _____

7.0 POST-PERFORMANCE ACTIVITIES (continued)

[7] **VERIFY/REMOVE** differential pressure gauge connected across Orifice 2-FE-63-151.

_____ 1st

_____ CV

[8] **VERIFY/REMOVE** differential pressure gauge connected across Orifice 2-FE-63-20.

_____ 1st

_____ CV

[9] **VERIFY/REMOVE** the differential pressure gauge connected across Orifice 2-FE-63-2.

_____ 1st

_____ CV

[10] **CLOSE** the Work Order issued for preparation/assembly of the watt-transducer test equipment in Step 4.3[60]. _____

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

Date _____

8.0 RECORDS

A. QA Records

Complete Test Package

B. Non-QA Records

None

Appendix A
(Page 1 of 1)

Test Procedures/Instructions Reference Review

Date _____

Additional copies of this table may be made as necessary.

PROCEDURE/ INSTRUCTION	REVISION/ CHANGES (N/A for no change)	INITIAL AND DATE.
WBN-VTM W120-0010, Westinghouse Supplied Centrifugal Charging Pumps, R23		
WBN-VTM W120-0720, The Westinghouse Supplied Safety Injection Pumps and Motors, R28		
WBN-VTM W120-0570, Westinghouse Supplied Ingersoll-Rand Residual Heat Removal Pumps, R13		
FSAR - Amendment 111		
2-TSD-63-3, Safety Injection System: Centrifugal Charging Pump, RHR Pump, Safety Injection Pump and Related SIS Performance Test, and Flow Balance Test		
2-TOP-63-02, Safety Injection System Preoperational Tests		
WBN2-63-4001 R3, Safety Injection System		

Appendix B
(Page 1 of 1)

TEMPORARY CONDITION LOG

Date _____

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

ITEM No.	TEMPORARY CONDITION DESCRIPTION	PERFORMED		RETURNED TO NORMAL	
		Step No.	Performed By/Date CV By/Date	Step No.	Returned By/Date CV By/Date

Appendix C
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PERMANENT PLANT INSTRUMENTATION LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	SUBSECTION	CAL DUE DATE	FILLED AND VENTED[1]	PLACED IN SERVICE[1]	USED FOR QUANTITATIVE ACC CRIT		POST-TEST CAL DATE[2]	POST-TEST CALIBRATION ACCEPTABLE[2] INITIAL/DATE
			INIT/DATE	INIT/DATE	YES	NO		
2-LPL-63-50	6.1-6.11							
2-LPL-63-51	6.1-6.11							
2-LPL-63-52	6.1-6.11							
2-LPL-63-53	6.1-6.11							
2-LPT-63-131	6.1-6.11							
2-LPT-63-132	6.1-6.11							
2-LPP-63-149	6.4, 6.6, 6.7							
2-LPP-63-18	6.5, 6.6, 6.8							
2-LPP-74-13	6.9							
2-LPP-74-26	6.10							

[1] 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. (N/A)

[2] May be identified as Not Applicable (N/A) if instrument was not used to verify/record quantitative acceptance criteria data.

Appendix C
(Page 2 of 6)
PERMANENT PLANT INSTRUMENTATION LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	SUBSECTION	CAL DUE DATE	FILLED AND VENTED[1]	PLACED IN SERVICE[1]	USED FOR QUANTITATIVE ACC CRIT		POST-TEST CAL DATE[2]	POST-TEST CALIBRATION ACCEPTABLE[2] INITIAL/DATE
			INIT/DATE	INIT/DATE	YES	NO		
2-EI-57-39	6.1-6.10							
2-EI-57-66	6.1-6.10							
2-FI-63-2	6.4-6.8							
2-EI-62-104B	6.2-6.3							
2-EI-62-108B	6.1, 6.3							
2-PI-62-247A	6.1, 6.3							
2-PI-62-247B	6.1, 6.3							
2-LPF-70-146	6.1, 6.3							
2-PI-62-244A	6.2-6.3							

[1] 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. (N/A)

[2] May be identified as Not Applicable (N/A) if instrument was not used to verify/record quantitative acceptance criteria data.

Appendix C
(Page 3 of 6)
PERMANENT PLANT INSTRUMENTATION LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	SUBSECTION	CAL DUE DATE	FILLED AND VENTED[1]	PLACED IN SERVICE[1]	USED FOR QUANTITATIVE ACC CRIT		POST-TEST CAL DATE[2]	POST-TEST CALIBRATION ACCEPTABLE[2] INITIAL/DATE
			INIT/DATE	INIT/DATE	YES	NO		
2-PI-62-244B	6.2-6.3							
2-LPF-70-145	6.2-6.3							
2-EI-63-12B	6.4, 6.6, 6.7							
2-PI-63-139	6.4, 6.6, 6.7							
2-PI-63-140	6.4, 6.6, 6.7							
2-LPF-70-147	6.4, 6.6, 6.7							
2-EI-63-16B	6.5, 6.6, 6.8							
2-PI-63-145	6.5, 6.6, 6.8							
2-PI-63-146	6.5, 6.6, 6.8							

[1] 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. (N/A)

[2] May be identified as Not Applicable (N/A) if instrument was not used to verify/record quantitative acceptance criteria data.

Appendix C
(Page 4 of 6)

PERMANENT PLANT INSTRUMENTATION LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	SUBSECTION	CAL DUE DATE	FILLED AND VENTED[1]	PLACED IN SERVICE[1]	USED FOR QUANTITATIVE ACC CRIT		POST-TEST CAL DATE[2]	POST-TEST CALIBRATION ACCEPTABLE[2] INITIAL/DATE
			INIT/DATE	INIT/DATE	YES	NO		
2-TI-63-138	6.4, 6.6, 6.7							
2-TI-63-141	6.4, 6.6, 6.7							
2-TI-63-144	6.5, 6.6, 6.8							
2-TI-63-147	6.5, 6.6, 6.8							
2-LPF-70-148	6.5, 6.6, 6.8							
2-EI-74-5A	6.9							
2-EI-74-5B	6.9							
2-TIS-74-7	6.9							
2-LPF-70-151	6.9							

[1] 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. (N/A)

[2] May be identified as Not Applicable (N/A) if instrument was not used to verify/record quantitative acceptance criteria data.

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PERMANENT PLANT INSTRUMENTATION LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	SUBSECTION	CAL DUE DATE	FILLED AND VENTED[1]	PLACED IN SERVICE[1]	USED FOR QUANTITATIVE ACC CRIT		POST-TEST CAL DATE[2]	POST-TEST CALIBRATION ACCEPTABLE[2] INITIAL/DATE
			INIT/DATE	INIT/DATE	YES	NO		
2-EI-74-17A	6.10							
2-EI-74-17B	6.10							
2-TIS-74-19	6.10							
2-LPF-70-152	6.10							
2-LPF-63-170	6.1-6.3							
2-LPF-63-20	6.5, 6.6, 6.8							
2-LPF-63-151	6.4, 6.6, 6.7							
2-LPL-63-46	6.1-6.11							
2-LPL-63-49	6.1-6.11							

[1] 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. (N/A)

[2] May be identified as Not Applicable (N/A) if instrument was not used to verify/record quantitative acceptance criteria data.

Appendix C
(Page 6 of 6)
PERMANENT PLANT INSTRUMENTATION LOG

Date _____

INSTRUMENT OR INSTRUMENT LOOP #	SUBSECTION	CAL DUE DATE	FILLED AND VENTED[1]	PLACED IN SERVICE[1]	USED FOR QUANTITATIVE ACC CRIT		POST-TEST CAL DATE[2]	POST-TEST CALIBRATION ACCEPTABLE[2] INITIAL/DATE
			INIT/DATE	INIT/DATE	YES	NO		
2-LS-63-103	6.11							
2-LS-63-104	6.11							
2-TI-63-131	6.1-6.11							
2-TI-63-132	6.1-6.11							
2-FIS-74-12	6.9							
2-FIS-74-24	6.10							

[1] 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. (N/A)

[2] May be identified as Not Applicable (N/A) if instrument was not used to verify/record quantitative acceptance criteria data.

Appendix D
(Page 1 of 2)

COMPUTER POINT VERIFICATION LOG

Date _____

COMPUTER POINT	DESCRIPTION	INITIAL/DATE
T0703A	CENT CHG PMP A-A INBRD BRG	
T0704A	CENT CHG PMP A-A OUTBRD BRG	
T0705A	CENT CHG PMP A-A THRUST BRG	
T0711A	CENT CHG PMP A-A MTR INBRD BRG	
T0712A	CENT CHG PMP A-A MTR OUTBRD BRG	
T0713A	CENT CHG PMP A-A MTR PH A WNDG	
T0714A	CENT CHG PMP A-A MTR PH B WNDG	
T0715A	CENT CHG PMP A-A MTR PH C WNDG	
T0700A	CENT CHG PMP B-B INBRD BRG	
T0701A	CENT CHG PMP B-B OUTBRD BRG	
T0702A	CENT CHG PMP B-B THRUST BRG	
T0706A	CENT CHG PMP B-B MTR INBRD BRG	
T0707A	CENT CHG PMP B-B MTR OUTBRD BRG	
T0708A	CENT CHG PMP B-B MTR PH A WNDG	
T0709A	CENT CHG PMP B-B MTR PH B WNDG	
T0710A	CENT CHG PMP B-B MTR PH C WNDG	
T0150A	SIS PUMP A-A MOTOR PH A WNDG	
T0151A	SIS PUMP A-A MOTOR PH B WNDG	
T0152A	SIS PUMP A-A MOTOR PH C WNDG	
T0153A	SIS PUMP A-A MTR OUTBRD GUIDE BRG	

Appendix D
(Page 2 of 2)

COMPUTER POINT VERIFICATION LOG

Date _____

COMPUTER POINT	DESCRIPTION	INITIAL/DATE
T0154A	SIS PUMP A-A MTR INBRD GUIDE BRG	
T0155A	SIS PUMP B-B MOTOR PH A WNDG	
T0156A	SIS PUMP B-B MOTOR PH B WNDG	
T0157A	SIS PUMP B-B MOTOR PH C WNDG	
T0158A	SIS PUMP B-B MTR OUTBRD GUIDE BRG	
T0159A	SIS PUMP B-B MTR INBRD GUIDE BRG	
T0650A	RHR PUMP 1 MTR INBOARD BRG TEMP	
T0651A	RHR PUMP 1 MTR OUTBOARD BRG TEMP	
T0652A	RHR PUMP 1 MTR WINDING-PH A TEMP	
T0653A	RHR PUMP 1 MTR WINDING-PH B TEMP	
T0654A	RHR PUMP 1 MTR WINDING-PH C TEMP	
T0655A	RHR PUMP 2 MTR INBOARD BRG TEMP	
T0656A	RHR PUMP 2 MTR OUTBOARD BRG TEMP	
T0657A	RHR PUMP 2 MTR WINDING-PH A TEMP	
T0658A	RHR PUMP 2 MTR WINDING-PH B TEMP	
T0659A	RHR PUMP 2 MTR WINDING-PH C TEMP	

Appendix E
(Page 1 of 2)
CENTRIFUGAL CHARGING PUMP 2A-A OPERATING DATA

Date _____

COMP.POINT LIMIT	TEMP °F AMBIENT _____/____ INITIAL/DATE	TEMP °F + 10 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 20 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 30 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 40 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 50 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 60 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 70 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 80 MIN TIME_____ _____/____ INITIAL/DATE
T0703A < 170°F									
T0704A < 170°F									
T0705A < 170°F									
T0711A < 200°F									
T0712A < 200°F									
T0713A < 245°F									
T0714A < 245°F									
T0715A < 245°F									

NOTE: Unused blocks may be marked N/A. Additional data sheets may be added if required.

Appendix E
(Page 2 of 2)

CENTRIFUGAL CHARGING PUMP 2A-A OPERATING DATA

Date _____

STEP 6.1[17] INITIALS/DATE

2-EI-62-108B (SDB/2A-A CMPT 18) MOTOR CURRENT PH 1/2/3
_____AMPS
< 43.3 AMPS
_____/_____

2-PI-62-247B (LOCAL) AUX OIL PUMP FILTER UPSTREAM PRESS NORMAL RANGE
_____PSIG
(11-15 PSIG)
_____/_____

2-PI-62-247A (LOCAL) AUX OIL PUMP FILTER DOWNSTREAM PRESS
_____PSIG
(10-12 PSIG)
_____/_____

CCP 2A-A OIL COOLER (LOCAL) COOLING WATER INLET TEMP.
M&TE ID# _____
_____°F
(60-100 °F)
_____/_____

CCP 2A-A OIL COOLER (LOCAL) COOLING WATER OUTLET TEMP.
M&TE ID# _____
_____°F
<110°F
_____/_____

2-FI-70-146 (0-M-27B) COOLING WATER FLOW
_____GPM
28 GPM (NORMAL)
_____/_____

Appendix F
(Page 1 of 4)

CENTRIFUGAL CHARGING PUMP 2A-A PUMP CURVE DATA

Date _____

STEP NO.	TARGET FLOW GPM	DISCH PRESS PSIG	SUCT PRESS PSIG	FLOW, GPM (Q)	PUMP SPEED RPM	MOTOR CURRENT 2-EI-62-108B (SDB 2A-A CMPT 18) PH 1/2/3 AMPS	WATTS[1] (ENTER mA & WATTS)	6.9Kv SDBD VOLTS 2-EI-57-39 (2-M-1) VOLTS
6.1[18]	60 - 70							
6.1[28]	250							
6.1[30]	350							
6.1[32]	450							
6.1[34]	550							

[1] Watts = multimeter reading (in mA) X Constant K (Step 4.3[60]C), Watts = mA X K

[1] Step 6.1[41] Pump Curve Calculation

A. Target flow, Miniflow

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

Appendix F
(Page 2 of 4)

CENTRIFUGAL CHARGING PUMP 2A-A PUMP CURVE DATA

Date _____

B. Target flow, 250 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

C. Target flow, 350 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

Appendix F
(Page 3 of 4)

CENTRIFUGAL CHARGING PUMP 2A-A PUMP CURVE DATA

Date _____

D. Target flow, 450 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

E. Target flow, 550 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

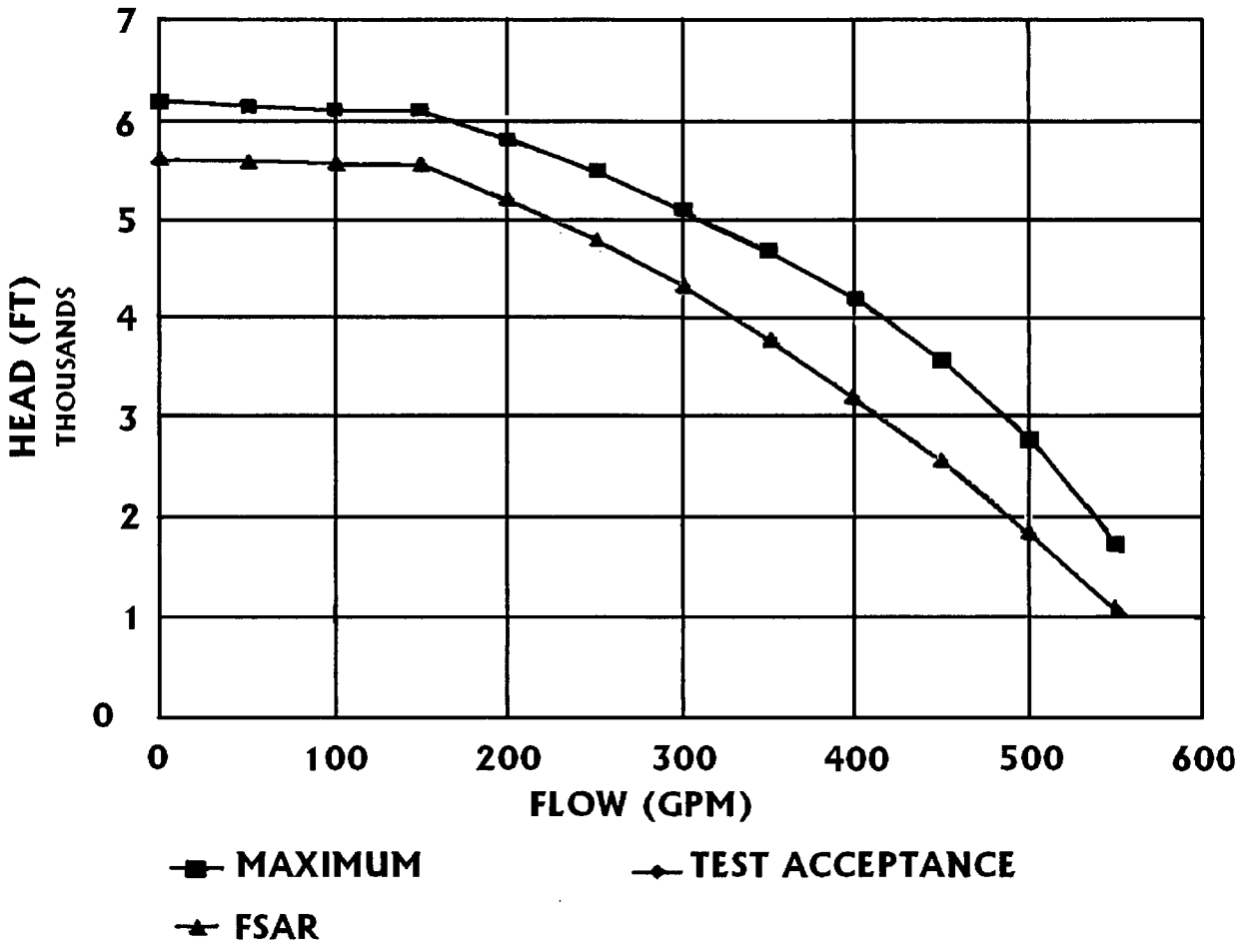
Calculation Verified By _____ (Initials) _____ (Date)

F. PLOT the flows vs. TDH on the composite pump curve. _____

Appendix F
(Page 4 of 4)

CENTRIFUGAL CHARGING PUMP 2A-A PUMP CURVE DATA

Date _____



NOTES

1) When plotting points along the pump curve, adjust the head ± 18 ft to account for instrument inaccuracy. (Maximum affect of instrument inaccuracy is ± 17.66 ft. Re-evaluate in case M&TE changes from that stated in Subsection 4.2.)

2) If needed, the actual data points of the pump curve are tabled in the Safety Injection System Description, WBN2-63-4001.

Appendix G
(Page 1 of 2)

CENTRIFUGAL CHARGING PUMP 2B-B OPERATING DATA

Date _____

COMP.POINT LIMIT	TEMP °F AMBIENT _____/____ INITIAL/DATE	TEMP °F + 10 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 20 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 30 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 40 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 50 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 60 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 70 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 80 MIN TIME_____ _____/____ INITIAL/DATE
T0700A < 170°F									
T0701A < 170°F									
T0702A < 170°F									
T0706A < 200°F									
T0707A < 200°F									
T0708A < 245°F									
T0709A < 245°F									
T0710A < 245°F									

NOTE: Unused blocks may be marked N/A. Additional data sheets may be added if required.

Appendix G
(Page 2 of 2)

CENTRIFUGAL CHARGING PUMP 2B-B OPERATING DATA

Date _____

STEP 6.2[17]		INITIALS/DATE
2-EI-62-104B (SDB/2B-B CMPT 18) MOTOR CURRENT PH 1/2/3	_____AMPS < 43.3 AMPS	_____/_____
2-PI-62-244B (LOCAL) AUX OIL PUMP FILTER UPSTREAM PRESS NORMAL RANGE	_____PSIG (11-15 PSIG)	_____/_____
2-PI-62-244A (LOCAL) AUX OIL PUMP FILTER DOWNSTREAM PRESS	_____PSIG (10-12 PSIG)	_____/_____
CCP 2B-B OIL COOLER (LOCAL) COOLING WATER INLET TEMP. M&TE ID# _____	_____°F (60-100 °F)	_____/_____
CCP 2B-B OIL COOLER (LOCAL) COOLING WATER OUTLET TEMP. M&TE ID# _____	_____°F <110°F	_____/_____
2-FI-70-145 (0-M-27B) COOLING WATER FLOW	_____GPM 28 GPM (NORMAL)	_____/_____

Appendix H
(Page 1 of 4)

CENTRIFUGAL CHARGING PUMP 2B-B PUMP CURVE DATA

Date _____

STEP NO.	TARGET FLOW GPM	DISCH PRESS PSIG	SUCT PRESS PSIG	FLOW, GPM (Q)	PUMP SPEED RPM	MOTOR CURRENT 2-EI-62-104B (SDB 2B-B CMPT 18) PH 1/2/3 AMPS	WATTS[1] (ENTER mA & WATTS)	6.9Kv SDBD VOLTS 2-EI-57-66 (2-M-1) VOLTS
6.2[18]	60 - 70							
6.2[28]	250							
6.2[30]	350							
6.2[32]	450							
6.2[34]	550							

[1] Watts = multimeter reading (in mA) X Constant K (Step 4.3[60]C), Watts = mA X K

[2] Step 6.2[41] Pump Curve Calculation

A. Target flow, Miniflow

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

Appendix H
(Page 2 of 4)

CENTRIFUGAL CHARGING PUMP 2B-B PUMP CURVE DATA

Date _____

B. Target flow, 250 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

C. Target flow, 350 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix H
(Page 3 of 4)

CENTRIFUGAL CHARGING PUMP 2B-B PUMP CURVE DATA

Date _____

D. Target flow, 450 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

E. Target flow, 550 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (2.31 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (2.31 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

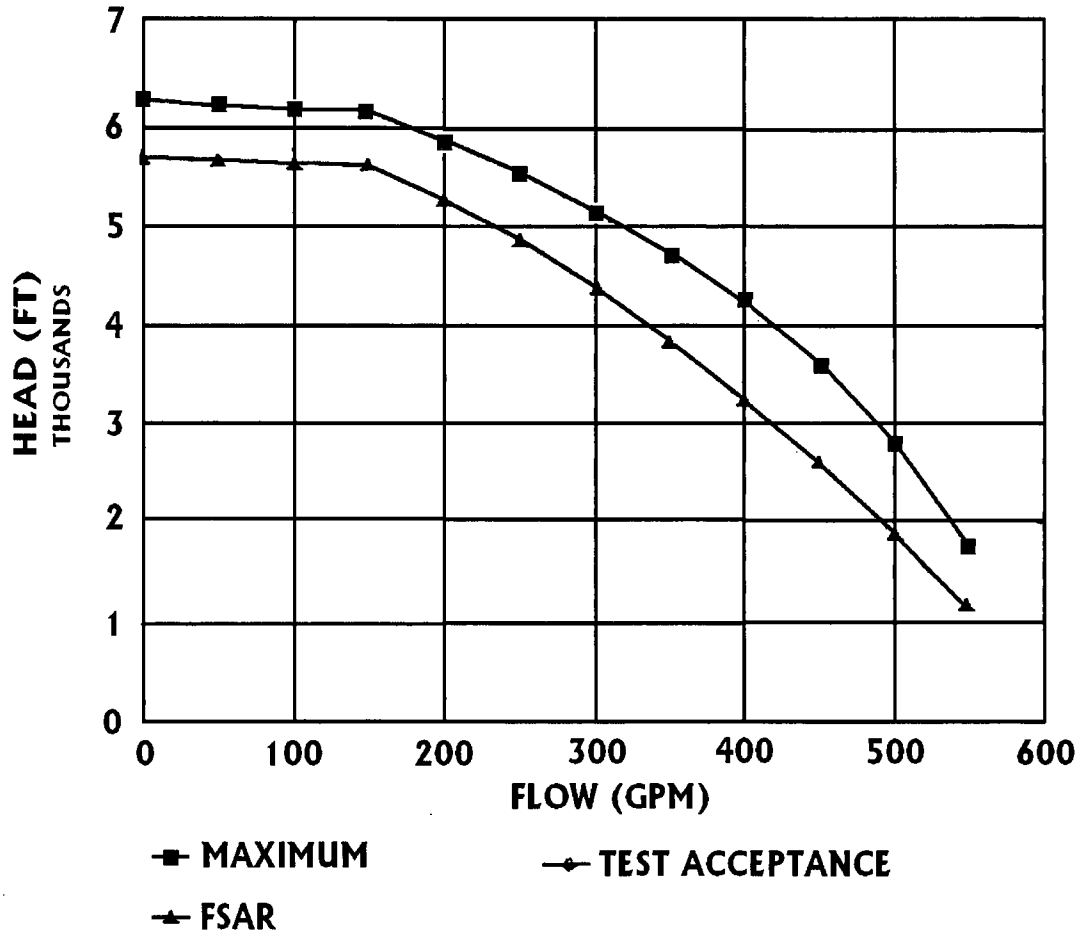
Calculation Verified By _____ (Initials) _____ (Date)

F. PLOT the flows vs. TDH on the composite pump curve. _____

Appendix H
(Page 4 of 4)

CENTRIFUGAL CHARGING PUMP 2B-B PUMP CURVE DATA

Date _____



NOTES

1) When plotting points along the pump curve, adjust the head ± 18 ft to account for instrument inaccuracy. (Maximum affect of instrument inaccuracy is ± 17.66 ft. Re-evaluate in case M&TE changes from that stated in Subsection 4.2.)
2) If needed, the actual data points of the pump curve are tabled in the Safety Injection System Description, WBN2-63-4001.

Appendix I
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CENTRIFUGAL CHARGING PUMP SUBSYSTEM PUMP DATA

Date _____

Step 6.3[28] CCP 2A-A		INITIALS/DATE
Test gauge 2-PI-62-110 (PD)	_____PSIG	_____/_____
Test gauge 2-PI-62-109 (PS)	_____PSIG	_____/_____
Total Flow	_____GPM	_____/_____
2-EI-62-108B (SDB 2A-A CMPT 18) PH 1/2/3	_____AMPS	_____/_____
2-EI-57-39 (2-M-1)	_____VOLTS (6900-7200 VOLTS)	_____/_____
T0703A (<170°F)	_____°F	_____/_____
T0704A (<170°F)	_____°F	_____/_____
T0705A (<170°F)	_____°F	_____/_____
T0711A (<200°F)	_____°F	_____/_____
T0712A (<200°F)	_____°F	_____/_____
T0713A (<245°F)	_____°F	_____/_____
T0714A (<245°F)	_____°F	_____/_____
T0715A (<245°F)	_____°F	_____/_____

Appendix I
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CENTRIFUGAL CHARGING PUMP SUBSYSTEM PUMP DATA

Date _____

Step 6.3[28] CCP 2A-A — INITIALS/DATE

2-PI-62-247B (LOCAL) AUX OIL PUMP FILTER UPSTREAM PRESS NORMAL RANGE	_____PSIG (11-15 PSIG)	_____/_____
2-PI-62-247A (LOCAL) AUX OIL PUMP FILTER DOWNSTREAM PRESS	_____PSIG (10-12 PSIG)	_____/_____
CCP 2A-A OIL COOLER (LOCAL) COOLING WATER INLET TEMP. M&TE ID# _____	_____°F (60-100 °F)	_____/_____
CCP 2A-A OIL COOLER (LOCAL) COOLING WATER OUTLET TEMP. M&TE ID# _____	_____°F <110°F	_____/_____
2-FI-70-146 (0-M-27B) COOLING WATER FLOW	_____GPM 28 GPM (NORMAL)	_____/_____

Appendix I
(Page 3 of 4)

CENTRIFUGAL CHARGING PUMP SUBSYSTEM PUMP DATA

Date _____

Step 6.3[36] CCP 2B-B		INITIALS/DATE
Test gauge 2-PI-62-106 (PD)	_____PSIG	_____/_____
Test gauge 2-PI-62-105 (PS)	_____PSIG	_____/_____
Total Flow	_____GPM	_____/_____
2-EI-62-104B (SDB 2B-B CMPT 18) PH 1/2/3	_____AMPS	_____/_____
2-EI-57-66 (2-M-1)	_____VOLTS (6900-7200 VOLTS)	_____/_____
T0700A (<170°F)	_____°F	_____/_____
T0701A (<170°F)	_____°F	_____/_____
T0702A (<170°F)	_____°F	_____/_____
T0706A (<200°F)	_____°F	_____/_____
T0707A (<200°F)	_____°F	_____/_____
T0708A (<245°F)	_____°F	_____/_____
T0709A (<245°F)	_____°F	_____/_____
T0710A (<245°F)	_____°F	_____/_____

Appendix I
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CENTRIFUGAL CHARGING PUMP SUBSYSTEM PUMP DATA

Date _____

Step 6.3[36] CCP 2B-B

INITIALS/DATE

2-PI-62-244B (LOCAL)
AUX OIL PUMP FILTER UPSTREAM
PRESS NORMAL RANGE

_____PSIG
(11-15 PSIG)

_____/_____

2-PI-62-244A (LOCAL)
AUX OIL PUMP FILTER
DOWNSTREAM PRESS

_____PSIG
(10-12 PSIG)

_____/_____

CCP 2B-B OIL COOLER (LOCAL)
COOLING WATER INLET TEMP.
M&TE ID# _____

_____°F
(60-100 °F)

_____/_____

CCP 2B-B OIL COOLER (LOCAL)
COOLING WATER OUTLET TEMP.
M&TE ID# _____

_____°F
<110°F

_____/_____

2-FI-70-145 (0-M-27B)
COOLING WATER FLOW

_____GPM
28 GPM (NORMAL)

_____/_____

Appendix J
(Page 1 of 2)

SAFETY INJECTION PUMP 2A-A OPERATING DATA

Date _____

COMP.POINT LIMIT	TEMP °F AMBIENT _____/____ INITIAL/DATE	TEMP °F + 10 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 20 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 30 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 40 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 50 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 60 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 70 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 80 MIN TIME_____ _____/____ INITIAL/DATE
T0150A < 275°F									
T0151A < 275°F									
T0152A < 275°F									
T0153A < 185°F									
T0154A < 185°F									

NOTE: Unused blocks may be marked N/A. Additional data sheets may be added if required.

Appendix J
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SAFETY INJECTION PUMP 2A-A OPERATING DATA

Date _____

STEP 6.4[16]		INITIALS/DATE
2-EI-63-12B (SDB/2A-A CMPT 15) MOTOR CURRENT PH 1/2/3	_____AMPS < 30.1 AMPS	_____/_____
2-PI-63-139 (LOCAL) LUBE OIL PUMP FILTER UPSTREAM PRESS	_____PSIG (10-12 PSIG)	_____/_____
2-PI-63-140 (LOCAL) LUBE OIL PUMP FILTER DOWNSTREAM PRESS	_____PSIG (5-9 PSIG)	_____/_____
2-TI-63-138 (LOCAL) LUBE OIL COOLER MANIFOLD TEMP.	_____°F <155°F	_____/_____
2-TI-63-141 (LOCAL) BEARING HOUSING TEMP.	_____°F <155°F	_____/_____
SIP 2A-A OIL COOLER (LOCAL) COOLING WATER INLET TEMP. M&TE ID# _____	_____°F (60-100 °F)	_____/_____
SIP 2A-A OIL COOLER (LOCAL) COOLING WATER OUTLET TEMP. M&TE ID# _____	_____°F <110°F	_____/_____
2-FI-70-147 (0-M-27B) COOLING WATER FLOW	_____GPM 15 GPM (NORMAL)	_____/_____

Appendix K
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SAFETY INJECTION PUMP 2A-A PUMP CURVE DATA

Date _____

STEP NO.	TARGET FLOW GPM	DISCH PRESS PSIG	SUCT PRESS PSIG	FLOW, GPM (Q)	PUMP SPEED RPM	MOTOR CURRENT 2-EI-62-12B (SDB 2A-A CMPT 15) PH 1/2/3 AMPS	WATTS[1] (ENTER mA & WATTS)	6.9Kv SDBD VOLTS 2-EI-57-39 (2-M-1) VOLTS
6.4[17]	40.5 - 49.5							
6.4[28]	250							
6.4[30]	350							
6.4[32]	450							
6.4[34]	550							
6.4[36]	650							

[1] Watts = multimeter reading (in mA) X Constant K (Step 4.3[60]C), Watts = mA X K

[3] Step 6.4[45] Pump Curve Calculation

A. Target flow, Miniflow

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix K
(Page 2 of 5)

SAFETY INJECTION PUMP 2A-A PUMP CURVE DATA

Date _____

B. Target flow, 250 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

C. Target flow, 350 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

Appendix K
(Page 3 of 5)

SAFETY INJECTION PUMP 2A-A PUMP CURVE DATA

Date _____

D. Target flow, 450 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

E. Target flow, 550 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix K
(Page 4 of 5)

SAFETY INJECTION PUMP 2A-A PUMP CURVE DATA

Date _____

F. Target flow, 650 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

G. PLOT the flows vs. TDH on the composite pump curve. _____

Appendix K
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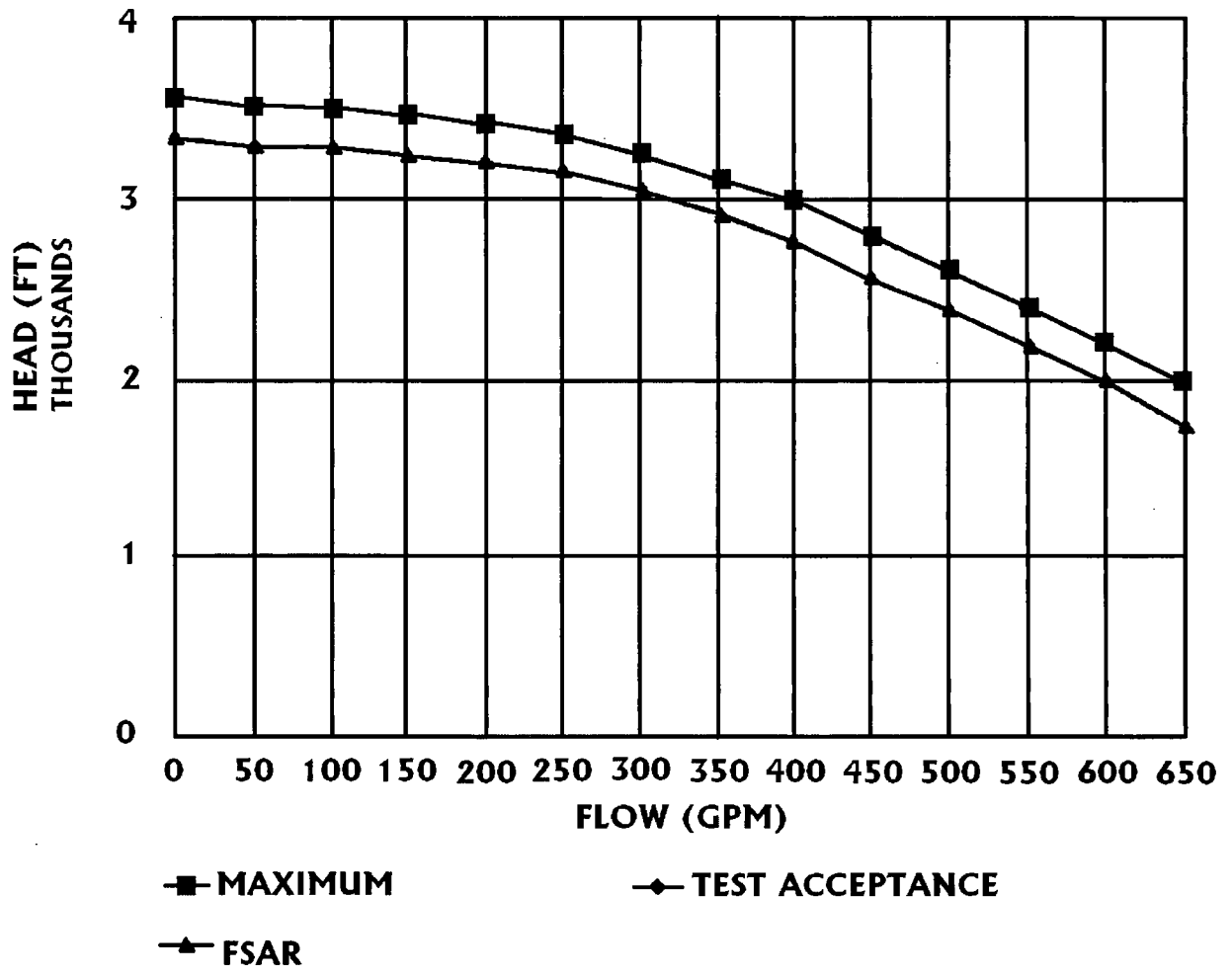
SAFETY INJECTION PUMP 2A-A PUMP CURVE DATA

Date _____



NOTES

1) When plotting points along the pump curve, adjust the head ± 12 ft to account for instrument inaccuracy. (Maximum affect of instrument inaccuracy is ± 11.89 ft. Re-evaluate in case M&TE changes from that stated in Subsection 4.2.)
2) If needed, the actual data points of the pump curve are tabled in the Safety Injection System Description, WBN2-63-4001.

Appendix L
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SAFETY INJECTION PUMP 2B-B OPERATING DATA

Date _____

COMP.POINT LIMIT	TEMP °F AMBIENT _____/_____ INITIAL/DATE	TEMP °F + 10 MIN TIME_____ _____/_____ INITIAL/DATE	TEMP °F + 20 MIN TIME_____ _____/_____ INITIAL/DATE	TEMP °F + 30 MIN TIME_____ _____/_____ INITIAL/DATE	TEMP °F + 40 MIN TIME_____ _____/_____ INITIAL/DATE	TEMP °F + 50 MIN TIME_____ _____/_____ INITIAL/DATE	TEMP °F + 60 MIN TIME_____ _____/_____ INITIAL/DATE	TEMP °F + 70 MIN TIME_____ _____/_____ INITIAL/DATE	TEMP °F + 80 MIN TIME_____ _____/_____ INITIAL/DATE
T0155A < 275°F									
T0156A < 275°F									
T0157A < 275°F									
T0158A < 185°F									
T0159A < 185°F									

NOTE: Unused blocks may be marked N/A. Additional data sheets may be added if required.

Appendix L
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SAFETY INJECTION PUMP 2B-B OPERATING DATA

Date _____

STEP 6.5[16]		INITIALS/DATE
2-EI-63-16B (SDB/2B-B CMPT 15) MOTOR CURRENT PH 1/2/3	_____AMPS < 30.1 AMPS	_____/_____
2-PI-63-145 (LOCAL) LUBE OIL PUMP FILTER UPSTREAM PRESS	_____PSIG (10-12 PSIG)	_____/_____
2-PI-63-146 (LOCAL) LUBE OIL PUMP FILTER DOWNSTREAM PRESS	_____PSIG (5-9 PSIG)	_____/_____
2-TI-63-144 (LOCAL) LUBE OIL COOLER MANIFOLD TEMP.	_____°F <155°F	_____/_____
2-TI-63-147 (LOCAL) BEARING HOUSING TEMP.	_____°F <155°F	_____/_____
SIP 2B-B OIL COOLER (LOCAL) COOLING WATER INLET TEMP. M&TE ID# _____	_____°F (60-100 °F)	_____/_____
SIP 2B-B OIL COOLER (LOCAL) COOLING WATER OUTLET TEMP. M&TE ID# _____	_____°F <110°F	_____/_____
2-FI-70-148 (0-M-27B) COOLING WATER FLOW	_____GPM 15 GPM (NORMAL)	_____/_____

Appendix M
(Page 1 of 5)

SAFETY INJECTION PUMP 2B-B PUMP CURVE DATA

Date _____

STEP NO.	TARGET FLOW GPM	DISCH PRESS PSIG	SUCT PRESS PSIG	FLOW, GPM (Q)	PUMP SPEED RPM	MOTOR CURRENT 2-EI-62-16B (SDB 2B-B CMPT 15) PH 1/2/3 AMPS	WATTS[1] (ENTER mA & WATTS)	6.9Kv SDBD VOLTS 2-EI-57-66 (2-M-1) VOLTS
6.5[17]	40.5 - 49.5							
6.5[28]	250							
6.5[30]	350							
6.5[32]	450							
6.5[34]	550							
6.5[36]	650							

[1] Watts = multimeter reading (in mA) X Constant K (Step 4.3[60]C), Watts = mA X K

[4] Step 6.5[45] Pump Curve Calculation

A. Target flow, Miniflow

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

Appendix M
(Page 2 of 5)

SAFETY INJECTION PUMP 2B-B PUMP CURVE DATA

Date _____

B. Target flow, 250 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

C. Target flow, 350 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

Appendix M
(Page 3 of 5)

SAFETY INJECTION PUMP 2B-B PUMP CURVE DATA

Date _____

D. Target flow, 450 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

E. Target flow, 550 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix M
(Page 4 of 5)

SAFETY INJECTION PUMP 2B-B PUMP CURVE DATA

Date _____

F. Target flow, 650 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (3.55 \times 10^{-5} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (3.55 \times 10^{-5} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

G. PLOT the flows vs. TDH on the composite pump curve. _____

Appendix M
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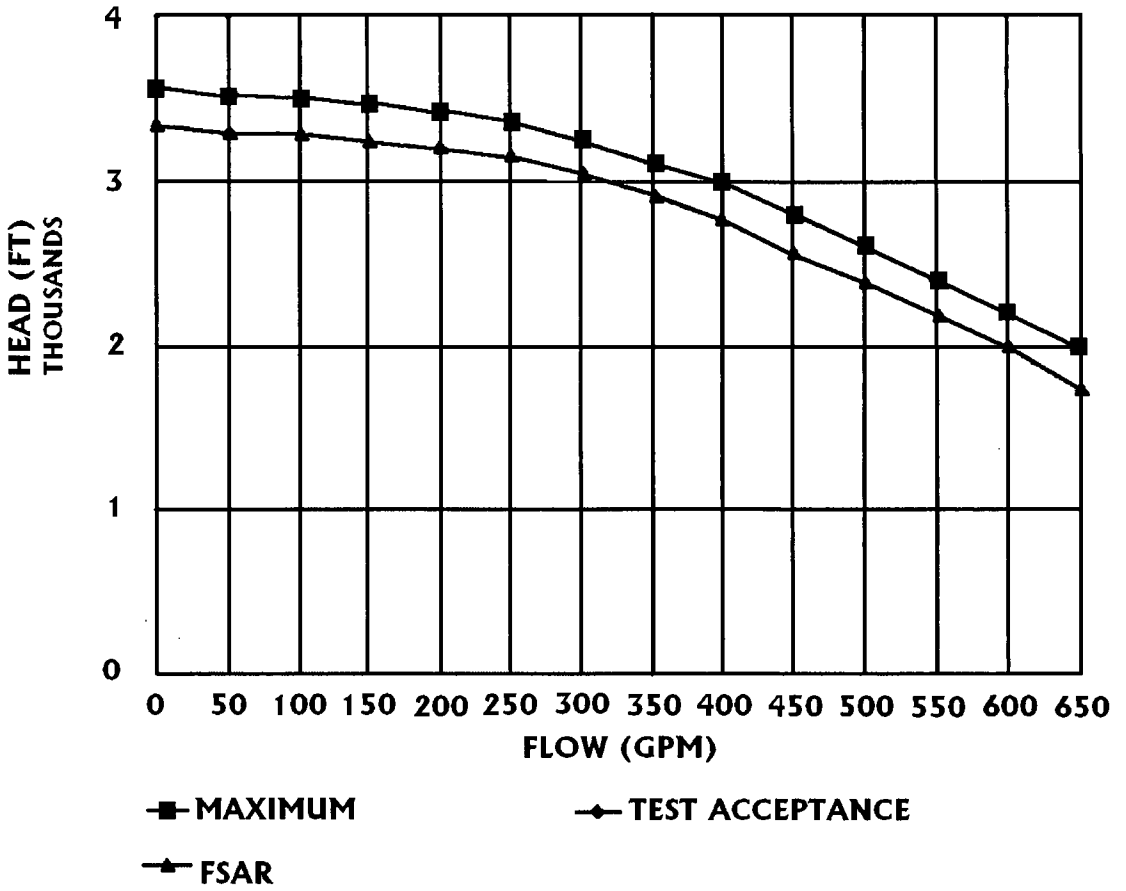
SAFETY INJECTION PUMP 2B-B PUMP CURVE DATA

Date _____



NOTES

1) When plotting points along the pump curve, adjust the head ± 12 ft to account for instrument inaccuracy. (Maximum affect of instrument inaccuracy is ± 11.89 ft. Re-evaluate in case M&TE changes from that stated in Subsection 4.2.)
2) If needed, the actual data points of the pump curve are tabled in the Safety Injection System Description, WBN2-63-4001.

Appendix N
(Page 1 of 4)

SAFETY INJECTION PUMP SUBSYSTEM PUMP DATA

Date _____

Step 6.6[32] SIP 2A-A		INITIALS/DATE
Test gauge 2-PT-63-149 (PD)	_____PSIG	_____/_____
Test gauge 2-PI-63-9 (PS)	_____PSIG	_____/_____
Total Flow	_____GPM	_____/_____
2-EI-62-12B (SDB 2A-A CMPT 15) PH 1/2/3	_____AMPS	_____/_____
2-EI-57-39 (2-M-1)	_____VOLTS (6900-7200 VOLTS)	_____/_____
T0150A (<275°F)	_____°F	_____/_____
T0151A (<275°F)	_____°F	_____/_____
T0152A (<275°F)	_____°F	_____/_____
T0153A (<185°F)	_____°F	_____/_____
T0154A (<185°F)	_____°F	_____/_____

Appendix N
(Page 2 of 4)

SAFETY INJECTION PUMP SUBSYSTEM PUMP DATA

Date _____

Step 6.6[32] SIP 2A-A		INITIALS/DATE
2-PI-63-139 (LOCAL) LUBE OIL PUMP FILTER UPSTREAM PRESS	_____PSIG (10-12 PSIG)	_____/_____
2-PI-63-140 (LOCAL) LUBE OIL PUMP FILTER DOWNSTREAM PRESS	_____PSIG (5-9 PSIG)	_____/_____
2-TI-63-138 (LOCAL) LUBE OIL COOLER MANIFOLD TEMP.	_____°F <155°F	_____/_____
2-TI-63-141 (LOCAL) BEARING HOUSING TEMP.	_____°F <155°F	_____/_____
SIP 2A-A OIL COOLER (LOCAL) COOLING WATER INLET TEMP. M&TE ID# _____	_____°F (60-100 °F)	_____/_____
SIP 2A-A OIL COOLER (LOCAL) COOLING WATER OUTLET TEMP. M&TE ID# _____	_____°F <110°F	_____/_____
2-FI-70-147 (0-M-27B) COOLING WATER FLOW	_____GPM 15 GPM (NORMAL)	_____/_____

Appendix N
(Page 3 of 4)

SAFETY INJECTION PUMP SUBSYSTEM PUMP DATA

Date _____

Step 6.6[43] SIP 2B-B		INITIALS/DATE
Test gauge 2-PT-63-18 (PD)	_____PSIG	_____/_____
Test gauge 2-PI-63-14 (PS)	_____PSIG	_____/_____
Total Flow	_____GPM	_____/_____
2-EI-62-16B (SDB 2B-B CMPT 15) PH 1/2/3	_____AMPS	_____/_____
2-EI-57-66 (2-M-1)	_____VOLTS (6900-7200 VOLTS)	_____/_____
T0155A (<275°F)	_____°F	_____/_____
T0156A (<275°F)	_____°F	_____/_____
T0157A (<275°F)	_____°F	_____/_____
T0158A (<185°F)	_____°F	_____/_____
T0159A (<185°F)	_____°F	_____/_____

Appendix N
(Page 4 of 4)

SAFETY INJECTION PUMP SUBSYSTEM PUMP DATA

Date _____

Step 6.6[43] SIP 2B-B		INITIALS/DATE
2-PI-63-145 (LOCAL) LUBE OIL PUMP FILTER UPSTREAM PRESS	_____PSIG (10-12 PSIG)	_____/_____
2-PI-63-146 (LOCAL) LUBE OIL PUMP FILTER DOWNSTREAM PRESS	_____PSIG (5-9 PSIG)	_____/_____
2-TI-63-144 (LOCAL) LUBE OIL COOLER MANIFOLD TEMP.	_____°F <155°F	_____/_____
2-TI-63-147 (LOCAL) BEARING HOUSING TEMP.	_____°F <155°F	_____/_____
SIP 2B-B OIL COOLER (LOCAL) COOLING WATER INLET TEMP. M&TE ID# _____	_____°F (60-100 °F)	_____/_____
SIP 2B-B OIL COOLER (LOCAL) COOLING WATER OUTLET TEMP. M&TE ID# _____	_____°F <110°F	_____/_____
2-FI-70-148 (0-M-27B) COOLING WATER FLOW	_____GPM 15 GPM (NORMAL)	_____/_____

Appendix O
(Page 1 of 2)

RESIDUAL HEAT REMOVAL PUMP 2A-A OPERATING DATA

Date _____

COMP.POINT LIMIT	TEMP °F AMBIENT _____/____ INITIAL/DATE	TEMP °F + 10 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 20 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 30 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 40 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 50 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 60 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 70 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 80 MIN TIME_____ _____/____ INITIAL/DATE
T0650A < 180°F									
T0651A < 180°F									
T0652A < 230°F									
T0653A < 230°F									
T0654A < 230°F									

NOTE: Unused blocks may be marked N/A. Additional data sheets may be added if required.

Appendix O
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RESIDUAL HEAT REMOVAL PUMP 2A-A OPERATING DATA

Date _____

STEP 6.9[13] INITIALS/DATE

2-EI-74-5B (SDB/2A-A CMPT 14) _____AMPS
MOTOR CURRENT PH 1/2/3 < 28.6 AMPS
_____/_____

2-TIS-74-7 (2-L-12) _____°F
MECH. SEAL HX OUTLET TEMP. <110°F
_____/_____

RHRP 2A-A SEAL COOLER _____°F
(LOCAL) (60-100 °F)
COOLING WATER INLET TEMP. _____/_____
M&TE ID# _____

RHRP 2A-A SEAL COOLER _____°F
(LOCAL) <110°F
COOLING WATER OUTLET TEMP. _____/_____
M&TE ID# _____

2-FI-70-151 (0-M-27B) _____GPM
COOLING WATER FLOW 5-10 GPM
_____/_____

Appendix P
(Page 1 of 5)
RESIDUAL HEAT REMOVAL 2A-A PUMP CURVE DATA

Date _____

STEP NO.	TARGET FLOW GPM	DISCH PRESS PSIG	SUCT PRESS PSIG	FLOW, GPM (Q)	PUMP SPEED RPM	MOTOR CURRENT 2-EI-74-5B (SDB 2A-A CMPT 14) PH 1/2/3 AMPS	WATTS[1] (ENTER mA & WATTS)	6.9Kv SDBD VOLTS 2-EI-57-39 (2-M-1) VOLTS
6.9[15]	MiniFlow							
6.9[21]	1400							
6.9[23]	3000							
6.9[25]	4000							
6.9[27]	5000							

[1] Watts = multimeter reading (in mA) X Constant K (Step 4.3[60]C), Watts = mA X K

[5] Step 6.9[43] Pump Curve Calculation

A. Target flow, Miniflow

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

Appendix P
(Page 2 of 5)

RESIDUAL HEAT REMOVAL 2A-A PUMP CURVE DATA

Date _____

B. Target flow, 1400 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

C. Target flow, 3000 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

Appendix P
(Page 3 of 5)

RESIDUAL HEAT REMOVAL 2A-A PUMP CURVE DATA

Date _____

D. Target flow, 4000 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

E. Target flow, 5000 GPM

$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$

$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$

$TDH = \_\_\_\_\_ FT$

Calculation Performed By _____ (Initials) _____ (Date)

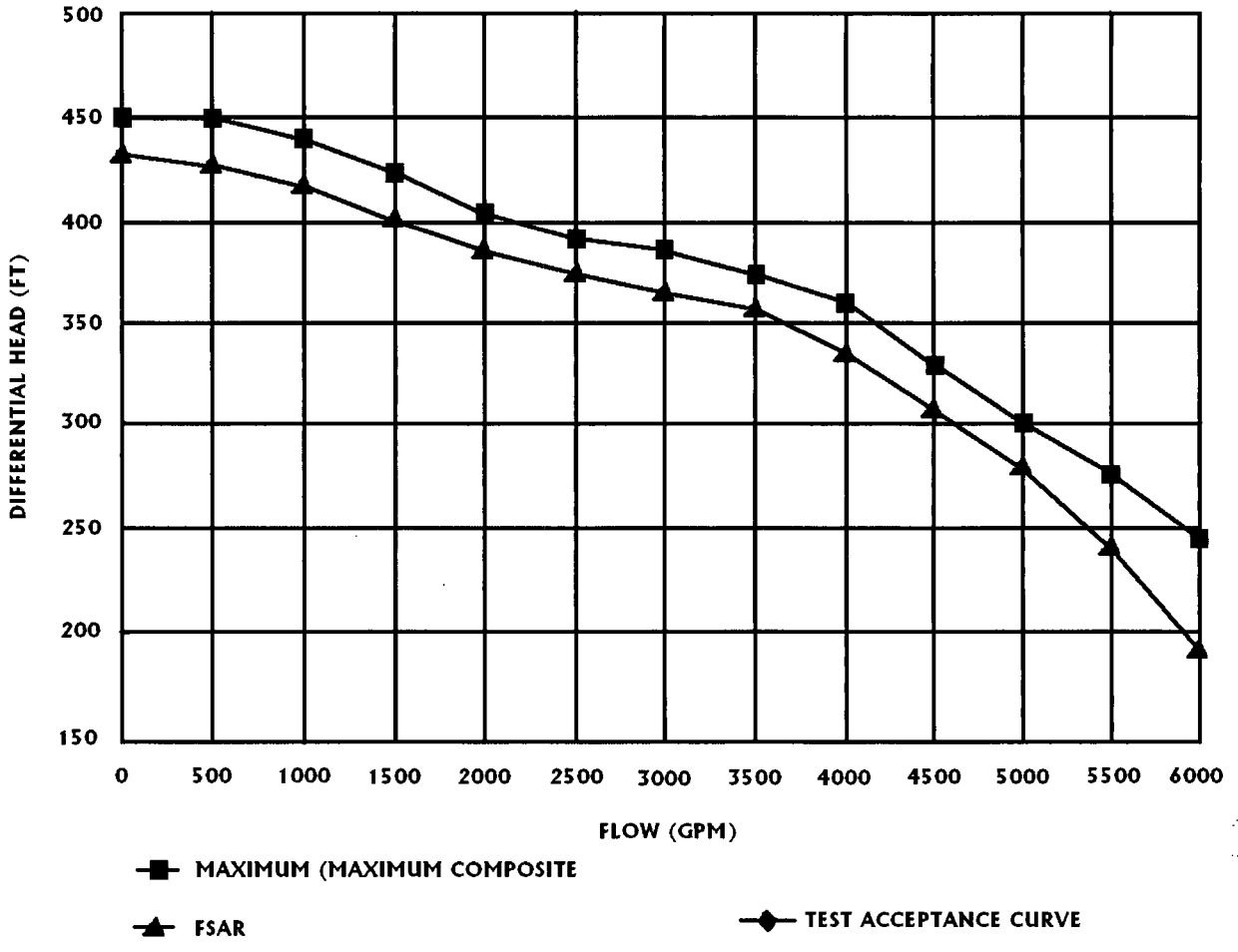
Calculation Verified By _____ (Initials) _____ (Date)

F. PLOT the flows vs. TDH on the composite pump curve. _____

Appendix P
(Page 4 of 5)

RESIDUAL HEAT REMOVAL 2A-A PUMP CURVE DATA

Date _____



NOTES

1) When plotting points along the pump curve, adjust the head ± 3 ft to account for instrument inaccuracy. (Maximum affect of instrument inaccuracy is ± 2.08 ft. Re-evaluate in case M&TE changes from that stated in Subsection 4.2.)
2) If needed, the actual data points of the pump curve are tabled in the Safety Injection System Description, WBN2-63-4001.

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RESIDUAL HEAT REMOVAL 2A-A PUMP CURVE DATA

Date _____

Step 6.9[29] RHRP 2A-A		INITIALS/DATE
T0150A (<275°F)	_____°F	_____/_____
T0151A (<275°F)	_____°F	_____/_____
T0152A (<275°F)	_____°F	_____/_____
T0153A (<185°F)	_____°F	_____/_____
T0154A (<185°F)	_____°F	_____/_____
2-TIS-74-7 (2-L-12) MECH. SEAL HX OUTLET TEMP.	_____°F <110°F	_____/_____
RHRP 2A-A SEAL COOLER (LOCAL) COOLING WATER INLET TEMP. M&TE ID# _____	_____°F (60-100 °F)	_____/_____
RHRP 2A-A SEAL COOLER (LOCAL) COOLING WATER OUTLET TEMP. M&TE ID# _____	_____°F <110°F	_____/_____
2-FI-70-151 (0-M-27B) COOLING WATER FLOW	_____GPM 5-10 GPM	_____/_____

Appendix Q
(Page 1 of 2)

RESIDUAL HEAT REMOVAL 2B-B OPERATING DATA

Date _____

COMP.POINT LIMIT	TEMP °F AMBIENT _____/____ INITIAL/DATE	TEMP °F + 10 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 20 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 30 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 40 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 50 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 60 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 70 MIN TIME_____ _____/____ INITIAL/DATE	TEMP °F + 80 MIN TIME_____ _____/____ INITIAL/DATE
T0655A < 180°F									
T0656A < 180°F									
T0657A < 230°F									
T0658A < 230°F									
T0659A < 230°F									

NOTE: Unused blocks may be marked N/A. Additional data sheets may be added if required.

Appendix Q
(Page 2 of 2)

RESIDUAL HEAT REMOVAL 2B-B OPERATING DATA

Date _____

STEP 6.10[13] INITIALS/DATE

2-EI-74-17B (SDB/2B-B CMPT 14) MOTOR CURRENT PH 1/2/3
_____AMPS
< 28.6 AMPS
_____/_____

2-TIS-74-19 (2-L-13) MECH. SEAL HX OUTLET TEMP.
_____°F
<110°F
_____/_____

RHRP 2B-B SEAL COOLER (LOCAL) COOLING WATER INLET TEMP.
_____°F
(60-100 °F)
_____/_____

M&TE ID# _____

RHRP 2B-B SEAL COOLER (LOCAL) COOLING WATER OUTLET TEMP.
_____°F
<110°F
_____/_____

M&TE ID# _____

2-FI-70-152 (0-M-27B) COOLING WATER FLOW
_____GPM
5-10 GPM
_____/_____

Appendix R
(Page 1 of 5)

RESIDUAL HEAT REMOVAL PUMP 2B-B PUMP CURVE DATA

Date _____

STEP NO.	TARGET FLOW GPM	DISCH PRESS PSIG	SUCT PRESS PSIG	FLOW, GPM (Q)	PUMP SPEED RPM	MOTOR CURRENT 2-EI-74-17B (SDB 2B-B CMPT 14) PH 1/2/3 AMPS	WATTS[1] (ENTER mA & WATTS)	6.9Kv SDBD VOLTS 2-EI-57-66 (2-M-1) VOLTS
6.10[15]	MiniFlow							
6.10[21]	1400							
6.10[23]	3000							
6.10[25]	4000							
6.10[27]	5000							

[1] Watts = multimeter reading (in mA) X Constant K (Step 4.3[60]C), Watts = mA X K

[6] Step 6.10[43] Pump Curve Calculation

A. Target flow, Miniflow

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix R
(Page 2 of 5)

RESIDUAL HEAT REMOVAL PUMP 2B-B PUMP CURVE DATA

Date _____

B. Target flow, 1400 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

C. Target flow, 3000 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

Appendix R
(Page 3 of 5)

RESIDUAL HEAT REMOVAL PUMP 2B-B PUMP CURVE DATA

Date _____

D. Target flow, 4000 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

Calculation Verified By _____ (Initials) _____ (Date)

E. Target flow, 5000 GPM

$$TDH = (PDISCH - PSUCT) \times 2.3144 + (7.85 \times 10^{-7} \times Q \times Q)$$

$$TDH = (\_\_\_\_\_ - \_\_\_\_\_) \times 2.3144 + (7.85 \times 10^{-7} \times \_\_\_\_\_ \times \_\_\_\_\_)$$

$$TDH = \_\_\_\_\_ FT$$

Calculation Performed By _____ (Initials) _____ (Date)

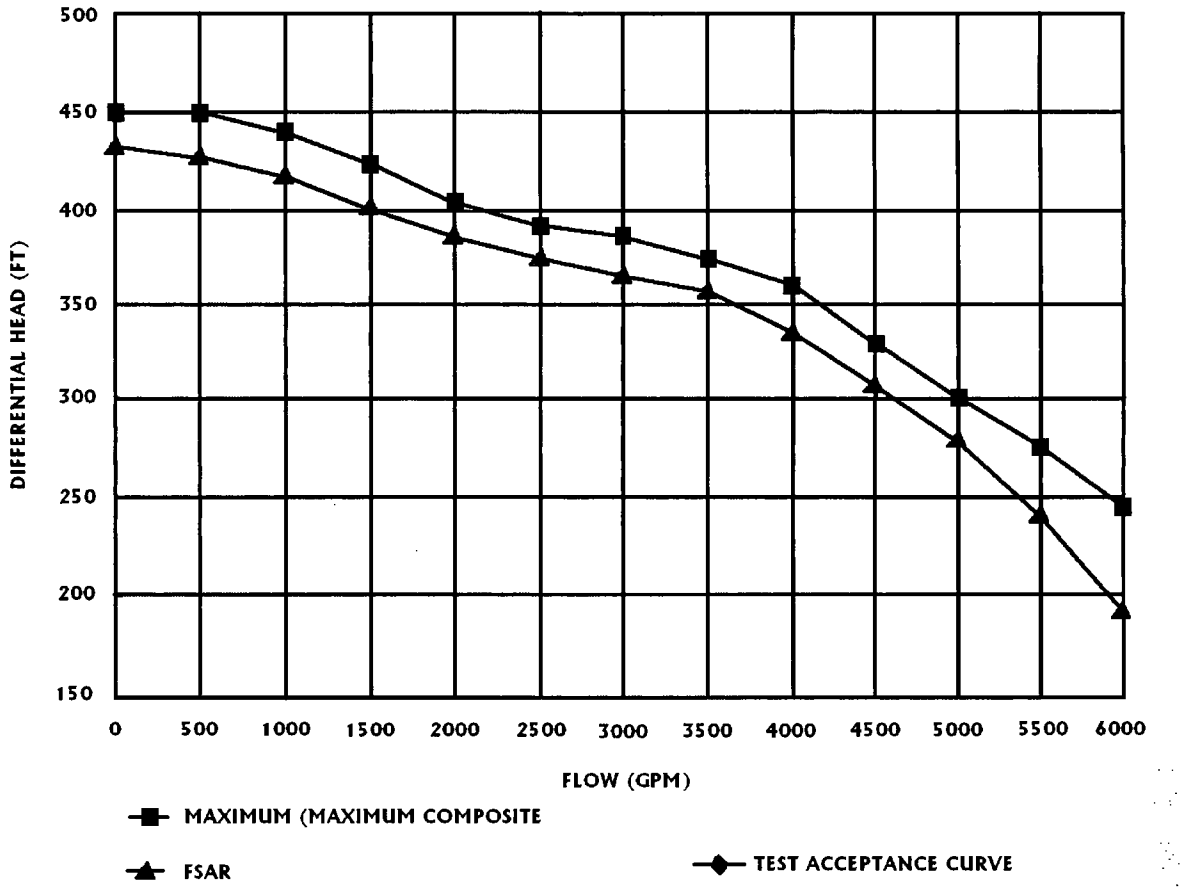
Calculation Verified By _____ (Initials) _____ (Date)

F. PLOT the flows vs. TDH on the composite pump curve. _____

Appendix R
(Page 4 of 5)

RESIDUAL HEAT REMOVAL PUMP 2B-B PUMP CURVE DATA

Date _____



NOTES

1) When plotting points along the pump curve, adjust the head ± 3 ft to account for instrument inaccuracy. (Maximum affect of instrument inaccuracy is ± 2.08 ft. Re-evaluate in case M&TE changes from that stated in Subsection 4.2.)
2) If needed, the actual data points of the pump curve are tabled in the Safety Injection System Description, WBN2-63-4001.

Appendix R
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RESIDUAL HEAT REMOVAL PUMP 2B-B PUMP CURVE DATA

Date _____

Step 6.10[29] RHRP 2B-B		INITIALS/DATE
T0155A (<275°F)	_____°F	_____/_____
T0156A (<275°F)	_____°F	_____/_____
T0157A (<275°F)	_____°F	_____/_____
T0158A (<185°F)	_____°F	_____/_____
T0159A (<185°F)	_____°F	_____/_____
2-TIS-74-19 (2-L-12) MECH. SEAL HX OUTLET TEMP.	_____°F <110°F	_____/_____
RHRP 2B-B SEAL COOLER (LOCAL) COOLING WATER INLET TEMP. M&TE ID# _____	_____°F (60-100 °F)	_____/_____
RHRP 2B-B SEAL COOLER (LOCAL) COOLING WATER OUTLET TEMP. M&TE ID# _____	_____°F <110°F	_____/_____
2-FI-70-152 (0-M-27B) COOLING WATER FLOW	_____GPM 5-10 GPM	_____/_____

Appendix S
(Page 1 of 2)

Flow Calculation Sheet

Date _____ Calc Number _____

Flow Element(s) _____ Step Number _____

Table 1 - Constants for Flow Calculations

Flow Element(s)	C'	Error (psid)
2-FE-63-27, 29, 31, 33	17.93	0.125
2-FE-63-122, 123, 124, 125	28.52	0.088
2-FE-63-159, 160, 161, 162	32.23	0.275
2-FE-62-93	60.77	0.008
2-FE-62-257	19.97	0.050
2-FE-63-20, 151	148.86	0.050
2-FE-63-2	28.13	0.033
2-FE-63-170	176.50	0.025
2-FE-74-12, 24	930.40	0.075

A. Flow at Least

$Q\ (gpm) = C' \times \sqrt{dP - Error}$

Q (gpm) = _____ $\times \sqrt{\_\_\_\_\_ - \_\_\_\_\_}$

Q = _____ gpm

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix S
(Page 2 of 2)

B. Flow Not More Than

$Q\ (gpm) = C' \times \sqrt{dP + Error}$

Q (gpm) = _____ $\times \sqrt{\quad + \quad}$

Q = _____ gpm

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

C. Flow Differencial

$dQ\ (gpm) = (C' \times \sqrt{Highest\_dP + Error}) - (C' \times \sqrt{Lowest\_dP - Error})$

dQ = (_____ $\times \sqrt{\quad + \quad}$) - (_____ $\times \sqrt{\quad - \quad}$)

dQ = _____ gpm

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix T
(Page 1 of 5)

Resistance Calculation

Date _____ Calc Number _____

Flow Element(s) _____ Step Number _____

Table 1 - Constants for Flow Calculations

Flow Element(s)	C'	Error (psid)
2-FE-63-27, 29, 31, 33	17.93	0.125
2-FE-63-122, 123, 124, 125	28.52	0.088
2-FE-63-159, 160, 161, 162	32.23	0.275
2-FE-62-257	19.97	0.050
2-FE-63-20, 151	148.86	0.050
2-FE-63-2	28.13	0.033
2-FE-63-170	176.50	0.025
2-FE-74-12, 24	930.40	0.075

Table 2 - Constants for Pressure Calculations

PI Test Gauge(s)	Error (psig)
2-PI-62-110, 106	7.5
2-PT-63-149, 18	5
2-PI-74-6, 18	0.75

Appendix T
(Page 2 of 5)

NOTE

Depending upon the calculation, the applicable flow rate may or may not include the normal pump discharge to the vessel or the miniflow. When only the miniflow or only the vessel injection is considered for the resistance calculation, the unused portion of the flow equation may be assumed to be zero.

A. Resistance Kmin

Q = Vessel Injection Flow + Miniflow

Q (gpm) = (C' $\times\sqrt{dP + Error}$) + (C' $\times\sqrt{dP + Error}$)

Q = (_____ $\times\sqrt{\_\_\_\_ + \_\_\_\_}$) + (_____ $\times\sqrt{\_\_\_\_ + \_\_\_\_}$)

Q = _____ gpm

Kmin (ft/gpm^2) = (P - Error) $x\left(\frac{144in^2}{ft^2}\right)\left(\frac{ft^3}{62.22lb}\right)/(Q)^2$

Kmin (ft/gpm^2) = (_____ - _____) x 2.3144 / (_____)^2

Kmin (ft/gpm^2) = (_____ x 2.3144) / (_____)

Kmin (ft/gpm^2) = _____ ft/gpm^2

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix T
(Page 3 of 5)

B. Resistance Kmax

Q = Vessel Injection Flow + Miniflow

Q (gpm) = (C' $\times\sqrt{dP - Error}$) + (C' $\times\sqrt{dP - Error}$)

Q = (_____ $\times\sqrt{\_\_\_\_ - \_\_\_\_}$) + (_____ $\times\sqrt{\_\_\_\_ - \_\_\_\_}$)

Q = _____ gpm

Kmax (ft/gpm^2) = (P + Error) $x\left(\frac{144in^2}{ft^2}\right)\left(\frac{ft^3}{62.22lb}\right) / (Q)^2$

Kmax (ft/gpm^2) = (_____ + _____) x 2.3144 / (_____)^2

Kmax (ft/gpm^2) = (_____ x 2.3144) / (_____)

Kmax (ft/gpm^2) = _____ ft/gpm^2

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix T
(Page 4 of 5)

C. Minimum Resistance for Hot Leg Recirc using Ultrasonic Flowmeter

Q = Ultrasonic Flowmeter Reading ± Error

Error = ±2% of 4500 gpm range = ±90 gpm

Q = Ultrasonic Flowmeter reading + Error

Q (gpm) = _____ + 90 = _____gpm

$$K_{min}\ (ft/gpm^2) = (P - Error)\ x\left(\frac{144in^2}{ft^2}\right)\left(\frac{ft^3}{62.22lb}\right)/(Q)^2$$

Kmin (ft/gpm^2) = (_____ - _____) x 2.3144 / (_____)^2

Kmin (ft/gpm^2) = (_____ x 2.3144) / (_____)

Kmin (ft/gpm^2) = _____ ft/gpm^2

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date

Appendix T
(Page 5 of 5)

C. Maximum Resistance for Hot Leg Recirc using Ultrasonic Flowmeter

Q = Ultrasonic Flowmeter Reading ± Error

Error = ±2% of 4500 gpm range = ±90 gpm

Q = Ultrasonic Flowmeter reading + Error

Q (gpm) = _____ - 90 = _____gpm

$$K_{max}\ (ft/gpm^2) = (P + Error)\ x\left(\frac{144in^2}{ft^2}\right)\left(\frac{ft^3}{62.22lb}\right)/(Q)^2$$

K_{max} (ft/gpm^2) = (_____ + _____) x 2.3144 / (_____)^2

K_{max} (ft/gpm^2) = (_____ x 2.3144) / (_____)

K_{max} (ft/gpm^2) = _____ ft/gpm^2

Calculation Performed By _____ Initials _____ Date

Calculation Verified By _____ Initials _____ Date