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

June 9, 2011

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

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

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

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

PTI NUMBER	Rev.	TITLE
2-PTI-061-02	0	Ice Condenser Ice Loading

If you have any questions, please contact Pete Olson at (423) 365-3294.

Respectfully,

David Stinson
Watts Bar Unit 2 Vice President

Enclosure
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

D030
NRR

WATTS BAR NUCLEAR PLANT
UNIT 2 PREOPERATIONAL TEST

TITLE: Ice Condenser Ice Loading

Instruction No: 2-PTI-061-02
Revision No: 0000

PREPARED BY: Kurt McCormack / [signature] DATE: 5/9/11
PRINT NAME / SIGNATURE

REVIEWED BY: STEVEN M. CZUK / [signature] DATE: 5/9/11
PRINT NAME / SIGNATURE

INSTRUCTION APPROVAL

JTG MEETING No: 2-11-010
JTG CHAIRMAN: [signature] DATE: 6/7/11
APPROVED BY : [signature] DATE: 6/7/11
PREOPERATIONAL STARTUP MANAGER

TEST RESULTS APPROVAL

JTG MEETING No: _____
JTG CHAIRMAN: _____ DATE: _____
APPROVED BY : _____ DATE: _____
PREOPERATIONAL STARTUP MANAGER

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0000	6/7/11	ALL	Initial issue based on Rev. 0 of 1-PTI-061-02

Table of Contents

1.0 INTRODUCTION 5
1.1 Test Objectives 5
1.2 Scope 5
2.0 REFERENCES 5
2.1 Performance References 5
2.2 Developmental References 6
3.0 PRECAUTIONS AND LIMITATIONS 9
4.0 PREREQUISITE ACTIONS 10
4.1 Preliminary Actions 10
4.2 Special Tools, Measuring and Test Equipment (M&TE), Parts, and Supplies 14
4.3 Field Preparations 15
4.4 Approvals and Notifications 16
5.0 ACCEPTANCE CRITERIA 17
6.0 PERFORMANCE 19
6.1 Ice Condenser Ice Loading 20
6.2 Gross Bypass Leakage Test 23
7.0 POST PERFORMANCE ACTIVITIES 27
8.0 RECORDS 28
Appendix A: TEST PROCEDURES/INSTRUCTIIONS REFERENCE REVIEW 29
Appendix B: TEMPORARY CONDITION LOG 30
Appendix C: PERMANENT PLANT INSTRUMENTATION LOG 31
Appendix D: COMPUTER POINT VERIFICATION LOG 34
Appendix E: CONTAINMENT BOUNDARY ALIGNMENT FOR SUBSECTION 6.2 36

Table of Contents (continued)

Data Sheet 1: LEAKAGE PATH DATA AND CALCULATIONS 37

Data Sheet 2: TEMPERATURE SURVEY AND DIFFERENTIAL TEMPERATURE CALCULATIONS 38

Data Sheet 3: AIR FLOW MEASUREMENTS AT THE WEST REFUELING CANAL DRAIN 41

Data Sheet 4: TEMPERATURE SURVEY AND DIFFERENTIAL TEMPERATURE CALCULATIONS 42

Data Sheet 5: AIR FLOW MEASUREMENTS AT THE WEST REFUELING CANAL DRAIN 45

Data Sheet 6: AIR FLOW MEASUREMENTS AT THE WEST REFUELING CANAL DRAIN 46

Data Sheet 7: GROSS BYPASS LEAKAGE CALCULATIONS 47

Attachment 1: LOWER INLET DOOR MEASURMENT CONVERSION AND ADJUSTMENT 48

Attachment 2: ICE BASKET WEIGHT ADJUSTMENT 49

Data Package: Page ____ of ____ **Date _____**

1.0 INTRODUCTION

1.1 Test Objectives

The objective of this test is to demonstrate that the Ice Condenser System operates to meet its design requirements, and to ensure that gross bypass leakage paths between the Upper and Lower Containment areas are not present. System valve operability and glycol expansion tank alarms are tested in 2-PTI-61-01 and will not be tested in this procedure.

1.2 Scope

A. Operability of the Ice Condenser meets design requirements.

B. Gross bypass leakage paths between the Upper and Lower Containment areas are not present.

2.0 REFERENCES

2.1 Performance References

A. SMP-9.0, Conduct of Test

B. 2-SI-61-1, Determination of Boron and pH on Ice Condenser Ice

C. 2-SI-61-10, Determination of Boron and pH on Ice Condenser Solutions

D. 2-SI-61-5, 18 Month Ice Condenser Lower Inlet Door Inspection

E. 2-SI-61-9, 18 Month Ice Condenser Floor Drain Visual Inspection

F. 2-MI-61.001, Initial Ice Loading

G. 2-SI-88-24, Containment Divider Barrier Personnel Access Doors and Equipment Hatches

H. SOI-30.03, Containment HVAC and Pressure Control

I. 2-SI-304-1, Divider Barrier Personnel Access and Equipment Hatch Inspection

Data Package: Page ____ of ____ **Date _____**

2.2 Developmental References

A. Final Safety Analysis Report

FSAR Amendment 103

a. Section 6.2, Containment Systems

b. Section 6.7, Ice Condenser System

c. Table 14.2-1 Sheet 87 of 89, Ice Condenser System Test Summary

B. Drawings

1. Flow Diagrams

a. 2-47W814-2 Rev 5, Flow Diagram Ice Condenser System

b. 2-47W814-3 Rev 2, Flow Diagram Ice Condenser System

Data Package: Page ____ of ____ **Date _____**

2.2 Developmental References (continued)

2. Mechanical

   a. 41N735-1 Rev 7, Concrete Floor - El 756.63 Outline

   b. 41N716-3 Rev 7, Concrete Interior Structure Outline

   c. 44N280 Rev 4, Escape Hatches

   d. 44W290-1 Rev 7, Seals Between Ice Condenser And Containment Vessel Arrangement - Sh 1

   e. 44W290-2 Rev 6, Seals Between Ice Condenser And Containment Vessel Details - Sh 2

   f. 44W290-3 Rev 2, Seals Between Ice Condenser And Containment Vessel Details - Sh 3

   g. 44W290-4 Rev 1, Seals Between Ice Condenser And Containment Vessel Details - Sh 4

   h. 44W290-5 Rev 2, Seals Between Ice Condenser And Containment Vessel Details - Sh 5

   i. 44W290-6 Rev 5, Seals Between Ice Condenser And Containment Vessel Details - Sh 6

   j. 47W476-4 Rev 10, Mechanical Containment Drains & Embedded Piping

   k. 47W476-5 Rev 6, Mechanical Containment Drains & Embedded Piping

   l. 48N921 Rev 9, Miscellaneous Steel Hatch Frame & Cover El 756.63

   m. 48N923 Rev 16, Miscellaneous Steel Shield Plugs & Frames El 756.63

   n. 48N927 Rev 18, Miscellaneous Steel Frames, Grating And Emb Parts El 756.63, Sh 1

Data Package: Page ____ of ____ **Date _____**

2.2 Developmental References (continued)

3. Logic/Control

   a. 2-47W610-61-2 Rev 1, Electrical Control Diagram Ice Condenser System

      (1) DRA 53228-110 Rev 1

   b. 2-47W610-61-3 Rev 1, Electrical Control Diagram Ice Condenser System

      (1) DRA 53228-106 Rev 1

4. Other

   a. 2-47A615-0 Rev 1, Integrated Computer System Terminations and I/O List

C. Documents

1. DCN 32204-A, Containment Divider Barrier Gross Bypass Leakage
2. CM-3.01 Rev 84, System Chemistry Specifications
3. SOI-61.01 Rev 35, Ice Condenser System
4. SOI-61.02 Rev 29, Ice Charging
5. 2-TSD-61 Rev 2, Ice Condenser System Testing
6. 2-T-30-210 Rev 0, Containment Air Mass Temperature Sensors
7. 1-SI-61-5 Change Notice-1, RIMS Reel E03736 Frame 1695
8. 1-SI-61-2 Change Notice-1, RIMS Reel E04432 Frame 2183

Data Package: Page ____ of ____ **Date _____**

3.0 PRECAUTIONS AND LIMITATIONS

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

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

C. Discrepancies between component ID tags and the description in a procedure/instruction 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. This condition does not require a TDN in accordance SMP-14.0. If the component label needs to be changed, a Tag Request Form (TR Card) should be processed in accordance with TI-12.14. Make an entry in the CTL and continue testing.

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

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

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

G. Access to and from Containment must be temporarily halted while taking flow measurements, to negate effects of any pressure differential between the Containment and Aux Buildings.

H. Performance of Subsection 6.2 requires establishing a differential temperature between the Upper compartment of Containment and the Lower compartment of Containment of 10°F or greater, to promote natural circulation from Upper to Lower Containment. Temperature surveys, as outlined in this test, are used exclusively for the purpose of establishing this test condition and may be repeated as necessary. Only the final surveys are required to be retained with the PTI Test Results Package.

I. Limit access to the Ice Condenser during performance of Subsection 6.2. Use established WBN safety practices for any required Ice Condenser entry, including use of the Buddy system, established clothing, and access points.

Data Package: Page ____ of ____ **Date _____**

4.0 PREREQUISITE ACTIONS

NOTE
Prerequisite steps may be performed in any order unless otherwise stated and should be completed as close in time as practicable to the start of the performance subsection to which they apply.

4.1 Preliminary Actions

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

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

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

[3] **VERIFY** current revisions and change paper for referenced drawings has 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. _____

[4] **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. _____

[5] **OBTAIN** copies of the applicable forms from the current revision in BSL, **AND**

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

Data Package: Page ____ of ____ **Date _____**

4.1 Preliminary Actions (continued)

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

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

[7] **ENSURE** required component testing has been completed prior to start of test. _____

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

[9] **VERIFY** plant instrument calibration due dates will support the completion of this test performance. _____

[10] **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. _____

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

[12] **VERIFY** the 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.

A. Subsection 6.2 _____

Data Package: Page ____ of ____ **Date _____**

4.1 Preliminary Actions (continued)

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

A. System 032, Control Air _____

B. System 081, Primary Water _____

C. System 024, Raw Cooling Water _____

D. System 055, Annunciator System _____

E. System 059, Demineralized Water System _____

F. System 206, 480V Auxiliary Bldg Common Power System _____

G. System 205, 480V Turbine Bldg Common Power System _____

H. System 232, Reactor Vent Power System _____

I. System 030J, Upper and Lower Containment Coolers _____

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

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

[16] **CONDUCT** a pretest briefing with test and operations personnel in accordance with SMP-9.0. _____

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

[18] **ENSURE** Surveillance Instruction 2-SI-61-5, 18 Month Ice Condenser Lower Inlet Door Inspection, has been submitted to the JTG for concurrence that it adequately satisfies the requirements of this procedure. (Subsection 6.1)

JTG Meeting #_____ _____

Data Package: Page ____ of ____ **Date _____**

4.1 Preliminary Actions (continued)

[19] **ENSURE** Surveillance Instruction 2-SI-61-9, 18 Month Ice Condenser Floor Drain Visual Inspection, has been submitted to the JTG for concurrence that it adequately satisfies the requirements of this procedure. (Subsection 6.1)

JTG Meeting #_____ _____

[20] **ENSURE** Maintenance Instruction 2-MI-61.001, Initial Ice Loading, has been submitted to the JTG for concurrence that it adequately satisfies the requirements of this procedure. (Subsection 6.1)

JTG Meeting #_____ _____

[21] **ENSURE** Surveillance Instruction 2-SI-88-24, Containment Divider Barrier Personnel Access Doors and Equipment Hatches, has been submitted to the JTG for concurrence that it adequately satisfies the requirements of this procedure. (Subsection 6.2)

JTG Meeting #_____ _____

[22] **ENSURE** Surveillance Instruction 2-SI-304-1, Divider Barrier Personnel Access and Equipment Hatch Inspection, has been submitted to the JTG for concurrence that it adequately satisfies the requirements of this procedure. (Subsection 6.2)

JTG Meeting #_____ _____

[23] **ENSURE** Surveillance Instruction 2-SI-61-1, Determination of Boron and pH on Ice Condenser Ice, has been submitted to the JTG for concurrence that it adequately satisfies the requirements of this procedure. (Subsection 6.1)

JTG Meeting #_____ _____

[24] **ENSURE** Surveillance Instruction 2-SI-61-10, Determination of Boron and pH on Ice Condenser Solutions, has been submitted to the JTG for concurrence that it adequately satisfies the requirements of this procedure. (Subsection 6.1)

JTG Meeting #_____ _____

Data Package: Page ____ of ____ **Date _____**

4.2 Special Tools, Measuring and Test Equipment (M&TE), Parts, and Supplies

[1] **ENSURE** the following M&TE or equivalent is available and within the calibration due date, **AND**

RECORD the M&TE data on SMP-9.0, Measuring and Test Equipment (M&TE) Log.

A. Digital Hot-Wire Anemometer, Range at least 0-3000 fpm, Accuracy ±5% of reading or better. _____

Data Package: Page ____ of ____ **Date _____**

4.3 Field Preparations

[1] **VERIFY/INSTALL** drain plug at the East refueling canal drain, located in the refueling canal at EL 713, **AND**

RECORD the as-found condition in the Chronological Test Log. (Subsection 6.2) _____

[2] **REMOVE/VERIFY REMOVED** the drain plug at the West Refueling Canal Drain, located in the refueling canal at EL 713, **AND**

RECORD the as-found condition in the Chronological Log. _____

[3] **VERIFY/PERFORM** Appendix E, Containment Boundary Alignment. (Subsection 6.2) _____

[4] **ENSURE** water soluble paper in the Ice Condenser floor drains. (Subsection 6.2) _____

[5] **PERFORM/VERIFY PERFORMED** 2-SI-304-3, 18 Month Divider Barrier Seal Inspection, in preparation for this test, **AND**

ATTACH to the data package. _____

Data Package: Page ____ of ____ **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

Data Package: Page ____ of ____ **Date _____**

5.0 ACCEPTANCE CRITERIA

NOTES

1) Acceptance Criteria has been converted from inch-pounds specified in the Tech Specs and Test Scoping Document to pounds to simplify performance due to all M&TE data being recorded in pounds. The conversion calculation is shown in Attachment 1, "Lower Inlet Door Measurement Conversion and Adjustment."
2) Instrument accuracy (± 0.6% +.01 lbs.) for lower inlet door forces has been taken into account and Acceptance Criteria conservatively adjusted accordingly. The adjustment is shown in Attachment 1, "Lower Inlet Door Measurement Conversion and Adjustment."
3) The Technical Specification minimum weight limit is 1237 pounds. This weight limit has been conservatively adjusted for instrument inaccuracy. The adjustment is shown in Attachment 2, "Ice Basket Weight Adjustment."

[1] Each ice baskets contains ≥ 1252 lbs net weight of ice. (Step 6.1[3]B)

[2] Each borax solution sample boron concentration is [1800-2000 ppm] and pH is [9.0-9.5]. (Step 6.1[6]A, 6.1[6]B)

[3] Each ice storage bin ice sample boron concentration is [1800-2000 ppm] and pH is [9.0-9.5]. (Step 6.1[9]A, 6.1[9]B)

[4] Each lower inlet door satisfies the following:

A. The opening of each door is NOT impaired by ice, frost, or debris. (Step 6.1[11]A)

B. The force required to initially open each door is equal to or less than 16.51 pounds (Step 6.1[11]B)

C. The force required to prevent each door from closing is greater than 2.01 pounds when the door is 40 degrees OPEN. (Step 6.1[11]C)

D. The force required to open each door is less than 4.79 pounds when the door is 40 degrees OPEN. (Step 6.1[11]D)

Data Package: Page ____ of ____ **Date _____**

5.0 ACCEPTANCE CRITERIA (continued)

E. The frictional force of each door is less than or equal to 0.997 pounds. (Step 6.1[11]E)

[5] Each Ice Condenser drain satisfies the following:

A. Each drain pipe is free of ice, frost, or debris. (Step 6.1[13]A)

B. Each drain valve is free of ice, frost, or debris. (Step 6.1[13]B)

C. Each gate opening force is equal to or less than 98.5 lbs. (Step 6.1[13]C)

D. Each valve seat is free of any corrosion, pitting, or cracking. (Step 6.1[13]D)

E. Each valve gate shall full open freely without excessive sticking or binding. (Step 6.1[13]E)

[6] The total gross bypass leakage area between upper and lower containment is ≤ 5 ft^2. (Step 6.2[18])

Data Package: Page ____ of ____ **Date _____**

6.0 PERFORMANCE

NOTES

1) Subsection 6.1 and 6.2 may be performed in any order, but not concurrently.
2) Startup Engineer and Operations will verify proper functioning of ice machines and ice distribution system per SOI-61.02, Ice Charging.
3) 2-MI-61.001, Initial Ice Loading, will be utilized for initial ice loading, flow passage cleanout and initial ice basket weighing.

Data Package: Page ____ of ____ **Date _____**

6.1 Ice Condenser Ice Loading

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

[2] **PERFORM/VERIFY PERFORMED** the applicable portions of 2-MI-61.001, Initial Ice Loading. _____

[3] **REVIEW** completed 2-MI-61.001, **AND**

VERIFY the following:

A. The Ice Condenser is cooled to between 5°F and 20°F prior to ice loading. _____

B. Each ice baskets contains ≥ 1252 lbs net weight of ice. (**ACC CRIT** 5.0[1]) _____

C. All calibration checks performed during ice weighing are satisfactory. _____

[4] **OBTAIN** completed copy of Surveillance Instruction 2-SI-61-1, Determination of Boron and pH on Ice Condenser Ice, performed during ice loading, **AND**

ATTACH to the PTI in accordance with SMP-9.0. _____

[5] **REVIEW** all sample analyses on Surveillance Instruction 2-SI-61-1, Determination of Boron and pH on Ice Condenser Ice. _____

[6] **VERIFY** all ice sample analyses on Surveillance Instruction 2-SI-61-1, Determination of Boron and pH on Ice Condenser Ice, meet the following:

A. Boron Concentration [1800-2000 ppm]. (**ACC CRIT** 5.0[2]) _____

B. pH [9.0-9.5]. (**ACC CRIT** 5.0[2]) _____

[7] **OBTAIN** completed copy of Surveillance Instruction 2-SI-61-10, Determination of Boron and pH on Ice Condenser Solutions, performed during ice loading, **AND**

ATTACH to the PTI in accordance with SMP-9.0. _____

Data Package: Page ____ of ____ **Date _____**

6.1 Ice Condenser Ice Loading (continued)

[8] **REVIEW** all sample analyses on Surveillance Instruction 2-SI-61-10, Determination of Boron and pH on Ice Condenser Solutions. _____

[9] **VERIFY** all borax solution sample analyses on Surveillance Instruction 2-SI-61-10, Determination of Boron and pH on Ice Condenser Solutions, meet the following:

A. Boron Concentration [1800-2000 ppm]. (**ACC CRIT** 5.0[3]) _____

B. pH [9.0-9.5]. (**ACC CRIT** 5.0[3]) _____

NOTE

The instructions specified for performance below may be performed concurrently and/or in any order.

[10] **PERFORM** 2-SI-61-5, 18 Month Ice Condenser Lower Inlet Door Inspection, for all lower inlet doors, **AND**

ATTACH to the PTI in accordance with SMP-9.0. _____

[11] **REVIEW** the completed copy of 2-SI-61-5, **AND**

VERIFY the following:

A. Opening of each lower inlet door is NOT impaired by ice, frost, or debris. (**ACC CRIT** 5.0[4]A) _____

B. The force required to initially open each door is equal to or less than 16.51 pounds. (**ACC CRIT** 5.0[4]B) _____

C. The force required to prevent each door from closing is greater than 2.01 pounds when the door is 40 degrees open. (**ACC CRIT** 5.0[4]C) _____

D. The force required to open each tested door is less than 4.79 pounds when the door is 40 degrees open. (**ACC CRIT** 5.0[4]D) _____

E. The frictional force of each tested door is less than or equal to 0.997 pounds. (**ACC CRIT** 5.0[4]E) _____

Data Package: Page ____ of ____ **Date _____**

6.1 Ice Condenser Ice Loading (continued)

[12] **PERFORM** 2-SI-61-9, 18 Months Ice Condenser Floor Drains Visual Inspection, **AND**

ATTACH to the PTI in accordance with SMP-9.0. _____

[13] **REVIEW** the completed copy of 2-SI-61-9, **AND**

VERIFY the following:

A. Each Ice Condenser drain pipe is free of ice, frost, or debris. (**ACC CRIT** 5.0[5]A) _____

B. Each Ice Condenser drain valve is free of ice, frost, or debris. (**ACC CRIT** 5.0[5]B) _____

C. Valve gate opening force for each valve is equal to or less than 98.5 pounds. (**ACC CRIT** 5.0[5]C) _____

D. Each Ice Condenser drain valve seat is free of any corrosion, pitting, or cracking. (**ACC CRIT** 5.0[5]D) _____

E. Each valve gate shall full open freely without excessive sticking or binding. (**ACC CRIT** 5.0[5]E)

Data Package: Page ____ of ____ **Date _____**

6.2 Gross Bypass Leakage Test

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

NOTE

The following two steps may be completed concurrently.

[2] **PERFORM, (FULL PERFORMANCE)** 2-SI-88-24, Containment Divider Barrier Personnel Access Doors and Equipment Hatches, **AND**

ATTACH to the PTI in accordance with SMP-9.0. _____

[3] **PERFORM** 2-SI-304-1, Divider Barrier Personnel Access and Equipment Hatch Inspection, **AND**

ATTACH to the PTI in accordance with SMP-9.0. _____

[4] **REVIEW** the completed copy of 2-SI-304-1 for evidence of any documented deficiencies or openings between Upper and Lower Containment, **AND**

DOCUMENT findings, including dimensional measurements of any openings, on Data Sheet 1. _____

NOTE

The following two steps are intended to establish a differential temperature between the Upper and Lower Containment compartments with the Lower being hotter, in order to promote natural circulation.

[5] **ENSURE/PLACE** the Upper Containment coolers in service per SOI-30.03, with the Temperature Indicating Controllers for the coolers in service set at maximum cooling. _____

[6] **ENSURE/PLACE** the Lower Containment coolers in service per SOI-30.03, with the temperature indicating controllers for the coolers in service set at minimum cooling. _____

Data Package: Page ____ of ____ **Date _____**

6.2 Gross Bypass Leakage Test (continued)

NOTE

The following step may be repeated as many times as needed until it is confirmed that a 10°F or greater temperature differential has been established between the Upper and Lower Containment compartments, with the Lower compartment being the hotter. Document step re-performance in the Chronological Log. Only the final survey need be maintained in the PTI Test Results Package. Additional equipment may be operated, at the discretion of the SM/US/SRO, to generate additional heat in the lower compartment. Document any actions taken in the Chronological Log.

[7] **PERFORM** Temperature Survey and Calculations per Data Sheet 2. _____

[8] **VERIFY** the results of Data Sheet 2 indicate that a 10°F or greater temperature differential exists between Upper and Lower Containment compartments, with the Lower compartment being hotter. _____

[9] **TEMPORARILY STOP** personnel access in and out of Containment while taking flow measurements in the following sub steps.

[9.1] **MEASURE** air velocity using a digital hot wire anemometer at the West refueling canal drain opening to the Containment Sump, EL 709, **AND**

RECORD data on Data Sheet 3. _____

[9.2] **RECORD** direction of air flow between Upper and Lower Containment at the drain opening.

DIRECTION OF AIR FLOW _____ _____

[10] **TEMPORARILY SEAL** all leaks identified on Data Sheet 1 using duct tape or similar material, **AND**

RECORD actions taken in the Chronological Log. _____

Data Package: Page ____ of ____ **Date _____**

6.2 Gross Bypass Leakage Test (continued)

NOTE

The following step may be repeated as many times as necessary until the required differential temperature (equal to or greater than Data Sheet 2) is verified. Document re-performance in the Chronological Log. Only the final survey need be maintained in the PTI Test Results Package. Additional equipment may be operated, at the discretion of the SM/US/SRO, to generate additional heat in the lower compartment. Document any actions taken in the Chronological Log.

[11] **PERFORM** temperature survey per Data Sheet 4, **AND**

VERIFY that the differential temperature between Upper and Lower Containment is greater than or equal to that previously established per Data Sheet 2. _____

[12] **TEMPORARILY STOP** personnel access in and out of Containment while taking flow measurements in the following sub steps.

[12.1] **MEASURE** air velocity at the West refueling canal drain opening to the Containment Sump using a digital hot wire anemometer, **AND**

RECORD data on Data Sheet 5. _____

[12.2] **RECORD** direction of air flow between Upper and Lower Containment at the drain opening.

DIRECTION OF AIR FLOW _____ _____

[13] **OPEN** Personnel Escape Hatch #2, located at AZ300 EL 756. _____

Data Package: Page ____ of ____ **Date _____**

6.2 Gross Bypass Leakage Test (continued)

[14] **TEMPORARILY STOP** personnel access in and out of Containment while taking flow measurements in the following sub steps.

[14.1] **MEASURE** air velocity at the West refueling canal drain opening to the Containment Sump using a digital hot wire anemometer, **AND**

RECORD data on Data Sheet 6. _____

[14.2] **RECORD** direction of air flow between Upper and Lower Containment at the drain opening.

DIRECTION OF AIR FLOW _____ _____

[15] **CLOSE** Personnel Escape Hatch #2, unless directed otherwise by the SM/US/SRO. _____

[16] **NOTIFY** the SM/US/SRO that data taking for this subsection is complete, and the Upper and Lower Containment coolers may be adjusted at the discretion of the SM/US/SRO. _____

[17] **CALCULATE** the maximum unknown leakage and final leakage area per Data Sheet 7. _____

[18] **VERIFY** the total gross bypass leakage area calculated in Data Sheet 7 is $\leq 5ft^2$(**ACC CRIT** 5.0[6])

_____ft^2 ($\leq 5\ ft^2$) _____

[19] **REMOVE** the plug from the East refueling canal drain, unless directed otherwise by the SM/US/SRO. _____

Data Package: Page ____ of ____ **Date _____**

7.0 POST PERFORMANCE ACTIVITIES

[1] **VERIFY** that Post-test calibration of the M&TE used to record quantitative acceptance criteria has been satisfactorily performed and results RECORDED on Measuring and Test Equipment (M&TE) Log. _____

[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] **REMOVE** any temporary sealing installed in Step 6.2[10], and **DOCUMENT** actions taken in the Chronological Log. _____

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

Data Package: Page ____ of ____ **Date _____**

8.0 RECORDS

A. QA Records

Complete Test Package

B. Non-QA Records

None

Appendix A
(Page 1 of 1)

TEST PROCEDURES/INSTRUCTIIONS REFERENCE REVIEW

Data Package: Page ____ of ____ **Date _____**

Additional copies of this table may be made as necessary.

PROCEDURE/ INSTRUCTION	REVISION/CHANGES	INITIAL AND DATE. (N/A for no change)
Unit 2 FSAR Section 6.2 Section 6.7 Table 14.2-1 Sht 87 of 89 Tech Spec 3.6.12		
2-TSD-61, Ice Condenser System Testing		

Appendix B
(Page 1 of 1)

TEMPORARY CONDITION LOG

Data Package: Page ____ of ____ **Date _____**

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
(Page 1 of 3)

PERMANENT PLANT INSTRUMENTATION LOG

Data Package: Page ____ of ____ **Date _____**

INSTRUMENT OR INSTRUMENT LOOP #	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-TE-30-210A							
2-TE-30-210B							
2-TE-30-210C							
2-TE-30-210D							
2-TE-30-210E							
2-TE-30-210F							
2-TE-30-210O							
2-TE-30-210P							
2-TE-30-210Q							
2-TE-30-210R							

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 3)

PERMANENT PLANT INSTRUMENTATION LOG

Data Package: Page ____ of ____ **Date _____**

INSTRUMENT OR INSTRUMENT LOOP #	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-TE-30-210S							
2-TE-30-210T							
2-TE-30-210U							
2-TE-30-210V							
2-TE-30-210W							
2-TE-30-210X							
2-TE-30-210Y							
2-TE-30-210Z							

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 3)

PERMANENT PLANT INSTRUMENTATION LOG

Data Package: Page ____ of ____ **Date _____**

INSTRUMENT OR INSTRUMENT LOOP #	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-TE-30-210AA							
2-TE-30-210AB							
2-TE-30-210AC							
2-TE-30-210AD							
2-TE-30-210AE							
2-TE-30-210AF							
2-TE-30-210AG							
2-TE-30-210AH							

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

Data Package: Page ____ of ____ **Date _____**

COMPUTER POINT	DESCRIPTION	INITIAL/DATE
T1001A	CNTMT TEMP 104/796 PRZ ENCL CEILG	
T1002A	CNTMT TEMP 0/796 SG ENCL CEILG	
T1003A	CNTMT TEMP 180/796 SG ENCL CEILG	
T1004A	CNTMT TEMP 184/708 RX SHLD WALL	
T1005A	CNTMT TEMP 0/708 RX SHLD WALL	
T1014A	CNTMT TEMP 45/753 OPP REFUEL GATE	
T1015A	CNTMT TEMP 104/726 IN PZR SUPP PLTF	
T1022A	CNTMT TEMP 126/745 ICE PLTFM RCP#2	
T1023A	CNTMT TEMP 309/745 ICE PLTFM RCP#4	
T1024A	CNTMT TEMP 201/745 ICE PLTFM SG#3	
T1025A	CNTMT TEMP 22/745 ICE PLTFM SG#1	
T1026A	CNTMT TEMP 90/687 SUMP	
T1027A	CNTMT TEMP 0/723 FAN COMPT WALL	
T1028A	CNTMT TEMP 180/723 FAN COMPT WALL	
T1029A	CNTMT TEMP 090/716 INSTR RM WALL	
T1030A	CNTMT TEMP 040/723 ACCUM RM WALL	
T1031A	CNTMT TEMP 140/723 ACCUM RM WALL	
T1032A	CNTMT TEMP 220/723 ACCUM RM WALL	
T1033A	CNTMT TEMP 320/723 ACCUM RM WALL	
T1000A	CNTNMT AIR TEMP AZ/EL 270/868 DOME	
T1016A	CNTMT TEMP 55/809 ICE COND WALL	
T1017A	CNTMT TEMP 235/809 ICE WALL OP SID	

Appendix D
(Page 2 of 2)

COMPUTER POINT VERIFICATION LOG

Data Package: Page ____ of ____ **Date _____**

COMPUTER POINT	DESCRIPTION	INITIAL/DATE
T1018A	CNTMT TEMP 92/766 PRZR ENCL WALL	
T1019A	CNTMT TEMP 285/766 IC OPP PRZR	
T1020A	CNTMT TEMP 180/766 SG ENCL WALL	
T1021A	CNTMT TEMP 0/766 SG ENCL OPP SIDE	

Appendix E
(Page 1 of 1)

CONTAINMENT BOUNDARY ALIGNMENT FOR SUBSECTION 6.2

Data Package: Page ____ of ____ **Date _____**

ELEV/AZ	DESCRIPTION	REMARKS	POSITION/ STATUS	INITIAL/ DATE
745/NA	Ice Condenser Lower Inlet Doors	All 24 Bays	Closed	
804/NA	Ice Condenser Intermediate Deck Doors	All 24 Bays	Closed	
819/NA	Ice Condenser Top Deck Blanket	All 24 Bays	Installed	
756/055	Reactor Cooling Pump 1 Access Plug	Round	Installed	
756/125	Reactor Cooling Pump 2 Access Plug	Round	Installed	
756/235	Reactor Cooling Pump 3 Access Plug	Round	Installed	
756/310	Reactor Cooling Pump 4 Access Plug	Round	Installed	
756/270	Lower Containment Access Plug	Rectangle	Installed	
756/NA	CRDM Missile Shield Piece 1	Rectangle	Installed	
756/NA	CRDM Missile Shield Piece 2	Rectangle	Installed	
756/NA	CRDM Missile Shield Piece 6	Rectangle	Installed	
745/270	Transfer Canal Gate Block Piece 3	Rectangle	Installed	
735/270	Transfer Canal Gate Block Piece 4	Rectangle	Installed	
725/270	Transfer Canal Gate Block Piece 5	Rectangle	Installed	
756/300	Personnel Escape Hatch #2	Round	Closed	
764/285	Equipment Hatch	X-1	Closed	
756/105	Access Hatch near Pressurizer	Rectangle	Closed	
719/062	Personnel Air Lock	X-2A	Closed	
760/255	Personnel Air Lock	X-2B	Closed	
806/245	Ice Cond. End Wall	Rectangle	Closed	
806/300	Ice Cond. End Wall	Rectangle	Closed	
808/289	Ice Blowing - 10"	X-79A	Closed	
809/290	Neg Return - 12"	X-79B	Closed	
758/300	Maintenance Port - 16"	X-117	Closed	
711/NA	Fuel Transfer Tube	Blind Flange	Installed	
801/105	Escape Hatch #1 Above Pressurizer	Round	Closed	

Data Sheet 1
(Page 1 of 1)

LEAKAGE PATH DATA AND CALCULATIONS

Data Package: Page ____ of ____ **Date _____**

(1) DEFICIENT ITEM/LOCATION	(2) MEASURED DIMENSIONS	(3) TOTAL AREA	INITIAL/DATE
	(4) SUM OF ALL TOTAL AREAS = ____ ÷ 144 = _____	SQ. FT.	

[1] **RECORD** deficient and location from review of data in 2-SI-304-1. _____

[2] **MEASURE AND RECORD** dimension of deficient area. _____

[3] **CALCULATE** total area of openings, in square inches. _____

[4] **SUM** all total areas, **AND CALCULATE** square feet. _____

CALCULATIONS PERFORMED BY: _____

CALCULATIONS VERIFIED BY: _____

Data Sheet 2
Page 1 of 3)

TEMPERATURE SURVEY AND DIFFERENTIAL TEMPERATURE CALCULATIONS

Data Package: Page ____ of ____ **Date _____**

Step 6.2[7] **UPPER CONTAINMENT SURVEY**

[5] **RECORD** temperatures from computer points. _____

[6] **CALCULATE** individual upper weighted temperature by multiplying the reading recorded in Column (1) by the corresponding weighted fraction in Column WF. _____

[7] **SUM** the weighted fraction temperature in Column (2) to obtain TU. _____

INSTRUMENT	AZ/EL DESCRIPTION	COMPUTER PT	(1)	INITIAL/DATE	WF	(2)
2-TE-30-210A	270/868 DOME	T1000A			0.25	
2-TE-30-210Q	055/868 ICE COND WALL	T1016A			0.11	
2-TE-30-210R	235/809 IC WALL OP SID	T1017A			0.11	
2-TE-30-210S	095/766 PRZR ENCL WALL	T1018A			0.11	
2-TE-30-210T	285/766 IC OPP PRZR	T1019A			0.20	
2-TE-30-210U	180/766 SG ENCL WALL	T1020A			0.11	
2-TE-30-210V	000/766 SG ENCL OP SID	T1021A			0.11	
SUM OF UPPER COMPT. WEIGHTED FRACTION TEMPERATURES, TU. (3)						°F

CALCULATIONS PERFORMED BY: _____

CALCULATIONS VERIFIED BY: _____

Data Sheet 2
(Page 2 of 3)

TEMPERATURE SURVEY AND DIFFERENTIAL TEMPERATURE CALCULATIONS

Data Package: Page ____ of ____ **Date _____**

Step 6.2[7] **LOWER CONTAINMENT SURVEY**

[8] **RECORD** temperatures from computer points. _____

[9] **CALCULATE** individual lower weighted temperature by multiplying the reading recorded in Column (4) by the corresponding weighted fraction in Column WF _____

[10] **SUM** the weighted fraction temperature in Column (5) to obtain TL. _____

INSTRUMENT	AZ/EL DESCRIPTION	COMPUTER PT	(4)	INITIAL/DATE	WF	(5)
2-TE-30-210B	104/796 PRZ ENCL CEILG	T1001A			0.007	
2-TE-30-210C	000/796 SG ENCL CEILG	T1002A			0.072	
2-TE-30-210D	180/796 SG ENCL CEILG	T1003A			0.072	
2-TE-30-210E	184/708 REAC SHLD WALL	T1004A			0.122	
2-TE-30-210F	000/708 REAC SHLD WALL	T1005A			0.122	
2-TE-30-210O	045/753 OP REFUEL GATE	T1014A			0.034	
2-TE-30-210P	104/726 IN PR SUP PLTF	T1015A			0.007	
2-TE-30-210W	126/745 IC PLTFM RCP #2	T1022A			0.061	
2-TE-30-210X	309/745 IC PLTFM RCP #4	T1023A			0.061	
2-TE-30-210Y	201/745 IC PLTFM SG #3	T1024A			0.061	
2-TE-30-210Z	022/745 IC PLTFM SG #1	T1025A			0.061	
2-TE-30-210AA	090/687 SUMP	T1026A			0.034	
2-TE-30-210AB	000/723 FAN COMPT WALL	T1027A			0.037	
2-TE-30-210AC	180/723 FAN COMPT WALL	T1028A			0.038	
2-TE-30-210AD	090/716 INSTR RM WALL	T1029A			0.043	
2-TE-30-210AE	040/723 ACCUM RM WALL	T1030A			0.053	
2-TE-30-210AF	140/723 ACCUM RM WALL	T1031A			0.047	
2-TE-30-210AG	220/723 ACCUM RM WALL	T1032A			0.034	
2-TE-30-210AH	320/723 ACCUM RM WALL	T1033A			0.034	
SUM OF LOWER COMPT. WEIGHTED FRACTION TEMPERATURES, TL. (6)						°F

Data Sheet 2
(Page 3 of 3)

TEMPERATURE SURVEY AND DIFFERENTIAL TEMPERATURE CALCULATIONS

Data Package: Page ____ of ____ **Date _____**

CALCULATE ΔT between Upper and Lower Containment below:

$$TL \underset{(6)}{_____}\,°F - TU \underset{(3)}{_____}\,°F = _____\,°F(\geq 10°F)$$

CALCULATIONS PERFORMED BY: _____

CALCULATIONS VERIFIED BY: _____

Data Sheet 3
(Page 1 of 1)

AIR FLOW MEASUREMENTS AT THE WEST REFUELING CANAL DRAIN

Data Package: Page ____ of ____ **Date _____**

Step 6.2[9.1]

TRAVERSE POINT (ACROSS FACE)	VELOCITY (FPM)	INITIAL/DATE
2.09"		
3.62"		
4.68"		
5.54"		
6.28"		
6.97"		
7.70"		
8.57"		
9.63"		
11.16"		
SUM OF INDIVIDUAL VELOCITIES		

M&TE _____ Cal Due Date _____

AVERAGE VELOCITY = SUM OF IND. VELOCITIES ÷ 10 = _____FPM

CALCULATIONS PERFORMED BY: _____

CALCULATIONS VERIFIED BY: _____

Data Sheet 4
(Page 1 of 3)

TEMPERATURE SURVEY AND DIFFERENTIAL TEMPERATURE CALCULATIONS

Data Package: Page ____ of ____ **Date _____**

Step 6.2[11] **UPPER CONTAINMENT SURVEY**

[11] **RECORD** temperatures from computer points. _____

[12] **CALCULATE** individual upper weighted temperature by multiplying the reading recorded in Column (1) by the corresponding weighted fraction in Column WF. _____

[13] **SUM** the weighted fraction temperature in Column (2) to obtain TU. _____

INSTRUMENT	AZ/EL DESCRIPTION	COMPUTER PT	(1)	INITIAL/DATE	WF	(2)
2-TE-30-210A	270/868 DOME	T1000A			0.25	
2-TE-30-210Q	055/868 ICE COND WALL	T1016A			0.11	
2-TE-30-210R	235/809 IC WALL OP SID	T1017A			0.11	
2-TE-30-210S	095/766 PRZR ENCL WALL	T1018A			0.11	
2-TE-30-210T	285/766 IC OPP PRZR	T1019A			0.20	
2-TE-30-210U	180/766 SG ENCL WALL	T1020A			0.11	
2-TE-30-210V	000/766 SG ENCL OP SID	T1021A			0.11	
SUM OF UPPER COMPT. WEIGHTED FRACTION TEMPERATURES, TU. (3)						°F

CALCULATIONS PERFORMED BY: _____

CALCULATIONS VERIFIED BY: _____

Data Sheet 4
(Page 2 of 3)

TEMPERATURE SURVEY AND DIFFERENTIAL TEMPERATURE CALCULATIONS

Data Package: Page ____ of ____ **Date _____**

Step 6.2[11] **LOWER CONTAINMENT SURVEY**

[14] **RECORD** temperatures from computer points. _____

[15] **CALCULATE** individual lower weighted temperature by multiplying the reading recorded in Column (4) by the corresponding weighted fraction in Column WF _____

[16] **SUM** the weighted fraction temperature in Column (5) to obtain TL. _____

INSTRUMENT	AZ/EL DESCRIPTION	COMPUTER PT	(4)	INITIAL/DATE	WF	(5)
2-TE-30-210B	104/796 PRZ ENCL CEILG	T1001A			0.007	
2-TE-30-210C	000/796 SG ENCL CEILG	T1002A			0.072	
2-TE-30-210D	180/796 SG ENCL CEILG	T1003A			0.072	
2-TE-30-210E	184/708 REAC SHLD WALL	T1004A			0.122	
2-TE-30-210F	000/708 REAC SHLD WALL	T1005A			0.122	
2-TE-30-210O	045/753 OP REFUEL GATE	T1014A			0.034	
2-TE-30-210P	104/726 IN PR SUP PLTF	T1015A			0.007	
2-TE-30-210W	126/745 IC PLTFM RCP #2	T1022A			0.061	
2-TE-30-210X	309/745 IC PLTFM RCP #4	T1023A			0.061	
2-TE-30-210Y	201/745 IC PLTFM SG #3	T1024A			0.061	
2-TE-30-210Z	022/745 IC PLTFM SG #1	T1025A			0.061	
2-TE-30-210AA	090/687 SUMP	T1026A			0.034	
2-TE-30-210AB	000/723 FAN COMPT WALL	T1027A			0.037	
2-TE-30-210AC	180/723 FAN COMPT WALL	T1028A			0.038	
2-TE-30-210AD	090/716 INSTR RM WALL	T1029A			0.043	
2-TE-30-210AE	040/723 ACCUM RM WALL	T1030A			0.053	
2-TE-30-210AF	140/723 ACCUM RM WALL	T1031A			0.047	
2-TE-30-210AG	220/723 ACCUM RM WALL	T1032A			0.034	
2-TE-30-210AH	320/723 ACCUM RM WALL	T1033A			0.034	
SUM OF LOWER COMPT. WEIGHTED FRACTION TEMPERATURES, TL. (6)						°F

Data Sheet 4
(Page 3 of 3)

TEMPERATURE SURVEY AND DIFFERENTIAL TEMPERATURE CALCULATIONS

Data Package: Page ____ of ____ **Date _____**

[17] **CALCULATE** ΔT between Upper and Lower Containment below:

$$TL\underset{(6)}{_____}°F - TU\underset{(3)}{_____}°F = _____°F(\geq \text{RESULT IN DATA SHEET 2})$$

CALCULATIONS PERFORMED BY: _____

CALCULATIONS VERIFIED BY: _____

Data Sheet 5
(Page 1 of 1)

AIR FLOW MEASUREMENTS AT THE WEST REFUELING CANAL DRAIN

Data Package: Page ____ of ____ **Date _____**

Step 6.2[12.1]

TRAVERSE POINT (ACROSS FACE)	VELOCITY (FPM)	INITIAL/DATE
2.09"		
3.62"		
4.68"		
5.54"		
6.28"		
6.97"		
7.70"		
8.57"		
9.63"		
11.16"		
SUM OF INDIVIDUAL VELOCITIES		

M&TE _____ Cal Due Date _____

AVERAGE VELOCITY = V_{A1} =SUM OF IND. VELOCITIES ÷ 10 = _____FPM

CALCULATIONS PERFORMED BY: _____

CALCULATIONS VERIFIED BY: _____

Data Sheet 6
(Page 1 of 1)

AIR FLOW MEASUREMENTS AT THE WEST REFUELING CANAL DRAIN

Data Package: Page ____ of ____ **Date _____**

Step 6.2[14.1]

TRAVERSE POINT (ACROSS FACE)	VELOCITY (FPM)	INITIAL/DATE
2.09"		
3.62"		
4.68"		
5.54"		
6.28"		
6.97"		
7.70"		
8.57"		
9.63"		
11.16"		
SUM OF INDIVIDUAL VELOCITIES		

M&TE _____ Cal Due Date _____

AVERAGE VELOCITY = V_{A3} =SUM OF IND. VELOCITIES ÷ 10 = _____FPM

CALCULATIONS PERFORMED BY: _____

CALCULATIONS VERIFIED BY: _____

Data Sheet 7
(Page 1 of 1)

GROSS BYPASS LEAKAGE CALCULATIONS

Data Package: Page ____ of ____ **Date _____**

Step 6.2[17] **MAXIMUM UNKNOWN LEAKAGE CALCULATION**

Per DCN 32204-A, the maximum unknown leakage area (A_u) is determined by the following equation:

$A_u = V_{A1} \div [(V_{A3} - V_{A1}) \div A_3]$ where,

V_{A1} = Air Velocity measured at one refueling canal drain with all known leaks plugged =_____
(CALCULATED IN DATA SHEET 5)

V_{A3} = Air Velocity measured at one refueling canal drain with a known leak of area A_3 imposed =_____
(CALCULATED IN DATA SHEET 6)

A_3 = Known leakage area of Personnel Hatch #2 = 3.14 ft^2

$$A_U = \frac{\quad}{V_{A1}} \div \left[\left(\frac{\quad}{V_{A3}} - \frac{\quad}{V_{A1}}\right) \div 3.14 \cdot ft^2\right]$$ A_u =_____SQ FT

FINAL LEAKAGE CALCULATION

[18] **SUM** THE FOLLOWING:

AREA OF REFUELING CANAL DRAINS = $2 \times \pi \times (6.625/12)^2$ = 1.92 ft^2

TOTAL AREA LEAKAGE FROM DATA SHEET 1 _____ft^2

MAXIMUM UNKNOWN LEAKAGE A_u _____ft^2

=_____ft^2 [$\leq$5 ft^2 (**ACC CRIT**)]

CALCULATIONS PERFORMED BY: _____

CALCULATIONS VERIFIED BY: _____

Attachment 1
(Page 1 of 1)

LOWER INLET DOOR MEASURMENT CONVERSION AND ADJUSTMENT

$$\text{Distance} = 40.125\text{in}(\text{From} \cdot 1 - \text{SI} - 61 - 5 \cdot \text{CN} - 1)$$

$$\text{Force}_{\text{Initial}} = \frac{\text{Torque}_{\text{Initial}}}{\text{Distance}} = \frac{675\text{in} - \text{lb}}{40.125\text{in}} = 16.82\text{lb}$$

$$\text{Force}_{\text{InitialAdjusted}} = \text{Force}_{\text{Initial}} - \text{Accuracy}_{50\text{lbGauge}}$$

$$\text{Force}_{\text{InitialAdjusted}} = 16.82\text{lb} - [(0.6\% \times 50\text{lb}) + .01\text{lb}]$$

$$\text{Force}_{\text{InitialAdjusted}} = 16.82\text{lb} - 0.31\text{lb}$$

$$\text{Force}_{\text{InitialAdjusted}} = 16.51\text{lb}$$

$$\text{Force}_{40\text{deg OPEN}} = \frac{\text{Torque}_{40\text{deg OPEN}}}{\text{Distance}} = \frac{195\text{in} - \text{lb}}{40.125\text{in}} = 4.859\text{lb}$$

$$\text{Force}_{40\text{deg OPENadj}} = \text{Force}_{40\text{deg OPEN}} - \text{Accuracy}_{10\text{lbGauge}}$$

$$\text{Force}_{40\text{deg OPENadj}} = 4.859\text{lb} - [(0.6\% \times 10\text{lb}) + .01\text{lb}]$$

$$\text{Force}_{40\text{deg OPENadj}} = 4.859\text{lb} - 0.07\text{lb}$$

$$\text{Force}_{40\text{deg OPENadj}} = 4.79\text{lb}$$

$$\text{Force}_{40\text{deg CLOSE}} = \frac{\text{Torque}_{40\text{deg CLOSE}}}{\text{Distance}} = \frac{78\text{in} - \text{lb}}{40.125\text{in}} = 1.94\text{lb}$$

$$\text{Force}_{40\text{deg CLOSEadj}} = \text{Force}_{40\text{deg CLOSE}} + \text{Accuracy}_{10\text{lbGauge}}$$

$$\text{Force}_{40\text{deg CLOSEadj}} = 1.94\text{lb} + [(0.6\% \times 10\text{lb}) + .01\text{lb}]$$

$$\text{Force}_{40\text{deg CLOSEadj}} = 1.94\text{lb} + 0.07\text{lb}$$

$$\text{Force}_{40\text{deg CLOSEadj}} = 2.01\text{lb}$$

$$\text{Force}_{\text{Friction}} = \frac{\text{Torque}_{\text{Friction}}}{\text{Distance}} = \frac{40\text{in} - \text{lb}}{40.125\text{in}} = 0.997\text{lb}$$

Attachment 2
(Page 1 of 1)

ICE BASKET WEIGHT ADJUSTMENT

$$\text{Weight}_{\text{IceACCCRIT}} = \text{Weight}_{\text{TechSpec}} + \text{Accuracy}_{\text{Gauge}}$$

$$\text{Weight}_{\text{IceACCCRIT}} = 1237\text{lb} + (5000\text{lb} \times 0.3\%)$$

$$\text{Weight}_{\text{IceACCCRIT}} = 1237\text{lb} + 15\text{lb}$$

$$\text{Weight}_{\text{IceACCCRIT}} = 1252\text{lb}$$