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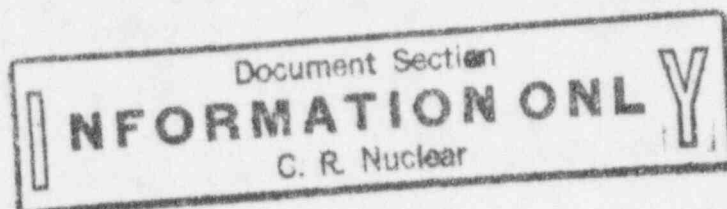
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Rev. 0

Effective Date

3/1/96



SURVEILLANCE PROCEDURE

SP-169H

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

REACTOR COOLANT PUMP SEAL FLOW INSTRUMENTATION CALIBRATION

THIS PROCEDURE ADDRESSES SAFETY RELATED COMPONENTS

APPROVED BY: Interpretation Contact

  
(SIGNATURE ON FILE)

DATE:

3-1-96

INTERPRETATION CONTACT: Manager, Nuclear I&C Shop

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### ENCLOSURES

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## 1.0 PURPOSE

- 1.1 To provide a method for calibration of instruments and instrument strings which are used for Reactor Coolant Pump Individual Seal Flow Rate indication. These have no direct or indirect Technical Specification requirements but will be calibrated in this surveillance procedure due to the criticality of seal flow to pump

The following is a list of the major strings/instruments calibrated in this procedure.

MU-7-DPT1, RCP-1A Seal Water Flow

MU-7-DPT2, RCP-1B Seal Water Flow

MU-7-DPT2, RCP-1C Seal Water Flow

MU-7-DPT2, RCP-1D Seal Water Flow

- 1.2 See Enclosure 7 for a complete list of CMIS Tags affected by this procedure.

## 2.0 REFERENCES

### 2.1 IMPLEMENTING REFERENCES

- 2.1.1 CP-115, Nuclear Plant Tags and Tagging Orders
- 2.1.2 CP-111, Initiating and Processing of Precursor Cards and Problem Reports
- 2.1.3 CP-113A, Work Request Initiation and Work Package Control

## 2.2 DEVELOPMENTAL REFERENCES

### 2.2.1 Technical Specification References

| <u>Applicable<br/>References</u> | <u>Surveillance<br/>Performed<br/>During Modes</u> | <u>LCO/Other<br/>Requirement<br/>During Modes</u> | <u>Surv.<br/>Freq.</u> | <u>Freq.<br/>Notes</u> | <u>Mode<br/>Notes</u> |
|----------------------------------|--|---|------------------------|------------------------|-----------------------|
| None                             | 4,5,6  |   | *                      |                        | 1                     |

Surveillance Frequency Designation:

\* - Frequency as specified in SP-443.

Frequency Notes: None

Mode Notes:

- 1 - This procedure is normally performed during refuel in Modes 4, 5, or 6. However, this procedure may be performed in other modes, as plant conditions allow and with concurrence of the SSOD.

### 2.2.2 Drawings: (See the individual Calibration Data Sheet for specific instrument component drawing.)

D8034039 Sht. 4 & 5 Make-Up & Purif. Control Loop 7 & 31  
(Aperature Card 925 Sht. 4 & 5)

208-047 RC-1,2,3,4, Elementary Diagram Reactor Coolant Pump

209-178 SHT. 2, Auxiliary Control System (NNI) Cabinet 2 & 5

302-661 Sht. 3, Make-Up & Purification

308-669 Makeup & Purification Differential Pressure  
Transmitters (MU-7-DPT1/MU-7-DPT2)

308-670 Makeup & Purification Differential Pressure  
Transmitters (MU-7-DPT3/MU-7-DPT4)

### 2.2.3 Instruction Manuals:

Integrated Control & Non-Nuclear Instrumentation, Book No. 49

Rosemount Inc., 1152 Alphaline Press. Trans., Book No. 1496

#### 2.2.4 Other:

IE Information Notice No. 85-100, (NRC Dated 12/31/85), FPC Letter No. 3N1285-24

I-88-0014, Selection of Instr. Loops in a Harsh Environment for IR

I-92-003, Instrumentation Error for HPI Flow Verification

SP-443, Master Surveillance Plan

### 3.0 PERSONNEL INDOCTRINATION

#### 3.1 SETPOINTS

The setpoints and tolerances of instruments calibrated by this procedure are per the calibration data sheets.

#### 3.2 DESCRIPTION

- 3.2.1 This procedure provides instruction to calibrate the instrument strings listed in Section 1.1. Information such as input values, desired outputs, spans, tolerances, etc. are provided on the various String Calibration Data Sheets.

#### 3.3 DEFINITIONS AND ABBREVIATIONS

- 3.3.1 ITS: Improved Technical Specification
- 3.3.2 SPV: Second Party Verifier
- 3.3.3 LCO: Limiting Conditions for Operations

#### 3.4 RESPONSIBILITIES

- 3.4.1 Manager, Nuclear I&C Shop is responsible for this procedure content.
- 3.4.2 Nuclear I&C Shop is responsible for implementing and completing this procedure.



### 3.5 LIMITS AND PRECAUTIONS

- 3.5.1 Any leads lifted, terminal block links opened, jumpers temporarily installed, valve manipulations, etc., shall be recorded on the Equipment Alteration Log Enclosure 1.
- 3.5.2 For work located in Radiation Controlled Areas, due consideration must be given to the ALARA program. This may result in a determination that special preparations and/or precautions are necessary. Health Physics coverage is specified on the Radiation Work Permit (RWP).
- 3.5.3 This procedure may result in the generation of radioactive waste. Plan and perform this procedure such that radioactive waste generation is reduced to the minimum.
- 3.5.4 Certain lots of Rosemount transmitters have been found to exhibit internal leakage of fill oil due to a manufacturing defect. One of the symptoms of fill oil loss is a "sluggish" response to differential pressures. This is best detected by the observation of an experienced technician during calibration.
- Any Rosemount transmitter which is suspected of sluggish response should be bench calibrated to confirm the response. As an alternative, the transmitter can be replaced outright.
- IF any transmitter is suspected of oil leakage or replaced because of sluggish response,  
THEN report the transmitter tag number, model number, and serial number to the Supervisor, Nuclear Plant Technical Support (I&C) NA2J
- 3.5.5 When working on Rosemount Transmitters be careful not to break the neck seal between the sensor module and the electronics housing.
- IF it is suspected that the neck seal is broken,  
THEN contact the job supervisor.
- 3.5.6 During calibration of transmitters, tubing must be disconnected for loading the transmitter. A container to collect reactor coolant fluid should be used at the job location.
- 3.5.7 MU-7-DPT1, DPT2, DPT3, and DPT4 provide a start permissive to the associated Reactor Coolant Pump that allows the pump to start above a minimum seal flow rate.
- 3.5.8 Retain all Calibration Data Sheets for transmittal to Document Control with the completed procedure.

### 3.6 ACCEPTANCE CRITERIA

- 3.6.1 The "As-Found" portions of the data sheets indicate the tolerance required for each instrument. Data taken should be within the tolerance stated. If the data is not within the tolerance, refer to Contingencies at the appropriate step.
- 3.6.2 The "As-Left" portions of the data sheets indicate the tolerance required for each string end instrument or data point. This tolerance must be met before returning the string to service.

### 3.7 PREREQUISITES

#### 3.7.1 Test Equipment

- o In H2O Test Gauge capable of monitoring 0-200 In H2O with an accuracy of  $\pm 0.5$  In H2O.
- o Variable pressure source capable of applying 0-200 In H2O
- o 2 Digital Multimeter (DMM), Keithley Model 197 or 197A
  - 1 hour warm-up required
  - Following warm-up, zero the Model 197A as follows:
    1. Set DMM to the desired range/function (20Vdc, 20mAdc).
    2. Short the INPUT HI and LO test leads together.
    3. Wait until the display reading settles.
    4. Press the REL button.
- o Calibrated Breakaway Style Torque wrench capable of 200 in-lb torque, with adapter for Rosemount Transmitter Cover
- o Transmitter Simulator, Transmation Model 1040.



### 3.7.2 Supplies

3.7.2.1 The following supplies will be required for performance of Section 4.

- o Dow Corning 55M O-Ring Lubricant (FPC # 1430265)
- o Neolube lubricant (FPC #01430515)
- o Cover O-Ring for Rosemount 1152 Transmitters (FPC # 52601159), One O-ring will be required for each transmitter calibrated.

### 3.7.3 Initial Conditions

3.7.3.1 Ensure an RWP(s) has been obtained for performance of the Instrument Calibration or String Calibration Check(s) as applicable.

#### INSTRUMENT

#### LOCATION

MU-7-DPT1, 119'EL. Reactor Bldg. "A" D-Ring, Northeast Corner

MU-7-DPT2, 119'EL. Reactor Bldg. "A" D-Ring, Northwest Corner

MU-7-DPT3, 119'EL. Reactor Bldg. "B" D-Ring, Southeast Corner

MU-7-DPT4, 119'EL. Reactor Bldg. "B" D-Ring, Northwest Corner

3.7.3.2 Tag Order(s), may be necessary for calibration of some instrumentation. Ensure drawings are adequately reviewed.

3.7.3.3 Multiple Copies of the Equipment Alteration Log Enclosure 1 and the Out of Tolerance Log Sheet Enclosure 6 may be needed for the performance of this procedure.

3.7.3.4 Ensure the Nuclear Shift Supervisor or Nuclear Operator is notified prior to equipment being removed from service. [ ]

3.7.3.5 Notify Nuclear Quality Control (NQC) prior to start of work. [ ]

3.7.3.6 Section 3.0 has been read and understood by Nuclear Technical Support Technician(s) responsible for performing this procedure.

Initial/Date

Initial/Date

Initial/Date

Initial/Date

Initial/Date

Initial/Date

Initial/Date

Initial/Date

## 4.0 INSTRUCTIONS

- 4.0.1 Each instrument string should be calibrated for the maximum achievable accuracy. (The max. error for the "As Left" readings should be smaller than the "As Found" error and if possible should be no more than 1/2 of the listed tolerance.) This is to allow for normal instrument drift between calibrations.

### 4.1 CALIBRATION OF REACTOR COOLANT PUMP SEAL WATER FLOW STRINGS

#### 4.1.1 RCP Seal Water Flow Transmitter Calibration

- 4.1.1.1 Notify Nuclear Shift Supervisor of instrument to be removed from service.
- o MU-7-DPT1, RCP-1A Seal Water Flow [ ]
  - o MU-7-DPT2, RCP-1B Seal Water Flow [ ]
  - o MU-7-DPT3, RCP-1C Seal Water Flow [ ]
  - o MU-7-DPT4, RCP-1D Seal Water Flow [ ]
- 4.1.1.2 Isolate the transmitter from service, as necessary, to permit calibration and document on the Equip. Alteration Log, Enclosure 1.
- 4.1.1.3 Connect test equipment as required to false load the transmitter.
- 4.1.1.4 False load the transmitter to the values listed on the appropriate String Calibration Data Sheet and record the "As Found" Data for the Transmitter.

#### STRING CALIBRATION DATA SHEET

| <u>INSTRUMENT #</u> |             |     |
|---------------------|-------------|-----|
| MU-7-DPT1           | Enclosure 2 | [ ] |
| MU-7-DPT2           | Enclosure 3 | [ ] |
| MU-7-DPT3           | Enclosure 4 | [ ] |
| MU-7-DPT4           | Enclosure 5 | [ ] |

**NOTE:** Contingency actions in Step 4.1.1.5 can be performed following calibration and after exiting the Reactor Building.

- 4.1.1.5 IF any "As Found" data is NOT within the tolerance specified on the String Calibration Data Sheet,  
THEN perform the following:
- o Circle the Out of Tolerance Reading in Red.
  - o Fill out the Out-Of-Tolerance Log Sheet (Enclosure 6).
  - o Initiate a Precursor Card
  - o Consult with the I&C Supervisor and SSOD to determine if a Problem Report is required.
  - o Ensure a Problem Report is initiated if required.
- 4.1.1.6 IF "As Found" data is within the "As Left" tolerance and adjustments are NOT desired,  
THEN enter the statement "Same As Found" in the "As Left" column of the String Calibration Data Sheet,  
AND GO TO Step 4.1.1.10 for Restoration.
- 4.1.1.7 IF "As Found" data is within tolerance and adjustments are desired,  
THEN GO TO Step 4.1.1.8 for Calibration.
- 4.1.1.8 Calibrate the transmitter for maximum achievable accuracy per the String Calibration Data Sheet and record the "As Left" Data on the String Calibration Data Sheet.
- 4.1.1.9 IF the transmitter can not be calibrated to the required "As Left" tolerances,  
THEN notify the I&C Supervisor and initiate a Work Request for repair/replacement.
- 4.1.1.10 Remove all test equipment.
- 4.1.1.11 Restore temporary alterations required for the transmitter calibration such as lifted wires, disconnected tubing, etc. and document on Equipment Alteration Log, Enclosure 1.

4.1.1.12 **HOLD POINT** Re-install transmitter electronic housing cover as follows:

Second Party Verifier (SPV): To verify new O-Ring lubricated and installed. Cover torqued to 200 in-lbs.

1. Obtain new cover O-ring (FPC 52601159).
2. Lubricate O-ring with Dow Corning 55M, Silicone O-ring lubricant (FPC #01430265) and install on cover.
3. Apply Neolube lubricant (FPC #01430279) on housing cover threads.
4. Install cover and torque to 200 in-lbs.
5. Record Torque Wrench I.D. # and Cal Due Date in the Test Equipment Section of the String Calibration Data Sheet.

4.1.1.13 Return the transmitter to service and document on the Equipment Alteration Log, Enclosure 1.

4.1.1.14 Inform the Nuclear Shift Supervisor and Nuclear Operator that the transmitter calibration is complete and that the transmitter has been returned to service.

- o MU-7-DPT1, RCP-1A Seal Water Flow [ ]
- o MU-7-DPT2, RCP-1B Seal Water Flow [ ]
- o MU-7-DPT3, RCP-1C Seal Water Flow [ ]
- o MU-7-DPT4, RCP-1D Seal Water Flow [ ]

4.1.1.15 Proceed as follows:

- o Complete Section 4.1.1 for other transmitters to be calibrated at this time.

OR

- o GO TO Section 4.1.2 to complete the String Calibration.

#### 4.1.2 RCP Seal Water Flow String Components

4.1.2.1 Notify Nuclear Shift Supervisor of instrument to be removed from service.

- o MU-7-DPT1, RCP-1A Seal Water Flow [ ]
- o MU-7-DPT2, RCP-1B Seal Water Flow [ ]
- o MU-7-DPT3, RCP-1C Seal Water Flow [ ]
- o MU-7-DPT4, RCP-1D Seal Water Flow [ ]

4.1.2.2 Open links for the appropriate field wires so that the transmitter mAdc values may be false loaded into the string and document on Equipment Alteration Log Enclosure 1.

| <u>STRING</u> | <u>CABINET</u> | <u>TERMINALS</u>               |
|---------------|----------------|--------------------------------|
| MU-7-DPT1     | NNI Cab.2      | Row 9 TB 6, Term 5(+) & 6(-)   |
| MU-7-DPT2     | NNI Cab.2      | Row 9 TB 6, Term 9(+) & 10(-)  |
| MU-7-DPT3     | NNI Cab.2      | Row 9 TB 6, Term 13(+) & 14(-) |
| MU-7-DPT4     | NNI Cab.2      | Row 9 TB 6, Term 17(+) & 18(-) |

4.1.2.3 Connect the Transmitter Simulator with a DMM (set to 20 mAdc range) in series to the appropriate terminals (listed above).

4.1.2.4 False load the "As Found" transmitter mAdc into the applicable string and record the "As Found" Data for all associated String Components listed on the String Calibration Data Sheet.

| <u>INSTRUMENT #</u> | <u>STRING CALIBRATION<br/>DATA SHEET</u> |     |
|---------------------|--|-----|
| MU-7-DPT1           | Enclosure 2                              | [ ] |
| MU-7-DPT2           | Enclosure 3                              | [ ] |
| MU-7-DPT3           | Enclosure 4                              | [ ] |
| MU-7-DPT4           | Enclosure 5                              | [ ] |

- 4.1.2.5 IF any "As Found" data is NOT within the tolerance specified on the String Calibration Data Sheet,  
THEN perform the following:
- o Circle the Out of Tolerance Reading in Red.
  - o Fill out the Out-Of-Tolerance Log Sheet (Enclosure 6).
  - o Initiate a Precursor Card
  - o Consult with the I&C Supervisor and SSOD to determine if a Problem Report is required.
  - o Ensure a Problem Report is initiated if required.
- 4.1.2.6 Calibrate components as required using the following general instructions:
- o Determine which individual component (module, indicator, etc.) require calibration.
  - o Obtain the necessary Calibration Data Sheets from Document Control for those components requiring calibration.
  - o Calibrate components as required.
- 4.1.2.7 IF component can not be calibrated to the required "As Left" tolerances,  
THEN notify the I&C Supervisor and initiate a Work Request for repair/replacement.
- 4.1.2.8 False load the "As Left" transmitter mAdc into the string and record the "As Left" Data for all String Components listed on the String Calibration Data Sheet.
- 4.1.2.9 IF any "As-Left" reading is not within the tolerance specified,  
THEN notify the I&C Supervisor and proceed as directed.
- 4.1.2.10 Remove all test equipment.
- 4.1.2.11 Restore alterations required for performance of the string calibration such as open links, etc. and document on Equipment Alteration Log, Enclosure 1.



4.1.2.12 Inform the Nuclear Shift Supervisor and Nuclear Operator that the string calibration is complete and that the string has been returned to service.

- o MU-7-DPT1, RCP-1A Seal Water Flow [ ]
- o MU-7-DPT2, RCP-1B Seal Water Flow [ ]
- o MU-7-DPT3, RCP-1C Seal Water Flow [ ]
- o MU-7-DPT4, RCP-1D Seal Water Flow [ ]

4.1.2.13 Repeat Section for other strings to be calibrated.

## 5.0 FOLLOW-UP ACTIONS

### 5.1 RESTORATION

5.1.1 Inform Health Physics that the RWP(s) obtained in Step 3.7.3.1 is no longer needed.

5.1.2 Verify that the Equipment Alteration Log data is "Restored" and complete. (Enclosure 1)

            
Initial/Date

### 5.2 CONTINGENCIES

5.2.1 All Contingencies are listed at the appropriate Steps in the procedure.

### 5.3 REPORT AND DOCUMENTATION

5.3.1 Review all Calibration Data Sheets/String Calibration Data Sheets to ensure all out-of-tolerance readings are listed on Enclosure 6.

5.3.2 Sign and date Enclosure 6 when Step 5.3.1 is complete.

5.3.3 Mail copy of Enclosure 6 to Supervisor, Nuclear Plant Technical Support (I&C), NA2J.

5.3.4 Ensure that all completed Calibration Data Sheets are attached to the working copy of procedure for transmittal.



STRING CALIBRATION DATA SHEET

ENCLOSURE 2

SYSTEM: Makeup and Purification  
 FUNCTION: RC Pump 1A Seal Inlet Water Flow  
 PRIMARY ELEMENT: MU-7-DPT1  
 RANGE: 0-200 inches H<sub>2</sub>O

REF: D8034039 SHT. 4, 208-047 RC-01, 209-178 SHT. 2,  
 302-661 SHT. 3, and 308-669

TEST EQUIPMENT \_\_\_\_\_  
 \_\_\_\_\_  
 CAL DUE DATE \_\_\_\_\_  
 \_\_\_\_\_

NOTE: (1) Transmitter located 119' elev Reactor. Bldg., outside "A" D-ring wall, Northeast corner.  
 (2) Connect Transmitter Simulator with DMM in series to NNI Cabinet 2 Row 9 Terminal Board 6, Terminal 5(+) and 6(-).

| INPUT  |                         | MU-7-DPT1           |          |                                |         |                               | MU-7-F11 (Main Control Board PSA Lower) |          |                              |         |                             |
|--------|-------------------------|---------------------|----------|--------------------------------|---------|-------------------------------|---|----------|------------------------------|---------|-----------------------------|
| % SPAN | inches H <sub>2</sub> O | DESIRED OUTPUT mAdc | AS FOUND | AS FOUND TOLERANCE ± 0.08 mAdc | AS LEFT | AS LEFT TOLERANCE ± 0.04 mAdc | DESIRED OUTPUT GPM                      | AS FOUND | AS FOUND TOLERANCE ± 0.5 GPM | AS LEFT | AS LEFT TOLERANCE ± 0.5 GPM |
| 0      | 0                       | 4.00                |          | 3.92 to 4.08                   |         | 3.96 to 4.04                  | 0                                       |          | -0.5 to 0.5                  |         | -0.5 to 0.5                 |
| 25     | 50                      | 8.00                |          | 7.92 to 8.08                   |         | 7.96 to 8.04                  | 10                                      |          | 9.5 to 10.5                  |         | 9.5 to 10.5                 |
| 49     | 98                      | 11.84               |          | 11.76 to 11.92                 |         | 11.80 to 11.88                | 14                                      |          | 13.5 to 14.5                 |         | 13.5 to 14.5                |
| 72.25  | 144.5                   | 15.56               |          | 15.48 to 15.64                 |         | 15.52 to 15.60                | 17                                      |          | 16.5 to 17.5                 |         | 16.5 to 17.5                |
| 100    | 200                     | 20.00               |          | 19.92 to 20.08                 |         | 19.96 to 20.04                | 20                                      |          | 19.5 to 20.5                 |         | 19.5 to 20.5                |
| 72.25  | 144.5                   | 15.56               |          | 15.48 to 15.64                 |         | 15.52 to 15.60                | 17                                      |          | 16.5 to 17.5                 |         | 16.5 to 17.5                |
| 49     | 98                      | 11.84               |          | 11.76 to 11.92                 |         | 11.80 to 11.88                | 14                                      |          | 13.5 to 14.5                 |         | 13.5 to 14.5                |
| 25     | 50                      | 8.00                |          | 7.92 to 8.08                   |         | 7.96 to 8.04                  | 10                                      |          | 9.5 to 10.5                  |         | 9.5 to 10.5                 |
| 0      | 0                       | 4.00                |          | 3.92 to 4.08                   |         | 3.96 to 4.04                  | 0                                       |          | -0.5 to 0.5                  |         | -0.5 to 0.5                 |

NOTE: Connect DMM to NNI 2-9-3 Term. 5 & 6 to monitor contact action, 125 Vdc may be present from RCP start circuit.

| SERVICE DEVICES - NNI SIGNAL MONITORS  |  |          |                                |         |                               |
|--|--|----------|--------------------------------|---------|-------------------------------|
| DEVICE                                 | ACTION / SETPOINT  | AS FOUND | AS FOUND TOLERANCE ± 0.05 mAdc | AS LEFT | AS LEFT TOLERANCE ± 0.03 mAdc |
| NNI SIGNAL MONITOR 4-8-1<br>(MU-7-FS1) | NEG "ON" at 4.36 mAdc ↓<br>(3 GPM)   |          | 4.31 to 4.41 mAdc              |         | 4.33 to 4.39 mAdc             |
|  | LOW SEAL FLOW ALARM EVENT PT. 1084   | [ ]      |                                | [ ]     |                               |
|  | RC PUMP SEAL FLOWS HIGH/LOW ALARM (H-5-7)  | [ ]      |                                | [ ]     |                               |
|  | NNI 2-9-3 Term. 5 & 6 (Contact Open On Low Flow)<br>(Interlock to RCP Start Circuit) | [ ]      |                                | [ ]     |                               |

Lubricated and installed new Cover O-ring (FPC #52601159). Cover torqued to 200 in-lbs.

Cover Restoration Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

SPV - Cover Restoration Verified by: \_\_\_\_\_ Date: \_\_\_\_\_

Calibration Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Data Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_

STRING CALIBRATION DATA SHEET

ENCLOSURE 3

SYSTEM: Makeup and Purification  
 FUNCTION: RC Pump 1B Seal Inlet Water Flow  
 PRIMARY ELEMENT: MU-7-DPT2  
 RANGE: 0-200 inches H<sub>2</sub>O

REF: D8034039 SHT. 4, 208-047 RC-02, 209-178 SHT. 2,  
 302-661 SHT. 3, and 308-669

TEST EQUIPMENT \_\_\_\_\_ CAL. DUE DATE \_\_\_\_\_

NOTE: (1) Transmitter located 119' elev Reactor. Bldg., outside "A" D-ring wall, Northwest corner.  
 (2) Connect Transmitter Simulator with DMM in series to NNI Cabinet 2 Row 9 Terminal Board 6, Terminal 9(+) and 10(-) (MUR37).

| INPUT  |                         | MU-7-DPT2           |          |                                   |         |                                  | MU-7-F12 (Main Control Board PSA Lower) |          |                                 |         |                                |
|--------|-------------------------|---------------------|----------|-----------------------------------|---------|----------------------------------|---|----------|---------------------------------|---------|--------------------------------|
| % SPAN | inches H <sub>2</sub> O | DESIRED OUTPUT mAdc | AS FOUND | AS FOUND TOLERANCE<br>± 0.08 mAdc | AS LEFT | AS LEFT TOLERANCE<br>± 0.04 mAdc | DESIRED OUTPUT GPM                      | AS FOUND | AS FOUND TOLERANCE<br>± 0.5 GPM | AS LEFT | AS LEFT TOLERANCE<br>± 0.5 GPM |
| 0      | 0                       | 4.00                |          | 3.92 to 4.08                      |         | 3.96 to 4.04                     | 0                                       |          | -0.5 to 0.5                     |         | -0.5 to 0.5                    |
| 25     | 50                      | 8.00                |          | 7.92 to 8.08                      |         | 7.96 to 8.04                     | 10                                      |          | 9.5 to 10.5                     |         | 9.5 to 10.5                    |
| 49     | 98                      | 11.84               |          | 11.76 to 11.92                    |         | 11.80 to 11.88                   | 14                                      |          | 13.5 to 14.5                    |         | 13.5 to 14.5                   |
| 72.25  | 144.5                   | 15.56               |          | 15.48 to 15.64                    |         | 15.52 to 15.60                   | 17                                      |          | 16.5 to 17.5                    |         | 16.5 to 17.5                   |
| 100    | 200                     | 20.00               |          | 19.92 to 20.08                    |         | 19.96 to 20.04                   | 20                                      |          | 19.5 to 20.5                    |         | 19.5 to 20.5                   |
| 72.25  | 144.5                   | 15.56               |          | 15.48 to 15.64                    |         | 15.52 to 15.60                   | 17                                      |          | 16.5 to 17.5                    |         | 16.5 to 17.5                   |
| 49     | 98                      | 11.84               |          | 11.76 to 11.92                    |         | 11.80 to 11.88                   | 14                                      |          | 13.5 to 14.5                    |         | 13.5 to 14.5                   |
| 25     | 50                      | 8.00                |          | 7.92 to 8.08                      |         | 7.96 to 8.04                     | 10                                      |          | 9.5 to 10.5                     |         | 9.5 to 10.5                    |
| 0      | 0                       | 4.00                |          | 3.92 to 4.08                      |         | 3.96 to 4.04                     | 0                                       |          | -0.5 to 0.5                     |         | -0.5 to 0.5                    |

NOTE: Connect DMM to NNI 2-9-3 Term. 9 & 10 to monitor contact action, 125 Vdc may be present from RCP start circuit.

| SERVICE DEVICES - NNI SIGNAL MONITORS     |   |          |                                   |         |                                  |
|---|---|----------|-----------------------------------|---------|----------------------------------|
| DEVICE                                    | ACTION / SETPOINT   | AS FOUND | AS FOUND TOLERANCE<br>± 0.05 mAdc | AS LEFT | AS LEFT TOLERANCE<br>± 0.03 mAdc |
| NNI SIGNAL MONITOR<br>4-8-6<br>(MU-7-FS2) | NEG "ON" at 4.36 mAdc ±<br>(3 GPM)  |          | 4.31 to 4.41 mAdc                 |         | 4.33 to 4.39 mAdc                |
|   | LOW SEAL FLOW ALARM EVENT PT. 1085  | [ ]      |                                   | [ ]     |                                  |
|   | RC PUMP SEAL FLOWS HIGH/LOW ALARM (H-5-7)   | [ ]      |                                   | [ ]     |                                  |
|   | NNI 2-9-3 Term. 9 & 10 (Contact Open On Low Flow)<br>(Interlock to RCP Start Circuit) | [ ]      |                                   | [ ]     |                                  |

Lubricated and installed new Cover O-ring (FPC #52601159). Cover torqued to 200 in-lbs.

Cover Restoration Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

SPV - Cover Restoration Verified by: \_\_\_\_\_ Date: \_\_\_\_\_

Calibration Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Data Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_

# STRING CALIBRATION DATA SHEET

ENCLOSURE 4

SYSTEM: Makeup and Purification

FUNCTION: RC Pump IC Seal Inlet Water Flow

PRIMARY ELEMENT: MU-7-DPT3

RANGE: 0-200 inches H<sub>2</sub>O

REF: D8034039 SHT. 4, 208-047 RC-03, 209-178 SHT. 2,  
302-661 SHT. 3, and 308-670

TEST EQUIPMENT

CAL DUE DATE

NOTE: (1) Transmitter located 119' elev Reactor. Bldg., outside "B" D-ring wall, Southeast corner.

(2) Connect Transmitter Simulator with DMM in series to NNI Cabinet 2 Row 9 Terminal Board 6, Terminal 13(+) and 14(-).

| INPUT  |                         | MU-7-DPT3           |          |                                |         |                               | MU-7-FI3 (Main Control Board PSA Lower) |          |                              |         |                             |
|--------|-------------------------|---------------------|----------|--------------------------------|---------|-------------------------------|---|----------|------------------------------|---------|-----------------------------|
| % SPAN | inches H <sub>2</sub> O | DESIRED OUTPUT mAdc | AS FOUND | AS FOUND TOLERANCE ± 0.08 mAdc | AS LEFT | AS LEFT TOLERANCE ± 0.04 mAdc | DESIRED OUTPUT GPM                      | AS FOUND | AS FOUND TOLERANCE ± 0.5 GPM | AS LEFT | AS LEFT TOLERANCE ± 0.5 GPM |
| 0      | 0                       | 4.00                |          | 3.92 to 4.08                   |         | 3.96 to 4.04                  | 0                                       |          | -0.5 to 0.5                  |         | -0.5 to 0.5                 |
| 25     | 50                      | 8.00                |          | 7.92 to 8.08                   |         | 7.96 to 8.04                  | 10                                      |          | 9.5 to 10.5                  |         | 9.5 to 10.5                 |
| 49     | 98                      | 11.84               |          | 11.76 to 11.92                 |         | 11.80 to 11.88                | 14                                      |          | 13.5 to 14.5                 |         | 13.5 to 14.5                |
| 72.25  | 144.5                   | 15.56               |          | 15.48 to 15.64                 |         | 15.52 to 15.60                | 17                                      |          | 16.5 to 17.5                 |         | 16.5 to 17.5                |
| 100    | 200                     | 20.00               |          | 19.92 to 20.08                 |         | 19.96 to 20.04                | 20                                      |          | 19.5 to 20.5                 |         | 19.5 to 20.5                |
| 72.25  | 144.5                   | 15.56               |          | 15.48 to 15.64                 |         | 15.52 to 15.60                | 17                                      |          | 16.5 to 17.5                 |         | 16.5 to 17.5                |
| 49     | 98                      | 11.84               |          | 11.76 to 11.92                 |         | 11.80 to 11.88                | 14                                      |          | 13.5 to 14.5                 |         | 13.5 to 14.5                |
| 25     | 50                      | 8.00                |          | 7.92 to 8.08                   |         | 7.96 to 8.04                  | 10                                      |          | 9.5 to 10.5                  |         | 9.5 to 10.5                 |
| 0      | 0                       | 4.00                |          | 3.92 to 4.08                   |         | 3.96 to 4.04                  | 0                                       |          | -0.5 to 0.5                  |         | -0.5 to 0.5                 |

NOTE: Connect DMM to NNI 2-9-3 Term. 13 & 14 to monitor contact action, 125 Vdc may be present from RCP start circuit.

| SERVICE DEVICES - NNI SIGNAL MONITORS         |   |          |                                |         |                               |
|---|---|----------|--------------------------------|---------|-------------------------------|
| DEVICE  | ACTION / SETPOINT   | AS FOUND | AS FOUND TOLERANCE ± 0.05 mAdc | AS LEFT | AS LEFT TOLERANCE ± 0.03 mAdc |
| NNI SIGNAL MONITOR<br>4-8-4<br><br>(MU-7-FS3) | NEG "ON" at 4.36 mAdc ±<br>(3 GPM)<br><br>LOW SEAL FLOW ALARM EVENT PT. 1086<br><br>RC PUMP SEAL FLOWS HIGH/LOW ALARM (H-5-7)<br><br>NNI 2-9-3 Term. 13 & 14 (Contact Open On Low Flow)<br>(Interlock to RCP Start Circuit) |          | 4.31 to 4.41 mAdc              |         | 4.33 to 4.39 mAdc             |
|   |   | [ ]      |                                | [ ]     |                               |
|   |   | [ ]      |                                | [ ]     |                               |
|   |   | [ ]      |                                | [ ]     |                               |

Lubricated and installed new Cover O-ring (FPC #52601159). Cover torqued to 200 in-lbs.

Cover Restoration Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

SPV - Cover Restoration Verified by: \_\_\_\_\_ Date: \_\_\_\_\_

Calibration Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Data Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_



STRING CALIBRATION DATA SHEET

ENCLOSURE 5

SYSTEM: Makeup and Purification  
 FUNCTION: RC Pump ID Seal Inlet Water Flow  
 PRIMARY ELEMENT: MU-7-DPT4  
 RANGE: 0-200 inches H<sub>2</sub>O

REF: D8034039 SHT. 4, 208-047 RC-04, 209-178 SHT. 2,  
 302-661 SHT. 3, and 308-670

TEST EQUIPMENT \_\_\_\_\_  
 \_\_\_\_\_  
 CAL DUE DATE \_\_\_\_\_  
 \_\_\_\_\_

NOTE: (1) Transmitter located 119' elev Reactor Bldg., outside "B" D-ring wall, Northwest corner.  
 (2) Connect Transmitter Simulator with DMM in series to NNI Cabinet 2 Row 9 Terminal Board 6, Terminal 17(+) and 18(-).

| INPUT  |                         | MU-7-DPT4           |          |                                    |         |                                   | MU-7-FI4 (Main Control Board PSA Lower) |          |                                  |         |                                 |
|--------|-------------------------|---------------------|----------|------------------------------------|---------|-----------------------------------|---|----------|----------------------------------|---------|---------------------------------|
| % SPAN | inches H <sub>2</sub> O | DESIRED OUTPUT mAdc | AS FOUND | AS FOUND TOLERANCE $\pm 0.08$ mAdc | AS LEFT | AS LEFT TOLERANCE $\pm 0.04$ mAdc | DESIRED OUTPUT GPM                      | AS FOUND | AS FOUND TOLERANCE $\pm 0.5$ GPM | AS LEFT | AS LEFT TOLERANCE $\pm 0.5$ GPM |
| 0      | 0                       | 4.00                |          | 3.92 to 4.08                       |         | 3.96 to 4.04                      | 0                                       |          | -0.5 to 0.5                      |         | -0.5 to 0.5                     |
| 25     | 50                      | 8.00                |          | 7.92 to 8.08                       |         | 7.96 to 8.04                      | 10                                      |          | 9.5 to 10.5                      |         | 9.5 to 10.5                     |
| 49     | 98                      | 11.84               |          | 11.76 to 11.92                     |         | 11.80 to 11.88                    | 14                                      |          | 13.5 to 14.5                     |         | 13.5 to 14.5                    |
| 72.25  | 144.5                   | 15.56               |          | 15.48 to 15.64                     |         | 15.52 to 15.60                    | 17                                      |          | 16.5 to 17.5                     |         | 16.5 to 17.5                    |
| 100    | 200                     | 20.00               |          | 19.92 to 20.08                     |         | 19.96 to 20.04                    | 20                                      |          | 19.5 to 20.5                     |         | 19.5 to 20.5                    |
| 72.25  | 144.5                   | 15.56               |          | 15.48 to 15.64                     |         | 15.52 to 15.60                    | 17                                      |          | 16.5 to 17.5                     |         | 16.5 to 17.5                    |
| 49     | 98                      | 11.84               |          | 11.76 to 11.92                     |         | 11.80 to 11.88                    | 14                                      |          | 13.5 to 14.5                     |         | 13.5 to 14.5                    |
| 25     | 50                      | 8.00                |          | 7.92 to 8.08                       |         | 7.96 to 8.04                      | 10                                      |          | 9.5 to 10.5                      |         | 9.5 to 10.5                     |
| 0      | 0                       | 4.00                |          | 3.92 to 4.08                       |         | 3.96 to 4.04                      | 0                                       |          | -0.5 to 0.5                      |         | -0.5 to 0.5                     |

NOTE: Connect DMM to NNI 2-9-3 Term. 17 & 18 to monitor contact action, 125 Vdc may be present from RCP start circuit.

| SERVICE DEVICES - NNI SIGNAL MONITORS  |  |          |                                    |         |                                   |
|--|--|----------|------------------------------------|---------|-----------------------------------|
| DEVICE                                 | ACTION / SETPOINT  | AS FOUND | AS FOUND TOLERANCE $\pm 0.05$ mAdc | AS LEFT | AS LEFT TOLERANCE $\pm 0.03$ mAdc |
| NNI SIGNAL MONITOR 4-8-B<br>(MU-7-FS4) | NEG "ON" at 4.36 mAdc $\pm$ (3 GPM)  |          | 4.31 to 4.41 mAdc                  |         | 4.33 to 4.39 mAdc                 |
|  | LOW SEAL FLOW ALARM EVENT PT. 1087   | [ ]      |                                    | [ ]     |                                   |
|  | RC PUMP SEAL FLOWS HIGH/LOW ALARM (H-5-7)  | [ ]      |                                    | [ ]     |                                   |
|  | NNI 2-9-3 Term. 17 & 18 (Contact Open On Low Flow)<br>(Interlock to RCP Start Circuit) | [ ]      |                                    | [ ]     |                                   |

Lubricated and installed new Cover O-ring (FPC #52601159). Cover torqued to 200 in-lbs.

Cover Restoration Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

SPV - Cover Restoration Verified by: \_\_\_\_\_ Date: \_\_\_\_\_

Calibration Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Data Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_





# INTEROFFICE CORRESPONDENCE

FROM: Manager, Nuclear I&C Shop  
Office

NW2A  
MAC

3784  
Telephone

SUBJECT: Out-of-Tolerance Log Sheet

TO: Supervisor, Nuclear Plant Technical Support (I&C), NA2J

| Tag # | Step/Enclosure # | Page # | Max Error | PR, WR # | Date | Comments | Print Name |
|-------|------------------|--------|-----------|----------|------|----------|------------|
|       |                  |        |           |          |      |          |            |
|       |                  |        |           |          |      |          |            |
|       |                  |        |           |          |      |          |            |
|       |                  |        |           |          |      |          |            |
|       |                  |        |           |          |      |          |            |
|       |                  |        |           |          |      |          |            |
|       |                  |        |           |          |      |          |            |
|       |                  |        |           |          |      |          |            |

Additional Comments/Observations: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Additional copies of this form can be made as required.

CMIS EQUIPMENT

NOTE: The following is a list a CMIS Tag #'s affected by this procedure.

| <u>TAG #</u> | <u>DESCRIPTION</u>    | <u>TAG #</u> | <u>DESCRIPTION</u>    |
|--------------|-----------------------|--------------|-----------------------|
| MU-7-DPT1    | TRANSMITTER, FLOW     | MU-7-DPT2    | TRANSMITTER, FLOW     |
| MU-7-DPT3    | TRANSMITTER, FLOW     | MU-7-DPT4    | TRANSMITTER, FLOW     |
| MU-7-FI1     | INDICATOR, FLOW       | MU-7-FI2     | INDICATOR, FLOW       |
| MU-7-FI3     | INDICATOR, FLOW       | MU-7-FI4     | INDICATOR, FLOW       |
| MU-7-FS1     | SWITCH, FLOW          | MU-7-FS2     | SWITCH, FLOW          |
| MU-7-FS3     | SWITCH, FLOW          | MU-7-FS4     | SWITCH, FLOW          |
| MU-7-SQ1     | SQUARE ROOT EXTRACTOR | MU-7-SQ2     | SQUARE ROOT EXTRACTOR |
| MU-7-SQ3     | SQUARE ROOT EXTRACTOR | MU-7-SQ4     | SQUARE ROOT EXTRACTOR |
| MU-7-IB1     | BUFFER, CURRENT       | MU-7-IB2     | BUFFER, CURRENT       |
| MU-7-IB3     | BUFFER, CURRENT       | MU-7-IB4     | BUFFER, CURRENT       |