ENCLOSURE 5

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
NRC DOCKET NOS. 50-325 & 50-324
OPERATING LICENSE NOS. DPR-71 & DPR-62
REQUEST FOR LICENSE AMENDMENT
SERVICE WATER SYSTEM

2-PT-24.6.4

SERVICE WATER SYSTEM HYDRAULIC PERFORMANCE TEST (INCLUDING RESULTS)

DATE COMPLETED 12-6-91

UNIT 2 & POWER 0 GMWE 0

FOREMAN/SUPERVISOR CHISO / SCOGGIN

REASON FOR TEST (check one or more) :

__✓__ Routine Surveillance

_____ OWP # _____

_____ WR/JO # _____

_____ Other (Explain)

_____

_____

_____

CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT

UNIT 2

PROCEDURE TYPE:	PERFORMANCE TEST
NUMBER:	2-PT-24.6.4
PROCEDURE TITLE:	SERVICE WATER SYSTEM HYDRAULIC PERFORMANCE TEST
FREQUENCY:	A. Once every Refueling B. Heat Exchanger Performance Monitoring as required

REVISION 2

APPROVED BY: R E Helme 11/19/91

General Manager/
Manager - Technical Support

Date

DATE COMPLETED _____

UNIT ____ __% POWER ____ GMWE _____

FOREMAN/SUPERVISOR _____

REASON FOR TEST (check one or more) :

____ Routine Surveillance

____ OWP # _____

____ WR/JO # _____

____ Other (Explain)

_____

_____

_____

CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT

UNIT 2

PROCEDURE TYPE:	PERFORMANCE TEST
NUMBER:	2-PT-24.6.4
PROCEDURE TITLE:	SERVICE WATER SYSTEM HYDRAULIC PERFORMANCE TEST
FREQUENCY:	A. Once every Refueling
	B. Heat Exchanger Performance Monitoring as required

REVISION 2

APPROVED BY: _____ 4/19/91

Manager/
Ma[illegible] - Technical Support

Date

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1.0 PURPOSE

1.1 The purpose of this Performance Test is to demonstrate, at refueling outage frequency, the Service Water System is hydraulically capable of meeting the design basis flow requirements to safety related components and provide a data source for non-modification performance trending of the Service Water System and individual components thereof. This test is not intended to demonstrate particular set flow values at each component, but will collect data from which performance can be extrapolated. This test will also quantify Service Water leakage from the Nuclear to Conventional Header.

Flow measurement at individual components will be accomplished utilizing Controlotron portable (temporary) ultrasonic flow metering systems. To observe system trending from performance to performance of this test the locations where the flow measurement are taken and the equipment set up must be duplicated as close as possible every time this procedure is performed. Attachments 1 through 5 provide the means to accomplish this by establishing and recording initial setup locations and documenting any deviations thereafter.

2.0 REFERENCES

2.1 Technical Specification Interpretation, TSI 90-03 (Rev. 0)

2.2 FSAR Section 5.4.7, Residual Heat Removal System

2.3 FSAR Section 7.4.3, Residual Heat Removal (RHR) System, Reactor Shutdown Cooling System Mode

2.4 FSAR Section 9.2.1, Service Water System

2.5 FSAR Section 9.2.2, Reactor Building Component Cooling Water System

2.6 FSAR Section 15.0, Accident Analysis

2.7 Operating Procedure OP-43, Service Water System

2.8 Operating Procedure OP-43.1, Chlorination System

2.9 Operating Procedure OP-44, Turbine Building Closed Cooling Water System

2.10 Operating Procedure OP-29, Circulating Water System

2.11 System Description SD-43, Service Water System

2.12 Drawings

D-02041, Sheets 1, 2 and 3, Service Water System, Unit 2

D-02274, Sheets 1 and 2, Diesel Generator Service Water and Demineralized Water System, Units 1 and 2

2.0 REFERENCES

D-02537, Sheets 1 and 2, Reactor Building Service Water System, Unit 2

2.13 The Following Controlotron™ Field Manuals, Bulletins and Technical Advisories.

2.13.1 Field Manual 990PFM-1C-A

2.13.2 Field Manual 990PFM-2B

2.13.3 Bulletin 991XA

2.13.4 Technical Advisories #1, #3, #8, #14, and zero reversal procedure.

3.0 GENERAL PREREQUISITES

3.1 The Service Water System is lined up for normal operation per OP-43 (with Conventional Service Water, Nuclear Service Water, and RHR Service Water [A and B Loop] operable) with any deviation from the normal lineup affecting this procedure noted on this procedure's Certification and Review Form.

3.2 No other testing or maintenance is in progress that will adversely affect the performance of this test.

3.3 Unit 2 TBCCW will be diverted to the 2C TBCCW Heat Exchanger where it will be cooled by Unit 1 Service Water.

3.4 Unit 2 Circulating Water System is shut down and not in service.

3.5 Test gauges are to be installed at Pressure Switch, 2-SW-PS-3213, Pressure Switch 2-SW-PS-3214, Pressure Indicator, 2-SW-PI-819, and Pressure Indicacor, 2-SW-PI-821.

4.0 GENERAL PRECAUTIONS AND LIMITATIONS

4.1 When taking readings to be recorded during the performance of this procedure, the indicator/pointer fluctuation should be reduced to a minimum. An instrument isolation valve upstream of the instrument may be throttled to reduce fluctuation.

4.2 One RHR Pump Room Cooler shall be aligned to the NSW Header whenever the NSW Header is in service.

4.3 At Step 9.3.34, the Unit 2 Conventional Header will be depressurized, and therefore all loads off the Unit 2 Conventional Header are to be shut down or aligned to an alternate source of cooling.

4.4 Unit 2 shall be in Mode 4 or 5 during the performance of this procedure.

4.0 GENERAL PRECAUTIONS AND LIMITATIONS

4.5 Steps can be performed out of sequence with the concurrence of the Shift Supervisor and the responsible engineer.

5.0 RESPONSIBILITIES

5.1 Responsible Engineer: Determine system components which require flow monitoring during the performance of this procedure, direct the performance of this procedure to include mobilization of forces for setup of temporary flow monitoring instrumentation, collection of data and transmit the collected data to NED for analysis. During initial performance of this Performance Test during Refueling Outage B210R1, pipe wall thicknesses (per Section 11.3.4) will be obtained at each flow monitoring site location. On subsequent performances of the Performance Test, the responsible engineer will evaluate if pipe wall thicknesses (per Section 11.3.4) are needed to be determined if flow monitoring site locations have not changed.

5.2 Operations: Operate plant systems, equipment and valves as directed by this procedure.

5.3 Maintenance: Install appropriate test equipment and gauges as directed by the responsible engineer.

5.4 NED: Analyze collected data and determine if system capabilities are within the system design basis.

6.0 SPECIAL TOOLS AND EQUIPMENT

6.1 The following test gauges:

		Preferred Range	Acceptable Range
6.1.1	Test Gauge #1 Heisse	0 - 150 psig	0 - 100 psig
6.1.2	Test Gauge #2 Heisse	0 - 150 psig	0 - 100 psig
6.1.3	Test Gauge #3 Heisse	0 - 150 psig	0 - 100 psig
6.1.4	Test Gauge #4 Heisse	0 - 150 psig	0 - 100 psig

6.2 Uniflow Ultrasonic Flowmeter System 990 Portable Computers (Controlotron) SB version (115 VAC Power) Group 4 (operates transducers sizes 1, 2, 3, 4, and 4A) with the appropriate transducer, cables and mounting tracks as necessary to support flow data collection during this procedure.

6.3 Ultrasonic wall thickness measuring instruments (as needed).

NOTE:

A suitable test gauge shall have a total range of less than or equal to three times the reference value for the parameter being monitored and an adequate range to prevent damage during use.

6.0 SPECIAL TOOLS AND EQUIPMENT

6.4 A suitable test instrument may be installed in place of any instrument to obtain data.

6.4.1	Instrument replaced by test instrument	NA
6.4.2	Shift Supervisor's permission to replace Instrument	NA
6.4.3	Range of test instrument	NA
6.4.4	Instrument I.D. No.	NA
6.4.5	Calibration due Date	NA

6.5 The following installed instruments with the required data recorded below:

6.5.1	2-SW-PDIC-138	Calibration Date	3/29/91 N-1
6.5.2	2-SW-PDIC-138	Calibration Due Date	2/10/92
6.5.3	2-SW-PDIC-140	Calibration Date	3/29/91
6.5.4	2-SW-PDIC-140	Calibration Due Date	2/10/92
6.5.5	2-SW-PI-131-1	Calibration Date	1/22/91
6.5.6	2-SW-PI-131-1	Calibration Due Date	1/20/92
6.5.7	2-SW-PI-144	Calibration Date	7/26/91
6.5.8	2-SW-PI-144	Calibration Due Date	1/20/92
6.5.9	2-SW-PI-145	Calibration Date	7/25/91
6.5.10	2-SW-PI-145	Calibration Due Date	1/20/92
6.5.11	2-SW-PI-143-1	Calibration Date	1/22/91
6.5.12	2-SW-PI-143-1	Calibration Due Date	1/20/92
6.5.13	2-SW-FI-5114	Calibration Date	6/5/91
6.5.14	2-SW-FI-5114	Calibration Due Date	11/30/92
6.5.15	2-SW-FI-5115	Calibration Date	7/3/91
6.5.16	2-SW-FI-5115	Calibration Due Date	11/30/92

6.0 SPECIAL TOOLS AND EQUIPMENT

6.5.17	2-SCW-LT-285	Calibration Date	10/10/91
6.5.18	2-SCW-LT-285	Calibration Due Date	1/6/92
6.5.19	2-SW-FT-1158	Calibration Date	~~7/16/91~~ 9/18/91
6.5.20	2-SW-FT-1158	Calibration Due Date	7/6/92
6.5.21	2-E11-FT-N007A	Calibration Date	5/9/91
6.5.22	2-E11-FT-N007A	Calibration Due Date	5/4/92
6.5.23	2-E11-FI-R602A	Calibration Date	11/5/91
6.5.24	2-E11-FI-R602A	Calibration Due Date	4/27/92
6.5.25	2-E11-FT-N007B	Calibration Date	5/9/91
6.5.26	2-E11-FT-N007B	Calibration Due Date	5/4/92
6.5.27	2-E11-FI-R602B	Calibration Date	11/6/91
6.5.28	2-E11-FI-R602B	Calibration Due Date	4/27/92

7.0 ACCEPTANCE CRITERIA

7.1 As such, there is no set flow rate established for the individual Service Water System components or the system as a whole. Ongoing modifications and system degradation due to age, corrosion and wear alter flow not only at the individual components, but throughout the whole system. Data collected by this procedure will be analyzed by NED for permissible near and long term operability.

8.0 TEST EQUIPMENT SETUP

8.1 Obtain permission form the Shift Supervisor to perform this section. _____

8.2 Setup the Controlotron flow measuring equipment at the required sites and perform the zero flow calibrations as instructed in Section 11.0 of this procedure. SR

9.0 PROCEDURE STEPS

9.1 Prerequisites

9.1.1 The Service Water System is lined up for normal operation per OP-43 with any deviation from the normal lineup affecting this procedure noted on this procedure's Certification and Review Form.

9.1.2 Both NSW Pumps are available.

9.2 Precautions and Limitations

9.2.1 The RBCCW Service Water flow rate shall not be decreased below 2500 gpm nor exceed 5500 GPM indicated at 2-SW-FI-1158-1 on RTGB Panel XU-2.

9.2.2 TBCCW and RBCCW temperatures should be closely monitored while this test is being performed. If temperatures start to rise or fall excessively, they should be allowed to return to normal before this test is continued.

9.2.3 The data generated by this procedure shall be analyzed by NED and approval given prior to unit start-up.

9.3 Procedure Steps

9.3.1 Ensure that all prerequisites listed in Section 9.1 are met. _____

9.3.2 Obtain permission from the Shift Supervisor to perform this test. _____

9.3.3 Open 2-SW-PS-3213 Instrument Test Valve, 2-SW-PS-3213-10. _____

9.3.4 Open 2-SW-PS-3214 Instrument Test Valve, 2-SW-PS-3214-10. _____

9.3.5 ~~Open 2-SW-PI-819~~ Instrument Drain Valve, 2-SW-PI-819-6. _____

9.3.6 Open 21-SW-PI-821 Instrument Drain Valve, 2-SW-PI-821-6. _____

9.3.7 Open, or verify open, Nuclear Service Water Pump A Discharge Pressure Indicator Root Valve to 2-SW-PI-144, 2-SW-V61. _____

Revise (2-SW-PI-819-1)

TEMP. REV. 91-403

9. PROCEDURE STEPS

9.1 Prerequisites

9.1.1 The Service Water System is lined up for normal operation per OP-43 with any deviation from the normal lineup affecting this procedure noted on this procedure's Certification and Review Form.

9.1.2 Both NSW Pumps are available.

9.2 Precautions and Limitations

9.2.1 The RBCCW Service Water flow rate shall not be decreased below 2500 gpm nor exceed 5500 GPM indicated at 2-SW-FI-1158-1 on RTGB Panel XU-2.

9.2.2 TBCCW and RBCCW temperatures should be closely monitored while this test is being performed. If temperatures start to rise or fall excessively, they should be allowed to return to normal before this test is continued.

9.2.3 The data generated by this procedure shall be analyzed by NED and approval given prior to unit start-up.

9.3 Procedure Steps

9.3.1 Ensure that all prerequisites listed in Section 9.1 are met. _____

9.3.2 Obtain permission from the Shift Supervisor to perform this test. _____

9.3.3 Open 2-SW-PS-3213 Instrument Test Valve, 2-SW-PS-3213-10. PL

9.3.4 Open 2-SW-PS-3214 Instrument Test Valve, 2-SW-PS-3214-10. PL

9.3.5 Open 2-SW-PI-819 Instrument Drain Valve, 2-SW-PI-819-6. Test. Rig

9.3.6 Open 21-SW-PI-821 Instrument Drain Valve, 2-SW-PI-821-6. _____

9.3.7 Open, or verify open, Nuclear Service Water Pump A Discharge Pressure Indicator Root Valve to 2-SW-PI-144, 2-SW-V61. PL

9.0 PROCEDURE STEPS

9.3.8 Open, or verify open, Nuclear Service Water Pump B Discharge Pressure Indicator Root Valve 2-SW-PI-145, 2-SW-V62. PL

9.3.9 Verify as aligned, or align the Vital Header to the Nuclear Header per OP-43. NP

9.3.10 At RTGB Panel P601 place, or verify as placed, the WELL WATER TO VITAL HEADER VLV 2-SW-V141 control switch in the CLOSE position. NP

9.3.11 Fail open Core Spray Pump Room D Cooler Service Water Outlet Valve, 2-SW-V123, by deenergizing Circuit 18 on 120/208 VAC Dist. Pnl. 2D-HY1. NS

9.3.12 Fail open RHR Pump Room B Cooler Service Water Outlet Valve, 2-SW-V124, by deenergizing Circuit 20 on 120/208 VAC Dist. Pnl. 2D-HY1. NS

9.3.13 Fail open RHR Pumps B and D Coolers Service Water Outlet Valves, 2-SW-V125 and 2-SW-V126, by deenergizing Circuit 21 on 120/208 VAC Dist. Pnl. 2B-HO7. NS

9.3.14 Fail open Core Spray Pump Room C Cooler Service Water Outlet Valve, 2-SW-V128, by deenergizing Circuit 18 on 120/208 VAC Dist. Pnl. 2C-HYO. NS

9.3.15 Fail open RHR Pump Room A Cooler Service Water Outlet Valve, 2-SW-V129, by deenergizing Circuit 20 on 120/208 VAC Dist. Pnl. 2C-HYO. NS

9.3.16 Fail open RHR Pumps A and C Coolers Service Water Outlet Valves, 2-SW-V130 and 2-SW-V131, by deenergizing Circuit 18 on 120/208 VAC Dist. Pnl. 2A-HO6. NS

****

CAUTION

For pump protection, a Nuclear Service Water Pump should not be continuously operated with a flow rate of less than 2500 gpm or greater than 8000 gpm. A flow rate of 2500 gpm corresponds to a Nuclear Header pressure of 78 psig and a flow rate of 8000 gpm corresponds to a Nuclear Header pressure of 48 psig. (As indicated on Panel XU-2 at 2-SW-PI-143-1)

****

NOTE:

Start a second Nuclear Service Water Pump when required.

9.0 PROCEDURE STEPS

9.3.17 Initiate Service Water flow through the #3 Diesel Generator Jacket Water Cooler by performing the following:

PL

9.3.17.1 Deenergize #3 Diesel Generator SW to Jacket Water Cooler Isolation Valve, 2-SW-V212, by placing the breaker at compartment EF2 at MCC DGC in the OFF position.

PL

9.3.17.2 Manually OPEN valve 2-SW-V212.

9.3.18 Initiate Service Water flow through the #4 Diesel Generator Jacket Water Cooler by performing the following:

PL

9.3.18.1 Deenergize #4 Diesel Generator SW to Jacket Water Cooler Isolation Valve, 2-SW-V213, by placing the breaker at compartment EF6 at MCC DGD in the OFF position.

PL

9.3.18.2 Manually OPEN valve 2-SW-V213.

mp

9.3.19 Align the Nuclear Header to supply RBCCW Service Water at a flow rate of 3500 gpm as indicated at Panel XU-2, FLOW TO RBCCW HX indicator 2-SW-FI-1158-1 by throttling the RBCCW Heat Exchanger Service Water Outlet Flow Control Valve 2-SW-V382.

NOTE:

Unit 2 TBCCW will be diverted to the 2C TBCCW Heat Exchanger where it will be cooled by Unit 1 service water. This iteration is necessary since flow through the Unit 2 Conventional service water header will be secured by this procedure.

****

CAUTION

For pump protection, a Conventional Service Water Pump should not be continuously operated with a flow rate of less than 2500 gpm or greater than 8000 gpm. A flow rate of 2500 gpm corresponds to a Conventional Header pressure of 78 psig and a flow rate of 8000 gpm corresponds to a Conventional Header pressure of 48 psig. (As indicated at Panel XU-2 on 2-SW-PI-131-1)

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9.3.20 Verify, or place, the 2C TBCCW Heat Exchanger in service on Unit 1 service water per 1-OP-43.

9.0 PROCEDURE STEPS

9.3.21 Verify, or place, the 2C TBCCW Heat Exchanger in service on Unit 2 TBCCW, and isolate TBCCW Heat Exchangers 2A and 2B, per OP-44.

NOTE:

The RHR SW Loops will be fed by the Nuclear Header in this procedure. Either Unit 2 RHR SW Loop may be put into service at this time for this test. Loop swap per Steps 9.3.30 through 9.3.33 must be performed if the RHR SW Booster Pump Motor Coolers SW flow on the standby loop require flow monitoring. If flow monitoring on RHR SW Booster Pump Motor Coolers is to be observed on one RHR SW Loop only, the loop swap per Steps 9.3.30 through 9.3.33 need not be performed and the signoffs at these steps and the appropriate data sheet blocks should be N/A'ed.

9.3.22 Per OP-43 start, or verify operating, RHR SW A(B) Loop with both RHR SW Booster Pumps A and C (B and D) operating supplied by the Nuclear Header at a flow rate of 3000 gpm indicated at 2-E11-FI-R602A(B), RHR SW FLOW, on Panel P601.

9.3.23 At Panel P601 position, or verify as positioned, the WELL WATER SUPPLY VALVE 2-SW-V143 control switch in the CLOSE position.

9.3.24 Per OP-29 Shutdown, or verify shutdown the Unit 2 Circulating Water System.

9.3.25 Close, or verify closed, 2-SW-V36, using the SW TO CW PUMPS INB VLV 2-SW-V36 control switch at Panel XU-2.

9.3.26 Align Unit 1 to supply service water to the Chlorination System per the following:

9.3.26.1 Open, or verify open, Chlorination System Service Water Supply Valves, 1-SW-V294 and 1-SW-V295.

9.3.26.2 Close, or verify closed, Chlorination System Service Water Supply Valves, 2-SW-V294 and 2-SW-V295.

9.3.27 Throttle TBCCW ~~Heat Exchanger~~ A Service Water Outlet Valve, 2-SW-V9, and/or TBCCW Heat Exchanger B Service Water Outlet Valve, 2-SW-V10, to establish the Conventional header pressure equal to the Nuclear header pressure within ± 2 psi of 60 psig as indicated at test gauges installed at 2-SW-PS-3213 and 2-SW-PS-3214.

9.0 PROCEDURE STEPS

9.3.28 Record Test Performance Site Setup Verification data per Section 11.5 on the site attachments for components in service. _____

9.3.29 Perform Test Data Acquisition per Section 11.6 for the sites being monitored for flow. Record all data required on Data Sheets 1 through 5. _____

NOTE:

The RHR SW Loop swap per Steps 9.3.30 through 9.3.33 must be performed if either of the RHR SW Booster Pump Motor Coolers SW flow on the standby loop require flow monitoring. If flow monitoring on RHR SW Booster Pump Motor Coolers is to be observed only on the RHR SW Loop presently operating, the loop swap per Steps 9.3.30 through 9.3.33 need not be performed and the signoffs at these steps and the appropriate data sheet blocks should be N/A'ed.

****

CAUTION

For pump protection, a Nuclear Service Water Pump should not be continuously operated with a flow rate of less than 2500 gpm or greater than 8000 gpm. A flow rate of 2500 gpm corresponds to a Nuclear Header pressure of 78 psig and a flow rate of 8000 gpm corresponds to a Nuclear Header pressure of 48 psig. (As indicated at Panel XU-2 on 2-SW-PI-143-1)

****

NOTE:

Shutdown one of the operating Nuclear Service Water Pumps when it is not required.

9.3.30 Per OP-43 shutdown RHR SW A(B) Loop operation. _____

NOTE:

Start a second Nuclear Service Water Pump when it is required.

9.3.31 Per OP-43 place RHR SW B(A) Loop in operation, with both RHR SW Booster Pumps B and D (A and C) operating, supplied by the Nuclear Header at flow rate of 3000 gpm as indicated at 2-E11-FI-R602B(A). _____

9.3.32 Record Test Performance Site Setup Verification data per Section 11.5 on the site Attachments for RHR SW Booster Pump Cooler flow for RHR SW B(A) Loop. _____

9.3.33 Perform Test Data Acquisition per Section 11.6 for the sites being monitored for flow. Record all data required on Data Sheets 1 through 5. _____

9.0 PROCEDURE STEPS

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CAUTION

The following step will depressurize the Unit 2 Conventional Header. Ensure all loads off of the Unit 2 Conventional Header are shutdown or aligned to an alternate source of cooling. If Nuclear Header pressure drops below 40 psig as indicated at 2-SW-PI-143-1, indicating excessive leakage from the Nuclear, to the Conventional Header, immediately restart the Conventional Service Water Pump(s).

****

9.3.34 Place all Unit 2 Conventional Service Water Pump mode selector switches in the MAN position. _____

9.3.35 Depressurize the Unit 2 Conventional Header by stopping the operating Unit 2 Conventional Service Water Pump(s). _____

9.3.36 Deenergize the Conventional Service Water Pump A Discharge Valve to Conventional Header, 2-SW-V13, by placing the breaker at compartment E07 at MCC 2PA in the OFF position. PL

9.3.37 Deenergize the Conventional Service water Pump B Discharge Valve to Conventional Header, 2-SW-V15, by placing the breaker at compartment E36 at MCC 2PB in the OFF position. PL

9.3.38 Deenergize the Conventional Service Water Pump C Discharge Valve to Conventional Header, 2-SW-V17, by placing the breaker at compartment BV0 at MCC 1PA in the OFF position. PL

9.3.39 Manually open Conventional Service Water Pump A Discharge Valve to Conventional Header, 2-SW-V13. PL

9.3.40 Manually open Conventional Service Water Pump B Discharge Valve to Conventional Header, 2-SW-V15. PL

9.3.41 Manually open Conventional Service Water Pump C Discharge Valve to Conventional Header, 2-SW-V17. PL

9.3.42 Perform Test Data Acquisition per Section 11.6 for the sites being monitored for flow. Record all data required on Data Sheets 1 through 5. _____

9.0 PROCEDURE STEPS

9.3.43 Place the discharge valve breakers for the two Conventional Service Water Pumps to remain idle in the ON position. N/A signoffs below for the Conventional Service Water Pump to be started in Step 9.3.46. — PL

9.3.43.1 Breaker ON at compartment E07 at MCC 2PA for Conventional Service Water Pump A Discharge Valve to Conventional Header, 2-SW-V13. — PL ~~N/A~~ / ~~N/A~~ — Ind.Ver.

9.3.43.2 Breaker ON at compartment E36 at MCC 2PB for Conventional Service Water Pump B Discharge Valve to Conventional Header, 2-SW-V15. — ~~NA~~ NA / ~~N/A~~ — Ind.Ver.

9.3.43.3 Breaker ON at compartment BV0 at MCC 1PA for Conventional Service Water Pump C Discharge Valve to Conventional Header, 2-SW-V17. — PL / ~~N/A~~ — Ind.Ver.

9.3.44 Verify (locally) the respective valves for the breakers placed in the ON position in the above steps are CLOSED. N/A the signoffs for the valve for the breaker that remained deenergized.

9.3.44.1 Conventional Service Water Pump A Discharge Valve to Conventional Header, 2-SW-V13. — PL / ~~N/A~~ — Ind.Ver.

9.3.44.2 Conventional Service Water Pump B Discharge Valve to Conventional Header, 2-SW-V15. — NA / NA — Ind.Ver.

9.3.44.3. Conventional Service Water Pump C Discharge Valve to Conventional Header, 2-SW-V17. — PL / [illegible] — Ind.Ver.

9.3.45 Manually close the Conventional Service Water Pump Discharge Valve to Conventional Header for the Conventional Service Water Pump to be placed in service. — PL

9.0 PROCEDURE STEPS

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CAUTION

The Conventional Service Water Pump Discharge Valve to Conventional Header for the Conventional SW Pump must be manually opened slowly as the pump is started to prevent water hammer.

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9.3.46 Perform the following for the Conventional SW Pump to be placed in service (Conventional Service Water Pump Discharge Valve to Conventional Header breaker open). 2B

9.3.46.1 Align pump discharge selector switch to Conventional Header.

9.3.46.2 Start the pump.

9.3.46.3 Slowly (manually) open the Conventional Service Water Pump Discharge Valve to Conventional Header to the fully open position.

9.3.47 Place the breaker for the Conventional Service Water Pump Discharge Valve to Conventional Header opened in step 9.3.46.3 in the ON position and record the following:

MCC No.	Bkr. Compt.	Position	
2P6	E36	ON	Ind.Ver.

9.3.48 Open 2-SW-V36 using the SW TO CW PUMPS INB VLV SW-V36 control switch on Panel XU-2. Ind.Ver.

9.3.49 Align SW Chlorination Supply as directed by Shift Supervisor. (U/1 or U/2 supplying)

9.3.50 Manually open TBCCW Header supply valves 2-SW-V3 and 2-SW-V4.

9.3.51 Throttle TBCCW Heat Exchanger Service Water Outlet Valves 2-SW-V9 and/or 2-SW-V10 until the Conventional header pressure is 48 to 78 psig, as indicated on 2-SW-PI-131-1 on Panel XU-2. NR

9.3.52 Manually close #3 Diesel Generator SW to Jacket Water Cooler Isolation Valve, 2-SW-V212.

9.3.53 Energize #3 Diesel Generator SW to Jacket Water Cooler Isolation Valve, 2-SW-V212, by placing the breaker at compartment EF2 at MCC DGC in the ON position. Ind.Ver.

9.0 PROCEDURE STEPS

9.3.54	Verify the Green CLOSED indicator at MCC DGC Compartment EF2 for Valve 2-SW-V212 is illuminated.	PL, Ind.Ver.
9.3.55	Manually close #4 Diesel Generator SW to Jacket Water Cooler Isolation Valve, 2-SW-V213.	PL
9.3.56	Energize #4 Diesel Generator SW to Jacket Water Cooler Isolation Valve, 2-SW-V213, by placing the breaker at compartment EF6 at MCC DGD in the ON position.	PL, Ind.Ver.
9.3.57	Verify the Green CLOSED indicator at MCC DGD Compartment EF6 for Valve 2-SW-V213 is illuminated.	PL, Ind.Ver.
9.3.58	Restore Unit 2 RBCCW flow as per the Shift Supervisor's instruction.	
9.3.59	Place the Conventional Service Water Pump mode selector switches for the idle Conventional Service Water Pumps to the AUTO position.	Ind.Ver.
9.3.60	Place the idle Conventional Service Water Pump Discharge Valve Selector Switches to the header position (CONV/NUC HDR) as directed by the Shift Supervisor.	Ind.Ver.
9.3.61	Restore Unit 2 RHR SW as per the Shift Supervisor's instructions.	

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CAUTION

One RHR Pump Room Cooler shall be aligned to the NSW Header whenever the NSW Header is in service.

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9.3.62	Energize Core Spray Pump Room D Cooler Service Water Outlet Valve, 2-SW-V123, by placing Circuit 18 on 120/208 VAC Dist. Pnl. 2D-HY1 in the ON position.	Ind.Ver.
9.3.63	Energize RHR Pump Room B Cooler Service Water Outlet Valve, 2-SW-V124, by placing Circuit 20 on 120/208 VAC Dist. Pnl. 2D-HY1 in the ON position.	Ind.Ver.
9.3.64	Energize RHR Pumps B and D Seal Coolers Service Water Outlet Valves, 2-SW-V125 and 2-SW-V126, by placing Circuit 21 on 120/208 VAC Dist. Pnl. 2B-HO7 in the ON position.	Ind.Ver.

9.0 PROCEDURE STEPS

9.3.65	Energize Core Spray Pump Room C Cooler Service Water Outlet Valve, 2-SW-V128, by placing Circuit 18 on 120/208 VAC Dist. Pnl. 2C-HYO in the ON position.	/ Ind.Ver.
9.3.66	Energize RHR Pump Room A Cooler Service Water Outlet Valve, 2-SW-V129, by placing Circuit 20 on 120/208 VAC Dist. Pnl. 2C-HYO in the ON position.	/ Ind.Ver.
9.3.67	Energize RHR Pumps A and C Coolers Service Water Outlet Valves, 2-SW-V130 and 2-SW-V131, by placing Circuit 18 on 120/208 VAC Dist. Pnl. 2A-HO6 in the ON position.	/ Ind.Ver.
9.3.68	Close Nuclear Service Water Pump A Discharge Pressure Root Valve to 2-SW-PI-144, 2-SW-V61.	/ Ind.Ver.
9.3.69	Close Nuclear Service Water Pump B Discharge Pressure Root Valve to 2-SW-PI-145, 2-SW-V62.	/ Ind.Ver.
9.3.70	Close 2-SW-PS-3213 Instrument Test Valve, 2-SW-PS-3213-10.	/ Ind.Ver.
9.3.71	Close 2-SW-PS-3214 Instrument Test Valve, 2-SW-PS-3214-10.	/ Ind.Ver.
9.3.72	Close 2-SW-PI-819 Instrument Drain Valve, 2-SW-I-819-6. REVISE 2-SW-PI-819-1	/ Ind.Ver.
9.3.73	Close 2-SW-PI-821 Instrument Drain Valve, 2-SW-PI-821-6.	/ Ind.Ver.
9.3.74	Place the WELL WATER SUPPLY VALVE 2-SW-V143 control switch, on Panel P601, to the AUTO/OPEN position.	/ Ind.Ver.
9.3.75	If desired, place TBCCW Heat Exchangers 2A and/or 2B in service, and shut down TBCCW Heat Exchanger 2C, per OP-43.	
9.3.76	If desired, isolate Unit 1 service water from the 2C TBCCW Heat Exchanger per 1-OP-43.	
9.3.77	Restore Unit 2 Vital Header lineup per OP-43 and the Shift Supervisor's instruction.	
9.3.78	Per OP-29 and the Shift Supervisor's instruction place the Unit 2 Circulating Water System into service. (if required, otherwise N/A signoff)	
9.3.79	Inform the Shift Supervisor that the test portion of this procedure is complete.	

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9.0 PROCEDURE STEPS

9.3.65	Energize Core Spray Pump Room C Cooler Service Water Outlet Valve, 2-SW-V128, by placing Circuit 18 on 120/208 VAC Dist. Pnl. 2C-HY0 in the ON position.	Ind.Ver.
9.3.66	Energize RHR Pump Room A Cooler Service Water Outlet Valve, 2-SW-V129, by placing Circuit 20 on 120/208 VAC Dist. Pnl. 2C-HY0 in the ON position.	Ind.Ver.
9.3.67	Energize RHR Pumps A and C Coolers Service Water Outlet Valves, 2-SW-V130 and 2-SW-V131, by placing Circuit 18 on 120/208 VAC Dist. Pnl. 2A-H06 in the ON position.	Ind.Ver.
9.3.68	Close Nuclear Service Water Pump A Discharge Pressure Root Valve to 2-SW-PI-144, 2-SW-V61.	Ind.Ver.
9.3.69	Close Nuclear Service Water Pump B Discharge Pressure Root Valve to 2-SW-PI-145, 2-SW-V62.	Ind.Ver.
9.3.70	Close 2-SW-PS-3213 Instrument Test Valve, 2-SW-PS-3213-10.	Ind.Ver.
9.3.71	Close 2-SW-PS-3214 Instrument Test Valve, 2-SW-PS-3214-10.	Ind.Ver.
9.3.72	Close 2-SW-PI-819 Instrument Drain Valve, 2-SW-I-819-6.	Ind.Ver.
9.3.73	Close 2-SW-PI-821 Instrument Drain Valve, 2-SW-PI-821-6.	Ind.Ver.
9.3.74	Place the WELL WATER SUPPLY VALVE 2-SW-V143 control switch, on Panel P601, to the AUTO/OPEN position.	Ind.Ver.
9.3.75	If desired, place TBCCW Heat Exchangers 2A and/or 2B in service, and shut down TBCCW Heat Exchanger 2C, per OP-43.	
9.3.76	If desired, isolate Unit 1 service water from the 2C TBCCW Heat Exchanger per 1-OP-43.	N/A
9.3.77	Restore Unit 2 Vital Header lineup per OP-43 and the Shift Supervisor's instruction.	
9.3.78	Per OP-29 and the Shift Supervisor's instruction place the Unit 2 Circulating Water System into service. (if required, otherwise N/A signoff)	
9.3.79	Inform the Shift Supervisor that the test portion of this procedure is complete.	

10.0 RESTORATION

10.1 Obtain the Shift Supervisor's permission to perform this section. JM

10.2 Remove all Controlotron test equipment used for this procedure. JR

10.3 Inform the Shift Supervisor that this section is complete. SF

11.0 CONTROLOTRON FLOW INSTRUMENTATION SETUP AND DATA ACQUISITION GUIDELINES

NOTE:

Attachments 1 through 5 contain the information required for programming the Uniflow flowmeter and appropriate locations to record the site specific information from the following instructions. After the first performance of this procedure track and transducer installation at each specific site shall be as close as possible to that recorded for the first performance of this procedure. The following instructions do not contain each line item in setting up the Controlotron, as some are intrinsic to the operation of the machine and should be known to a proficient technician. The instructions given are intended to ensure each site is identified and appropriate information collected to ensure duplication of the site can be achieved and verified in future performances of this procedure and that the correct flow data is stored and is retrievable in the Controlotron during the performance of the test section of this procedure.

11.1 Enter the SITE NAME as given on the attachment.

11.2 TEST EQUIPMENT

NOTE:

Track and transducer installation shall conform to Controlotron installation instructions and drawings. To ensure that exact as possible location of the transducers is accomplished for each performance of this procedure the upstream transducer shall always be located with the letter index track.

11.2.1 Record the Controlotron serial number on the Site Attachment.

11.2.2 Record the Track/Transducer size and serial number to be used at the site on the Site Attachment.

11.2.3 Record Track/Transducer Mounting Mode on the Site Attachment.

11.3 PIPE DATA

11.3.1 From the site attachment sketch determine the approximate site location. Clean the pipe (remove paint to the pipe surface) to a clean, smooth surface at the anticipated transducer and pipe O.D. measurement locations.

11.0 CONTROLOTRON FLOW INSTRUMENTATION SETUP AND DATA ACQUISITION GUIDELINES

11.3.2 Determine the pipe outside diameter by performing the following:

NOTE:

For the first performance of this procedure initial transducer locations can be determined by setting up the tracks and transducer at the site and put the Controlotron into service using standard nominal pipe data and appropriate Controlotron default settings. A Valc of 50 or greater is acceptable for the initial location of tracks and transducers, but every effort should be made to obtain Valc readings of 60 or greater. For subsequent performances of this procedure install identical tracks and transducers at each site at the location noted on each site attachment sketch using the dimensions recorded in the first performance of this procedure.

11.3.2.1 Using micrometers or calipers, measure the O.D. of the pipe at the upstream transducer location. Record this dimension on the Site Attachment.

11.3.2.2 At a position 90° around the pipe from the above location measure the pipe O.D. Record this dimension on the Site Attachment.

11.3.2.3 Measure the O.D. of the pipe at the downstream transducer location. Record this dimension on the Site Attachment.

11.3.2.4 At a position 90° around the pipe from the above location measure the pipe O.D. Record this dimension on the Site Attachment.

11.3.2.5 Average the measured O.D.'s and record this number on the Site Attachment and enter as PIPE O.D. in the Controlotron site setup.

11.3.3 Enter the PIPE MATERIAL as given on the Site Attachment.

11.3.4 Determine the pipe wall thickness by performing the following:

NOTE:

The greater the degree of accuracy of the UT pipe wall thickness measuring instrument, the greater the accuracy of the flow measurement, particularly in the small bore pipe, obtained by the Controlotron. The UT instrument used should have the greatest accuracy practically achievable for a given site. Actual UT instrument used shall be determined by the UT Examiner based on site parameters. An appropriate data sheet from the NDE procedure for the UT instrument used to determine pipe wall thickness shall be completed for each site.

11.0 CONTROLOTRON FLOW INSTRUMENTATION SETUP AND DATA ACQUISITION GUIDELINES

11.3.4.1 Using a ultrasonic pipe wall thickness measuring instrument, measure the pipe wall thickness at the upstream transducer location. Record this on the Site Attachment.

11.3.4.2 At a position 90° around the pipe from the above location measure the pipe wall thickness. Record this dimension on the Site Attachment.

11.3.4.3 Using a ultrasonic pipe wall thickness measuring instrument, measure the pipe wall thickness at the downstream transducer location. Record this on the Site Attachment.

11.3.4.4 At a position 90° around the pipe from the above location measure the pipe wall thickness. Record this dimension on the Site Attachment.

11.3.4.5 Average the upstream and downstream pipe wall thicknesses and record the results on the Site Attachment. Enter this as the WALL THICKNESS in the Controlotron setup.

11.3.5 Enter LINER MATERIAL and LINER THICKNESS as given on the Site Attachment, if applicable.

11.3.6 Enter Sea Water as LIQUID TYPE. Leave ESTIMATED Vs and VISCOSITY (CS) at the default settings.

11.3.7 Enter, or verify, VOLUME UNITS as gallons.

11.3.8 Enter, or verify, TIME UNITS as minutes.

11.3.9 Verify that the flow total setup RESOLUTION (0000x000, 00000x00, etc.) is appropriate for the anticipated flow rates.

11.3.10 Enter the following from the DATA SELECTED menu for datalogger setup: SITE NAME, DATE, TIME, FLOW TOTAL, Vs and Valc.

11.3.11 Enter the LOG INTERVAL SET in the datalogger setup as 1M.

11.3.12 In the Controlotron Site Setup Site Load Menu move the cursor to SAVE SITE, then cursor right and press ENTER to save this site in the AFAC memory of the Controlotron.

11.0 CONTROLOTRON FLOW INSTRUMENTATION SETUP AND DATA ACQUISITION GUIDELINES

11.4 Zero Flow Calibration

NOTE:

Site track/transducer setup and cables shall remain in place after zero flow calibration and through test completion. Transducer couplant should be checked prior to the test initiation and if dried up the transducer and pipe shall be cleaned of residue and new couplant applied.

11.4.1 Setup the tracks and transducers at the location shown and described on the Site Attachment. Record the reference dimension on the Site Attachment.

11.4.2 RECALL the desired site in the Controlotron Site setup menu. Initiate flow measuring with the Controlotron using the default zero flow set and parameters generated in Sections 11.1, 11.2 and 11.3.

11.4.3 Record the Letter/Number Spacing Index established for this site.

11.4.4 Establish and verify the zero flow system line up.

11.4.5 Record the present flow reading as the Zero Offset on the Site Attachment.

11.4.6 In the installation menu of the Controlotron enter ACTUAL ZERO as the zero flow set.

11.4.7 From the diagnostics menu of the Controlotron record Vs, Valc, fx, Vfmax, and Vsmax at Diagnostic Data on the Site Attachment.

11.4.8 In the Controlotron Site Setup Site Load Menu move the cursor to SAVE SITE, then cursor right and press ENTER to save this site in the AFAC memory of the Controlotron.

11.5 Test Performance Site Setup Verification.

11.5.1 RECALL the desired site in the Controlotron Site setup menu.

11.5.2 From the diagnostics menu of the Controlotron record Vs, Valc, fx, Vfmax, and Vsmax at Test Diagnostic Data on the Site Attachment.

11.0 CONTROLOTRON FLOW INSTRUMENTATION SETUP AND DATA ACQUISITION GUIDELINES

NOTE:

If, during the performance of the procedure steps per Section 9.0, it appears that the zero flow calibration for the site has been lost or the present setup at a site is questionable determined from the diagnostic information, the tracks and transducers may be moved, reset and the site zero calibrated by the transducer reversal method and noted as such in the comment section of the appropriate Site Attachment.

11.6 Test Data Acquisition

11.6.1 Record the appropriate Site Attachment number on the Data Acquisition Sheet.

11.6.2 RECALL the desired site in the Controlotron Site setup menu.

NOTE:

The Net Totalizer Register may be reset to zero prior to performing the next step by pressing and holding the function key for the channel being used (F1 for Channel 1, F2 for Channel 2) and then press numeric key 1 on the hand held CDU.

11.6.3 At the Data Logger Setup in the Controlotron site setup menu, cursor to DataLogger Mode, cursor right to level D, scroll to MEMORY and press ENTER.

11.6.4 Return cursor to level A of the Controlotron menus, then scroll to Operation Setup, cursor right to level B and scroll (down) to Display Select, cursor right to level C then scroll to DATALOGGER and press ENTER. The Datalogger display should appear on the Graphic Screen.

11.6.5 Press and hold the down cursor button on the CDU until the data on the Graphics Display Screen stops scrolling.

11.6.6 Record the Attachment No., Site Name, Step No. and Date on the Data Acquisition Sheet.

11.6.7 Observe the Graphic Display on the Controlotron and as new updates are displayed at 1 minute intervals (this requires occasionally scrolling the down cursor on the CDU) record the data on the Data Acquisition Sheet. At each subsequent update calculate the difference of the displayed Flow Total and record this in the appropriate box of the Flow Total Difference Column.

11.0 CONTROLOTRON FLOW INSTRUMENTATION SETUP AND DATA ACQUISITION GUIDELINES

11.6.8 Continue recording each update until at least 5 Flow Total Differences have been calculated. Average the flow total differences and record the results in the appropriate box for that site for the procedure step being performed on the appropriate data sheet.

11.6.9 Review recorded data on the Data Acquisition Sheet with the data displayed on the Graphics Display Screen for accuracy.

11.6.10 When sufficient data has been recorded on the Data Acquisition Sheet, return to the Datalogger Setup menu, go into Datalogger Mode and Enter OFF. Proceed to the next site for data acquisition or to the next test procedure step.

ATTACHMENT 1 2A NUCLEAR SERVICE WATER PUMP DISCHARGE SITE SETUP

1.0 SITE NAME: 2ANPMP

1.1 TEST EQUIPMENT

1.1.1 Controlotron Serial No. 40679

1.1.2 Track/Transducer size: 9

1.1.3 Transducer Serial Nos.: (up) 40335A
(down) 40335B

1.1.4 Track/Transducer Mounting Mode: (Direct/Reflect) Direct

1.2 PIPE DATA

1.2.1 Pipe O.D.:

1.2.1.1 O.D. at upstream transducer location. 19.516 in.

1.2.1.2 O.D. 90° around pipe from upstream transducer location. 19.532 in.

1.2.1.3 O.D. at downstream transducer location. 19.528 in.

1.2.1.4 O.D. 90° around pipe from downstream transducer location. 19.546 in.

1.2.1.5 Average of measured O.D.'s: 19.531 in.

Micrometers/Calipers:
CP&L No.: VC003 Cal Date: 8/5/91 Cal Due Date: 2/3/92

1.2.2 Pipe Material: STEEL

1.2.3 Wall Thickness:

1.2.3.1 Pipe Wall thickness at upstream transducer location. 0.365 in.

1.2.3.2 Pipe wall thickness 90° around pipe from upstream transducer location. 0.370 in.

1.2.3.3 Pipe Wall thickness at downstream transducer location. 0.355 in.

1.2.3.4 Pipe wall thickness 90° around pipe from downstream transducer location. 0.365 in.

1.2.3.5 Average pipe wall thickness. 0.364 in.

1.2.4 Liner Material: Cement Thickness: .313 in.

ATTACHMENT 1 2A NUCLEAR SERVICE WATER PUMP DISCHARGE FLOW

2.0 ZERO FLOW CALIBRATION

2.1 Precautions and Limitations

2.1.1 The 2A Nuclear Service Water Pump can be removed from service.

2.2 System Lineup

2.2.1 Setup the tracks and transducers on line 2-SW-4-20-157 at the location shown on the 2A Nuclear Service Water Pump Discharge Site Setup Sketch. Measure and record below and on the sketch the reference dimension from the floor (El. 4' 0") to the upstream edge of the track.

REFERENCE DIMENSION: 130 1/9"

2.2.2 Measure and record the axial displacement in inches on the pipe surface from the centerline of the Nuclear Header to the nearest edge of the track holding the upstream transducer.

REFERENCE DIMENSION: 18 1/2"

2.2.3 Remove from service, or verify as such, 2A Nuclear Service Water Pump. SR

2.2.4 Verify the Nuclear Header Service Water Pump A Discharge Valve, 2-SW-V19, is closed. SR

2.3 Zero Set

2.3.1 Letter/Number Spacing Index B/9

2.3.2 Zero Offset: (-) 15 gpm

2.3.3 Diagnostic Data:

Vs 1439.21 m/s Valc 50 fx 22

Vfmax 34.92 Vsmax 1749.35

3.0 TEST PERFORMANCE SITE SETUP VERIFICATION

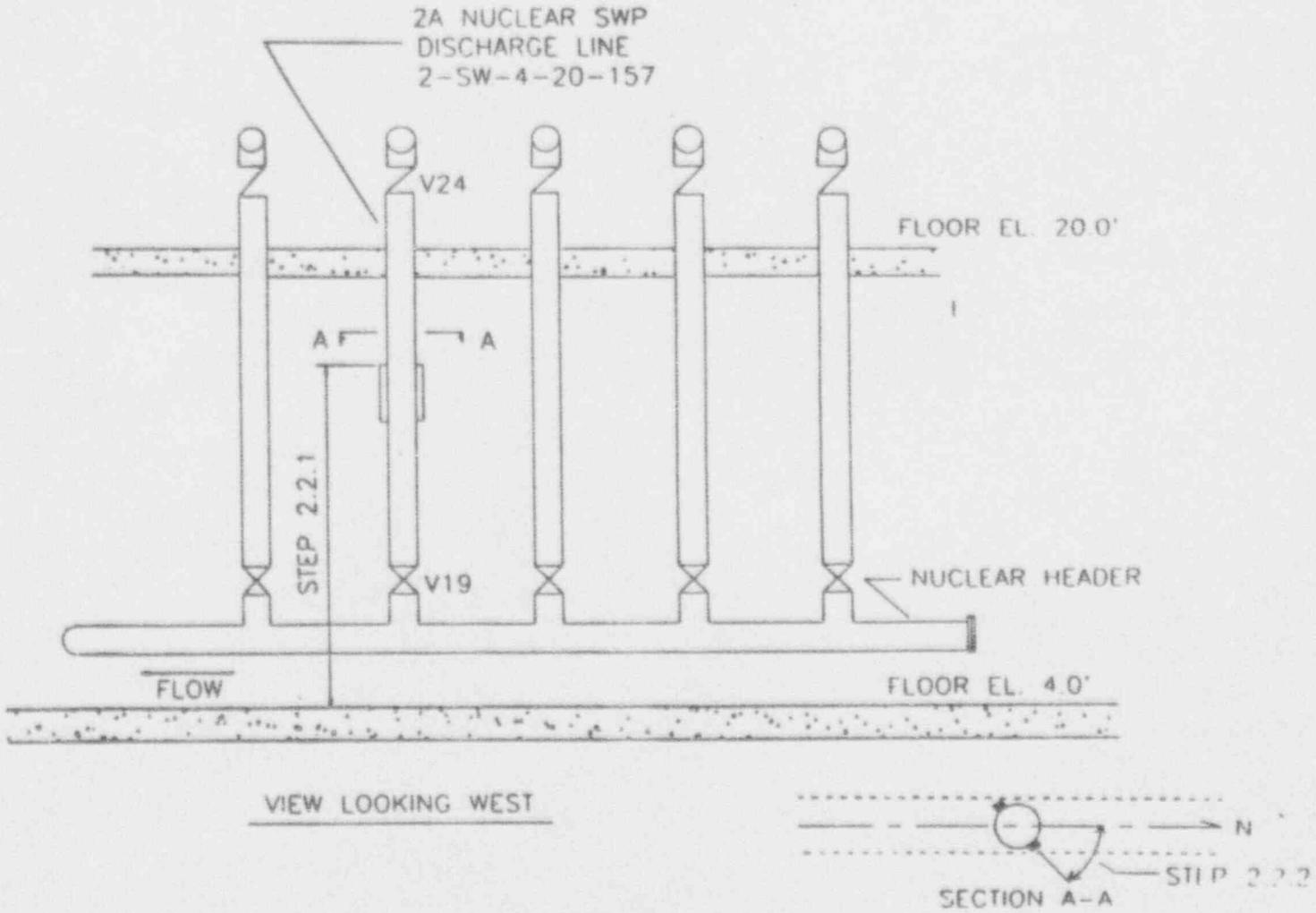
3.1 Test Diagnostic Data:

Vs 1436.40 m/s Valc 51 fx 22

Vfmax 33.79 Vsmax 1749.35

COMMENTS:

ATTACHMENT 1



2A NUCLEAR SERVICE WATER PUMP DISCHARGE SITE SETUP SKETCH
UNIT 2 SERVICE WATER BUILDING

ATTACHMENT 2 2B NUCLEAR SERVICE WATER PUMP DISCHARGE SITE SETUP

1.0 SITE NAME: 2BNPMP

1.1 TEST EQUIPMENT

1.1.1 Controlotron Serial No. 40679

1.1.2 Track/Transducer size: 4

1.1.3 Transducer Serial Nos.: (up) 40438A
(down) 40438B

1.1.4 Track/Transducer Mounting Mode: (Direct/Reflect) Direct

1.2 PIPE DATA

1.2.1 Pipe O.D.:

1.2.1.1 O.D. at upstream transducer location. 19.302 in.

1.2.1.2 O.D. 90° around pipe from upstream transducer location. 19.691 in.

1.2.1.3 O.D. at downstream transducer location. 19.334 in.

1.2.1.4 O.D. 90° around pipe from downstream transducer location. 19.529 in.

1.2.1.5 Average of measured O.D.'s: 19.452 in.

Micrometers/Calipers:
CP&L No.: VC003 Cal Date: 8/5/91 Cal Due Date: 2/3/92

1.2.2 Pipe Material: Copper Nickel (70/30)

1.2.3 Wall Thickness:

1.2.3.1 Pipe Wall thickness at upstream transducer location. 0.370 in.

1.2.3.2 Pipe Wall thickness 90° around pipe from upstream transducer location. 0.385 in.

1.2.3.3 Pipe Wall thickness at downstream transducer location. 0.380 in.

1.2.3.4 Pipe Wall thickness 90° around pipe from downstream transducer location. 0.380 in.

1.2.3.5 Average pipe wall thickness. 0.379 in.

ATTACHMENT 2 2B NUCLEAR SERVICE WATER PUMP DISCHARGE SITE SETUP

2.0 ZERO FLOW CALIBRATION

2.1 Precautions and Limitations

2.1.1 The 2B Nuclear Service Water Pump can be removed from service.

2.2 System Lineup

2.2.1 Setup the tracks and transducers on line 2-SW-5-20-046 at the location shown on the 2B Nuclear Service Water Pump Discharge Site Setup Sketch. Measure and record below and on the sketch the reference dimension from the floor (El. 4' 0", to the upstream edge of the track.

REFERENCE DIMENSION: 130 1/2"

2.2.2 Measure and record the axial displacement in inches on the pipe surface from the centerline of the Nuclear Header to the nearest edge of the track holding the upstream transducer.

REFERENCE DIMENSION: 16 1/2"

2.2.3 Remove from service, or verify as such, 2B Nuclear Service Water Pump. SAT

2.2.4 Verify the Nuclear Header Service Water Pump B Discharge Valve, 2-SW-V20, is closed. SAT

2.3 Zero Set

2.3.1 Letter/Number Spacing Index B, 4

2.3.2 Zero Offset: 316 gpm

2.3.3 Diagnostic Data:

Vs 1473.76 m/s Valc 81 fx 22

Vfmax 35.47 Vsmax 1849.98

3.0 TEST PERFORMANCE SITE SETUP VERIFICATION

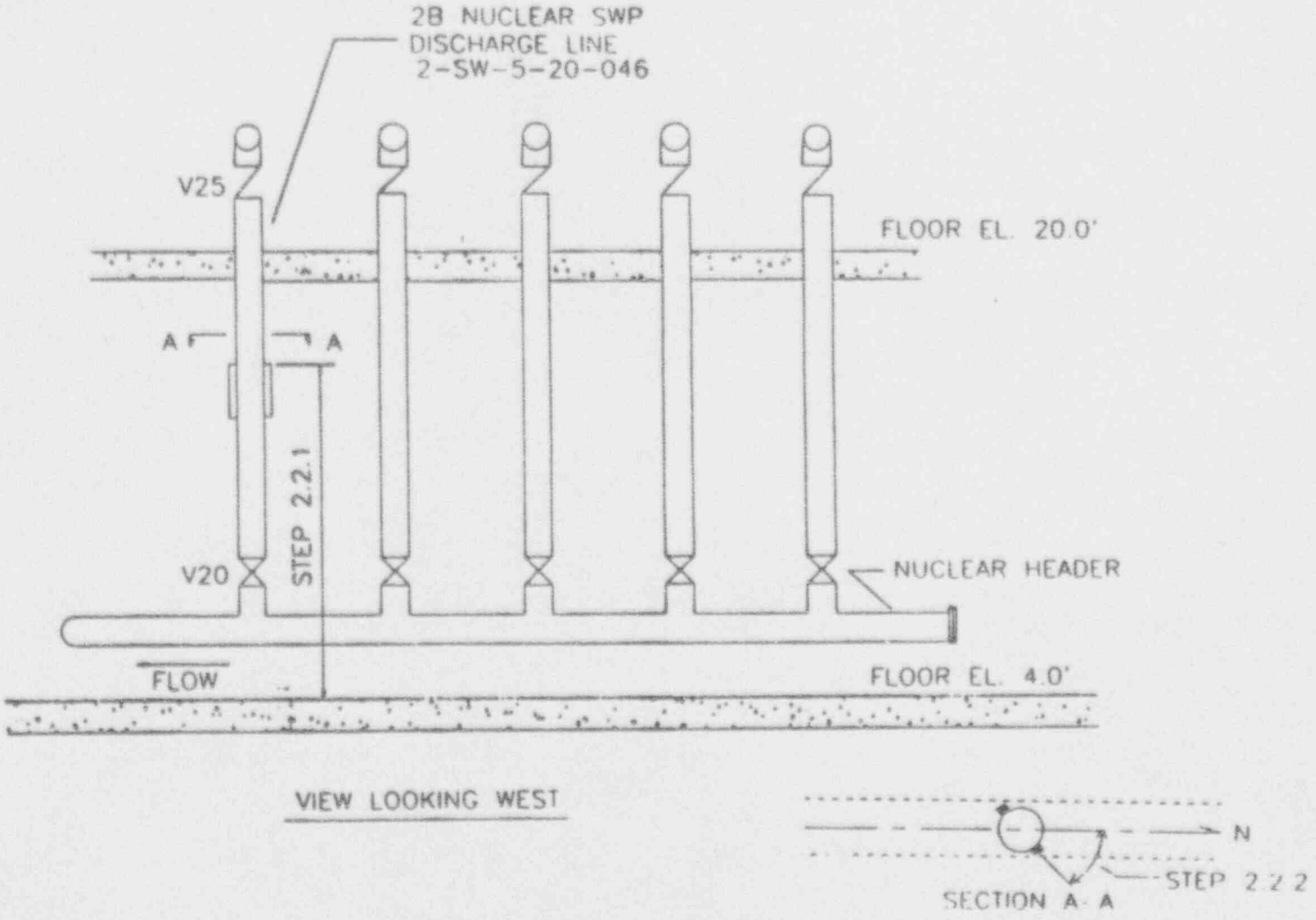
3.1 Test Diagnostic Data:

Vs 1489.83 m/s Valc 79 fx 22

Vfmax 35.08 Vsmax 1849.98

COMMENTS:

ATTACHMENT 2



2B NUCLEAR SERVICE WATER PUMP DISCHARGE SITE SETUP SKETCH
UNIT 2 SERVICE WATER BUILDING

ATTACHMENT 3 No. 3 DIESEL GENERATOR JACKET WATER COOLER SW SITE SETUP

1.0 SITE NAME: 3DGJKT

1.1 TEST EQUIPMENT

1.1.1 Controlotron Serial No. 4401 11

1.1.2 Track/Transducer size: 3

1.1.3 Transducer Serial Nos.: (up) 4410A
(down) 4410B

1.1.4 Track/Transducer Mounting Mode: (Direct/Reflect) Direct

1.2 PIPE DATA

NOTE:

Remove grating as necessary to access piping.

1.2.1 Pipe O.D.:

1.2.1.1 O.D. at upstream transducer location. 6.692 in.

1.2.1.2 O.D. 90° around pipe from upstream transducer location. 6.669 in.

1.2.1.3 O.D. at downstream transducer location. 6.693 in.

1.2.1.4 O.D. 90° around pipe from downstream transducer location. 6.693 in.

1.2.1.5 Average of measured O.D.'s: 6.648 in.

Micrometers/Calipers:
CP&L No.: VC015 Cal Date: 6/4/91 Cal Due Date: 12/2/91

1.2.2 Pipe Material: STEEL

1.2.3 Wall Thickness:

1.2.3.1 Pipe Wall thickness at upstream transducer location. 0.280 in.

1.2.3.2 Pipe Wall thickness 90° around pipe from upstream transducer location. 0.280 in.

1.2.3.3 Pipe Wall thickness at downstream transducer location. 0.305 in.

ATTACHMENT 3 No. 3 DIESEL GENERATOR JACKET WATER COOLER SW SITE SETUP

1.2.3.4 Pipe Wall thickness 90° around pipe from downstream transducer location. 0.275 in.

1.2.3.5 Average pipe wall thickness. 0.285 in.

1.2.4 Liner Material: Cement Thickness: 0.250 in.

2.0 ZERO FLOW CALIBRATION

2.1 Precautions and Limitations

2.1.1 The piping configuration at the primary setup location may not leave this pipe full of service water at all times. If empty pipe indications are obtained with the Controlotron at this location, or flow anomalies are anticipated due to piping configuration, duplicate the setup at the alternate location.

2.2 System Lineup

2.2.1 Setup the tracks and transducers on line 2-SW-233-6-157 as shown on the No. 3 Diesel Generator Jacket Water Cooler SW Flow Setup Sketch. Measure and record the reference dimension from the U-bolt on the horizontal pipe support to the upstream edge of the track.
REFERENCE DIMENSION 130 1/2 "

2.2.2 Measure and record the axial location of the transducer track assembly as noted on the sketch.
REFERENCE DIMENSION 2 1/2 "

2.2.3 Verify No. 3 Diesel Generator is not running. SR

2.2.4 Verify the No. 3 Diesel Generator Jacket Water Cooler SW Isolation Valve, 2-SW-V212, is closed. SR

2.2.5 Verify the No. 3 Diesel Generator Jacket Water Cooler SW Isolation Valve, 1-SW-V212, is closed. SR

2.3 Zero Set

2.3.1 Letter/Number Spacing Index B / 9

2.3.2 Zero Offset: (-) 32 GPM

2.3.3 Diagnostic Data:

Vs 1521.03 m/s Valc 65 fx 16

Vfmax 8.26 Vsmax 1978.06

ATTACHMENT 3 No. 3 DIESEL GENERATOR JACKET WATER COOLER SW SITE SETUP

3.0 TEST PERFORMANCE SITE SETUP VERIFICATION

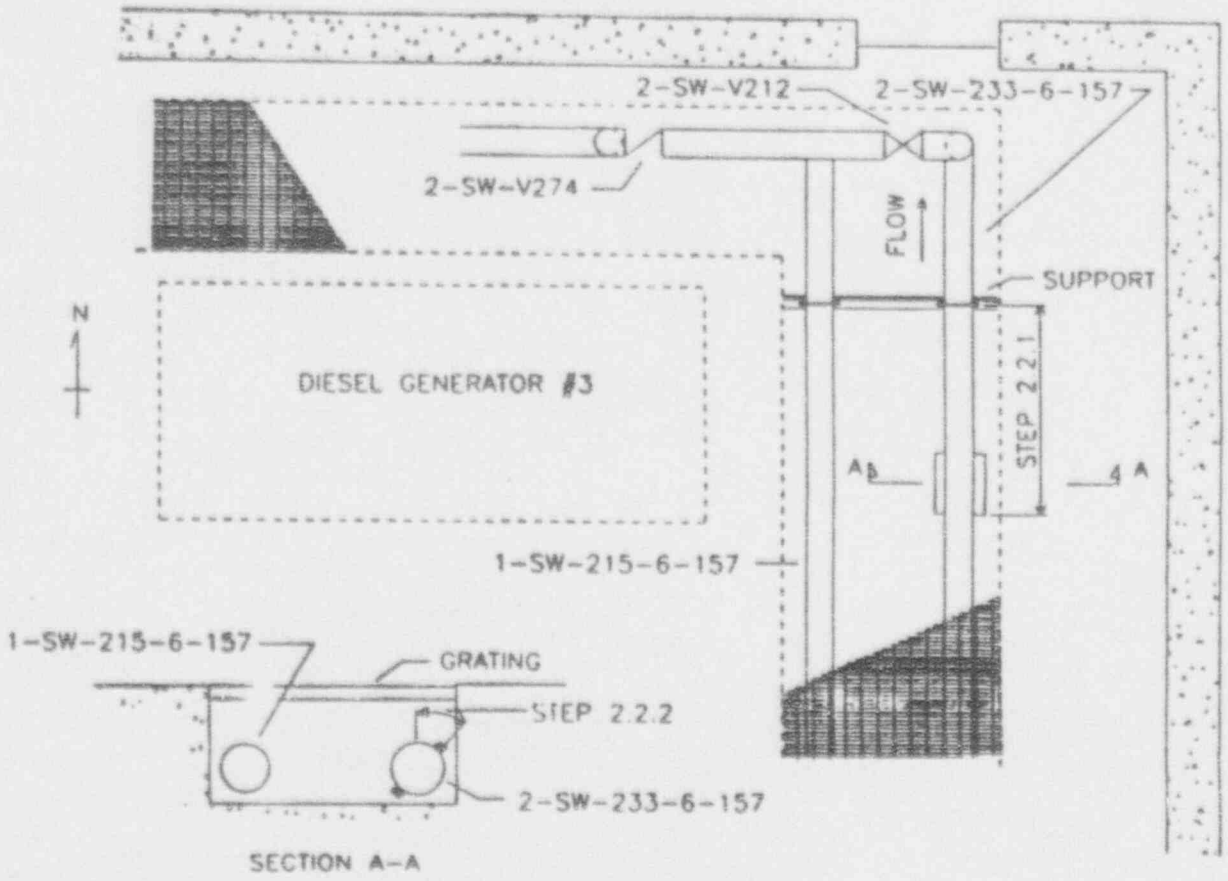
3.1 Test Diagnostic Data:

Vs 1500.19 m/s Valc 57 fx 16

Vfmax 8.17 Vsmax 1978.06

COMMENTS:

ATTACHMENT 3



NO. 3 DIESEL GENERATOR JACKET WATER COOLER SW INLET SETUP SKETCH
DIESEL GENERATOR BUILDING

ATTACHMENT 4 No. 4 DIESEL GENERATOR JACKET WATER COOLER SW SITE SETUP

1.0 SITE NAME: 4DGJKT

1.1 TEST EQUIPMENT

1.1.1 Controlotron Serial No. 11∅981

1.1.2 Track/Transducer size: 3

1.1.3 Transducer Serial Nos.: (up) U∅414A
(down) U∅414B

1.1.4 Track/Transducer Mounting Mode: (Direct/Reflect) Direct

1.2 PIPE DATA

NOTE:

Remove grating as necessary to access piping.

1.2.1 Pipe O.D.:

1.2.1.1 O.D. at upstream transducer location. 6.659 in.

1.2.1.2 O.D. 90° around pipe from upstream transducer location. 6.639 in.

1.2.1.3 O.D. at downstream transducer location. 6.632 in.

1.2.1.4 O.D. 90° around pipe from downstream transducer location. 6.646 in.

1.2.1.5 Average of measured O.D.'s: 6.692 in.

Micrometers/Calipers:
CP&L No.: VC015 Cal Date: 6/4/91 Cal Due Date: 12/2/91

1.2.2 Pipe Material: STEEL

1.2.3 Wall Thickness:

1.2.3.1 Pipe Wall thickness at upstream transducer location. 0.270 in.

1.2.3.2 Pipe Wall thickness 90° around pipe from upstream transducer location. 0.285 in.

1.2.3.3 Pipe Wall thickness at downstream transducer location. 0.285 in.

ATTACHMENT 4 No. 4 DIESEL GENERATOR JACKET WATER COOLER SW SITE SETUP

1.2.3.4 Pipe Wall thickness 90° around pipe from downstream transducer location. 0.270 in.

1.2.3.5 Average pipe wall thickness. 0.278 in.

1.2.4 Liner Material: Cement Thickness: 0.250 in.

2.0 ZERO FLOW CALIBRATION

2.1 Precautions and Limitations

2.1.1 The piping configuration at the primary setup location may not leave this pipe full of service water at all times. If empty pipe indications are obtained with the Controlotron at this location, or flow anomalies are anticipated due to piping configuration, duplicate the setup at the alternate location.

2.2 System Lineup

2.2.1 Setup the tracks and transducers on line 2-SW-234-6-157 as shown on the No. 4 Diesel Generator Jacket Water Cooler SW Flow Setup Sketch. Measure and record the reference dimension from the U-bolt on the horizontal pipe support to the upstream edge of the track.
REFERENCE DIMENSION 130½"

2.2.2 Measure and record the axial location of the transducer track assembly as noted on the sketch.
REFERENCE DIMENSION 2½"

2.2.3 Verify No. 4 Diesel Generator is not running. SR

2.2.4 Verify the No. 4 Diesel Generator Jacket Water Cooler SW Isolation Valve, 2-SW-V213, is closed. SR

2.2.5 Verify the No. 4 Diesel Generator Jacket Water Cooler SW Isolation Valve, 1-SW-V213, is closed. SR

2.3 Zero Set

2.3.1 Letter/Number Spacing Index B / 4

2.3.2 Zero Offset: (-) 57 gpm

2.3.3 Diagnostic Data:

Vs 1463.44 m/s Valc 70 fx 15

Vfmax 7.50 Vsmax 1984.38

ATTACHMENT 4 No. 4 DIESEL GENERATOR JACKET WATER COOLER SW SITE SETUP

3.0 TEST PERFORMANCE SITE SETUP VERIFICATION

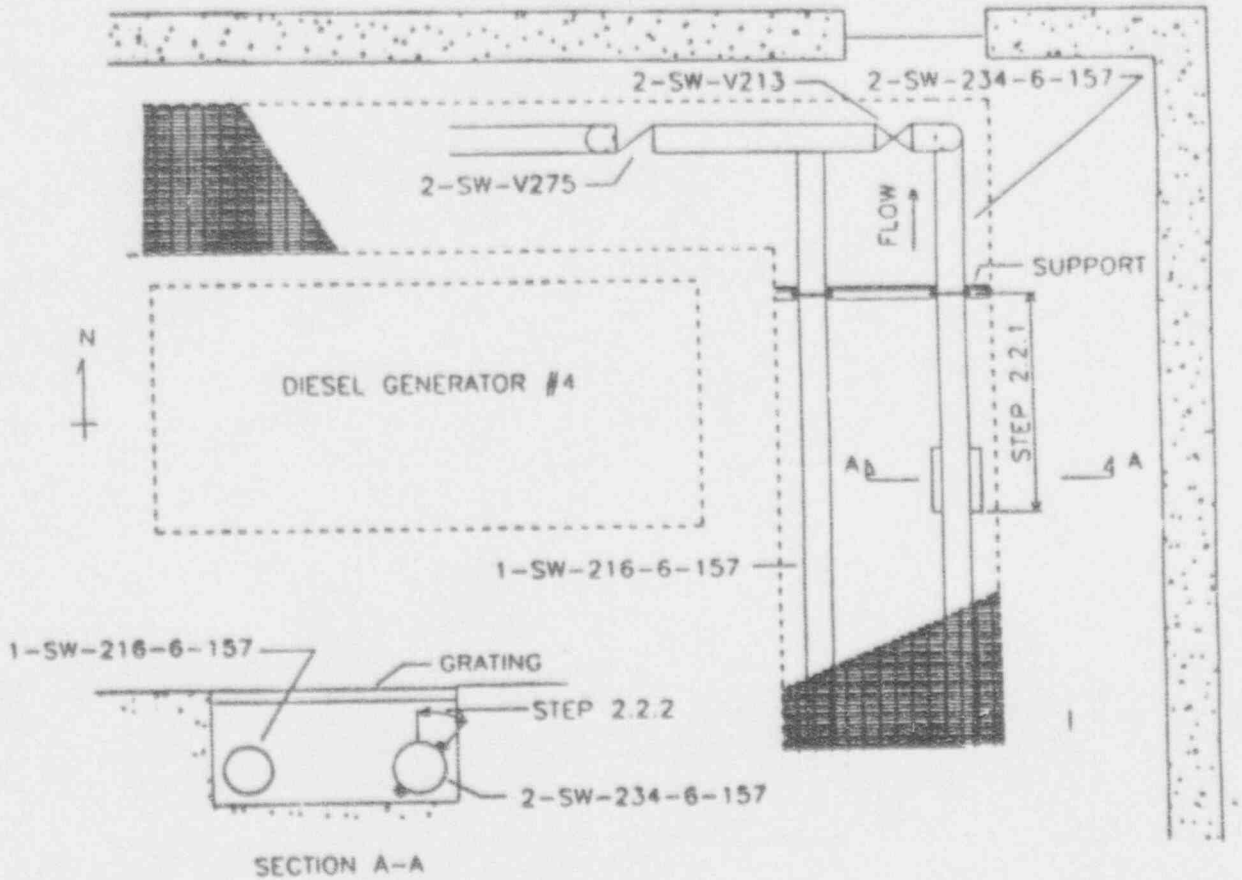
3.1 Test Diagnostic Data:

Vs 1966.12 m/s Valc 74 fx 15

Vfmax 7.60 Vsmax 1984.38

COMMENTS:

ATTACHMENT 4



NO. 4 DIESEL GENERATOR JACKET WATER COOLER SW INLET SETUP SKETCH
DIESEL GENERATOR BUILDING

ATTACHMENT 5 VITAL HEADER (FROM NUCLEAR HEADER) SW INLET SITE SETUP

1.0 SITE NAME: VITHDR

1.1 TEST EQUIPMENT

1.1.1 Controlotron Serial No. U4390

1.1.2 Track/Transducer size: 3

1.1.3 Transducer Serial Nos.: (up) U2665A
(down) U2665B

1.1.4 Track/Transducer Mounting Mode: (Direct/Reflect) Direct

1.2 PIPE DATA

1.2.1 Pipe O.D.:

1.2.1.1 O.D. at upstream transducer location. 6.510 in.

1.2.1.2 O.D. 90° around pipe from upstream transducer location. 6.682 in.

1.2.1.3 O.D. at downstream transducer location. 6.559 in.

1.2.1.4 O.D. 90° around pipe from downstream transducer location. 6.693 in.

1.2.1.5 Average of measured O.D.'s: 6.610 in.

Micrometers/Calipers:
CP&L No.: VC015 Cal Date: 6/9/91 Cal Due Date: 12/2/91

1.2.2 Pipe Material: COPPER NICKEL (70/30)

1.2.3 Wall Thickness:

1.2.3.1 Pipe Wall thickness at upstream transducer location. 0.255 in.

1.2.3.2 Pipe Wall thickness 90° around pipe from upstream transducer location. 0.255 in.

1.2.3.3 Pipe Wall thickness at downstream transducer location. 0.255 in.

1.2.3.4 Pipe Wall thickness 90° around pipe from downstream transducer location. 0.255 in.

1.2.3.5 Average pipe wall thickness. 0.255 in.

ATTACHMENT 5 VITAL HEADER (FROM NUCLEAR HEADER) SW INLET SITE SETUP

2.0 ZERO FLOW CALIBRATION

2.1 Precautions and Limitations

2.1.1 Performance of the zero flow calibration for the Vital Header (From Nuclear Header) SW Inlet Site Setup requires transfer of the Vital Header flow from the NSW Header to the CSW Header.

2.1.2 After zero flow calibration has been completed, the vital header is to be restored so that flow to the vital header is from the NSW header.

2.1.3 Flow and lineup restrictions shall be in place in accordance with TSI 90-03, Rev. 0.

2.2 System Lineup

2.2.1 Set up the tracks/transducers on line 2-SW-117-6-046 as shown on the Vital Header (From Nuclear Header) SW Inlet Site Setup Sketch. Measure and record the reference dimension from the upstream elbow to the upstream edge of the track.

REFERENCE DIMENSION 5'-2"

2.2.2 Measure and record the axial location of the transducer track assembly as noted on the sketch.

REFERENCE DIMENSION 0'-0"

****

CAUTION

TSI 90-03, Rev. 0 requires that at least one RHR pump room cooler to be in service on the NSW header. Failure to meet this lineup restriction will invoke the requirements of Tech Spec 3.0.3 or 3.0.5, as applicable. This will invoke this requirement for the short period of time needed to perform the zero flow set.

****

2.2.3 Close the Nuclear Header to Vital Header Valve, 2-SW-V117. _____ JK

Delete

2.2.4 Close the Nuclear Header to Vital Header Isolation Valve, 2-SW-V116. _____

Temp Ltr 91-387

ATTACHMENT 5 VITAL HEADER (FROM NUCLEAR HEADER) SW INLET SITE SETUP

2.0 ZERO FLOW CALIBRATION

2.1 Precautions and Limitations

2.1.1 Performance of the zero flow calibration for the Vital Header (From Nuclear Header) SW Inlet Site Setup requires transfer of the Vital Header flow from the NSW Header to the CSW Header.

2.1.2 After zero flow calibration has been completed, the vital header is to be restored so that flow to the vital header is from the NSW header.

2.1.3 Flow and lineup restrictions shall be in place in accordance with TSI 90-03, Rev. 0.

2.2 System Lineup

2.2.1 Set up the tracks/transducers on line 2-SW-117-6-046 as shown on the Vital Header (From Nuclear Header) SW Inlet Site Setup Sketch. Measure and record the reference dimension from the upstream elbow to the upstream edge of the track.

REFERENCE DIMENSION _____

2.2.2 Measure and record the axial location of the transducer track assembly as noted on the sketch.

REFERENCE DIMENSION _____

****

CAUTION

TSI 90-03, Rev. 0 requires that at least one RHR pump room cooler to be in service on the NSW header. Failure to meet this lineup restriction will invoke the requirements of Tech Spec 3.0.3 or 3.0.5, as applicable. This will invoke this requirement for the short period of time needed to perform the zero flow set.

****

2.2.3 Close the Nuclear Header to Vital Header Valve, 2-SW-V117. _____ _____

2.2.4 Close the Nuclear Header to Vital Header Isolation Valve, 2-SW-V116. _____

ATTACHMENT 5 VITAL HEADER (FROM NUCLEAR HEADER) SW INLET SITE SETUP

2.3 Zero Set

2.3.1 Letter/Number Spacing Index B, 3

2.3.2 Zero Offset: 53 gpm

2.3.3 Diagnostic Data:

Vs 1438.03 m/s Valc 88 fx 14

Vfmax 7.71 Vsmax 1999.14

2.4 System Restoration

Delete

2.4.1 Open the Nuclear Header to Vital Header Isolation Valve, 2-SW-V116. _____

2.4.2 Open the Nuclear Header to Vital Header Valve, 2-SW-V117. K

3.0 TEST PERFORMANCE SITE SETUP VERIFICATION

3.1 Test Diagnostic Data:

Vs 1433.54 m/s Valc 86 fx 14

Vfmax 7.68 Vsmax 1999.14

COMMENTS:

Temp Rev 91-387

ATTACHMENT 5 VITAL HEADER (FROM NUCLEAR HEADER) SW INLET SITE SETUP

2.3 Zero Set

2.3.1 Letter/Number Spacing Index ____/____

2.3.2 Zero Offset: _____ gpm

2.3.3 Diagnostic Data:

Vs _____ m/s Valc ____ fx _____

Vfmax _____ Vsmax _____

2.4 System Restoration

2.4.1 Open the Nuclear Header to Vital Header Isolation Valve, 2-SW-V116. _____

2.4.2 Open the Nuclear Header to Vital Header Valve, 2-SW-V117. _____

3.0 TEST PERFORMANCE SITE SETUP VERIFICATION

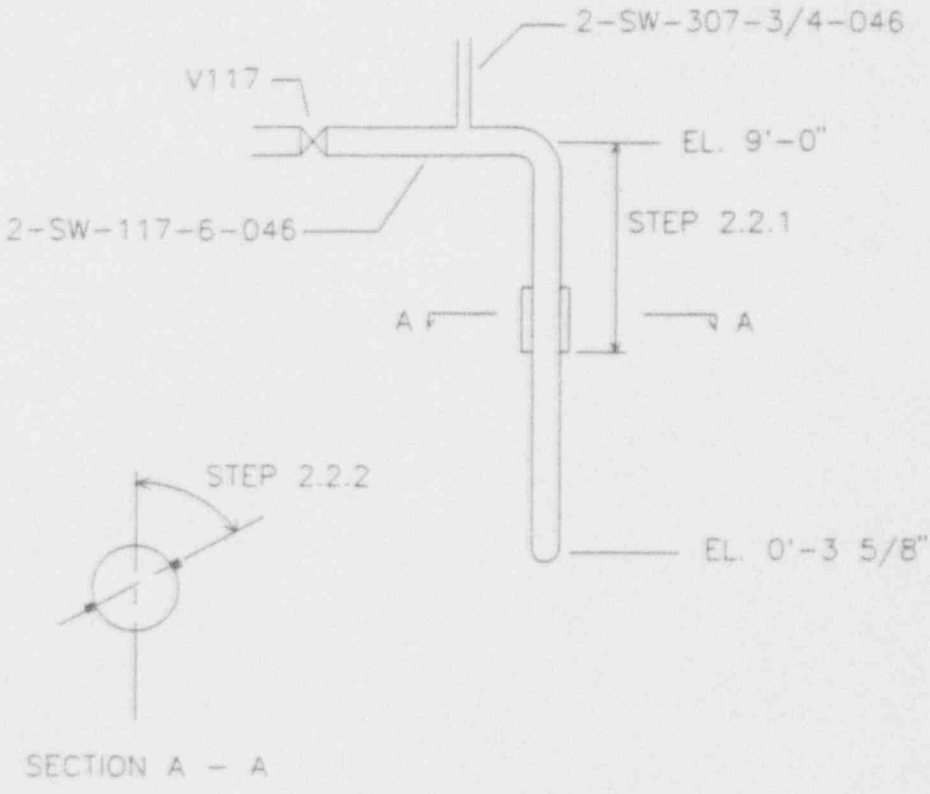
3.1 Test Diagnostic Data:

Vs _____ m/s Valc ____ fx _____

Vfmax _____ Vsmax _____

COMMENTS:

ATTACHMENT 5



VITAL HEADER (FROM NUCLEAR HEADER) SW INLET SITE SETUP
UNIT 2 REACTOR BUILDING, EL. -17'

BSEP Form 7A (10/91) OPERATING MANUAL TEMPORARY REVISION FORM

I. DESCRIPTION Volume X Temporary Revision No. 91-357

Title, Procedure No., and Current Revision No. of Procedure Service Water System Hydraulic Performance Test, 2-PT-24.6.4, Rev. 2

Pages and Paragraphs Revised Page 40 of 48, paragraph 2.2.4; Page 41 of 48, paragraph 2.9.2.

Reason for Revision Single valve closure will be sufficient for zero flow calibration. This is a non-intent change

Originator [signature] Date 11-20-91

II. INITIAL APPROVAL/REVIEW

Name [signature] Title Non-Cooling Date 11-20-91

Name [signature] Title Shift Supervisor Date 11-20-91

Entered in Control Room copies: Unit 1 ___ Unit 2 X

By [signature] Title Ops Rep Date 11/20/91

III. NUCLEAR SAFETY AND TECHNICAL REVIEWS (Within 14 days of implementation)

Technical Reviews:

First Technical Reviewer _____ Discipline _____ Date _____

Second Technical Reviewer _____ Discipline _____ Date _____

Safety Reviews:

AI-109, Attachment 2, Safety Review Forms completed and attached. Date _____

IV. TEMPORARY REVISION APPROVAL/DISPOSITION

1. (X) Onetime use only. This revision must be removed from Control Room copies on or before 11-30-91.

2. ( ) Permanent revision required on or before _____. DO NOT REMOVE from Control Room copies until permanent revision is received.

3. ( ) *Extension. This Temporary Revision has been extended until _____.
By _____ Approved _____

*Person extending this Temporary Revision must route copies as indicated in routing section.

_____ Approved
General Manager/Designee PNSC Required Date _____

_____ Recommended
PNSC Not Recommended Date _____

V. TEMPORARY REVISION REMOVAL (Onetime Use Only)

Temporary Revision deleted from Control Room copies. Unit 1 _____ Unit 2 _____

Name _____ Title _____ Date _____

*Routing:

Original - Originating Unit/Subunit
Copy - Control Room copy of procedure revised
Copy - Records Management

NOTE: THIS REVISION MAY NOT BE USED AFTER EXPIRATION DATE.

CERTIFICATION AND REVIEW FORM

General Comments and Recommendations "A" RHR SW in service in Sh cooling
N-1 - All Instruments checked for NRSO's in AIMS 866 163691
N-2 STEPS SIGNED OFF ON TEXT REV ~~4~~ 4 N-3 STEPS SIGNED OFF ON ORIGINAL REV 2 ~~AMEND~~ 12-4-91 12-4-91
M Knuth RS Barnett

Test procedure performed by:	Initials	Name (Print)
	W/	C. Long/S. Cooper
	WB/	JOHN STOLZ/J. HINSON
	MP/	MICHAEL POTTER/W. FULTON
	PL/	PLubinsky/D. Cushman
	JB/	John Stedel/D. BAIN
	SR/	Si Riffle/S. KNOTTS

Exceptions to satisfactory performance _____

Corrective action required _____

Test procedure has been satisfactorily completed

Foreman _____ 12-6-91 → 12-6-91
Signature Date

Test procedure has not been satisfactorily completed

Foreman N/A N/A
Signature Date

Test has been reviewed by _____ 12-6-91

Supervisor _____ 12-6-91 → 12-6-91
Signature Date

FIGURE 11.7.1

Purpose: PT 24.6.4

Date: 11-26-91

This figure is to be used to perform independent verifications with procedures listed in 11.7.1b which do not contain provisions for independent verification sign-offs. All components repositioned as a result of the control procedure shall be identified below.

COMPONENT	POSITION		VERIFICATIONS			
	AS FOUND	AS LEFT	1st		2nd	
			INIT.	METHOD	INIT.	METHOD
MCC 2FA 2-SW-V19 COMPT E07	ON	ON	PL	A PL	[illegible]	C
MCC 2FB 2-SW-V15 COMPT 536	ON	ON	PL	A PL	[illegible]	C
MCC 1FA 2-SW-V17 COMPT BVD	ON	ON	PL	A PL	[illegible]	C
				[illegible] 11/26/91		

*The method for each verification must be identified. The code listed below may be used.

CODE	METHOD
A	Physical verification by hands on and confirming movement to the open/throttled/close position.
B	Functional testing of the integrated system or component as appropriate.
C	Visual verification of the component's position by direct observation or remote indication.
D	Visual verification of the component's position by system process parameter changes as indicated by direct or remote indication or annunciation.

Performed By:

(Name)	Initials
[illegible]	PL
M Lotter	[illegible]
R BROWN	RB

CERTIFICATION AND REVIEW FORM

General Comments and Recommendations _____

_____

_____

	Initials	Name (Print)
Test procedure performed by:	K/LK	Initialed S. KNOTTS
	SR	Si Riffle

Exceptions to satisfactory performance _____

_____

Corrective action required _____

_____

_____

Test procedure <u>has</u> been satisfactorily completed

Foreman _____ _____
Signature Date

Test procedure <u>has not</u> been satisfactorily completed

Foreman _____ _____
Signature Date

Test has been reviewed by

Supervisor _____ _____
Signature Date

DATA SHEET 1

CONTROL ROOM

STEP NO.	TIME	CANAL TEMP COMP POINT C382	CANAL LEVEL 2-SCW-LR-285	NUC HDR PRESS 2-SW-PI -143-1	CONV HDR PRESS 2-SW-PI -131-1	RHRSW A(B)-LOOP FLOW 2-E11 -FI- R602A(B) * (gpm)	RBCCW SW FLOW 2-SW -FI- 1158-1 (gpm)	VITAL HDR FLOW A-LOOP 2-SW-FI -5114 (gpm)	VITAL HDR FLOW B-LOOP 2-SW-FI -5115 (gpm)
9.3.29	13:30	55.4°F	+ 1.0	63 psi	60 psi	3000 - A Loop	3500	520	555
9.3.33	15:27	54.6°F	- 0.8	61 "	59.5 "	3000 - B Loop	3500	520	550
9.3.42	16:25	54.5°F	- 1.4	62 "	12 "	3000 - A Loop	3500	510	550

* Note the operating RHR SW LOOP (A or B) with the recorded data.

DATA SHEET 2

DIESEL GENERATORS
SERVICE WATER FLOWS

STEP NO.	DIESEL GENERATOR #3 JACKET WATER COOLER SW FLOW	DIESEL GENERATOR #4 JACKET WATER COOLER SW FLOW
9.3.29	1.996 Kgal/min	1.936 Kgal/min
9.3.33	1.362 Kgal/min	1.253 Kgal/min
9.3.42	~~1.375~~ 1.365 Kgal/min OR 1 1/2 cells	1.172 Kgal/min

DATA SHEET 3

SERVICE WATER BUILDING

STEP NO.	NSW PUMP 2A FLOW	NSW PUMP 2B FLOW	CONV HDR PRESS TEST GAUGE#1 at PS-3213	NUC HDR PRESS TEST GAUGE #2 at PS-3214	NSW PMP A DISCH PRESS PI-144	NSW PMP B DISCH PRESS PI-145	NSW PMP A DISCH STRN ΔP PDIC-138	NSW PMP A DISCH STRN ΔP PDIC-140
9.3.29	5.7 KGAL/MIN	4.61 KGAL/MIN	60.8 psi	max 63 ~~60.2~~ psi 11-26-91	58 psi	61 psi	0.6 psi	0.3 psi
9.3.33	5.94 KGAL/MIN	4.62 KGAL/MIN	59.6 psi	60.2 psi	58 psi	60 psi	0.6 psi	0.3 psi
9.3.42	~~5.93~~ 5.92 KGAL/MIN	4.60 KGAL/MIN	10.4 psi	61.8 psi	57 psi	60 psi	0.6 psi	0.4 psi

Test Gauge #1 Data:

CP&L No. G136 Range: 0-150 psi Installed El.: 6'0"

Cal Date: 11-20-91 Cal. Due Date: 12/16/91

Test Gauge #2 Data:

CP&L No. G125 Range: 0-150 psi Installed El.: 6'-0"

Cal Date: 11-20-91 Cal. Due Date: 12/16/91

DATA SHEET 4

REACTOR BUILDING EL. -17'

STEP NO.	VITAL HDR SW FLOW (Kgal/min)	VITAL HDR A LOOP PRESS TEST GAUGE # 3 at PI-821 (psi)	VITAL HDR B LOOP PRESS TEST GAUGE # 4 at PI-819 (psi)
9.3.29	1.0467	63 1/2	66
9.3.33	1.054	63	65
9.3.42	1.067	63	64 1/2

Test Gauge #3 Data:

CP&L No. G179 Range: 0-100 psi Installed El.: (-)12.625

Cal Date: 11-19-91 Cal. Due Date: 12/16/91

Test Gauge #4 Data:

CP&L No. G-207 Range: 0-100 psi Installed El.: (-) 13.0

Cal Date: 11-11-91 Cal. Due Date: 12/9/91

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 1

SITE NAME: ZANPMP

STEP NO.: 9.3.29

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
13:31	1444.4 M/S	49	237.61 KGAL	5.67 KGAL/MIN
13:32	1444.4	49	243.28	5.67
13:33	1444.4	49	248.95	5.69
13:34	1444.4	49	254.64	5.70
13:35	1444.4	49	260.34	5.72
13:36	1444.4	49	266.06	5.74
13:37	1444.4	50	271.80	
				Average 5.70 KGAL/MIN

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 1

SITE NAME: ZANPMP

STEP NO.: 9.3.33

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
15:28	1443.5	49	367.07 KGAL	~~5.95~~ KGAL/MIN
15:29	1443.6	48	373.02	~~5.97~~
15:30	1443.5	49	378.99	~~6.92~~
15:31	1443.5	48	384.91	~~5.93~~
15:32	1443.5	49	390.84	~~6.01~~
15:33	1443.4	48	396.85	~~5.93~~
15:34	1443.4	49	402.78	~~5.93~~
1535	1443.5	48	408.71	
				Average 5.94 KGal/min

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 1

SITE NAME: ZAN PMP

STEP NO.: 9.3.42

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1624	1443.1	49	184.05	~~5.98~~
1625	1443.1	49	190.03	~~5.95~~
1626	1443.1	49	195.98	~~5.90~~
1627	1443.2	49	201.88	~~5.96~~
1628	1443.2	49	207.84	~~5.97~~
1629	1443.2	49	213.81	~~5.86~~ ~~5.88~~ TR 11-26-91
1630	1443.2	49	219.69	~~5.92~~
1631	1443.1	49	225.61	
				Average ~~5.93~~ 5.94 Kgal/min

TR 11-26-91

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 2

SITE NAME: 2BNPMP

STEP NO.: 9.3.29

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
13:55	1444.3	74	35.06 KGAL	~~4.61~~
13:56	1444.3	74	39.67	~~4.63~~
13:57	1444.4	74	44.30	~~4.64~~
13:58	1444.3	74	48.94	~~4.60~~
13:59	1444.3	74	53.54	~~4.62~~
14:00	1444.3	74	58.16	~~4.61~~
14:01	1444.5	74	62.77	
				Average 4.61 KGAL/min

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 2

SITE NAME: 2BNPMP

STEP NO.: 9.3.33

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
			KGAL	KGAL/MIN
15:39	1443.5	74	10.29	~~4.66~~
1540	1443.7	74	14.95	~~4.63~~
1541	1443.6	74	19.58	~~4.59~~
1542	1443.6	74	24.17	~~4.62~~
1543	1443.6	74	28.79	~~4.65~~
1544	1443.6	74	33.44	~~4.60~~
1545	1443.6	74	38.04	~~4.64~~
1546	1443.7	74	42.68	
				Average 4.62 Kgal/min

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 2

SITE NAME: ZBN PMP

STEP NO.: 9.3.42

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1634	1443.2	74	12.23	4.63
1635	1443.2	74	16.86	4.65
1636	1443.1	74	21.51	4.61
1637	1443.2	74	26.12	4.55
1638	1443.2	74	30.71	4.58
1639	1443.1	74	35.29	4.64
1640	1443.2	74	39.93	4.59
1641	1443.1	74	44.52	
				Average 4.60

K Gal/min.

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 1

SITE NAME: 3~~A~~DGJKT GRT 11/26/91

STEP NO.: 9.3.29

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1332	1387.1	50	3191.45K	
1333	1387.0	50	3192.94K	1.49K
1334	1387.1	50	3194.44K	1.50K
1335	1387.0	50	3195.94K	1.50K
1336	1387.0	50	3197.43K	1.49K
1337	1387.0	50	3198.93K	1.50K
1338	1387.0	50	3200.43K	1.50K
				Average ~~1.42K~~

GRT 11/26/91

1.496Kg/min

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 3

SITE NAME: 3DGJKT

STEP NO.: 9.3.33

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1530	1347.1	50	3365.22K	
1531	1347.1	50	3366.58K	1.36K
1532	1347.2	50	3367.94K	1.36K
1533	1347.2	50	3369.30K	1.36K
1534	1347.2	50	3370.67K	1.37K
1535	1347.2	50	3372.03K	1.36K
1536	1347.0	49	3373.39K	1.36K
				Average 1.362Kg/min

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 3

SITE NAME: 3DGJKT

STEP NO.: 9.3.9Z

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1627	1347.0	50	3443.50K	
1628	1347.0	50	3444.86K	1.36 K
1629	1347.0	50	3446.23K	1.37 K
1630	1346.7	50	3447.59K	1.36K
1631	1346.8	50	3448.96K	1.37 K
1632	1346.7	50	3450.32K	1.36K
1633	1346.6	50	3451.69 K	1.37K
				Average ~~1.375K~~ 1.365 g/min

SR
11-26-91

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 3

SITE NAME: 4 ZDGJKT GRT 11/26/91

STEP NO.: 9.3.29

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1333	1420.5	70	117.64 K	
1334	1420.4	70	119.58 K	1.94 K
1335	1420.5	70	121.51 K	1.93 K
1336	1420.5	70	123.45 K	1.94 K
1337	1420.5	70	125.39 K	1.94 K
1338	1420.5	70	127.32 K	1.93 K
1339	1420.5	70	129.26 K	1.94 K
				Average 1.936K g/min

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 1

SITE NAME: ADGJKT

STEP NO.: 9.3.33

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1544	1439.0	69	0.95K	
1545	1441.7	61	2.16K	1.21K
1546	1439.0	61	3.42K	1.26K
1547	1440.3	61	4.69K	1.27K
1548	1441.7	61	5.95K	1.26K
1549	1441.7	61	7.21K	1.26K
1550	1441.7	61	8.47K	1.26K
				Average 1.253K g/min

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 4

SITE NAME: 406 JKT

STEP NO.: 9.3.42

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1627	1438.6	69	52.69 K	~~1.17K~~ JKT 11/26/91
1628	1439.0	69	53.86 K	1.17K
1629	1438.7	69	55.04 K	1.18K
1630	1438.7	69	56.21 K	1.17K
1631	1438.7	70	57.38 K	1.17K
1632	1438.6	69	58.55 K	1.17K
1633	1438.7	69	59.72 K	1.17K
				Average 1.172K g/min.

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 5

SITE NAME: VITHOR

STEP NO.: 9.3.29

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
13.30	1433.7	85	334.61	~~1.04~~
13.31	1433.8	85	335.65	~~1.05~~
13.32	1434.0	85	336.70	~~1.05~~
13.33	1433.8	85	337.75	~~1.05~~
13.34	1433.5	85	338.80	~~1.05~~
13.35	1433.5	85	339.85	~~1.04~~
13.36	1433.8	84	340.89	
				Average 1.046 Kgal/min

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 5

SITE NAME: VITHOR

STEP NO.: 9.3.33

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1528	1433.2	85	0.490 KG	1.06
1529	1433.1	85	1.55	1.04
1530	1432.8	85	2.59	1.05
1531	1433.0	84	3.64	1.06
1532	1432.9	85	4.70	1.06
1533	1432.6	85	5.76	
				Average 1.054 KG/min

DATA SHEET 5

DATA ACQUISITION SHEET

ATTACHMENT NO.: 5

SITE NAME: VITHOR

STEP NO.: 9.3.42

DATE: 11/26/91

TIME	Vs	VALC	FLOW TOTAL	FLOW TOTAL DIFFERENCE
1624	1432.7	85	2.24	——
1625	1432.4	85	3.30	1.06 KG PER MIN
1626	1432.4	85	4.37	1.07
1627	1432.6	85	5.44	1.07
1628	1432.4	85	6.50	1.06
1629	1432.3	85	7.56	1.06
1630	1432.4	85	8.64	1.08
				Average 1.067 KG PER MIN