ATTACHMENT 1

PROCEDURE 1PEP07-CH-0002

m5844
BK 1

HOUSTON LIGHTING AND POWER COMPANY
SOUTH TEXAS PROJECT
ELECTRIC GENERATING STATION
PLANT PROCEDURES MANUAL

DEPARTMENT PROCEDURE

SAFETY-RELATED (Q)

300 Ton Essential Chiller Bypass Modification Verification Test

1PEP07-CH-0002
Rev. 0
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APPROVED: D Jordan — Systems Engineering Manager
12/23/93 — Date Approved
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PROCEDURE USE CONTROL: **REFERENCE**

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1.0 Purpose and Scope

1.1 This procedure gathers data to determine if the Essential Chilled Water System will function as required and specified by Modification 93049 during cold weather conditions. The testing configurations consist of 4 special lineups specified by Modification 93049 to simulate Chiller operation during cold weather. The first test will simulate a single 300 Ton Idle Chiller Safety Injection Start during cold weather conditions. The second lineup will simulate a single 300 Ton Chiller Starting in LOOP cold weather conditions. The third will simulate two 300 Ton Chillers Operating in Steady State cold weather conditions. The fourth lineup will simulate a single 150 Ton Idle Chiller Safety Injection Start during cold weather conditions.

1.2 This procedure is applicable to the following equipment:

1.2.1 Unit 1 300 Ton Essential Chillers
3V111VCH004 AT 10' EL. MAB (Chiller 12A)
3V111VCH005 AT 10' EL. MAB (Chiller 12B)
3V111VCH006 AT 10' EL. MAB (Chiller 12C)

1.2.2 Unit 1 150 Ton Essential Chillers
3V111VCH001 AT 10' EL. MAB (Chiller 11A)
3V111VCH002 AT 10' EL. MAB (Chiller 11B)
3V111VCH003 AT 10' EL. MAB (Chiller 11C)

1.3 This procedure obtains various pressure, temperature, and amperage readings while operating the Essential Chillers with the specified simulated condition and configured for cold weather operation as specified by Modification 93049.

1.4 This procedure shall be performed in the sequence written unless otherwise specified.

1.5 Performance of this test requires the train of Essential Chilled Water being tested and associated 300 and 150 ton chillers be declared inoperable and the LCO action statements of 3.7.14 entered.

2.0 Definitions

2.1 DOUBLE ASTERISK (**): Denotes steps within this procedure that shall be independently verified on Data Sheet (-2).

2.2 This procedure is written to allow testing in whichever trains are available at the time of the test. When equipment or instrument numbers are specified, the A train will be first, B train next and C train will follow (Example: Essential Chiller 12A (12B)(12C)).

2.3 For cold weather operation the inoperable chiller ECW outlet bypass valve position was specified by Design Engineering as 5-10% open. From actual valve stroke a 7½% setting was determined for the 150 and 300 ton chillers which was ¾ turn open in both cases.

3.0 Responsibilities

3.1 The Test Coordinator is responsible for:

3.1.1 Notifying other departments of the support requirements for this test.

3.1.2 Coordinating test sequence and support activities with Plant Operations.

3.1.3 Directing non-operations personnel performing test-related activities.

3.1.4 Coordinating evaluation and resolution of test deficiencies.

3.1.5 Notifying Plant Operations of test completion and test results.

3.1.6 Ensuring test package completeness, legibility, and accuracy before transmittal to RMS.

4.0 Prerequisites

4.1 This procedure is applicable for Unit 1, in modes 5 and 6 only.

4.2 Open the Chronological Text Log, Data Sheet (-6) and maintain testing status through the completion of the test.

4.3 OBTAIN permission to start the test from the Shift Supervisor on Data Sheet (-1).

4.4 ENTER the Equipment Number (Tag/TPNS) of the chillers to be tested on Data Package Cover Sheet (-1):

4.5 When a blank (__) precedes a step, THEN ENTER a check mark (√) in the blank when the step is completed. If a conditional step is not required, enter N/A in the blank. Enter justification in the Chronological Test Log, on Data Sheet (-6), if the basis for use of "N/A" is not apparent, or otherwise documented in the procedure.

4.6 Obtain the following test equipment and RECORD the Description, STPEGS I.D. Number, and Calibration Due Date in the M&TE RECORD on Data Sheet (-2), as applicable.

4.6.1 Two (2) pressure transmitters, 0-50 Psia, accurate to 0.2% full scale, or equivalent.

4.6.2 One (1) pressure transmitter, 0-50 Psig, accurate to 0.2% full scale, or equivalent.

4.6.3 Six (6) RTD's, 32 - 100 °F, accurate to 0.2 °F, or equivalent.

4.6.4 Two (2) RTD 32-230°F, accurate to 0.2°F or equivalent.

4.6.5 Three (3) Differential Pressure gauges, 0-30" WC, accurate to 2% full scale, or equivalent. (0-50" WC Differential Pressure gauges may be substituted, if required)

FC-94-0022

4.6.6 One (1) sling psychrometer, Bacharach model 12-7012, accurate to 2 °F, or equivalent.

NOTE

Readings from parameters monitored from the data logger will be transferred and stored in a laptop computer during the performance of the test.

4.6.7 One (1) Data Logger, Fluke Model 2280 or equivalent.

FC 94-0030
FC 94-0055

4.6.8 One (1) Controllotron Model 990 or equivalent with ± 2% FS accuracy.

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4.7 Request operations align or verify alignment of the chilled water system for operation per 0POP02-CH-0001 for the two trains being tested.

4.8 Test Coordinator shall conduct pretest briefing with Test and Operations personnel AND initial on Data Sheet (-2).

FC 94-0045
FC 94-0055

5.0 Precautions

5.1 If at any time during this procedure any Essential Chiller in the Train or Trains being tested trips, suspend the test and evaluate the condition before resuming the test. Record the test status in the Chronological Log, Data Sheet (-6).

5.2 Shift turnover for the test shall be performed with the permission of the Shift Supervisor under the coordination of the Test Coordinator, AND documented in the Chronological Test Log, Data Sheet (-6). Oncoming test personnel SHALL sign onto the Test Chronological Log Sheet (-6).

5.3 Insure during the performance of this test adequate Essential Chilled Water System Chillers remain in operation to support plant cooling requirements.

CAUTION

Notify Operations prior to performing any of the following actions as they will require the respective Essential Chilled Water system to be declared INOPERABLE:

1. Changing the position of any Essential Chilled Water System valve from its position defined in 0POP02-CH-0001, Essential Chilled Water System.

2. Changing the position of any Essential Cooling Water System valve from its position defined in 0POP02-EW-0001, Essential Cooling Water System.

3. Resetting the 300 Ton Chiller Chilled Water Temperature Control Module A1CHTC9603, B1CHTC9604, or C1CHTC9605 for the applicable train.

6.0 Procedure

6.1 Test #1, 300 Ton Chiller Test for MOD 93049

___ 6.1.1 Notify the Shift Supervisor that Test #1 will commence and to declare the affected Essential Chilled Water train inoperable, AND initial on Data Sheet (-2).

___ 6.1.2 Verify prerequisites have been completed and precautions have been read AND initial on Data Sheet (-2).

___ 6.1.3 Request Operation place the 300 Ton Essential Chiller 12A(12B)(12C) handswitch in Pull to Lock for the train to be tested.

NOTE

At the discretion of the test coordinator Steps 6.1.4, 6.1.7 and 6.1.8 may be performed out of sequence. Substeps shall be performed in the order written.

___ 6.1.4 Install the following test equipment on the applicable 300 Ton Chiller to be tested at the location listed and connect each instrument to the data logger.

** ___ 6.1.4.1 Pressure indicator/transducer, 0-50 psia, at CONDENSER SERVICE VALVE AND initial on Data Sheet (-2).

6.1.4.1.1 Open Condenser Service Isolation Valve AND initial on Data Sheet (-2).

** ___ 6.1.4.2 Pressure indicator/transducer, 0-50 psia, at EVAPORATOR SERVICE VALVE AND initial on Data Sheet (-2).

** 6.1.4.2.1 Open Evaporator Service Isolation Valve AND initial on Data Sheet (-2).

** ___ 6.1.4.3 RTD at Chiller Condenser ECW inlet thermowell EW-TW-6904A (6905A) (6906A) for the train being tested. (Range of 32-100°F), AND initial on Data Sheet (-2).

** ___ 6.1.4.4 RTD at Chiller Condenser ECW outlet thermowell EW-TW-6904B (6905B) (6905B) for the train being tested. (Range of 32-100°F), AND initial on Data Sheet (-2).

** ___ 6.1.4.5 RTD at Chiller Evaporator CH inlet thermowell CH-TI-9502 (9508) (9514) [Remove existing temperature indicator] for the train being tested AND for the train to be tested in Test #3. (Range of 32-100°F), AND initial on Data Sheet (-2).

** ___ 6.1.4.6 RTD at Chiller Evaporator CH outlet thermowell CH-TI-9502A (9508A) (9514A) [Remove existing temperature indicator] for the train being tested AND for the train to be tested in Test #3. (Range of 32-100°F), AND initial on Data Sheet (-2).

** ___ 6.1.4.7 RTD at chiller compressor discharge thermowell, located in the compressor discharge volute (not labeled) for the train being tested AND for the train to be tested in Test #3. (Range of 32-230°F), AND initial on Data Sheet (-2).

___ 6.1.5 Install the 0-50 PSIG pre[illegible] transmitter on the Chiller Oil Pressure Indicator Manifold on the 300 Ton chiller being tested AND initial on Data Sheet (-2), as follows:

___ 6.1.5.1 Open the door to the local Chiller Control Panel on the chiller to be tested.

___ 6.1.5.2 Close Chiller Oil Pressure Gauge Service Isolation Valve CH-1318 (1321) (1324) on the Chiller to be tested.

___ 6.1.5.3 At the Oil Pressure Gauge disconnect tubing running to the Oil Pressure Gauge.

___ 6.1.5.4 Install an instrument test tee on the tubing going to the oil pressure gauge. Reconnect oil pressure gauge tubing to the tee.

** ___ 6.1.5.5 Connect the test instrument tubing to the open port on the test tee AND initial on Data Sheet (-2).

___ 6.1.5.6 Request Operations place the Aux Oil Pump Handswitch in Manual for the chiller to be vented.

___ 6.1.5.7 Vent air from all affected lines as necessary by cracking open the oil pressure gauge service valve CH1318(1321)(1324) for the chiller to be tested.

___ 6.1.5.8 Request Operations place the Aux Oil Pump Handswitch in Auto for the chiller vented.

** ___ 6.1.5.9 Fully open Chiller Oil Pressure Gauge Service Isolation Valve CH1318(1321)(1324) for the chiller to be tested, AND initial on Data Sheet (-2).

___ 6.1.6 Connect instrumentation installed in Step 6.1.4 and 6.1.5 to the Data Logger AND initial on Data Sheet (-2).

CAUTION

If using 0-50" WC differential pressure gauge, the range of the gauge shall not be more than 3 times the indicated reading.

** ___ 6.1.7 Install a 0-30" WC (or 0-50" WC) differential pressure gauge on the 300 Ton Chiller Chilled Water flow element FE-9502 (FE-9508) (FE-9514) for the train tested, AND for the chiller to be tested in Test #3. AND initial on Data Sheet (-2).

___ 6.1.7.1 Request operations open or verify open FE-9502 (9508) (9514) instrument isolation valves CH-0887 and CH-0888 (CH-0889 and CH-0890) (CH-0891 and CH-0892) for the train being tested and for the chiller to be tested in Test #3 AND initial on Data Sheet (-2).

** ___ 6.1.8 Install Controllotron Flow Meter on the ESF Pump Room AHU Outlet piping 2" CH1133WA3 (CH1227WA3) (CH1333WA3) for the train being tested, AND initial on Data Sheet (-2).

** 6.1.8.1 Install a 0-30" WC (or 0-50" WC) differential pressure gauge on the 150 Ton Chilled Water flow element FE-9473 (FE-9483) or a Controllotron Flow Computer by FE-9493 for the train to be tested AND initial on Data Sheet (-2).

6.1.8.1.1 Request Operations open or verify open FE-9473 (FE-9483) instrument isolation valves CH-0881 and CH-0882 (CH-0883 and CH0884) for the train being tested (train C requires no valves open) AND initial on Data Sheet (-2)

___ 6.1.9 Request Electrical Maintenance or PED reset the 300 Ton Chiller Temperature Control Modules A1CHTC9603 (B1CHTC9604) (C1CHTC9605) to 48+/-1°F, for the chiller being tested, as follows:

___ 6.1.9.1 If chilled water outlet temperature is less than 48°F operate chilled water pump with the chiller secured to allow chilled water outlet temperature to increase to >48°F.

___ 6.1.9.2 Raise the setting of the 300 Ton Essential Chiller Outlet Temperature Control Module by turning the Temperature Control Point dial on the face of the module clockwise several increments. (Each increment is approximately 1°F.)

FC-94022

___ 6.1.9.3 Request Operations restart the chiller previously secured AND Observe discharge water temperature with the chiller in operation using installed M&TE.

___ 6.1.9.4 Continue to adjust the Temperature Control Point dial on the Temperature Current Module until chilled water discharge temperature is stable at approximately 48+/-1°F, AND record final temperatures on Data Sheet (-2).

___ 6.1.10 Rebalance the Essential Chilled Water System for the train being tested per Addendum 1, (2), (3), AND record on Data Sheets (-3), (-4), (-5) as applicable.

___ 6.1.11 Verify ECW Pump Discharge temperature is ≤ 69 °F using N1EWTI6883 (6888) (6893) located on CP-002, AND record on Data Sheet (-2).

6.1.12 Request Operations secure the 300 Ton Essential Chiller 12A(12B)(12C) for the chiller to be tested AND place handswitch to Pull to Lock.

___ 6.1.13 Request Operations close or verify closed the 300 Ton Chiller ECW outlet valve EW-PV-6904 (6905) (6906).

___ 6.1.14 Request Operations establish flow through the 300 Ton Chiller ECW outlet bypass valve EW-3013 (EW-3019) (EW-3025) to 240 GPM as indicated on local flow indicator FI-6904C (6905C) (6906C).

___ 6.1.15 Request Operations place 150 Essential Chiller 11A (11B) (11C) handswitch on CP022 to PULL TO LOCK for the train being tested.

___ 6.1.16 Request Operations close or verify closed the 150 Ton Chiller ECW outlet valve EW-PV-6854 (6864) (6874).

___ 6.1.17 Request Operations reposition the 150 Ton Chiller ECW Outlet Bypass Valve EW-3010 (3016) (3022) to 3/4 hand wheel turn open.

___ 6.1.18 Request Operations place Essential Chilled Water Pump 11A (11B) (11C) handswitch to PULL TO LOCK for the train being tested.

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FC 94-0055

___ 6.1.19 Request Operations secure Essential Cooling Water Pump 1A (1B)(1C) for the train being tested.

___ 6.1.20 Wait 24 hours maintaining this line-up. RECORD start of 24 hour holding period on Data Sheet (-2).

___ 6.1.21 When the 24 hours has passed, THEN verify the Essential Cooling Water Pump secured in step 6.1.19 has not run in the past 24 hours and record the completion time on Data Sheet (-2).

FC 94-0043
FC 94-0055

___ 6.1.22 Verify ECW Pump Discharge temperature is still ≤ 69°F using NIEWTI6883 (6888) (6893) located on CP-002 AND record on Data Sheet (-2).

___ 6.1.23 Request Operations to place EAB AND Control Room ventilation systems are in operation for the train of Essential Chilled Water being tested.

___ 6.1.24 Request Operations place the Control Room AND EAB Main area Chilled Water temperature modulating valve handswitches TV-9476A/B (TV-9486A/B) (TV-9496A/B) and TV-9477A/B (TV-9487A/B) (TV-9497A/B) in bypass closed position for the train being tested.

___ 6.1.25 Request Operations start or verify Essential Chiller Supplemental Cooler 11A (11B) (11C) is in operation for the train being tested.

CAUTION

To insure satisfactory data collection Step 6.1.26 and substeps must be performed in the order and time sequence written. Ensure Operations and Test Personnel are fully briefed before proceeding

6.1.26 Perform the following substeps within the specified time restrictions to ensure satisfactory data collection during the chiller start.

___ 6.1.26.1 Configure data logger to record temperature and pressure readings at once per second.

___ 6.1.26.2 Request Operations START the ECW Pump 1A (1B)(1C)for the train being tested.

___ 6.1.26.3 10 seconds after the start of the ECW Pump, request Operations START the Essential Chilled Water Pump for the train being tested.

___ 6.1.26.4 START the data logger concurrent with the ECW pump start.

___ 6.1.26.5 Request Operations IMMEDIATELY (within 5 seconds of starting the chilled water pump) start the 300 Ton Essential Chiller 12A (12B) (12C) for the train being tested.

___ 6.1.27 RECORD Essential Chilled Water differential pressure through the 300 Ton Chiller Evaporator at FE-9502 (9508) (9514) for the train being tested on Data Sheet (-2).

___ 6.1.28 RECORD 300 Ton Chiller Condenser ECW bypass flow using FI-6904C (6905C) (6906C) for the train tested on Data Sheet (-2).

___ 6.1.29 Continue data collection on the data logger for at least 30 minutes OR until Essential Chilled Water outlet temperature reaches 48°F for the train being tested.

___ 6.1.30 TURN OFF the data logger.

___ 6.1.31 RECORD Essential Chilled Water differential pressure through the 300 Ton Chiller Evaporator at FE-9502 (9508) (9514) for the train being tested on Data Sheet (-2).

___ 6.1.32 RECORD 300 Ton Chiller Condenser ECW bypass flow using FI-6904C (6905C) (6906C) for the train being tested on Data Sheet (-2).

6.2 Test #2, 300 Ton Chiller Test for MOD 93049

___ 6.2.1 After operation of the 300 ton chiller for at least one hour RECORD Chiller ECW pump discharge temperature using NIEWTI6883(6888)(6893) AND Essential Chilled Water outlet temperatures using installed RTD's on Data Sheet (-2).

___ 6.2.2 Request Operations secure the 300 Ton Essential Chiller 12A (12B) (12C) being tested.

___ 6.2.3 Request Operations secure ECW Pump 1A (1B) (1C) for the train being test.

NOTE

CR/EAB ventilation fans may be utilized as required to enhance chilled water system heat up.

___ 6.2.4 Continue operation of the Chilled Water pump in a closed loop heatup of the chilled water system being tested.

___ 6.2.5 Request Operations start or stop CR/EAB ventilation fans as required to assist the heat up of the Essential Chilled Water System.

___ 6.2.6 Continue running the Essential Chilled Water Pump until Essential Chilled Water temperature, as measured by the RTDs mounted in the chiller evaporator outlet thermowell is at least 25° greater than ECW Pump discharge Temperature as measured at N1EWTI6883 (6888) (6893) located on CP002.

___ 6.2.7 RECORD Chiller ECW Pump discharge temperature and Essential Chilled Water outlet temperatures on Data Sheet (-2) AND verify at least 25°ΔT.

___ 6.2.8 Request Operations secure the Essential Chilled Water Pump 11A(11B)(11C) for the train being tested.

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CAUTION

To ensure satisfactory data collection, Step 6.2.9 must be performed in the order and timed sequence as written. Ensure Operations and Test Personnel are fully briefed before proceeding.

6.2.9 Perform the following substeps within the specified time restrictions to ensure satisfactory data collection during the chiller start.

___ 6.2.9.1 Configure data logger to record temperature and pressure readings once per second.

___ 6.2.9.2 Request Operations START the ECW Pump 1A (1B) (1C) for the train being tested.

___ 6.2.9.3 START the data logger concurrent with the ECW Pump start.

___ 6.2.9.4 After 3 1/2 minutes, request Operations START the Essential Chilled Water Pump 11A (11B) (11C) for the train being tested.

___ 6.2.9.5 Request operations IMMEDIATELY (within 5 seconds of Essential Chilled Water Pump start) START the 300 Ton Essential Chiller 12A (12B) (12C) for the train being tested.

___ 6.2.10 Continue to take data on the data logger until the chiller outlet Essential Chilled Water temperature reaches 48 °F for the train being tested.

___ 6.2.11 TURN OFF the data logger.

6.3 Test #3, 300 Ton Chiller Test for MOD 93049

___ 6.3.1 Notify the Shift Supervisor that Test #3 will commence and to declare the SECOND affected Essential Chilled Water train inoperable AND initial on Data Sheet (-2).

___ 6.3.2 Request Electrical Maintenance OR PED reset the 300 Ton Chiller Temperature Control Modules A1CHTC9603 (B1CHTC9604) (C1CHTC9605) to 48+/-1°F as follows:

___ 6.3.2.1 If Chilled Water Temperature Outlet is less than 48°F as read on test RTD's request operations secure the chiller if not already secured. Operate Chilled Water Pump to allow chilled water temperature to increase to >48°F by continuing to operate the chilled water pump, otherwise proceed to step 6.3.2.2.

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___ 6.3.2.2 Raise the setting of the 300 Ton Essential Chiller Temperature Current Module by turning the Temperature Control Point dial clockwise several increments. (Each increment is approximately 1°F).

___ 6.3.2.3 Request Operations start the chiller if previously secured AND observe chilled water discharge temperature as read on test RTD's using installed M&TE.

___ 6.3.2.4 Continue to adjust the Temperature Control Point dial on the Temperature Current Module until chilled water discharge temperature is stable at approximately 48+/-1°F, AND record final temperature on Data Sheet (-2).

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FC 94-0055

___ 6.3.3 Remove the controllotron installed on the ESF Pump Room AHU for the train tested in Test #1.

___ 6.3.4 Install and remove the Controllotron Flowmeter at C train 150 Ton Chiller piping 4" CH1301WA3 or or theESF Pump Room AHU Outlet piping 2" CH1133WA3 (CH1227WA3) (CH1333WA3) as required to perform the flow balance per step 6.3.5 for the second train being tested.

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FC 94-0055

___ 6.3.5 Rebalance the Essential Chilled Water System for the second train being tested per Addendum 1, (2), (3) record on Data Sheet (-3), (-4), (-5) as applicable.

___ 6.3.6 Request Operations stop the SECOND 300 Ton Essential Chiller 12A(12B)(12C) being tested.

___ 6.3.7 Verify ECW Pump Discharge temperature is ≤ 69 °F using N1EWTI6883 (6888) (6893) located on CP-002 AND record on Data Sheet (-2).

___ 6.3.8 Request Operations close or verify closed 300 Ton Chiller ECW outlet valve EW-PV-6904 (6905) (6906) for the second chiller being tested.

___ 6.3.9 Request Operations establish flow through the 300 Ton Chiller ECW outlet bypass valve EW-3013 (EW-3019) (EW-3025) to 240 GPM as indicated on local flow indicator FI-6904C (6905C) (6906C) for the second chiller being tested.

___ 6.3.10 Request Operations place the 150 Ton Essential Chiller 11A (11B) (11C) handswitch on CP022 to PULL TO LOCK for the second train being tested.

___ 6.3.11 Request Operations close or verify closed the 150 Ton Chiller ECW outlet valve EW-PV-6854 (6864) (6874) for the second train being tested.

___ 6.3.12 Request Operations reposition the 150 Ton Chiller ECW Outlet Bypass Valve EW-3010 (3016) (3022) to 3/4 hand wheel turn open for the second train being tested.

6.3.13 Request operations verify the EAB Main Area ventilation is in operation for each of the two trains of Essential Chilled Water being tested.

___ 6.3.14 Request operations verify that Control Room ventilation is in operation for ONLY ONE of the two trains of Essential Chilled Water being tested.

___ 6.3.15 For the second train being tested, request Operations verify the Control Room AND EAB Main area chilled water temperature modulating valve handswitches TV-9476A/B (TV9486A/B) (TV9496A/B) and TV9477A/B (TV9487A/B) (TV9497A/B) are in bypass closed position.

___ 6.3.16 Request Operations start and/or verify the two 300 Ton Essential Chillers 12A (12B) (12C) being tested are in operation.

___ 6.3.17 Verify Chillers have been in service for at least 1 hour AND record on Data Sheet (-2).

6.3.18 Configure the Data Logger to record data for both 300 ton chillers at 10 minute intervals for 1 hour:

___ 6.3.18.1 Essential Chilled Water inlet temperatures.

___ 6.3.18.2 Essential Chilled Water outlet temperatures.

___ 6.3.18.3 Essential Chiller Compressor Discharge temperatures.

___ 6.3.19 START data logger.

___ 6.3.20 RECORD Essential Chilled Water flows through the 300 ton chillers at 10 minute intervals on Data Sheet (-2).

___ 6.3.21 Record the following information on Data Sheet (-2) at least once during the test:

___ 6.3.21.1 Outside air dry bulb and wet bulb temperatures.

___ 6.3.21.2 Outside air % relative Humidity.

___ 6.3.21.3 Approximate Prerotation Vane percent open position for both chillers being tested.

___ 6.3.21.4 Approximate Hot Gas Bypass Valve percent open position for both chillers being tested.

___ 6.3.21.5 Motor amps for both the 300 Ton Essential Chillers being tested using the ammeter at load center E1A cubicle 4 (E1B cubicle 9) (E1C cubicle 9).

___ 6.3.22 TURN OFF data logger.

NOTE

Restoration steps 6.3.23 through 6.3.29 may be performed in parallel with Test #4.

___ 6.3.23 Request Operations restore the second Essential Chilled Water trains being tested as follows AND record on Data Sheet (-2) the train to be restored.

___ 6.3.23.1 Request operations secure the 300 Ton Essential Chiller 12A (12B) (12C) in the train being restored, per step 6.3.23.

___ 6.3.23.2 Realign Essential Chilled Water System per 0POP02-CH-0001.

___ 6.3.23.3 Realign Essential Cooling Water System per 0POP02-EW-0001.

___ 6.3.23.4 Return Temperature Control Point dial on the Temperature Current Module to the fully counterclockwise position.

___ 6.3.23.5 Request operations close FE 9502 (9508) (9514) instrument isolation valves CH0887 and CH0888 (CH0889 and CH0890) (CH0891 and CH0892) for the train being restored per Step 6.3.23.

___ 6.3.24 Notify the Shift Supervisor that testing of the second Essential Chilled Water train is complete and that the train may be returned to service, record on Data Sheet (-2).

___ 6.3.25 Close Condenser Service Isolation Valve AND initial on Data Sheet (-2) for the train tested in Test #1.

___ 6.3.26 Close Evaporator Service Isolation Valve AND initial on Data Sheet (-2) for the train tested in Test #1.

___ 6.3.27 Request operation close FE9502(9508)(9514) instrument isolation valves CH0887 and CH0888(CH0889 and CH0890)(CH0891 and CH0892) for the train tested in Test #1.

6.3.27.1 Request Operations close or verify closed FE-9473 (FE-9483) instrument isolation valves CH-0881 and CH-0882 (CH-0883 and CH0884) for the train tested in Test #1 (train C requires no valves closed).

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___ 6.3.28 Remove the 0-50 PSIG pressure transmitter on the Chiller Oil Pressure Indicator Manifold previously installed for Tests #1 and #2 as follows:

___ 6.3.28.1 Open the door to the local Chiller Control Panel.

___ 6.3.28.2 Close Chiller Oil Pressure Gauge Service Isolation Valve CH-1318 (1321) (1324) on the Chiller.

** ___ 6.3.28.3 Disconnect and remove instrument test tee on the tubing to oil pressure gauge. Reconnect oil pressure gauge tubing to the oil pressure gauge valve, AND initial on Data Sheet (-2).

___ 6.3.28.4 Request Operations place the Aux Oil Pump handswitch in Manual for the chiller to be vented.

___ 6.3.28.5 Vent air from all affected lines as necessary by cracking open the oil pressure gauge service isolation valve CH-1318(1321)(1324).

___ 6.3.28.6 Request operations place the Aux Oil Pump Handswitch in Auto for the chiller vented.

** ___ 6.3.28.7 Open Chiller Oil Pressure Gauge Service Isolation Valve CH1318(1321)(1324) AND initial on Data Sheet (-2).

** ___ 6.3.29 Remove all M&TE previously installed in steps 6.1.4, 6.1.7, 6.1.8, 6.3.4, and record on Data Sheet (-2).

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6.4 Test #4, 150 Ton Chiller Test for MOD 93049

___ 6.4.1 Verify the train to be tested is not the train that was selected for return to service in Step 6.3.23 AND record Tag/TPNS of chiller to be tested on Data Sheet (-2).

___ 6.4.2 Verify ECW Pump Discharge temperature is ≤ 69 °F using N1EWTI6883 (6888) (6893) located on CP-002 AND record on Data Sheet (-2).

___ 6.4.3 Request Operations place the 300 Ton Essential Chiller 12A (12B) (12C) handswitch on CP022 to PULL TO LOCK for the train being tested.

___ 6.4.4 Request Operations reposition 300 Ton Chiller ECW Outlet Bypass Valve EW-3013 (3019) (3025) to 3/4 hand wheel turn open.

___ 6.4.5 Request Operations establish flow through the 150 Ton Chiller ECW outlet bypass valve EW-3010 (EW-3016) (EW-3022) to 120 GPM as indicated on local flow indicator FI-6854C (6864C) (6874C).

___ 6.4.6 Request Operations place Essential Chilled Water Pump 11A (11B) (11C) handswitch on CP022 to PULL TO LOCK for the train being tested.

___ 6.4.7 Request Operations secure Essential Cooling Water Pump 1A (1B)(1C) for the train being tested.

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___ 6.4.8 Request Operations insure the 150 Ton Essential Chiller 11A (11B) (11C) handswitch on CP022 is in PULL TO LOCK for the train being tested.

___ 6.4.9 When the 24 hours has passed, THEN verify the Essential Cooling Water Pump secured in step 6.4.7 has not run in the past 24 hours and record the completion time on Data Sheet (-2).

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___ 6.4.10 WHEN the 24 hours has passed, THEN record completion time on Data Sheet (-2).

___ 6.4.11 Request Operations place EAB AND Control Room ventilation systems in operation for the train of Chilled Water to be tested.

___ 6.4.12 Request Operations ensure Control Room AND EAB Main area Chilled Water temperature modulating valve handswitches TV9476A/B (TV9486A/B) (TV-9496A/B) and TV-9477A/B (TV9487A/B) (TV9497A/B) are in bypass closed position for the train being tested.

___ 6.4.13 Request Operations START the ECW Pump 1A (1B) (1C) for the train being tested.

___ 6.4.14 WHEN 3 1/2 minutes have elapsed, THEN request operations start Essential Chilled Water Pump 11A (11B) (11C) for the train being tested.

___ 6.4.15 IMMEDIATELY (within 5 seconds of CH Pump start) request Operations start the 150 Ton Essential Chiller 11A (11B) (11C) for the train being tested.

___ 6.4.16 5 minutes and again 30 minutes after the 150 Ton Essential Chiller start, RECORD the following parameters for the 150 ton chiller being tested using installed plant instrumentation on Data Sheet (-2).

___ 6.4.16.1 Chiller condenser pressure

___ 6.4.16.2 Chiller evaporator pressure

___ 6.4.16.3 Chiller oil pressure

___ 6.4.16.4 Chilled Water inlet temperature

___ 6.4.16.5 Chilled Water outlet temperature

___ 6.4.17 Notify Shift Supervisor testing is complete.

___ 6.4.18 Request Operations restore the Essential Chilled Water train being tested as follows AND record on Data Sheet (-2).

___ 6.4.18.1 Realign Essential Chilled Water System per 0POP02-CH-0001.

___ 6.4.18.2 Realign Essential Cooling Water System per 0POP02-EW-0001.

___ 6.4.18.3 Return temperature control dial on the Temperature Control Module fully counterclockwise.

6.5 Attach data logger data to Data Sheet (-2)

6.6 Test Coordinator shall sign, date and record the time on Data Package Cover Sheet (-1) indicating all M&TE is removed and Shift Supervisor has been informed of test completion.

6.7 Test Coordinator shall evaluate the test results against the Section 7.0 Acceptance Criteria for acceptability and record on Data Sheet (-1).

6.8 Forward documentation to Design Engineering for review.

6.9 Design Engineering shall evaluate the test results against the Section 7.0 Acceptance Criteria for acceptability and record on Data Sheet (-1) AND return to the Cognizant System Engineer. Additional sheets used to perform the test evaluation shall be attached to this package.

6.10 Cognizant System Engineer shall review and forward to the Records Management System for storage as a permanent plant record.

7.0 Acceptance Criteria

7.1 Test #1

7.1.1 Chiller starts and operates successfully for the duration of the test.

7.1.2 Design Engineering evaluation is required for acceptance of the following:

7.1.2.1 Peak condenser pressure is less than 24 psig.

7.1.2.2 Peak load on the chiller condenser is less than 6.4×10^6 BTU/HR

7.2 Test #2

7.2.1 Chiller starts and operates successfully for the duration of the test.

7.3 Test #3

7.3.1 Chiller starts and operates successfully for the duration of the test.

7.4 Test #4

7.4.1 Chiller starts and operates successfully for the duration of the test.

8.0 References

8.1 Technical Specification 3.7.14

8.2 0POP02-CH-0001, Essential Chilled Water System

8.3 Plant Modification 93049

8.4 0POP02-EW-0001, Essential Cooling Water System

9.0 Support Documents

9.1 Addendum 1, A Train Essential Chilled Water Flow Balancing

9.2 Addendum 2, B Train Essential Chilled Water Flow Balancing

9.3 Addendum 3, C Train Essential Chilled Water Flow Balancing

9.4 Addendum 4, Psychrometric Chart

9.5 Addendum 5, Data Logger Setup

9.6 Data Package Cover Sheet (-1)

9.7 Test Verification Data Sheet (-2)

9.8 A Train CH Balancing Data Sheet (-3)

9.9 B Train CH Balancing Data Sheet (-4)

9.10 C Train CH Balancing Data Sheet (-5)

9.11 Chronological Test Log Data Sheet (-6)

ADDENDUM 1
A TRAIN ESSENTIAL CHILLED WATER FLOW BALANCING
(Page 1 of 2)

COMPONENT NUMBER	DESCRIPTION	INITIAL SETTING	MOD 93049 CHANGED SETTING	MEASUREMENT LOCATION/DEVICE
3V111VCH001	(11A Chiller)	303 GPM	300 -0/+60 GPM	FE-9473 ΔP **Gauge
3V111VCH004	(12A Chiller)	607 GPM	600 -0/+60 GPM	FE-9502 ΔP **Gauge
3V111VHX026	(Elect Pen CC Space)	3.8 PSID	*	CH0943,0944 ΔP Gauge
3V111VHX016	(Cont Rm CC)	7.5 PSID	*	CH0956,1448 ΔP Gauge
3V111VHX007A	(EAB Mn Area CC	13.3 PSID	*	CH1477,1478 ΔP Gauge
3V111VHX007B	(EAB Mn Area CC)	13.0 PSID	*	CH1476,1479 ΔP Gauge
3V101VAH012	(Rm Mu AHU WTR AHU)	1.8 PSID	*	CH1049,1048 ΔP Gauge
3V101VAH019	(Ess Chlr AHU)	2.5 PSID	*	CH1037, 1036 ΔP Gauge
3V101VAH008	(BA Pump Rm AHU)	2.0 PSID	*	CH1041, 1040 ΔP Gauge
3V101VAH010	(Rom 033 CVCS AHU)	1.0 PSID	*	CH1045, 1044 ΔP Gauge
3V101VAH016	(Radwaste CR CC)	31 GPM	0 GPM	N/A
3V101VAH022	(Rad Montr. Rm AHU)	0.9 PSID	*	CH1057,1056 ΔP Gauge
3V121VHX012	(ESF Pump Rm CC)	62.5 GPM	40 ± 3 GPM	Controllotron Flow Element
3V121VAH012	(FHB IVC AHU)	1.8 PSID	*	CH1025, 1024 ΔP Gauge
3V111VCH001	11A Chiller	N/A	*	CH1519,1462 ΔP Gauge
3V111VCH004	12A Chiller	N/A	*	CH1428,1429 ΔP Gauge

* MOD 93049 has no specified change in design flow rates. Readings will be taken for comparison only (no acceptance criteria) to initial flow settings.

** Flows on the Essential Chiller can be computed from annular flow equation on Data Sheet (-3).

ADDENDUM 1
A TRAIN ESSENTIAL CHILLED WATER FLOW BALANCING
(Page 2 of 2)

Balancing Sequence

1. Record initial as found flow readings on Essential Chillers 11A, 12A and ESF Pump Rm AHU on Data Sheet (-3).
2. Valve out the Radwaste Control Room AHU by closing valves CH0673 and CH0674.
3. Set flow on Essential chillers 11A (CH0289), 12A (CH0589) and record flows on Data Sheet (-3)**.
4. Set flow on ESF Pump Rm AHU (CH0735) and Record on Data Sheet (-3).
5. Repeat steps 3 & 4 as many times as needed to set all flows in required ranges.
6. Take ΔP readings on remaining components for comparison only (No Acceptance Criteria). Also take ΔP readings on Essential Chillers 11A, 12A. Record results in Data Sheet (-3).

ADDENDUM 2
B TRAIN ESSENTIAL CHILLED WATER FLOW BALANCING
(Page 1 of 2)

COMPONENT NUMBER	DESCRIPTION	INITIAL SETTING	MOD 93049 CHANGED SETTING	MEASUREMENT LOCATION/DEVICE
3V111VCH002	(11B Chiller)	293 GPM	300-10/+60 GPM	FE-9483 ΔP **Gauge
3V111VCH005	(12B Chiller)	587 GPM	600-10/+60 GPM	FE-9508 ΔP **Gauge
3V111VHX025	(Elect Pen Space CC)	6.5 PSID	*	CH0948,0947 ΔP Gauge
3V111VHX017	(Cont Rm CC)	7.0 PSID	*	CH0960,1452 ΔP Gauge
3V111VHX010A	(EAB Mn Area CC)	13.1 PSID	*	CH1481,1482 ΔP Gauge
3V111VHX010B	(EAB Mn Area CC)	12.9 PSID	*	CH1480,1483 ΔP Gauge
3V101VAH013	(Rx M/u Pap Rm AHU)	2.2 PSID	*	CH1069,1068 ΔP Gauge
3V101VAH020	(Essen Chlr AHU)	3.3 PSID	*	CH1061, 1060 ΔP Gauge
3V101VAH011	(Rm 33 CVCS AHU)	0.95 PSID	*	CH1065, 1064 ΔP Gauge
3V101VAH014	(Rm 226 CVCS AHU)	0.9 PSID	*	CH1073, 1072 ΔP Gauge
3V121VAH010	(SFP Pump AHU)	2.0 PSID	*	CH1017,1619 ΔP Gauge
3V121VHX013	(ESF Pump Rm CC)	62.5 GPM	40 ± 3 GPM	Controllotron Flow Element
3V121VAH013	(FHB IVC AHU)	1.6 PSID	*	CH1029, 1028 ΔP Gauge
3V111VCH002	11B Chiller	N/A	*	CH1520,1463 ΔP Gauge
3V111VCH005	12B Chiller	N/A	*	CH1431,1430 ΔP Gauge

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* MOD 93049 has no specified change in design flow rates. Readings will be taken for comparison only (no acceptance criteria) to initial flow settings.

** Flows on the Essential Chiller can be computed from the flow equation on Data Sheet (-4).

ADDENDUM 2
B TRAIN ESSENTIAL CHILLED WATER FLOW BALANCING
(Page 2 of 2)

Balancing Sequence

1. Record initial as found flow readings on Essential Chillers 11B, 12B and ESF Pump Rm AHU on Data Sheet (-4).
2. Set flow on Essential Chillers 11B (CH0298), 12B (CH0598) and record flows on Data Sheet (-4)**.
3. Set flow on ESF Pump Rm AHU (CH0752) and Record on Data Sheet (-4).
4. Repeat steps 2 & 3 as many times as needed to set all flows in required ranges.
5. Take ΔP readings on remaining components for comparison only (No Acceptance Criteria). Also take ΔP readings on Essential Chillers 11B, 12B. Record results in Data Sheet (-4).

ADDENDUM 3
C TRAIN ESSENTIAL CHILLED WATER FLOW BALANCING
(Page 1 of 2)

COMPONENT NUMBER	DESCRIPTION	INITIAL SETTING	MOD 93049 CHANGED SETTING	MEASUREMENT LOCATION/DEVICE
3V111VCH003	(11C Chiller)	318 GPM	300 -15/+60 GPM	Controllotron Flow Meter
3V111VCH006	(12C Chiller)	635 GPM	600 -10/+60 GPM	FE-9514 ΔP **Gauge
3V101VAH009	(BA Pump Rm AHU)	2.0 PSID	*	CH1080,1081 ΔP Gauge
3V111VHX018	(Cont Rm CC)	7.2 PSID	*	CH1456,0964 ΔP Gauge
3V111VHX013A	(EAB Mn Area CC)	12.5 PSID	*	CH1485,1486 ΔP Gauge
3V111VHX013B	(EAB Mn Area CC)	12.5 PSID	*	CH1484,1487 ΔP Gauge
3V101VAH021	(Essen Chlr AHU)	2.75 PSID	*	CH1077,1076 ΔP Gauge
3V101VAH007	(Rm 44 CVCS AHU)	1.0 PSID	*	CH1085, 1084 ΔP Gauge
3V101VAH015	(Rm 226 CVCS AHU)	0.2 PSID	*	CH1089, 1088 ΔP Gauge
3V101VAH018	(Radwaste CR AHU)	31 GPM	0 GPM	N/A
3V101VAH023	(Rad Montr. Rm AHU)	.075 PSID	*	CH1097, CH1096 ΔP Gauge
3V111VHX 024	(Elect Pen Sp CC)	8.25 PSID	*	CH952, 951 ΔP Gauge
3V121VAH014	(FHB IVC AHU)	1.0 PSID	*	CH1033, 1032 ΔP Gauge
3V121VAH011	(SFP Pump AHU)	2.0 PSID	*	CH1021, 1622 ΔP Gauge
3V121VHX 014	(ESF Pump Rm CC)	63 GPM	40 ± 3 GPM	Controllotron Flow Element
3V111VCH003	11C Chiller	N/A	*	CH1524,1454 ΔP Gauge
3V111VCH006	12C Chiller	N/A	*	CH1433,1432 ΔP Gauge

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* MOD 93049 has no specified change in design flow rates. Readings will be taken for comparison only (no acceptance criteria) to initial flow settings.

** Flows on the Essential Chiller can be computed from the flow equation on Data Sheet (-5).

ADDENDUM 3
C TRAIN ESSENTIAL CHILLED WATER FLOW BALANCING
(Page 2 of 2)

Balancing Sequence

1. Record initial As Found flow readings on Essential Chillers 11C, 12C and Train C ESF Pump Rm AHU on Data Sheet (-5).
2. Valve out the Train C Radwaste Control Room AHU by closing valves CH00722 and CH0723.
3. Set flow on Essential Chillers 11C (CH0307), 12C (CH0607) and record flows on Data Sheet (-5).**
4. Set flow on Train C ESF Pump Rm AHU (CH0768) and record on Data Sheet (-5).
5. Repeat steps 3 & 4 above as needed to set all flows in required ranges.
6. Take ΔP readings on remaining components for comparison only (no acceptance criteria). Also take ΔP readings on Essential Chillers 11C, 12C. Record results in Data Sheet (-5).

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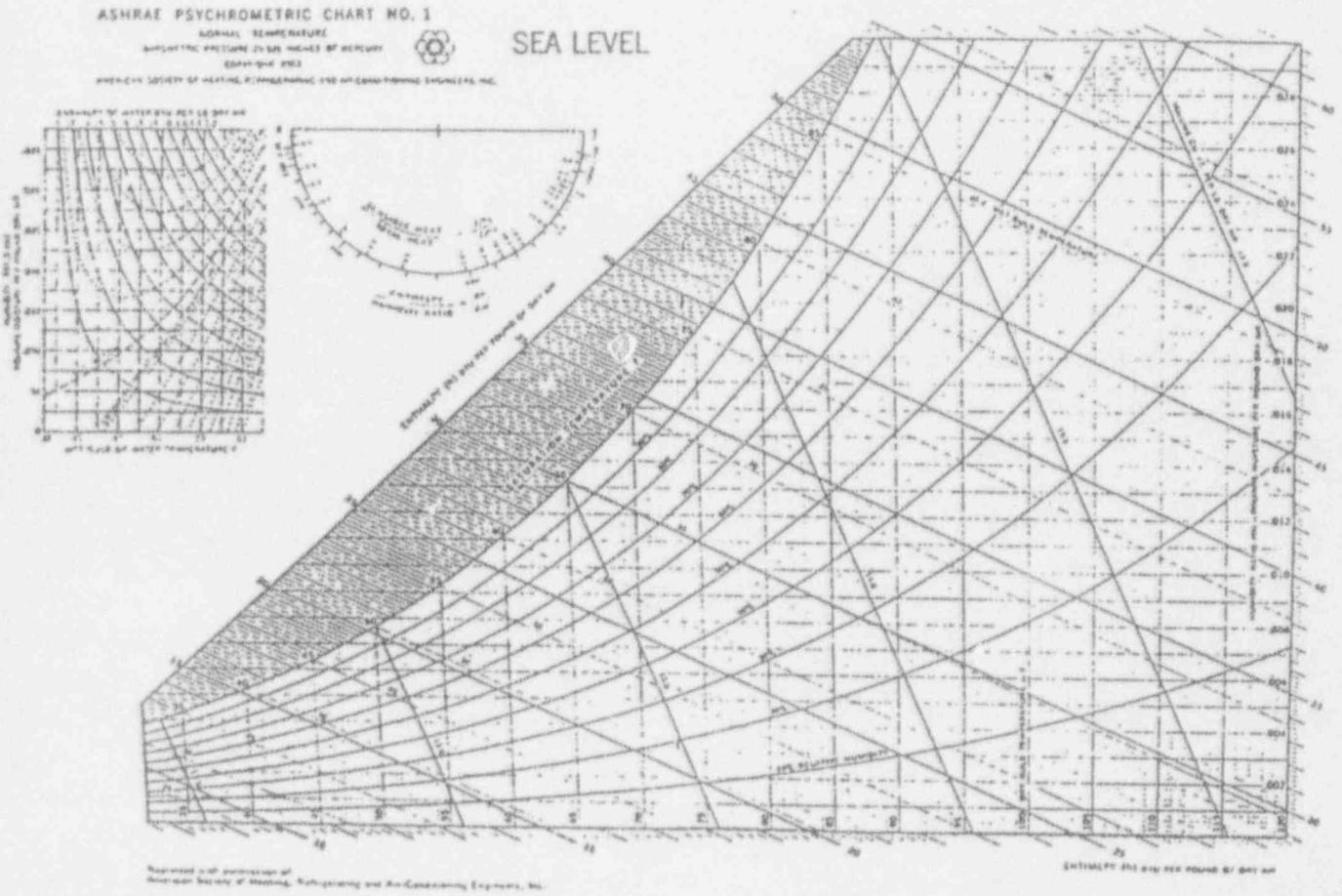
ADDENDUM 4
PSYCHROMETRIC CHART
(Page 1 of 1)



ADDENDUM 5
DATA LOGGER SETUP
(Page 1 of 1)

CHANNEL	DESCRIPTION
C0	300 Ton Chiller Chilled Water Inlet Temperature (First chilled water train tested)
C1	300 Ton Chiller Chilled Water Outlet Temperature (First chilled water train tested)
C2	300 Ton Chiller ECW Inlet Temperature (First chilled water train tested)
C3	300 Ton Chiller ECW Outlet Temperature (First chilled water train tested)
C5	300 Ton Chiller Compressor Discharge Temperature (First chilled water train tested)
C6	300 Ton Chiller Chilled Water Inlet Temperature (Second chilled water train tested) (Test #3 only)
C7	300 Ton Chiller Chilled Water Outlet Temperature (Second chilled water train tested) (Test #3 only)
C8	300 Ton Chiller Compressor Discharge Temperature (Second chilled water train tested) (Test #3 only)
C20	300 Ton Chiller Evaporator Pressure (First chilled water train tested)
C21	300 Ton Chiller Condenser Pressure (First chilled water train tested)
C22	300 Ton Chiller Compressor Oil Pressure (First chilled water train tested)

DATA PACKAGE COVER SHEET
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NOTE

For this Data Package to be complete, the Data Sheet (-2) , (-6) and any two of Data Sheets (-3), (-4), (-5) must be attached.

EQUIPMENT NUMBER(S):			
TECH SPEC REFERENCE(S): 3.7.14	TEST INTERVAL: Post Modification Test Once for MOD 93049	UNIT NUMBER: 1	WORK AUTHORIZATION NO.:
REASON FOR TEST: Post Modification Test for MOD 93049			
PERMISSION TO START THE TEST _____ SHIFT SUPERVISOR	_____ TIME	_____ DATE.	
M&TE REMOVED AND SHIFT SUPERVISOR INFORMED OF TEST COMPLETION: _____ TEST COORDINATOR	_____ TIME	_____ DATE	
TEST RESULTS: [ ] ACCEPTABLE (ALL ACCEPTANCE CRITERIA MET) [ ] UNACCEPTABLE (ANY ACCEPTANCE CRITERIA NOT MET) REVIEW FOR COMPLETENESS: _____ TEST COORDINATOR	_____ TIME	_____ DATE	
TEST RESULTS: [ ] ACCEPTABLE (ALL ACCEPTANCE CRITERIA MET) [ ] UNACCEPTABLE (ANY ACCEPTANCE CRITERIA NOT MET) REVIEW FOR COMPLETENESS: _____ DESIGN ENGINEERING ENGINEER	_____ TIME	_____ DATE	
REMARKS: _____			

This FORM, when completed, shall be retained for the life of the plant.

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TEST VERIFICATION DATA SHEET
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4.6

M&TE RECORD		
DESCRIPTION	STPEGS I.D. NO.	CALIBRATION DUE DATE
PRESSURE TRANSMITTER 0-50 psia		
PRESSURE TRANSMITTER 0-50 psia		
PRESSURE TRANSMITTER 0-50 psig		
RTD, 32-100 °F		
RTD, 32-100 °F		
RTD, 32-100 °F		
RTD, 32-100 °F		
RTD, 32-100 °F		
RTD, 32-100 °F		
RTD 32-230°F		
RTD 32-230°F		
DIFFERENTIAL PRESSURE GAUGE, 0-30"WC (or 0-50"WC)		
DIFFERENTIAL PRESSURE GAUGE, 0-30"WC (or 0-50"WC)		
SLING PSYCHROMETER		
DATA LOGGER		
DIFFERENTIAL PRESS. GAUGE, 0-30" WC (or 0-50" WC)		

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This FORM, when completed, shall be retained for the life of the plant.

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TEST VERIFICATION DATA SHEET
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STEP		PERFORMED BY	VERIFIED BY
		INITIAL/DATE	INITIAL/DATE
4.8	Pretest briefing conducted		
TEST 1			
6.1.1	Notify Shift Supervisor that test one is commencing and train will be inoperable		
6.1.2	Verify prerequisites complete		
6.1.4.1	0-50 psia gauge installed on Condenser Service Valve		
6.1.4.1.1	Condenser Service Isolation Valve opened		
6.1.4.2	0-50 psia gauge installed on Evaporator Service Valve		
6.1.4.2.1	Evaporator Service Isolation Valve opened		
6.1.4.3	RTD at chiller Condenser EW inlet thermowell EW-TI-6904A (6905A) (6906A)		
6.1.4.4	RTD at Chiller Condenser EW outlet thermowell EWTI 6904B, (6905B), 6906B)		
6.1.4.5	RTD at Chiller Evaporator CH inlet thermowell CH-TI 9502 (9508) (9514) for chiller tested in Test #1. Existing Temperature Indicators removed.		
6.1.4.5	RTD at Chiller Evaporator inlet thermowell CH-TI-9502 (9508) (9514) for the second chiller tested (Test #3). Existing Temperature Indicator removed.		

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TEST VERIFICATION DATA SHEET
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STEP		PERFORMED BY INITIAL/DATE	VERIFIED BY INITIAL/DATE
6.1.4.6	RTD at Chiller Evaporator CH outlet thermowell CH-TI 9502A (9508A) (9514A) for chiller tested in Test #1. Existing Temperature Indicators removed.		
6.1.4.6	RTD at Chiller Evaporator CH outlet thermowell CH-TI 9502A (9508A) (9514A) for second chiller tested (Test #3). Existing Temperature Indicators removed.		
6.1.4.7	RTD at Chiller Compressor Discharge Temperature thermowell for chiller train tested in Test #1.		
6.1.4.7	RTD at Chiller Compressor Discharge Temperature thermowell for chiller train tested in Test #3.		
6.1.5.5	0-50 Psig Gauge installed on oil pressure gauge manifold		
6.1.5.9	Oil pressure gauge isolation valve opened		
6.1.6	Instruments connected to Data Logger.		
6.1.7	0-30" or 0-50" WC diff pressure gauge installed on chiller train tested in Test #1.		
6.1.7.1	0-30" or 0-50" WC gauge instrument isolation valves opened or verified open for the train being tested and for the chiller to be tested in Test #3.		
6.1.8	Controllotron flow meter installed on ESF Pump Room AHU outlet piping on train being tested.		
6.1.8.1	0-30" or 0-50" WC diff pressure gauge installed on 150 Ton chiller flow element of train being tested or Controllotron by the flow element FE-9493.		
6.1.8.1.1	0-30" or 0-50" WC gauge instrument isolation valves opened or verified open for train being tested (train C requires no valves to be opened).		
6.1.9.4	Chiller outlet temperature reset to 48°F.		

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STEP		PERFORMED BY INITIAL/DATE	VERIFIED BY INITIAL/DATE
6.1.11	Verify and record ECW Pump discharge temperature is ≤ 69°F. ECW temp_____°F.		
6.1.20	24 hour hold start time recorded. Start Time: _____		
6.1.21	24 hour hold time completion time recorded Completion Time_____ _____		
6.1.22	Verify and record ECW Pump discharge temperature is ≤ 69°F. ECW temp_____°F.		
6.1.27	300 Ton Chiller Evaporator ΔP recorded ΔP _____in. WC		
6.1.28	300 Ton Chiller condenser flow recorded Condenser flow_____GPM		
6.1.31	300 Ton Chiller Evaporator ΔP recorded ΔP _____in. WC		
6.1.32	300 Ton Chiller condenser flow recorded Condenser flow_____GPM		

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TEST VERIFICATION DATA SHEET
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STEP		PERFORMED BY INITIAL/DATE	VERIFIED BY INITIAL/DATE
TEST 2			
6.2.1	Chilled Water outlet and ECW supply temperatures recorded. ECW Supply Temp_____°F, Chilled Water Outlet Temp _____°F		
6.2.7	Chilled Water outlet and ECW Pump Discharge temperatures recorded. ECW Temp_____°F, Chilled Water Outlet Temp _____°F		
TEST 3			
6.3.1	Shift Supervisor notified Test #3 will commence and a second chilled water train will be inoperable.		
6.3.2.4	300 Ton Chiller outlet temp for second train reset to 48°F.		
6.3.3	Controllotron removed from the ESF Pump Room AHU in the train tested in Test #1.		
6.3.7	Record and verify ECW Pump Discharge Temperature is ≤ 69°F ECW Temp. _____°F		
6.3.17	Both 300 Ton Chillers have been in operation ≥ 1 hour.		
6.3.20	300 Ton Essential Chiller # _____ chilled water flow (1st Train) (10 min data) ΔP _____ in. WC		
6.3.20	300 Ton Essential Chiller # _____ chilled water flow (2nd Train) (10 min data) ΔP _____ in. WC		

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STEP		PERFORMED BY INITIAL/DATE	VERIFIED BY INITIAL/DATE
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (1st Train) (20 min data)		
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (2nd Train) (20 min data)		
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (1st Train) (30 min data)		
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (2nd Train) (30 min data)		
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (1st Train) (40 min data)		
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (2nd Train) (40 min data)		
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (1st Train) (50 min data)		
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (2nd Train) (50 min data)		
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (1st Train) (60 min data)		
6.3.20	300 Ton Essential Chiller #____ chilled water flow ΔP _____ in. WC (2nd Train) (60 min data)		
6.3.21.1	Record outside air dry bulb temperature _____°F and wet bulb temperature _____°F		
6.3.21.2	Record outside air relative humidity _____% Rel. Hum. (See Addendum 4 for Psychrometric Chart)		
6.3.21.3	Record Approximate Prerotation Valve Position (PRV) (1st Train Tested) Chiller # _____ PRV _____%open		
6.3.21.3	Record Approximate Prerotation Valve Position (PRV) (2nd Train Tested) Chiller # _____ PRV _____%open		

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STEP		PERFORMED BY INITIAL/DATE	VERIFIED BY INITIAL/DATE
6.3.21.4	Record Approximate Hot Gas Bypass (HGBP) Position. (1st Train Tested) Chiller # _____ HGBP _____%open		
6.3.21.4	Record Approximate Hot Gas Bypass (HGBP) Position. (2nd Train Tested) Chiller # _____ HGBP _____%open		
6.3.21.5	Record 300 Ton Chiller amperage (1st Train Tested) Chiller # _____ Amperage _____AMPS		
6.3.21.5	Record 300 Ton Chiller amperage (2nd Train Tested) Chiller # _____ Amperage _____AMPS		
6.3.23	Verify operations restoration activities are complete and record train being restored. Train _____		
6.3.24	Shift Supervisor notified second train of chiller water tested is restored and the train may be returned to service.		
6.3.25	Condenser Service Isolation Valve closed.		
6.3.26	Evaporator Service Isolation Valve closed.		
6.3.28.3	Oil pressure gauge and test Tee remove		
6.3.28.7	Oil pressure gauge Service Isolation Valve open		
6.3.29	Condenser pressure indicator/transducer removed.		
6.3.29	Evaporator Pressure indicator/transducer removed.		
6.3.29	RTD at Condenser ECW inlet removed.		
6.3.29	RTD at Condenser ECW outlet removed.		

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STEP		PERFORMED BY INITIAL/DATE	VERIFIED BY INITIAL/DATE
6.3.29	RTD at evaporator CH inlet removed and permanent temperature indicator reinstalled for the first chiller tested in Test #1.		
6.3.29	RTD at evaporator CH inlet removed and permanent temperature indicator reinstalled for the second chiller tested in Test #3.		
6.3.29	RTD at evaporator CH outlet removed and permanent temperature indicator reinstalled for the first chiller tested in Test #1.		
6.3.29	RTD at evaporator CH outlet removed and permanent temperature indicator reinstalled for the second chiller tested in Test #3.		
6.3.29	RTD at Chiller Compressor discharge thermowell removed for the first chiller tested in Test #1.		
6.3.29	RTD at Chiller Compressor discharge thermowell removed for the second chiller tested in Test #3.		
6.3.29	0-30" or 0-50" Diff Pressure Water Gauge removed for the first chiller tested in Test #1.		
6.3.29	0-30" or 0-50" Diff Pressure Water Gauge removed for the second chiller tested in Test #3.		
6.3.29	Controllotron Flow meter removed, train tested in Test #3.		
6.3.29	0-30" or 0-50" Diff Pressure Water Gauge removed for 150 Ton chiller flow element of train being tested or Controllotron by flow element FE-9493 removed.		
6.4.1	Verify train tested was not returned to service and recorded tested chiller Tag/TPNS. _____		

FC 94-0055

FC-94-0022

FC 94-0043
FC 94-0055

TEST VERIFICATION DATA SHEET
1PEP07-CH-0002-2
(Page 9 of 9)

STEP		PERFORMED BY INITIAL/DATE	VERIFIED BY INITIAL/DATE
TEST 4			
6.4.2	Record and verify ECW Pump Discharge Temperature is ≤ 69°F ECW temp. _____ °F		
6.4.9	Start of 24 Holding Period Start Time _____		
6.4.9	Completion of 24 Holding Period Completion Time _____		
6.4.16.1	150 Ton Chiller Condenser Pressure (5 min data) _____ psig/in Hg		
6.4.16.2	150 Ton Chiller Evaporator pressure (5 min data)_____ in Hg		
6.4.16.3	150 Ton Chiller Oil Pressure (5 min data)_____ psig		
6.4.16.4	150 Ton Chiller Chilled Water Inlet Temperature (5 min data)_____ °F		
6.4.16.5	150 Ton Chiller Chilled Water Outlet Temperature (5 min data) _____ °F		
6.4.16.1	150 Ton Chiller Condenser Pressure (30 min data) _____ psig/in Hg		
6.4.16.2	150 Ton Chiller Evaporator Pressure (30 min data)_____ in Hg		
6.4.16.3	150 Ton Chiller Oil Pressure (30 min data)_____ psig		
6.4.16.4	150 Ton Chiller Chilled Water Inlet Temperature (30 min data)_____ °F.		
6.4.16.5	150 Ton Chiller Chilled Water Outlet Temperature (30 min data) _____ °F.		
6.4.17	Shift Supervisor notified testing is complete.		
6.4.18	Verify operations restoration activities are complete.		
6.5	Data logger tape attached		

A TRAIN CH BALANCING DATA SHEET

1PEP07-CH-0002-3
(Page 1 of 1)

COMPONENT NUMBER	DESCRIPTION	AS FOUND VALUE	FINAL AS LEFT VALUE	AS LEFT CHANGED VALVE POSITION
3V111VCH001	(11A Chiller)	Δp _____ in WC Flow * _____GPM	Δp _____ in WC Flow * _____GPM	CH-0289 Position_____
3V111VCH004	(12A Chiller)	Δp _____ in WC Flow ** _____GPM	Δp _____ in WC Flow ** _____GPM	CH-0589 Position_____
3V111VHX026	(Elect Pen CC Space)		PSID	
3V111VHX016	(Cont Rm CC)		PSID	
3V111VHX007 A	(EAB Mn Area CC		PSID	
3V111VHX007 B	(EAB Mn Area CC)		PSID	
3V101VAH012	(Rm Mu AHU WTR AHU)		PSID	
3V101VAH019	(Ess Chlr AHU)		PSID	
3V101VAH008	(BA Pump Rm AHU)		PSID	
3V101VAH010	(Rom 033 CVCS AHU)		PSID	
3V101VAH016	(Radwaste CR CC)			
3V101VAH022	(Rad Montr. Rm AHU)		PSID	
3V121VHX012	(ESF Pump Rm CC)	GPM	GPM	CH-0735 Valve Position_____
3V121VAH012	(FHB IVC AHU)		PSID	
3V111VCH001	11A Chiller		PSID	
3V111VCH004	12A Chiller		PSID	

Ev 1/7/94 FC 94-0036

* Flow for essential chiller 11A can be determined from the following:

$$FLOW\ (GPM) = 68.2 * \sqrt{\Delta(inWC)}$$

** Flow for essential chiller 12A can be determined from the following:

$$FLOW\ (GPM) = 137.2 * \sqrt{\Delta(inWC)}$$

B TRAIN CH BALANCING DATA SHEET
1PEP07-CH-0002-4
(Page 1 of 1)

COMPONENT NUMBER	DESCRIPTION	AS FOUND VALUE	FINAL AS LEFT VALUE	AS LEFT CHANGE VALVE POSITION
3V111VCH002	(11B Chiller)	Δp _____ in WC Flow * _____GPM	Δp _____ in WC Flow * _____GPM	CH-0298 Valve Position_____
3V111VCH005	(12B Chiller)	Δp _____ in WC Flow ** _____GPM	Δp _____ in WC Flow ** _____GPM	CH-0598 Valve Position_____
3V111VHX025	(Elect Pen Space CC)		PSID	
3V111VHX017	(Cont Rm CC)		PSID	
3V111VHX010A	(EAB Mn Area CC)		PSID	
3V111VHX010B	(EAB Mn Area CC)		PSID	
3V101VAH013	(Rx M/u Pap Rm AHU)		PSID	
3V101VAH020	(Essen Chlr AHU)		PSID	
3V101VAH011	(Rm 33 CVCS AHU)		PSID	
3V101VAH014	(Rm 226 CVCS AHU)		PSID	
3V121VAH010	(SFP Pump AHU)		PSID	
3V121VHX013	(ESF Pump Rm CC)	GPM	GPM	CH-0752 Valve Position_____
3V121VAH013	(FHB IVC AHU)		PSID	
3V111VCH002	11B Chiller		PSID	
3V111VCH005	12B Chiller		PSID	

* Flow for essential chiller 11B can be determined from the following:

$$FLOW\ (GPM) = 68.2 * \sqrt{\Delta(inWC)}$$

** Flow for essential chiller 12B can be determined from the following:

$$FLOW\ (GPM) = 137.2 * \sqrt{\Delta(inWC)}$$

C TRAIN CH BALANCING DATA SHEET
1PEP07-CH-0002-5
(Page 1 of 1)

COMPONENT NUMBER	DESCRIPTION	AS FOUND VALUE	FINAL AS LEFT VALUE	AS LEFT CHANGE VALVE POSITION
3V111VCH003	(11C Chiller)	Δp _____ in WC Flow * _____GPM	Δp _____ in WC Flow * _____GPM	CH-0307 Valve Position_____
3V111VCH006	(12C Chiller)	Δp _____ in WC Flow ** _____GPM	Δp _____ in WC Flow ** _____GPM	CH-0607 Valve Position_____
3V101VAH009	(BA Pump Rm AHU)		PSID	
3V111VHX018	(Cont Rm CC)		PSID	
3V111VHX013A	(EAB Mn Area CC)		PSID	
3V111VHX013B	(EAB Mn Area CC)		PSID	
3V101VAH021	(Essen Chlr AHU)		PSID	
3V101VAH007	(Rm 44 CVCS AHU)		PSID	
3V101VAH015	(Rm 226 CVCS AHU)		PSID	
3V101VAH018	(Radwaste CR AHU)			
3V101VAH023	(Rad Montr. Rm AHU)		PSID	
3V111VHX024	(Elect Pen Sp CC)		PSID	
3V121VAH014	(FHB IVC AHU)		PSID	
3V121VAH011	(SFP Pump AHU)		PSID	
3V121VHX 014	(ESF Pump Rm CC)	GPM	GPM	CH-0768 Valve Position_____
3V111VCH003	11C Chiller		PSID	
3V111VCH006	12C Chiller		PSID	

Rev 1/1/94 FC 94-0036 Rev 1/1/94 FC 94-0036 Rev 1/1/94 FC 94-0036 Rev 1/1/94 FC 94-0036

* Flow for Essential Chiller 11C can be determined from the following:

$$FLOW\ (GPM) = 68.2 * \sqrt{\Delta(inWC)}$$

** Flow for essential chiller 12C can be determined from the following:

$$FLOW\ (GPM) = 137.2 * \sqrt{\Delta(inWC)}$$

FC 94-0055

CHRONOLOGICAL TEST LOG DATA SHEET (TYPICAL)
1PEP07-CH-0002-6
(Page 1 of 1)

Chronological Test Log

TIME	LOG ENTRY

R07/09
1

FIELD CHANGE FORM
0PGP03-ZA-0002-4
(Page 1 of 1)

N/A ANY FIELDS NOT NEEDED FC NO. 94-~~0048~~ 0055 Rev 1/12/94

[X] NO [ ] YES One-Time-Only FC?
[X] NO [ ] YES Typed prior to the Section B approval?

SECTION A - DESCRIPTION

Procedure No. 1PEP07-CH-0002 Rev No. 0

Procedure Title 300 Ton Essential Chiller Bypass Modification Verification Test

SAFETY CLASSIFICATION:	[X]	SAFETY RELATED*	[ ]	NON-SAFETY RELATED
QUALITY CLASSIFICATION:	[X]	QUALITY-RELATED	[ ]	NON QUALITY-RELATED
APPROVAL CLASSIFICATION:	[ ]	STATION	[X]	DEPARTMENT

Description of Change(s): Incorporate changes originally ~~issued~~ made on FC's 94-0030, 1 Rev 1/14/94 94-0048, & 94-0046 into this FC. Due to administrative deficiencies with these FC's they cannot be issued by Doc. Control. Correct typographical errors. Delete Page 85a. 94-0043

Reason for Change(s): Changes originally developed on FC's listed above have programatic problems that will not allow DC to issue the FC's. This FC will replace FC's 94-0030, 94-0043, & 94-0046, & 94-0048

This is the 2nd FC against this current revision, other than one-time-only.

Affected/Additional Pages 5,6,11,15,19,20,26,28,29,33,34,35,36,37,38,39,40,41,44,45

Prepared by (Signature) Rodger Ward Date 1/12/94
Prepared by (Print) Rodger Ward

SECTION B - APPROVAL

Recommend Approval _____ Technical Reviewer Date 1-12-94

Approved _____ Authorized Individual Date 1-13-94

* An SRO signature is required for Safety-Related Procedures.

[X] NO [ ] YES Is this FC a minor change to correct an obvious typographical, editorial or drafting error? If YES, provide explanation/justification in the "Reason for Change" above and the LCR Form and Technical and Surveillance Procedure Review Checklists are not required.

SECTION C - FINAL REVIEW AND APPROVAL OF TYPED COPY

NOTE: Cognizant DM Review SHALL be completed within 21 calendar days of effective date.
Satisfactory [ ] NO [ ] YES Station Problem Report No. _____
Revision Required [ ] NO [ ] YES Tracking No: _____
Is a change required to the other unit's and/or trains' procedures?
[ ] NO [ ] YES [ ] N/A Tracking No.(s) _____
Training required [ ] NO [ ] YES

**Reviewed by _____ Cognizant DM Date _____

#Approved by _____ Plant Manager or Cog DM Date _____

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FIELD CHANGE FORM
0PGP03-ZA-0002-4
(Page 1 of 1)

FC NO. 94-0022

N/A ANY FIELDS NOT NEEDED
[X] NO [ ] YES One-Time-Only FC?
[X] NO [ ] YES Typed prior to the Section B approval?

SECTION A - DESCRIPTION

Procedure No. 1PEP07-CH-0002 Rev No. 0

Procedure Title 300 Ton Essential Chiller B/pass Modification Verification Test

SAFETY CLASSIFICATION:	[X] SAFETY RELATED*	[ ] NON-SAFETY RELATED
QUALITY CLASSIFICATION:	[X] QUALITY-RELATED	[ ] NON QUALITY-RELATED
APPROVAL CLASSIFICATION:	[ ] STATION	[X] DEPARTMENT

Description of Change(s): Add installation of flow gauge on the 150 Ton essential Chiller

Reason for Change(s): Needed to perform flow balancing

This is the 1 FC against this current revision, other than one-time-only.
Affected/Additional Pages 5, 9, 10, 35, 40

Prepared by (Signature) [signature] Date 1-6-94
Prepared by (Print) Barry Merritt

SECTION B - APPROVAL

Recommend Approval [signature] Date 1/6/94
Technical Reviewer

Approved [signature] Date 1/6/94
Authorized Individual

* An SRO signature is required for Safety-Related Procedures.

[X] NO [ ] YES Is this FC a minor change to correct an obvious typographical, editorial or drafting error? If YES, provide explanation/justification in the "Reason for Change" above and the LCR Form and Technical and Surveillance Procedure Review Checklists are not required.

SECTION C - FINAL REVIEW AND APPROVAL OF TYPED COPY

NOTE: Cognizant DM Review SHALL be completed within 21 calendar days of effective date.
Satisfactory [ ] NO [ ] YES Station Problem Report No. _____
Revision Required [ ] NO [ ] YES Tracking No: _____
Is a change required to the other unit's and/or trains' procedures?
[ ] NO [ ] YES [ ] N/A Tracking No.(s) _____
Training required [ ] NO [ ] YES

**Reviewed by _____ Date _____
Cognizant DM

#Approved by _____ Date _____
Plant Manager or Cog DM

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FIELD CHANGE FORM
0PGP03-ZA-0002-4
(Page 1 of 1)

N/A ANY FIELDS NOT NEEDED FC NO. 94-0048

[4] NO [ ] YES One-Time-Only FC?
[4] NO [ ] YES Typed prior to the Section B approval?

SECTION A - DESCRIPTION

Procedure No. 1PEP07-CH-0002 Rev No. 0

Procedure Title 300 Ton Essential Chiller Bypass Modification Verification Test

SAFETY CLASSIFICATION: [4] SAFETY RELATED* [ ] NON-SAFETY RELATED
QUALITY CLASSIFICATION: [4] QUALITY-RELATED [ ] NON QUALITY-RELATED
APPROVAL CLASSIFICATION: [ ] STATION [ ] DEPARTMENT

Description of Change(s): Change Addendum 3 11C chilled water flow tolerance to 300-15/+60

Reason for Change(s): Actual flow for the 11C chiller is 288gpm and for the purpose of this test, as confirmed with DED, will not affect the test results.

This is the 6th FC against this current revision, other than one-time-only.
Affected/Additional Pages 28

Prepared by (Signature) [signature] Date 1-10-94
Prepared by (Print) JB Cottam

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SECTION B - APPROVAL

Recommend Approval [signature] Technical Reviewer Date 1/10/94

Approved [signature] Authorized Individual Date 1-10-94

* An SRO signature is required for Safety-Related Procedures.

[X] NO [ ] YES Is this FC a minor change to correct an obvious typographical, editorial or drafting error? If YES, provide explanation/justification in the "Reason for Change" above and the LCR Form and Technical and Surveillance Procedure Review Checklists are not required.

SECTION C - FINAL REVIEW AND APPROVAL OF TYPED COPY

NOTE: Cognizant DM Review SHALL be completed within 21 calendar days of effective date.
Satisfactory [ ] NO [4] YES Station Problem Report No. _____
Revision Required [4] NO [ ] YES Tracking No: _____
Is a change required to the other unit's and/or trains' procedures?
[ ] NO [ ] YES [4] N/A Tracking No.(s) _____
Training required [4] NO [ ] YES

**Reviewed by N/A Cognizant DM Date _____

#Approved by [signature] Plant Manager or Cog DM Date 1/13/94 960

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FIELD CHANGE FORM
0PGP03-ZA-0002-4
(Page 1 of 1)

FC NO. 94-0046

N/A ANY FIELDS NOT NEEDED
[4/NO [ ] YES One-Time-Only FC?
[4/NO [ ] YES Typed prior to the Section B approval?

SECTION A - DESCRIPTION

Procedure No. PEP07-CH-0002 Rev No. 0

Procedure Title 300 TON Essential Chiller Bypass Modification Verification Test

SAFETY CLASSIFICATION: [4/] SAFETY RELATED* [ ] NON-SAFETY RELATED
QUALITY CLASSIFICATION: [4/] QUALITY-RELATED [ ] NON QUALITY-RELATED
APPROVAL CLASSIFICATION: [ ] STATION [4/] DEPARTMENT

Description of Change(s): Correct typographical errors. And - Change the allowable flow band for 11C and 12C Essential chillers to include a negative 10 GPM tolerance.

Reason for Change(s): Flow could not be achieved within the given tolerance. Per conversation with Doc Starks of Design Engineering a -10 gpm tolerance on the 1st +300 ton chillers is acceptable.

This is the 2nd/4th FC against this current revision, other than one-time-only.
Affected/Additional Pages 15, 26, 28

Prepared by (Signature) [signature] Date 1-9-94
Prepared by (Print) Larry Merritt

SECTION B - APPROVAL

Recommend Approval [signature] Technical Reviewer [signature] D. Fisher Date 1/9/94
1-10-94

Approved [signature] Date 1/9/94
Authorized Individual

* An SRO signature is required for Safety-Related Procedures.

[4/] NO [ ] YES Is this FC a minor change to correct an obvious typographical, editorial or drafting error? If YES, provide explanation/justification in the "Reason for Change" above and the LCR Form and Technical and Surveillance Procedure Review Checklists are not required.

SECTION C - FINAL REVIEW AND APPROVAL OF TYPED COPY

NOTE: Cognizant DM Review SHALL be completed within 21 calendar days of effective date.
Satisfactory [ ] NO [4/] YES Station Problem Report No. _____
Revision Required [4/] NO [ ] YES Tracking No: _____
Is a change required to the other unit's and/or trains' procedures?
[ ] NO [ ] YES [4/] N/A Tracking No.(s) _____
Training required [4/] NO [ ] YES

**Reviewed by N/A Date _____
Cognizant DM

#Approved by [signature] Date 1/12/94 900
Plant Manager or Cog DM

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FIELD CHANGE FORM
0PGP03-ZA-0002-4
(Page 1 of 1)

N/A ANY FIELDS NOT NEEDED FC NO. 94-0043

[X] NO [ ] YES One-Time-Only FC?
[X] NO [ ] YES Typed prior to the Section B approval?

SECTION A - DESCRIPTION

Procedure No. 1PEP07-CH-0002 Rev No. 0

Procedure Title 300 Ton Essential Chiller By Pass Modification Verification Test

SAFETY CLASSIFICATION: [X] SAFETY RELATED* [ ] NON-SAFETY RELATED
QUALITY CLASSIFICATION: [X] QUALITY-RELATED [ ] NON QUALITY-RELATED
APPROVAL CLASSIFICATION: [ ] STATION [X] DEPARTMENT

Description of Change(s): Revise step 6.1.19 per request of Operations to ~~place~~ secure ECW Pump 1A(1B)(1C) hand switch rather than "Pull To Lock". Clarify step 5.1 that test will be suspended if chiller in test train trips rather than if any Essential chiller trips. Correct typographical errors. Rev 1/8/94

Reason for Change(s): Needed to perform/continue test in progress.

This is the 4th FC against this current revision, other than one-time-only.
Affected/Additional Pages 6, 11, 20, ~~26~~, 28, 33, 34, ~~35~~, ~~35a~~ Rev 1/13/94, 36, 37, 38, 39, 40, & 41

Prepared by (Signature) Rodger Ward Date 1/8/94
Prepared by (Print) Rodger Ward

RECEIVED JAN 13 1994

SECTION B - APPROVAL

Recommend Approval Gary A Hunt AR Technical Reviewer Date 1/9/94

Approved [signature] Authorized Individual Date 1-9-94

* An SRO signature is required for Safety-Related Procedures.

[X] NO [ ] YES Is this FC a minor change to correct an obvious typographical, editorial or drafting error? If YES, provide explanation/justification in the "Reason for Change" above and the LCR Form and Technical and Surveillance Procedure Review Checklists are not required.

SECTION C - FINAL REVIEW AND APPROVAL OF TYPED COPY

NOTE: Cognizant DM Review SHALL be completed within 21 calendar days of effective date.
Satisfactory [ ] NO [X] YES Station Problem Report No. _____
Revision Required [X] NO [ ] YES Tracking No: _____
Is a change required to the other unit's and/or trains' procedures?
[ ] NO [ ] YES [X] N/A Tracking No.(s) _____
Training required [X] NO [ ] YES

**Reviewed by N/A Cognizant DM Date JAN 13 1994

#Approved by [signature] Plant Manager or Cog DM Date 1/11/94 0900

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FIELD CHANGE FORM
0PGP03-ZA-0002-4
(Page 1 of 1)

N/A ANY FIELDS NOT NEEDED FC NO. 94-0036

[X] NO [ ] YES One-Time-Only FC?
[X] NO [ ] YES Typed prior to the Section B approval?

SECTION A - DESCRIPTION

Procedure No. 1PEP07-CH-0002 Rev No. 0

Procedure Title 300 Ton Essential Chiller Bypass Modification Verification Test

SAFETY CLASSIFICATION: [X] SAFETY RELATED* [ ] NON-SAFETY RELATED
QUALITY CLASSIFICATION: [X] QUALITY-RELATED [ ] NON QUALITY-RELATED
APPROVAL CLASSIFICATION: [ ] STATION [X] DEPARTMENT

Description of Change(s): Add a negative tolerance of -10 gpm Flow on the B train 150 and 300 Ton chillers and change typographical errors

Reason for Change(s): Minimum Flow could not be achieved. Per discussions with Vic Starks of Design Engineering a negative tolerance of -10 GPM on the B train 150 + 300 Ton chillers was acceptable and will note ~~in~~ 1-7-94

This is the 3 FC against this current revision, other than one-time-only.
Affected/Additional Pages 14, 26, 28, 42, 43, 44

Prepared by (Signature) _____ Date 1-7-94
Prepared by (Print) Barry Merritt

SECTION B - APPROVAL

Recommend Approval _____ Date 1/7/94
Technical Reviewer

Approved _____ Date 1/7/94
Authorized Individual

* An SRO signature is required for Safety-Related Procedures.

[X] NO [ ] YES Is this FC a minor change to correct an obvious typographical, editorial or drafting error? If YES, provide explanation/justification in the "Reason for Change" above and the LCR Form and Technical and Surveillance Procedure Review Checklists are not required.

SECTION C - FINAL REVIEW AND APPROVAL OF TYPED COPY

NOTE: Cognizant DM Review SHALL be completed within 21 calendar days of effective date.
Satisfactory [ ] NO [ ] YES Station Problem Report No. _____
Revision Required [ ] NO [ ] YES Tracking No: _____
Is a change required to the other unit's and/or trains' procedures?
[ ] NO [ ] YES [ ] N/A Tracking No.(s) _____
Training required [ ] NO [ ] YES

**Reviewed by _____ Date _____
Cognizant DM

#Approved by _____ Date _____
Plant Manager or Cog DM

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FIELD CHANGE FORM
0PGP03-ZA-0002-4
(Page 1 of 1)

N/A ANY FIELDS NOT NEEDED FC NO. 94-0030

[✓] NO [ ] YES One-Time-Only FC?

[✓] NO [ ] YES Typed prior to the Section B approval?

SECTION A - DESCRIPTION

Procedure No. 1PEP07-CH-0002 Rev No. 0

Procedure Title 300 Ton Essential Chiller Bypass Modification ~~Test~~* Verification Test.

SAFETY CLASSIFICATION:	[✓] SAFETY RELATED*	[ ] NON-SAFETY RELATED
QUALITY CLASSIFICATION:	[✓] QUALITY-RELATED	[ ] NON QUALITY-RELATED
APPROVAL CLASSIFICATION:	[ ] STATION	[✓] DEPARTMENT

Description of Change(s): Delete requirement for second controllotron. Add steps required for use of single controllotron for balancing chilled water systems. Duplicate pag 35's make second pg 35a and 35 of 9

Reason for Change(s): Needed to perform flow balancing.

This is the 2nd FC against this current revision, other than one-time-only.

Affected/Additional Pages 19, 5, 15, 33, 37, ~~35a~~ DC 1-10-94

Prepared by (Signature) JB Cottam DC 1/10/94 Date 1-6-94

Prepared by (Print) JB Cottam

SECTION B - APPROVAL

Recommend Approval DC 1-10-94 Technical Reviewer Date 1-6-94

Approved Authorized Individual Date 1-6-94

* An SRO signature is required for Safety-Related Procedures.

[✓] NO [ ] YES Is this FC a minor change to correct an obvious typographical, editorial or drafting error? If YES, provide explanation/justification in the "Reason for Change" above and the LCR Form and Technical and Surveillance Procedure Review Checklists are not required.

SECTION C - FINAL REVIEW AND APPROVAL OF TYPED COPY

NOTE: Cognizant DM Review SHALL be completed within 21 calendar days of effective date.

Satisfactory [ ] NO [✓] YES Station Problem Report No. _____

Revision Required [✓] NO [ ] YES Tracking No: _____

Is a change required to the other unit's and/or trains' procedures?

[ ] NO [ ] YES [✓] N/A Tracking No.(s) _____

Training required [✓] NO [ ] YES

**Reviewed by N/A Cognizant DM Date _____

#Approved by Plant Manager or Cog DM Date 1/6/94

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ATTACHMENT 2

UNREVIEWED SAFETY QUESTION EVALUATION #93-0036

STP 687A (11/90) SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION ATTACHMENT IP-3.20Q-3

UNREVIEWED SAFETY QUESTION EVALUATION FORM

(TYPICAL) PAGE 1 OF 3

Unreviewed Safety Question Evaluation # 93-0036 Revision No: 1

ORIGINATING DOCUMENT: Modifications 93-049 and 93-050. REV. NO. __

NOTE: Attach 10CFR50.59 Screening Form or License Compliance Review Form to this USQE.

NOTE: Use additional sheets as necessary to provide the bases.

A.1 I Does the subject of this evaluation increase the probability of occurrence of an accident previously evaluated in the Safety Analysis Report? ☐ YES ■ NO

Bases: The Essential Cooling Water (ECW) and the Essential Chilled Water (CH) Systems either directly or indirectly provide cooling water for removing heat from safety related components either during or after 1) Loss of Offsite Power, 2) Loss of Coolant Accident, 3) Safe shutdown Earthquake, 4) Main Steam Line Break, 5) Feedwater Line Break, and 6) Steam Generator Tube Rupture. These systems are designed for mitigation of these accidents. The design of the bypass valves, piping and instrumentation are of the same Quality Class as the balance of the ECW system. The construction of the modification meets the codes and standards and seismic requirements specified for ECW. Additionally, the bypass system flow rate is designed to meet flow rate requirements to mitigate the above accident during acute cold ECW inlet temperatures. Therefore, this modification will not increase the probability of occurrence of accident previously evaluated in the SAR.

II Does the subject of this evaluation increase the consequences of an accident previously evaluated in the Safety Analysis Report? ☐ YES ■ NO

Bases: The modification of installing a bypass line does not increase the consequences of any accident previously evaluated in the SAR, listed above, since the design function of the system is not changed and the accident/consequences are bounded by those evaluations including the single failure of a train of ECW or CH system.

III Does the subject of this evaluation increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the Safety Analysis Report? ☐ YES ■ NO

Bases: This modification does not increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the SAR. Per the analyses contained within Calculation MC 6429, a single cold (69°F to 42°F) ECW flow setting of 240 gpm will ensure that previously operating or previously idle 300 ton chillers will start and run following receipt of an SI signal. Furthermore, with ECW temperature 69°F to 42°F, operator intervention will not be required to readjust the flow settings for several hours post-DBA.

For an ECW temperature range of 41°F to 37°F (reference calculation MC 6429), operation of the 300 ton chillers will require continuous local operator monitoring of both running and idle chillers. The running chillers (s) will be monitored for the appropriate range of condenser pressures and the ECW bypass flow will be adjusted as required.

STP 6878 (11/90) SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION ATTACHMENT IP-3.20Q-3

UNREVIEWED SAFETY QUESTION EVALUATION FORM

(TYPICAL) Evaluation No. 93-0036 Revision 1

The idle chiller(s) will have ECW isolated. Upon receipt of an SI start signal and subsequent start of a previously idle chiller, the operator will begin throttling ECW flow through the chiller using condensing pressure as the monitored parameter.

If the ECW temperature drops below 37°F while in modes 1 through 4 (reference calculation MC 6429), the Essential Chillers must be declared inoperable. (Reference calculation MC 6429)

In the event of a Design Basis Loss of Coolant Accident, operators local to the chillers would receive a conservatively estimated radiation exposure of 5.8 Rem over the first eight (8) hours following accident initiation. (Reference calculation MC 6429) This dose is within the once in a lifetime emergency dose for radiation workers of 25 Rem referenced in 10CFR100.

IV Does the subject of this evaluation increase the consequences of malfunction of equipment important to safety previously evaluated in the Safety Analysis Report? ☐ YES ■ NO

Bases: The consequences of a malfunction of equipment important to safety previously evaluated in the SAR is not increased. The manual throttling capability enhanced by this modification ensures that a specific flow setting for cold ECW will allow previously operating and previously idle 300 ton Essential Chillers to start and run following a receipt of an SI signal. Local operator control of the throttling valves when ECW is in the temperature range of 41 °F to 37 °F will ensure that previously operating or previously idle 300 ton chiller will start and run following receipt of an SI signal. Therefore, no common mode failures have been introduced and the capabilities of ECW and CH systems to perform their safety functions with a single failure remain unchanged. Note that the analyses performed in calculation MC 6412 provide details of Essential Chiller performance with a limiting single failure.

The design of the bypass valves, piping and instrumentation are of the same Quality Class as the balance of the ECW system. The construction of the modification meets the codes and standards and seismic requirements specified for ECW. Austenitic stainless steel is utilized in the bypass piping and valves. This material is utilized satisfactorily within other portions of the ECW system where flow is maintained. A small ECW flow will be maintained through the new bypass valves at the 150 ton chillers when they are not in use. The idle 300 ton chillers must be completely isolated from ECW when the ECW temperature is between 41°F and 37°F and the chillers are locally monitored by operators. However, such operation is expected to be infrequent and of sufficiently short duration to preclude damage to the stainless steel components. Additionally, the stainless and aluminum bronze piping is galvanically isolated with insulating kits at the connecting flanges.

A.2 I Does the subject of this evaluation create the possibility of an accident of a different type than any previously evaluated in the Safety Analysis Report? ☐ YES ■ NO

Bases: The possibility of an accident of a different type than previously evaluated in the Safety Analysis Report, such as LOCA mitigation with a complete loss of essential environmental or habitability control is not increased by enhancing the manual throttling capability of the ECW system through the Essential Chiller condensers. Analyses performed within calculation MC 6429 indicate the capability of the Essential Chillers to start and run upon receipt of an SI signal with cold ECW throttled to 240 gpm (for ECW 69°F to 42°F) and with local operator control when the ECW temperature is in the range of 41°F to 37°F.

II Does the subject of this evaluation create the possibility of a different type of malfunction of equipment important to safety than any previously evaluated in the Safety Analysis Report? ☐ YES ■ NO

STP 687B (11/90) SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION ATTACHMENT IP-3.19Q-3

UNREVIEWED SAFETY QUESTION EVALUATION FORM
(TYPICAL)

Evaluation No. 93-0036 Revision No. 1

Bases: No new malfunctions of a different type than previously analyzed for the ECW system or the Essential Chillers have been introduced. The current ECW line break and flooding scenarios envelope the addition of the new bypass lines. A single failure due to operator error in mispositioning a new throttling valve is compensated by existing single failure analyses for loss of either ECW or CH train. The analyses performed within calculation MC 6429 show that tripping of all 300 ton chillers upon an attempt to start or restart, following an SI signal with cold (69 °F to 42 °F) ECW conditions is not a credible event. Additionally, with the ability of the chillers to start/restart and run with cold ECW without operator intervention post-DBA, the reliable operation of Essential Chillers is enhanced. When local operator action is required with 41 °F to 37 °F ECW, the improved control capability provided by the new bypass valve enhance the cold ECW performance of the chiller over the previous use of large bore butterfly valve for throttling.

A.3 I Does the subject of this evaluation reduce the margin of safety as defined in the basis for any Technical Specifications? ☐ YES ■ NO

Bases: The margin of safety as defined in the basis for Technical Specification 3.7.14 is qualitative in that the capacity of Essential Chilled Water system is adequate to satisfy assumptions in the safety analyses with a single failure. The analyses performed in calculation MC 6412 best identifies the system DBA and LOOP loads and margins for both summer and winter conditions including various and limiting single failures. The 240 gpm condensing water flow to support chiller operation with cold (69 °F to 42 °F) ECW and the flow setting selected by local operator for 41 °F to 37 °F ECW (reference calculation MC 6429) will support the chiller capacity requirements specified in calculation MC 6412. Therefore, the margin of safety implied by this Technical Specification basis is not reduced. The Essential Chillers shall be declared inoperable if the ECW temperature drop below 37 °F while the unit is in modes 1 through 4.

B. 1. ■ All of the above questions were answered NO, therefore, the originating document does not involve an Unreviewed Safety Question.

2. ☐ One or more of the above questions were marked YES, therefore, the originating document involves an Unreviewed Safety Question. The originating document, as presented shall NOT be implemented without prior approval of the NRC. Provide a recommendation for disposition of the Unreviewed Safety Question below. Refer to IP-1.19Q for processing licensing amendments. Further processing of this form to PORC, Plant Manager, and NSB is not required.

RECOMMENDED DISPOSITION:

Prepared by: C.H. Thaus / 1/6/94
ORIGINATOR DATE

Approved by: [signature] / 1/6/94
DEPARTMENT MANAGER DATE

Approved by: Lew W Myers / 1-11-94
PLANT MANAGER DATE

PORC Meeting No.: 94-003 / 1/6/94
DATE

REMARKS:

10CFR50.59 SCREENING FORM
(TYPICAL)

UNIT #1 [] [ ] PROCEDURE [X] PLANT MODIFICATION [ ] ECNP [ ] DCN
UNIT #2 [ ]
BOTH [X] [ ] UFSAR CN [ ] OTHER

ORIGINATING DOCUMENT NO.: MODs 93-049 & 93-050. REV. NO. 3

DESCRIPTION OF CHANGE: **INSTALL A BYPASS ASSEMBLY AROUND THE ECW OUTLET VALVES OF THE ESSENTIAL CHILLERS FOR IMPROVED CONTROL OF ECW FLOW DURING COLD WEATHER CONDITIONS.**

REASON FOR CHANGE: **DURING COLD WEATHER, WHEN ECW POND WATER TEMPERATURE GOES BELOW 60°F, THE ESSENTIAL CHILLER CONDENSER PRESSURES BECOME AFFECTED RESULTING IN A CONDITION THAT COULD POSSIBLY TRIP AN ESSENTIAL CHILLER OFF-LINE. THEREFORE, THE ECW FLOW THROUGH THE ESSENTIAL CHILLERS SHOULD BE REDUCED DURING COLD WEATHER CONDITIONS.**

PRELIMINARY SCREENING

		YES	NO
1.	Does the proposed change represent a change to the plant Technical Specifications?	[ ]	[X]
2.	If an Unreviewed Safety Question is known to be associated with the subject change, then further screening is not required; refer to IP-1-19Q.		

Does the proposed change represent:		YES	NO
3.	A change to correct a typographical, editorial or drafting error?	[ ]	[X]
4.	A change which is identical to and addressed in its entirety by an existing approved 10CFR50.59 Screening/USQE?	[ ]	[X]
5.	A procedure change in which the format or text changed without changing actions or intent?	[ ]	[X]
6.	A spare or replacement part/component change with an equivalent part/component (see Section 3.16 for a definition of equivalent).	[ ]	[X]

If all answers to the above questions are "No" perform the final screening and mark N/A in the approval blocks below.

If the answer to any question (3) through (6) is "Yes" a final screening is not necessary. Sign the approval blocks below and discard pages 2 through 4.

Provide an explanation/justification and references if items (3) through (6) are answered "Yes."

Prepared by: N/A _____ Date

Approved by: N/A _____ Date
Section Supervisor

10CFR50.59 SCREENING FORM
(TYPICAL)

ORIGINATING DOCUMENT: MODs 93-049 & 93-050

FINAL SCREENING

In response to the questions below, if the change involves something that is not described in the SAR and is not part of the licensing basis as shown by a review of NRC-published documents, then "No" is appropriate. However, this decision must be clearly documented with adequate technical justification. The phrase "not part of the licensing basis" implies that the subject was not used by the NRC to issue or maintain the operating license or amendments; and is determined by examination of the Licensing Docket and the following (as applicable):

Safety Analysis Report
Environmental Report
Fire Hazards Analysis Report
Physical Security Plan
Safeguards Contingency Plan
Operations Quality Assurance Plan
Emergency Plan
Previously Approved USQ Evaluations
Training and Qualification Program
Final Environmental Statement
Safety Evaluation Report
Standard Review Plan
Correspondence

		YES	NO
1.	Does the subject of this review involve a change to the facility as described in the Safety Analysis Report?	[X]	[ ]
2.	Does the subject of this review involve a change to the procedures as described in the Safety Analysis Report?	[ ]	[X]
3.	Does the subject of this review propose the conduct of tests or experiments not described in the Safety Analysis Report?	[ ]	[X]
4.	Does the proposed change affect the conditions or bases assumed in the Safety Analysis Report or safety-related functions of equipment/systems, even though the proposed change does not entail any physical change in existing structures, systems, or procedures as described in the SAR?	[ ]	[X]

If any answer is affirmative, complete the screening form and perform an Unreviewed Safety Question Evaluation.

If all answers are negative, no Unreviewed Safety Question Evaluation is required.

All questions require adequate technical justification.

10CFR50.59 SCREENING FORM
(TYPICAL)

ORIGINATING DOCUMENT: MODs 93-049 & 93-050

TECHNICAL JUSTIFICATION SHOULD INCLUDE THE SAFETY IMPLICATIONS OF THE CHANGE AND OTHER INFORMATION SUPPORTING ALL ANSWERS.

TECHNICAL JUSTIFICATION OF THE CHANGE:

The Essential Cooling Water System (ECW) provides cooling water for removing heat from safety related components and transfers the heat to the Essential Cooling Pond (ECP), which acts as the ultimate heat sink, during all modes of plant operation. The ECP temperature fluctuates with the outside weather conditions and the components which it services which are therefore also affected by these varying temperature changes. As the temperature in the ECP drops below 60°F (Calculation MC 6429) the operation of the Essential Chillers become unstable and could result in an Essential Chiller trip. The original design used electro-hydraulic controlled ECW Essential Chiller outlet valves to throttle ECW flow through the Essential Chiller. The colder the water, the more the flow was throttled. However, due to excessive maintenance and control problems the electro-hydraulic, the valve actuators were removed and replaced with manual operator under Temporary Modifications T1-EW-89-0063, 0064, and 0065 for Unit 1, and T2-EW-89-0041, 0042, and 0043 for Unit 2. Modifications 88-0167 and 88-0168 are being implemented to document and convert temporary modifications into permanent modifications. Currently, these valves are manually positioned to throttle flow during cold weather conditions. Since these outlet valves are relatively large (6" and 8" butterfly valves) and the control using a butterfly valve is fairly crude, an operator is required to be present to continuously monitor conditions and adjust flow when ECW supply drops below 45°F including after a design basis LOCA which is an ALARA concern. This is an undesirable situation. A better means of control is necessary since the main valves cannot effectively control in that flow range and the range of the flow measuring instrumentation does not give accurate readings at such low flow conditions. Therefore, modifications 93049 for Unit 1 and 93050 for Unit 2 were developed to install a bypass assembly including an appropriate flow instrumentation around the outlet valves to provide precise flow control during acute cold ECW supply temperatures. When water temperature drops below 60°F, the main outlet valves are to be closed and flow is then limited to the bypass line. The local flow instruments will provide accurate indication insuring better control. Since this bypass assembly will be set at one flow rate, continual adjustments by operations will not be required when ECW supply temperatures fall to and including 42 °F. These modifications also abandon the Radwaste air handling unit inplace inaddition to providing instructions for testing and procedure changes to accommodate the supporting calculations.

After installation of this modification, the following features and configurations will be implemented:

a. "Cold ECW" operation is entered from a range of conditions defined as follows:

- Above ECW supply temperature of 69°F only normal ECW and Essential Chilled Water system operation is allowed.
- Below an ECW supply temperature of 60°F, only "cold ECW" operation is allowed.
- Procedural entry to and exit from "cold" ECW chiller operation may occur at any temperature from 60°F through 69°F.

b. The 300 Ton Essential Chillers will start and operate successfully during "cold" ECW conditions, without operator intervention, following a design basis accident, with ECW flow rates manually set at 240 gpm. In modes 1 through 4 this conclusion is valid with ECW supply temperatures down to and including 42°F. When the ECW supply temperature is between 41 °F and 37 °F, operator actions are required to maintain chiller operability. When the ECW supply temperature falls below 37 °F, the chillers are inoperable. In modes 5 and 6 or "defueled" mode, appropriate operator actions are required to maintain chiller operability (150 and 300 ton) when ECW supply temperature falls between 42 °F and 32 °F. The ECW system pressure boundary has been analyzed for temperature down to 32 °F.

ORIGINATING DOCUMENT: MODs 93-049 & 93-050

c. In modes 1 through 4 with "cold" ECW, the 150 Ton Chillers will be locked out electrically, the ECW flow through the 150 Ton Chiller is limited to 5 to 10% (position) open of the bypass valve. This is required to prevent "free cooling" when ECW temperatures are very cold and "free heating" when ECW temperatures are above chilled water temperatures.

d. Starting an idle chiller can involve heat transfer loads on the evaporator and condenser considerably in excess of the rated chiller load. The 300 Ton Essential Chiller could operate at or near rated loads with lower ECW flow rates, which would also allow operation at minimum load with lower ECW temperatures, provided the current limiter setpoint for the 300 Ton Essential Chillers is set at 48 °F to minimize the load during startup.

If the main header outlet valves are left closed and only the bypass valves remained open with corresponding flow of 240 gpm the Essential Chiller operation would operate until the ECP temperature reaches approximately 69°F. At that temperature and flow the Essential Chillers would be experiencing high condenser pressure which might cause the Essential Chillers to trip. This change occurs over an extended time, allowing ample time for operators to increase flow.

The ECW and CH system designs are affected by this modification in that the method of cold weather control is different but the intent is the same as the original design. Regulating the ECW flow through the Essential Chiller, was part of the original design and does not change the ECW or CH system designs. The Essential Chillers performance was evaluated (ref. calculation MC-6412 and MC-6429) by including the affects of the bypass assembly around the ECW Essential Chiller outlet valves. This reduction in flow during cold weather was also part of the original design. It was determined that the ECW and CH systems will maintain and meet their original design and performance requirements with the exception that the minimum ECW temperature for 300 ton Essential Chiller operability is established at 37°F. In modes 5 and 6 or "defueled" mode, appropriate operator actions are required to maintain chiller operability (150 and 300 ton) when ECW supply temperature falls between 42 °F and 32 °F.

This modification provides for the installation of a bypass assembly around the ECW system outlet valve from each of the Essential Chillers. Each bypass assembly consists of two aluminum bronze weld-o-lets with tie-in flanges, two stainless steel isolation/control valves, a stainless steel flow orifice for flow indication, associated flow instrumentation, and stainless steel piping. The new isolation valves are manually operated and will be classified as non-active valves, however the pressure retaining parts will be ASME III Class 3. The bypass assembly material transitions from aluminum bronze to stainless steel (ref. 5L019PS004 Pipe Spec. "WT" and "WB"). The aluminum bronze to stainless steel connection points will be galvanically insulated by the use of insulating kits. The bypass assemblies meet stress allowable values and is and found acceptable. The calculated stresses are low and are within ASME code allowable limits. The concern for microbiological induced corrosion (MIC) is being limited by maintaining flow, using stainless steel material and by the addition of a chlorine/bromine solution to control water chemistry. It should be noted that stainless steel is already being used in the EW system without detrimental MIC affects.

10CFR50.59 SCREENING FORM
(TYPICAL)

ORIGINATING DOCUMENT: MODs 93-049 & 93050

TECHNICAL JUSTIFICATION SHOULD INCLUDE THE SAFETY IMPLICATIONS OF THE CHANGE AND OTHER INFORMATION SUPPORTING ALL ANSWERS.

TECHNICAL JUSTIFICATION OF THE CHANGE: (CONT'D)

1. The ECW and CH Systems are discussed and shown in the UFSAR. The addition of the bypass line does revise and affect the descriptions, assumptions, or bases for the UFSAR. Therefore, it is considered to be a change to the facility as described in the UFSAR.

2. This is not a change to a procedure as described in the UFSAR or SER.

3. This is not a test or experiment as described in the UFSAR or SER.

4. The installation of a bypass assembly does not adversely affect the function or quality of the ECW or CH Systems. There is no adverse effect on fire hazard analysis, seismic II/I, HELBA, MELBA, EQ or any other item or activity as described in the UFSAR.

Interdiscipline Coordination Required? [X] Yes [ ] No

If "Yes," obtain appropriate Concurrence.

[ ] Risk and Reliability Analysis [ ] Thermal Hydraulics ___ [ ] Reactor Engr. ___

[X] Civil ___ [ ] Mech ___ [ ] Elect ___ [X] I & C ___ [ ] EQ ___ [X] Other STRESS GP ___

Prepared by: C. H. Pham — 1/6/94
Cong H. Pham — Date

Approved by: ___ — 1/6/94
Department Manager — Date

10CFR50.59 SCREENING FORM
(TYPICAL)

ORIGINATING DOCUMENT: MODs 93-049 & 93-050.

The following documents/attributes have been reviewed as part of the 10CFR50.59 final screening process.

Documents	Sections Reviewed
UFSAR	2.4.11, 9.2.1.2, 9.2.5 Table 3.9-1.2, 9.4.1, Table 9.4-5.1
Technical Specifications	3/4.7.4, 3/4.7.5, 3/4.7.14
Safety Evaluation Report (SER)	2.4.11, 9.2.1.2, 9.2.5, 9.4.1
Fire Protection (FHAR)	N/A
Environmental Report	N/A
Security Plan	N/A
Emergency Plan	N/A
Offsite Dose Calculation Manual (ODCM)	N/A
Final Environmental Statement	N/A
Core Operating Limits Report (COLR)	N/A
Operations Quality Assurance Plan	N/A
Other DBD ECW System	5R289MB1006
Other DBD CH System	5V369VB0120

Attributes	Check if Reviewed
Environmental Qualification	
Seismic Design	✓
Personnel Radiation Protection	
Missile Protection	
Containment Integrity	
Single Failure Criteria	
Electrical Separation (RG 1.75)	
Heavy Loads	
HELBA	
Control Room Habitability	
Internal Flooding	
Plant Chemistry	
Human Factors	
Probabilistic Safety Assessment	
Other	
_____	

Note: If Attributes are identified in the originating document, this section need not be completed.

ATTACHMENT 3

CORRESPONDENCE FROM HOUSTON LIGHTING & POWER TO
YORK INTERNATIONAL, DATED FEBRUARY 1, 1994

The Light company
Houston Lighting & Power South Texas Project Electric Generating Station P. O. Box 289 Wadsworth, Texas 77483

February 1, 1994
ST-HS-XX-17104
File.: M08.11.01

York International Corp.
P.O. Box 1592
York, PA. 17405

Attention: Mr. Herm Paetow, Director of Contracts Engineering

The purpose of this letter is to confirm and document discussions and agreements between York International (principally by Tony Shanko) and Houston Lighting & Power (principally by Victor Starks & Phillip Pieknik) regarding the analysis of essential chiller operation contained in HL&P calculation number MC-6429, Rev. 0.

The modification to the 300 ton chiller involves resetting the chilled water control setpoint from 42 °F to 48 °F (applies to all operating modes), addition of a manual bypass valve around the original condenser cooling water flow control valve, and changes to operating procedures to divert condenser cooling water flow through the bypass line and set flow at 240 gpm before condenser cooling water temperature drops below 60 °F (between 60 & 59 °F). In normal operation, in the cold condenser cooling water alignment, the 150 ton chiller in each train will be intentionally disabled, to increase the load available to the 300 ton chiller.

The same modifications apply to the 150 ton chiller except the flow is 120 gpm, and the 150 ton chiller would be used in the cold condenser cooling water lineup only in cold shutdown and refueling modes of unit operation.

York and HL&P jointly ran several specific cases analyzed in calculation MC-6429 Rev. 0. A comparison of the results is included as an attachment to this letter. The MC-6429 results either were in close agreement with the York computer results (for the low load, low temperature case) or were conservative relative to the York computer results.

Discussions regarding differences in compressor shaft horsepower between the HL&P model and York model led to an agreement to reset the 300 ton chiller current limiter based on the expected bus voltage of 4160 volts, instead of the motor rated voltage of 4000 volts.

York confirmed that effective chiller capacity of the 300 ton chiller increases with increasing chilled water outlet temperature, and provided a graph showing maximum predicted capacity versus chilled water outlet temperature, for chilled water outlet temperatures from 42 to 60 °F, entering condenser water temperatures of 100 and 107.9 °F, and flows per the original design. HL&P understands the assumption within the York computer model of optimum refrigerant charge at each point, so actual field results could vary depending on whether the refrigerant charge has been optimized for that condition.

York provided compressor maps for both the 150 ton and 300 ton essential chillers and described the design process leading to the selection of compressor speed. This has given HL&P insight into how seemingly small differences in condenser cooling water inlet temperature specified, fouling factor, and/or flow rate would have resulted in a significant reduction in compressor speed and a more flexible operating range.

York concurs with the method of operating the essential chillers with condenser cooling water temperatures below the 60-69 °F range, with the following points of discussion noted:

- The output predicted by the York computer model assumes the refrigerant charge is tailored for the conditions analyzed. The results of post-modification testing showed chiller output exceeded 300 tons during pulldown when chilled water outlet reached 48 °F. This proves the actual refrigerant charge is acceptable for the revised chilled water temperature control setpoint. The margin of available capacity over required capacity makes it unnecessary to optimize the refrigerant charge for the new conditions.

- The rate of tube fouling will increase significantly with the lower condenser cooling water flow. This is recognized and acknowledged in MC-6429. The new program of condenser performance testing will be capable of detecting tube fouling.

- The compressor operating point for the 100 ton, 40.7 °F cooling water case is below the region of the compressor map supported by factory test data or York field experience. This point is virtually equivalent to the same load, with a condenser cooling water flow of 1100 gpm and inlet temperature of 54 °F. The latter was allowed by previous operating procedures. The 300 ton chillers have probably operated under conditions very similar to the 100 ton load, 40.7 °F case, but such operation has not been documented.

  Observation of chiller operation as condenser cooling water temperature drops between 50 and 42 °F, when this next occurs, will provide sufficient evidence of post-accident operability.

- York had expressed a concern for potential oil foaming during the restart of an operating 300 ton chiller during diesel loading. Starting the Emergency Cooling Water Pump several minutes before starting the chiller compressor is one of the circumstances which can lead to a chiller trip during startup, due to oil foaming. Oil foaming is a phenomenon normally associated with a chilled water train which has been idle for an extended period of time. The condition described would allow the chiller to be idle for only about 4 minutes, so there is a very limited time for refrigerant to be absorbed in the oil. HL&P described the method and results of the post modification testing recently completed, especially Test #2. This test simulated the restart sequence, with the exception of the extended period of time (roughly 1 hour) needed to warm the chilled water system up the specified temperature difference. Bearing oil pressure was recorded at 1 second intervals. The test results show a temporary depression in oil pressure such as would be caused by oil foaming, but the minimum oil pressure remained well above the low oil pressure trip setpoint. York agreed this was a more severe case than the post LOCA restart because of the much longer time available to absorb refrigerant during the test.

In summary, it is York International's opinion that the 300 ton chiller will operate successfully under the conditions described in MC-6429, Rev. 0.

A R Shanko, Jr. — 2-2-94
Anthony Shanko, York Int., Contract Engineer — Date

P. W. Pieknik — 2/1/94
P. W. Pieknik, HL&P STPEGS Design Engineer — Date

V. Starks — 2-1-94
Victor Starks, HL&P STPEGS Design Engineer — Date

Yours very truly,

S. E. Thomas
Department Manager,
Design Engineering

PWP/hg

Attachment

ATTACHMENT

1. York run #1 = Appendix 8.b of MC-6429

Input: Load = 100 tons
Condenser flow = 240 gpm
Condenser water entering temperature = 40.7 °F

Results:	York	MC-6429
Condenser Load	1.46×10^6 Btu/hr	1.50×10^6 Btu/hr
Tsat in Condenser	53.6 °F	53.7 °F

Hand calculations confirmed adequate differential pressure between condenser and evaporator to achieve adequate refrigerant flow through the float valve.

2. York run #2 = MC-6429 Max. Transient (App. 1 & App. 3.d)

Input: Condenser flow = 240 gpm
Condenser water entering temperature = 69 °F
Load limited to 447 shp (York) or 484 shp (MC6429)

Results:	York	MC-6429
Chiller load	380 tons	431 tons
Condenser load	5.68×10^6 Btu/hr	6.41×10^6 Btu/hr
Tsat in Condenser	119.1 °F	125.8 °F

3. York run #3 = MC-6429 Max. Load @ 48 °F chilled water (App. 1 and App. 3.b)

Input: Condenser flow = 240 gpm
Condenser water entering temperature = 69 °F
Load limited to 447 shp (York) or 484 shp (MC6429)

Results:	York	MC-6429
Chiller load	348 tons	379 tons
Condenser load	5.32×10^6 Btu/hr	5.78×10^6 Btu/hr
Tsat in Condenser	115.8 °F	121.5 °F