PROCEDURE COVER SHEET

PENNSYLVANIA POWER & LIGHT CO. SUSQUEHANNA STEAM ELECTRIC STATION	
SPRAY POND TEST	HF-00-057 Revision 0 Page 1 of 18

Effective Date 5-21-82 Expiration Date 5-21-84

Revised Expiration Date ______

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Reviewed by Robert G. Sharenko Date 5-18-82

PORC Review Required Yes (✓) No ( )

Approved by L D Mui Date 5/19/82
Section Head

PORC Meeting Number 82-054 Date 5/21/82

H Keiser Date 5-21-82
Superintendent of Plant

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ATTACHMENTS

1.0 PURPOSE

1.1 Test Description

The spray pond test will consist of supplying heat to the spray pond using reactor power as the heat source. With the reactor at rated pressure, the Residual Heat Removal (RHR) System will be placed in the steam condensing mode. Heat shall be transfered to the spray pond thru RHR Service Water via the spray nozzles.

Prior to the heat rate capacity tests are run, the pond level shall be lowered approximately 1 1/2 feet. The pond shall then be refilled using very sensitive flow and level instrumentation so an accurate pond volume to pond level can be determined.

Two 24 hour tests shall be conducted at different heat rate capacities. One test shall use the maximum heat rate generated to the spray pond while the other test shall consist of a limited heat rate supply.

Throughout these tests, data will be collected using equipment to monitor the spray pond that will measure pond temperature, spray temperature, flow rates into pond, meteorological variables, and water losses due to drift and evaporation.

Upon completion of tests, the data shall be sent to NPE. They will coordinate activities for analyzing and comparing the predicted performance to that defined in the design specification.

1.2 Test Objectives

The objective of this test is to collect data for NPE. From this data, NPE is to verify the spray pond will perform as designed to operate for thirty days without make-up and to maintain a water temperature below 95°F under conservative meteorological conditions. To verify the computer model, the test's meteorological conditions will be entered into the Bechtel Model to predict the performance of the pond and these predictions will be compared to the tested values.

2.0 REFERENCES

2.1 AD-TY-462; Preparation, Conduct, Review of Hot Functional Test, Rev. 0

2.2 FSAR, Section 9.2.7

2.3 OP-16-001, Residual Heat Removal Service Water System, Rev.

2.4 OP-50-001, Reator Core Isolation Cooling System, Rev.

2.5 OP-54-001, Emergency Service Water System, Rev.

2.6 OP-49-001, Residual Heat Removal System, Rev.

2.7 Technical Specifications, Sections 3.7.1.3 and 3.10

3.0 EQUIPMENT

3.1 Vendor to supply all instrumentation and recording devices for spray pond test.

3.2 Pumps for lowering pond level 1 1/2 feet in a reasonable time frame.

3.3 Piping and flow meter temporary modification to be attached to.

4.0 PREREQUISITES

4.1 Plant condition: MODE Switch in run.

_______________/__________
Verified by Date

4.2 The following systems are operable:

4.2.1 Two independent RHR Service Water Subsystems.

_______________/__________
Verified by Date

4.2.2 Two independent Emergency Service Water Subsystems.

_______________/__________
Verified by Date

4.2.3 RCIC

_______________/__________
Verified by Date

4.2.4 Two independent RHR subsystems.

_______________/__________
Verified by Date

4.3 Weather forecast of "No Rain" for duration of test.

_______________/__________
Verified by Date

4.4 Piping and flow meter temporary modification is attached to 18" pond makeup line.

_______________/__________
Verified by Date

4.5 Pump(s) are avilable for lowering spray pond level.

_______________/__________
Verified by Date

4.6 Vendor is ready to perform test.

_______________/__________
Verified by Date

5.0 PRECAUTIONS

5.1 Do not allow RHR heat exchanger level to drop below ( )% of its capacity while in steam condensing mode. Flow induced vibration may damage heat exchanger.

5.2 Tests should not be run during heavy rainstorms producing run-off since there is uncertainty about the run-off characteristics for the area draining into the pond.

5.3 Do not discharge any water into spray pond than thru spray nozzles during the heat rate capacity tests.

6.0 LIMITS

6.1 TECH SPEC 3.7.1.3: THE SPRAY POND SHALL BE OPERABLE WITH:

a. A MINIMUM WATER LEVEL AT OR ABOVE ELEVATION 677' MEAN SEA. LEVEL, USGS DATUM, AND

b. AN AVERAGE WATER TEMPERATURE OF LESS THAN OR EQUAL TO 88°F.

6.2 Special test exceptions shall be in effect for spray pond temperature and level during this test.

7.0 PROCEDURE

7.1 Volumetric Test of Spray Pond

CAUTION

THIS TEST MAY EXCEED TECHNICAL SPECIFICATION LOWER LEVEL LIMIT OF SPRAY POND OF 677' (SECTION 3.7.1.3) IN ACCORDANCE WITH SPECIAL TEST EXCEPTION (SECTION 3.10).

7.1.1 Lower spray pond level approximately 17" from top of weir (678'6").

7.1.2 When draining is complete, remove pump suction from pond to prevent syphoning pond during test.

7.1.3 Notify vendor when ready to refill pond.

NOTE: Vendor is measuring flow rate vs. pond level to get an accurate measurement of pond volume to pond level.

7.1.4 Refill pond using 18" spray pond makeup line.

7.1.5 Stop refilling when within approximately 2" from top of weir.

7.2 Maximum Heat Rate Capacity Test of Spray Pond

7.2.1 Lower spray pond level approximately 6" from top of weir (678' 6").

7.2.2 Remove pump suction from pond to prevent syphoning pond during test.

7.2.3 Place RHR Division I in suppression pool cooling per OP-49-001, section 3.9.5. Use large spray network.

7.2.4 Place RHR Division II in steam condensing per OP-49-001, section 3.6. Use large spray network.

7.2.5 Calculate the heat rate of the RHR heat exchanger B per Attachment A. Adjust heat exchanger level to achieve at heat

rate of 196 x 10^6 BTU/HR (RHR SW Temperature difference at 9000gpm is 43.7 ± 2°F).

7.2.6 Notify vendor to start 24 hour test.

7.2.7 Start recording data information hourly per Attachment A.

7.2.8 Establish a computer log to print out for the following points on a 24 hour summary on an hourly bases.

a. AEZ 69 Pond Temperature

b. AEZ 70 Pond Temperature

c. AEZ 61 Pond Level

d. AEZ 62 Pond Level

7.2.9 Upon completion of 24 hour test, check with vendor to verify sufficient data has been recorded to terminate test.

7.2.10 Restore systems to normal operating status.

7.2.11 Refill pond to approximately 6" from top of weir (678'6").

7.3 Lower Heat Rate Capacity Test

7.3.1 Place RHR Division II in suppression pool cooling per OP-49-001, Section 3.9.5. Use large spray network.

7.3.2 Place RHR Division I in steam condensing per OP-49-001, section 3.6. Use large spray network.

7.3.3 Calculate the heat rate of the RHR heat exchanger A per Attachment B. Adjust heat exchanger level to achieve a heat rate of 142 x 10^6 BTU/HR. (RHRSW Temperature difference at 9000gpm is 31.7 ± 2°F).

7.3.4 Notify vendor to start 24 hour test.

7.3.5 Start recording data information hourly per Attachment B.

7.3.6 Establish a computer log to printout for the following points on a 24 hour summary on an hourly bases.

a. AEZ 69 Pond Temperature

b. AEZ 70 Pond Temperature

c. AEZ 61 Pond Level

d. AEZ 62 Pond Level

7.3.7 Upon completion of 24 hour test, check with vendor to verify sufficient data has been recorded to terminate test.

7.3.8 Restore systems to normal operating status.

7.3.9 Refill pond to normal level.

8.0 SUBSEQUENT ACTIONS

8.1 Restore the plant in accordance with current operating or testing conditions.

_________________/__________
Verified by Date

8.2 Review data sheets and verify all information has been recorded and calculations on attachments have been completed.

_________________/__________
Verified by Date

8.3 Attach copy of strip charts from recorder FDR 01204A and B for each test. Label start and completion on charts for both tests.

_________________/__________
Verified by Date

8.4 Attach copy of computer point log printouts of pond level and temperature plots for both test.

_________________/__________
Verified by Date

Maximum Heat Rate Capacity Test

Date: ____________________

Time of Test (To): ____________________

RHR HEAT EXCHANGER A

Time Hours	1R602A RHR SW Flow, gpm	TI 11208A RHR SW INLET TEMP, °F	TRS 1R601 RHR SW OUTLET TEMP, °F	Calculations QHX in BTU/Hr (See Note)
To				
T + 1				
T + 2				
T + 3				
T + 4				
T + 5				
T + 6				
T + 7				
T + 8				
T + 9				
T + 10				
T + 11				
T + 12				
T + 13				
T + 14				
T + 15				
T + 16				

Time Hours	1R602A RHR SW Flow, gpm	TI 11208A RHR SW INLET TEMP, °F	TRS 1R601 RHR SW OUTLET TEMP, °F	Calculations QHX in BTU/Hr (See Note)
T + 17				
T + 18				
T + 19				
T + 20				
T + 21				
T + 22				
T + 23				
T + 23				
T + 24				

RHR HEAT EXCHANGER B

Time Hours	1R602B RHR SW Flow, gpm	TI 11208B RHR SW INLET TEMP, °F	TRS 1R601 RHR SW OUTLET TEMP, °F	Calculations QHX in BTU/Hr (See Note)
To				
T + 1				
T + 2				
T + 3				
T + 4				
T + 5				
T + 6				
T + 7				
T + 8				
T + 9				
T + 10				
T + 11				
T + 12				
T + 13				
T + 14				
T + 15				
T + 16				
T + 17				
T + 18				
T + 19				

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Time Hours	1R602B RHR SW Flow, gpm	TI 11208B RHR SW INLET TEMP, °F	TRS 1R601 RHR SW OUTLET TEMP, °F	Calculations QHX in BTU/Hr (See Note)
T + 20				
T + 21				
T + 22				
T + 23				
T + 24				

Note: Calculations for Heat Removal Capacity

QHX = M (H in - H out)

where M = Flow Rate in Lbm/Hr
H in = Enthalpy of inlet cooling water in BTU/Lbm
H out = Enthalpy of outlet cooling water in BTU/Lbm

Conversion:

LBM/HR = (______) Gal/Min x 60 Min/Hr x .134 Cu Ft/Gal x (______) Lbm/ Cu Ft
= ___________Lbm/Hr

For the QHX calculations on previous page, the maximum QHx for each heat exchnager is:

Heat Exchanger A

Max QHX = _____________BTU/Hr

Heat Exchanger B

Max QHX = _____________BTU/Hr

Lower Heat Rate Capacity Test

Date: ____________________

Time of Test (To): ____________________

RHR HEAT EXCHANGER A

Time Hours	1R602A RHR SW Flow, gpm	TI 11208A RHR SW INLET TEMP, °F	TRS 1R601 RHR SW OUTLET TEMP, °F	Calculations QHX in BTU/Hr (See Note)
To				
T + 1				
T + 2				
T + 3				
T + 4				
T + 5				
T + 6				
T + 7				
T + 8				
T + 9				
T + 10				
T + 11				
T + 12				
T + 13				
T + 14				
T + 15				
T + 16				

Time Hours	1R602A RHR SW Flow, gpm	TI 11208A RHR SW INLET TEMP, °F	TRS 1R601 RHR SW OUTLET TEMP, °F	Calculations QHX in BTU/Hr (See Note)
T + 17				
T + 18				
T + 19				
T + 20				
T + 21				
T + 22				
T + 23				
T + 23				
T + 24				

RHR HEAT EXCHANGER B

Time Hours	1R602B RHR SW Flow, gpm	TI 11208B RHR SW INLET TEMP, °F	TRS 1R601 RHR SW OUTLET TEMP, °F	Calculations QHX in BTU/Hr (See Note)
To				
T + 1				
T + 2				
T + 3				
T + 4				
T + 5				
T + 6				
T + 7				
T + 8				
T + 9				
T + 10				
T + 11				
T + 12				
T + 13				
T + 14				
T + 15				
T + 16				
T + 17				
T + 18				
T + 19				

Time Hours	1R602B RHR SW Flow, gpm	TI 11208B RHR SW INLET TEMP, °F	TRS 1R601 RHR SW OUTLET TEMP, °F	Calculations QHX in BTU/Hr (See Note)
T + 20				
T + 21				
T + 22				
T + 23				
T + 24				

Note: Calculations for Heat Removal Capacity

QHX = M (H in - H out)

where M = Flow Rate in Lbm/Hr
H in = Enthalpy of inlet cooling water in BTU/Lbm
H out = Enthalpy of outlet cooling water in BTU/Lbm

Conversion:

LBM/HR = (______) Gal/Min x 60 Min/Hr x .134 Cu Ft/Gal x (______) Lbm/ Cu Ft
= ___________Lbm/Hr

For the QHX calculations on previous page, the maximum QHx for each heat exchnager is:

Heat Exchanger A

Max QHX = _____________BTU/Hr

Heat Exchanger B

Max QHX = _____________BTU/Hr