ENCLOSURE 2

FOR INFORMATION ONLY

PROCEDURE COVER SHEET

SUSQUEHANNA STEAM ELECTRIC STATION PP&L	NUCLEAR DEPARTMENT PROCEDURE LOSS OF FUEL POOL COOLING/ COOLANT INVENTORY	ON-235-001 Revision 13 Page 1 of 16

EFFECTIVE DATE: 6-30-93 (MP 6-30-93) 7-1-93

PERIODIC REVIEW FREQUENCY: 2 YEARS

PERIODIC REVIEW DUE DATE: 6-30-95

REVISED PERIODIC REVIEW DUE DATE: _____

PROCEDURE TYPE: QA Program (✓) YES (___) NO

Plant Procedure (✓) YES (___) NO

REVIEW METHOD:

(✓) Alternate (___) Expedited

(___) PORC (_____) ERC

Prepared by Jon M. Dilz Date 6-22-93

Reviewed by David M. Kapasi Date 6/28/93
Supervisor

Recommended H. J. Parlman Date 6/28/93
for Functional Unit Manager

NA Date _____
PORC Committee Meeting No.

NA Date _____
ERC Committee Meeting No.

Approved by Steve Stanley Date 6/29/93

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1.0 SYMPTOMS AND OBSERVATIONS

1.1 Loss of Service Water:

1.1.1 SERVICE WATER HEADER LO PRESS alarm at Unit Services Benchboard 2C668.

1.1.2 Fuel Pool Heat Exchanger Inlet/Outlet High Temperature alarm at Fuel Pool Cooling Control Panel 2C206.

1.2 Loss of Fuel Pool Cooling:

1.2.1 Any following alarm at Fuel Pool Storage Control Panel 0C211 Unit 2 side:

a. Fuel Pool Low Level

b. Fuel Pool High Temperature

c. Fuel Pool Cooling Pump Discharge Low Flow

d. Skimmer Surge Tank Low Level

e. Reactor Well Seal Leak

f. Refueling Bellows Leak

g. Refueling Gates Leak

1.2.2 Any following alarm at Fuel Pool Cooling Control Panel 2C206:

a. Fuel Pool Heat Exchanger Inlet/Outlet High Temperature

b. Fuel Pool Cooling Pump Discharge Low Flow

c. Fuel Pool Cooling Pump Discharge Low Pressure

d. Skimmer Surge Tank Low Level

2.0 AUTOMATIC CONDITIONS

2.1 Loss of Service Water:

Standby Service Water Pump 2P502C(A)(B) starts on low system pressure.

2.2 Loss of Fuel Pool Cooling:

2.2.1 If loss of fuel pool cooling due to loss of instrument air following action will occur:

a. U2 FP Filter Demin Holding Pump 2P205 will start with no flow since discharge valve fails closed.

b. Makeup Valve HV-25308 fails closed.

2.2.2 Low low Skimmer Surge Tank 2T208 level trips running FP Cooling Pp 2A(2B)(2C) 2P211A(B)(C).

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3.0 OPERATOR ACTIONS CHECKED

NOTE: Entry into procedure may also require implementation of Emergency plan.

3.1 RECORD date and time of event. _____/_____
Date Time

3.2 When cause of loss of Fuel Pool Cooling determined, PERFORM any or all of following:

3.2.1 MONITOR Fuel Pool Level and Tempreature by using FUEL POOL LEVEL/TEMP RECORDER LR/TR-25347 on 2C644.

3.2.1 If level decreases to less than 22 feet above the Reactor Cavity flange or top of irradiated fuel bundles, ENSURE compliance with Technical Specification 3.5.2, 3.5.3, 3.9.9 and 3.9.11.2.

3.2.2 If loss of service water cooling occurred, PERFORM section 3.3.

3.2.3 If loss of fuel pool cooling flow occurred, PERFORM section 3.4.

3.2.4 If system breach occurred, PERFORM section 3.5.

3.2.5 If Fuel Pool Cooling cannot be established, PERFORM section 3.6.

CHECKED

3.3 If loss of service water occurred:

3.3.1 CHECK at least one Service Water Pump 2P502A(B)(C) in operation. _____

3.3.2 If no Service Water Pump 2P502A(B)(C) operating, PERFORM ON-211-001 Loss of Service Water. _____

3.3.3 If service water available, CHECK operation of Pressure Control Valve PCV-21036 on return line from fuel pool heat exchangers as follows:

a. OBSERVE valve position. _____

b. If Pressure Control Valve PCV-21036 failed closed, THROTTLE OPEN PCV-21036 Bypass Valve 210089 to control fuel pool heat exchanger service water. _____

c. When conditions permit, CLOSE PCV-210036 Bypass Valve 210089. _____

3.3.4 If cooling cannot be restored, PERFORM section 3.6. _____

CHECKED

3.4 If loss of fuel pool cooling flow occurred, PERFORM following:

3.4.1 At Panel 2C206, CHECK at least one FP Cooling Pp 2A(2B)(2C) 2P211A(B)(C) in operation. _____

3.4.2 If no pumps running: _____

a. CHECK Fuel Pool Skimmer Surge Tank Level LI-25312 above pump trip setpoint, ~5%. _____

b. If level on LI-25312 < 67%:

(1) DETERMINE source of water to be used for makeup considering following: _____

(a) Pump seal water from Condensate Transfer System has least impact from water management perspective but provides lowest volume.

(b) Skimmer Surge Tank Makeup from Demineralized Water Transfer has greatest impact from water management perspective but provides highest volume.

(2) MAKEUP to Fuel Pool Cooling and Cleanup System performing following as applicable:

(a) OPEN FP Clg Pp A Seal Wtr Iso 253008A, _____

AND/OR

(b) OPEN FP Clg Pp B Seal Wtr Iso 253008B, _____

AND/OR

(c) OPEN FP Clg Pp C Seal Wtr Iso 253008C. _____

CHECKED

AND/OR

(d) OPEN Skimmer Surge Tank Makeup HV-25308, _____

AND/OR

(e) OPEN Makeup Demin Wtr Supply HV-25308 BPV 253076. _____

c. When FP Clg Surge Tank Level LI-25312 between 67% and 90%, PERFORM following as applicable:

(1) CLOSE FP Clg Pp A Seal Wtr Iso 253008A. _____

(2) CLOSE FP Clg Pp B Seal Wtr Iso 253008B. _____

(3) CLOSE FP Clg Pp C Seal Wtr Iso 253008C. _____

(4) CLOSE Skimmer Surge Tank Makeup HV-25308. _____

(5) CLOSE Makeup Demin Wtr Supply HV-25308 BPV253076. _____

(6) ENSURE makeup to compensate for evaporative losses established in accordance with OP-235-001 Fuel Pool Cooling and Cleanup System. _____

d. CHECK Fuel Pool Cooling Pump 2P211A(B)(C) supply breaker 2B251062(2B261052)(2B271023) CLOSED. _____

e. START FP Cooling Pp 2A(2B)(2C) 2P211A(B)(C). _____

f. As required VENT Fuel Pool Cooling Pump 2P211A(B)(C). _____

3.4.3 If Unit 2 (Common) Fuel Pool Filter Demineralizer not 2F202(OF202) in service or isolated. THROTTLE OPEN Fuel Pool Filter Bypass 253013. _____

CHECKED

3.4.4 When conditions permit, CLOSE Fuel Pool Pool Filter Bypass 253013. _____

3.4.5 If flow cannot be restored, PERFORM section 3.6._____

CHECKED

3.5 If system breach occurred:

3.5.1	COMMENCE walkdown of system to determine location and severity of leak.	_____
3.5.2	If possible, ISOLATE leak.	_____
3.5.3	FILL Skimmer Surge Tank 2T208 in accordance with step 3.4.2.	_____
3.5.4	If Fuel Pool Cooling System shutdown required, SHUTDOWN System in accordance with OP-235-001.	_____

CHECKED

(1) 3.6 If Fuel Pool Cooling cannot be established:

3.6.1 If power available, CROSS-TIE both fuel pools via the cask storage pit by removal of the cask storage pit blocks in accordance with OP-235-001. _____

3.6.2 If available, PLACE RHR System in Fuel Pool Cooling Assist Mode in accordance with OP-249-003 RHR Operation in Fuel Pool Cooling Assist. _____

3.6.3 If Fuel Pool level cannot be maintained at least 22 feet above Irradiated Fuel Bundles, ADD water to Fuel Pool to maintain level a minimum of 22 feet above Irradiated Fuel Bundles using any of the following methods:

a. To fill Fuel Pool via Condensate Transfer System, ADD water to overflow Skimmer Surge Tank to increase Skimmer Surge Tank level to at least 100% in accordance with step 3.4.2. _____

b. FILL Shipping Cask Storage Pit from RWST to overflow to Skimmer Surge Tank in accordance with OP-235-001 Fuel Pool Cooling and Cleanup System. _____

(R) c. ADD water to Fuel Pool via ESW System as follows:

(1) START ESW System in accordance with OP-054-001 Emergency Service Water System. _____

NOTE: Unit 2 makeup source provides quicker increase to pool.

(2) To add water via ESW Unit 2 makeup:

(a) OPEN ESW Loop A(B) to Fuel Storage Pool Make-up Iso 253500(253501). _____

(b) OPEN ESW to Fuel Stor Pool IB Iso 253090A(B). _____

CHECKED

(c) THROTTLE OPEN ESW to Fuel Stor Pool OB Iso 253091A(B). _____

(3) To add water via ESW Unit 1 makeup:

(a) OPEN ESW Loop A(B) to Fuel Storage Pool Makeup Iso 153500(153501). _____

(b) OPEN ESW to Fuel Stor Pool IB Iso 153090A(B). _____

(c) THROTTLE OPEN ESW to Fuel Stor Pool OB Iso 153091A(B). _____

(R) (4) When desired fuel pool level reached, STOP adding water to Fuel Pool:

(a) To secure Unit 2 makeup:

1. CLOSE ESW to Fuel Stor Pool OB Iso 253091A(B). _____

2. CLOSE ESW to Fuel Stor Pool IB Iso 253090A(B). _____

3. CLOSE ESW Loop A(B) to Fuel Stor Pool Make-up Iso 253500(253501). _____

(b) To secure Unit 1 makeup:

1. CLOSE ESW to Fuel Stor Pool OB Iso 153091A(B). _____

2. CLOSE ESW to Fuel Stor Pool IB Iso 153090A(B). _____

3. CLOSE ESW Loop A(B) to Fuel Stor Pool Makeup Iso 153500(153501). _____

(c) STOP ESW System in accordance with OP-054-001 Emergency Service Water System. _____

CHECKED

d. ADD water from Fire Protection System as follows:

(1) ROUTE hose(s) from Fire Protection hose reel(s) on refueling floor into fuel pool _____

AND

(2) SECURE hose(s). _____

(3) OPEN hose reel valve(s) to add fire protection system water to fuel pool. _____

(4) When desired Fuel Pool level reached, STOP adding water from fire protection system by CLOSING hose reel valve(s). _____

3.6.4 If access to elevation 818' restricted, MONITOR fuel pool level at Panel 2C206 (elevation 749').

NOTE: LI-25312 does not monitor actual fuel pool level. Water level in the fuel pool can decrease below the weirs without changing the level indication on skimmer surge tank level indicator LI-25312.

a. IF < 100% on LI-25312, actual Fuel Pool level is below weirs. _____

b. If ≥ 100% on LI-25312, DETERMINE if level above weirs as follows:

(1) OPEN 253065A to drain Skimmer Surge Tank. _____

(2) OBSERVE indicated level drops below 100%. _____

NOTE: It will take approximately 80 minutes for level to drop 10%.

(3) If level does not drop below 100%, Fuel Pool level is above weirs. _____

CHECKED

(4) If level does drop below 100%, then Fuel Pool level is below weirs. _____

(5) CLOSE 253065A. _____

CAUTION

ALLOWING POOL TO BOIL CAN RESULT IN:

- INCREASED AIRBORNE RADIOACTIVITY ON THE REFUEL FLOOR
- EVACUATION OF THE REFUEL FLOOR DUE TO INCREASING RADIATION LEVELS.
- ADVERSE EFFECTS TO SAFETY RELATED SYSTEMS AND COMPONENTS IN THE REACTOR BUILDING DUE TO EXCESSIVE MOISTURE IF VENTILATION SYSTEMS FOR ZONES I, II, AND III ARE ISOLATED.

3.6.5 If all means of cooling lost:

a. NOTIFY HP of intent to allow fuel pool to boil. _____

b. ALLOW water in the Fuel Pool to boil. _____

NOTE: It is estimated the fuel pool will begin to boil as early as 25 hours after loss of cooling. This time could be significantly longer.

c. ATTEMPT to MAINTAIN Fuel Pool level a minimum of 22 feet above irradiated fuel bundles to comply with Technical Specification 3.9.9, using any of the methods listed in step 3.6.3. If level can be maintained higher, maintain as high as possible without risk of overflowing. _____

d. MONITOR reactor building release. _____

3.7 FORWARD completed copy of this procedure to following for review and retention:

3.7.1 Shift Supervisor _____/_____
Signature Date

3.7.2 Operations Day Shift Supervisor _____/_____
Signature Date

3.7.3 Operations Manager _____/_____
Signature Date

3.7.4 DCS Supervisor

4.0 REFERENCES

4.1 FSAR Section 9.1.3

4.2 FSAR Appendix 9A

4.3 P&ID M-2151

4.4 P&ID M-2153

4.5 P&ID M-154

4.6 P&ID M-2110

4.7 P&ID M-2111

4.8 E-167 SH 5-7

4.9 OP-054-001 Emergency Service Water System (ESW)

4.10 OP-235-001 Fuel Pool Cooling and Cleanup System

4.11 OP-249-003 RHR Operation in Fuel Pool Cooling Assist

4.12 ON-211-001 Loss of Service Water

4.13 Technical Specification 3.5.1

4.14 Technical Specification 3.5.2

4.15 Technical Specification 3.5.3

4.16 Technical Specification 3.9.9

4.17 Technical Specification 3.9.11.2

(R) 4.18 10 CFR 50 Appendix R

(R) 4.19 PLI-62071 Appendix R Closeout Project Manual Actions for procedures

([1]) 4.20 NE-092-002, Rev. 0, Loss of Fuel Pool Cooling Event Evaluation for EDR #G20020

5.0 DISCUSSION

This procedure provides alternate methods for cooling of Spent Fuel Assemblies stored in the Fuel Pool during a loss of Service Water System or Fuel Pool Cooling Systems. The Fuel Assemblies will be kept cool by alternate methods. Alternate methods include: cross connecting the fuel pools via the cask storage pit and removing the heat using the Unit 1 fuel pool cooling system, use of the RHR system in the Fuel Pool Cooling Assist Mode, and providing makeup to the pools from the ESW or Fire Protection Systems. When providing makeup from the ESW system, either Unit 2 or Unit 1 makeup supplies can be aligned. Makeup from Unit 2 is preferred since level increase is quicker. Makeup from Unit 1 is via the Cask Storage Pit through its weir unless the gates are removed. If refueling is in progress, and the reactor cavity is tied to the fuel pool, the Core Spray System can be used to fill the pool with the RHR System in the shutdown cooling mode utilized to cool the pool.

Due to the common refueling floor and HVAC design any moisture generated through evaporation and/or boiling of the fuel pool will spread to the secondary containment should Zone 3 HVAC be lost or shutdown. For a loss of offsite power (LOOP), Zone 1, 2 and 3 HVAC will isolate, and go into the recirculation mode. For a LOCA, Zone 2 and Zone 3 HVAC will isolate and go into the recirculation mode. The excessive moisture could cause adverse effects to safety related systems and components. All available means should be employed to cool the fuel pool prior to allowing the pool to boil.

PROCEDURE CHANGE APPROVAL FORM	1. PCAF NO. 2-94-0144	2. PAGE 1 of 2
3. PROCEDURE NO. ON-235-001, REV. 13	4. FORM NO. N/A, REV. N/A	

5. PROCEDURE TITLE:

LOSS OF FUEL POOL COOLING/COOLANT INVENTORY

6. PROCEDURE TYPE:
QA PROGRAM (✓)-YES; (_)-NO
PLANT PROC. (✓)-YES; (_)-NO

7. REQUESTED CHANGE:
DELETE PCAFs (✓)-NO; (_)-YES: #_____, #_____, #_____, #_____

ADD FUEL POOL LEVEL/TEMP INDICATOR LR/LT-25347

Continued (_)

8. REASON FOR CHANGE:

INSTALLATION OF DCP 93-3076

FOR INFORMATION ONLY

Continued (_)

9. RECOMMENDED FOR PERMANENT STATUS: (✓) - YES
(_) - NO, EXPIRATION DATE: NA
(60 DAY MAXIMUM FOR TEMPORARY STATUS)

10. IF PLANT PROCEDURE, COMPLETE ITEMS 11 THRU 15 ON PAGE 2 OF THIS FORM.

16. INITIATOR:

3/15/94
DATE

17. MANAGEMENT REVIEW:

a. (_) QADR NOT REQUIRED
b. (✓) QADR PERFORMED, NO COMMENTS
c. (_) NQA QADR REQUIRED PRIOR TO APPROVAL PER BLOCK 21

3/15/94
MANAGEMENT MEMBER DATE

18. AUTHORIZATION (FOR PLANT PROCEDURES)

Grant Dressler
SHIFT SUPERVISOR

3/30/94
DATE

19. NQA QADR

a. (✓) NQA QADR NOT REQUIRED
b. (_) NQA QADR PERFORMED, NO COMMENTS
c. (_) NQA QADR PERFORMED-COMMENTS ATTACHED

REVIEWER: _____ DATE: _____

20. COMMITTEE MEETING

TYPE: _____

MTG #: _____

RECOMMENDED: (_) - YES; (_) - NO
REVISED: (_) - YES; (_) - NO

21. APPROVAL:

_____ (INITIALS) _____ (DATE)

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2-94-0144

OPS TRAINING INFO	
OTHER UNIT-SAME CHANGE	[ ]
HOT BOX	[ ]
PCI	[ ]
NONE	[✓]

PROCEDURE CHANGE APPROVAL FORM

1. PCAF NO. 2-94-0163
2. PAGE 1 OF 14

3. PROCEDURE NO. TP-235-011 REV. 0
4. FORM NO. N/A REV. N/A

5. PROCEDURE TITLE FUEL POOL DECAY HEAT REMOVAL

6. PROCEDURE TYPE:
QA PROGRAM (✓) YES ( ) NO
PLANT PROC (✓) YES ( ) NO

7. REQUESTED CHANGE

DELETE PCAFs (✓) NO ( ) YES # _____ # _____ # _____ # _____

1) REPLACE ATTACHED PGS 4,6,7,9,10,11,12,18
2) ADD 9,11b

104

Continued ( )

8. REASON FOR CHANGE

SEE ATTACHED

Continued ( )

9. RECOMMENDED FOR PERMANENT STATUS ( ) YES
( ) NO, EXPIRATION DATE NA
(60 DAY MAXIMUM FOR TEMPORARY STATUS)

[redacted]

16.
INITIATOR: T. Sullivan DATE: 4/6/94

AUTHORIZATION OF [redacted]
N/A
SHIFT SUPERVISOR

17. MANAGEMENT REVIEW
a. ( ) QADR NOT REQUIRED
b. (✓) QADR PERFORMED, NO COMMENTS
c. ( ) NQA QADR REQUIRED PRIOR TO APPROVAL PER BLOCK 21

Jerry Wilson for R.A. Hutton 4-6-94
MANAGEMENT MEMBER DATE

19. NQA QADR
a. (✓) NQA QADR NOT REQUIRED
b. ( ) NQA QADR PERFORMED, NO COMMENTS
c. ( ) NQA QADR PERFORMED, COMMENTS ATTACHED

REVIEWER: _____ DATE: _____

20. COMMITTEE MEETING
TYPE: PORC
MTG #: 94-052
RECOMMENDED: (✓) YES ( ) NO
REVISED: ( ) YES (✓) NO

21. APPROVAL
[redacted] 4/7/94
(INITIALS) DATE

CONTROLLED

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4/7/94

8. REASON FOR CHANGE (Cont.)

1) Fuel Pool Temperature Administrative Limit

The FSAR limit for Fuel Pool Temperature is 125 Deg. F per FSAR Section 9.1.3. This limit is based on Calculation NAI-78-74 which determined that no boiling in any fuel assembly will occur if bulk Fuel Pool Temperatures do not exceed 125 Deg. F. Presently, a guideline administrative limit of 110 Deg. F has been selected via this TP to provide margin to the FSAR limit. During past outages, Service Water Temperatures to the non-outage Fuel pool heat Exchangers have exceeded 80 Deg. f which has subsequently driven the Fuel Pool Temperatures above this 110 Deg. F value (Due to the approximate 30 Deg. f Delta-T between these two values as based on Fuel Pool Heat Exchanger Capacity). Review of past data has shown that service water temperatures exceeding 85 Deg. F. (which equates to approximately 115 Deg. F in the Fuel Pools) is much more unlikely than the present 80 Deg. F/110 Deg. F relation. In addition, the 115 Deg. F limit still provides adequate margin to the 125 Deg. F FSAR limit.

It should be noted that utilizing the same 30 Deg. F temperature relationship between Service Water Temperatures/Fuel Pool Temperatures would mean that Service Water Temperatures would need to exceed 90-95 Deg. F in order for fuel Pool Temperatures to exceed 120-125 Deg. f. during the Service Water outages. This point is made because the maximum temperature of service water indicated at the plant is approximately 93 Deg. F which has typically only occurred during high temperature days (> 90 Deg. F) during the summer months. Therefore, even if no compensatory actions were taken, it is highly unlikely that the FSAR limit would be exceeded.

2) Compensatory Actions

As an additional measure in this procedure, recommended actions to be taken have been include if Fuel Pool Temperatures exceed 115 Deg. F. These actions basically include providing additional cooling to the pools (i.e. increasing Unit 1 Service Water Flow to the Unit 1 Fuel Pool Heat Exchangers), restoring other cooling means (i.e. Restoring RHR Shutdown Cooling, Restoring Unit 2 Service Water), or utilizing other cooling means (Utilize Unit 2 RHR in Fuel Pool Cooling Assist Mode.)