

Post-examination Comments

(Green Paper)

1. Licensee Submitted Post-examination Comments

SURRY EXAM 2002-301

50-280, 281/2002-301

MARCH 18 - 28, 2002

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

March 28, 2002

Regional Administrator
United States Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street S.W., Suite 23T85
Atlanta, Georgia 30303-8931

Serial No.	02-176
BAG	R0
Docket No.	50-280
	50-281
License No.	DPR-32
	DPR-37

Dear Mr. Reyes:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
WRITTEN LICENSE EXAMINATION COMMENTS

In accordance with NUREG-1021, Section ES-402, the following comments are submitted concerning the Reactor Operator and Senior Reactor Operator written initial examinations administered at Surry on March 14, 2002.

SRO QUESTION: #19/ RO QUESTION: #20

Unit 1 is shutdown proceeding to CSD.

- Train "A" RHR is in operation.
- Train "B" RHR is in standby.
- Pressurizer level is 65%; and lowering rapidly.
- RCS pressure is 300 psig and lowering.
- RCS temperature is 210 degrees F.
- Accumulators are Isolated.
- Containment Sump Level is rising.

Which one of the following procedures should be implemented for the above conditions?

- A. AP-16.00, "Excessive RCS Leakage"
- B. AP-27.00, "Loss of Decay Heat Removal Capability"
- C. E-0, "Reactor Trip or Safety Injection"
- D. AP-16.01, "Shutdown LOCA"

ANSWER: (D)

Reference: Attached applicable portions of AP-27.00 and AP-16.01,
Lesson Plan ND-88.2-LP-3, pages 22, 24, and 25

COMMENTS:

Given the Unit conditions presented in the stem of the question, the entry conditions for both AP-16.01, Shutdown LOCA, and AP-27.00, Loss of Decay Removal Capability, are met.

The trainees were taught that AP-27.00 was an appropriate procedure to enter if the Residual Heat Removal (RHR) System is in service and a loss of Reactor Coolant System (RCS) inventory is occurring. Indications provided in the stem of the question are in lesson plans ND-88.2-LP-3, pages 22 and 24.

A direct entry condition for AP-27.00 is stated as Loss of RCS inventory while on RHR. Step 1 of AP-27.00 identifies RCS inventory decreasing. Pressurizer level decreasing and containment sump level increasing are listed in Step 1 and the stem of the question. If the leakage cannot be isolated in AP-27.00 and RCS temperature is greater than 200°F, the team is transitioned to AP-16.01.

One of the entry criteria for AP-16.01 is listed as transition from AP-27.00.

Three of the eleven trainees chose answer (B).

RECOMMENDATIONS:

Based on the above information, both (B) and (D) should be accepted as correct answers.

SRO QUESTION: #36/ RO QUESTION: #39

The following are conditions for Unit 1:

- 100% power.
- No abnormal alarms are indicated in the control room.
- Maintenance activities are in progress on the Fire Protection System in the Auxiliary Bldg.
- The Spent Fuel Pit purification system has been realigned from RWST purification to Spent Fuel Pit purification.
- The Aux Bldg Operator reports that the Spent Fuel Pit level has decreased 2 inches from its previous reading.
- A check of the Component Cooling Water Surge Tank level indicates that level has decreased slightly since the previous log reading.

Which one of the following is the cause of the decrease in the Spent Fuel Pit level?

- A. Improper alignment associated with the maintenance activities on the Fire Protection System.
- B. Improper alignment of the Spent Fuel Pit purification system.
- C. Leakage between the Component Cooling Water system and the Spent Fuel Pit Cooling system.
- D. A seal failure on the non-operating Spent Fuel Pit Cooling Water pump.

ANSWER: (B)

Reference: Nuclear Control Room Operator Development Program (NCRODP)
Module #59, Table 59-1, page 2 and Table 59-4, page 11;
NCRODP Module #43, Table 43-2, pages 3 and 4;
O-AP-22.02, page 4 of 9

COMMENTS:

The Spent Fuel Pool (SFP) level decreased by 2 inches since the last reading. The SFP contains approximately 1182 gallons per inch. This corresponds to a volume of 2364 gallons lost from the SFP.

Log readings for SFP level are taken once every 24 hours. The decrease of the SFP level by 2 inches in a 24 hour period corresponds to a 1.64 gallons per minute (gpm) loss of water ($2364/24 = 98.5$ gph, $98.5/60 = 1.64$ gpm).

The water from a leaking SFP cooling pump seal would drain to the Fuel Building sump. The Fuel Building sump pump has a capacity of 25 gpm. It automatically starts at 24 inches in the sump and stops at 6 inches in the sump. The pump will cycle to maintain level below the setpoint for sump high level of 33 inches. This pump discharges to either the Low Level Waste Tanks (capacity 2600 gallons each, 2 tanks are operated in parallel, total capacity is 5200 gallons) or the High Level Waste Tanks (capacity 2130 gallons each, 2 tanks are operated in parallel, total capacity is 4260 gallons). These tanks receive water from numerous other places and are periodically pumped to the Radioactive Waste Facility prior to receiving any level alarms. It is expected that no high level alarms would come in on these tanks due to their capacity and the volume of water from the SFP leakage.

The Fuel Building sump pump will keep up with a leak rate of the magnitude from the SFP pump seal described in the question without any abnormal alarms in the Main Control Room.

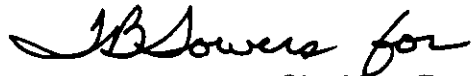
Four of eleven trainees chose answer (D).

RECOMMENDATIONS:

Based on the above information, both (B) and (D) should be accepted as correct answers.

Please find attached a copy of reference material associated with the above comments. If you have any questions or require additional information, please contact us.

Very truly yours,

A handwritten signature in black ink, appearing to read "R. Blount for".

Richard H. Blount, Site Vice President
Surry Power Station

Attachment

Commitments contained in this letter: None

copy:

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Mr. R. A. Musser
Senior Resident Inspector
Surry Power Station

ATTACHMENT

WRITTEN LICENSE EXAMINATION COMMENTS

REFERENCE MATERIAL TO SUPPORT COMMENTS

SRO QUESTION: #19/ RO QUESTION: #20

Surry Power Station - Units 1 & 2

VIRGINIA ELECTRIC AND POWER COMPANY

ATTACHMENT

WRITTEN LICENSE EXAMINATION COMMENTS

REFERENCE MATERIAL TO SUPPORT COMMENTS

SRO QUESTION: #36/ RO QUESTION: #39

Surry Power Station - Units 1 & 2

VIRGINIA ELECTRIC AND POWER COMPANY

TABLE 59-1
DESIGN CHARACTERISTICS
(Continued)

Materials:

pump casing	cast iron
shaft	steel
impeller	bronze

Fuel Building Sump Pumps

Number	two
Type	vertical, centrifugal, single-stage
Motor horsepower	3 HP
Seal	packing
Capacity	25 gpm
Head at rated capacity	74 ft. H ₂ O
Design pressure	150 psig
Design temperature	350°F

Materials:

pump casing	304 stainless steel
shaft	304 stainless steel
impeller	304 stainless steel

Decon building sump pumps

Number	two
Type	Vertical, Centrifugal
Motor Hp	1.5
Capacity	20 gpm

TABLE 59-4
ALARMS, INTERLOCKS, AND INDICATIONS
(Continued)

<u>Title</u>	<u>Annun</u> <u>Window</u>	<u>Initiating</u> <u>Device</u>	<u>Setpoint</u>	<u>Remarks</u>
Fuel building sump pump interlock	-	1-DA-LS-103	24 in. increasing, 6 in. decreasing	starts and stops pumps in AUTO
FUEL BLDG SUMP HI LVL Alarm	VSP E4	1-DA-LS-103	33 in. increasing	
Fuel bldg sump pump interlock		1-DA-LS-103	36 in. increasing	starts both pumps
CTMT SUMP HI LVL Alarm	1B-A3	1-DA-LS-100C	95% increasing	
INCORE INST SUMP HI LVL Alarm	1B-C5	1-DA-LS-105	18 in. increasing	

TABLE 43-2
COMPONENT DATA

Low Level Waste Tank

Designation	1-LW-TK-3A and 3B
Type	vertical, cylindrical
Capacity (each)	2600 gal.
Operating capacity (each)	1833 gal.
Operating pressure	atmospheric
Operating temperature	120°F
Design pressure	25 psig
Design temperature	200°F
Material	stainless steel

Low Level Waste Tank Pump

Designation	1-LW-P-1A and 1B
Pump Design	
flow	120 gpm
head	94 feet
type	horizontal, centrifugal
design pressure	41 psig
casing material	stainless steel
impeller material	stainless steel
seal	mechanical
Motor	
horsepower	7.5
voltage	480 VAC
speed	3600 rpm

TABLE 43-2
COMPONENT DATA
 (Continued)

High Level Waste Tank

Designation	1-LW-TK-2A and 2B
Capacity (each)	2130 gal.
Operating capacity (each)	1567 gal.
Type	vertical, cylindrical
Operating Pressure	atmospheric
Operating Temperature	120°F
Design Pressure	25 psig
Design Temperature	200°F
Material	stainless steel

High Level Waste Tank Pump

Designation	1-LW-P-2A and 2B
Pump design	
flow	120 gpm
head	86 feet
type	horizontal, centrifugal
design pressure	38 psig
casing material	stainless steel
impeller material	stainless steel
seal	mechanical
Motor	
horsepower	7.5
voltage	480 VAC
speed	3600 rpm

NUMBER	PROCEDURE TITLE	REVISION
0-AP-22.02	LOSS OF SPENT FUEL PIT LEVEL	4
		PAGE 4 of 9

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><u>NOTE:</u> • One inch of SFP level is approximately equal to 1182 gallons.</p> <p>• SFP level should be monitored remotely by using the Fuel BLDG video monitors in the MCR, or locally if radiation level permits.</p> <p>• Tech Spec 5.4, FUEL STORAGE, should be reviewed as time permits.</p>	
8. <u>CHECK HIGH VOLUME MAKEUP</u> - REQUIRED	<p>Do the following:</p> <p>a) Makeup to the SFP IAW one of the following:</p> <ul style="list-style-type: none"> • Locally open 1-PG-54. • Makeup from either Blender or RWST using ()-OP-FC-001, SPENT FUEL PIT MAKEUP. • Makeup from BRT IAW 0-OP-FC-003, SPENT FUEL PIT - MAKEUP FROM <u>AND</u> TRANSFER TO THE BORON RECOVERY TANKS. <p>b) GO TO Step 10.</p>	

VIRGINIA POWER
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ABNORMAL PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
1-AP-27.00	LOSS OF DECAY HEAT REMOVAL CAPABILITY (With 11 Attachments)	10
		PAGE 1 of 19

PURPOSE

To provide guidance when the RHR System fails to remove decay heat.

ENTRY CONDITIONS

1. No RHR pumps running due to failure or loss of power.
2. Air-binding of the operating RHR pump as indicated by any of the following:
 - Motor amperage oscillations
 - Flow oscillations
 - Excessive pump noise
 - RHR HX LO FLOW annunciator, 1B-G6
3. Failure of the RHR system to control RCS temperature due to loss of Component Cooling or valve failure.
4. **Loss of RCS inventory while on RHR** as indicated by any of the following:
 - Increasing PRT level, pressure, or temperature
 - Local observation of RCS inventory loss
 - CTMT SUMP HI LVL annunciator, 1B-A3
 - SHUTDOWN COOLING LO LVL annunciator, 1B-G8
 - Decreasing trend on 1-RC-LR-105, COLD SHUTDOWN RCS LEVEL - NARROW RANGE
5. Transition from 1-FR-C.3, RESPONSE TO SATURATED CORE COOLING.

APPROVAL RECOMMENDED	APPROVED CHAIRMAN STATION NUCLEAR SAFETY AND OPERATING COMMITTEE	DATE
REVIEWED		

NUMBER	PROCEDURE TITLE	REVISION
1-AP-27.00	LOSS OF DECAY HEAT REMOVAL CAPABILITY	10
		PAGE 2 of 19

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION: • Loss of RHR due to a total loss of IA is addressed by 0-AP-40.00.
NON-RECOVERABLE LOSS OF IA.

- Loss of RHR may cause CTMT radiological and heat stress conditions to degrade. Local actions in CTMT should be coordinated with HP.
- During solid plant operation, inadvertent actuation of the OPMS may occur if letdown is isolated.

1. CHECK RCS INVENTORY - DECREASING GO TO Step 4.

- PRZR level - DECREASING
- Standpipe level - DECREASING
- Reactor cavity level - DECREASING
- RCS Narrow Range level - DECREASING
- CTMT sump level - INCREASING
- Makeup rate - INCREASING
- PRT level, pressure, or temperature - INCREASING
- PDTT level - INCREASING
- RWST level - INCREASING

NUMBER	PROCEDURE TITLE	REVISION
1-AP-27.00	LOSS OF DECAY HEAT REMOVAL CAPABILITY	10
		PAGE 3 of 19

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	<p>ATTEMPT TO IDENTIFY AND STOP INVENTORY LOSS:</p> <p>a) Stop any known draining evolution</p> <p>b) Close RHR LETDOWN FLOW valve</p> <ul style="list-style-type: none"> • 1-RH-HCV-1142 <p>c) Close or verify closed RCS loop drains</p> <ul style="list-style-type: none"> • 1-RC-HCV-1557A • 1-RC-HCV-1557B • 1-RC-HCV-1557C <p>d) Increase RCS makeup</p> <p>e) Terminate any activities that could cause leakage</p> <ul style="list-style-type: none"> • Valve alignments • Periodic testing • Maintenance <p>f) Coordinate local walkdowns with HP to identify and isolate RCS leakage</p> <p>g) Check RCS level - STABLE OR INCREASING</p>	<p>b) Close 1-CH-PCV-1145.</p> <p>g) <u>IF</u> RCS temperature greater than 200°F. <u>THEN</u> GO TO 1-AP-16.01. SHUTDOWN LOCA.</p> <p><u>IF</u> RCS temperature less than 200°F. <u>THEN</u> align any available SI flowpath to maintain stable or increasing RCS level.</p>
3.	GO TO STEP 16	

VIRGINIA POWER
SURRY POWER STATION
ABNORMAL PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
1-AP-16.01	SHUTDOWN LOCA (With 6 Attachments)	2
		PAGE 1 of 26

PURPOSE

To provide guidance in the event of a Loss of Coolant accident that occurs when the SI accumulators are isolated and RCS temperature is greater than 200°F.

ENTRY CONDITIONS

Loss of Reactor Coolant when the SI accumulators are isolated and RCS temperature is greater than 200°F as indicated by any of the following:

1. Uncontrollable decrease in PRZR level.
2. Uncontrollable decrease in RCS subcooling.
3. Excessive RCS leakage as indicated by any of the following:
 - Increasing makeup to maintain VCT level
 - PRZR pressure decreasing
 - Abnormal Containment indications:
 - a. Increasing Radiation monitor readings
 - b. Increasing Sump level
 - c. Increasing temperature or pressure
 - Abnormal Auxiliary Building indications:
 - a. Increasing Radiation Monitor readings
 - b. Sump high level alarm
4. Transition from 1-AP-16.00, EXCESSIVE RCS LEAKAGE.
5. Transition from 1-AP-27.00, LOSS OF DECAY HEAT REMOVAL CAPABILITY.

APPROVAL RECOMMENDED	APPROVED	DATE
REVIEWED	CHAIRMAN STATION NUCLEAR SAFETY AND OPERATING COMMITTEE	

B. AP-27.00, Loss of Decay Heat Removal Capability

Ensure the trainees have a current copy of AP-27.00, Loss of Decay Heat Removal Capability, for the following discussion.

1. AP-27.00 addresses various events that can occur while the Unit is operating on RHR. The types of events are as follows:
 - Loss of a running RHR pump due to pump failure, loss of power, or vortexing.
 - Loss of heat removal capability due to loss of CC or valve failure.
 - Loss of RCS inventory.
2. Loss of RHR pump events
 - a. Steps 4 and 5 address the restoration of RHR flow due to pump trip or loss of power.
 - b. The basic method for flow restoration is to perform the following:
 - FCV-1605 and HCV-1758 are closed
 - The standby RHR pump is started
 - FCV-1605 and HCV-1758 are adjusted to pre-event settings
 - c. If a standby pump is unavailable, then the operator is directed to Step 16 where preparations are begun for Alternate Cooling methods.

- Check RHR flow normal; if it is not then FCV-1605 and HCV-1758 are adjusted as necessary
- Check CC flow normal; if it is not then verify the CC TVs open, try to reopen them locally using FCA-16.00 for guidance, swap to the standby RHR HX, evaluate implementation of AP-15.00, and go to step 16 if cannot be restored.
- RHR HX outlet temperatures are verified normal and SW flow to the CCHXs adjusted to control temperature. If temperature cannot be stabilized, then sent to Step 16.
- RCS temperature is verified to be stable or decreasing. If it is not then HCV-1758 is adjusted. If temperature cannot be controlled then go to Step 16.

5. Loss of inventory

- a. Steps 1 and 2 address the loss of inventory.
- b. The basic outline for this condition is as follows:
 - RCS inventory is checked to be decreasing by a **decreasing trend** on **Pzr level**, standpipe level, ultrasonic level, or reactor cavity level, or by an **increasing trend** in **CTMT sump level**, makeup rate, PRT level/pressure/temperature, PDTT level, or RWST level.

- Next, the known drain paths from the RCS are isolated and any evolutions that could be the cause for the loss are terminated; makeup is increased; and walkdowns are conducted locally to identify the source of the loss.
 - If RCS temperature is above 200°F and RCS inventory is still decreasing, a transition is made to AP-16.01, Shutdown LOCA, to address the inventory loss.
 - If RCS temperature is less than 200°F and RCS inventory continues to decrease, any available SI flowpath is aligned in an attempt to control inventory and the operator is sent to step 15 to check for RHR pump vortexing.
6. Step 16 begins a sequence of steps to prepare for the implementation of alternate cooling methods.
- a. Step 16 checks for an initial RCS level above or below reduced inventory.
 - b. If initial level was below reduced inventory level, the operator is sent directly to Step 19 and 20 since under this plant condition personnel are probably working CTMT and CTMT closure must be established. If initial level is above reduced inventory then the operator is sent to the next step to check RCS temperature.
7. Step 17 checks pre-event RCS temperature above or below 200°F. If less than 200°F it must be determined what amount of time, based on heat up rate, it will take to heat up to 200°F. If above 200°F, it is probable that there are no personnel in CTMT and CTMT integrity is still set. Because of this, the steps associated with evacuating CTMT and setting CTMT closure are skipped.