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March 24, 2009
L-2009-071

Mr. Luis A. Reyes
Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
Sam Nunn Atlanta Federal Center
61 Forsyth Street, S. W., Suite 23T85
Atlanta, GA 30303

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Post Examination Comments for the Turkey Point Written NRC License Examination Administered on March 18, 2009

In accordance with NUREG-1021, Revision 9, Supp. 1, Operator Licensing Examination Standards for Power Reactors, Section ES-402, Administering Initial Written Examinations, the facility is allowed to submit comments within 5 working days after the written portion of the License Examination is administered.

Following the administration of the site-specific written license examination at Turkey Point on March 18, 2009, Florida Power and Light Company (FPL) has collected all post examination comments. Specifically, one Reactor Operator applicant, docket number 55-22979, provided comments for three written examination questions. FPL has considered the guidance contained in ES-403 Section D.1 and found that these comments provided by the applicant meet one or more of the acceptable review criteria and should be submitted to NRC for post examination modification of the answer key.

In accordance with NUREG-1021, Section ES-402, subsection E.5, FPL submits herein for your review and evaluation the questions, answers, the applicant's comment and the supporting references. These comments have been reviewed by Charles Sizemore, FPL Corporate Training Manager. Additionally, FPL is providing a recommendation as to whether the answer should be changed or the question should be deleted for each of the applicant's comments.

The comments are for the NRC examination questions 28, 60, 63 and all relevant information is presented in Attachments 1 through 3, respectively.

Should there be any questions, please contact Greg Laughlin at (305) 246-6274 or James Conder at (305) 246-6895.

Very truly yours,

William Jefferson
Vice President
Turkey Point Nuclear Plant

Attachments

SM

cc: Malcolm Widmann, Chief, Operator Licensing Branch, Region II, USNRC
Gerry Laska, Chief Examiner, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant
Document Control Desk, USNRC, Washington, D.C.

CANDIDATE'S COMMENT ON QUESTION 28

Question 28

Which ONE of the following correctly describes the purpose of the RCP Oil Lift Pump and how it is required to be operated in accordance with 3-OP-041.1, "Reactor Coolant Pump", during a normal RCP start?

The RCP Oil Lift pump prevents metal contact for the RCP:

A. thrust bearing during RCP startup. The RCP Oil Lift pump operation must be limited to 20 minutes.
B. Thrust bearing during RCP startup. The RCP Oil Lift Pump should be run at least 3 minutes prior to starting the RCP.
C. Radial bearings during RCP startup. The RCP Oil Lift Pump operation must be limited to 20 minutes.
D. radial bearings during RCP Startup. The RCP Oil Lift Pump should be run at least 3 minutes prior to starting the RCP.

The answer key states that "B" is the correct answer.

Concerns:

1. Neither time periods of 3 minutes or 20 minutes are correct.
2. The 20 minute time frame is not correct due to the Precaution in 3-OP-041.1 states that the RCP Oil Lift Pump should not be run for greater than 15 minutes which rules out answers "A" and "C".
3. The 3 minute time frame is not correct. The procedure clearly states that the RCP Oil Lift Pump will be started and run for 2 minutes, verify the white light is on, start the RCP, let the RCP Oil Lift Pump run for an additional minute, then stop the RCP Oil Lift Pump. Therefore answers "B" and "D" are not correct since the RCP Oil Lift Pump must only be run for 2 minute PRIOR to starting the RCP.

Recommendations:

1. All answers contain differing time requirements than what is stated in the procedure.
2. Remove question from exam.

Reference:

1. 3-OP-041.1 Step 5.1.1.13.b.1, 5.1.2.1, and 5.1.2.2.

FPL Response

Q #28

Which ONE of the following correctly describes the purpose of the RCP Oil Lift pump and how it is required to be operated in accordance with 3-OP-041.1, "Reactor Coolant Pump", during a normal RCP start?

The RCP Oil Lift pump prevents metal to metal contact for the RCP:

A. thrust bearing during RCP startup.
The RCP Oil Lift Pump operation must be limited to 20 minutes.

B. thrust bearing during RCP startup.
The RCP Oil Lift Pump should be run at least 3 minutes prior to starting the RCP.

C. radial bearings during RCP startup.
The RCP Oil Lift Pump operation must be limited to 20 minutes.

D. radial bearings during RCP startup.
The RCP Oil Lift Pump should be run at least 3 minutes prior to starting the RCP.

Q #28

ANSWER: B

KA: 003K1.13

Knowledge of the physical connections and/or cause-effect relationships between the RCPS and RCP bearing lift oil pump. 2.5/2.5

10CFR55: 41.2 to 41.9

Reference: SD-008 Page 18
3-OP-041.1 Step 4.17 and 5.1.1.13.b(2)(e)

Cog Level: 1 Recall

Modified from Exam Bank - 69021080623

Response Analysis:

A. Incorrect because the RCP Oil Lift pump may only be run as long as 15 minutes. Plausible because the RCP Oil Lift pump prevents metal to metal contact for the RCP thrust bearing during RCP startup.

B. Correct per the references. The RCP Oil Lift pump prevents metal to metal contact for the RCP thrust bearing during RCP startup and should be run at least 3 minutes prior to starting the RCP.

C. Incorrect because the RCP Oil Lift pump prevents metal to metal contact for the RCP thrust bearing not the radial bearings during RCP startup and because the RCP Oil Lift pump may only be run as long as 15 minutes. Plausible if the operator confuses the radial bearings with the thrust bearings and does not recall the procedural limit of 3 minutes before starting the RCP.

D. Incorrect because the RCP Oil Lift pump prevents metal to metal contact for the RCP thrust bearing during RCP startup. Plausible because the oil lift pump should be run at least 3 minutes prior to starting the RCP.

Question 28 – FPL Position

FPL agrees that there is no totally correct answer to this question. Choices A and B are the most correct as they address the thrust bearing but are both incorrect in that they do not have correct time for the second part of the question.

Recommend **deleting** question from exam since no answer is completely correct.

The following documentation is provided. See references following this question.

- 3-OP-041.1, Reactor Coolant Pump, procedure with Precautions/Limitations and the section for starting the 3A RCP.
- 3-OP-041.1 Basis Document with Precautions/Limitations and the section for starting *A Reactor Coolant Pump
- Excerpts from the System Description.

Choices A and C are incorrect because step 4.17 states the oil lift pump should not be run greater than 15 minutes at a time.

Choices B and D are incorrect because step 5.1.1.13.b verifies the white permissive light comes on after 2 minutes. The RCP Oil Lift Pump will run for an additional 1 minute after the RCP has been started (total of 3 minutes). The oil lift pump only has to be run for 2 minutes before the RCP is started.

Choices C and D are clearly incorrect. The oil lift system prevents metal to metal contact on the thrust bearing during RCP start.

A knowledgeable candidate would be aware of the 15 minute and 2 minute criteria and would also be aware that the oil lift pump provides lubrication for the thrust bearing. The candidate would now have to guess as to which answer (A or B) is the most correct since the 2 minutes prior to start and the 1 minute after start is not in any answer.

This question has been reviewed by a licensed SRO (Assistant Operations Manger) and is in agreement that the question is misleading. The only requirement is to get the white light (2 minutes) then you can start the RCP.

QUESTION 28 SUPPORTING DOCUMENTS

Florida Power & Light Company

Turkey Point Nuclear Plant

Unit 3

This procedure may be affected by an O.T.S.C. (On The Spot Change) verify information prior to use. Date verified________ Initials________

3-OP-041.1

CAUTION

Performance of this procedure may affect core reactivity.

Title:

Reactor Coolant Pump

(Continuous Use)

Safety Related Procedure

Responsible Department:	Operations
Revision Approval Date:	3/5/08

RTSs *87-0699, 87-0964P, 87-2006, 87-2033, 87-2244P, 87-2530, 88–0003, 88-1909P, 88-2842P, 88-2944P, 89-1050, 89-1877, 90-0117E, 90-0668P, 91-0577, 91-0837, 91-1152T, 91-2740P, 91-3552P, 92-0600, 92-1747P, 93-0198P, 93-1386P, 95-0074P, 95-0931P, 97-0119P, 97–0700P, 97-1113P, 98-0312P, 99-0250P, 01-0153P, 01-0417P, 02-0026P, 03-0503P, 04-0674, 04-1124P, 05-0088, 05-0218P, 05-0273P, 05-0623P, 05-0776, 07-0267P, 07-0437P, 07-0452P, 08-0113P*
OTSCs *5349, 5498, 5562, 6689, 7966, 9706, 11060, 0599-95, 0615-96, 0345-06*
PC/Ms *83-154, 87-258, 89-574, 00-027, 04-162, 04-112*

W97:/GLP/ev/cls/cls

4.12.10 Do NOT operate a reactor coolant pump unless seal injection water is being supplied, except as follows:

1. All No. 1 seal leak-off RCP bearing and CCW temperatures are within limits specified in this procedure and

2. Reactor coolant temperature is less than 150°F

OR

3. The No. 1 seal leak-off rate is less than 5 gpm and at least 25 gpm of component cooling flow at an inlet temperature of less than 105°F is flowing through the thermal barrier cooling coil.

4.12.11 Seal injection water temperature increasing to 130°F (TI-3-116, VCT). This temperature may increase to 150°F if RCS temperature does NOT exceed 400°F.

4.13 The voltage transient that occurs from starting an RCP may be enough to affect R11/R12 sample skid operation.

4.14 Starting a Reactor Coolant Pump may cause an EDG paralleled to the affected 4160V bus to trip, and could cause damage to the EDG.

4.15 A Reactor Coolant Pump shall not be started with the Reactor critical. The Reactor shall be shutdown prior to restart of an RCP. Tech Spec 3.4.1.1 requires all loops to be in operation in Modes 1 and 2.

4.16 A Reactor Coolant Pump shall NOT be started if it is believed that a Reactor Coolant Loop(s) may be at a significantly lower boron concentration than the Reactor Vessel. 0-ONOP-041.9, POTENTIAL DILUTION OF REACTOR COOLANT LOOP(s), provides instructions for ensuring required boron concentrations are achieved prior to RCP operation. [Commitment - Step 2.3.4]

4.17 RCP Oil Lift Pump operation should be limited to 15 minutes during normal RCP starting evolutions. Exception may be taken during off-normal operation or troubleshooting. Prolonged operation of RCP Oil Lift Pumps may cause air entrainment in the oil resulting in the inability to achieve RCP prestart oil pressure.

5.0 **STARTUP/NORMAL OPERATION**

5.1 Starting 3A Reactor Coolant Pump

INIT Date/Time Started:__________/__________

5.1.1 Initial Conditions

NOTE

Initial conditions may be verified in any order.

__ __ __ __ __ 1. Applicable prerequisites in Section 3.0 are satisfied.

__ __ __ __ __ 2. VCT pressure is being maintained in the normal range of 20 to 40 psig or as required to maintain RCP seal leak-off **AND** as specified by Chemistry.

__ __ __ __ __ 3. RCP Loop A Seal Water Flow, FI-3-130, is 6 gpm to 13 gpm.

__ __ __ __ __ 4. **IF** thermal barrier differential pressure is less than 0 inches of water as indicated on PI-3-131A, **THEN** perform the following:

a. Locally adjust the seal injection valve on each RCP to obtain a flow of 6 to 13 gpm per pump while the RO monitors ERDADS RCP Detailed Data Summary display for flow changes. (If 6 gpm can NOT be obtained, the throttle valve should be full open.)

__ __ __ __ __ (1) 3-297A for RCP A

__ __ __ __ __ (2) 3-297B for RCP B

__ __ __ __ __ (3) 3-297C for RCP C

__ __ __ __ __ (4) Repeat steps as necessary to maintain 6 to 13 gpm.

__ __ __ __ __ b. While RCP seal injection flows are being monitored locally, adjust Charging Flow to Regen Hx, HCV-3-121 in the closed direction to maximize seal injection flow.

__ __ __ __ __ 5. 3A EDG is not paralleled to 3A 4160V Bus.

CAUTION

An RCP shall NOT be started if there is reason to believe that a reactor coolant loop may have been diluted while the RCPs were shutdown. 0-ONOP-041.9, POTENTIAL DILUTION OF REACTOR COOLANT LOOP(S), provides instructions if a dilution may have occurred. [Commitment - Step 2.3.4]

6. **IF** no RCPs are running, **THEN** the Shift Manager has verified that NO operations were performed or reported that indicate a reactor coolant loop or portion thereof may have been diluted during the period of time the RCPs were secured. [Commitment - Step 2.3.4]

__ __ __ __ __ a. Record Shift Manager verification on QA Record Page for this subsection.

INIT

5.1.1.9.c.2 (Cont'd)

_____ (d) **WHEN** Maintenance completed hand-rotation of the 3A RCP rotating element, **THEN** return to Substep 5.1.1.9.

OR

(3) Option - Cycle the 3A RCP Seal Leak-off Isolation Valve:

_____ (a) Obtain Engineering approval for this option:

____________________ ________
Engineering Representative Date

> **CAUTION**
>
> ***CV-3-303A shall NOT be closed for greater than one minute AND shall NOT be cycled more than three times.***

_____ (b) Close 3A RCP Seal Leakoff, CV-3-303A.

_____ (c) Open 3A RCP Seal Leakoff, CV-3-303A.

_____ (d) Return to Substep 5.1.1.9.

_____ 10. Verify greater than 225 psid across number 1 seal, PI-3-156.

11. Verify the following annunciators are clear (N/A if adequate seal leakoff visually verified locally):

_____ a. G 2/1 - RCP A STANDPIPE HI LEVEL (N/A if standpipe hi level alarm option used)

_____ b. G 3/1 - RCP A STANDPIPE LO LEVEL

_____ 12. **IF** the RCS has NOT been fully vented, **THEN** verify RCS pressure is greater than 325 psig (325 to 350 psig for solid plant condition).

> **CAUTION**
>
> ***RCP Oil Lift Pump operation should be limited to 15 minutes during normal RCP starting evolutions. Exception may be taken during off-normal operation or troubleshooting. Prolonged operation of RCP Oil Lift Pumps may cause air entrainment in the oil resulting in the inability to achieve RCP prestart oil pressure.***

13. Start the Oil Lift Pump as follows:

_____ a. Start the 3A RCP Oil Lift Pump.

Procedure No.: 3-OP-041.1	Procedure Title: Reactor Coolant Pump	Page: 17 Approval Date: 4/27/05

INIT — 5.1.1.13 (Cont'd)

b. Perform one of the following (N/A steps not used):

NORMAL → (1) Verify white permissive light comes on after the 3A RCP Oil Lift Pump has run for 2 minutes **AND** prior to starting the 3A RCP.

OR

(2) **IF** the white permissive light does not come on after 2 minutes **AND** the 3A RCP Oil Lift Pump discharge pressure is locally verified to be acceptable, **THEN** perform the following:

__ __ __ __ __ (a) Stop the 3A RCP Oil Lift Pump.

EM EM EM EM EM (b) Have Electrical Department install a jumper in 3A MCC Cubicle 30554 between terminals HH1-1 (wire #X1) and HH1-2 (wire #31).

__ __ __ __ __ (c) Start the 3A RCP Oil Lift Pump.

__ __ __ __ __ (d) Verify by local indication that the discharge pressure of the 3A RCP Oil Lift Pump is greater than 500 psig ±50 psig.

__ __ __ __ __ (e) Verify that the 3A RCP Oil Lift Pump has run for at least 3 minutes.

Nothing in question stem indicates an abnormal start where the thrust bearing pressure switch (white light) is not functioning properly.

INIT

CAUTIONS

- ***When a RCP is started while OMS is in Low Pressure Operation, the RCS pressure should be closely monitored using the highest indicating channel.***
- ***Reactor Coolant Loops without a RCP running will have the highest indicated pressure.***
- ***Starting a Reactor Coolant Pump may cause an EDG paralleled to the affected 4160V bus to trip and could cause damage to the EDG.***
- ***Monitor RCP #1 Seal Differential Pressure during RCP starts at low pressure. If the seal differential pressure drops to 225 psid, the pump must be stopped.***
- ***All associated RCP instrumentation (i.e., Seal Leakoff Flow, #1 Seal Differential Pressure) should be operable and indicating properly for present plant condition.***

NOTE

If the RCS is NOT vented, only operate the RCP for as long as directed by 3-OP-041.8, FILLING AND VENTING REACTOR COOLANT SYSTEM.

5.1.2 Procedure Steps

_____ 1. Start the Reactor Coolant Pump **AND** verify the starting current and RCS loop flow rate increase.

_____ a. **IF** RCP starting current does NOT return to less than 943 amps within 25 seconds, **THEN** stop the RCP.

_____ 2. After 1 minute of 3A RCP operation, stop the 3A RCP oil lift pump.

3. **IF** the 3A RCP number 1 seal leak-off flow was verified adequate by any means other than being within the limits of Enclosure 1 as indicated on FR-3-154A and/or FR-3-154B, **THEN** monitor 3A RCP seal leak-off flow as follows:

_____ a. **IF** the 3A RCP number 1 seal leak-off flow as indicated on FR-3-154A and/or FR-3-154B does not come within the limits of Enclosure 1 within 3 minutes of starting the 3A RCP, **THEN** stop the 3A RCP.

_____ 4. Check for proper indication on R11/R12.

_____ a. **IF** proper indication has **NOT** returned, **THEN** contact I&C Department to start sample pumps in MANUAL MODE locally at the skid.

_____ 5. Verify VCT pressure is between 20 and 40 psig or as required to maintain RCP seal leakoff **AND** as specified by the Nuclear Chemistry Department.

Florida Power & Light Company

Turkey Point Nuclear Plant

Unit 3 & 4 (Master)

BASIS DOCUMENT

FOR:

***-OP-041.1**

DATED:

3/5/08

TITLE:

Reactor Coolant Pump

BASIS DOCUMENT

9. A minimum flow rate for seal leakoff is 0.2 gpm at 200 psid. Contingencies and lessons learned from operating experience incorporated in event seal leakoff is not per Enclosure 1.

10. The 200 psid is the minimum by technical specifications. The 225 psid is the administrative low limit to start an RCP to assure that seal damage does not occur.

11. To assure proper back pressure of #2 seal and ensure that #2 seal is not cocked. Reduced from 375 psig by Westinghouse Letter 92-TP-TD-5513 dated December 4, 1992.

12. To assure that adequate pressure is present in the RCS to allow for the unvented system to move the bubbles around, lose pressure, and still maintain 225 psid across the number 1 seal for the period of RCP starting current across the breaker contacts. Opening RCP breakers during high current periods could cause severe damage to the contacts.

13. Oil lift pumps must be **ON** supplying a minimum of 350 psig to upper shoes for two minutes to illuminate the white light for that oil pump. This closes the interlock for RCP start circuit.

System Description

Thrust Bearing, Upper Guide Bearing, and Oil Lift System

The upper bearing is a combination double Kingsbury type thrust bearing (suitable for upward or downward thrust) and a segmented radial guide bearing. The babbit-on-steel thrust bearing shoes are mounted on equalizing pads which distribute the thrust load equally to all shoes. The radial bearing is a babbit-on-steel type bearing, which can be radially positioned by jackscrews. The upper radial bearing and thrust bearing operate against an alloy steel journal and thrust runner combination which is shrunk on the shaft.

The entire upper bearing assembly is located in the upper oil pot which has a capacity of approximately 175 gallons of oil and is provided with level indication and level alarm devices. The REACTOR COOLANT PUMP OIL RESERVOIR HIGH/LOW LEVEL alarm is annunciated on panel B, window 2/4 (2/5 or 2/6). A separate oil-to-component cooling water heat exchanger mounted on the side of the motor cools the oil.

In order to prevent metal-to-metal contact on the thrust bearing during startup of the pump, an "oil lift pump" is provided to supply high pressure forced lubrication to the thrust bearing. The lift pump takes suction from the upper oil pot and discharges through individual tubing directly to each shoe of the thrust bearing. The forced lubrication creates an oil film between the running surfaces which reduces wear and starting torque. When the coolant pump is operating at normal speed, the thrust runner acts as a centrifugal pump (a series of holes are drilled in the runner to make it more effective) and circulates oil through the bearings and external oil cooler. With this oil flow established it is permissible to shut down the lift pump. There is a permissive interlock in the motor starting circuit that prevents starting the RCP until the oil lift pump pressure has reached a preset value (650 PSIG) and two minutes have elapsed. See logic sheet 5610-T-L1, Sheet 30A. After the RCP has been in operation for about one minute the oil lift pump may be shut down. Oil lift pump operation is not required when shutting down the RCP.

Although forced lubrication during startup is provided by an "oil lift pump," it does not provide any real lifting function. This nomenclature is a holdover from previous designs where the oil lift pump physically raised or lifted the rotor. The thrust bearing oil lift system includes a 10 HP, 480 volt, 1800 RPM motor, a gear type positive displacement pump and the required valves and piping. The oil lift pump and motor are mounted externally on the upper part of the motor casing. The lower side of the thrust bearing takes the weight of the rotating parts when the reactor coolant loop is at low pressure. As the loop pressure increases the unbalanced force on the No. 1 seal assembly causes the shaft to lift and transfer the thrust to the upper side of the thrust bearing. By the time the

Start Oil Lift Pump

Check that the steam generator is not hotter than the RCS to prevent a pressure transient.

When the lift oil pump interlock has been satisfied, (>650 PSIG and 2 minutes time elapsed) start the RCP by momentarily placing the desired control switch on VPA to "START". Observe motor current. It will peg high and return to scale in about 20 seconds. If current is greater than 943 amps after 25 seconds stop the pump and investigate the problem.

The reactor coolant pumps are not designed for "jogging" operations. Never restart a pump until it comes to rest. Start pumps one at a time and allow the starting current to decay before starting another. The motor must be allowed to cool for at least 30 minutes before attempting a restart. Additionally, only three restarts may be attempted in any two-hour period. The motor must be allowed to cool for one hour before a fourth restart is attempted.

With a bubble in the pressurizer, always start B or C pump first to supply spray flow. During solid plant conditions the overpressure mitigation system must be verified to be aligned for low pressure operations.

CANDIDATE'S FEEDBACK ON QUESTION # 60

CANDIDATE'S FEEDBACK

Question 60

Operators are responding to a Small Break LOCA on Unit 3.

- Containment pressure peaked at 12 psig.
- Containment temperature is 160 degrees and slowly lowering.
- One hour after event initiation the 3C ECF fan fails.
- The RO observes dual light indication (Both red and green lights on) for the 3C ECF Spray valves.

Which ONE of the following describes the 3C ECF spray valves response and the effect on 3C ECF charcoal bed temperatures?

A. Both ECF spray valves are full open. 3C ECF charcoal temperatures will decrease.
B. Both ECF spray valves are full open. 3C ECF charcoal temperatures will increase.
C. Only one ECF spray valve is full open. 3C ECF charcoal temperatures will decrease.
D. Only one ECF spray valve is full open. 3C ECF charcoal temperatures will increase.

The answer key states "D" as the correct answer.

Concerns:

1. At 12 psig peak pressure the containment spray pumps will not have started, therefore there will be no spray flow through the dousing valves.
2. The Turkey Point FSAR (Table 14.3.2.2-2) shows that for all analyzed break sizes for a Small Break LOCA, no Rod Burst will occur therefore releasing no additional iodine into the RCS.
3. With no fuel damage, there will be no iodine released other than that which is already in the RCS which is minimal to none.
4. With no significant amounts of iodine released into containment, the charcoal beds will not absorb enough to cause temperature to increase while the temperature in containment is decreasing (ambient losses will be greater than the heat generated from decay of iodine.)
5. There is no indication in the Control Room of the charcoal bed temperatures (monitoring points have been abandoned.)

Recommendations:

1. Based on the above concerns the recommended action would be to accept either "C" or "D" as correct answers.

References:

1. 3-OSP-056.1, Emergency Containment Filter Fans Operability Test, Sect. 4.0, Step 4.4
2. ECF Design Basis Document Sect. 1.0
3. Turkey Point FSAR Chapters 6.3 and 14.3

FPL Response

Q #60

Operators are responding to a Small Break LOCA on Unit 3.

- Containment pressure peaked at 12 psig.
- Containment temperature is 160 degrees and slowly lowering.
- One hour after event initiation the 3C ECF fan fails.
- The RO observes dual light indication (Both red and green lights on) for the 3C ECF Spray valves.

Which ONE of the following describes the 3C ECF spray valves response and the effect on 3C ECF charcoal bed temperatures?

A. Both ECF spray valves are full open.
3C ECF charcoal temperatures will <u>decrease</u>.

B. Both ECF spray valves are full open.
3C ECF charcoal temperatures will <u>increase</u>.

C. Only one ECF spray valve is full open.
3C ECF charcoal temperatures will <u>decrease</u>.

D. Only one ECF spray valve is full open.
3C ECF charcoal temperatures will <u>increase</u>.

Q #60

ANSWER: D

KA: 027A4.04

Ability to manually operate and/or monitor in the control room: Filter temperature. 2.8/2.9

10CFR55: 41.7

Reference: SD-029 Page 14 & Figure 6A , 3-OSP-056.2 Section 7.11

Cog Level: 2 Comprehension

Level 2 because the operator must recall that the source of ECF spray flow is the containment spray system. Containment spray has not actuated because containment pressure reached 12 psig. Additionally dual light indication means that only one spray valve has opened (one set of red & green lights are shared by both spray valves). Finally the ECF charcoal temperatures will increase.

New Question

Response Analysis:

A. Incorrect because only one spray valve is open. Plausible because if the bed were being sprayed, charcoal temperatures would be expected to decrease.

B. Incorrect because only one spray valve is open. Plausible because if the charcoal bed is not being sprayed the charcoal temperatures would be expected to increase.

C. Incorrect charcoal bed is not being sprayed the charcoal temperatures would be expected to increase. Plausible because Only one ECF valve is open.

D. Correct per the references and discussion above.

Question 60 – FPL Position

FPL agrees that the selected answer is incorrect. The correct answer is C. Change answer key to support C as correct or delete question due to insufficient information in the stem to determine the amount of core damage if any. The stem information would lead most candidates to assuming that the ECCS systems have properly functioned and that the fuel cladding is in tacked and therefore only the activity in the RCS have been released which is very minimal and should be cooled by the normal containment coolers.

The question/distractor analysis listed simply states the charcoal bed temperature will increase without providing any reference for this conclusion. The references provided, SD – 029 and the OSP – 56.2 do not address this post SBLOCA accident charcoal bed response.

The following documentation is provided to substantiate that there is no post accident fuel damage or subsequent release for a SBLOCA.

- FSAR Section 14.3.2.2.2 & .3 "Small Break LOCA (Small Ruptured Pipes or Cracks in Large Pipes) which Actuate the Emergency Cooling System" which describes that no fuel damage results from a SBLOCA.
- Table 14.3.2.2-2, "Small Break LOCA Analysis Fuel Cladding Results" which shows cladding remains cooled and that no rod burst occurs.

The question assumes that since Containment Spray has not actuated and therefore there is no charcoal bed cooling water flow, charcoal bed temperatures will increase. When, in fact, on a small break LOCA, there is no reason to assume fuel failure of any kind or that a sufficient amount of Iodine or other radio-nuclides have escaped and have been adsorbed in the charcoal beds to be causing the beds to heat up one hour after a small break LOCA. Unless there is fuel failure and a large amount of Iodine is released to containment, the charcoal temperature will follow containment temperature, which is stated in the stem as DECREASING since there is not an adequate heat source to increase the charcoal bed temperature. On certain sizes of small break LOCAs the RCPs may still be running so the RO would reset the SI and the phase "A" and start the Normal Containment Coolers (following the Immediate Operator Actions of EOP-E.0) to provide RCP cooling which will also cooldown the containment and the charcoal beds providing a large amount of Iodine is not adding more decay heat to the charcoal beds than the normal coolers can remove.

For one half of the question, the operator must determine that containment spray has not actuated (12 psig) and that only one charcoal bed spray valve is open based on the dual position indication, which would be the case for conditions given in the stem of the question. The operator should realize that the spray dousing valves should be open since the ECF tripped and no air flow is sensed. From the indication given, the operator should realize that only one valve is open. This information is needed to dismiss distractors A & B as wrong. However, he should not have an expectation that a sufficient amount of Iodine has been adsorbed in the charcoal beds to cause a temperature increase following a SBLOCA as our FSAR does not support any fuel failure even for the most limiting 3" cold leg break.

Also the candidate points out that there is no way to monitor the charcoal bed temperatures in the control room so there would not be available indication of which direction temperature is changing following the ECF fan trip. A plant modification removed the temperature sensors that use to cause charcoal bed dousing with flow switches that result in dousing when no flow is sensed following fan operation.
See following supporting documentation from the FSAR chapter 14 on accident analysis.

FSAR SBLOCA

The 5°F full-power T_{AVG} coastdown does not impact the small break LOCA analysis since lower vessel average temperature is non-limiting for the Turkey Point small break LOCA analysis.

An analysis of the limiting 3 inch Small Break LOCA with ZIRLO cladding was performed in Reference 14.3.2.3-21. The calculated PCT is 1683ºF. Previous generic assessments have determined that IFBA analysis is not required for Small Break LOCA, regardless of initial backfill pressure. The maximum local metal-water reaction is less than 17 percent. The total core metal-water is less than 1.0 percent. The temperature transient is terminated at a time when core geometry is still amenable to cooling. As a result, the core temperature will continue to drop and the ability to remove decay heat generated in the fuel for an extended period of time will be provided. It was determined that ZIRLO cladding resulted in a limiting PCT 5ºF less than Zircalloy-4 cladding, and is therefore bounded by the analysis performed with Zircalloy cladding. The 10 CFR 50.46 Acceptance Criteria continue to be satisfied for Turkey Point Units 3 and 4 with ZIRLO clad fuel.

The analyses and evaluation presented in this section show that the high head safety injection subsystems of the Emergency Core Cooling System, together with the heat removal capability of the steam generator, provide sufficient core heat removal capability to maintain the calculated peak-clad temperatures below the required limit of 10 CFR 50.46. Hence, adequate protection is afforded by the emergency core cooling system in the event of a small break loss-of-coolant accident.

14.3.2.2.3 CONCLUSIONS - SMALL BREAK LOCA ANALYSIS

For small breaks in the reactor coolant system pipe up to a cross sectional area of less than 1.0 ft², the Emergency Core Cooling System will meet the Acceptance Criteria presented to 10 CFR 50.46. That is:

1. The calculated peak fuel cladding temperature provides for a substantial margin to the requirement of 2200°F.

2. The amount of fuel cladding that reacts chemically with the water or steam does not exceed 1% of the hypothetical amount that would be generated if all the zirconium metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react.

3. The localized cladding oxidation limit of 17% is not exceeded during or after quenching.

4. The core remains amenable to cooling during and after the LOCA.

5. The core temperature is reduced and decay heat is removed for an extended period of time. This is required to remove the heat produced by the long-lived radioactivity remaining in the core.

No fuel damage so MINIMAL radio-nuclide release.

TABLE 14.3.2.2-2

SMALL BREAK LOCA ANALYSIS
FUEL CLADDING RESULTS

Break Spectrum, (High T_{AVG})

	BREAK SIZE		
	2-inch	3-inch	4-inch
Peak Clad Temperature (°F)	1656	1688(2)	1583
Peak Clad Temperature Location (ft)(1)	11.75	11.75	11.50
Peak Clad Temperature Time (sec)	2627	1188	668
Local Zr/H_2O Reaction, Max (%)	2.0188	1.5535	0.6679
Local Zr/H_2O Reaction Location (ft)(1)	11.75	11.50	11.25
Total Zr/H_2O Reaction (%)	< 1.0	< 1.0	< 1.0
Hot Rod Burst Time (sec)	No Burst	No Burst	No Burst *
Hot Rod Burst Location (ft)(1)	N/A	N/A	N/A

Results for the Limiting 3-inch Break Size

	High TAVG	Low TAVG
Peak Clad Temperature (°F)	1688(2)	1619
Peak Clad Temperature Location (ft)(1)	11.75	11.50
Peak Clad Temperature Time (sec)	1188	1229
Local Zr/H_2O Reaction, Max (%)	1.5535	1.1034
Local Zr/H_2O Reaction Location (ft)(1)	11.50	11.50
Total Zr/H_2O Reaction (%)	< 1.0	< 1.0
Hot Rod Burst Time (sec)	No Burst	No Burst
Hot Rod Burst Location (ft)(1)	N/A	N/A

Notes:
1. Height from bottom of active fuel.
2. Analysis performed with Zircalloy 4 cladding bounds the use of ZIRLO clad fuel.
3. See Appendix 14A or 14B for latest PCT.

CANDIDATE'S COMMENT ON QUESTION # 63

Question 63

Operators are rolling the Unit 3 turbine to normal operating speed.

- Turbine speed is approaching 1400 rpm when turbine acceleration increases to 275 rpm/minute.

In accordance with 3-OP-089, "Main Turbine", which ONE of the following describes the correct operator response?

Lower the:

A. Load Limit controller until acceleration is less than the maximum allowed value of 250 rpm/minute.
B. Governor controller until acceleration is less than the maximum allowed value of 250 rpm/minute.
C. Load Limit controller until acceleration is less than the maximum allowed value of 150 rpm/minute.
D. Governor Controller until acceleration is less than the maximum allowed value of 150 rpm/minute.

The answer key states "A" as the correct answer.

Concerns:

1. The acceleration rate of 250 rpm/minute is the correct maximum acceleration rate when the turbine is less than 300 rpm.
2. After the 300 rpm turbine rub check and closing the turbine control valves, it is stated to raise turbine speed within the limits of the Plant Curve Book, based on turbine first stage metal temperatures.
3. After the 300 rpm threshold, the operation of the turbine is bound by the PCB not the 250 rpm/minute.

Recommendations:

1. Remove question from exam due to no answer containing the proper limits for the turbine acceleration. These acceleration rates could vary from 30 rpm/minute to 225 rpm/minute based on the Initial HP Turbine First Stage Metal Temperatures.

References:

1. 3-OP-089 MAIN TURBINE Step 5.1.2.17-19
2. Plant Curve Book Section 4, Figure 4

FPL Response

Q #63

Operators are rolling the Unit 3 turbine to normal operating speed.

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In accordance with 3-OP-089, "Main Turbine", which ONE of the following describes the correct operator response?

Lower the:

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C. Load Limit controller until acceleration is less than the maximum allowed value of 150 rpm/minute.

D. Governor controller until acceleration is less than the maximum allowed value of 150 rpm/minute.

Q #63

ANSWER: A

KA: 045A2.17

Ability to (a) predict the impacts of the following malfunctions or operations on the MT/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Malfunction of electrohydraulic control 2.7/2.9

10CFR55: 41.5, 43.5

Reference: 3-OP-089 Steps 5.1.2.16, 5.1.2.17, 5.1.2.19, 5.1.2.20

Cog Level: 1 Recall

New Question

Response Analysis:

A. Correct per the references and discussion above. The operator should lower the Load Limit controller until Turbine acceleration is below 250 rpm/min.

B. Incorrect because the Load Limit is in control, not the governor. Plausible because the operator should lower the controller until Turbine acceleration is below 250 rpm/min.

C. Incorrect because the acceleration limit is 250 rpm/minute, not 150 rpm/minute. Plausible if the operator does not recall the acceleration limit and because the load limit is in control.

D. Incorrect because the Load Limit is in control, not the governor and because the acceleration limit is 250 rpm/minute, not 150 rpm/minute. Plausible if the operator does not recall the acceleration limit and if the operator does not recall that the load limit is in control when turbine speed is 1400 rpm.

Question 63 – FPL Position

FPL agrees that no correct answer to this question is provided. Recommend **deleting** this question from the exam.

The following documentation is provided on the following pages.

- 3-OP-089, Main Turbine, Precautions/Limitations and the Main Turbine Startup section
- Plant Curve Book Section 4 Figure 4 referenced in OP-089 step 5.1.2.14

Step 14 of the OP has the operator refer to the Plant Curve Book to determine minimum turbine roll time. This time is dependent on First Stage Metal Temperature. The minimum time to increase speed to 1800 rpm is 10 minutes. This means the maximum acceleration rate is 180 rpm/min. The rate can be less, depending on the first stage metal temperature.

Step 17 has the operator increase turbine speed at 250 rpm/min or less and hold at 300 rpm. This is the only time 250 rpm/min is used as the acceleration rate is then determined based on metal temperature.

Step 19 resumes the speed increase. The acceleration rate is determined from the Plant Curve Book Section 4 Figure 4. At no time will the rate be 250 rpm/min at 1400 rpm as stated in stem.

A knowledgeable candidate aware of the acceleration limits would be aware there is no correct answer and would have to guess which is the most correct.

A licensed SRO (Assistant Operations Manager) has reviewed this question and agrees it should be challenged based on the fact that with normal first stage temperature during turbine roll in the 200 – 300 °F range, the minimum time to reach 1800 rpm is 10 minutes (180 rpm/minute) not the 250 rpm/min stated in the identified correct answer.

Additionally since First Stage Metal Temperature is not given in the stem of this question there is insufficient information to determine a correct response.

Florida Power & Light Company

Turkey Point Nuclear Plant

Unit 3

This procedure may be affected by an O.T.S.C. (On The Spot Change) verify information prior to use.
Date verified________ Initials______

3-OP-089

CAUTION

Performance of this procedure may affect core reactivity.

Title:

Main Turbine

(Continuous Use)

Non-Safety Related Procedure

Responsible Department:	Operations
Revision Approval Date:	7/23/08

***PCRs** 08-2190, 08-1778*
***RTSs** 87-0549P, 87-1517, 87-1792, 88-0402, 89-0562, 89-251489-3410, 90-0465, 90-0730, 90-2247, 92-0179P, 92-0707P, 92-1369P, 92-1610P, 93-0102, 92-2146P, 93-0098P, 94-0823, 94-0820P, 95-0323P, 95-1286P, 96-0444, 96-1151P, 97-0840P, 98-0460P, 98-1098P, 99-0445P, 00-0095P, 02-0108P, 03-0323P, 04-0562P, 04-0393, 05-0921P, 06-0978P, 07-0452P, 07-0871P, 08-0002P*
***OTSCs** 8344, 11091, 0392-94, 0366-96, 0338-97, 0339-97, 0502-98, 0128-03*
***TCs** 08-026*
***PC/Ms** 83-184, 85-132, 89-453, 92-018, 94-052, 94-140, 96-049, 98-0032, 98-048,03-008, 06-084*

W2003:/JRM/cls/ln/ln

4.0 PRECAUTIONS/LIMITATIONS

4.1 Steam Generator Precautions

4.1.1 Steam should be drawn slowly and feedwater additions regulated carefully to avoid uncontrolled step cooling of the RCS.

4.1.2 Steam should not be used to increase turbine speed above 600 rpm until RCS temperature is at least 544°F to 550°F.

4.2 Turbine Temperature Limitations

4.2.1 Bearing oil temperatures should not exceed 160°F from the hottest bearing.

4.2.2 Bearing metal temperatures (journal or thrust bearing) should not exceed 185°F.

4.2.3 Exhaust hood temperatures should be maintained less than 160°F if exhaust hood spray is in service. With exhaust hood spray out of service, continuous operation is allowable with exhaust hood temperature of 175°F, but may not exceed 250°F.

4.2.4 Inlet nozzle steam temperatures should be within 25°F of each other. For abnormal conditions, temperatures may differ as much as 50°F and are permissible up to 75°F difference for less than 15 minutes of a 4-hour period.

4.2.5 Instantaneous changes of steam temperatures to the low pressure turbine inlets should be limited to a maximum of 100°F, and a rate of change of 250°F/hr or less should be adhered to under normal conditions.

4.2.6 At less than 10 percent rated load, low pressure turbine steam inlet temperatures should be limited to 400°F.

4.3 Turbine Rolling Time and Speed Hold Limitations:

4.3.1 The minimum time to accelerate to synchronous speed is determined using PCB Section 4, Figure 4.

4.3.2 Do not hold turbine speed in any of the resonant speed ranges provided in Enclosure 1, Turbine Speed Hold Recommendations, for an extended period of time. If during the turbine roll, a speed hold is necessary and the turbine is in a resonant speed range, then reduce speed below the resonant speed before holding turbine speed.

4.4 Turbine Loading Limitations

4.4.1 Operation of the turbine generator at less than 5 percent rated load (approximately 40 MWe) should be minimized.

4.4.2 Seventy percent of rated load shall not be exceeded with a reheat stop or interceptor valve closed. Monitor turbine thrust position and thrust bearing temperature. Maintain MSR pressure less than 160 psig.

4.4.3 Maintain condenser vacuum in accordance with the Condenser Vacuum Limitation Curve on Enclosure 2.

Procedure No.: 3-OP-089	Procedure Title: Main Turbine	Page: 14 Approval Date: 4/23/08

INIT

5.1.2 (Cont'd)

___ 12. Ensure the Overspeed Protection switch is in the ON position.

___ 13. At the turbine front standard area, verify Main Oil Pump Suction Pressure is greater than 10 psig as indicated on PI-3-3410.

___ 14. Refer to the Plant Curve Book, Section 4, Figure 4 **AND** determine the minimum turbine roll **AND** load times for the present metal temperatures as indicated on R-3-342.

Minimum time to accelerate to synchronous speed: ________ minutes

___ 15. **IF** Subsection 7.2 of 3-OSP-089 was not performed prior to turbine roll, **THEN** station an Operator at the turbine valves to observe valve movements necessary to complete Step 7.1.2 of 3-OSP-089, Main Turbine Valves Operability Test.

NOTE

The BUMP and WAIT technique should be used to allow equipment response between switch manipulations as load limit oil pressure approaches and is being adjusted in the 15 to 21 psig range.

___ 16. Increase Load Limit oil pressure using the BUMP and WAIT technique with the Generator Load Limit RAISE-LOWER switch until the turbine rolls off the turning gear.

NOTES

Rate of speed change can be determined by one of two methods:

- *The Turbine Speed Rate of Change meter of the Console or locally, OR*
- *Timing the rate that turbine speed changes using the Turbine Speed indication on VPA or locally.*

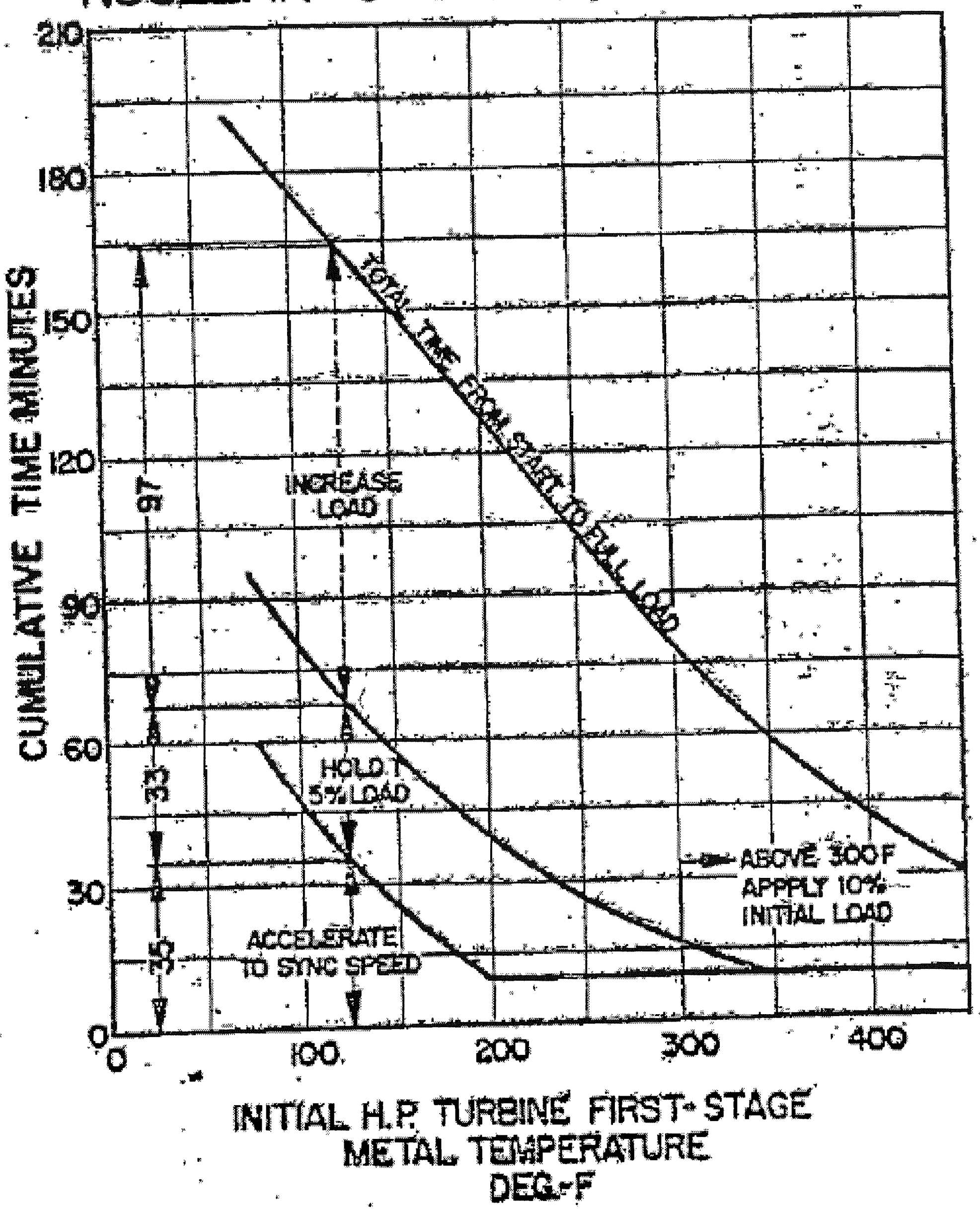
For example, if using the timed rate of turbine speed change, turbine speed increase should be controlled at approximately 100 rpm per 30-second interval on average to obtain a 200 rpm/min speed change.

___ 17. Continue increasing Load Limit oil pressure **AND** turbine speed at the rate of 250 rpm/min **OR** less **AND** hold at approximately 300 rpm as indicated by the Turbine Speed **AND** Turbine Speed Rate of Change meters.

HOLD AT 300 RPM

RECOMMENDED START-UP AND LOADING TIMES

NUCLEAR STEAM SYSTEM UNITS



LAST PAGE OF TURKEY POINT COMMENTS ON RO WRITTEN EXAM FROM 3/18/09