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Nuclear Plant Vogtle

Georgia Power
the southern electric system

Nuclear Plant Vogtle - Units 1 & 2
Written Examination Comments
June 12, 1989
Log: NOT-01723
Security Code: NC

United States Nuclear Regulatory Commission
Region II - Suite 2900
101 Marietta Street, N. W.
Atlanta, Georgia 30323

ATTENTION: Mr. Charles Casto

Dear Mr. Casto:

Attached are the comments compiled by the Training Department regarding the Written Examination conducted at Vogtle Electric Generating Plant on June 12, 1989. Your consideration of these comments in grading of the examination is appreciated.

Very truly yours,

J Bockhold

G. Bockhold, Jr.
General Manager

RED
RED:msh

ATTACHMENT

xc: W. G. Hairston (w/o attachments)
C. K. McCoy (w/o attachments)

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PDR ADOCK 05000424
V PNU

QUESTION 3.06 (1.00)

Concerning the Reactor Coolant Pump #3 seal, describe the source and motive force for injection, and to where the leakoff flows.

ANSWER 3.06 (1.00)

Water flows from a standpipe (0.25) through the seal by static head (0.25)
Top seal leakoff goes to the containment sump (0.25)
Bottom seal leakoff (joins #2 seal leakoff and) goes to the RCDT (0.25)

REFERENCE

LO-LP-16401-03, Objectives 2 & 3, p. 8.
KA: 003000K103 (3.3)

003000K103 ..(KA's)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

Question 3.06

Facility Comment: Answer to the question references the top and bottom seal leakoff from the #3 seal in the answer key.

The question only asks where the leakoff goes and does not specify that the candidate should include the specific part of the seal providing this leakage.

Recommendation: We recommend that reference to the top and bottom part of the seal be deleted as required information for full credit.

No references attached

QUESTION 3.25 (1.50)

Fill in the following blanks with the correct parameters for the Safety Injection Pumps.

Design shut off head: _____ psig in the RCS

Design runout head: _____ psig

Rated flow: _____ gpm

ANSWER 3.25 (1.50)

(0.5 each)
1. 1540 psig (+ or - 100 psig)
2. 75 psig (+ or - 10 psig)
3. 425 gpm (+ or - 25 gpm)

REFERENCE

LO-LP-13201-03-C, Objective 5, pp. 13 & 14.
KA: 006000K603 (3.6)

006000K603 ..(KA's)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

Question 3.25

Facility Comment: The design runout head for the Safety Injection (SI) pumps was listed in the answer key as 75 psig which is indicated as being taken from Vogtle lesson plan LO-LP-13201-03-C. This material was taken from this source as contained in the attached reference (3.25-a) but the 75 psig is a typographical error as can be checked by converting 1650 ft. water head to psig. The proper answer should be approximately 710 psig as indicated on page 6 of the same lesson plan and enclosed as reference 3.25-b.

Recommendation: We recommend that the answer to part 2 of this question be changed to 710 psig ± 100 psig.

References 3.25-a and 3.25-b enclosed.

III. LESSON OUTLINE:

NOTES

Reference 3.25-a.

1. STATE THE PURPOSE OF THE INTERMEDIATE HEAD SAFETY INJECTION SYSTEM

   Provides cool, borated water to the RCS to mitigate consequences of LOCA, SLB, or SGTR; works in conjunction with high and low head portions of ECCS

2. DRAW A ONE-LINE DIAGRAM OF THE INTERMEDIATE HEAD SAFETY INJECTION SYSTEM. INCLUDE THE FOLLOWING MAJOR COMPONENTS:

   a. RWST

   b. SAFETY INJECTION PUMPS (SIP's)

   c. LOOP PENETRATIONS (BOTH HOT AND COLD LEGS)

   d. VALVES WITH SAFETY RELATED (SI) CONTROL FUNCTIONS AND REMOTELY OPERATED VALVES

   e. INJECTION THROTTLE VALVES

   Refer to LO-TP-13201-005

3. DESCRIBE THE FLOW PATH ESTABLISHED BY THE INTERMEDIATE HEAD SI SYSTEM UPON RECEIPT OF AN SI ACTUATION SIGNAL.

   Injection phase in the flow path established on receipt of SI actuation signal - shown darkened on drawing LO-TP-13201-005

4. LIST THE STARTING DUTY REQUIREMENTS OF THE SI PUMPS.

   2 consecutive starts from ambient temperature

   A subsequent restart is permitted after 15 minutes if motor is left running or after 45 minutes if the motor is left idle

✳ 5. STATE THE FOLLOWING PARAMETERS FOR THE SAFETY INJECTION PUMPS:

   a. SHUTOFF HEAD (PRESSURE)

      - 3550 ft., or 1540 psi, or 1625 psig in RCS

   b. RATED FLOW

      425 gpm

III. LESSON OUTLINE:

NOTES

c. RUNOUT HEAD (PRESSURE)

Flow = 650 gpm

1650 ft., or 75 psi

6. DESCRIBE THE FLOW PATH FOR COLD LEG RECIRCULATION.

a. Containment sumps to RHR pump suctions via 8811A and B (RWST suctions 8812A and B shut)

b. RHR pumps to RHR heat exchangers

c. RHR heat exchangers to:

1) Cold legs via 8809A and B

2) Suction of CCP's via 8804A

3) Suction of SIP's via 8804B

(Note: RHR crossover valves 8716As and B shut)

d. CCP's to cold legs via 8801A and B

1) Mini-flow to RWST isolated

(8508A and B, 8509A and B shut)

2) Suction header cross-connected to SIP's (8924, 8807A and B open)

3) Suction from RWST (112D and E) shut

e. SIP's to cold legs via 8835

1) Mini-flow to RWST isolated (8813,8814, 8920 shut)

2) Suction header cross-connected to CCP's

3) Suction from RWST (8806) shut

7. DESCRIBE THE FLOW PATH FOR HOT LEG RECIRCULATION

Note: performed 16 hours after initiation of ECCS -- already in cold leg recirculation

a. RHR heat exchangers to:

1) hot legs via 8716A and B and 8840 (cold leg injection valves 8809A and B shut)

III. LESSON OUTLINE:

	NOTES
Reference 3.25-b E. Major Components	
1. SIP-A and SIP-B	
a. Located on Level B, Auxiliary Building	
b. Power supplies	
1) SIP A--4160KV, 1AA02, Breaker 16	
2) SIP B--4160KV, 1BA03, Breaker 17	
c. Design pressure--1750 psig	
d. Design temperature--300°F	
e. Design flow--425 gpm	Objective 5b
f. Design head--2680 ft. (1150 psi)	LO-TP-13201-004
1) TDH (ft. or psi) is difference between pump inlet and pump discharge pressure	
g. Maximum flow--650 gpm	Objective 5c
* h. Design head at max flow--1650 ft. (710 psig)	
i. Design shutoff head--1625 psig	Objective 5a
1) Shutoff head occurs when the resistance to flow is equal to the pressure being supplied	
j. Required NPSH at any flow--less than 15 ft.	Values given here differ from pump curves due to: 1) Static pressur difference 2) Instrument accuracy
k. Motor has two motor coolers (30 gpm each NSCW)	
l. Pump bearings have oil cooler (10 gpm NSCW) and will run only 40 seconds without NSCW flow. Pump has eleven impellors and a mechanical seal	
m. Each pump is 100% capacity for ESF analysis	
n. Handswitches on QMCB-A and respective shut-down panel	
1) Give alarm on SSMP when in Pull-to-Lock	
o. Starting duty of the SI pump	Objective 4

QUESTION 3.27 (1.00)

Which ONE of the following correctly describes system response if operator error causes an inadvertent Train "A" SI signal to be sent to the Safeguards Sequencer(s) during surveillance testing?

a. Only the Train A diesel will start
Only the Train A sequencer will operate
No loads will sequence on

b. Only the Train A diesel will start
Only the Train A sequencer will operate
Only Train A loads will sequence on

c. Both the Train A and B diesels will start
Only the Train A sequencer will operate
Only Train A loads will sequence on

d. Both the Train A and B diesels will start
Both the Train A and B sequencers will operate
Only Train A loads will sequence on

e. Both the Train A and B diesels will start
Both the Train A and B sequencers will operate
Both Train A and B loads will sequence on

ANSWER 3.27 (1.00)

a. (1.0)

REFERENCE

LO-LP-01401-04-C, Objective 6, pp. 12 & 13.
KA: 064000K411 (3.5)

064000K411 ..(KA's)

(***** CATEGORY 3 CONTINUED ON NEXT PAGE *****)

Question 3.27

Facility Comment: The question lists answer (a.) as the only choice. To make (a.) the correct answer, the SI signal would have to be isolated to the single output to the sequencer. During normal surveillance activities, the "relay mode selector" switch is placed in test which prevents any spurious Safeguards System actuations during testing as indicated in reference 3.27-a. If this switch is in test the SI signal to the sequencer would also be blocked due to the inability of the slave relays to energize. The candidates assumed that if the signal went out to the sequencer that it also was sent to the remaining "A" train loads due to an error in testing which would result in response (b.) being the correct response.

Recommendation: We recommend that the answer key be changed from (a.) to (b.)

Reference 3.27-a enclosed.

LESSON OUTLINE:

NOTES

Reference 3.27-a

h. Panel also contains LEDs for General Warning

1) Two normally energized (General Warning not present) LEDs, indicate general warning status of both trains

2) Lense covers are colored green (this train) amber (opposite train)

3) De-energize when associated train general warning is present (trip or testing)

6. Output Relay Test

a. Checks continuity of circuit from master relays to coils of slave relays. (Picks up where logic test left off)

b. Utilizes 15 VDC signal, insufficient to actually pick up slave relays

* c. Requires INPUT ERROR INHIBIT and MULTIPLEX TEST Switches from logic test panel to be placed in INHIBIT position

d. MODE SELECTOR Switch

1) From OPERATE to TEST

2) Prevents actual actuation by selecting the 15 VDC power supply for master relay operation

3) Enables master relay selector

e. MASTER RELAY SELECTOR

1) Selects master relay to be tested

2) 11 positions

f. RELAY TEST PUSHBUTTON

1) Allows test to be performed

2) Checks for continuity

g. SLAVES OPERATED lights

1) Will light to indicate successful test

QUESTION 4.10 (2.50)

State the RPS trips which provide protection from exceeding the following thermal limits:

a. DNB less than 1.3 (3 trips required) (1.5)

b. Peak Clad Temperature greater than 4700 degrees F (2 trips required) (1.0)

ANSWER 4.10 (2.50)

a. 1. OT Delta-T Trip [+0.5]
2. Loss of flow trips [+0.5]
3. Low pressure trips [+0.5]

b. 1. High neutron flux trip [+0.5]
2. OP Delta-T trip [+0.5]

REFERENCE

1. Vogtle: LO-LP-36001-03-C.

193009K105 ..(KA's)

(***** CATEGORY 4 CONTINUED ON NEXT PAGE *****)

Question 4.10

Facility Comment: For answer to part "a" also accept as possible answers:

1. Undervoltage on RCP bus
2. Underfrequency on RCP bus
3. Power range/negative rate trip

Recommendation: Change answer key for part "a" to read:

a. 1. OT Delta T trip
   2. Low flow trip
   3. Low pressure trip
   4. Undervoltage on RCP bus
   5. Underfrequency on RCP bus
   6. Power range negative rate trip

(Any three for .5 pts each)

REACTOR TRIP SYSTEM INSTRUMENTATION SETPOINTS (Continued)

The various Reactor trip circuits automatically open the Reactor trip breakers whenever a condition monitored by the Reactor Trip System reaches a preset or calculated level. In addition to redundant channels and trains, the design approach provides a Reactor Trip System which monitors numerous system variables, therefore providing Trip System functional diversity. The functional capability at the specified trip setting is required for those anticipatory or diverse Reactor trips for which no direct credit was assumed in the safety analysis to enhance the overall reliability of the Reactor Trip System. The Reactor Trip System initiates a Turbine trip signal whenever Reactor trip is initiated. This prevents the reactivity insertion that would otherwise result from excessive Reactor Coolant System cooldown and thus avoids unnecessary actuation of the Engineered Safety Features Actuation System.

Manual Reactor Trip

The Reactor Trip System includes manual Reactor trip capability.

Power Range, Neutron Flux

In each of the Power Range Neutron Flux channels there are two independent bistables, each with its own trip setting used for a High and Low Range trip setting. The Low Setpoint trip provides protection during subcritical and low power operations to mitigate the consequences of a power excursion beginning from low power, and the High Setpoint trip provides protection during power operations to mitigate the consequences of a reactivity excursion from all power levels.

The Low Setpoint trip may be manually blocked above P-10 (a power level of approximately 10% of RATED THERMAL POWER) and is automatically reinstated below the P-10 Setpoint.

Power Range, Neutron Flux, High Rates

The Power Range Positive Rate trip provides protection against rapid flux increases which are characteristic of a rupture of a control rod drive housing. Specifically, this trip complements the Power Range Neutron Flux High and Low trips to ensure that the criteria are met for rod ejection from mid-power.

The Power Range Negative Rate trip provides protection for control rod drop accidents. At high power a single or multiple rod drop accident could cause local flux peaking which could cause an unconservative local DNBR to exist. The Power Range Negative Rate trip will prevent this from occurring by tripping the reactor. No credit is taken for operation of the Power Range Negative Rate trip for those control rod drop accidents for which DNBRs will be greater than 1.30.

Undervoltage and Underfrequency - Reactor Coolant Pump Busses

The Undervoltage and Underfrequency Reactor Coolant Pump Bus trips provide core protection against DNB as a result of complete loss of forced coolant flow. The specified Setpoints assure a Reactor trip signal is generated before the Low Flow Trip Setpoint is reached. Time delays are incorporated in the Underfrequency and Undervoltage trips to prevent spurious Reactor trips from momentary electrical power transients. For undervoltage, the delay is set so that the time required for a signal to reach the Reactor trip breakers following the loss of power to the reactor coolant pump bus circuit breakers shall not exceed 1.2 seconds. For underfrequency, the delay is set so that the time required for a signal to reach the Reactor trip breakers after the Underfrequency Trip Setpoint is reached shall not exceed 0.3 second.

On decreasing power the Undervoltage and Underfrequency Reactor Coolant Pump Bus trips are automatically blocked by P-7 (a power level of approximately 10% of RATED THERMAL POWER with a turbine impulse chamber pressure at approximately 10% of full power equivalent); and on increasing power, reinstated automatically by P-7.

Turbine Trip

A Turbine trip initiates a Reactor trip. On decreasing power the Reactor trip from the Turbine trip is automatically blocked by P-9 (a power level of approximately 50% of RATED THERMAL POWER); and on increasing power, reinstated automatically by P-9.

Safety Injection Input from ESF

If a Reactor trip has not already been generated by the Reactor Trip System instrumentation, the ESF automatic actuation logic channels will initiate a Reactor trip upon any signal which initiates a Safety Injection. The ESF instrumentation channels which initiate a Safety Injection signal are shown in Table 3.3-3.

Reactor Trip System Interlocks

The Reactor Trip System interlocks perform the following functions:

P-6 On increasing power, P-6 allows the manual block of the Source Range trip (i.e., prevents premature block of Source Range trip), and deenergizes the high voltage to the detectors. On decreasing power, Source Range Level trips are automatically reactivated and high voltage restored.

QUESTION 6.03 (1.00)

STATE the associated Technical Specification bases for EACH of the following isolation signals. (1.0)

a. SI signal

b. High-High steam generator level

ANSWER 6.03 (1.00)

a. Minimizes RCS cooldown from break of feed to steam lines [+0.5].

b. Protects turbine and prevents excessive cooldown [+0.5].

REFERENCE

1. Vogtle: LO-LP-18201-06-C.

059000K419 ..(KA's)

Question 6.03

Facility Comment:

1. Poorly worded question; does not specify which isolation signal for SI. SI will initiate a feedwater isolation and a containment isolation signal.

2. There are no Tech Spec Bases for these signals.

Recommendation: Delete question

III. LESSON OUTLINE:

NOTES

a) Those that do trip pumps are sometimes referred to as "full" feedwater isolation

b) Those that don't trip pumps may be referred to as "partial" feedwater isolation

b. FWI actuation signals

1) Safety injection

a) Any signal

b) Isolates and trips MFPs

c) Trips main turbine

2) High High steam generator level (P-14)

a) 2/4 NR channels on 1/4 SGs greater than 78%

b) Isolates and trips MFPs

c) Also provides main turbine trip signal

3) Reactor trip (P-4) with Low Tavg (2/4 less than 564°F)

a) Closes valves only

b) Does not trip MFPs or main turbine

4) Manual

a) Feedwater can be manually isolated by closing FWI valves (1/2 switches) for individual lines

c. [redacted]

1) SI actuated FWI minimizes RCS cooldown from break of feed or steam lines

2) Hi level FWI protects turbine and prevents excessive cooldown by limiting amount of water in steam generators

III. LESSON OUTLINE:

NOTES

3) Prevents excessive cooldown on Rx trip and reduces the effects of steam line break

d. Reset of FWI following:

1) SI

a) SI must be reset

b) Rx trip breakers must be reclosed to reset P-4

2) S/G Hi Hi Level - P-4

a) S/G Hi Hi Level must decrease below the setpoint

b) MFP's must be restarted

c) No reset required on valves unless coincident with P-4

(1) If P-4, than P-4 must be reset to reopen valves

3) Rx trip and low tave

a) Manually reset the FWI switches on QMCB

b) The initiating condition can still be present

11. Calometric measurement

Required daily

a. Procedure 14030-1 Power range calorimetric channel calibration

1) This procedure is used to calibrate the power range NIS to within 2% of the calorimetric power and provide for manual calculation of the calorimetric

2) Done with computer or manually

b. Parameters used for manual calorimetric

1) SG pressure

2) Feedwater inlet temperature

QUESTION 5.17 (2.50)

a. STATE SIX (6) conditions that will trip an emergency diesel generator after a normal start that are DISABLED on an emergency start. (Trip values not required). (1.5)

b. STATE the FOUR (4) conditions that will trip an emergency diesel after an emergency start. (Trip values not required). (1.0)

ANSWER 6.17 (2.50)

a.
1. High lube oil temp
2. engine bearing high temp
3. crankcase pressure high
4. turbo charger oil pressure low
5. jacket water pressure low
6. engine high vibration
7. turbo charger high vibration

Any six (6) [+0.25] each; [+1.5] max

b.
1. generator differential trip (187 A,B or C / 186 A LOR set)
2. low lube oil pressure
3. high jacket water temp
4. overspeed

[+0.25] each

REFERENCE

1. Vogtle LO-LP-11201-03-C Obj. 7

064000K402 ..(KA's)

Question 6.17

Facility Comments: For answer to part "a" accept the following alternate answers:

1. Phase overcurrent
2. Loss of field
3. Generator neutral overcurrent

Recommendation: Change answer "a" to the following:

1. High lube oil temp
2. Engine bearing high temp
3. Crankcase pressure hig..
4. Turbo charger oil pressure low
5. Jacket water pressure low
6. Engine high vibration
7. Turbo charger high vibration
8. Generator phase overcurrent
9. Loss of field
10. Generator neutral overcurrent (ground)

(Any six for .25 pts each; [+1.5] max

III. LESSON OUTLINE:

NOTES

2) DC

6. Remote Shutdown Panels (A & B)

a. Diesel generator ESF HVAC controls

b. Indication for diesel generator breaker (open/closed)

c. Diesel generator ammeters (3 phases)

7. Generator protection

a. Diesel generator lockout relays (LORs)

Objective 4
QMR 297 (EDG lockout relays)

1) There are 3 lockout relays on the generator control panel

2) Each has a trip and reset position

3) Lockout relays

a) Lockout relay 186A

(1) Trips diesel and output breaker

(2) Trips when a diesel generator differential relay picks up (187)

(3) Does not discriminate between emergency and normal start

b) Lockout relay 186B

(1) Trips diesel generator output breaker and shuts down diesel generator and engine, except in SI condition

(2) Relay trips upon receipt of following relays:

(a) Loss of field (140)

(b) Generator neutral O.C. (151 N)

(c) Generator phase over-current (151VA, 152VB, 151VC)

QUESTION 6.26 (1.00)

STATE TWO (2) conditions, EITHER of which, will satisfy the minimum administrative SRO control room manning requirements during modes 1, 2, 3, and 4. (1.0)

ANSWER 6.26 (1.00)

1. One (1) SRO with license on both units [+0.5]

2. One (1) SRO at each unit [+0.5]

REFERENCE

1. Vogtle: Procedure 10003-C.

194001A103 ..(KA's)

Question 6.26

Facility Comment: Poorly worded question:

1. Does not specify if OSOS is to be included as SRO or not.

2. Does not specify whether it is T.S. admin or Ops admin.

3. Does not specify whether it is for both units or one unit.

4. Does not specify status of SRO license: Dual or unit specific.

Recommendation: Delete question.

ENCLOSURE 4

NRC RESOLUTION OF FACILITY COMMENTS

SRO Examination

Question 4.10

NRC Resolution: Comment accepted. Answer key changed to reflect facility comment. LO-LP-360001-03-C of Vogtle Lesson Plans does not properly reflect cited Technical Specification Bases.

Question 6.03

NRC resolution: Comment accepted. Question deleted from exam. Point values adjusted accordingly.

Question 6.17

NRC resolution: Comment accepted. Alternate answers are acceptable for full credit.

Question 6.26

NRC resolution: Comment not accepted due to the following:

1. Both Technical Specifications and Procedure 10003-C state minimum SRO manning requirements as requested in question.

2. Minimum Technical Specification and Procedure 10003-C requirements are the same.

3. Question asks for minimum control room manning requirements. Vogtle has common control room, hence, no reference to unit needed.

4. Specification to dual or unit specific is part of answer.

Direction was given to all candidates during test by proctor, to "consider minimum licensed SRO requirements for SROs licensed on one or both units."

RO Examination

Question 3.06

NRC resolution: Comment accepted. This is consistent with the intent of the answer key as written.

Question 3.25

NRC resolution: Comment partially accepted. Answer key has been changed to 710 psig. However, a tolerance band of +/- 50 psig has been selected.

Question 3.27

NRC resolution: Comment partially accepted. This question has more than one correct answer based on assumptions of the positions of certain test switches. Question has been deleted from the exam. Point values adjusted accordingly.

ENCLOSURE 5

SIMULATION FACILITY REPORT

Facility Licensee: Georgia Power Company

Facility Docket Nos.: 50-424 and 50-425

Operating Tests Administered On: June 13 - 15, 1989

During the conduct of the simulator portion of the operating tests, the following items were observed :

ITEM	DESCRIPTION
Steam break	During the simulation of a steamline break the pressures of the non-faulted steam generators trend down with the faulted steam generator(s). This is negative training in that the operators "learn" to define steadily decreasing steam generator pressures as stable for purposes of the simulator. In real situations, such indications would require transfer to a procedure for all faulted steam generators.
Pressurizer level	As pressurizer pressure decreases as in a Safety Injection situation, pressurizer level will increase, taking the pressurizer to a solid condition. This again is negative training in that the operators expect to go solid after every safety injection. This was particularly noted during a scenario where a faulted PORV was used in contradiction to the guidance of the EOPs to prevent lifting the code safeties due to solid pressurizer conditions.
Reactor	Due to modeling problems with decay heat and the pressurizer, a low pressure safety injection occurred after almost every reactor trip within 10-30 seconds regardless of operator actions to reduce cooldown.
"A" CCP controller	This switch will not go to the pull to lock position. This required unnecessary involvement by the simulator operator to simulate the desired conditions.
Circ. water	This program was inadvertently dropped by the computer during one of the scenarios requiring the simulator to be stopped and backed up for five minutes to reset to proper conditions. This error detracted from the sense of realism associated with the scenario.
Tave/Tref recorder	This recorder failed during the running of one of the exam scenarios.
Delta "I"	This alarm comes in erroneously. Under certain conditions the alarm causes the operators to take additional actions not intended for the scenario.