OPERATOR LICENSE EXAMINATION REPORT
No. 50-382/OL 86-02

Licensee: Louisiana Power & Light Company
142 Delaronde Street
New Orleans, Louisiana 70174

Docket: 50-382

Operator License Examinations at Waterford 3 Steam Electric Station (W3SES)

Chief Examiner: John E. Whittemore — Date: 4/2/86

Approved By: R. A. Cooley — Date: 4/2/86

Summary

Single category operator license examinations were administered to one (1) Reactor Operator and six (6) Senior Reactor Operator candidates on March 17, 1986. The Reactor Operator failed the examination while all six Senior Reactor Operator candidates passed the examination and have been issued the appropriate license or certificate.

Details

1. Examination Results

Single category written examinations were administered to one Reactor Operator and six Senior Reactor Operator candidates. The six Senior Reactor Operator candidates passed these examinations and the one Reactor Operator failed. No operating examinations were administered during this site visit.

2. Examiners

J. E. Whittemore (Chief Examiner, did not travel to site)
D. N. Graves

3. Examination Report

Performance results for individual candidates are not included in this report. This examination report is composed of the sections listed below.

A. Examination Review Comment Resolution

In general, editorial comments or changes made during the examination or during subsequent grading reviews are not addressed by this report section. This section reflects comments and recommended changes to the examination answer key, made by the licensee. Examination key modifications resulting from these comments and recommendations are included in the master examination and answer keys, which are provided elsewhere in this report. Comments and resolutions are listed by section question number.

3.02.a Also accept "RCS Mass Flow Rate" as COLSS is used to monitor the 12-hour surveillance requirement per NE-4-004.

RESOLUTION: Accept. Key modified

3.02.b Recommend accepting "Pressurizer Pressure" and "CEAC Penalty
6.04.b Factors," for items 5 and 7 of answer.

RESOLUTION: Accept. Key modified.

3.03.a Recommend accepting a value of 28-30 GPM as this range is widely used at W3SES.

RESOLUTION: Accept. Key modified.

3.03.b Second part of answer should not be required for full credit as this is the reason, not the purpose.

RESOLUTION: Partially accept. Key modified but full credit answer must include concept of system transient behavior.

3.04.c Accept "Startup Feed Reg. Valve" for Bypass valve. Also
6.06.c change 5% open to 5% flow demand. Should also accept 3900 RPM or minimum speed for feed pump speed program.

RESOLUTION: Accept. Key modified.

3.05.a Also accept "Backup UEL-----Reed Switch"
6.07.a

RESOLUTION: Will accept but not require for full credit. Key modified.

3.05.b Accept: 2/4 CPC generated pretrips in place of individual
6.07.b parameter trips and logic.

RESOLUTION: Accept. Key modified.

3.06.b Delete "Manual" and "Individual Manual" control mode descriptions and accept description of "Modulation" and "Quick Opening" modes of operation for same credit.

RESOLUTION: Not accepted. Question specifically asks for modes of bypass valve CONTROL, not OPERATION.

3.08 Delete second sentence. Candidates should not be penalized
6.08 for <u>not</u> stating the trips are <u>not</u> corrected for shadowing.

RESOLUTION: Accept. Key modified to allow credit for stating trips that are corrected.

3.09.b Change key to indicate that shearing of RCP shaft is a separate event that is protected against by the trip.

RESOLUTION: Accept. Key modified.

3.10.a Another acceptable should be, "Any calibrate switch out of "operate."

RESOLUTION: Accept. Key modified.

3.10.b Another acceptable answer should be, "Warn the operator of increasing count rate when shutdown.

RESOLUTION: Accept. Key modified to accept either answer for full credit.

6.05.a Accept "Cold leg injection valves" to replace header valves.

RESOLUTION: Accept. Key modified.

6.05.b The word "manipulated" should be changed to "closed" as the bypass valve cannot be throttled.

RESOLUTION: Accept. Key modified.

6.09.b Answer for SIAS should reflect modification that allows operator to select one pump that will not start and that letdown is isolated.

RESOLUTION: Accept. Key modified.

6.10.b Accept words to the effect that lower guide tube is tapered instead of requiring the phrase "Dashpot Effect."

RESOLUTION: Accept. Key modified.

8.01.a Delete first sentence in answer as it is not solicited by the question.

RESOLUTION: Accept. Key modified.

8.05 Add to list of possible answers: Surveillance or maintenance in progress.

RESOLUTION: Accept. Key modified.

8.06.a Accept: Flow Wier Monitoring System for no. 2.

RESOLUTION: Accept. Key modified.

8.06.b Delete first statement as it is part of the Action Statement which is specifically not required.

RESOLUTION: Accept. Key modified to require number of systems and specific combinations required.

8.09.a Candidates may also mention dose projections based on FSAR accident data.

RESOLUTION: Accept. Not required for full credit.

8.09.b Accept 914 meters for boundary.

RESOLUTION: Accept. Key modified.

B. Exit Meeting Summary

An exit meeting with the licensee was not held following administration of the written examinations.

C. EXAMINATION MASTER COPIES

The Senior Reactor Operator and Reactor Operator master examination and answer keys follow. Changes resulting from licensee comments are reflected in these keys.

U. S. NUCLEAR REGULATORY COMMISSION
REACTOR OPERATOR LICENSE EXAMINATION

FACILITY: WATERFORD 3

REACTOR TYPE: PWR-CE

DATE ADMINISTERED: 86/03/17

EXAMINER: WHITTEMORE, J.

APPLICANT: _____

INSTRUCTIONS TO APPLICANT:

Use separate paper for the answers. Write answers on one side only. Staple question sheet on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires at least 70% in each category and a final grade of at least 80%. Examination papers will be picked up six (6) hours after the examination starts.

CATEGORY VALUE	% OF TOTAL	APPLICANT'S SCORE	% OF CATEGORY VALUE	CATEGORY
25.00	100.00	_____	_____	3. INSTRUMENTS AND CONTROLS
25.00	100.00	_____	_____	TOTALS

FINAL GRADE _____%

All work done on this examination is my own. I have neither given nor received aid.

_____
APPLICANT'S SIGNATURE

QUESTION 3.01 (2.00)

a. How will the operator be made aware that an individual CEA timer has failed, and what is the impact of timer failure on normal CEA operation ? (1.0)

b. How will the operator determine the specific CEA(S) affected ? Where is the indication obtained ? (1.0)

QUESTION 3.02 (2.50)

a. What are the five (5) Limiting Conditions for Operation monitored by COLSS ? (1.0)

b. List six (6) of the parameters which are inputs to the CPC's. (1.5)

QUESTION 3.03 (3.00)

a. What is the range of control of the Letdown Throttle Valve in automatic control and why ? (1.2)

b. What is the purpose of the lead/lag unit between the Pressurizer Level Controller and Letdown Throttle Valve Controller ? (1.0)

c. Explain how pressurizer pressure can affect pressurizer level indication ? (0.8)

QUESTION 3.04 (2.50)

a. Explain "Compensated Level" signal as it pertains to the Feed Water Control System (FWCS). (1.0)

b. What are the 3 analog programs generated by the FWCS ? (0.75)

c. What are the limitations placed on pump speed and valve position during Reactor Trip Override ? (0.75)

(***** CATEGORY 03 CONTINUED ON NEXT PAGE *****)

QUESTION 3.05 (2.50)

a. List all CEDMCS interlocks that use CEA position as an input, and state the source of the input. (1.6)

b. Describe any other interlock(s) effective in Manual Sequential. State any applicable circuit logic. (0.9)

QUESTION 3.06 (2.50)

a. Where may Steam Bypass Control "Emergency Off" be initiated from, and what are the effects of initiating "Emergency Off" ? (1.0)

b. Describe the different modes of Bypass Valve control. Address the "Permissive Switch" position in your description. (1.5)

QUESTION 3.07 (2.50)

a. Where can ALL outputs from In-Core fixed and movable detectors be routed to ? Be specific for each type of detector and signal. (1.5)

b. What are two specific uses of the movable detector outputs ? (1.0)

QUESTION 3.08 (2.50)

What Reactor Protection System trips can be affected by Temperature and CEA shadowing ? Further, explain all means or methods used to minimize or correct the effects of shadowing on affected trips. (2.5)

(***** CATEGORY 03 CONTINUED ON NEXT PAGE *****)

QUESTION 3.09 (2.50)

a. Which of the following input parameters are common to the HI LPD and LO DNBR trips ?

1. Radial peaking factors from CEA position.
2. RCS pressure.
3. Coolant flow rate from RCP speed.
4. Delta T power from coolant temperature, pressure, and flow.
5. Penalty factors from CEAC's for CEA deviation within a subgroup.
6. Core inlet temperature. (1.0)

b. Why is it necessary to have a Steam Generator Low Flow reactor trip AND for what specific events is protection afforded ? (1.5)

QUESTION 3.10 (2.50)

a. What are 3 of the general conditions that will cause an INOPERABLE annunciator for an Ex-Core Safety Channel ? (1.2)

b. What is the purpose of the " STARTUP CHANNEL _ NEUTRON FLUX HI" annunciator ? (0.7)

c. What are 2 valid reasons for a "STARTUP CHANNEL _ OFF NORMAL" alarm ? (0.6)

(***** END OF CATEGORY 03 *****)
(********** END OF EXAMINATION **********)

ANSWERS -- WATERFORD 3 -86/03/17-WHITTEMORE, J.

ANSWER 3.01 (2.00)

a. A timer failure alarm occurs when the primary CEA timing circuit fails. [0.5] There is no impact on normal operation as there is a backup timing circuit available. [0.5] (1.0)

b. There are individual red alarm status lights that indicate failure of specific CEA'S [0.5] on the CEA Disable and Timer Failure Lamp Panel. [0.5] (Accept Local CEDMCS Panels on the + 21 ft. elevation in the "B" switchgear room.) (1.0)

REFERENCE
W3SES SD CEDMCS, Pp. 10,11

ANSWER 3.02 (2.50)

a. 1. Peak linear heat rate
2. Margin to DNB/DNBR
3. Total core power
4. Azimuthal tilt
5. RCS mass flow rate
6. Axial Shape Index [Any 5, 0.2 ea.] (1.0)

b. 1. Neutron power/flux
2. T cold
3. T hot
4. RCP speed
5. RCS (or PZR) pressure
6. CEA positions
7. CEA (or CEAC) penalty factors [any 6, 0.25 ea.] (1.5)

REFERENCE
W3SES SD CPC, TAB.1.3 AND COLSS, P.1

ANSWER 3.03 (3.00)

a. (28-30) - 128 GPM. [0.4] Minimum limit for adequate heat transfer across regenerative heat exchanger. [0.4] Maximum limit based on max. charging pump capacity less RCP bleed off flow. [0.4] (1.2)

b. To slow down the speed of the Letdown Throttle Valve stroke [0.5] and minimize system transients. [0.5] (1.0)

c. Changing density in the volume of liquid or steam can affect indicated pressurizer level. (0.8)

REFERENCE
W3SES SD PLCS, Pp.7,9,11

ANSWER 3.04 (2.50)

a. The level signal is dynamically compensated [0.2] for actual level rate of change [0.4] as well as the rate of change of the flow error signal[0.4]. (1.0)

b. Bypass (SU Feed Reg) valve demand
Main valve demand
Feed pump speed setpoint [0.25 ea.] (0.75)

c. Pump speed----------5% (Min. Speed ~ 3900 RPM)
Bypass (SU Feed Reg) valve-----5% Demand(25-30% open)
Main valve----------0% (closed) [0.25 ea.] (0.75)

REFERENCE
W3SES SD FWCS, Pp.2,4,7

ANSWERS -- WATERFORD 3 -86/03/17-WHITTEMORE, J.

ANSWER 3.05 (2.50)

a. UEL----------Reed switch UCS----------Computer
LEL----------Reed switch LCS----------Computer
UGS----------Computer Upper Seq. Perm.----Computer
LGS----------Computer Lower Seq. Perm.----Computer
Will accept Backup UEL---Reed Switches. Not required for full credit. [0.2 ea.] (1.0)

b. CWP on: 2/4 Hi LPD
2/4 LO DNBR
2/4 Hi Pzr. Pressure [0.3 ea.]
Will accept 2/4 CPC generated pretrips in place of LPD and DNBR trips (0.9)

REFERENCE
W3SES SD CEDMCS, Pp. 27-29

ANSWER 3.06 (2.50)

a. Initiate from: Turbine Generator control (CP-1) [0.25]
SBCS Cabinet (CP-5) [0.25]

Effects: The signal blocks Perm. and Q.O. solenoids for each valve [0.25] and blocks opening or causes quick closure. [0.25] (1.0)

b. Automatic control: All valves controlled in automatic from Master Controller with Permissive Switch in Auto.
Manual Control: All valves controlled in manual from master controller with permissive sw. in auto.
Ind. Man. Control: All valves controlled in manual from individual controller with permissive sw. in manual.
[0.5 each] (1.5)

REFERENCE
W3SES SD SBCS, Pp.21,29,34

ANSWERS -- WATERFORD 3 -86/03/17-WHITTEMORE, J.

ANSWER 3.07 (2.50)

a. FIXED MOVABLE

Neutron Flux: COLSS Computer
Neutron Flux: Computer

Core Exit Temp: Computer QSPDS

[0.3 for ea. correct dest.] (1.5)

b. 1. Flux mapping
2. Detector burnup compensation
3. Ex-Core calibration [any 2, 0.5 each] (1.0)

REFERENCE
W3SES SD IN-CORE, Pp. 14,23

ANSWER 3.08 (2.50)

Trips affected include: Lin. Hi Power, Log. Hi Power, DNBR, and LPD. [0.125 ea.] DNBR and LPT Trips are corrected for CEA and/or Temperature Shadowing. [0.5] An attempt is made to minimize effects by running ARO [0.25] and periodically updating Ex-Core output during power operation. [0.5] Also Strict adherence to PDIL minimizes effects of CEA shadowing. [0.25] The CPC'S make corrections to DNBR & LPD trips based on axial profile shape and cold leg temperature (0.5% power/ deg. F.) [0.5] (2.5)

REFERENCE
W3SES SD EX-CORE, Pp.13,14

ANSWER 3.09 (2.50)

a. 1, 4, 5 [0.33 ea.] (1.0)

b. The CPC's may not see loss of RCP's in MSLB environment [0.5] with loss of power supply bus. [0.5] Also provides protection for RCP sheared shaft event. [0.5 (1.5)

REFERENCE
W3SES SD RPS, Pp. 28,29,36

ANSWERS -- WATERFORD 3 -86/03/17-WHITTEMORE, J.

ANSWER 3.10 (2.50)

a. 1. Loss of high voltage
2. Loss of drawer voltage
3. Removal of any ckt. card
4. Test/Cal. switches out of operate [any 3, 0.4 ea.] (1.2)

b. To warn the operator that detector high voltage has not been turned off during SU, OR; count rate is increasing when shutdown. (0.7)

c. 1. Channel relay turned off but voltage still applied.
2. Relay on but voltage off. [0.3 ea] (0.6)

REFERENCE
W3SES SD EX-CORE, Pp. 86-88

U. S. NUCLEAR REGULATORY COMMISSION
SENIOR REACTOR OPERATOR LICENSE EXAMINATION

FACILITY: WATERFORD 3

REACTOR TYPE: PWR-CE

DATE ADMINISTERED: 86/03/17

EXAMINER: WHITTEMORE, J.

APPLICANT: _____

INSTRUCTIONS TO APPLICANT:

Use separate paper for the answers. Write answers on one side only. Staple question sheet on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires at least 70% in each category and a final grade of at least 80%. Examination papers will be picked up six (6) hours after the examination starts.

CATEGORY VALUE	% OF TOTAL	APPLICANT'S SCORE	% OF CATEGORY VALUE	CATEGORY
25.00	100.00	_____	_____	6. PLANT SYSTEMS DESIGN, CONTROL, AND INSTRUMENTATION
25.00	100.00	_____	_____	TOTALS

FINAL GRADE _____%

All work done on this examination is my own. I have neither given nor received aid.

_____
APPLICANT'S SIGNATURE

QUESTION 6.01 (2.00)

a. How will the operator be made aware that an individual CEA timer has failed, and what is the impact of timer failure on normal CEA operation ? (1.0)

b. How will the operator determine the specific CEA(S) affected ? Where is the indication obtained ? (1.0)

QUESTION 6.02 (3.00)

a. How will individual 6.9 KV motor feeder breakers react to loss of power to a 6.9 KV bus ? WHY ? (0.5)

b. What specific protection is afforded to Reactor Coolant Pump breakers, but not to other 6.9 KV breakers ? (0.5)

c. What are 4 problems or conditions that may exist when the Control Room indication for 6.9 KV bus transformer feeder has both lights extinguished ? (1.0)

d. What conditions must be met to close a tie feeder breaker for the 3ABS bus ? (0.5)

e. What alternative conditions must be met to close the auxiliary transformer feeder breaker to bus 2A or 2B ? (0.5)

QUESTION 6.03 (2.50)

a. Explain how the Containment Spray System functions to limit offsite dose or post accident radiation. (1.5)

b. Give two (2) methods of removing or limiting post-accident hydrogen concentration inside the containment. (1.0)

QUESTION 6.04 (2.50)

a. What are the five (5) Limiting Conditions for Operation monitored by COLSS ? (1.0)

b. List six (6) of the parameters which are inputs to the CPC's. (1.5)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.05 (2.50)

a. What are (2) reasons for controlling HPSI cold leg flow rate AND how how is this control accomplished ? (1.5)

b. Explain the purpose of the HPSI neader Flow Orifices and Bypass Valves, and detail how this purpose is accomplished. (1.0)

QUESTION 6.06 (2.50)

a. Explain "Compensated Level" signal as it pertains to the Feed Water Control System (FWCS). (1.0)

b. What are the 3 analog programs generated by the FWCS ? (0.75)

c. What are the limitations placed on pump speed and valve position during Reactor Trip Override ? (0.75)

QUESTION 6.07 (2.50)

a. List all CEDMCS interlocks that use CEA position as an input, and state the source of the input. (1.6)

b. Describe any other interlock(s) effective in Manual Sequential. State any applicable circuit logic. (0.9)

QUESTION 6.08 (2.50)

What Reactor Protection System trips can be affected by Temperature and CEA shadowing ? Further, explain all means or methods used to minimize or correct the effects of shadowing on affected trips. (2.5)

(***** CATEGORY 06 CONTINUED ON NEXT PAGE *****)

QUESTION 6.09 (2.50)

a. Is the ability to borate for cold shutdown, prior to cooldown, compromised by loss of letdown capability ? Explain your answer. (1.0)

b. Describe the initial effect on the CVCS due to:
1. SIAS
2. CIAS (1.5)

QUESTION 6.10 (2.50)

a. What is the dual purpose of the CEA shrouds ? (0.8)

b. Describe the different methods of limiting or minimizing bottoming impact of full length CEA's after a reactor trip. (0.8)

c. Describe the specific material used in the part length CEA's from top to bottom. Specific numbers or elevations not required. (0.9)

(***** END OF CATEGORY 06 *****)
(********** END OF EXAMINATION **********)

ANSWER 6.01 (2.00)

a. A timer failure alarm occurs when the primary CEA timing circuit fails. [0.5] There is no impact on normal operation as there is a backup timing circuit available. [0.5] (1.0)

b. There are individual red alarm status lights that indicate failure of specific CEA'S [0.5] on the CEA Disable and Timer Failure Lamp Panel. [0.5] (Accept Local CEDMCS Panels on the + 21 ft. elevation in the "B" switchgear room.) (1.0)

REFERENCE
W3SES SD CEDMCS, Pp. 10,11

ANSWER 6.02 (3.00)

a. All breakers open on undervoltage. (0.5)

b. Phase differential current (or Differential Protection) (0.5)

c. 1. Lamp burned out
2. Breaker racked out
3. Control power de-energized
4. Trip circuit fuse blown [0.25 ea.] (1.0)

d. 1. Other tie breaker open
2. 480 VAC feeder to 31 ABS open [0.25 ea] (0.5)

e. 1. Bus de-energized or;
2. Generator on line, bus and transformer synched. [0.25 ea.] (0.5)

REFERENCE
W3SES SD 56b, Pp 4,6 & SD 56c, Pp. 11,13

ANSWER 6.03 (2.50)

a. Spray reduces containment pressure which reduces out leakage [0.75] and scavenges atmospheric iodine. [0.75] (1.5)

b. 1. Hydrogen recombiners
1. Containment atmosphere release system. [0.5 ea.] (1.0)

ANSWERS -- WATERFORD 3 -86/03/17-WHITTEMORE, J.

REFERENCE
W3SES SD 15c, P.1 AND SD 19 P.2

ANSWER 6.04 (2.50)

a. 1. Peak linear heat rate
2. Margin to DNB/DNBR
3. Total core power
4. Azimuthal tilt
5. RCS mass flow rate
6. Axial Shape Index [Any 5, 0.2 ea.] (1.0)

b. 1. Neutron power/flux
2. T cold
3. T hot
4. RCP speed
5. RCS (or PZR) pressure
6. CEA positions
7. CEA (or CEAC) penalty factors [any 6, 0.25 ea.] (1.5)

REFERENCE
W3SES SD CPC, TAB.1.3 AND COLSS, P.1

ANSWER 6.05 (2.50)

a. 1. Prevent total flow from exceeding runout conditions. [0.5]
2. Prevent all SI flow from spilling out of a break. [0.5]
3. Upon a SIAS, all CLI header valves open to a predetermined throttled position. [0.5] (1.5)

b. 1. To equalize flow between hot and cold leg injection paths. [0.5]
2. Bypass valve is open for cold leg injection and closed to equalize flow between paths. [0.5] (1.0)

REFERENCE
W3SES SD Safety Injection, P.13

ANSWER 6.06 (2.50)

a. The level signal is dynamically compensated [0.2] for actual level rate of change [0.4] as well as the rate of change of the flow error signal[0.4]. (1.0)

b. Bypass valve (SU Feed Reg) demand
Main valve demand
Feed pump speed setpoint [0.25 ea.] (0.75)

c. Pump speed----------5% (Min.Speed ~ 3900 RPM)
Bypass (SU Feed Reg) valve-----5% Demand (25-30% open)
Main valve----------0% (closed) [0.25 ea.] (0.75)

REFERENCE
W3SES SD FWCS, Pp.2,4,7

ANSWER 6.07 (2.50)

a. UEL----------Reed switch UCS----------Computer
LEL----------Reed switch LCS----------Computer
UGS----------Computer Upper Seq. Perm.----Computer
LGS----------Computer Lower Seq. Perm.----Computer
Will accept Backup UEL---Reed switches. Not required for full credit. [0.2 ea.] (1.0)

b. CWP on: 2/4 Hi LPD
2/4 LO DNBR
2/4 Hi Pzr. Pressure [0.3 ea.]
Will accept 2/4 CPC generated pretrips in place of LPD and DNBR trips. (0.9)

REFERENCE
W3SES SD CEDMCS, Pp. 27-29

ANSWER 6.08 (2.50)

Trips affected include: Lin. Hi Power, Log. Hi Power, DNBR, and LPD. [0.125 ea.] DNBR and LPD Trips are corrected for CEA and/or Temperature Shadowing. [0.5] An attempt is made to minimize effects by running ARO [0.25] and periodically updating Ex-Core output during power operation. [0.5] Also Strict adherence to PDIL minimizes effects of CEA shadowing. [0.25] The CPC'S make corrections to DNBR & LPD trips based on axial profile shape and cold leg temperature (0.5% power/ deg. F.) [0.5] (2.5)

REFERENCE
W3SES SD EX-CORE, Pp.13,14

ANSWER 6.09 (2.50)

a. No. [0.5] BAMT is sufficiently concentrated to attain necessary RCS concentration by allowing pressurizer level to increase above normal level. [0.5] (1.0)

b. 1. Starts 2 charging pumps, [0.25] and positions valves to inject from BAMT to RCS. [0.25] Isolates Letdown. [0.25] (0.75)

2. Isolates [0.25] Letdown [0.25] and controlled bleed off from RCP seals. [0.25] (0.75)

REFERENCE
W3SES SD CVCS, Pp. 45-47

ANSWER 6.10 (2.50)

a. 1. Shield withdrawn CEA's from RCS cross flow.
2. Transfer upward loads from fuel alignment plate to support plate. [0.4 ea.] (0.8)

b. Center finger contacts guide port and is connected to shock absorber on spider. [0.4] A dashpot effect is also provided by the CEA guide tubes. [0.4] (Accept tapered guide tube for dashpot effect.) (0.8)

c. TOP---- (16")--- B4c
MIDDLE--(58")----Hollow water filled tube
BOTTOM--(75")----Solid Inconel [0.3 ea.] (0.9)

ANSWERS -- WATERFORD 3 -86/03/17-WHITTEMORE, J.

REFERENCE
W3SES SD RV & INTERNALS, Pp.10,11,16

U. S. NUCLEAR REGULATORY COMMISSION
SENIOR REACTOR OPERATOR LICENSE EXAMINATION

FACILITY: WATERFORD 3

REACTOR TYPE: PWR-CE

DATE ADMINISTERED: 86/03/17

EXAMINER: WHITTEMORE, J.

APPLICANT: _____

INSTRUCTIONS TO APPLICANT:

Use separate paper for the answers. Write answers on one side only. Staple question sheet on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires at least 70% in each category and a final grade of at least 80%. Examination papers will be picked up six (6) hours after the examination starts.

CATEGORY VALUE	% OF TOTAL	APPLICANT'S SCORE	% OF CATEGORY VALUE	CATEGORY
25.00	100.00	_____	_____	8. ADMINISTRATIVE PROCEDURES, CONDITIONS, AND LIMITATIONS
25.00	100.00	_____	_____	TOTALS

FINAL GRADE _____%

All work done on this examination is my own. I have neither given nor received aid.

_____
APPLICANT'S SIGNATURE

QUESTION 8.01 (3.00)

For each of the following situations indicate what REQUIREMENT, if any, applies and what ACTION, if any, should be taken. Consider each situation separately.

a. Diesel generator A's operability load test, which is required every 31 days, is scheduled for today. The last three tests were completed 36, 68, and 102 days ago respectively. The plant is at 100% power. (1.0)

b. The plant is at 295 F and heating up at 1 F per minute, when an HPSI pump is found inoperable. (1.0)

c. The plant is at 100% power and the discharge valve for one of the emergency feedwater pumps has been frozen shut for four (4) days and cannot be re-opened. (1.0)

QUESTION 8.02 (3.00)

For each of the following events explain briefly why the NRC SHOULD or SHOULD NOT be notified within 1 hr.

a. During instrument testing while at power, three pressurizer pressure safety channels are momentarily place in bypass.

b. While at power, Tave momentarily dips to 510 F and then returns to normal.

c. Refueling water tank level falls below 400,000 gallons and cannot be restored.

d. During surveillance testing an expected actuation of LPIS train A occurs. (3.0)

QUESTION 8.03 (2.00)

What actions, if any, should the Shift Supervisor take if the plant is in Mode 6, fuel loading is in progress, and the Refueling Senior Reactor Operator reports, "We have just lost the audio count rate out here in the containment, but I'm in position to load this fuel bundle, so I'll lower it down to prevent leaving a suspended load over the core." Justify your answer. (2.0)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.04 (2.50)

a. What are the two different types (administrative) of maintenance performed at Waterford 3 ? (0.5)

b. Describe what happens to a CONDITION IDENTIFICATION and WORK AUTHORIZATION (CIWA) Tag if it is hung on a component and the component is subsequently removed to a shop for repair. (1.0)

c. Explain what should be done if it is discovered that CIWA work instructions for a safety related component deviate from the requirements of the component vendor manual. (1.0)

QUESTION 8.05 (2.00)

During shift turnover, the oncoming and offgoing shifts should walkdown the control panels together. Describe 5 topics that should be included in the turnover discussion that occurs during this walkdown in accordance with OP-100-007. (2.0)

QUESTION 8.06 (2.50)

a. List the Leak Detection Systems addressed in the Waterford Three Technical Specifications. (1.2)

b. What are the operability requirements to meet the Limiting Condition for Operation for Leak Detection Systems in Mode 1 ? (Do NOT discuss the action statement.) (1.3)

QUESTION 8.07 (2.50)

a. What action is necessary if continued operation in mode 1 is desired with inoperable Steam Line Safety Valves ? Explain the reason(s) for this action. (1.5)

b. Explain why the Main Turbine or related equipment is addressed in the Technical Specifications when the turbine is not considered to be Safety Related equipment. (1.0)

(***** CATEGORY 08 CONTINUED ON NEXT PAGE *****)

QUESTION 8.08 (2.50)

a. Complete the following table:

The guidelines for emergency exposure are:

ORGAN	CORRECTIVE ACTION	LIFE SAVING
Whole Body	25 Rems	----------
Extremities	----------	----------
Thyroid	----------	----------

b. What are 4 of the 5 guidelines recommended by the Emergency Plan that should be used to select personnel to receive exposures to the limits listed above ? (2.5)

QUESTION 8.09 (2.50)

a. Provide a basic description of the method used to manually calculate off-site dose rate from the control room during an emergency. Include parameter values needed to make the projection. (2.0)

b. Where (location or distance from release) will the projected dose rate occur ? (0.5)

QUESTION 8.10 (2.50)

a. List four means or procedures used to prove or determine operability of an individual Reactor Protection System channel. (1.0)

b. During mode 1 operation the operator reports that one Pressurizer Pressure Safety channel is reading 90 psi lower than the lowest of the other channels, which all agree within 20 psi. Describe the problem if any AND action necessary to continue operation in mode 1. (1.5)

(***** END OF CATEGORY 08 *****)
(********** END OF EXAMINATION **********)

ANSWERS -- WATERFORD 3 -86/03/17-WHITTEMORE, J.

ANSWER 8.01 (3.00)

a. (Each test must be within 25% of required time) and each three consecutive tests must be within 3.25 of required time. [0.3] Declare DG A inoperable. [0.3] Prove operability of DG B within 1 hr. [0.2] Conduct load test on DG A. [0.2] (1.0)

b. Only one HPSI pump required operable until 350 deg's. [0.5] Ensure third pump aligned to provide second train of ECCS before exceeding 350 deg's. [0.5] (1.0)

c. Unable to comply with LCO or Action Statement. (T. S. 303) [0.4] Start shutdown within one hour. [0.2] Hot standby within next 6 hours. [0.2] Hot Shutdown within following 6 hours. [0.2] (1.0)

REFERENCE
T.S., pp. 3/4 0-1, 3/4 0-2, 3/4 5-8, 3/4 7-4, 3/4 8-11

ANSWER 8.02 (3.00)

a. Should report [0.5] plant is operated outside design basis [0.25]

b. No report [0.5] needed when an action statement for LCO is entered [0.25]

c. Should report [0.5] shutdown due to inability to meet LCO action statement requirement[0.25]

d. No report [0.5] for ESF actuation during surveillance testing [0.25] (3.0)

REFERENCE
10 CFR 50.72

ANSWER 8.03 (2.00)

Order Refueling SRO to move fuel to a safe and conservative position. [1.0] Suspension of fuel loading is required by loss of audio count rate. [1.0] (2.0)

ANSWERS -- WATERFORD 3 -86/03/17-WHITTEMORE, J.

REFERENCE
T. S. 9.2

ANSWER 8.04 (2.50)

a. Controlled and Uncontrolled [0.25 ea.] (0.5)

b. Half of the two part tag should accompany the component, [0.5] and the other half should be hung near the location where the component was installed. [0.5] (1.0)

c. Work should be stopped until a technical review and resolution are accomplished. (1.0)

REFERENCE
UNT-5-002, Pp. 4,14,22

ANSWER 8.05 (2.00)

1. Status of Safety related systems.

2. Operating equipment and systems alignment.

3. Inoperable equipment, Tech. Spec. actions and/or surveillance requirements.

4. Reason for panel or computer alarms.

5. Outstanding clearances.

6. Unusual events in past 24 hrs.

7. Surveillance or maintenance in progress. [any 5, 0.4 ea.] (2.0)

REFERENCE
OP-100-007, P. 5

ANSWER 8.06 (2.50)

a. 1. Containment atmosphere particulate monitoring system.
2. Containment sump level and flow monitoring system.
3. Containment cooler flow monitoring switches.
4. Containment atmosphere gaseous monitoring system. [0.3 ea] (1.2)

b. Must have three systems operable. [0.5] Must always have #1 and #2 with #3 or #4. [0.8] (1.3)

REFERENCE
T. S. 3/4.4.5

ANSWER 8.07 (2.50)

a. RPS setpoints must be reduced to limit core thermal power. [0.75] This is necessary so the core will not produce steam flow in excess of the capacity of the operable safety valves. [0.75] (1.5)

b. The turbine overspeed system is addressed, as inoperability of the trip could result in the turbine becoming a missile hazard which could affect safety related equipment. (1.0)

REFERENCE
T.S. 3/4.3.4 & 3/4.7.1.1

ANSWER 8.08 (2.50)

a.

Whole Body	25 Rems	100 Rems
Extremities	100 Rems	300 Rems
Thyroid	125 Rems	No Limit

[0.2 for each correct answer] (1.0)

b. 1. Individual is a volunteer.
2. Individual is familiar with consequences of exposure.
3. Should not use fertile females.
4. Should not have received previous emergency exposure.
5. Select older individuals. [any 4, 0.375 ea.] (1.5)

REFERENCE
EP-2 030, P. 3

ANSWER 8.09 (2.50)

a. Release rate and dispersion factor [0.5] are converted to dose rate using a nomograph in the control room.[0.5] Parameters needed are release flow rate, uC/cc or mR/hr. monitor readings, wind speed and temperature differences from met.tower at 10M and 60M. [1.0] (2.0)

b. Exclusion area boundary. (Accept 914 meters) (0.5)

REFERENCE
EP-2-050, ATT. 7

ANSWER 8.10 (2.50)

a. 1. Channel check.
2. Channel calibration.
3. Channel functional test.
4. Response time check. [0.25 ea.] (1.0)

b. Problem is that protection system design logic is compromised.[0.5] Declare low reading channel inoperable. [0.5] Place affected channel in trip or bypass within 1 hour. [0.5] (1.5)

REFERENCE
T. S. 4.3.1.1, 4.3.1.3, and
3.3.1 Action stmt.2