Examination Report
No. 50-482/OL-85-02

Docket Number: 50-482

Licensee: Kansas Gas and Electric Company
P. O. Box 208
Wichita, Kansas 67201

Examinations administered at Wolf Creek Generating Station (WCGS)

Chief Examiner: J. E. Whittemore, Examiner — Date: 7/23/85

Approved by: R. A. Cooley, Section Chief — Date: 7/23/85


Summary

Operator license examinations at Wolf Creek, April 23-24, 1985.

Examinations were administered to two (2) Senior Reactor Operators, two (2) Instructor Certification Candidates, and one (1) Reactor Operator Candidate. The Reactor Operator failed the examination. All applicants for Senior Reactor Operator or Instructor Certification passed the examinations.

WCGS EXAMINATION REPORT DETAILS

1. Examination Results

Written examinations were administered to two Senior Reactor Operators, two Instructor Certification Candidates and one Reactor Operator Candidate. Simulator examinations were administered to two Instructor Certification Candidates. Senior Reactor Operator and Instructor Certification Candidates passed all examinations. The Reactor Operator failed the written examination.

2. Examiners

J. E. Whittemore (Chief Examiner)

S. L. McCrory

3. The examination report is composed of the following sections:

A. Examinations Review and Comment Resolutions

This section reflects comments made by the facility staff during the examination review held after completions of the written examinations. In general, editorial comments or changes made during the examination and subsequent review are not addressed. Answer modifications have been integrated into the master examinations keys which are included elsewhere in the report. The following personnel were present for the written examination review:

| NRC | Utility |
|---|---|
| S. L. McCrory | B. Byerley |
| J. E. Whittemore | S. Ferguson |
| | M. Herrell |
| | J. Koske |
| | A. Mah |
| | F. Scheiman |
| | P. Turner |

Comments and resolutions are listed by section question number.

Comments

| | |
|---|---|
| 2.05 | Part a should also include "Safety Injection Signal" as a correct answer. |
| Resolutions: | Agree with documentations provided. Key modified. |
| 3.01c/ 6.07c | The core exit thermocouples should be included as a correct answer as they are prt of the in-core nuclear instrucment system and may be used to detect a core quadrant tilt. |

| | |
|---|---|
| Resolutions: | Disagree: |
| | The question asks for systems that will detect and "warn" the operator of a flux tilt abnormality. There are no warning capabilities associated with the core exit thermocouple system, and the system would detect abnormal conditions only during routine surveillance. |
| 3.03a | The bank "D" rod stop also prevents including error into the bank overlap program. |
| Resolutions: | Agree: Key modified. |
| 3.30b | Individual "Banks" should be changed to individual groups. |
| Resoltuions: | Agree. Key modified. |
| 3.04c/ 3.08c | A high pressurizer level may also provide a reactor trip. |
| Resolutions: | Agree. Added High Pressurizer Level Trip as a correct choice. |
| 3.10 | The answer in the key and material provided for examinations preparations is incorrect. |
| Resolutions: | Agree. Changed answer to reflect new information in documentation provided by facility. |
| 4.05/ 7.05 | Answer "2" may be listed with "B" to agree with attachment 4 of procedure. |
| Resolution: | Agree. Key modified. |
| 4.06/ 7.07 | Inadequate Shutdown Margin should be added to the list of reasons to perform "Immediate Boration." |
| Resolution: | Accept in accordance with documentations provided. |
| 4.08/ 7.09 | Answers are not inclusive of items listed in attachment 4 to GEN 004. |
| | Resolution: Agree. Changed key to require six items from procedure text and/or attachment 4. |
| 4.10 | Pressurizer level setpoint for Safety Injection termination or reinitiation has been changed to 4%. |
| Resolution: | Agree. Key modified. |
| 6.02c | This line up is not in our procedures and the only place it appears is in the generic Westinghouse notes. Should not be required knowledge of candidates. |

Resolutions: Agree. Questions deleted and points redistributed.

7.06 Operators normally just do steps and not verification steps.

Resolutions: Disagree. (Verification required as part of immediate action for emergency procedures is required knowledge.

8.02a Answer number 3 may not be an examinee response as installation of temporary electrical equipment is not considered a temporary modification.

Resolution: Agree. Deleted that particular answer and redistributed points.

8.04 ADM02-400 Says that the Shift Supervisor is responsible for review and approval of the event classification and notifications and would probably direct others to perform subtasks of the two major headings.

Resolution: Agree. Instructions inserted in answer key to allow full credit for the two major headings.

8.08 Should also accept "no leakage" as a limit for answer a. as in the case of pressure boundary leakage.

Resolutions: Disagree, as the only leakage normally associated with Reactor Coolant Pumps is seal leakage which is considered controlled leakage.

8.10 Acceptable answer should be:

1. E.

7. B or C

Resolutions: Agree. Key modified.

B.. Exit Meeting Summary

At the conclusion of the examinations, examiners met with members of the facility staff to discuss simulator examinations results. The following personnel were present at the meeting.

| NRC | Utility |
|---|---|
| S. McCrory | S. Ferguson |
| J. Whittemore | S. Hatch |
| | G. Pendergrass |

Mr. Whittemore started the meeting by informing the facility personnel that both candidates had clearly passed the simulator examination. It was also stated that there were no generic weaknesses noted in the two candidates. The examiners did point out that the simulator had exhibited minor problems (possibly modeling) during the course of the examinations. It was also pointed out that preliminary examinations results would be available in approximately 30 days. The meeting concluded with the examiners thanking the facility staff for their assistance and cooperation towards the examinations effort.

C. The Reactor Operator and Senior Reactor Operator Master examinations and assure keys constitute the remainder of this report.

U. S. NUCLEAR REGULATORY COMMISSION
REACTOR OPERATOR LICENSE EXAMINATION

FACILITY: WOLF CREEK

REACTOR TYPE: PWR-WEC4

DATE ADMINISTERED: 85/04/23

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 | 25.00 | _____ | _____ | 1. PRINCIPLES OF NUCLEAR POWER PLANT OPERATION, THERMODYNAMICS, HEAT TRANSFER AND FLUID FLOW |
| 25.00 | 25.00 | _____ | _____ | 2. PLANT DESIGN INCLUDING SAFETY AND EMERGENCY SYSTEMS |
| 25.00 | 25.00 | _____ | _____ | 3. INSTRUMENTS AND CONTROLS |
| 25.00 | 25.00 | _____ | _____ | 4. PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL |
| 100.00 | 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 1.01 (3.50)

a. Define differential boron worth. (0.5)

b. Explain how and why the following changes affect differential boron worth:

1. Boron concentration INCREASES. (0.75)
2. Moderator temperature INCREASES. (0.75)
3. Fission product concentration INCREASES. (0.75)
4. Core age INCREASES. (0.75)

QUESTION 1.02 (2.00)

With a stable positive period of 80 seconds, at a power level of 10 MW :

a. What is the startup rate ? (0.5)

b. What is power level after 1 minute ? (0.75)

c. How much time is required to increase power to 1000MW ? (0.75)

NOTE: Show all calculations

QUESTION 1.03 (2.00)

Briefly describe how and why the axial flux profile changes with core life over one full cycle. Assume full power operation with all rods out throughout the cycle. Include a sketch in your answer. (0.2)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.04 (2.50)

a. For an operator taking data for a 1/M plot, how will the Shutdown margin (SDM) affect the time elapsed before a stable count rate can be obtained after withdrawing rods ? (0.75)

b. How will the initial count rate affect the count rate at criticality ? (0.75)

c. If the speed of the control rods were to somehow increase. What would be the effect be on:

1. Rod height at criticality ? (0.5)

2. Count rate at criticality ? (0.5)

QUESTION 1.05 (3.00)

a. Explain the terms beta bar and beta bar effective. Your answer should include an explanation of which term is larger in magnitude and why. (1.5)

b. Explain how and why the above mentioned terms will affect reactor response throughout cycle life. (1.5)

QUESTION 1.06 (2.00)

a. Explain what is meant by the term "Isothermal Temperature Coefficient" ? (1.0)

b. When and why is the coefficient of interest or concern to the operator ? (1.0)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.07 (1.00)

A motor operated centrifugal pump is operating at rated flow when the discharge valve is throttled towards the shut direction. Which of the following statements best describes the parameter changes that will occur ?

a. Flow constant, discharge pressure constant, motor amps increase, NPSH increases.

b. Flow decreases, discharge pressure increases, motor amps increase, NPSH increases.

c. Flow decreases, discharge pressure increases, motor amps increase, NPSH decreases.

d. Flow decreases, discharge pressure increases, motor amps decreases, NPSH increases. (1.0)

QUESTION 1.08 (3.00)

a. During natural circulation cooldown, you notice pressurizer level suddenly increase after the initiation of pressurizer spray. Explain what is occurring. (1.5)

b. Assume a small LOCA results from the rupture of a pressurizer level transmitter sensing line. Compare the severity of the accident if the ruptured line is the upper (reference) or lower (variable) sensing line. (1.5)

QUESTION 1.09 (3.00)

a. Since fuel temperature cannot be measured, what power distribution limit is observed at Wolf Creek to prevent exceeding the fuel temperature limit ? (0.8)

b. If fuel temperature limit is 4700 deg's and cladding limit is 2200 deg's., what limit must be observed to prevent exceeding the clad limit when fuel temperature is above 2200 deg's ? (0.8)

c. Why will the fuel rod surface temperature peak towards the top of the core rather than the location of peak actual heat flux ? (1.4)

(***** CATEGORY 01 CONTINUED ON NEXT PAGE *****)

QUESTION 1.10 (3.00)

a. How do each of the following parameters change (increase, decrease or no change) if one main steam isolation valve closes with the plant at 50% load. Assume all controls are in automatic that no trip occurs.

1. Affected loop steam generator level (INITIAL change only)
2. Affected loop steam generator pressure
3. Affected loop cold leg temperature
4. Unaffected loop steam generator level (INITIAL change only)
5. Unaffected loop steam generator pressure
6. Unaffected loop cold leg temperature (2.4)

b. Which of the reactor protection system signals could be expected to cause a reactor trip ? (If more than one, list the one that would reach the trip point first.) (0.6)

(***** END OF CATEGORY 01 *****)

QUESTION 2.01 (3.00)

a. What is the normal atmosphere inside the Pressurizer Relief Tank ? Why ? (0.8)

b. When relieving pressurizer safeties into the tank at approx. 650 degrees and 2250 psi, why isn't the safe operating pressure (~100#) of the tank exceeded ? (1.0)

c. What are the 2 methods available to cool the tank and what is the ADVANTAGE of either method ? (1.2)

QUESTION 2.02 (2.80)

a. Describe how the ECCS is lined up to maintain Safety Injection flow if RCS pressure should increase above RHR Pump shutoff head pressure, and RWST is at or below low-low level conditions. Explain the necessity of the lineup. (1.2)

b. Explain how the 4 different types of ECCS pumps are prevented from overheating or vibrating, when operating at shutoff head conditions. Provide specific information for each type of pump. (1.6)

QUESTION 2.03 (2.40)

a. Describe the method of sealing the reactor vessel head to the vessel flange. (1.2)

b. Describe in detail, the system for detecting seal leakage. (1.2)

QUESTION 2.04 (2.90)

a. What are the 2 SETS of conditions that will auto close the start-up transformer output breakers for auto bus transfer ? (1.0)

b. What conditions will auto trip the startup transformer output breakers ? (0.9)

c. Explain how and why non-class 13.8 KV power will transfer after a reactor trip. (1.0)

(***** CATEGORY 02 CONTINUED ON NEXT PAGE *****)

QUESTION 2.05 (2.40)

a. What are 6 specific conditions that place the control room heating, ventilating, and air conditioning system into the emergendy mode of operation ? (1.2)

b. Describe how the control room atmosphere is maintained habitable during accident conditions. (1.2)

QUESTION 2.06 (2.80)

a. With a steam generator (S/G) tube leak (10 GPM), and the affected S/G identified, would the operator use "FAST" or "SLOW CLOSE" to close the affected Main Steam Isolation Valve (MSIV) ? Explain. (1.0)

b. Explain why the MSIV's are designed to seal from either direction, and how this objective is accomplished. (0.8)

c. What conditions, other than manual, will automatically close the MSIV's ? Setpoints are not required, but be specific as to conditions. (1.0)

QUESTION 2.07 (3.00)

a. List all possible sources of feedwater heating when using the startup feedwater system. In addition to the component or heat exchanger utilized, state the source of heat or steam for that component. (1.2)

b. Describe the flow paths through the Moisture Separator Reheaters. Your answer should include source of inlet fluid, and a sequential list of components that the drains pass through before collecting in the heater drain tank. (1.8)

QUESTION 2.08 (3.00)

Explain or list the specific actions caused by the Load Shedding and Sequencing system for the 3 different initiating conditions ?

(***** CATEGORY 02 CONTINUED ON NEXT PAGE *****)

QUESTION 2.09 (2.70)

Describe 3 different ways that Component Cooling Water flow can be automatically isolated to the Reactor Coolant Pumps either individually or all at the same time. A correct answer should mention all components used in isolating the flow paths. (2.7)

(***** END OF CATEGORY 02 *****)

QUESTION 3.01 (2.70)

a. What are the 3 Intermediate Range Nuclear Instrument control, interlock, or protection signals that do not pass through an isolation amplifier ? (0.9)

b. Explain how the Intermediate Range is designed so that channel surveillance may be performed without causing a reactor trip at low power, even though the trip logic is 1/2. (0.8)

c. List and explain 2 different nuclear instrument subsystems that will detect and warn the operator of a tilt in quadrant power production. (1.0)

QUESTION 3.02 (2.30)

a. What 3 conditions will cause a "Computer Rod Deviation" alarm ? (0.9)

b. What 2 signals are compared to provide a "Rod Position Indication" deviation alarm ? (0.6)

c. Explain how the Rod Insertion Limit Computer Comparator receives the actual rod position for comparison to the limit. (0.8)

QUESTION 3.03 (2.50)

a. List the control rod interlocks that will prohibit rod withdrawal in automatic only AND explain the necessity for these interlocks. (1.0)

b. Explain the effects on rod motion due to:

1. Logic cabinet urgent failure alarm.

2. Power cabinet urgent failure alarm. (1.5)

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

QUESTION 3.04 (2.40)

The protection system will cause a reactor trip upon a turbine trip when power is above 50%:

a. What is the rationale for not needing a reactor trip for a turbine trip below 50% power ? (0.8)

b. What provides the turbine trip signal to the protection system ? State any applicable logic. (0.8)

c. In the event this trip fails to actuate, what are 2 other trips that will cause a protective shutdown ? (0.8)

QUESTION 3.05 (2.80)

Concerning protection system permissives:

a. What will actuate the P-4 permissive signal, and what directly results from it's actuation ? (1.6)

b. What will occur directly as a result of actuating the P-14 permissive ? (1.2)

QUESTION 3.06 (2.30)

a. What parameters are compared to determine the positioning signal received by the steam dump I/P convertor for:

1. Load rejection ?
2. Plant trip ? (0.8)

b. Explain how it is possible for 2 groups of steam dumps to trip open, while the other 2 groups ramp open. (1.5)

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

QUESTION 3.07 (2.80)

a. Explain how the feedwater control valves are overridden and shut by protection signals. Specific signals are not required but the answer should include discussion of control system components, and their functions or attributes. (1.2)

b. Explain how and why the control system for the feedwater bypass control valve is basically different from the system for the feedwater control valve. (1.0)

c. What effect will loss of the total steam flow signal have on the automatic control of feed pump speed ? (0.6)

QUESTION 3.08 (2.80)

a. Some controls located on the Auxiliary Shutdown Panel (ASP) have transfer switches associated with them. Classify the types of controls or equipment that do AND do not have transfer switches. (1.0)

b. After control room evacuation, why is the operator required to place the 3 isolation switches in the "Control Room Isolate" position ? (0.8)

c. What important interlocks are defeated by the operation of the ASP isolation switches ? (1.0)

QUESTION 3.09 (2.40)

a. Explain the corrections or modifications that are automatically made to the OT delta T and OP delta P trip setpoints. (1.75)

b. The OT delta T trip is designed to preclude DNB limiting accidents and DNB is flow dependent. Why doesn the circuitry have RCS flow input for calculating the trip setpoint ? (0.65)

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

QUESTION 3.10 (2.00)

a. Why will the wide range Reactor Vessel Level Indicating system (RVLIS) indicate differently between 1% and 100% power ? (1.0)

b. Explain how the accuracy of the RVLIS is enhanced or maintained in spite of changing containment temperature conditions ? (1.0)

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

QUESTION 4.01 (1.50)

Identify the evacuation exits from the fuel building.

QUESTION 4.02 (1.00)

Describe the initial decontamination process for hand contamination.

QUESTION 4.03 (2.50)

If you answer the phone in the control room and it turns out to be a bomb threat:

A. What are 4 of the 8 prescribed questions you should attempt to ask the caller?
B. Outline the other information you should try to determine about the caller.

C. Where in the control room are the bomb threat forms located?

QUESTION 4.04 (2.50)

Arrange the following events in order of occurence during a startup from hot standby to minimum load.
A. Block Power Range Low Power trips
B. Place the Turbine Generator on the line.
C. Place Main Feedwater Pump Turbine Speed controls in auto.
D. Block the Source Range Flux Doubling Transfer trip.
E. Start one Main Feedwater Turbine Pump
F. Block the Source Range High Flux trip.
G. Place the Steam Dump Mode Controller in Tavg mode.
H. Place the Main Feedwater Control Valve Bypass Valves in manual and increase Steam Generator level to 55-65%.

(***** CATEGORY 04 CONTINUED ON NEXT PAGE *****)

QUESTION 4.05 (2.50)

Match the following operator actions with the required power level while increasing power level above minimum load to full power. Some power levels may be used more than once and some may not be used at all.

| | | | |
|---|---|---|---|
| A. | Verify P-9 actuated | 1. | 80% |
| B. | Verify Intermediate Range Hi Level Trip Status Lights on | 2. | 10% |
| | | 3. | 40% |
| C. | Start both Heater Drain Pumps | 4. | 25% |
| D. | Verify P-8 actuated | 5. | 50% |
| E. | Perform a calorimetric | 6. | 48% |

QUESTION 4.06 (2.50)

List five conditions that require immediate boration.

QUESTION 4.07 (2.50)

A. Which critical safety function has the top priority?

B. What is the purpose of a Functional Restoration Guide?

C. What action must be taken if a red color symbol is found in a status tree?

QUESTION 4.08 (3.00)

When escalating in power per GEN 00-004 (Power Operation), there are six things which should be done when reactor power reaches 50%. What are they?

QUESTION 4.09 (2.50)

List five conditions which indicate natural circulation flow exists as per EMG ES-03 (SI TERMINATION).

(***** CATEGORY 04 CONTINUED ON NEXT PAGE *****)

QUESTION 4.10 (3.00)

Answer the following regarding the S/G tube rupture procedure EMG E-3.

A. State the S.I. termination criteria.

B. What constitutes Reinitiation Criteria for S.I.?

QUESTION 4.11 (1.50)

According to OFN 00-001 (Load Rejection), list four of six signals whihch will initiate a turbire runback. Include setpoints. (1.5)

(***** END OF CATEGORY 04 *****)
(********** END OF EXAMINATION **********)

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 1.01 (3.50)

a. Change in reactivity due to a change in boron concentration. (0.5)

b. 1. Differential boron worth (DBW) decreases [0.25] because the boron atoms are competing with each other for neutrons [0.5]. (0.75)

2. DBW decreases [0.25] as moderator density decreasing (moves boron atoms farther apart)[0.25] decreasing neutron capture probability in boron atoms [0.25]. (0.75)

3. DBW decreases [0.25] because poisons are competing with boron atoms. [0.5] (0.75)

4. DBW initially decreases [0.25] due to fp buildup [0.125] then increases [0.25] due to boron depletion [0.125]. (0.75)

REFERENCE
WJE 152
WCGS Nuclear Training Division Test Bank Question RT-G3

ANSWER 1.02 (2.00)

a. SUR = 26/T = 26/80 = .325 (0.5)

b. Pf = Pi*10EE(1 min.* 0.325) = 10 (2.1) = 21.1MW (0.75)

c. 10 - 1000 MW = 2 decades, 2 decades/ 0.325 DPM = 6.15 min. or ~ 370 seconds. (0.75)

REFERENCE
WCGS Nuclear Training Manual Test Bank Question RT-H11

ANSWER 1.03 (2.00)

At BOL, the flux is peaked in the bottom of the core due to temperture gradient over the core. The colder water at the bottom increases the local reactivity there [.5]. At EOL, burnup causes a dished profile. [0.5] (1.0)

```
|*****B        -- Top of core
|     EB
|     E B
|     E  B        B = BOL   (0.5)
|   E     B       E = EOL   (0.5)
|     E    B      * = both
|     E   B
|     E  B        Grade on general shape of curves ONLY.
|    E  B
|****BBB       -- Bottom of core                          (1.0)
```

REFERENCE
WJE 154
WCGS Nuclear Training Division Test Bank Question RT-K6

ANSWER 1.04 (2.50)

a. The closer to criticality, (less SDM) the longer time required to reach a stable count rate. (0.75)

b. A higher initial count rate will result in a higher count rate at criticality. (0.75)

c. 1. Critical rod height is not affected. (0.5)

2. Critical count rate will be lower. (0.5)

REFERENCE
WJE 192
WCGS Reactor Theory Review, P. 21

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 1.05 (3.00)

a. Beta bar is the average delayed neutron fraction or the weighted average fraction for the different fissionable materials present. [0.5] Beta bar effective is the effective fraction [0.25] and is smaller as it is the product of beta bar and an importance factor. [0.25] The importance factor is generally less than one as delayed neutrons are less likely to cause fission. [0.5] (Will accept an explanation of how the importance factor is affected by Fast Fission and Non-leakage factors) (1.5)

b. Beta bar and Beta Bar effective will decrease in value over cycle life [0.5] due to the changing concentrations of the different fissionable isotopes in the core. [0.5] Smaller values of the effective fraction means that the reactor period will be smaller or the reactor will respond quicker for a given reactivity change, as the core ages. [0.5] (1.5)

REFERENCE
WJE 192
WCGS Reactor Theory Review, Pp. 25,26

ANSWER 1.06 (2.00)

a. The ITC is the reactivity change associated with a unit change in the temperature of the moderator, clad and the fuel. (1.0)

b. During start up when core and moderator are heated uniformly. (1.0)

REFERENCE
WJE 194
WCGS Core Physics, P. 5-4

ANSWER 1.07 (1.00)

ANSWER----- d.

REFERENCE
WJE 195
WCGS Heat Transfer Review, Pp.117-122

ANSWER 1.08 (3.00)

a. Due to the decrease in pressurizer temperature/pressure [0.5] the system is voiding somewhere else [0.5] and forcing coolant into the pressurizer. [0.5] (1.5)

b. The lower line rupture is more severe [0.75] as the mass loss of water is greater than the mass loss of steam. [0.75] (1.5)

REFERENCE
WJE 196
WCGS Exam Question Bank, HT-D2, HD-D3

ANSWER 1.09 (3.00)

a. Local power density-KW/FT. (0.8)

b. DNB or DNBR (accept either answer) (0.8)

c. Fuel surface temperature is a function of heat flux and moderator temperature. [0.7] Moderature temperature is higher at the top of the core. [0.7] (1.4)

REFERENCE
WJE 197
WCGS Heat Transfer Review, Pp.140,142

ANSWER 1.10 (3.00)

a. 1. Decrease
2. Increase
3. Increase
4. Increase
5. Decrease
6. Decrease [0.4 each] (2.4)

b. Lo-Lo S/G Level (0.6)

REFERENCE
WJE 198
WCGS Question Bank, HT-L4,7

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 2.01 (3.00)

a. Nitrogen, [0.4] to prevent inleakage of air and accumulating a mixture of H2 & O2. [0.4] (0.8)

b. Steam is discharged into the tank through a sparger underwater. [0.5] The steam is cooled and condensed by mixing with water near ambient temperature. [0.5] (1.0)

c. 1. Spraying with cool reactor makeup water. (0.4)

2. Circulating water through the RCDT HX. (0.4)

Accept either for advantage;

Spraying is much quicker; OR

Recircing does not generate waste. (0.4)

REFERENCE
WJE 149
NPS 215 Ch. 3 Pp. 26,27

ANSWER 2.02 (2.80)

a. When the RWST is empty, the suction to the CCP's and SI Pumps is lined up from RHR Pump discharge, [0.8] as the intermediate and high pressure pumps are not directly supplied by the containment sump. [0.4] (1.2)

b. 1. RHR Pump-- Recircs to pump suction.
2. SI Pumps-- Recircs to RWST.
3. CCP's-- Recircs to Seal Water HX.
4. CS Pumps-- Recirc through eductor. [0.4 ea.] (1.6)

REFERENCE
WJE 150
NPS 221, Ch. 2, Pp.30,31

ANSWER 2.03 (2.40)

a. A seal is maintained between the vessel and head by 2 hollow metal "O" rings in concentric grooves (in the head flange).[0.8] the rings are self energized by RCS pressure. [0.4] (1.2)

b. The spaces between the rings and outside of the outer ring are piped to a tell-tale drain. [0.4] The common line is equipped with a temperature indicator. [0.4] Seal leakage will cause a high temperature alarm. [0.4] (1.2)

REFERENCE
WJE 151
Facility Question Bank, FH-3

ANSWER 2.04 (2.90)

a. 1. Control switch in normal.
Main generator output or switchyard breakers open.
Sync. check relay satisified.

2. Aux. transformer output breakers open.
Undervoltage on the bus. [0.2 each] (1.0)

b. SU XFMR lockout relay trip.
Any aux. XFMR output breaker is closed.
Fault on SU XFMR output breaker. [0.3 each] (0.9)

c. Turbine will trip immediatly, but generator output breakers remain closed for 30 seconds. [0.2] Automatically transfer to startup power when breakers open. [0.2] This provides uninterrupted power to RCP's [0.3] and prevents turbine overspeed. [0.3](1.0)

REFERENCE
WJE 156
NPS 213, Ch. 2,Pp.6,8,9

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 2.05 (2.40)

a. 1. Chlorine
2. Control rm. gas. act.
3. FB vent. isol. sig.
4. SI Signal.
5. CIS "A"
6. Cont. purge hi gas. act.
7. Cont. atmos. hi gas. act.
[Any 6, 0.2 each] (1.2)

b. Outside air is isolated and the system goes on internal recirculation. [0.6] Simultaneously, the MCR is pressurized with outside filtered air (to prevent inleakage). [0.6] (1.2)

REFERENCE
WJE 157
NPS 221, Ch. 4, Pp. 42,43

ANSWER 2.06 (2.80)

a. Use slow close [0.4] as fast close will shut all MSIV's [0.4] and limit cooldown ability. [0.2] (1.0)

b. The MSIV's must seal for breaks upstream and downstream. [0.4] This is accomplished by using a split disc arrangement where pressure from either side will seat one of the disc. [0.4] (0.8)

c. Above P-11,[0.2] Low steam pressure. [0.2]
Below P-11 and SI blocked, [0.2] High negative press. rate [0.2]
High cont pressure II [0.2] (1.0)

REFERENCE
WJE 158
NPS 223, Ch. 2, Pp.11-15

ANSWER 2.07 (3.00)

a. 1. Main condenser. [0.1] Sparging steam from main or aux. steam. [0.2]
   2. S/G blowdown regen. HX. [0.1] Flash tank drains. [0.2]
   3. 5A&B feed heaters. [0.1] Flash tank steam. [0.2]
   4. 6A%B feed heaters. [0.1] Main steam. [0.2] (1.2)

b. MSR Shell [0.1] Source is from HP turbine exhaust. [0.2] Drains to MSR drain tank and directly to heater drain tank. [0.3]

   1st. stg. heater. [0.1] Source is HP 3rd stg. extraction steam. [0.2] Drains are routed to drain tank, 6A&B feedheaters, and to heater drain tank. [0.3]

   2nd. stg. heater. [0.1] Source is main steam. [0.2] Drains are routed through the drain tank, 7A&B feed heaters, 6A&B feed heaters, to heater drain tank. [0.3] (1.8)

REFERENCE
WJE 159
MPS 223, Ch. 3, Pp.9,26,27,28

ANSWER 2.08 (3.00)

Undervoltage (UV) : 1. Starts diesel.
2. Sheds ALL bus loads.
3. D/G bkr. shuts and starts sequencer.

SIS/CSAS : 1. Sheds NON-SAFETY loads.
2. Starts LOCA sequencer.

SIS/CSAS with UV: 1. Starts diesel.
2. Sheds ALL loads.
3. Blocks LOCA Sequencer.
4. When D/G bkr. closes,
5. Sequences SAFETY loads. [0.3 each] (3.0)

REFERENCE
WJE 168
NPS 213, Ch. 3, Pp. 14-17

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 2.09 (2.70)

a. Phase "B" isolation [0.3] will shut 2 valves in series in the cooling water supply common to all pumps. [0.3] The signal also shuts 2 sets of 2 valves in series on the outlet side, [0.2] 1 path from the oil and air coolers, [0.2] and the other from the thermal barrier. [0.2] (1.2)

b. Each pump has a motor operated outlet valve that will shut on high flow from the thermal barrier, [0.5] and a check valve that isolates the inlet. [0.25] (0.75)

c. A common return valve from all thermal barriers will shut on high flow, [0.5] and the individual inlet check valves will isolate the CCW inlet. [0.25] (0.75)

REFERENCE
WJE 171
NPS 215, Ch. 4, Pp. 16-18

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 3.01 (2.70)

a. 1. C-1, Auto and manual rod block
   2. P-6 Permissive
   3. Reactor trip. [0.3 each] (0.9)

b. The level trip bypass switch prevents a protection signal from being processed from the channel being tested. (0.8)

c. 1. Detector current comparator. [0.2] Each detector current is compared to the average of the other upper or lower detector currents. [0.2] An alarm is annunciated on deviation (of 2%, over 50% power). [0.1] (0.5)

   2. Channel current comparator. [0.2] A channel output is compared to the other channels. [0.2] An alarm is annunciated on a deviation (of 2%). [0.1] (0.5)

REFERENCE
WJE 160
NPS 227, Ch. 2, Pp.20,21,27,28

ANSWER 3.02 (2.30)

a. 1. Any shutdown rod < 220 steps
   2. A deviation (of 12 steps) between any 2 rods in the same bank.
   3. A deviation (12 steps) between any rod DRPI and it's bank demand. [0.3 each] (0.9)

b. Bank demand position, [0.3] and individual DRPI. [0.3] (0.6)

c. A pulse/analog convertor receives the same signal as the step counters. [0.4] The convertor converts these pulses to an analog output proportional to bank position. [0.4] (0.8)

REFERENCE
WJE 161
NPS 227, Ch. 3, Pp. 11-13

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 3.03 (2.50)

a. 1. Low power (C-5) interlock [0.3] prevents auto rod motion when impulse power < 15% to preclude unstable operation. [0.2]

2. High bank "D" rod stop [0.3] prevents outward motion when the bank is near the top to prevent system counter misalignment. [0.2] (1.0)

b. Logic cabinet--- Stops all rod motion in man. and auto. [0.5]

Power cabinet--- Inhibits rod motion in auto and manual for all rods in the affected group. [0.5] Individual groups or banks not associated with the failed cabinet, may be moved. [0.5] (1.5)

REFERENCE
WJE 162
NPS 227, Ch. 4, Pp. 17,18,21

ANSWER 3.04 (2.40)

a. The reactor can accept the load change with 10% handled by the control rods [0.4] and 40% by steam dumps. [0.4] (0.8)

b. 2/2 switches [0.2] Emergency trip oil system pressure decreasing. [0.2]

4/4 [0.2] turbine stop valves closed. [0.2] (0.8)

c. 1. High RCS Pressure.
2. Overtemperature delta T.
3. High pressurizer level. [Any 2, 0.4 each] (0.8)

REFERENCE
WJE 163
NPS 227, Ch. 5, P. 22

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 3.05 (2.80)

a. Caused by opening a reactor trip and bypass breaker. [0.4]

RESULTS: Trips turbine
Causes feed isolation with decreasing Tave.
Prevents auto SI initiation after reset.
Transfers steam dump controllers.
(FWIV interlock ---not required) [0.3ea.] (1.6)

b. 1. FCV's and bypasses shut.
2. Both MFP's trip.
3. Main turbine trips.
4. Feed line isolation occurs. [0.3 each] (1.2)

REFERENCE
WJE 164
NPS 227, Ch. 5, Pp. 23,26

ANSWER 3.06 (2.30)

a. Load reject--- Auct. high Tave.
Tref. (impulse pressure)

Plant trip---- Auct. high Tave.
T-no load. [0.2 each] (0.8)

b. The controller temperature deviation output signal feeds 2 bi-stables set to trip at 50% and 100% steam dump demand equivalent. [0.5] The 50% bistable causes steam dump groups 1 & 2 to trip open,while the other bistable actuates groups 3 & 4. [0.5] Thus, a signal of deviation over 50% and demand over 75% will cause 2 groups to trip open and 2 groups to ramp open. [0.5] (1.5)

REFERENCE
WJE 165
NPS 223, Ch. 4, Pp. 11-14

ANSWER 3.07 (2.80)

a. The FCV is a diaphragm operated valve that opens with air pressure against spring pressure and is positioned by a signal from a positioner. [0.6] The actuating line contains train "A" & "B" solenoids that upon deenergizing will block operating air and vent the diaphragm chamber, causing the valve to shut. [0.6] (1.2)

b. In place of a flow error signal the bypass control system uses auct. high nuclear power [0.3] as an indication of anticipated steam demand. [0.3] This is necessary because flow signals are less stable and accurate at low power, and better transient response is obtained. [0.4] (1.0)

c. The pumps will run at a speed to maintain the no-load delta-P. (0.6)

REFERENCE
WJE 166
NPS 223, Ch.6, Pp.4,5,14,17

ANSWER 3.08 (2.80)

a. Generally on/off controls such as open or shut valves and run or stop pumps do not have a transfer switch. [0.5] Modulation or variable type controls do have transfer switches. [0.5] (1.0)

b. To prevent "B" side components from operating or actuating spuriously. (0.8)

c. 1. Pressurizer heaters.
2. AFW pump suction switchover. [0.5 each] (1.0)

REFERENCE
WJE 167
NPS 229, Ch. 1, Pp. 11,17

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 3.09 (2.40)

a. The OT dT setpoint will decrease if:

1. Tave increases.
2. RCS pressure decreases.
3. Delta I outside of target band.

The OP dT setpoint will decrease if:

1. Tave is above full power value.
2. Tave is increasing (rate) [0.35 each] (1.75)

b. The inputs used are sensitive to and will change as flow changes OR; other trips provide loss of flow protection. (Accept either answer for full credit.) (0.65)

REFERENCE
WJE 169
NPS 215, Ch. 5, Pp. 8-10

ANSWER 3.10 (2.00)

a. The temperature compensation signal used is Wide Range RCS Thot, which does not accurately represent Reactor Vessel average temperature at full power. [0.5] This over compensation for density change causes the indicated level to decrease as power is increased. [0.5] (1.0)

b. RTD's are located on the sensing lines and this temperature signal is used to provide a sensing line density correction factor. (1.0)

REFERENCE
WJE 170
NPS 215, Ch. 3, Pp. 9-11

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 4.01 (1.50)

Door #61021 next to the roll-up door on the east side toward the south end of the fuel building el. 2000'.

Door #61011 located on the south side through the stairwell el. 2000'.

Door #15071, northwest door on el. 2047'.

Any description which can be translated to the above locations is alright.

0.5 pt each

REFERENCE
WCGS ADM 03-052, REV 1, pg 2

ANSWER 4.02 (1.00)

Wash hands with MILD SOAP and LUKEWARM WATER, using a SOFT BRISTLE BRUSH around the fingernails, if necessary. PAT hands dry, do not rub.

0.25 pts for each CAPITALIZED area.

REFERENCE
WCGS ADM 03-102, REV 2, pg 4

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 4.03 (2.50)

A. (any 4)
What kind of bomb is it?
Where is the bomb located?
When will it explode?
What does it look like?
Did you place the bomb?
Why?
What is your name?
What is your address?

B. Caller's Sex, age, race, voice characteristics, type of language used.
Background sounds
Length of call and number at which received.
(Give full credit if 80% or more of the above are given)

C. Accept: 1. File cabinet by desk; OR 2. Book case in SS office.

1 pt each for A and B, 0.5 pts for C.

REFERENCE
WCGS ADM 10-004, REV 0, pg 3 FORM 1600-53

ANSWER 4.04 (2.50)

D, F, H, E, A, C, B, G

There are seven arrangement shifts possible for the worst case. Each shift is worth 0.357 pts when the minimum number of shifts are made to achieve the correct order.

REFERENCE
WCGS GEN 00-003, REV 1 pgs 5-11.

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 4.05 (2.50)

A. 5
B. 4 or 2
C. 3 or 5
D. 6
E. 1 or 5

0.5 pts each

REFERENCE
WCGS GEN 00-004, REV 1, pgs 3-5

ANSWER 4.06 (2.50)

1. Failure of any RCCA to fully insert following a reactor trip or shutdown.
2. Control rod height below the insertion limit.
3. Failure of the Reactor Makeup Control System to the extent that bypass is necessary to accomplish boration.
4. Uncontrolled RCS cooldown following a reactor trip not requiring safeguards actuation.
5. Unexpected or uncontrolled reactivity increase as indicated by abnormal control bank insertion, increasing temperature or nuclear power level, or increasing flux level during shutdown.
6. Inadequate SDM [Any 5, 0.5 each]

REFERENCE
WCGS NPS 217-2,pg 38

ANSWER 4.07 (2.50)

A. Subcriticality

B. Direct operator action to recover/restore the degraded safety function dependent on which CSF is challenged and the extent of degradation.

C. If an extreme challenge is diagnosed, the operator should immediately stop optimal recovery and initiate function restoration to restore the Critical Safety Function under extreme challenge.

0.5 pts for A. and 1 pt each for B. and C.

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

REFERENCE
WCGS ERGs

ANSWER 4.08 (3.00)

1. Verify Permissive P-9 has actuated.
2. Open heater drain pump discharge valves.
3. Heat balance calculation
4. Start third condensate pump
5. Start second feedwater pump
6. Start third circulating water pump.
7. Calculate QPTR [Any 6, 0.5 each]

REFERENCE
WCGS GEN 00-004, pg 3

ANSWER 4.09 (2.50)

1. RCS subcooling based on core exit T/Cs- Greater than required per fig.1
2. S/G pressures - stable or decreasing
3. RCS hot leg temperature - stable or decreasing
4. Core exit T/Cs - stable or decreasing
5. RCS cold leg temperatures - at saturation temperature for S/G pressure

0.5 pts each

REFERENCE
WCGS EMG ES-03, ATTACHMENT A

ANSWERS -- WOLF CREEK -85/04/23-WHITTEMORE, J.

ANSWER 4.10 (3.00)

A. SI termination criteria;
   1. RCS subcooling based on core exit T/Cs - greater than required by fig. 1
   2. Secondary heat sink:
      a. Total feed flow to intact S/Gs - greater than 300,000 lbm/hr.
      b. N.R. level in at least one intact S/G - greater than 4%.
   3. RCS pressure - stable or increasing
   4. Pressurizer level - greater than 4%

B. Reinitiate SI if EITHER condition listed below occurs:
   1. RCS subcooling based on core exit T/Cs- less than required by fig.1
   2. Pressurizer level - cannot be maintained greater than 4%.

0.5 pts for each of 6 major subparts.

REFERENCE
WCGS EMG E-3, pgs 16, 31

ANSWER 4.11 (1.50)

(Any 4)
1. C-3, OT DELTA T (3% below the reactor trip setpoint.)
2. C-4, OP DELTA T (3% below the reactor trip setpoint.)
3. Stator water temperature high (82 degrees C)
4. Stator water pump discahrge pressure low
5. Loss of a circulating pump when >60% power
6. Loss of a main feed pump when >60% power. [0.375 ea.] (1.5)

REFERENCE
WCGS OFN 00-001, REV. 0, pg 1

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

FACILITY: WOLF CREEK

REACTOR TYPE: PWR-WEC4

DATE ADMINISTERED: 85/04/23

EXAMINER: MCCRORY, S.

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 | 25.00 | _____ | _____ | 5. THEORY OF NUCLEAR POWER PLANT OPERATION, FLUIDS, AND THERMODYNAMICS |
| 25.00 | 25.00 | _____ | _____ | 6. PLANT SYSTEMS DESIGN, CONTROL, AND INSTRUMENTATION |
| 25.00 | 25.00 | _____ | _____ | 7. PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL |
| 25.00 | 25.00 | _____ | _____ | 8. ADMINISTRATIVE PROCEDURES, CONDITIONS, AND LIMITATIONS |
| 100.00 | 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 5.01 (3.50)

a. Define differential boron worth. (0.5)

b. Explain how and why the following changes affect differential boron worth:

1. Boron concentration INCREASES. (0.75)
2. Moderator temperature INCREASES. (0.75)
3. Fission product concentration INCREASES. (0.75)
4. Core age INCREASES. (0.75)

QUESTION 5.02 (2.50)

a. For an operator taking data for a 1/M plot, how will the Shutdown margin (SDM) affect the time elapsed before a stable count rate can be obtained after withdrawing rods ? (0.75)

b. How will the initial count rate affect the count rate at criticality ? (0.75)

c. If the speed of the control rods were to somehow increase. What would be the effect be on:

1. Rod height at criticality ? (0.5)

2. Count rate at criticality ? (0.5)

QUESTION 5.03 (3.00)

a. Explain the terms beta bar and beta bar effective. Your answer should include an explanation of which term is larger in magnitude and why. (1.5)

b. Explain how and why the above mentioned terms will affect reactor response throughout cycle life. (1.5)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.04 (2.00)

a. Explain what is meant the term "Isothermal Temperature Coefficient ? (1.0)

b. When and why is the coefficient of interest or concern to the operator ? (1.0)

QUESTION 5.05 (3.00)

a. During natural circulation cooldown, you notice pressurizer level suddenly increase after the initiation of pressurizer spray. Explain what is occurring. (1.5)

b. Assume a small LOCA results from the rupture of a pressurizer level transmitter sensing line. Compare the severity of the accident if the ruptured line is the upper (reference) or lower (variable) sensing line. (1.5)

QUESTION 5.06 (3.00)

a. How do each of the following parameters change (increase, decrease or no change) if one main steam isolation valve closes with the plant at 50% load. Assume all controls are in automatic and that no trip occurs.

1. Affected loop steam generator level (INITIAL change only)
2. Affected loop steam generator pressure
3. Affected loop cold leg temperature
4. Unaffected loop steam generator level (INITIAL change only)
5. Unaffected loop steam generator pressure
6. Unaffected loop cold leg temperature (2.4)

b. Which of the reactor protection system signals could be expected to cause a reactor trip? (If more than one, list the one that would reach the trip point first.) (0.6)

(***** CATEGORY 05 CONTINUED ON NEXT PAGE *****)

QUESTION 5.07 (1.50)

Explain rod worth variation:

A. with its radial position in the core.
B. if another rod is inserted adjacent to it.
C. if the moderator temperature changes.

QUESTION 5.08 (2.50)

The power defect is an observable reactivity effect in the reactor.

A. Explain how and why the defect changes from BOL to EOL.

B. Explain fully how power defect affects reactor operation at power.

QUESTION 5.09 (3.00)

A. At BOL with Keff=0.995, 500 pcm is add to the reactor. What is the condition of the reactor (subcritical, critical, or supercritical)? Justify your answer with a calculation of the new Keff.

B. What power level would this reactor be at if 700 pcm is added instead of 500 pcm? State all assumptions and thumb rules.

QUESTION 5.10 (1.00)

Explain why the mass flow rate in the secondary system is substantially lower than that in the primary system.

(***** END OF CATEGORY 05 *****)

QUESTION 6.01 (2.00)

a. What are 2 interlocks that must be considered if a line up change is is to be made to the Safety Related 120VAC system due to inoperable equipment, scheduled surveillance, ground isolation and repair, etc. ? (0.8)

b. Why are there 2 different sizes of Safety Related 125VDC batteries ? (0.6)

c. When and how is a Safety Related battery charger lined up for a equalizer charge ? (0.6)

QUESTION 6.02 (2.10)

a. Explain how automatic make up flow rate is controlled. (1.2)

b. Describe the action that occurs as a result of placing the Make Up Control Switch in "RUN" with the Make Up Mode Selector switch in "MANUAL". (0.9)

QUESTION 6.03 (1.80)

a. Describe what happens to any gaseous and liquid radioactive waste generated by the Post Accident Sampling System as a result of sampling Reactor Coolant or the Containment Sump. (1.0)

b. What are 4 subsystems of the Solid Radwaste system ? (0.8)

QUESTION 6.04 (2.90)

a. What are the 2 SETS of conditions that will auto close the startup transformer output breakers for auto bus transfer ? (1.0)

b. What conditions will auto trip the startup transformer output breakers ? (0.9)

c. Explain how and why non-class 13.8 KV power will transfer after a reactor trip. (1.0)

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

QUESTION 6.05 (3.00)

a. List all possible sources of feedwater heating when using the startup feedwater system. In addition to the component or heat exchanger utilized, state the source of heat or steam for that component.

b. Describe the flow paths through the Moisture Separator Reheaters. Your answer should include source of inlet fluid, and a sequential list of components that drains pass through before collecting in the heater drain tank.

QUESTION 6.06 (3.00)

Explain or list the specific actions caused by the Load Shedding and Sequencing system for the 3 different initiating conditions ?

QUESTION 6.07 (2.70)

a. What are the 3 Intermediate Range Nuclear Instrument control, interlock, or protection signals that do not pass through an isolation amplifier ? (0.9)

b. Explain how the Intermediate Range is designed so that channel surveillance may be performed without causing a reactor trip at low power, even though the trip logic is 1/2. (0.8)

c. List and explain 2 different nuclear instrument subsystems that will detect and warn the operator of a tilt in quadrant power production. (1.0)

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

QUESTION 6.08 (2.40)

The protection system will cause a reactor trip upon a turbine trip when power is above 50%:

a. What is the rationale for not needing a reactor trip for a turbine trip below 50% power ? (0.8)

b. What provides the turbine trip signal to the protection system ? State any applicable logic. (0.8)

c. In the event this trip failed to actuate, what are 2 other trips that would cause a protective shutdown ? (0.8)

QUESTION 6.09 (2.30)

a. What parameters are compared to determine the positioning signal recieved by the steam dump I/P convertor for:

1. Load rejection ?
2. Plant trip ? (0.8)

b. Explain how it is possible for 2 groups of steam dumps to trip open, while the other 2 groups ramp open. (1.5)

QUESTION 6.10 (2.80)

a. Explain how the feedwater control valves are overridden and shut by protection signals. Specific signals are not required but the answer should include discussion of control system components, and their functions or attributes. (1.2)

b. Explain how and why the control system for the feedwater bypass control valve is basically different from the system for the feedwater control valve. (1.0)

c. What effect will loss of the total steam flow signal have on the automatic control of feed pump speed ? (0.6)

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

QUESTION 7.01 (1.50)

Identify the evacuation exits from the fuel building.

QUESTION 7.02 (1.00)

Describe the initial decontamination process for hand contamination.

QUESTION 7.03 (2.50)

If you answer the phone in the control room and it turns out to be a bomb threat:

A. What are 4 of the 8 prescribed questions you should attempt to ask the caller?
B. Outline the other information you should try to determine about the caller.

C. Where in the control room are the bomb threat forms located?

QUESTION 7.04 (2.50)

Arrange the following events in order of occurence during a startup from hot standby to minimum load.
A. Block Power Range Low Power trips
B. Place the Turbine Generator on the line.
C. Place Main Feedwater Pump Turbine Speed controls in auto.
D. Block the Source Range Flux Doubling Transfer trip.
E. Start one Main Feedwater Turbine Pump
F. Block the Source Range High Flux trip.
G. Place the Steam Dump Mode Controller in Tavg mode.
H. Place the Main Feedwater Control Valve Bypass Valves in manual and increase Steam Generator level to 55-65%.

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.05 (2.50)

Match the following operator actions with the required power level while increasing power level above minimum load to full power. Some power levels may be used more than once and some may not be used at all.

| | | | |
|---|---|---|---|
| A. | Verify P-9 actuated | 1. | 80% |
| B. | Verify Intermediate Range Hi Level Trip Status Lights on | 2. | 10% |
| | | 3. | 40% |
| C. | Start both Heater Drain Pumps | 4. | 25% |
| D. | Verify P-8 actuated | 5. | 50% |
| E. | Perform a calorimetric | 6. | 48% |

QUESTION 7.06 (5.00)

List the immediate actions for each of the following emergency conditions or responses. Where verifications are required, list the indications to be observed or monitored to perform the verification.

A. Loss of all AC Power, EMG C-0

B. Safety Injection, EMG E-0

QUESTION 7.07 (2.50)

List five conditions that require immediate boration.

QUESTION 7.08 (2.50)

A. Which critical safety function has the top priority?

B. What is the purpose of a Functional Restoration Guide?

C. What action must be taken if a red color symbol is found in a status tree?

QUESTION 7.09 (3.00)

When escalating in power per GEN 00-004 (Power Operation), there are six things which should be done when reactor power reaches 50%. What are they?

(***** CATEGORY 07 CONTINUED ON NEXT PAGE *****)

QUESTION 7.10 (2.00)

If a startup is being made to recover from a reactor trip, the Mode 3 to 2 and the Mode 2 to 1 checklists may be considered complete if 4 conditions exist. What are these conditions?

(***** END OF CATEGORY 07 *****)

QUESTION 8.01 (2.00)

A. When may a Clearance without a DNO Tag be authorized?

B. When is it appropriate to consider using this kind of Clearance?

QUESTION 8.02 (2.00)

A. When may a temporary modification be made to a system without issuing a Temporary Modification Order or hanging Temporary Modification Tags?

B. How often must outstanding Temporary Modifications be reviewed?

QUESTION 8.03 (2.00)

Briefly define each of the following categories of surveillance tests:
A. L
B. C1
C. C2
D. R
E. P

QUESTION 8.04 (2.00)

Briefly outline the duties and responsibilities of the Shift Supervisor for Post Trip Review as set forth in ADM 02-400.

QUESTION 8.05 (2.00)

Fill in the blanks for the following:

A. If an individual expects to exceed ____ millirem in any calender week, his ___ shall notify ___ ___ ___ and obtain ___ permission.

B. The ___ of any individual who expects to exceed ___ millirem in any calender week shall submit a ___ ___ ___ for approval by ___ ___ ___.

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

QUESTION 8.06 (2.00)

What limits are placed on working overtime for unit staff personnel who perform safety related functions?

QUESTION 8.07 (3.00)

A. What three signatures are required before a Radiation Work Permit (RWP) is valid?

B. As Shift Supervisor, how would you handle a case where immediate entry into a Radiation Area is necessary and sufficient time is not available to process a RWP?

QUESTION 8.08 (2.00)

State the maximum allowable leak rate per Technical Specifications for each of the following:

A. Reactor Coolant Pump
B. BIT injection containment isolation valve
C. A Steam Generator tube
D. Reactor Vessel Head boltdown ring

QUESTION 8.09 (2.50)

What minimum required AC electrical sources must be OPERABLE in Mode 3?

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

QUESTION 8.10 (4.00)

Match the event with the correct emergency classification. An emergency classification may be used more than once or not at all.

| EVENT | EMERG. CLASS. |
|---|---|
| 1. Inadvertent opening of SG relief or safety valve | A. Unusual Event |
| 2. Break in instrument line from RCS pressure boundary that penetrates containment. | B. Alert |
| 3. Complete loss of RCS forced flow. | C. SAE |
| 4. Dropped fuel assembly during fueling operations. | D. General Emerg. |
| 5. Radioactive waste gas decay tank failure. | E. None |
| 6. SG tube failure | |
| 7. RCCA ejection accidents | |
| 8. RC pump shaft seizure | |

QUESTION 8.11 (1.50)

List three of the five organizations to be given initial notifications when the emergency plan is implemented.

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

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 5.01 (3.50)

a. Change in reactivity due to a change in boron concentration. (0.5)

b. 1. Differential boron worth (DBW) decreases [0.25] because the boron atoms are competing with each other for neutrons [0.5]. (0.75)

2. DBW decreases [0.25] as moderator density decreasing (moves boron atoms farther apart)[0.25] decreasing neutron capture probability in boron atoms [0.25]. (0.75)

3. DBW decreases [0.25] because poisons are competing with boron atoms. [0.5] (0.75)

4. DBW initially decreases [0.25] due to fp buildup [0.125] then increases [0.25] due to boron depletion [0.125]. (0.75)

REFERENCE
WJE 152
WCGS Nuclear Training Division Test Bank Question RT-G3

ANSWER 5.02 (2.50)

a. The closer to criticality, (less SDM) the longer time required to reach a stable count rate. (0.75)

b. A higher initial count rate will result in a higher count rate at criticality. (0.75)

c. 1. Critical rod height is not affected. (0.5)

2. Critical count rate will be lower. (0.5)

REFERENCE
WJE 192
WCGS Reactor Theory Review, P. 21

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 5.03 (3.00)

a. Beta bar is the average delayed neutron fraction or the weighted average fraction for the different fissionable materials present. [0.5] Beta bar effective is the effective fraction [0.25] and is smaller as it is the product of beta bar and an importance factor. [0.25] The importance factor is generally less than one as delayed neutrons are less likely to cause fission. [0.5] (Will accept an explanation of how the importance factor is affected by Fast Fission and Non-leakage factors) (1.5)

b. Beta bar and Beta Bar effective will decrease in value over cycle life [0.5] due to the changing concentrations of the different fissionable isotopes in the core. [0.5] Smaller values of the effective fraction means that the reactor period will be smaller or the reactor will respond quicker for a given reactivity change, as the core ages. [0.5] (1.5)

REFERENCE
WJE 192
WCGS Reactor Theory Review, Pp. 25,26

ANSWER 5.04 (2.00)

a. The ITC is the reactivity change associated with a unit change in the temperature of the moderator, clad and the fuel. (1.0)

b. During start up when core and moderator are heated uniformly. (1.0)

REFERENCE
WJE 194
WCGS Core Physics, P. 5-4

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 5.05 (3.00)

a. Due to the decrease in pressurizer temperature/pressure [0.5] the system is voiding somewhere else [0.5] and forcing coolant into the pressurizer. [0.5] (1.5)

b. The lower line rupture is more severe [0.75] as the mass loss of water is greater than the mass loss of steam. [0.75] (1.5)

REFERENCE
WJE 196
WCGS Exam Question Bank, HT-D2, HD-D3

ANSWER 5.06 (3.00)

a. 1. Decrease
2. Increase
3. Increase
4. Increase
5. Decrease
6. Decrease [0.4 each] (2.4)

b. Lo-Lo S/G Level (0.6)

REFERENCE
WJE 198
WCGS Bank, HT-L

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 5.07 (1.50)

A. A control rod's worth is proportional to the square of the relative flux it sees. Since flux density drops off as you move away from the core centerline, so does rod worth. (0.50)

B. Placing a second rod adjacent to the first will depress the flux in that area and decrease the worth of the first rod. (0.5)

C. The rod worth will increase as temperature increases. This is because the neutron migration length increases as temperature increases, allowing the control rod to see more neutrons. Since the moderator is less dense, a neutron will travel farther while slowing down and diffusing through the core increasing chances of encountering a control rod.(0.5)

REFERENCE
Standard Reactor Theory
WCGS BANK QUES. RT-K4

ANSWER 5.08 (2.50)

A. Power defect will increase from BOL to EOL mainly due to the increase in the moderator temperature coefficient as boron is removed from the coolant over core life. (1.0)

B. The power defect is a negative reactivity effect that must be overcome when increasing reactor power. Also, on a reactor trip we must now add additional negative reactivity to achieve the desired shutdown margin in order to compensate for the positive reactivity resulting in the removal of the power defect. Since it is a negative feedback, it tends to stabilize reactor power and assist in reactor control. (1.5)

REFERENCE
Standard Reactor Theory
WCGS BANK QUES. RT-L2

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 5.09 (3.00)

A. Subcritical (0.5)
p=(K-1)/K = (0.995-1)/0.995 = -0.00503 = 503 pcm (0.5)

K2 = 1/(1-p) = 1/[1-(-0.00003)] = 0.9997 (0.5)

B. 503 pcm must be added in order for the reactor to go critical. 700-503= 197 (which is excess positive reactivity). (0.5) Power will rise to the point of adding heat where it will be stablized by the pwr defect at: (assume power coefficient of 14 pcm/%power) (0.5)
197pcm/(14pcm/%power) = 14% power (0.5)

REFERENCE
Standard Reactor Theory
WCGS BANK QUES. RT-L12

ANSWER 5.10 (1.00)

The secondary side of the steam generator undergoes a phase change. Large amounts of energy are stored in the latent heat of vaporization. Therefore less mass of water is needed to store the same thermal energy.

REFERENCE
Standard HT&FF Theory
WCGS BANK QUES H.T.-G11

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 6.01 (2.00)

a. 1. The regulated transformer output is interlocked so that it supply only 1 bus at a time. (0.4)

2. Interlocks prevent supplying a single bus from an inverter and the regulating bus at the same time. (0.4)

b. Two of the DC buses supply additional uncommon DC loads so their battery capacities are higher. (0.6)

c. When individual cell voltages drop to a predetermined setpoint, a switch on the charger panel is placed in the equilize position,(which raises output voltage). (0.6)

REFERENCE
WJE 172
NPS 213, Ch. 5, Pp. 5,12,13

ANSWER 6.02 (2.10)

a. The primary water flow control valve will throttle to maintain a total solution flow rate (of 120 GPM). [0.6] The boric acid flow control valve controls flow rate according to a predetermined setpoint.[0.6] (1.2)

b. 1. BA pump starts [0.3]
2. MU water pump starts [0.3]
3. Flow control valves assume preset flow control positions.[0.3](0.9)

REFERENCE
WJE 183
NPS 217, Ch.2, Pp.20,35,41

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 6.03 (1.80)

a. Sample waste is routed to the RCDT. [0.6] Liquid waste will be processed through normal liquid waste system. [0.2] The RCDT interfaces with the gaseous waste system which will process the gaseous waste. [0.2] (1.0)

b. 1. Dry waste compactor.
2. Filter handling subsystem.
3. Resin sluicing system.
4. Radwaste drumming system.
5. Resin charging system. [any 4, 0.2 each] (0.8)

REFERENCE
WJE 184
NPS 219, Ch. 3, Pp. 16,36

ANSWER 6.04 (2.90)

a. 1. Control switch in normal.
Main generator output or switchyard breakers open.
Sync. check relay satisified.

2. Aux. transformer output breakers open.
Undervoltage on the bus. [0.2 each] (1.0)

b. SU XFMR lockout relay trip.
Any aux. XFMR output breaker is closed.
Fault on SU XFMR output breaker. [0.3 each] (0.9)

c. Turbine will trip immediatly, but generator output breakers remain closed for 30 seconds. [0.3] Automatically transfer to startup power when breakers open. [0.3] This provides uninterrupted power to RCP's [0.2] and prevents turbine overspeed. [0.2](1.0)

REFERENCE
WJE 156
NPS 213, Ch. 2,Pp.6,8,9

ANSWER 6.05 (3.00)

a. 1. Main condenser. [0.1] Sparging steam from main or aux. steam. [0.2]
2. S/G blowdown regen. HX. [0.1] Flash tank drains. [0.2]
3. 5A&B feed heaters. [0.1] Flash tank steam. [0.2]
4. 6A%B feed heaters. [0.1] Main steam. [0.2] (1.2)

b. MSR Shell [0.1] Source is from HP turbine exhaust. [0.2] Drains to MSR drain tank and directly to heater drain tank. [0.3]

1st. stg. heater. [0.1] Source is HP 3rd stg. extraction steam. [0.2] Drains are routed to drain tank, 6A&B feedheaters, and to heater drain tank. [0.3]

2nd. stg. heater. [0.1] Source is main steam. [0.2] Drains are routed through the drain tank, 7A&B feed heaters, 6A&B feed heaters, to heater drain tank. [0.3] (1.8)

REFERENCE
WJE 159
MPS 223, Ch. 3, Pp.9,26,27,28

ANSWER 6.06 (3.00)

Undervoltage (UV) :
1. Starts diesel.
2. Sheds ALL bus loads.
3. D/G bkr. shuts and starts sequencer.

SIS/CSAS :
1. Sheds NON-SAFETY loads.
2. Starts LOCA sequencer.

SIS/CSAS with UV:
1. Starts diesel.
2. Sheds ALL loads.
3. Blocks LOCA Sequencer.
4. When D/G bkr. closes,
5. Sequences SAFETY loads. [0.3 each] (3.0)

REFERENCE
WJE 168
NPS 213, Ch. 3, Pp. 14-17

ANSWER 6.07 (2.70)

a. 1. C-1, Auto and manual rod block
   2. P-6 Permissive
   3. Reactor trip. [0.3 each] (0.9)

b. The level trip bypass switch prevents a protection signal from being processed from the channel being tested. (0.8)

c. 1. Detector current comparator. [0.2] Each detector current is compared to the average of the other upper or lower detector currents. [0.2] An alarm is annunciated on deviation (of 2%, over 50% power). [0.1] (0.5)

   2. Channel current comparator. [0.2] A channel output is compared to the other channels. [0.2] An alarm is annunciated on a deviation (of 2%). [0.1] (0.5)

REFERENCE
WJE 160
NPS 227, Ch. 2, Pp.20,21,27,28

ANSWER 6.08 (2.40)

a. The reactor can accept the load change with 10% handled by the control rods [0.4] and 40% by steam dumps. [0.4] (0.8)

b. 2/2 switches [0.2] Emergency trip oil system pressure decreasing. [0.2]

   4/4 [0.2] turbine stop valves closed. [0.2] (0.8)

c. 1. High RCS Pressure.
   2. Overtemperature delta T.
   3. High pressurizer level. [Any 2, 0.4 each] (0.8)

REFERENCE
WJE 163
NPS 227, Ch. 5, P. 22

ANSWER 6.09 (2.30)

a. Load reject--- Auct. high Tave.
Tref. (impulse pressure)

Plant trip---- Auct. high Tave.
T-no load. [0.2 each] (0.8)

b. The controller temperature deviation output signal feeds 2 bistables set to trip at 50% and 100% steam dump demand equivalent. [0.5] The 50% bistable causes steam dump groups 1 & 2 to trip open,while the other bistable actuates groups 3 & 4. [0.5] Thus, a signal of deviation over 50% and demand over 75% will cause 2 groups to trip open and 2 groups to ramp open. [0.5] (1.5)

REFERENCE
WJE 165
NPS 223, Ch. 4, Pp. 11-14

ANSWER 6.10 (2.80)

a. The FCV is a diaphragm operated valve that opens with air pressure against spring pressure and is positioned by a signal from a positioner. [0.6] The actuating line contains train "A" & "B" solenoids that upon deenergizing will block operating air and vent the diaphragm chamber, causing the valve to shut. [0.6] (1.2)

b. In place of a flow error signal the bypass control system uses auct. high nuclear power [0.3] as an indication of anticipated steam demand. [0.3] This is necessary because flow signals are less stable and accurate at low power, and better transient response is obtained. [0.4] (1.0)

c. The pumps will run at a speed to maintain the no-load delta-P. (0.6)

REFERENCE
WJE 166
NPS 223, Ch.6, Pp.4,5,14,17

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 7.01 (1.50)

Door #61021 next to the roll-up door on the east side toward the south end of the fuel building el. 2000'.

Door #61011 located on the south side through the stairwell el. 2000'.

Door #15071, northwest door on el. 2047'.

Any description which can be translated to the above locations is alright.

0.5 pt each

REFERENCE
WCGS ADM 03-052, REV 1, pg 2

ANSWER 7.02 (1.00)

Wash hands with MILD SOAP and LUKEWARM WATER, using a SOFT BRISTLE BRUSH around the fingernails, if necessary. PAT hands dry, do not rub.

0.25 pts for each CAPITALIZED area.

REFERENCE
WCGS ADM 03-102, REV 2, pg 4

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 7.03 (2.50)

A. (any 4)
What kind of bomb is it?
Where is the bomb located?
When will it explode?
What does it look like?
Did you place the bomb?
Why?
What is your name?
What is your address?

B. Caller's Sex, age, race, voice characteristics, type of language used.
Background sounds
Length of call and number at which received.
(Give full credit if 80% or more of the above are given)

C. Accept: 1. File cabinet by desk; OR 2. Book case in SS office.

1 pt each for A and B, 0.5 pts for C.

REFERENCE
WCGS ADM 10-004, REV 0, pg 3 FORM 1600-53

ANSWER 7.04 (2.50)

D, F, H, E, A, C, B, G

There are seven arrangement shifts possible for the worst case. Each shift is worth 0.357 pts when the minimum number of shifts are made to achieve the correct order.

REFERENCE
WCGS GEN 00-003, REV 1 pgs 5-11.

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 7.05 (2.50)

A. 5
B. 4 or 2
C. 3 or 5
D. 6
E. 1 or 5

0.5 pts each

REFERENCE
WCGS GEN 00-004, REV 1, pgs 3-5

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 7.06 (5.00)

A. 1. Verify reactor trip
- Rod bottom lights LIT
- Reactor trip and bypass breakers OPEN
- Neutron flux DECREASING

2. Verify turbine trip
- All turbine stop valves CLOSED

3. Verify RCS isolation
- PRZR PORVs CLOSED
- Letdown isolation valves CLOSED
- Excess letdown isolation valves CLOSED
- RCS sample valves CLOSED
- PRZR sample valves CLOSED

4. Verify AFW flow - GREATER THAN 300,000 lbm/hr

B. 1. (same as A.1.)

2. (same as A.2. plus)
- Verify main generator and exciter breakers OPEN

3. Verify Power to AC emergency busses
- AC emergency busses NB01/NB02 AT LEAST ONE ENERGIZED
  -- Voltage NORMAL
- AC emergency busses ALL ENERGIZED
  -- Voltage NORMAL

4. Check if safety injection is actuated
- BIT FLOW INDICATED
- LOCA sequencer annunciator LIT

5. Verify feedwater isolation
- MFW flow control valves CLOSED
- MFW flow control bypass valves CLOSED
- MFW isolation valves CLOSED
- MFW chemical injection valves CLOSED
- S/G blowdown valves CLOSED
- S/G sample isolation valves CLOSED

6. Verify containment isolation Phase A
- Phase A ACTUATED
- Phase A valves CLOSED
  --Check ESFAS status panel for proper alignment

7. Verify AFW pumps RUNNING
- MD-AFW pumps RUNNING
- Turbine driven AFW pump RUNNING IF NECESSARY

8. Verify ECCS pumps RUNNING
-CCP
-SI pump
-RHR pump

9. Verify CCW pumps RUNNING

10. Verify ESW pumps RUNNING

11. Verify containment fan coolers RUNNING IN EMERGENCY MODE

12. Verify containment purge isolation
    - Dampers CLOSED
13. Check if main steam lines should be isolated
    - Steamline prerssure LESS THAN 585 psig OR
    - Steamline pressure decrease rate greater than 100 psig/50sec when RCS pressure is less than 1970 psig OR
    - Containment pressure greater than or equal to 17 psig (32 psia)
    - Main steamline isolation, bypass and drain valves CLOSED
14. Verify containment spray not required
    - Containment pressure HAS REMAINED LESS THAN 27 psig (42 psia)

Each numbered step is worth 0.277 pts. If there are subparts to the step, 50% of the point value will be evenly divided among the subparts.

REFERENCE
A. WCGS EMG C-0, REV 0
B. WCGS EMG-E-0, REV 0

ANSWER 7.07 (2.50)

1. Failure of any RCCA to fully insert following a reactor trip or shutdown.
2. Control rod height below the insertion limit.
3. Failure of the Reactor Makeup Control System to the extent that bypass is necessary to accomplish boration.
4. Uncontrolled RCS cooldown following a reactor trip not requiring safeguards actuation.
5. Unexpected or uncontrolled reactivity increase as indicated by abnormal control bank insertion, increasing temperature or nuclear power level, or increasing flux level during shutdown.
6. Inadequate SDM

[Any 5, 0.5 ea.]

REFERENCE
WCGS NPS 217-2,pg 38

ANSWER 7.08 (2.50)

A. Subcriticality

B. Direct operator action to recover/restore the degraded safety function dependent on which CSF is challenged and the extent of degradation.

C. If an extreme challenge is diagnosed, the operator should immediately stop optimal recovery and initiate function restoration to restore the Critical Safety Function under extreme challenge.

0.5 pts for A. and 1 pt each for B. and C.

REFERENCE
WCGS ERGs

ANSWER 7.09 (3.00)

1. Verify Permissive P-9 has actuated.
2. Open heater drain pump discharge valves.
3. Heat balance calculation
4. Start third condensate pump
5. Start second feedwater pump
6. Start third circulating water pump.
7. Calculate QPTR.
   [Any 6, 0.5 ea.]

REFERENCE
WCGS GEN 00-004, pg 3

ANSWER 7.10 (2.00)

1. Control rod withdrawal is started within 24 hours of the trip.
2. RCS temperature has not decreased below 500 degrees F since the trip.
3. The plant is not in an ACTION statement in accordance with the T.S.
4. The cause of the trip is known and corrected.

0.5 pts each

REFERENCE
WCGS GEN 00-003, pg 3

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 8.01 (2.00)

A. A Clearance without DNO Tag may be used for a job if and only if it controls a single component such as a circuit breaker or valve.

B. It would be used for jobs of a trouble shooting or adjusting nature which may require that a component be isolated or deenergized and then restored several times over a short period of time to allow for work and then test.

REFERENCE
WCGS ADM 02-100, REV 8 pgs 12 and 13

ANSWER 8.02 (2.00)

A. Temporary Modification Orders/Tags are not required:
   1. On hoses temporarily installed for venting, draining, or providing supply gas for portable pneumatic equipment.
   2. For trouble shooting and equipment replacement when the activity is approved by the Shift Supervisor and the Cognizant Group Supervisor and is completed without lenghty interruptions.

B. Semi-annually (twice yearly)

0.75 pts each for A.1 & A.2 and 0.5 pt for B.

REFERENCE
WCGS ADM 02-101, REV 11 pgs 2, 5.

ANSWER 8.03 (2.00)

A. L = logs- no system alteration required only parameter verification.
B. C1= performed one time after achieving a common plant/equipment parameter or condition.
C. C2= performed at some specified frequency after achieving a specific plant/equipment parameter or condition.
D. R = performed on a regular frequency.
E. P = Post maintaince - performed to demonstrate operability subsequent to Test Deficiencies and maintenance activities.

0.4 pts each

REFERENCE
WCGS ADM 02-300, REV 3, pgs 8 & 9

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

ANSWER 8.04 (2.00)

DATA COLLECTION
Hard copy information - logs, strip charts, computer readouts, etc.
Operator statements - written statements for all operators involved.
POST-TRIP INVESTIGATION
Event reconstruction
Comparison with similar past events
Analysis and Evaluation
Preliminary safety assessment
Trip classification
Notifications

[1.0 for each major heading or partial credit for individual sub headings]

REFERENCE
WCGS ADM 02-400, REV 1, pgs 4-8

ANSWER 8.05 (2.00)

A. 250
Supervisor
Health Physics Supervision
Verbal

B. Supervisor
300
Radiation Exposure Extension
Health Physics Supervisor
0.25 pt each

REFERENCE
WCGS ADM 03-005, REV 3, pg 3

ANSWER 8.06 (2.00)

An individual should not be permitted to work more than:
1. 16 hours straight
2. 16 hours in any 24 hour period
3. 24 hours in any 48 hour period
4. 72 hours in any 7 day period.

0.5 pts each

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

REFERENCE
WCGS ADM 01-023, pg 2

ANSWER 8.07 (3.00)

A. Health Physics Technican
Health Physics Supervisor
Shift Supervisor

B. For jobs of very SHORT DURATION, EMERGENCIES, or where QUICK ACTION is necessary, the CONTINUOUS ESCORT BY A HEALTH PHYSICS TECHNICIAN may be substituted for an RWP. In such cases, an RWP will be COMPLETED "AFTER-THE-FACT" for any exposure documentation.

0.5 pts each for A. and 0.5 pts each for CAPITIALIZED section.

REFERENCE
WCGS ADM 03-101, pg 16 and RPM pg 6-27.

ANSWER 8.08 (2.00)

A. 8 gpm controlled leakage at 2235 psig
B. 1 gpm (per table 3.4-1)
C. 1 gpm per unisolated S/G and 500 gallons per day through any one S/G
D. none

0.5 pts each

REFERENCE
WCGS TS 3.4.6.2

ANSWER 8.09 (2.50)

A. Two physically independent circuits between the offsite transmission network and the Onsite Class 1E Distribution System. (0.5)

B. Two separate and independent diesel generators, each with: (0.5)
1. A separate day tank containing a minimum volume of 390 gallons of fuel. (0.5)
2. A separate fuel oil storage system containing a minimun volume of 85,300 gallons of fuel. (0.5)
3. A separate fuel transfer pump. (0.5)

Points as marked.

ANSWERS -- WOLF CREEK -85/04/23-MCCRORY, S.

REFERENCE
WCGS TS 3.8.1.1

ANSWER 8.10 (4.00)

| | | | |
|---|---|---|---|
| 1. | E. | 5. | A. |
| 2. | A. | 6. | C. |
| 3. | E. | 7. | B or C. |
| 4. | B. | 8. | B. |

[0.5 pts each, 0.4 for wrong answer that is conservative]

REFERENCE
WCGS RERP, TABLE 2.2-1, REV. 14

ANSWER 8.11 (1.50)

(any 3)
1. Coffey County Sheriff Office OR Kansas Highway Patrol Division 4
2. Kansas Division of Emergency Preparedness
3. KG&E System Operations
4. WCGS NRC Resident Inspector
5. NRC Incident Response Center - Bethesda

0.5 pts each

m

REFERENCE
WCGS EPP 01-3.1, REV. 1, pg 9