UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

EXAMINATION REPORT

Facility Licensee: Tennessee Valley Authority
500-A Chestnut Street Tower II
Chattanooga, TN 37401

Facility Name: Sequoyah

Facility Docket Nos. 50-327 and 50-328

Written and oral examinations were administered at Sequoyah near Soddy-Daisy, TN.

Chief Examiner: Sandy Lawyer 8/7/84
Sandy Lawyer Date Signed

Approved by: Bruce A. Wilson 8/9/84
Bruce A. Wilson Date Signed

Summary:

Examinations on May 21 - 24, 1984

Written and Oral examinations were administered to nine candidates, four of whom passed.

REPORT DETAILS

1. Persons Examined

SRO Candidates:

Carroll, Glenn A	55-8123
Childers, Spencer M.	55-7930
Crabtree, Philip B.	55-7929
McDonald, William H.	55-7927
Vanosdale, William A.	55-8125

RO Candidates:

Brackin, Carl	55-20332
Johnson, Samuel R.	55-20207
Mincy, Phillip N.	55-20333
Stewart, Danny P.	55-20334

Other Facility Employees Contacted:

A. Anderson, Instructor, POTC
*J. Anthony, Oper. Supv., SQNP
*C. Benton, Simulator Instructor, POTC
*C. Brewer, Unit Supervisor, POTC
*L. Bush, Shift Engineer Training, SQNP
*R. Crews, Simulator Instructor, POTC
*J. Johnson, Chief, NTB, POTC
M. Lorek, Instructor, POTC
*L. Nobles, Superintendent, O&E, SQNP
*C. Noe, Training Supervisor NTB, POTC
*L. Pauley, Simulator Instructor, POTC
*L. Sain, Instructor NTB, POTC
*P. Wallace, Plant Manager, SQNP

*Attended Exit Meeting

2. Examiners:

*Sandy Lawyer
Tony Vinnola
Pete Isaksen

*Chief Examiner

3. Examination Review Meeting

At the conclusion of the written examination, the examiners met with C. Brewer, M. Lorek, L. Bush, C. Benton, A. Anderson and R. Crews to review the written examination and answer key. The following comments were made by the facility reviewers:

a. SRO Exam

1. Question 5.01: This answer assumed that the reactor would go critical sooner on rod withdrawal as compared to dilution. This assumption was disputed.

Resolution: The answer was not changed. No material could be provided to support the contrary view.

2. Question 6.06: Both MFP's will not trip as a direct result of feedwater isolation.

   Resolution: "Both MFPs Trip" is not required for full credit.

3. Question 7.04: The answer is not in GOI precautions as could be implied.

   Resolution: Noted for future exams.

4. Question 7.08: "Immediately upon phase B isolation," should also be accepted.

   Resolution: Accepted and added to answer key.

5. Question 7.12.b: "Uncontrolled Depressurization" should be accepted for partial credit.

   Resolution: Half credit was given for this answer. To receive full credit the candidate would have to state "less than 1250 psi".

6. Question 7.14.a: A better way to ask this question is to add, "What is the minimum time required...".

   Resolution: Noted for future exams.

7. Question 7.14.a: "When Boron concentration is stabilized". Should also be accepted.

   Resolution: Accepted and added to answer key.

8. Question 8.03: The proper answer should be "no document allows for the SRO to verbally allow the condition established in Question 6.11".

   Resolution: Accepted and answer key changed.

b. RO Exam

1. Question 1.01: The question could be improved by adding "at a constant temperature".

   Resolution: Noted for future exams.

2.	**Question** 1.02:	The answer "greater than - because of the change in Beta bar effective there will be a larger ratio of prompt to delayed neutrons at EOL, therefore, more are born at higher energies and it would cause fast flux at EOL to increase" should also be accepted.
	Resolution:	Accepted and added to answer key.
3.	Question 1.05:	Sm peaks at 400 hours.
	Resolution:	Accepted. 12-16 days was put in answer key.
4.	Question 1.07.c:	The question would be clearer if "while at operating Heat Flux" was added.
	Resolution:	Noted for future exams.
5.	Question 2.01:	It makes a difference which unit the candidate assumes the question is addressing.
	Resolution:	The answer is correct for either assumption.
6.	Question 2.15:	A&C are both correct. Because Unit 1 is identical to Unit 2.
	Resolution:	Accepted and answer key changed.
7.	Question 2.16:	The candidate may answer assuming Unit 1.
	Resolution:	Comment rejected. The question specifically states Unit 2.
8.	Question 3.02.b:	Same as 6.06a.
	Resolution:	Same as 6.06a.
9.	Question 3.02.c:	(Suction valve opening) should be added to answer.
	Resolution:	Accepted and added to answer key.
10.	Question 3.03.b:	For those candidates who assume a 2 pump trip, answer 3 should be added to the answer key.
	Resolution:	Accepted.

11. Question 4.06: It was not clear if the reactor tripped in question a.

Resolution: Noted for future exams.

12. Question 4.11: Same as 7.08.

4. Exit Meeting

At the conclusion of the site visit the examiners met with representatives of the plant staff to discuss the results of the examination. Those individuals who clearly passed the oral examination were identified.

There was no generic weakness noted during the oral examination. The cooperation given to the examiners and effort to ensure an atmosphere in the control room conducive to oral examinations was noted and appreciated.

MASTER ENCLOSURE 3

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

Reviewed By:
C. Brewer
L. Bush
R. Crews
M. Lorek

FACILITY: SEQUOYAH 1&2

REACTOR TYPE: PWR

DATE ADMINISTERED: 84/05/21

EXAMINER: VINNOLA, A.

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	22.00	_____	_____	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 (1.00)

On initial criticality via dilution, counts on the source range are approximately 4000 cps. A normal startup critical count level is approximately 2000 cps. Why the difference? (1.0)

QUESTION 5.02 (3.50)

Multiple Choice.

The following readings were taken off the power range detectors:

	N41	N42	N43	N44
DET A (upper)	374.4	356.6	363.3	360.0
DET B (lower)	324.0	342.0	327.6	360.0

All readings in microamperes, full power current on all detectors is 400.0 microamperes.

a. The largest quadrant power tilt ratio is: (1.5)

1. 1.00
2. 1.03
3. 1.06
4. 1.30
5. 1.60

b. The axial flux difference (delta-I) for N41 is: (1.0)

1. 1.03
2. 1.80
3. 4.45
4. 6.30

c. Multiple Choice, fill in the blank.

The indicated AFD shall be considered outside of its limits when at least _____ excore channels are indicating the AFD to be outside the limits. (1.0)

1. One operable and one inoperable.
2. Two operable.
3. Two inoperable.
4. Three operable.
5. Three inoperable.

QUESTION 5.03 (1.50)

Multiple Choice.

a. With the plant operating at 85% power and all systems in a normal/auotomatic configuration, the operator borates 100 PCM. Shutdown Margin will:

1. Increase
2. Increases until rods move
3. Decrease
4. Decreases until rods move
5. Remain unchanged, whether or not rods move (1.0)

Fill in the blank.

b. The Shutdown Margin required by Technical Specifications for the operating condition described in a., above, is_____% delta K/K. (0.5)

QUESTION 5.04 (1.50)

According to Technical Specification bases 3/4.1.3, there are THREE reasons for the control rod insertion limits. NAME THE THREE ~~LIMITS~~ REASONS. (1.5)

QUESTION 5.05 (1.50)

A. Does Beta bar effective Increase, Decrease, or Remain the Same, from BOL to EOL? (Briefly explain your choice.) (1.0)

B. For equivalent positive reactivity additions to a critical reactor, will the SUR be the Same, Larger, or Smaller at EOL compared to BOL? (no explanation necessary) (0.5)

QUESTION 5.06 (.50)

True or False?

At EOL, with decreased fuel temperatures, the Fuel Temperature Coefficient is more negative due to ar increase in the quantity of Pu-240 in the fuel. (0.5)

QUESTION 5.07 (2.00)

For each of the following conditions, which of the two choices would the INDIVIDUAL (differential or integral as indicated) rod worth be greater?

	Rod Worth	Condition	Choice 1	Choice 2	
A.	Integral	Tavg	150-F	500-F	(0.5)
B.	Integral	Core life	BOL	EOL.	(0.5)
C.	Differential	Rod position	180 steps	215 steps	(0.5)
D.	Differential	Rod in Bank C which is next to a module with	an inserted rod	the rod withdrawn	(0.5)

QUESTION 5.08 (2.00)

a. If steam goes through a throttling process, (as in a leak from a main steam header high pressure line to atmosphere) will the following parameters Increase, Decrease, or Remain the Same? (no explanation required) (1.5)

1. Enthalpy
2. Pressure
3. Entropy
4. Specific volume
5. Temperature

b. State whether the steam will be Subcooled, Saturated, or Superheated as it leaks out. (0.5)

QUESTION 5.09 (1.50)

Critical Heat Flux (CHF) is defined as the heat flux at which Departure from Nucleate Boiling (DNB) occurs. For an INCREASE in each of the parameters below, state how the CHF will change. (Consider each parameter separately.)

(LIMIT YOUR ANSWER TO INCREASE, DECREASE, OR REMAINS UNCHANGED)

a. Reactor Coolant Flow Rate.
b. Reactor Coolant Temperature.
c. Reactor Coolant Pressure. (1.5)

QUESTION 5.10 (3.00)

True or False?

a. The differential temperature necessary to transfer heat is inversely proportional to heat flux. (0.5)

b. Pump runout is the term used to describe a centrifugal pump when it is pumping against a shut discharge valve. (0.5)

c. The latent heat of vaporization is another term for the latent heat of condensation. (0.5)

d. One of the pump laws for centrifugal pumps states that power required by the pump motor is directly proportional to the square of the pump speed. (0.5)

e. The faster a centrifugal pump rotates, the greater the NPSH required to prevent cavitation. (0.5)

f. When comparing a parallel-flow heat exchanger to a counter-flow heat exchanger, the temperature difference between the two fluids along the LENGTH of the heat exchanger tubes is MORE uniform for the parallel-flow heat exchanger. (0.5)

QUESTION 5.11 (2.50)

Assume one RCP trips at 30% power without a reactor protection system actuation or a change in turbine load. Indicate whether the following parameters will Increase, Decrease, OR Remain the Same.

a. Flow in the operating Reactor Coolant Systems loops. (0.5)

b. The ratio of core flow compared to the total loop flow. (Core flow/Total loop flow) (0.5)

c. Actual Reactor vessel delta-P. (0.5)

d. Core delta-T. (0.5)

e. An (RCS) operating loop steam generator temperature. (0.5)

QUESTION 5.12 (1.00)

Why is the allowable RCS PRESSURE for a cooldown more limiting than for a heatup? (1.0)

QUESTION 5.13 (1.00)

Which ONE of the statements would indicate that Natural Circulation has been established in the RCS?

A. Delta temperature across the core is increasing and greater than full load delta temperature.

B. Core outlet temperature is increasing and greater than RCS saturation temperature.

C. Steam generator level is increasing with constant auxiliary feedwater flow.

D. Steam generator pressure is decreasing and is near saturation pressure for the RCS temperature. (1.00)

QUESTION 5.14 (.50)

True or False?

The Doppler only power coefficient (PCM/%power) at hot full power becomes more negative during the life of the core (BOL to EOL). (0.5)

QUESTION 5.15 (.50)

True or False?

With all rods out, and a constant boron concentration (ppm), the MTC becomes more negative as RCS temperature (Tavg) increases. (0.5)

QUESTION 5.16 (.50)

True or False?

The isothermal temperature coefficient is NOT definitive in the explanation of reactor core behavior when the reactor core is producing heat. (0.5)

QUESTION 5.17 (.50)

Multiple Choice.

At what area in the core/reactor vessel is the Critical Heat Flux the HIGHEST at steady state 100% power?

A. Bottom of the core.
B. Half way up the core.
C. Top of the core.
D. Near the head area. (0.5)

QUESTION 5.18 (.50)

Multiple Choice.

The MAJOR source of heat produced in the reactor core five minutes after it has been shut down is:

A. Subcritical multiplication
B. Spontaneous fission
C. Fission product decay
D. Fission caused by delayed neutrons
E. Heat capacity of the metals in the reactor vessel (0.5)

QUESTION 6.01 (2.50)

A. Indicate whether the following statements are TRUE for OT Delta-T, OP Delta-T, OR BOTH, (OT Delta-T and OP Delta-T) protection instruments.

1. Protects the core from DNB.
2. Protects the core from overpower (Kw/ft).
3. Backup for the high neutron flux trip.
4. Circuitry dynamically compensates for piping delays to the loop temperature detectors.
5. Requires RCS pressure within the high and low reactor trip setpoints in order to be valid. (2.5)

QUESTION 6.02 (1.00)

TRUE or FALSE?

The following concern the construction and operation of the POWER RANGE NUCLEAR INSTRUMENTATION detector. (No explanation is required.)

A. Each upper and lower detector provides inputs to a delta flux meter, delta flux recorder, and current comparator.

B. The detector uses no compensation circuitry to remove gamma caused current. (1.0)

QUESTION 6.03 (2.00)

TRUE or FALSE?

The following concern how the ROD CONTROL SYSTEM would respond. (No explanation is required.)

a. An urgent failure in a power cabinet sends a signal to the logic cabinet. (All automatic rod motion is inhibited.)

b. At 105% power (delta-T equivalent), OT delta-T setpoint or 107% power (delta-T equivalent), OP delta-T setpoint, ALL automatic rod motion is inhibited.

c. If turbine power falls below 15%, automatic rod withdrawl is blocked.

d. At 103% reactor power, automatic rod insertion is inhibited. (2.0)

QUESTION 6.04 (3.00)

List the sequence of events (control and protection) which lead to a reactor trip when the controlling PZR level channel fails HIGH.

ASSUME- No operator action and initial plant conditions are in a normal/automatic configuration at 50% load. (Setpoints of control and protective events are not required.) (3.0)

QUESTION 6.05 (4.00)

What would happen to the following indications for the associated conditions? Consider each separately and EXPLAIN the end result in your answer.

	Indications	Conditions	
A.	Steam generator level--	steam pressure compensation signal fails low, while operating at steady-state power.	(1.0)
B.	A power range channel--	cold leg temperature decreases by 10-F, while maintaining 100% actual power.	(1.0)
C.	Control bank rod height--	Tcold input to Tavg channel fails low	(1.0)
D.	Hot calibrated PZR level-- compared to actual level	During a plant cooldown and depressurization	(1.0)

QUESTION 6.06 (1.75)

A. What automatic action(s) occur on a feedwater isolation signal? (1.0)

B. What is the setpoint for the "Low NPSH at MFP's"alarm AND what are the sensing point locations for this signal? (0.75)

QUESTION 6.07 (.50)

What is the basis for the Technical Specification requirement of 190,000 gallon (minimum) Condensate Storage tank volume? (0.5)

QUESTION 6.08 (1.50)

a. What type of detector is used to monitor the RCDT effluent discharge (RM-90-275/6)? (0.5)

b. What automatic action(s), if any, are associated with a high radiation alarm on the RCDT effluent discharge? (0.5)

c. Would the Auxiliary Building radiation monitor (RM-90-101) be considered "inoperable", ACCORDING TO TECHNICAL SPECIFICATIONS if it was indicating a low flow alarm condition? (0.5)

QUESTION 6.09 (3.50)

Utilize the attached RHR system drawing (FIG 6.1), for answering the following.

A. What is the setpoint for the relief valve labeled 'a' AND to where does it relieve? (0.5)

Multiple Choice.

B. Which of the following is the design capacity for the relief valve labeled 'a' based upon?

1. 1 centrifugal charging pump (CCP)
2. 1 CCP and 1 PDP
3. 2 CCP's
4. All charging pumps (0.5)

C. State THREE conditions (system lineups/valve positions) or interlocks which will prevent the RHR pump suction valves(74-3,21) from opening. (1.0)

D. The valve labeled 'd', (74-12) opens when pump discharge is less than _____ gpm and will close when pump discharge is greater than _____gpm. (0.5)

E. What is the purpose of the two valves labeled 'e', (74-33,35)? (0.5)

F. The valve labeled 'f', (62-83) discharges to the CVCS system upstream of the _____. (0.5)

QUESTION 6.10 (1.50)

In March, 1982 the Chemistry Lab Technician opened the sensing line calibration valve to the level switches on the UHI accumulator to draw the UHI sample. His actions affected the UHI isolation valves.

How were the isolation valves affected AND describe how his action caused the valves to respond the way they did. (1.5)

QUESTION 6.11 (2.25)

The plant is in Mode 3 with maintenance and surviellance tasks being performed in containment. The #3 steam generator (S/G) steam flow instrument is tripped for maintenance. The Instrument Technician (IT) just completed #3 S/G level instrument calibration, and he calls the control room to recieve permission to calibrate the #2 S/G level instrument. If you allowed him to perform the #2 S/G level instrument calibration, a Saftey Injection may occur, as it did in January 1982.

Why could a Saftey Injection occur? (2.25)

QUESTION 6.12 (1.00)

If the "Alternate Dilute" method achieves the same objective as the "Dilute" method and gives a quicker response, then why isn't the "Alternate Dilute" method preferred? (1.0)

QUESTION 6.13 (.50)

While operating at 92% power, the #3 heater drain tank level goes high enough to cause the water in the tank to begin dumping to the condenser. According to SOI's 5.1 & 6.1, what effect will this have on the turbine? (0.5)

7. PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL

QUESTION 7.01 (.75)

What is the maximum background radiation level in which a "frisker" may be used for personnel monitoring? ~~10 mr~~ 0.5

QUESTION 7.02 (1.90)

During your Licensing Examination you will be required to escort your examiner through the plant. What is the maximum whole body exposure limit of the examiner assigned to you in accordance with RCI-1; ANSWER THE QUESTION IF THE EXAMINER PROVIDES HIS DOSE RECORDS AND ALSO IF THE EXAMINER DOES NOT PROVIDE HIS DOSE RECORDS! (1.9)

QUESTION 7.03 (2.00)

Sequoyah Procedure, GOI-2 states the following precaution:

"All shutdown banks must be at the fully withdrawn position whenever positive reactivity is being inserted by boron or Xenon concentration changes, reactor coolant temperature changes, or motion of control banks."

State the TWO exceptions to this precaution. (2.0)

QUESTION 7.04 (2.00)

a. According to GOI-3A, "Hydrazine must not be added to the coolant during any phase of plant cooldown or shutdown, if the primary coolant system is to be opened." Explain WHY this precaution is necessary. (1.0)

b. Near the completion of plant cooldown (~140°F), Hydrogen Peroxide (H2O2) is added to the RCS and circulated with Reactor Coolant Pumps. WHAT does this action accomplish and WHY is it necessary? (1.0)

QUESTION 7.05 (2.00)

GOI-6C provides general operating and starting guidance for larger plant motors. Answer the following from information found in this instruction.

a. With regards to OPERATION of the motor, what does a "YELLOW LINE" on the motor ammeter indicate? (1.0)

b. Whose (By job title) permission must be obtained prior to continuous operation of a motor with its ammeter "RED LINE" value exceeded? (0.5)

c. Unless specific guidance from the manufacturer has been provided, how many successive starts may be attempted on a 500 horsepower motor, if the previous attempt(s) to start was/were unsuccessful? (0.5)

QUESTION 7.06 (1.50)

According to "Immediate Actions and Diagnostics" (EOI-0), if containment pressure is greater than 2.81 psig, what THREE SPECIFIC conditions must be verified? (1.5)

QUESTION 7.07 (2.75)

If the RCP bearing temperature approaches its alarm level (setpoint), your procedures state that the No. 1 seal bypass valve should be opened only if four conditions are met.

A. What is the parameter (indication) that is monitored to determine if the RCP bearing temperature is approaching its alarm level? (0.75)

B. What are the FOUR conditions that must be met before the bypass valve is opened? (2.0)

QUESTION 7.08 (.75)

If Component Cooling water is lost to the RCP's while the RCP'S are operating, when (time) are you required to stop the RCP's? (0.75)

QUESTION 7.09 (1.25)

If all RCP's have been stopped for more than 5 minutes and the RCS temperature is greater than the charging and seal injection water temperature, you are not to restart a RCP until a steam bubble has been formed in the pressurizer.

Explain the reason for waiting until a bubble has been formed. (1.25)

QUESTION 7.10 (1.00)

What are the TWO guidelines from EOI-1 Appendix D that indicate inadequate core cooling exists? (1.0)

QUESTION 7.11 (1.50)

An irradiated fuel assembly is being moved from the reactor vessel to the upender when it drops to the bottom of the refueling canal?

A. What are the SRO's immediate actions if radiation monitors indicate increasing levels, in accordance with AOI-29? (1.0)

B. What is the source (type) of the radiation activity released? (0.5)

QUESTION 7.12 (4.00)

A. What are FOUR methods that can be used for identifying the faulted steam generator, during a steam generator tube rupture accident, in accordance with EOI-3? (2.0)

B. What are the TWO conditions that must be monitored throughout a steam generator tube rupture accident that requires RCP's to be stopped? (2.0)

QUESTION 7.13 (.80)

Multiple Choice.

Which one of the following is a symptom of "Rods fail to insert following a decrease in turbine load"?

A. Low pressurizer pressure

B. "Pressurizer level high backup heaters on" alarm

C. "Reactor coolant loops Tref-Tauct. high-low" alarm at +3 F

D. Rod insertion low limit alarm (0.8)

QUESTION 7.14 (1.20)

When you are performing a reactor startup using procedures GOI-1 & 2,

A. If you are to change boron concentration by batch processing, how long are you required to wait between seperate batch processes? (0.4)

B. What will be the temperature range of the RCS when you finish GOI-1, "Plant Startup From Cold Shutdown to Hot Standby"? (0.4)

C. What are the temperature limits for pulling SHUTDOWN rods? (0.4)

QUESTION 7.15 (1.60)

One of the contributing problems during the March 25, 1982 over-exposure incident at Zion Nuclear Station was unclear procedures concerning when RWP's are required.

In accordance with Sequoyah procedure RCI-1, when are RWP's required for the following defined areas?

A. Radiation Area

B. High Radiation Area that is not locked

C. Areas where contamination is greater than 200 dpm/cm squared

D. Areas where airborne activity exceeds the limits of RCI-1 Section IV.B, BUT people entering are wearing properly fitted and approved resiratory equipment. (1.6)

QUESTION 8.01 (.50)

True or False?

The inoperability of vital inverter 2-II is cause for the Unit 1 Technical Specification LCO action statement to be entered, when Unit 1 is in Mode 1. (0.5)

QUESTION 8.02 (1.00)

When an RWP is required for maintenance or surveillances tasks, can the RWP requirement be waived if contionous HP coverage is present? (1.0)

QUESTION 8.03 (.75)

Which document allows you to VERBALLY grant permission for the #2 S/G calibration described in Question 6.11? (0.75)

QUESTION 8.04 (1.75)

What are the allowable Technical Specification heatup and cooldown limits for BOTH the RCS AND the Pressurizer? (1.75)

QUESTION 8.05 (2.50)

What actions must be taken, in accordance with the Technical Specifications, if RCS pressure has just exceeded 2735 PSIG? (INCLUDE APPLICABLE TIME LIMITS!)

A. If in Mode 1; (1.25)

B. If in Mode 3; (1.25)

QUESTION 8.06 (3.50)

A. Preparations are being made to parallel the main generator to the grid when the Unit Operator reports that Tavg is 539 degrees. What actions are required by the Sequoyah Technical Specifications? (1.5)

b. What are the FIVE Technical Specification bases for the minimum temperature for criticality? (2.0)

QUESTION 8.07 (2.50)

Fuel is being unloaded from the Unit 2 reactor vessel when the chemist reports that his latest boron sample of the RCS indicates 1925 ppm. What action is required? BE SPECIFIC! (2.5)
(Answer the question in accordance with the Technical Specifications.)

QUESTION 8.08 (2.00)

a. What are the Steady State and Transient Technical Specification limits for the RCS chemistry limits listed below?

1) Dissolved Oxygen (>250°F)
2) Chloride
3) Floride (0.6)

b. Why are the above Transient limits different than the Steady State limits? (0.8)

c. Why must RCS pressure be reduced below 500 psig if RCS chloride concentration exceeds the steady state limit for greater than 24 hours? (0.6)

QUESTION 8.09 (1.50)

If specific activity of the RCS is >1.0 uCi/gram dose equivalent I-131 for more than 48 hours during one continuous time interval, the plant must be placed in at least hot standby with RCS Tavg <500°F. What is the basis for reducing the RCS temperature to less than 500°F? (1.5)

QUESTION 8.10 (2.50)

Unit 1 reactor is operating at 80% power when the Unit Operator reports that Axial Flux Difference (AFD) is -25%. Utilizing the attached Technical Specification Figure 3.2.1, describe the two options, one of which must be taken. (BE SPECIFIC!) (2.5)

QUESTION 8.11 (5.00)

A. List the FIVE individuals (by job title) that are authorized to be the Site Emergency Director during a Radiological Emergency Plan implementation. (Provide new or old Job Titles) (2.5)

B. Match the IP's in Column A to the one correct description in Column B.

Column A	Column B
1. IP-1 Emergency Plan Classification	A. Provides early and prompt notification of minor events which could develop into or be indicative of more serious conditions.
2. IP-2 Notification of Unusual Event	B. Declared when events are in progress or have occurred which involved actual or emminent core degredation with potential for loss oc containment integrity.
3. IP-3 Alert	C. Declared when events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public.
4. IP-4 Site Area Emergency	D. Declared when events are in progress or have occurred which involve actual or potential degredation of the level of plant saftey.
5. IP-5	E. Details initiating conditions and directs shift personnel to appropriate notification and assessment procedures.

(2.5)

QUESTION 8.12 (1.50)

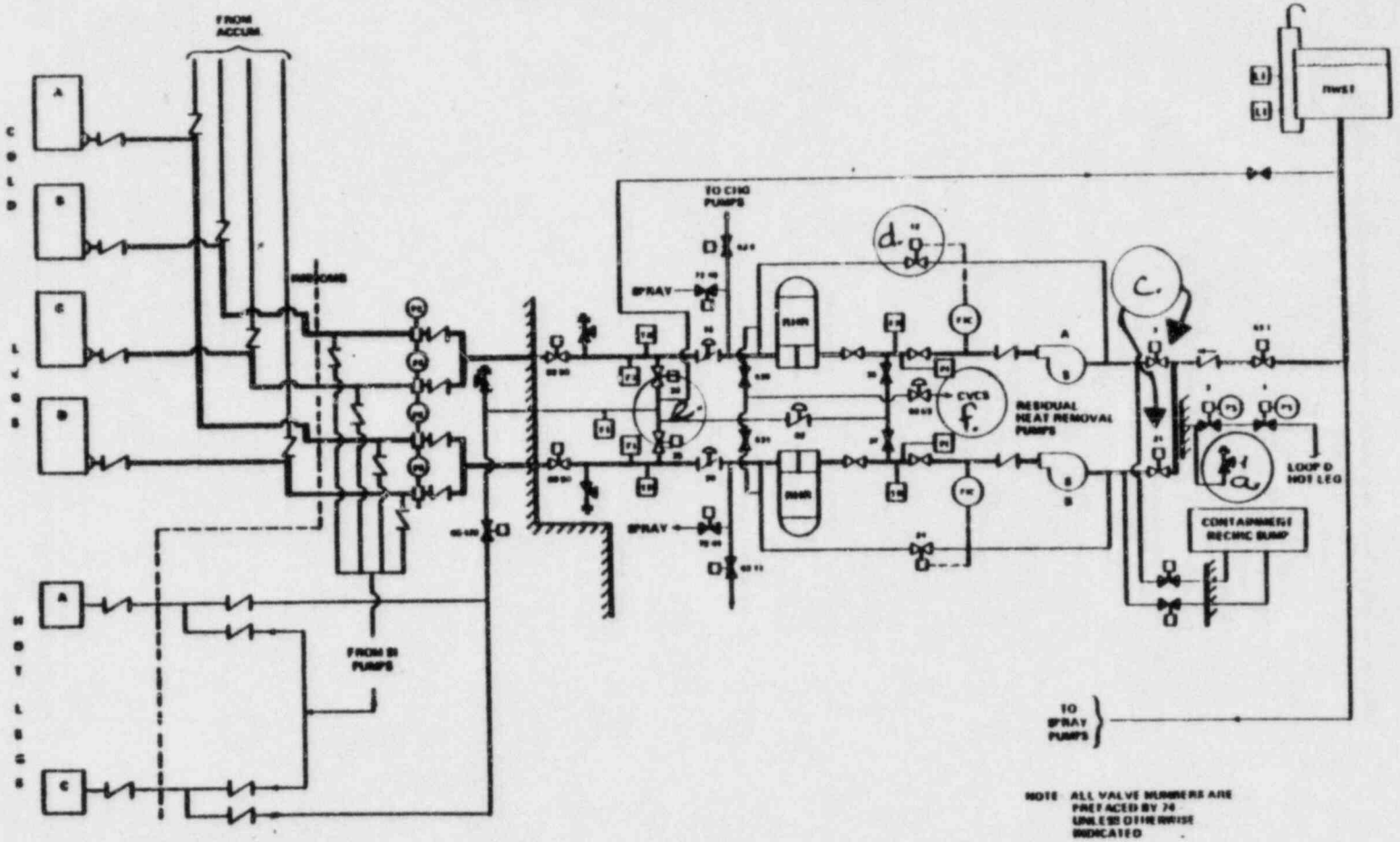
The Technical Specifications require a Fire Brigade.

A. What is the minimum number of members required on this Fire Brigade? (0.5)

B. What are the limitations concerning who shall NOT be assigned to the Fire Brigade? (0.6)

C. If one of the minimum number of members calls in sick, what is the maximum time you have to obtain a replacement? (0.4)

RESIDUAL HEAT REMOVAL SYSTEM



RESIDUAL HEAT REMOVAL SYSTEM

FIGURE 6.1

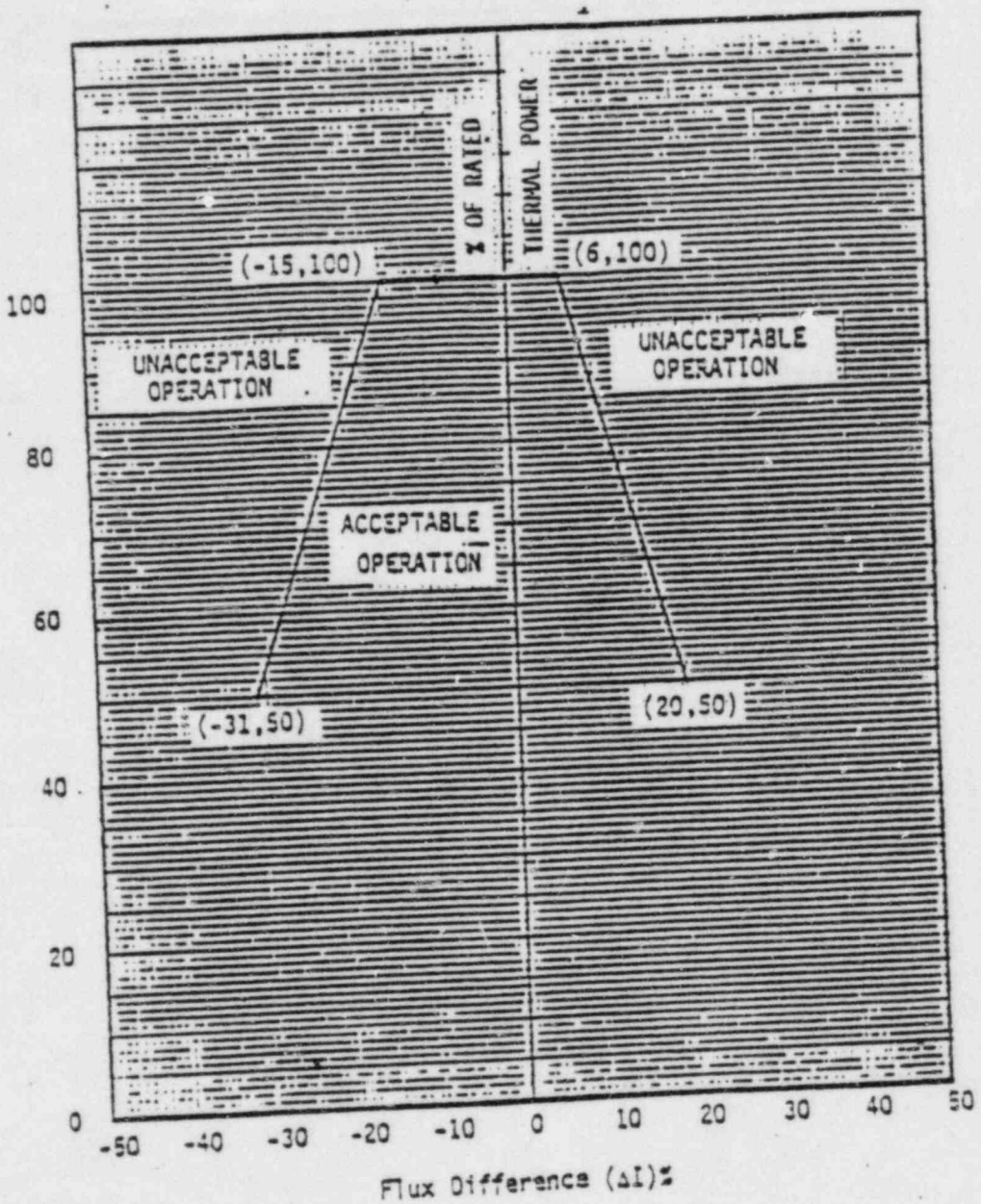


FIGURE 3.2-1

AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 5.01 (1.00)

The normal (initial) startup occurs in a shorter (longer) time period. The count rates are not (are) reaching their equilibrium values. [subcritical multiplication] (1.0)

REFERENCE
Sequoyah exam bank
PTI 57

ANSWER 5.02 (3.50)

a. 3 (1.06) (1.5)

b. 4 (6.30) (1.0)

c. 2 (1.0)

REFERENCE
Sequoyah exam bank & Technical Specifications 3.2.1 .
PTI 58

ANSWER 5.03 (1.50)

a. Increase. (1.0)

b. 1.6 (0.5)

REFERENCE
Sequoyah Technical Specifications 3.1.1.1; exam bank.
PTI 59

ANSWER 5.04 (1.50)

1. Maintain adequate shutdown margin.

2. Limit worth of ejected control rod.

3. Ensure acceptable core power distributions. [0.5 each] (1.5)

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

REFERENCE
Sequoyah Technical Specification bases 3/4.1.3.
PTI 60

ANSWER 5.05 (1.50)

a. Decreases [0.25] Pu 239 concentration increases (while U 235 concentration decreases) [0.75]. (1.0)

b. Larger SUR. (0.5)

REFERENCE
Sequoyah Nuclear Theory, Review of Neutron Kinetics, p 6-8.
PTI 61

ANSWER 5.06 (.50)

True. (0.5)

REFERENCE
Sequoyah Nuclear Theory, Review of Reactivity Coeff., p 7.
PTI 65

ANSWER 5.07 (2.00)

A. 2 (0.5)

B. 2 (0.5)

C 1 (0.5)

D. 2 (0.5)

REFERENCE
Sequoyah Nuclear Theory, Review of Core Poisons, p 485.
PTI 66

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 5.08 (2.00)

a. 1. Remain the same
2. Decrease
3. Increase
4. Increase
5. Decrease [0.3 each] (1.5)

b. Superheated (0.5)

REFERENCE
Westinghouse Thermal Science, Vol. II, Chapter 7.
PTI 67

ANSWER 5.09 (1.50)

a. Increase

b. Decrease

c. Increase [0.5 each] (1.5)

REFERENCE
Westinghouse Thermal Science, Chapter 13, p 33-52.
PTI 68

ANSWER 5.10 (3.00)

a. False
b. False
c. True
d. False
e. True
f. False [0.5 each] (3.0)

REFERENCE
Westinghouse Thermal Science, Chapters 3,5 & 10.
PTI 70

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 5.11 (2.50)

a. Increase
b. Decrease
c. Decrease
d. Increase
e. Decrease [0.5 each] (2.5)

REFERENCE
Transient Analysis
PTI 71

ANSWER 5.12 (1.00)

Because during a C/D the inner wall of the Reacto Vessel experiences a tensile stress, which increases the total stress on the inner wall. [0.5] [0.5] (1.0)

REFERENCE
Westinghouse Thermal Science, Ch. 13 p 67; and Technical Specifications p B 3/4 4-12.

ANSWER 5.13 (1.00)

D. (1.00)

REFERENCE
Westinghouse Thermal Science; Ch. 14, p 27. & ADI 35.

ANSWER 5.14 (.50)

False. (0.5)

REFERENCE
Instr. Notes; Review of Reactivity Coefficients.

ANSWER 5.15 (.50)

True. (0.5)

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

REFERENCE
Instr. Notes; Review of Reactivity Coefficients.

ANSWER 5.16 (.50)

True (0.5)

REFERENCE
Instructor Notes; Review of Reactivity Coefficients, pp 4, 10.

ANSWER 5.17 (.50)

A. (0.5)

REFERENCE
Westinghouse Thermal Science; Ch. 13, pp 33-52.

ANSWER 5.18 (.50)

C. (0.5)

REFERENCE
Instructor Notes; Review of Neutron Kinetics & Neutron Sources.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 6.01 (2.50)

A. 1. DT Delta-T
2. OP Delta-T
3. OP Delta-T
4. Both
5. DT Delta-T [0.5 each] (2.5)

REFERENCE
Sequoyah Technical Specifications p 2-7 through 2-10, and bases p B 2-4 & 5.
PTI 73

ANSWER 6.02 (1.00)

A. TRUE

B. TRUE [0.5 each] (1.0)

REFERENCE
Sequoyah System Description, Section 15 p 10-15.
PTI 74

ANSWER 6.03 (2.00)

a. TRUE

b. FALSE

c. TRUE

d. FALSE [0.5 each] (2.0)

REFERENCE
Sequoyah System Description, Section 4, p 9-12, and Section 13.
PTI 75

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 6.04 (3.00)

1. Backup heaters on [0.4]
2. PZR spray valves open [0.2]
3. Charging flow to minimum [0.4]
4. Letdown isolation (LCV-460 and orifice valves) [0.7]
5. Backup and control heaters cutout [0.4]
6. Reactor trip on high PZR level [0.9] (3.0)

REFERENCE
Sequoyah Simulator malfunction book, p 47,48; AOI-20.
PTI 76

ANSWER 6.05 (4.00)

a. Steam flow signal will decrease resulting in a lower feed rate and lower S/G level. (1.0)

b. The incoming coolant would be more dense, which would decrease leakage to the power range detector and result in a lower power range indication. (1.0)

c. The Tavg input to rod control is auctioneered high, therefore a low failure will have NO effect on rod position. (1.0)

d. The colder, more dense, ~~reference leg~~ water will result in the indicated level being higher than actual level. (1.0)

REFERENCE
Sequoyah System Description, Section 13, p 5; Transparency p 9-27,29.
PTI 77

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 6.06 (1.75)

A. (Both MFP's trip;) MFRV's and bypass valves close; MFW isolation valves close. (condensate system recircs to condenser) (1.0)

B. 100 psid decreasing; between No. 2 heater shell and MFP suction. (0.75)

REFERENCE
Sequoyah System Description, Section 8, p 6,10; Annunciator Response Vol I, tab 5, p 29.
PTI 78

ANSWER 6.07 (.50)

The ability to maintain the RCS at Hot Standby condition for 2 hrs. with steam discharging to atmosphere concurrent with a loss of offsite power. (0.5)

REFERENCE
Sequoyah Technical Specifications p B 3/4 7-2.
PTI 79

ANSWER 6.08 (1.50)

a. GM tube (0.5)

b. RCDT discharge valve (FCV-77-9 and/or -10) shut (0.5)

c. yes (0.5)

REFERENCE
SQNP ADI-31; Sequoyan (1) LER 82-144.
PTI 81

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 6.09 (3.50)

a. 450 psig, ~~CAE~~ PRT (0.5)

b. 4 (0.5)

c. 1. Charging and SI pump suction valves open (63-8,11)
2. Containment sump isolation valves open (63-72,73)
3. RHR discharge to spray header valves open (72-40,41) (1.0)

d. 550, 1250 (0.5)

e. To align the RHR system for recirculation phase following a LOCA. (0.5)

f. Letdown heat exchanger. (0.5)

REFERENCE
Sequoyan System Description, Section 3 p 6,7; FIG 3.1-1, 4.1-1.
PTI 82

ANSWER 6.10 (1.50)

The valves automatically closed,[0.50] because the pressure dropped when the sense line valve was opened and indicated a low level condition which shut the valves.[1.0] (1.5)

REFERENCE

3-18-82, Sequoyah Unit 2 occurrence & systems Manual 4.2.

ANSWER 6.11 (2.25)

With P-12 not blocked [0.75], and S/G #3 flow instrument tripped [0.75] when the instr. tech. calibrates #2 S/G level instr., the pulsations from the back fill pump caused (thru common loops) [CO,1&] the steam flow [0.25] setpoint on #2 S/G to be reached, which now meets the 2/4 coincidence [0.25] (2.25)

REFERENCE
January 1982, Unit 2 Occurrence & Systems Manual 11.10.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 6.12 (1.00)

Because it reduces the hydrogen concentration in the RCS. (1.0)

REFERENCE
SOI-62.2; p4.

ANSWER 6.13 (.50)

Turbine runback to 85%. [0.2] (0.5)
[0.3]

REFERENCE

SOI-5.1 & 6.1; p7.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 7.01 (.75)

200 cpm. (0.75)

REFERENCE
RCI-1.

ANSWER 7.02 (1.90)

WITHOUT DOSE RECORDS;
1. 300 mrem/cal. qtr. [0.9]

WITH DOSE RECORDS;
1. 1,250 mrem/cal. qtr.[1.0] OR

2. 3,000 mrem/cal. qtr.[0.8] if the requirements of 10 CFR 20[0.1] are met and authorization of the examiner's employer is obtained. [0.1] (1.9)

REFERENCE
RCI-1, p7.

ANSWER 7.03 (2.00)

a. The RCS temperature and boron concentration are being maintained at the hot shutdown, Xenon free condition. (1.0)

b. The RCS has been borated to the cold shutdown concentraton AND the plant is being cooled down. (1.0)

REFERENCE
SQNP GOI-2, p 2

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 7.04 (2.00)

a. Addition of hydrazine will result in the additional production of gases that must be removed prior to opening the RCS. (CAF)
Also accepted: The gas presents a personnel hazard if exposed to them, if this exists in the RCS. (1.0)

b. (H2O2) will cause activated corrosion products (Co 58, Co 60, and others) to be put into solution in the RCS. [0.5] This will result in decreased radiation levels (and corresponding radiation exposures). [0.5] ~~(CAF)~~ none provided. (1.0)

REFERENCE
SQNP GOI-3A, p 3
SQNP GOI-3C, P 30
SOE-62.3B, p 6

ANSWER 7.05 (2.00)

a. The (YELLOW LINE) indicates the maximum current value at which it can normally be operated. (It is called the "effective nameplate rating.") Half credit was given if reference to operation (1.0)
Caution or alarming condition to let the operator know that motor is in danger of exceeding maximum current.

b. Plant Superintendant (or his designate). Down to Shift Engineer. (0.5)

c. TWO (2) (0.5)

REFERENCE
SQNP GOI-6C, pp 7-9

ANSWER 7.06 (1.50)

1. Containment spray pumps running.

2. MSIVs closed.

3. Phase "B" Isolation (status monitor panel 6E and 6F lights). (1.5)

REFERENCE
SQNP EOI-0, p 5

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 7.07 (2.75)

A. Seal inlet temperature. (The mcr label is "Lower radial bearing "Temp. (0.75)

B. 1. RCS pressure is between 100 and 1000 psig, AND

2. No. 1 seal leakoff valve is open, AND

3. No. 1 seal leakoff flow rate is less than 1 gpm, AND

4. Seal injection water flow rate to EACH pump is greater than 6 gpm. (2.0)

REFERENCE
GOI-1; p4. SOI 62.13; p6.

ANSWER 7.08 (.75)

Within 2 minutes from the time CC water is lost. Also accept immediately (0.75)
after phase B isolation. (Did not accept 5 minutes after phase B isolation
because this was removed from procedure over 8 months ago)
REFERENCE
SOI 68.2; p4.
EOI 1.

ANSWER 7.09 (1.25)

The steam bubble will accomodate the resultant pressure transient caused by starting the first RCP and subsquent circulating of colder water which would have been injected by the charging pumps. (1.25)

REFERENCE
SOI 74.1A; pp 3&4.

ANSWER 7.10 (1.00)

a. More than four incore T/C's greater than or equal to 1200 F, or

b. Hot leg RTD's pegged high. (700°F) (1.0)

REFERENCE
EOI-1; App. D, p 1.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 7.11 (1.50)

A. Announce radiation abnormal in the reactor building and over the PA for all personnel to evacuate the containment building. (1.0)

B. Airborne gases (I, Kr, etc.) (0.5)

REFERENCE
AOI-29.

ANSWER 7.12 (4.00)

A. 1. Unexpected rise in on S/G level with feedwater flow reduced or stopped,

2. High radiation from any one S/G B/D line radiation sample monitor,

3. High radiation from any one S/G B/D, by analysis or portable radiation detector,

4. High radiation from port. monitoring of steam lines. (2.0)

B. 1. At least one of the four CCP/SI pumps running AND if RCS pressure decreases below 1250 psig, OR (half credit for uncontrolled depressurization)

2. Phase B cntmt. isoloation (2.0)

REFERENCE
EOI-3; pp 2-3.
AOI-24, p2.

ANSWER 7.13 (.80)

B. (0.8)

REFERENCE

AOI-2A; p2.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 7.14 (1.20)

A. 15 minutes. or sampling to ensure even boron distribution.

B. 540 - 547 F [-0.1 for 350-547 °F]

C. Greater than or equal to 541 F (Minimum temp. for criticality). New procedure (may) has no restrictions on temp. for pulling S/D bank. [0.4 each] (1.2)

REFERENCE
GOI-1; pp 2, 14, 15.

ANSWER 7.15 (1.60)

A. If a person is expected to recieve in excess of 50 mrem per day.

B. Always.

C. Always.

D. Always. (1.6)

REFERENCE

RCI-1.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 8.01 (.50)

True. (0.5)

REFERENCE
Tech. Spec. 3/4.8 & 12-20-83 occurrence.

ANSWER 8.02 (1.00)

~~The answer should be~~ no. (1.0)

~~CAF with RCI - 14.~~

REFERENCE
RCI - 14.

ANSWER 8.03 (.75)

~~AI-3, (p8.1~~ No document allows this. (0.75)

REFERENCE

~~AI-3, p8.~~ TI-67.

ANSWER 8.04 (1.75)

RCS: 100 degrees/hour for H/U & C/D.

PZR: 100 degrees/hour for H/U
200 degrees/hour for C/D (1.75)

REFERENCE
Technical Specification 3.4.9.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 8.05 (2.50)

a. Be in Hot Standby within 1 hour. [1.0] Notify NRC Operations Center (Bethesda) immediately (within 1 hour). [0.25] (1.25)

b. Reduce pressure to less than 2735 within 5 minutes. [1.0] Notify NRC Operations Center (Bethesda) immediately (within 1 hour). [0.25] (1.25)

REFERENCE
TS, pp. 2-1 and 6-14.
10 CFR 50, 50.72, pp 50-34 and 34a.

ANSWER 8.06 (3.50)

a. - Restore Tavg to 541 F(or greater) within 15 minutes OR
- Be in hot standby within the next 15 minutes. (1.5)
(Either answer will be accepted)

b. - MTC within analyzed range.

- Protective instrumentation within operating range.

- P-12 interlock above setpoint.

- Pressurizer in operable status with a bubble.

- Rx vessel temperature above minimum RT NDT. [0.4 each] (2.0)

REFERENCE
TS, pp 3/4 1-18 and B 3/4 1-2

ANSWER 8.07 (2.50)

1. Immediately suspend core alterations (unloading fuel) [0.75] AND

2. Commence boration at 10 gpm of 20K ppm boron solution [0.75] UNTIL

a. Keff less than or equal to 0.95 [0.25] OR

b. Boron greater than or equal to 2000 ppm [0.25]

- whichever is most restrictive [0.5] (2.5)

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

REFERENCE
TS, p 3/4 9-1

ANSWER 8.08 (2.00)

	Steady State	Transient
a. 1) Dissolved Oxygen	0.1 ppm	1.0 ppm
2) Chloride	0.15 ppm	1.5 ppm
3) Floride	0.15 ppm	1.5 ppm

(All values are less than or equal to) (0.6)

b. Since (stress) corrosion is time and temperature dependent. time (24 hours) is allowed to restore chemistry parameters prior to taking action. (0.8)

c. Reduce the effects of (stress) corrosion in the RCS. (0.6)

REFERENCE
TS, p 3/4 4-16,17 and B 3/4 4-4.

ANSWER 8.09 (1.50)

If a tube rupture were to occur, a release will be prevented, since the S/G atmospheric relief setpoint will be below the corresponding saturation pressure for 500 F. (1.5)

REFERENCE
TS, pp 3/4 4-23 and B 3/4 4-5.

ANSWER 8.10 (2.50)

a. Either restore the indicated AFD to within the limits within 15 minutes ~~[1.0]~~ [1.25] OR

b. Reduce power to less than 50% within 30 minutes ~~[0.75]~~ [1.25] (and reduce the PR High Flux Trip to less than or equal to 55% within the next 4 hours.) ~~[0.75]~~ (2.5)

REFERENCE
TS p 3/4 2-1.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 8.11 (5.00)

A. 1. Shift Engineer

2. Superintendent

3. Asst. Superintendent (Engineering/Operations)

4. Operations Supervisor

5. Results Supervisor (Engineering Supervisor) (2.5)

B. 1. E

2. A

3. D

4. C

5. B (2.5)

REFERENCE
REF; IP's.

ANSWER 8.12 (1.50)

A. b. (0.5)

B. Not to include 3 members of the minimum shift crew necessary for a safe shutdown of the unit[0.4], or any personnel required for other essential functions during a fire emergency. emergency[0.2] (0.6)

C. 2 hours. (0.4)

Master

U. S. NUCLEAR REGULATORY COMMISSION
REACTOR OPERATOR LICENSE EXAMINATION

FACILITY: SEQUOYAH 1&2

REACTOR TYPE: PWR

DATE ADMINISTERED: 84/05/21

EXAMINER: VINNOLA, A.

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 (.50)

True or False?

The reason that the Moderator Temperature Coefficient becomes less negative when RCS boron concentration is increased is because the thermal utilization factor increases. (0.5)

QUESTION 1.02 (2.00)

A. For a reactor operating at a constant power and temperature, the THERMAL neutron flux near EOL will be (GREATER THAN/SMALLER THAN/ or THE SAME AS) the flux near BOL? (Explain your answer.) (1.0)

B. For a reactor operating at a constant power and temperature, the FAST neutron flux near EOL will be (GREATER THAN/ SMALLER THAN/ or THE SAME AS) the flux near BOL? (Explain your answer.) (1.0)

QUESTION 1.03 (1.00)

Multiple Choice.

You have established a 1 DPM SUR during a reactor startup.

By which of the following factors would power have increased after 30 seconds?

A. 0.693
B. 2.718
C. 3.67
D. 5.0
E. 6.93 (1.0)

QUESTION 1.04 (.50)

Multiple Choice.

The MAJOR source of heat produced in the reactor core five minutes after it has been shut down is:

A. Subcritical multiplication
B. Spontaneous fission
C. Fission product decay
D. Fission caused by delayed neutrons
E. Heat capacity of the metals in the reactor vessel (0.5)

QUESTION 1.05 (2.50)

After a reactor startup from refueling the power level is maintained at 50%.

A. Approximately how much time will it take for the reactor to establish an equilibrium level of Xenon? (0.5)

B. If power level is increased to 100% after three months of 50% power operation, will the Samarium concentration immediately INCREASE/ DECREASE/ or REMAIN UNCHANGED ? (0.5)

C. COMPARE the EQUILIBRIUM concentrations of Samarium for the initial 50% power condition and after the 100% power condition (described in B., above). (0.5)

D. After a shutdown from 100% power operation, when will Xenon AND SAMARIUM reach their respective peak values? (1.0)

QUESTION 1.06 (4.00)

For each of the two transients below, qualitatively explain all of the the reactivity effects that cause reactor power to change throughout the transient.

In your discussion STATE whether reactor power will stabilize HIGHER THAN/ LOWER THAN/ or the SAME AS initial power.

ASSUME:
1. Initial power = 50%
2. Rod control is in the manual mode
3. No operator action
4. End of core cycle
5. Turbine controls are in automatic mode
6. No reactor trip

TRANSIENTS:

1. Steam Generator PORV fails open. (2.0)

2. One Bank D Control rod drops. (Reactor does not trip on negative rate.) (2.0)

QUESTION 1.07 (1.50)

True or False?

A. THE 100% reactor power Departure from Nucleate Boiling Ratio (DNBR) is GREATER THAN 20% reactor power DNBR. (0.5)

B. The point at which the convective heat transfer coefficient is at its MAXIMUM value is called departure from nucleate boiling. (0.5)

C. For a constant temperature difference (Twall-Tsat), if RCS pressure increases, the heat transfer rate (Btu/hr square foot) prior to Departure from Nucleate Boiling decreases. (0.5)

QUESTION 1.08 (2.00)

On the "Pressure/Head vs. Volumetric Flow Rate" curve (attached to the back of the exam) for a centrifugal pump, DRAW and LABEL:

A. Pump curve (0.5)

B. Minimun Net Positive Suction Head Curve (0.5)

C. Available Net Positive Suction Head Curve (0.5)

AND

SHOW where cavitation will occur. (0.5)

QUESTION 1.09 (.50)

True or False?

The isothermal temperature coefficient is NOT definitive in the explanation of reactor core behavior when the reactor core is producing heat. (0.5)

QUESTION 1.10 (1.50)

Multiple Choice.

Following a reactor trip from 100% power, how long should it take before the source range instrumentation would be automatically energized?

A. 9.7 minutes.
B. 12.3 minutes.
C. 18.2 minutes.
D. 23.1 minutes.
E. 55.1 minutes. (1.5)

QUESTION 1.11 (1.00)

Fill in the blanks with increases, decreases or remains unchanged.

Xenon worth__(1)__ and xenon concentration__(2)__ as a function of core burnup. (1.0)

QUESTION 1.12 (.50)

True or False?

The Doppler only power coefficient (PCM/%power) at hot full power becomes more negative during the life of the core (BOL to EOL). (0.5)

QUESTION 1.13 (.50)

True or False?

With all rods out, and a constant boron concentration (ppm), the MTC becomes more negative as RCS temperature (Tavg) increases. (0.5)

QUESTION 1.14 (.50)

True or False?

When comparing a parallel-flow heat exchanger to a counter-flow heat exchanger, the temperature difference between the two fluids along the LENGTH of the heat exchanger tubes is MORE uniform for the parallel-flow heat exchanger. (0.5)

QUESTION 1.15 (.50)

True or False?

The heat transfer rate of a cross-flow heat exchanger, e.g. main condenser, is CONSTANT along the length of the heat exchanger tubes. (0.5)

QUESTION 1.16 (1.50)

Critical Heat Flux (CHF) is defined as the heat flux at which Departure from Nucleate Boiling (DNB) occurs. For an INCREASE in each of the parameters below, tell how the CHF will change. (Consider each parameter seperately.)

(Limit your answer to INCREASE, DECREASE, or REMAINS UNCHANGED.)

A. Reactor Coolant Flow Rate.
B. Reactor Coolant Temperature.
C. Reactor Coolant Pressure. (1.5)

QUESTION 1.17 (.50)

Multiple Choice.

At what area in the core/reactor vessel is the Critical Heat Flux the HIGHEST at steady state 100% power?

A. Bottom of the core.
B. Half way up the core.
C. Top of the core.
D. Near the head area. (0.5)

QUESTION 1.18 (1.00)

Which one of the statements below would indicate that Natural Circulation has been established in the RCS?

A. Delta temperature across the core is increasing and greater than full load delta temperature.

B. Core outlet temperature is increasing and greater than RCS saturation temperature.

C. Steam generator level is increasing with constant auxiliary feedwater flow.

D. Steam generator pressure is decreasing and is near saturation pressure for the RCS temperature. (1.0)

QUESTION 1.19 (1.00)

If you suspected that the RCS pressure indication was incorrect during Mode 1 operation, what other instrument (indication) could be used to determine system pressure? What additional information would you need to determine the system pressure? (1.0)

QUESTION 1.20 (1.00)

Which of the following statements would be CORRECT for a constant speed centrifugal pump? More than one may be correct.

A. As the volume flow rate increases, the pump head increases.

B. As the volume flow rate increases, the amperage decreases.

C. If two centrifugal pumps are in parallel, the combined delivery for a given head is equal to the sum of the individual capacities of the two pumps at that head.

D. For two centrifugal pumps in series, the combined delivery for a given head is equal to the sum of the individual capacities of the two pumps at that head. (1.0)

QUESTION 1.21 (1.00)

A. Explain why fission product gas build-up in the fuel to clad gap causes the Doppler coefficient to become more negative, over the life of the core. (0.5)

B. Does the effect of "clad creep" cause the Doppler coefficient to become MORE or LESS negative, over the life of the core? (0.5)

QUESTION 2.01 (1.00)

Multiple choice.

If operating at 100% power and a vital battery board is lost, a reactor trip will occur. What will be the status of the auxiliary feedwater pumps?

A. All three pumps start.

B. Only one motor driven pump and the Terry turbine start.

C. Both motor driven pumps start and the Terry turbine does NOT start.

D. Only the Terry turbine starts.

E. One motor driven and the Terry turbine start; and the other motor driven starts on S/G low-low level. (1.0)

QUESTION 2.02 (.50)

True or False?

A Unit 2 reactor trip will be caused by the loss of the Unit 2, 125 volt DC battery board number II. (0.5)

QUESTION 2.03 (.50)

True or False?

Each RCP No. 1 seal bypass line has an individual control valve that can be operated from the main control board. (0.5)

QUESTION 2.04 (2.00)

Matching. (More than one valve may or may not close in each situation)

The situations in Column A will cause the turbine valves in Column B to close through the Overspeed Protection Controller (OPC). For each situation in Column A, designate the valve in Column B that will close.

	COLUMN A	COLUMN B
_____	A. Overspeed of 103%	1. HP Turbine Throttle (stop)
_____	B. Overspeed of 109%	2. HP Turbine Governor (control)
_____	C. OPC Test in "test"	3. LP Turbine Reheat Stop
_____	D. Generator Power is 3% less than turbine power	4. LP Turbine interceptor

(2.0)

QUESTION 2.05 (.50)

Briefly describe the action to be taken in order to disable the 103% runback feature during overspeed testing of the Main Turbine? (0.5)

QUESTION 2.06 (1.00)

What are the ~~FOUR~~ Three parameter inputs to the Feed Pump Speed Control Circuit? (1.0)

QUESTION 2.07 (1.10)

In March, 1982 the Chemistry Lab Technician opened the sensing line calibration valve to the level switches on the UHI accumulator to draw the UHI sample. His actions affected the UHI isolation valves.

How were the isolation valves affected AND describe how his action caused the valves to respond the way they did. (1.1)

QUESTION 2.08 (.50)

True or False?

The inoperability of vital inverter 2-II does NOT affect the Unit 1 electrical loads, when Unit 1 is in Mode 1. (0.5)

QUESTION 2.09 (2.00)

What FOUR automatic trips cause the Terry turbine Auxiliary Feedwater Pump steam control valve to shut. In each case designate whether the trip has to be reset manually. (2.0)

QUESTION 2.10 (3.10)

A. When starting a Condensate Booster Pump (CBP) in accordance with your SOI-2.1, what FOUR conditions must be present (met) before the pump will start? (1.4)

B. By turning the CBP hand switch to stop, what FOUR pump and valve actions will automatically occur? (1.7)

QUESTION 2.11 (.50)

While operating at 92% power, the #3 heater drain tank level goes high enough to cause the water in the tank to begin dumping to the condenser. According to SOI's 5.1 & 6.1, what effect will this have on the turbine? (0.5)

QUESTION 2.12 (2.00)

A. If the feedwater turbine condenser drain tank high level dump to condenser valve (LCV-209) opens, does it automatically shut or is manual operator action necessary to shut the valve? (0.5)

B. What THREE conditions must be satisified before the valve, LCV-209, will shut? (1.5)

QUESTION 2.13 (1.00)

If the "Alternate Dilute" method achieves the same objective as the "Dilute" method and gives a quicker response, then why isn't the "Alternate Dilute" method preferred? (1.0)

QUESTION 2.14 (.60)

Assume the letdown control valve (FCV-62-81) is in automatic and controlling RCS pressure in a solid water condition. For each of the following situations state whether RCS pressure will INCREASE, DECREASE, or REMAIN UNCHANGED.

A. A RHR pump is stopped?

B. A RHR pump is started? (0.6)

QUESTION 2.15 (2.00)

When operating the RHR Heat Exchanger outlet flow control valves, FCV-74-16 & FCV-74-28 from the Unit-1 and Unit-2 control rooms, which of the following would be true? (None or more than one may be true.)

A. Reset FCV-74-16 counter-clockwise (to the left) on Unit-1.
B. Reset FCV-74-28 counter-clockwise (to the left) on Unit-1.
C. Reset FCV-74-16 counter-clockwise (to the left) on Unit-2.
D. Reset FCV-74-28 counter-clockwise (to the left) on Unit-2. (2.0)

QUESTION 2.16 (2.50)

A. What specific parameters are used to program the pressure setpoints for the Cold Overpressure Protection system valves;

1. 2-PCV-68-340?

2. 2-PCV-68-334? (1.0)

B. Which of the two valves has the lowest setpoint? (0.5)

C. When is the system activated? (1.0)

QUESTION 2.17 (1.50)

What are the THREE RCS leakage monitoring systems that must be operable when the plant is operating at 100% power? (1.5)

QUESTION 2.18 (1.50)

If a loss of off-site power caused a loss of all RCP's, which RCP should be started first and why? (1.5)

QUESTION 2.19 (1.20)

List FOUR different ways to emergency borate. (1.2)

QUESTION 3.01 (2.00)

TRUE or FALSE?

The following concern the construction and operation of the POWER RANGE NUCLEAR INSTRUMENTATION detector. (No explanation is required.)

A. Each upper and lower detector provides inputs to a delta flux meter, delta flux recorder, and current comparator.

B. Boron-triflourice (BF3) gas is in the outer volume of the detector but not in the inner volume of the detector.

C BF3 gas is in BOTH inner and outer volumes of the detector.

D. The detector uses no compensation circuitry to remove gamma caused current. (2.0)

QUESTION 3.02 (3.00)

a. List THREE Main Feedwater isolation signals. (1.0)

b. What automatic action(s) occur on a feedwater isolation signal? (1.0)

c. What automatically happens as main feed pump suction pressure approaches saturation (low NPSH)? (0.5)

d. What is the setpoint for the "Low NPSH at MFP's" alarm AND what are the sensing point locations for this signal? (0.5)

QUESTION 3.03 (2.80)

Matching.

For each specified power level in Column A, designate the "Low DNBR Trips" in Column B which are NOT automatically blocked at that power level.

Column A (% Power)		Column B	
_____	A. 8	1. OT delta T	
_____	B. 15	2. Turbine Trip	
_____	C. 30	3. Low RCS Flow	
_____	D. 60	4. Low Pressurizer Pressure	(2.8)

QUESTION 3.04 (2.25)

The plant is in Mode 3 with maintenance and surviellance tasks being performed in containment. The #3 steam generator (S/G) steam flow instrument is tripped for maintenance. The Instrument Technician (IT) just completed #3 S/G level instrument calibration, and he calls the control room to recieve permission to calibrate the #2 S/G level instrument. If he was allowed to perform the #2 S/G level instrument calibration, a Saftey Injection may occur, as it did in January 1982.

Why could a Saftey Injection occur? (2.25)

QUESTION 3.05 (2.40)

List all the EIGHT Power Range Channel N44 output bistables that are actuated by a signal from the summing and level amplifier.

INCLUDE the associated trip setpoints. (2.4)

QUESTION 3.06 (.50)

True or False?

The indicated steam generator level would INCREASE if the differential pressure transmitter reference leg temperature decreased by 10 degrees. (ASSUME actual level does NOT change.) (0.5)

QUESTION 3.07 (2.80)

A. What are the FOUR permissives, by number, that allow MANUAL blocking of Safeguards protection? (1.6)

B. What are the THREE permissives, by number, that AUTOMATICALLY block Safeguards protection? (1.2)

QUESTION 3.08 (1.50)

Indicate whether the OT Delta-T AND OP Delta-T SETPOINT will INCREASE, DECREASE or NOT CHANGE if the following operating parameter changes occur. CONSIDER EACH CHANGE INDEPENDENTLY.

1. Pressurizer pressure decreases 100 psig.
2. The N-41 lower detector fails low.
3. Overdilution of the RCS, which causes rods to insert slowly to maintain constant load and Tave. (1.5)

QUESTION 3.09 (3.00)

A. If the turbine trips from an initial power of LESS than 50%, which steam dump controller will control the steam dumps? (1.0)

B. If the turbine trips from an initial power of GREATER than 50%, which steam dump controller will control the steam dumps? (1.0)

C. In addition to being an input to the steam dump controllers, what function does Tave provide in the Steam Dump Control circuitry? (1.0)

QUESTION 3.10 (2.25)

List the protective/control outputs for the following:

A. LOOP Tave Instrument, (FOUR REQUIRED) (1.28)

B. Auctioeered HIGH Tave Instrument, (THREE REQUIRED) (0.97)

QUESTION 3.11 (2.50)

What automatic actions occur upon detection of high radiation in the following radiation monitors?

A. Component Cooling water liquid effluent monitor.

B. Steam Generator blowdown liquid effluent monitor.

C. Containment purge air exhaust monitor.

D. Fuel Pool radiation monitor. (2.5)

4.0 PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL

QUESTION 4.01 (1.60)

One of the contributing problems during the March 25, 1982 over-exposure incident at Zion Nuclear Station was unclear procedures concerning when RWP's are required.

In accordance with Sequoyah procedure RCI-1, when are RWP's required for the following defined areas?

A. Radiation Area

B. High Radiation Area that is not locked

C. Areas where contamination is greater than 200 dpm/cm squared

D. Areas where airborne activity exceeds the limits of RCI-1 Section IV.B, BUT people entering are wearing properly fitted and approved resiratory equipment. (1.6)

QUESTION 4.02 (.75)

What is the maximum background radiation level in which a "frisker" may be used for personnel monitoring? (0.75)

QUESTION 4.03 (2.00)

List the FOUR parameters that have limiting saftey system settings placed on them to ensure the Technical Specification Saftey limit 2.1.1, "Reactor Core", is protected. (2.0)

QUESTION 4.04 (2.00)

A. If the plant was operating in Mode 1 when the RCS pressure exceeds 2735 psig, what action must you take, in accordance with the Technical Specifications? INCLUDE applicable time limit. (1.0)

B. If the plant was in Mode 3 when the RCS pressure exceeds 2735 psig, what action must you take, in accordance with the T. S.? INCLUDE applicable time limit. (1.0)

QUESTION 4.05 (1.50)

If the minimum temperature for criticality Technical Specification is violated, what are the TWO options that you have? (INCLUDE time limitations.) (1.5)

QUESTION 4.06 (4.85)

If a reactor trip "First Out" alarm is recieved AND the control rods do not respond to this signal;

A. What are the THREE immediate operator actions that must be performed in accordance with the ATWS procedure, EOI-14? (2.25)

B. If the main turbine does NOT trip after the three actions are taken in question a. (above), what are FOUR methods that can be used to stop the main turbine? (1.6)

C. What must be done so that the turbine trip and saftey injection (P-4) can be reset? (BE SPECIFIC!) (1.0)

QUESTION 4.07 (2.00)

If a saftey injection occurs AND RCS pressure is 1350 psig, what FIVE items must you check to verify ECCS status? (2.0)

QUESTION 4.08 (2.00)

GOI-6C provides general operating and starting guidance for larger plant motors. Answer the following from information found in this instruction.

a. With regards to OPERATION of the motor, what does a "YELLOW LINE" on the motor ammeter indicate? (1.0)

b. Whose (By job title) permission must be obtained prior to continuous operation of a motor with its ammeter "RED LINE" value exceeded? (0.5)

c. Unless specific guidance from the manufacturer has been provided, how many successive starts may be attempted on a 500 horsepower motor, if the previous attempt(s) to start was/were unsuccessful? (0.5)

QUESTION 4.09 (3.00)

What are the operational limits listed below? (In accordance with SOI-62)

A. Maximum CVCS mixed bed demineralizers FLOWRATE

B. Maximum TEMPERATURE of the water leaving the letdown heat exchanger BEFORE the control bypass valve (TCV-62-79) has to be in the bypass position

C. Maximum oxygen CONCENTRATION in the VCT

D. Maximum fluid outlet TEMPERATURE of the excess letdown heat exchanger

E. Minimum VCT PRESSURE when RCP's are operating

F. Maximum RCP seal injection water TEMPERATURE

[0.5 each] (3.0)

QUESTION 4.10 (2.75)

If the RCP bearing temperature approaches its alarm level (setpoint), your procedures state that the No. 1 seal bypass valve should be opened only if four conditions are met.

A. What is the parameter (indication) that is monitored to determine if the RCP bearing temperature is approaching its alarm level? (0.75)

B. What are the FOUR conditions that must be met before the bypass valve is opened? (2.0)

QUESTION 4.11 (.75)

If Component Cooling water is lost to the RCP's while the RCP'S are operating, when (time) are you required to stop the RCP's? (0.75)

QUESTION 4.12 (1.00)

What are the TWO guidelines from EOI-1 Appendix D which indicate that inadequate core cooling exists? (1.0)

QUESTION 4.13 (.80)

Multiple Choice.

Which one of the following is a symptom of "Rods fail to insert following a decrease in turbine load"?

A. Low pressurizer pressure

B. "Pressurizer level high backup heaters on" alarm

C. "Reactor coolant loops Tref-Tauct. high-low" alarm at +3 F

D. Rod insertion low limit alarm (0.8)

1.8

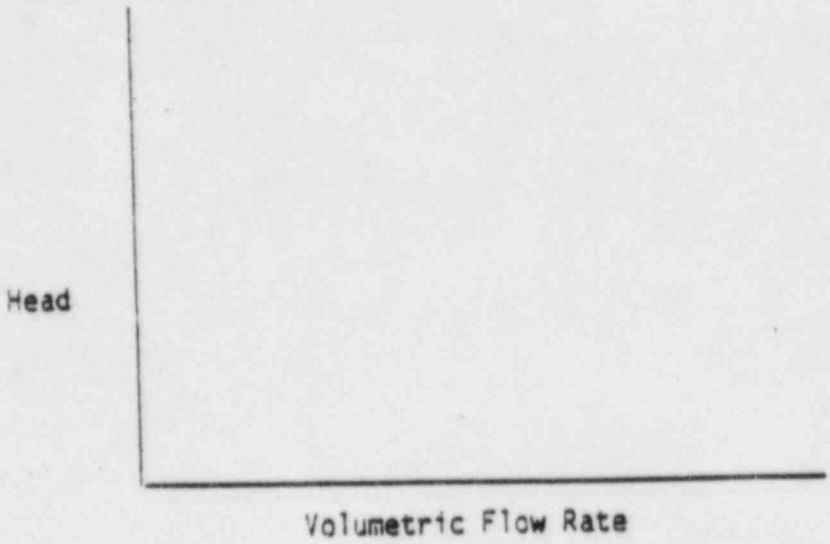


Figure 1.8

master

1.__PRINCIPLES_OF_NUCLEAR_POWER_PLANT_OPERATION,
THERMODYNAMICS,_HEAT_TRANSFER_AND_FLUID_FLOW

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 1.01 (.50)

False (0.5)

REFERENCE
Instructor Notes; Review of Reactivity Coefficients, pp 4, 10.

ANSWER 1.02 (2.00)

A. GREATER THAN; [0.5] Because : the fuel is depleted (Boron decresing) [0.25] the macroscopic cross section of the fuel will decrease and to maintain the same power level the thermal flux must increase. [0.25] (1.0)

B. SAME AS; [0.5] Because fast neutron flux is directly proportional to the power. [0.5] (1.0)

Also accepted: Greater Than, because ratio of prompt to delayed neutrons increase over the life of core

REFERENCE
Reactor Theory Manual, Chapter 3,4

ANSWER 1.03 (1.00)

C. (3.57) (1.0)

REFERENCE
Nuclear Theory Manual; Review of Neutron Kinetics, p9.

ANSWER 1.04 (.50)

C. (0.5)

REFERENCE
Instructor Notes; Review of Neutron Kinetics & Neutron Sources.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 1.05 (2.50)

A. approx. 40 hours. ± 5 (0.5)

B. Decreses. (0.5)

C. Same values. (0.5)

D. Xe: 8-12 hours.
Sm: ~~45-55~~ 12 to 16 days. (1.0)

REFERENCE
Systems Manual; pp 1.1 62-69.
TI -21

ANSWER 1.06 (4.00)

A. 1. + reactivity: from the lowered RCS temp. [.75]
2. - reactivity: from the increased fuel temp. (power increase) [.75]
3. Power stabilizes at a HIGHER level [.5] (2.0)

B. 1. - reactivity: from dropped rod [.5]
2. + reactivity: (a) from the decresed fuel temp. (power decrease) [.25]
(b) from the decreased coolant temp. [.25]
3. - reactivity: from the increased fuel temp. (as power is turned and increases) [.5]
4. Power stabilizes at the same level [.5] (2.0)

REFERENCE
Westinghouse Thermal Science; Ch. 12, pp 38-41.

ANSWER 1.07 (1.50)

A. False. (0.5)

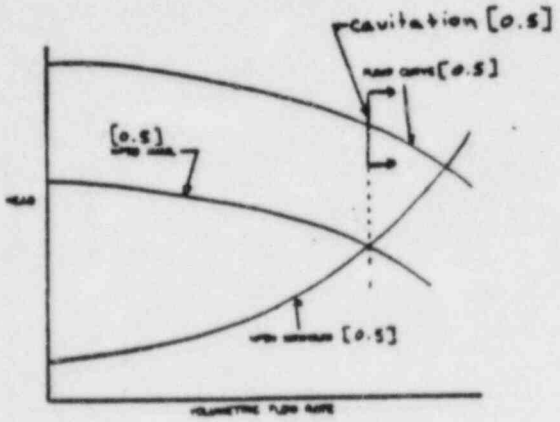
B. True. (0.5)

C. True. (0.5)

REFERENCE
Westinghouse Thermal Science; Ch. 13, pp 17-23.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 1.08 (2.00)



REFERENCE
Westinghouse Thermal Science; Ch. 10, pp 48-49.

ANSWER 1.09 (.50)

True (0.5)

REFERENCE
Instructor Notes; Review of Reactivity Coefficients, pp 4, 10.

ANSWER 1.10 (1.50)

b. (1.5)

REFERENCE
Sequoyah exam bank

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 1.11 (1.00)

Increases Decreases. (1.0)

REFERENCE
Sequoyah exam bank

ANSWER 1.12 (.50)

False. (0.5)

REFERENCE
Instr. Notes; Review of Reactivity Coefficients.

ANSWER 1.13 (.50)

True. (0.5)

REFERENCE
Instr. Notes; Review of Reactivity Coefficients.

ANSWER 1.14 (.50)

False (0.5)

REFERENCE
Westinghouse Thermal Science; Ch. 5, pp 8-15.

ANSWER 1.15 (.50)

False (0.5)

REFERENCE
Westinghouse Thermal Science; Ch. 5, pp 8-15.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 1.16 (1.50)

A. Increase. (0.5)

B. Decrease. (0.5)

C. Increase. (0.5)

REFERENCE
Westinghouse Thermal Science; Ch. 13, pp 33-52.

ANSWER 1.17 (.50)

A. (0.5)

REFERENCE
Westinghouse Thermal Science; Ch. 13, pp 33-52.

ANSWER 1.18 (1.00)

D. (1.00)

REFERENCE
Westinghouse Thermal Science; Ch. 14, p 27. & AOI 35.

ANSWER 1.19 (1.00)

Pressurizer Temperature (steam space) and steam/saturation tables. (1.0)
~~(CAF for Core Saturation Monitor)~~

REFERENCE
Westinghouse Thermal Science, Ch. 2.

ANSWER 1.20 (1.00)

C. (1.0)

REFERENCE

Westinghouse Thermal Science, Ch. 10.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 1.21 (1.00)

A. The gases contaminate the gap which reduces the thermal conductivity of the helium gas which raises the temerature of the fuel. (0.5)

B. LESS negative. (0.5)

REFERENCE
Systems Manual; pp 1.1-18 & 19. Instructor Notes; Reactivity Coefficients, pp 7-9.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 2.01 (1.00)

B. (1.00)

REFERENCE
AOI 21.

ANSWER 2.02 (.50)

False. (0.5)

REFERENCE
AOI 21

ANSWER 2.03 (.50)

False. (0.5)

REFERENCE
Instructor Notes, CVCS, p18.

ANSWER 2.04 (2.00)

A. 2, 4 [0.25 each correct; -0.25 each incorrect]

B. 1, 2, 3, 4 [0.125 each correct]

C. 3, 4 [0.25 each correct; -0.25 each incorrect]

D. 4 [0.5 each correct; -0.5 each incorrect] (2.0)

REFERENCE

Instructor Notes, Turbine Control, p5.

ANSWER 2.05 (.50)

EHC Key switch from "in service" to "overspeed test" (0.5)

REFERENCE
SOI 21

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 2.06 (1.00)

Total steam flow

Steam header pressure

~~Steam generator level~~

Feed water header pressure (1.0)

REFERENCE
Systems Manual, 11.7

ANSWER 2.07 (1.10)

The valves automatically closed,[0.5] because the pressure dropped when the sense line valve was opened and indicated a low level condition which shut the valves.[0.6] (1.1)

REFERENCE

3-18-82, Sequoyah Unit 2 occurrence & systems Manual 4.2.

ANSWER 2.08 (.50)

False. (0.5)

REFERENCE
Tech. Spec. 3/4.8 & 12-20-83 occurrence.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 2.09 (2.00)

1. Mechanical Overspeed (4900 rpm) [0.25] manual reset [0.25]
2. Electrical Overspeed (4300 rpm) [0.25] no manual reset [0.25]
3. Thermal Overload [0.25] manual reset [0.25]
4. Steam supply transfer [0.25] no manual reset [0.25] (2.0)

REFERENCE
Instructor Notes, Aux. Feed, p6.

ANSWER 2.10 (3.10)

A. 1. HS for CBP in P-auto [.2]
2. HS for aux. oil pump in P-auto [.2]
3. oil press. = 12 psig [.5]
4. CBP suction valve fully open [.5] (1.4)

Also accepted: Seal water press = 20psi
Motor winding temp. normal
NDS it cent het
no electrical faults

B. 1. CBP trips [.5]
2. suction valve shuts [.5]
3. aux. oil pump starts [.5]
4. aux. oil pump stops (when suction valve shuts) [.2] (1.7)

REFERENCE
SOI-2.1; p27.
CBP Logic Print

ANSWER 2.11 (.50)

Turbine runback to 85%. [0.3] [0.2] (0.5)

REFERENCE

SOI-5.1 & 6.1; p7.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 2.12 (2.00)

A. Manual operator action is necessary. (0.5)

B. 1. Tank level below setpoint.
2. Local control switch must be in "norm" position.
3. MCR HS to the close position (1.5)

REFERENCE
SOI-5.1 & 6.1; p9.

ANSWER 2.13 (1.00)

Because it reduces the hydrogen concentration in the RCS. (1.0)

REFERENCE
SOI-62.2; p4.

ANSWER 2.14 (.60)

A. Increases

B. Decreases (0.6)

REFERENCE
SOI 74.1A; p3.

ANSWER 2.15 (2.00)

Acc. (2.0)

REFERENCE
SOI 74-1A; pp 5 & 7.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 2.16 (2.50)

A. 1. Wide range hot leg temp.

2. Wide range cold leg temp. (1.0)

B. 2-PCV-68-340 (0.5)

C. When the auctioneering unit is less than 280 F (1.0)

REFERENCE
COPS Handout.

ANSWER 2.17 (1.50)

1. Lower cntmt atmosphere particulate radioactivity monitoring (106A)

2. Cntmt pocket sump level monitoring

3. Lower cntmt atmosphere gaseous activity monitoring (106B) (1.5)

REFERENCE
TS p 3/4 4-13.

ANSWER 2.18 (1.50)

Start #2 RCP first because of the driving head for pressurizer spray. (1.5)

REFERENCE
Sequoyah Exam Bank; #2-13.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 2.19 (1.20)

A. Manual emergency borate valve to the blender.

B. Emergency borate valve in the MCR.

C. Normal boration path to the suction of the CCP's.

D. Divert CCP's suction from VCT to RWST. [Four reqd]

E. Align the CCP's to inject the BIT by opening the motor operated inlet and outlet valves. (1.2)

REFERENCE
SNP Exam Bank; #2-17.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 3.01 (2.00)

a. True.

b. False.

c. False.

d. True. [0.5 each] (2.0)

REFERENCE
Systems Manual, Excore NI's.

ANSWER 3.02 (3.00)

a. 1. High-high level (75%) in any S/G (P-14).
2. SIS.
3. Rx trip with low Tavg (554-F). [0.33 each] (1.0)

b. (Both MFP's trip;) MFRV's and bypass valves close; MFW isolation valves close. (condensate system recirc's to condenser) (1.0)

c. Condensate booster pump (selected for P-auto) starts. (0.5)
(Suction valve opens)

d. 100 psid decreasing; between No. 2 heater shell and MFP suction. (0.5)

REFERENCE
Sequoyah System Description, Section 8, p 6,10; Annunciator Response Vol 1, tab 5, p 29.

ANSWER 3.03 (2.80)

A. 1

B. 1, 4, 3 (if candidate assumes 2 pumps trip)

C. 1, 4

D. 1, 2, 3, 4 [0.7 each; any incorrect, then that part full credit off] (2.8)

REFERENCE
Systems Manual, 11.10-1.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 3.04 (2.25)

With P-12 not blocked [0.75], and S/G #3 flow instrument tripped [0.75] when the instr. tech. calibrates #2 S/G level instr., the pulsations from the back fill pump caused (thru common loops) the steam flow setpoint on #2 S/G to be reached, which now meets the 2/4 coincidence [0.75] (2.25)

REFERENCE
January 1982, Unit 2 Occurrence & Systems Manual 11.10.

ANSWER 3.05 (2.40)

	[0.2 each]	[0.1 each]
1.	Overpower Rod Stop	103%
2.	P-10	10%
3.	P-9	50%
4.	P-8	35%
5.	Overpower trip low	25%
6.	Overpower trip high	109%
7.	Positive Rate trip	+5%/1.3 (sec) T.C.
8.	Negtive Rate trip	-3%/1.3 (sec) T.C.

(2.4)

REFERENCE

Instructor Notes, Excores, pp 5-19.

ANSWER 3.06 (.50)

False. (0.5)

REFERENCE

Systems Manual, 11.7.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 3.07 (2.80)

A. Permissives- 6, 10, 11, 12. (1.6)

B. Permissives- 7, 8, 9. (1.2)

REFERENCE

PLS; pp 7-8.

ANSWER 3.08 (1.50)

	OP Delta-T	OT Delta-T		
1.	no change	decreases		
2.	no change	decreases		
3.	no change	decreases	[0.25 each]	(1.5)

REFERENCE
Sequoyah Technical Specifications p 2-7 - 2-10, 32-4,5.

ANSWER 3.09 (3.00)

A. Load rejection controller (C-7; rate). (1.0)

B. ~~Turbine trip Controller (C-8);~~ (Rx trip, P-4). (1.0)

C. Provides a blocking signal for 9 valves during cooldown below the low-low Tave setpoint (i.e. uncontrolled cooldown). (1.0)

REFERENCE
Instructor Notes; Steam Dump Control System.

ANSWER 3.10 (2.25)

A. 1. Over Temp delta T
2. Over Pwr delta T
3. Low Tave intlk.
4. Low-low Tave intlk.

B. 1. Rod Control
2. Steam Dump Control
3. Pzr Level Control

[.32 each] (2.25)

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

REFERENCE
SNP Exam Bank; 3-6.

ANSWER 3.11 (2.50)

A. Surge tank vent valve shuts.

B. B/D diverted to Con. DI

C. Cntmt. vent isolation.

D. Aux. building isolation & starts aux. building emergency gas treatment. [.625 each] (2.5)

REFERENCE
Systems Manual; Radiation Monitoring, pp 2-25.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 4.01 (1.60)

A. If a person is expected to receive in excess of 50 mrem per day.

B. Always.

C. Always.

D. Always. (1.6)

REFERENCE

RCI-1.

ANSWER 4.02 (.75)

200 cpm. (0.75)

REFERENCE
RCI-1.

ANSWER 4.03 (2.00)

1. Reactor Power

2. Highest loop Tavg

3. PZR Pressure

4. RCS Flow (# of operating loops) (2.0)

Technical Specification 2.1.1.

ANSWER 4.04 (2.00)

A. Be in Hot Standby within one hour. (1.0)

B. Reduce RCS pressure to less than 2735 psig within 5 minutes. (1.0)

4. PROCEDURES - NORMAL, ABNORMAL, EMERGENCY AND RADIOLOGICAL CONTROL

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

REFERENCE
TS, p 2-1.

ANSWER 4.05 (1.50)

1. Restore Tavg > 541 F within 15 Minutes OR

2. Be in Hotstandby within the NEXT 15 minutes (30 min. total elapsed time). (1.5)

REFERENCE
TS, p. 3/4 1-6.

ANSWER 4.06 (4.85)

A. 1. Reactor trip switches to trip, and

2. Trip the breakers powering the control rod drive MG sets, and (at the 480v unit boards)

3. Trip the reactor trip breakers (in the MG set room) (2.25)

B. (Four required for full credit)

1. Turbine manual trip switch in MCR.

2. Manual turbine trip at turbine front standard.

3. Stop and lockout EHC pumps (at EHC pump control station).

4. Shut the MSIV's.

5. Shut the turbine valves. (1.6)

C. Ensure the trip breakers are in the trip position. (1.0)

REFERENCE
EOI-14.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 4.07 (2.00)

1. CCP's running,
2. SI pumps running,
3. RHR pumps running
4. Flow thru the BIT (FT-63-170)
5. SI pump flow (FI-63-20 & 151) (2.0)

REFERENCE
EOI-0, p3.

ANSWER 4.08 (2.00)

a. The (YELLOW LINE) indicates the maximum current value at which normally be operated. (It is called the "effective nameplate rating.") Also accepted: Caution or alarming condition that alerts operator as to excessive current being drawn. (1.0)
b. Plant Superintendant (or his designate). (0.5)
c. TWO (2) (0.5)

REFERENCE
SQNP GOI-6C, pp 7-9

ANSWER 4.09 (3.00)

A. 120 gpm

B. 140 F

C. 5%

D. 205 F

E. 17 psig

F. 130 F [0.5 each] (3.0)

REFERENCE
SOI-62.1A; p3.

ANSWERS -- SEQUOYAH 1&2 -84/05/21-VINNOLA, A.

ANSWER 4.10 (2.75)

A. Seal inlet temperature. ("Lower Radial Bearing" Temp. ind.) (0.75)

B. 1. RCS pressure is between 100 and 1000 psig, AND

2. No. 1 seal leakoff valve is open, AND

3. No. 1 seal leakoff flow rate is less than 1 gpm, AND

4. Seal injection water flow rate to EACH pump is greater than 6 gpm. (2.0)

REFERENCE
GOI-1; p4. SOI 62.13; p6.

ANSWER 4.11 (.75)

within 2 minutes from the time CC water is lost. (0.75)
Immediately upon phase B isolation

REFERENCE
SOI 68.2; p4.
EOI 1

ANSWER 4.12 (1.00)

a. More than four incore T/C's greater than or equal to 1200 F, or

b. Hot leg RTD's pegged high. (1.0)

REFERENCE
EOI-1; App. D, p 1.

ANSWER 4.13 (.80)

B. (0.8)

REFERENCE

AOI-2A; p2.