UNITED STATES NUCLEAR REGULATORY COMMISSION
PRESSURIZED WATER REACTOR GENERIC FUNDAMENTALS EXAMINATION
JUNE 2003--FORM A

Please Print

Name: _____

Facility: _____

Docket No.: _____

Start Time: _____ Stop Time: _____

INSTRUCTIONS TO APPLICANT

Answer all the test items using the answer sheet provided. Each item has equal point value. A score of at least 80% is required to pass this portion of the written licensing examination. All examination papers will be collected 4.0 hours after the examination starts. This examination applies to a typical pressurized water reactor (PWR) power plant.

SECTION	QUESTIONS	% OF TOTAL	SCORE
COMPONENTS	1 - 44		
REACTOR THEORY	45 - 72		
THERMODYNAMICS	73 - 100		
TOTALS	100		

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

_____
Applicant's Signature

RULES AND GUIDELINES FOR THE GENERIC FUNDAMENTALS EXAMINATION

During the administration of this examination the following rules apply:

NOTE: The generic term "control rod" refers to the length of neutron absorber material that can be positioned by the operator to change core reactivity.

1. Print your name in the blank provided on the cover sheet of the examination.

2. Fill in the name of your facility.

3. Fill in your individual docket number.

4. Fill in your start and stop times at the appropriate time.

5. Two aids are provided for your use during the examination:

   (1) An equations and conversions sheet contained within the examination copy, and

   (2) Steam tables provided by your proctor.

6. Place your answers on the answer sheet provided. Credit will only be given for answers properly marked on this sheet. Follow the instructions for filling out the answer sheet.

7. Scrap paper will be provided for calculations.

8. Cheating on the examination will result in the automatic forfeiture of this examination. Cheating could also result in severe penalties.

9. Restroom trips are limited. Only **ONE** examinee may leave the room at a time. In order to avoid the appearance or possibility of cheating, avoid all contact with anyone outside of the examination room.

10. After you have completed the examination, sign the statement on the cover sheet indicating that the work is your own and you have neither given nor received any assistance in completing the examination.

11. Turn in your examination materials, answer sheet on top, followed by the examination booklet, then examination aids - steam table booklets, handouts, and scrap paper used during the examination.

12. After turning in your examination materials, leave the examination area, as defined by the proctor. If after leaving you are found in the examination area while the examination is in progress, your examination may be forfeited.

GENERIC FUNDAMENTALS EXAMINATION
EQUATIONS AND CONVERSIONS HANDOUT SHEET

EQUATIONS

$\dot{Q} = \dot{m}c_p\Delta T$

$\dot{Q} = \dot{m}\Delta h$

$\dot{Q} = UA\Delta T$

$\dot{Q} \propto \dot{m}^3_{Nat\ Circ}$

$\Delta T \propto \dot{m}^2_{Nat\ Circ}$

$K_{eff} = 1/(1 - \rho)$

$\rho = (K_{eff} - 1)/K_{eff}$

$SUR = 26.06/\tau$

$\tau = \dfrac{\overline{\beta} - \rho}{\lambda_{eff}\ \rho}$

$\rho = \dfrac{\ell^*}{\tau} + \dfrac{\overline{\beta}}{1 + \lambda_{eff}\tau}$

$\ell^* = 1 \times 10^{-4}$ sec

$\lambda_{eff} = 0.1\ sec^{-1}$ (for small positive ρ)

$DRW \propto \varphi^2_{tip}/\varphi^2_{avg}$

$P = P_o 10^{SUR(t)}$

$P = P_o e^{(t/\tau)}$

$A = A_o e^{-\lambda t}$

$CR_{S/D} = S/(1 - K_{eff})$

$CR_1(1 - K_{eff1}) = CR_2(1 - K_{eff2})$

$1/M = CR_1/CR_X$

$A = \pi r^2$

$F = PA$

$\dot{m} = \rho A\vec{v}$

$\dot{W}_{Pump} = \dot{m}\Delta P\upsilon$

$E = IR$

Eff. = Net Work Out/Energy In

$\upsilon(P_2 - P_1) + \dfrac{(\vec{v}_2^{\,2} - \vec{v}_1^{\,2})}{2g_c} + \dfrac{g(z_2 - z_1)}{g_c} = 0$

$g_c = 32.2$ lbm-ft/lbf-sec^2

CONVERSIONS

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1 Mw	= 3.41×10^6 Btu/hr	1 Curie	= 3.7×10^{10} dps
1 hp	= 2.54×10^3 Btu/hr	1 kg	= 2.21 lbm
1 Btu	= 778 ft-lbf	1 gal_{water}	= 8.35 lbm
°C	= (5/9)(°F - 32)	1 ft^3_{water}	= 7.48 gal
°F	= (9/5)(°C) + 32		

QUESTION: 1

Given the following pressure specifications for operation of a main steam safety valve (MSSV):

Setpoint pressure (MSSV starts to open): 1200 psia
Maximum pressure (MSSV will be fully open): 1230 psia
Reseat pressure (MSSV will be fully closed): 1140 psia

Which one of the following is the percent blowdown for the MSSV?

A. 2.5%

B. 5.0%

C. 7.5%

D. 10.0%

QUESTION: 2

When manually closing a motor-operated valve, why must the operator avoid using excessive valve seating force?

A. The valve may bind and cause the valve motor to trip on overload during subsequent remote operation.

B. The valve actuator clutch may be damaged and disable subsequent automatic operation.

C. The valve stem limit switches may be damaged and cause inaccurate remote valve position indication.

D. The valve actuator position indicator may be damaged and cause inaccurate local valve position indication.

QUESTION: 3

A typical motor-operated valve (MOV) has just been opened from the main control room, and the breaker for the MOV has been opened. A plant operator has been directed to close the MOV locally for a surveillance test.

If the operator attempts to turn the MOV handwheel in the clockwise direction without first operating the clutch lever, which one of the following will occur?

A. The handwheel will not turn, and the valve stem will not move.

B. The handwheel will turn, but the valve stem will not move.

C. The handwheel will turn, and the valve stem will move toward the closed position because the clutch is automatically engaged when the handwheel is turned.

D. The handwheel will turn, and the valve stem will move toward the closed position because the clutch is automatically engaged when the breaker is opened.

QUESTION: 4

A stop check valve is a type of check valve that...

A. cannot be shut remotely.

B. can be used to prevent flow in both directions.

C. can be opened manually to allow flow in both directions.

D. contains both a gate valve disk and a check valve disk.

QUESTION: 5

A steam flow measuring instrument uses density compensation and square root compensation to convert the differential pressure across the flow element to flow rate in lbm/hr.

The purpose of square root compensation in this flow measuring instrument is to convert _____ to _____.

A. volumetric flow rate; mass flow rate

B. volumetric flow rate; differential pressure

C. differential pressure; mass flow rate

D. differential pressure; volumetric flow rate

QUESTION: 6

The following is the current calibration data for an orifice plate that is being used for water flow rate measurement:

Upstream Pressure:	135 psig
Downstream Pressure:	120 psig
Flow Rate:	100 gpm

During a surveillance the following pressures are observed across the orifice plate:

Upstream Pressure:	124 psig
Downstream Pressure:	117 psig

What is the approximate water flow rate through the orifice plate?

A. 47 gpm

B. 57 gpm

C. 68 gpm

D. 78 gpm

QUESTION: 7

Refer to the drawing of a pressurizer differential pressure (D/P) level detector (see figure below).

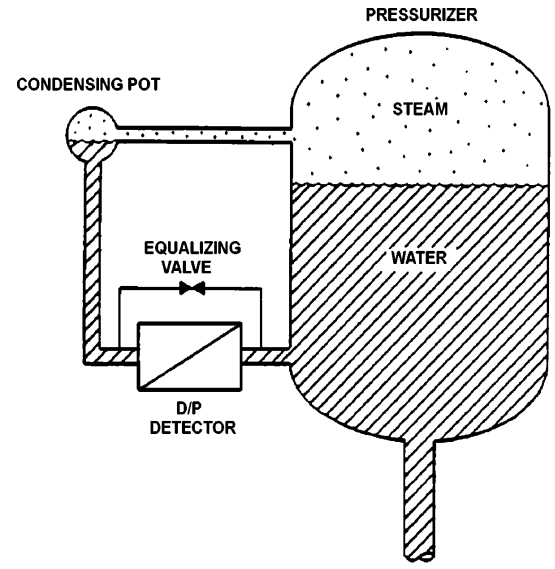
With the plant at normal operating conditions, a pressurizer level D/P instrument, that had been calibrated while the plant was in a cold condition, would indicate _____ than actual level because of a _____ D/P sensed by the D/P detector at normal operating conditions.

A. higher; smaller

B. higher; larger

C. lower; smaller

D. lower; larger



PRESSURIZER DIFFERENTIAL PRESSURE LEVEL DETECTOR

QUESTION: 8

Refer to the drawing of four tank differential pressure (D/P) level detectors (see figure below).

The tanks are identical with equal water levels and both are pressurized to 20 psig. All detectors were calibrated at the current water temperature and 70°F external (ambient) temperature.

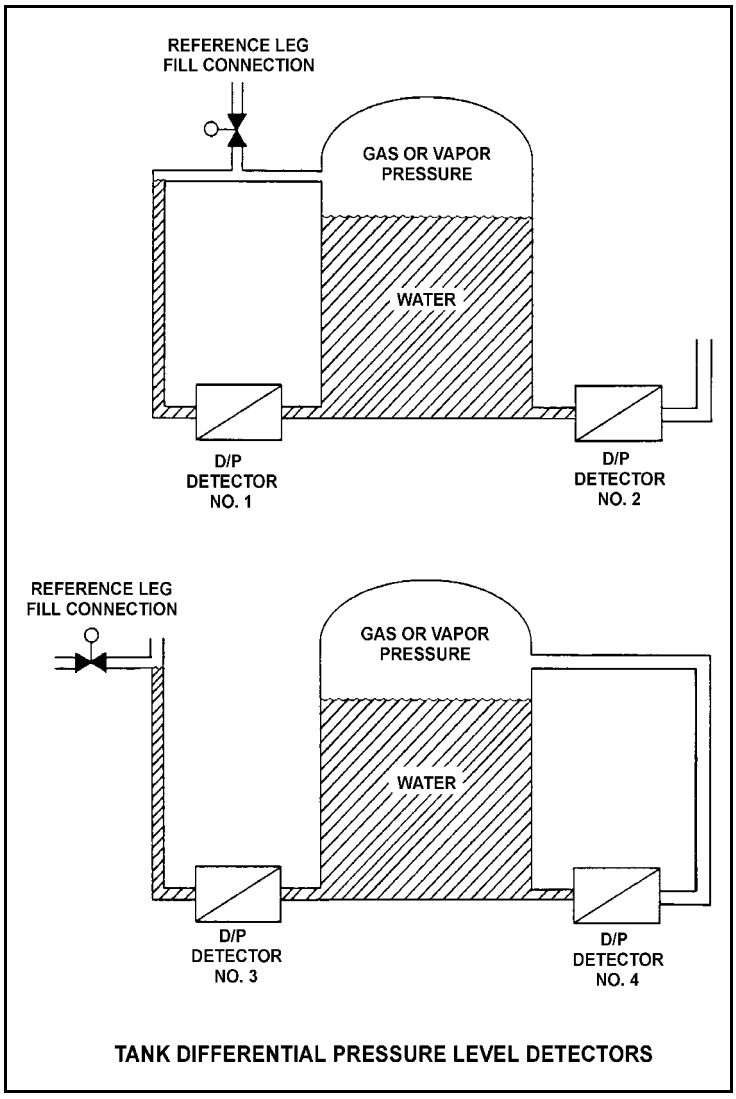
Which detectors will provide the most accurate level indication following an increase in external (ambient) temperature from 70°F to 100°F? (Assume tank contents temperatures and external pressure do not change.)

A. 1 and 3

B. 2 and 4

C. 1 and 4

D. 2 and 3



TANK DIFFERENTIAL PRESSURE LEVEL DETECTORS

QUESTION: 9

A bourdon-tube pressure detector was indicating 50% of scale when it was suddenly exposed to a high-pressure transient that caused permanent strain to the bourdon tube. The detector remained intact and actual pressure was restored to its original value.

During the pressure transient, the affected pressure indication initially went off-scale high. After the original pressure was restored, the indication was...

A. unpredictable.

B. less than 50% of scale.

C. 50% of scale.

D. greater than 50% of scale.

QUESTION: 10

What is the purpose of the reference junction panel that is provided with many thermocouple circuits?

A. Ensures that thermocouple output is amplified sufficiently for use by temperature indication devices.

B. Ensures that only temperature changes at the thermocouple measuring junction affect thermocouple temperature indication.

C. Ensures that electrical noise in the thermocouple extension wires does not affect thermocouple temperature indication.

D. Ensures that different lengths of thermocouple extension wires do not affect thermocouple temperature indication.

QUESTION: 11

Refer to the simplified drawing of an example control rod position detector (see figure below).

Coils of wire connected to an ac power supply are being used to monitor the position of a control rod in a reactor. The coils are mounted in a column outside the reactor vessel head such that the steel control rod drive shaft passes upward through the coils as the control rod is withdrawn. Currently, the top of a control rod drive shaft is located between coils A and B as shown. The control rod is to be withdrawn until the top of the control rod drive shaft is located just below coil C.

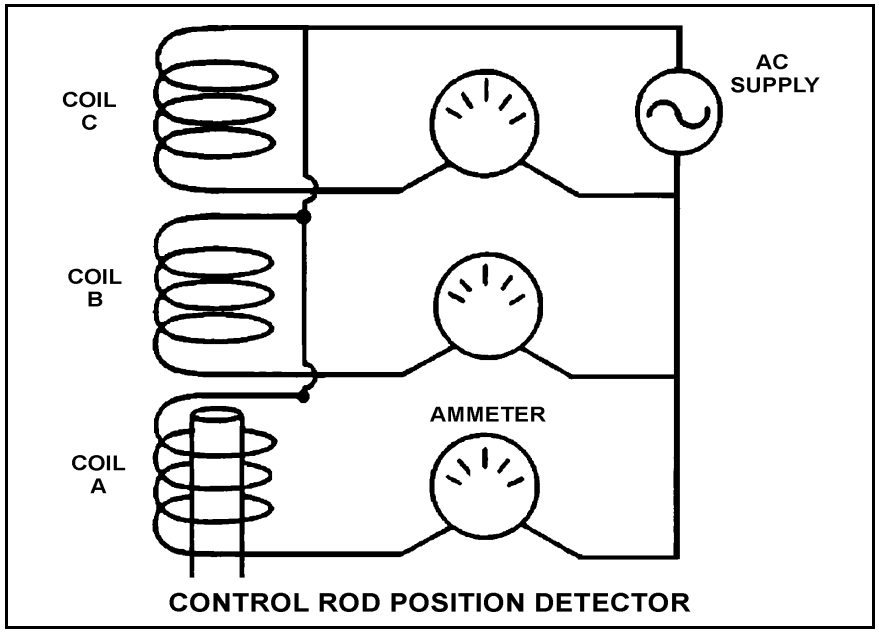
Compared to the initial coil output currents, after the control rod is withdrawn, the output current of coil A will be _____ and the output current of coil B will be _____.

A. higher; higher.

B. higher; lower.

C. the same; higher.

D. the same; lower.



QUESTION: 12

A reactor is shut down at 100 cps in the source range when a loss of coolant accident occurs. How will excore source range neutron level indication change as homogeneous core voiding increases from 80% to 100%?

A. Decreases because K_{eff} is decreasing.

B. Increases because K_{eff} is increasing.

C. Decreases because a smaller fraction of the core neutron population is leaking out of the core.

D. Increases because a larger fraction of the core neutron population is leaking out of the core.

QUESTION: 13

A boron trifluoride (BF_3) detector (proportional counter) is normally used to monitor only source range core neutron level. How will the detector and source range count rate indication be affected if normal detector high voltage is inadvertently applied during reactor operation in the power range?

A. The BF_3 gas will become completely ionized and source range indication will stabilize at a constant low value.

B. The BF_3 gas will become completely ionized and source range indication will stabilize at a constant high value.

C. The detector electrodes will become exposed to an extremely high neutron flux and cause a false high reading on the source range indication.

D. The detector electrodes will become exposed to an extremely high gamma flux and cause a false high reading on the source range indication.

QUESTION: 14

During reactor power operation, a reactor coolant sample is taken and analyzed. Which one of the following lists three radionuclides that are all indicative of a fuel cladding failure if detected in elevated concentrations in the reactor coolant sample?

A. Lithium-6, cobalt-60, and argon-41

B. Iodine-131, cesium-138, and strontium-89

C. Nitrogen-16, xenon-135, and manganese-56

D. Hydrogen-2 (deuterium), hydrogen-3 (tritium), and oxygen-18

QUESTION: 15

A flow controller has proportional, integral, and derivative control features. Which one of the following lists the effect on the control features when the controller is switched from the automatic mode to the manual mode?

A. Only the derivative feature will be lost.

B. Only the integral and derivative features will be lost.

C. All proportional, integral, and derivative features will be lost.

D. All control features will continue to influence the controller output.

QUESTION: 16

Refer to the drawing of a pressure bistable in an alarm circuit (see figure below).

The orientation of the bistable symbol indicates the characteristics of the bistable, as is normal for a control circuit diagram. The bistable turns on to actuate an alarm at a system pressure of 100 psig. The bistable has a 5 psig dead band, or neutral zone.

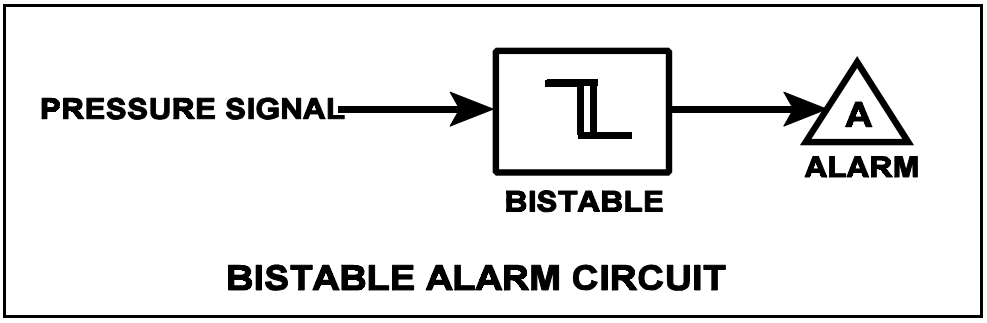
If current system pressure is 90 psig, which one of the following describes the alarm response as system pressure is slowly increased to 110 psig?

A. The alarm is currently actuated and will turn off at 95 psig.

B. The alarm will actuate at 100 psig and will not turn off.

C. The alarm is currently actuated and will turn off at 105 psig.

D. The alarm will actuate at 100 psig and will turn off at 105 psig.



BISTABLE ALARM CIRCUIT

QUESTION: 17

Which one of the following describes a characteristic of pneumatic valve positioners?

A. They can provide automatic and manual demand signals to valve controllers and valve actuators.

B. They can automatically increase or decrease air pressure to valve actuators to obtain the proper valve response.

C. They can either receive or supply air to/from valve controllers, depending on the direction of valve travel.

D. They can amplify air pressure to valve actuators above existing main air header pressure.

QUESTION: 18

A diesel generator is supplying an isolated electrical bus with the governor operating in the isochronous mode. If a large electrical load is started on the bus, generator frequency will...

A. initially decrease, then increase and stabilize below the initial value.

B. initially decrease, then increase and stabilize at the initial value.

C. initially decrease, then increase and stabilize above the initial value.

D. remain constant during and after the load start.

QUESTION: 19

A proportional-derivative controller senses an increase in the controlled parameter above the controller set point. The derivative function causes the controller output signal to...

A. increase until the controlled parameter equals the controller set point, at which time the output signal becomes constant.

B. remain directly proportional to the difference between the controlled parameter and the controller set point.

C. increase until the controlled parameter equals the controller set point, at which time the output signal becomes zero.

D. change at a rate that is directly proportional to the rate of change of the controlled parameter.

QUESTION: 20

Which one of the following contains indications of cavitation for an operating centrifugal pump?

A. Low flow rate with low discharge pressure

B. Low flow rate with high discharge pressure

C. High motor amps with low discharge pressure

D. High motor amps with high discharge pressure

QUESTION: 21

A variable-speed centrifugal fire water pump is taking a suction on an open storage tank and discharging through a 4-inch diameter fire hose and through a nozzle located 50 feet above the pump.

Which one of the following will cause the pump to operate at shutoff head?

A. The fire hose is replaced with a 6-inch diameter fire hose.

B. The fire hose is replaced with a 2-inch diameter fire hose.

C. Pump speed is increased until steam formation at the eye of the impeller prevents pump flow.

D. Pump speed is decreased until pump discharge pressure is insufficient to cause flow.

QUESTION: 22

Refer to the drawing of a centrifugal pump operating curve (see figure below).

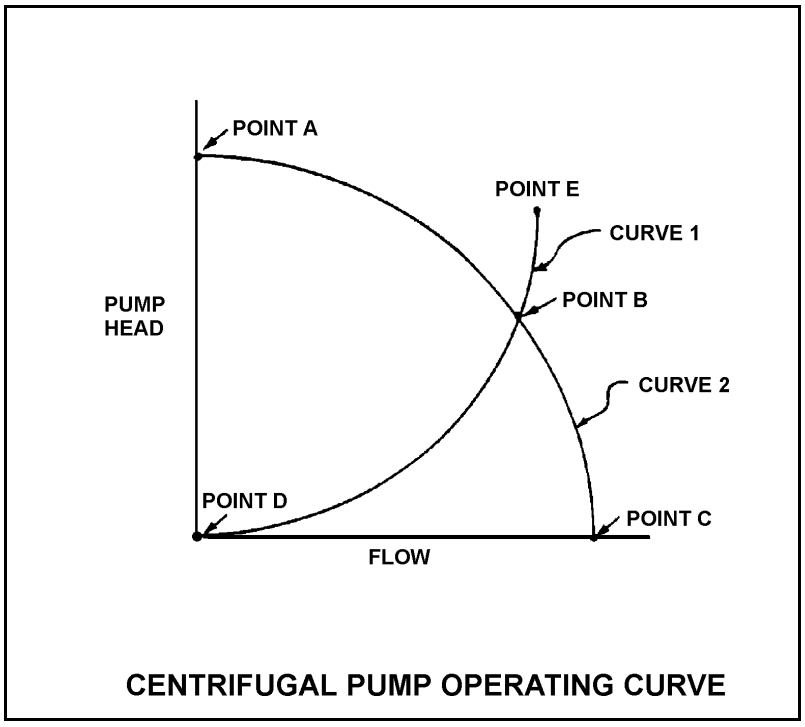
A centrifugal pump is currently operating at point B. If the pump speed is reduced by one-half, the new operating point will be located on curve _____, closer to point _____. (Assume that no other changes occur in the system.)

A. 1; D

B. 2; A

C. 1; E

D. 2; C



CENTRIFUGAL PUMP OPERATING CURVE

QUESTION: 23

A centrifugal pump is operating at rated conditions in an open system with all valves fully open. If the pump discharge valve is throttled to 50%, pump suction pressure will _____ and pump discharge pressure will _____.

A. increase; decrease

B. decrease; increase

C. increase; increase

D. decrease; decrease

QUESTION: 24

Which one of the following specifies the proper pump discharge valve position and the basis for that position when starting a large centrifugal pump?

A. Discharge valve fully open to reduce motor power requirements

B. Discharge valve throttled to reduce motor power requirements

C. Discharge valve fully open to ensure adequate pump net positive suction head

D. Discharge valve throttled to ensure adequate pump net positive suction head

QUESTION: 25

A section of reactor coolant piping is being hydrostatically tested to 2,900 psig using a positive displacement pump. The operating characteristics of the positive displacement pump are shown below, identifying ideal, expected, and actual pump performance during the test.

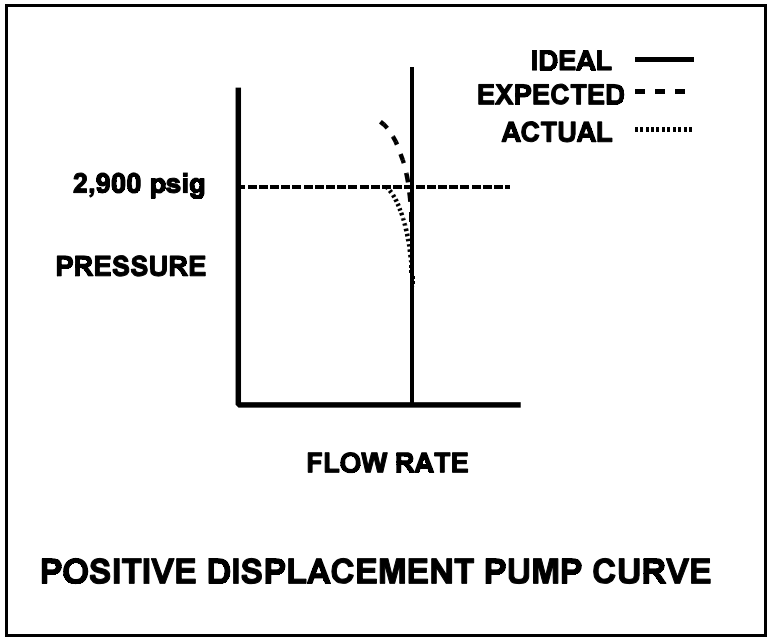
Which one of the following could have caused the observed difference between the expected and the actual pump performance?

A. Available NPSH decreased to slightly above the required NPSH for the pump.

B. Available NPSH decreased to slightly below the required NPSH for the pump.

C. A relief valve on the pump discharge piping failed to open at its set point of 2,900 psig.

D. A relief valve on the pump discharge piping opened prior to its set point of 2,900 psig.



POSITIVE DISPLACEMENT PUMP CURVE

QUESTION: 26

What is the purpose of the safety/relief valve located between the pump outlet and the discharge isolation valve of most positive displacement pumps?

A. Protect the pump and suction piping from overpressure if the discharge valve is open during system startup.

B. Protect the pump and suction piping from overpressure if the suction valve is closed during pump operation.

C. Protect the pump and discharge piping from overpressure if the discharge valve is closed during pump operation.

D. Protect the pump and discharge piping from overpressure due to thermal expansion of pump contents when the pump is shutdown with its suction valve closed.

QUESTION: 27

A reactor plant is operating normally at 80% power when a reactor coolant pump (RCP) shaft seizes. Which one of the following indications would <u>not</u> accompany the seized shaft?

A. Reactor coolant system pressure transient.

B. Reactor trip on low reactor coolant system flow rate.

C. Decreased flow rate in the remaining reactor coolant loop(s).

D. Increased current to the affected RCP with possible breaker trip.

QUESTION: 28

If the generator bearings on a motor-generator begin to overheat from excessive friction, which one of the following will occur next?

A. Generator current will begin to increase.

B. Generator windings will begin to heat up.

C. Motor current will begin to decrease.

D. Motor windings will begin to heat up.

QUESTION: 29

A diesel generator (D/G) is supplying an electrical bus that is connected to an infinite power grid. Assuming D/G terminal voltage and bus frequency do not change, if the D/G governor set point is increased from 60.0 Hz to 60.1 Hz, D/G kVAR load will _____ and D/G amps will _____.

A. increase; increase

B. increase; remain the same

C. remain the same; increase

D. remain the same; remain the same

QUESTION: 30

A rotary positive displacement pump (PDP) is being used to supply water to a piping system. The PDP is driven by an ac induction motor. The initial parameters are:

System pressure: 500 psig
PDP flow rate: 50 gpm
PDP motor current: 40 amps

After several hours, the PDP motor speed is increased such that the new PDP flow rate is 100 gpm. If system pressure does not change, what is the approximate value of the PDP motor current at the 100 gpm flow rate?

A. 80 amps

B. 160 amps

C. 320 amps

D. 640 amps

QUESTION: 31

The starting current in a typical ac induction motor is significantly higher than the full-load running current because...

A. starting torque is lower than running torque.

B. starting torque is higher than running torque.

C. rotor speed during start is too low to generate sufficient counter electromotive force (CEMF) in the stator.

D. rotor current during start is too low to generate sufficient CEMF in the stator.

QUESTION: 32

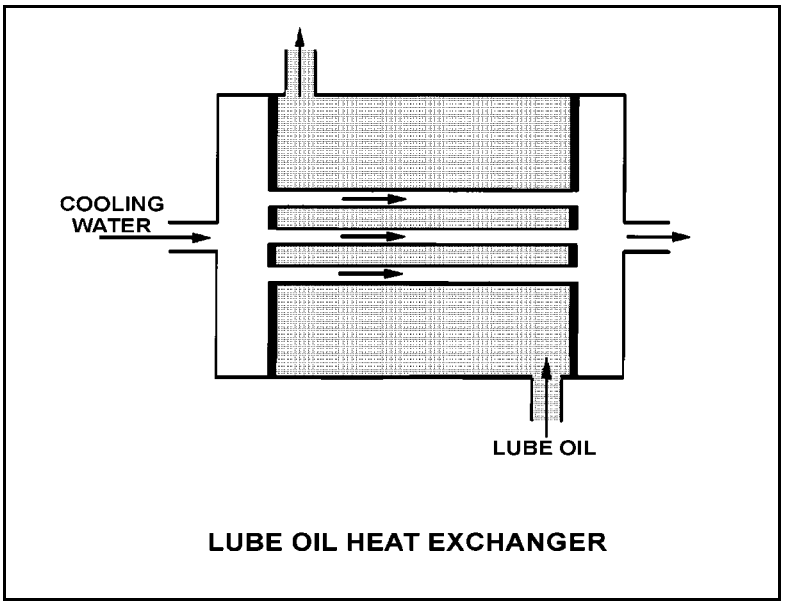
Refer to the drawing of a lube oil heat exchanger (see figure below).

The lube oil heat exchanger is in service with the following inlet temperatures:

Lube oil inlet temperature: 130°F
Cooling water inlet temperature: 70°F

Assume that cooling water mass flow rate is less than lube oil mass flow rate, and that both fluids have the same specific heat. Which one of the following pairs of heat exchanger outlet temperatures is not possible?

	Lube Oil Outlet Temp	Cooling Water Outlet Temp
A.	100°F	105°F
B.	105°F	105°F
C.	110°F	90°F
D.	115°F	90°F



QUESTION: 33

Steam has been admitted to a condenser for 25 minutes with no cooling water during a condenser startup. Initiating full cooling water flow rate at this time will...

A. reduce the stress on the condenser shell by rapidly cooling the shell.

B. reduce the stress on the condenser tubes by rapidly cooling the tubes.

C. induce large thermal stresses on the condenser shell.

D. induce large thermal stresses on the junctions between the condenser tubes and the tubesheet.

QUESTION: 34

A nuclear power plant is operating near rated power with the following initial conditions:

Main steam pressure: 900 psia
Main steam quality: 100%, saturated vapor
Main condenser pressure: 1.0 psia

Air leakage into the main condenser results in the main condenser pressure increasing and stabilizing at 2.0 psia. Assume that all main steam parameters (e.g., pressure, quality, and mass flow rate) remain the same and that the main turbine efficiency remains at 100%.

Which one of the following is the approximate percent by which the main generator output will decrease as a result of the main condenser pressure increase?

A. 5.0%

B. 6.3%

C. 7.5%

D. 8.8%

QUESTION: 35

A higher than expected differential pressure across an operating demineralizer will be caused by...

A. depletion of the cation resin.

B. channeling through the resin bed.

C. insufficient resin backwash.

D. decreased demineralizer outlet conductivity.

QUESTION: 36

Refer to the drawing of a parallel demineralizer loop that is currently aligned for normal flow direction through the demineralizer (see figure below).

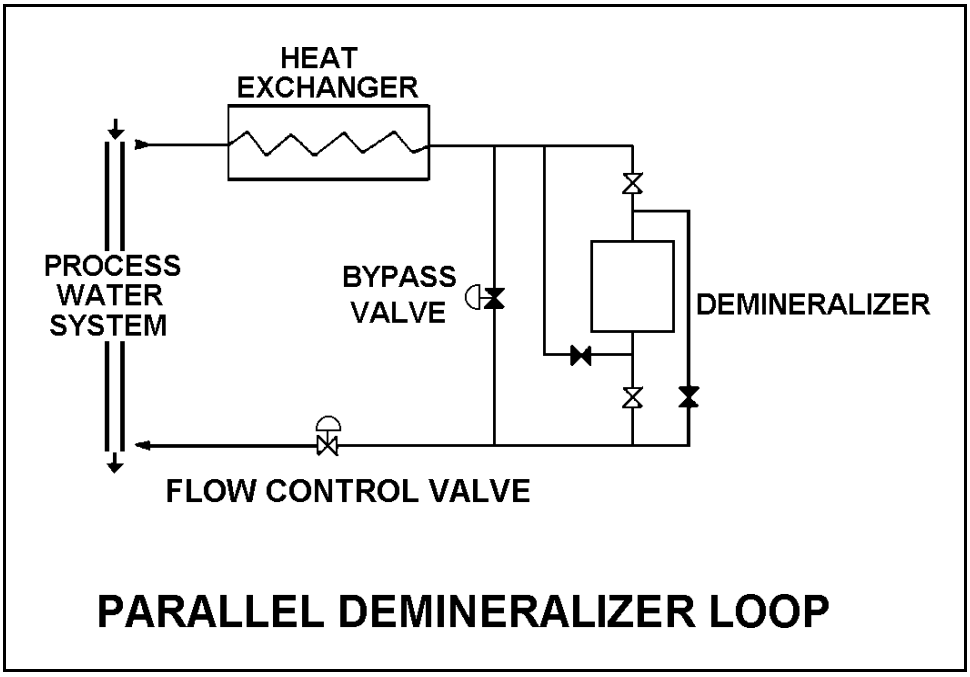
Which one of the following is most likely to cause a decrease in the demineralizer decontamination factor for ionic impurities?

A. Divert 50% of the demineralizer loop flow to bypass the demineralizer.

B. Decrease the process water system pressure from 125 psig to 115 psig.

C. Decrease the flow rate in the demineralizer loop from 105 gpm to 95 gpm.

D. Decrease the temperature in the demineralizer loop from 110°F to 100°F.



QUESTION: 37

Prior to a scheduled plant shutdown, the reactor coolant system was chemically shocked to induce a crud burst. What effect will this have on the letdown purification demineralizers?

A. Decreased radiation levels around the demineralizers

B. Increased flow rate through the demineralizers

C. Decreased demineralizer outlet conductivity

D. Increased pressure drop across the demineralizers

QUESTION: 38

To completely deenergize a component and its associated control and indication circuits, the component breaker should be...

A. open with the control switch in Pull-To-Lock.

B. open with the control switch tagged in the open position.

C. racked out and tagged in racked-out position.

D. racked out with control power fuses removed.

QUESTION: 39

How is typical breaker operation affected when the associated breaker control power transfer switch is placed in the "Local" position?

A. Control power will be available to provide protective trips, and the breaker can be electrically operated only from the control room.

B. Control power will be removed from both the open and close circuits, and the breaker can be electrically operated only from the control room.

C. Control power will be available to provide protective trips, and the breaker can be electrically operated only from the breaker cabinet.

D. Control power will be removed from both the open and close circuits, and the breaker can be electrically operated only from the breaker cabinet.

QUESTION: 40

Refer to the drawing of a valve control circuit (see figure below). Note: Limit switch (LS) contacts are shown open regardless of valve position, but relay contacts follow the standard convention for control circuit drawings.

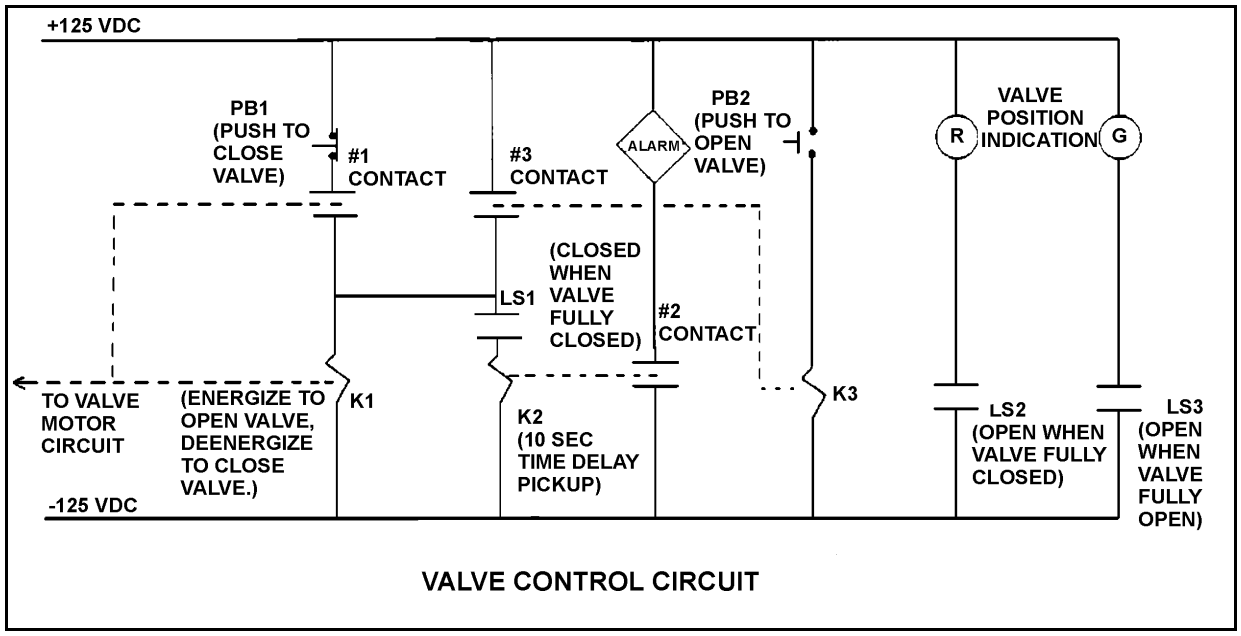
Pushbutton PB2 has been momentarily depressed and then released, and the valve is currently at mid-stroke and moving to the open position. Under these conditions, which one of the following describes the position of contacts #1, #2, and #3?

A. #1 closed; #2 open; #3 open

B. #1 open; #2 closed; #3 closed

C. #1 open; #2 open; #3 open

D. #1 closed; #2 closed; #3 closed



VALVE CONTROL CIRCUIT

QUESTION: 41

Which one of the following is an unsafe practice if performed when working on or near energized electrical equipment?

A. Cover exposed energized circuits with insulating material to prevent inadvertent contact.

B. Have a person standing by to deenergize the equipment in the event of an emergency.

C. Use two hands for balance and to prevent dropping tools onto energized equipment.

D. Stand on insulating rubber material to prevent yourself from being grounded.

QUESTION: 42

A main generator is about to be connected to an infinite power grid. Closing the generator output breaker with the generator voltage slightly lower than grid voltage and with generator frequency slightly higher than grid frequency will initially result in... (Assume no generator breaker protective trip occurs.)

A. the generator picking up reactive load from the grid.

B. the generator attaining a leading power factor.

C. the generator shedding real load to the grid.

D. motoring of the generator.

QUESTION: 43

Which one of the following functions or capabilities would remain following a loss of control power to a typical 480 Vac bus feeder breaker?

A. Remote breaker control capability

B. Breaker closing spring automatic recharging capability

C. Remote bus voltage indication

D. Remote breaker position indication

QUESTION: 44

Refer to the simplified drawing of an electrical distribution system showing 7.2 KV switchgear, step-down transformers, and 480 V motor control centers (MCCs) (see figure below). The high voltage side of each step-down transformer has a remote-operated disconnect. The control circuit for each disconnect is position-interlocked with the associated MCC feeder breaker.

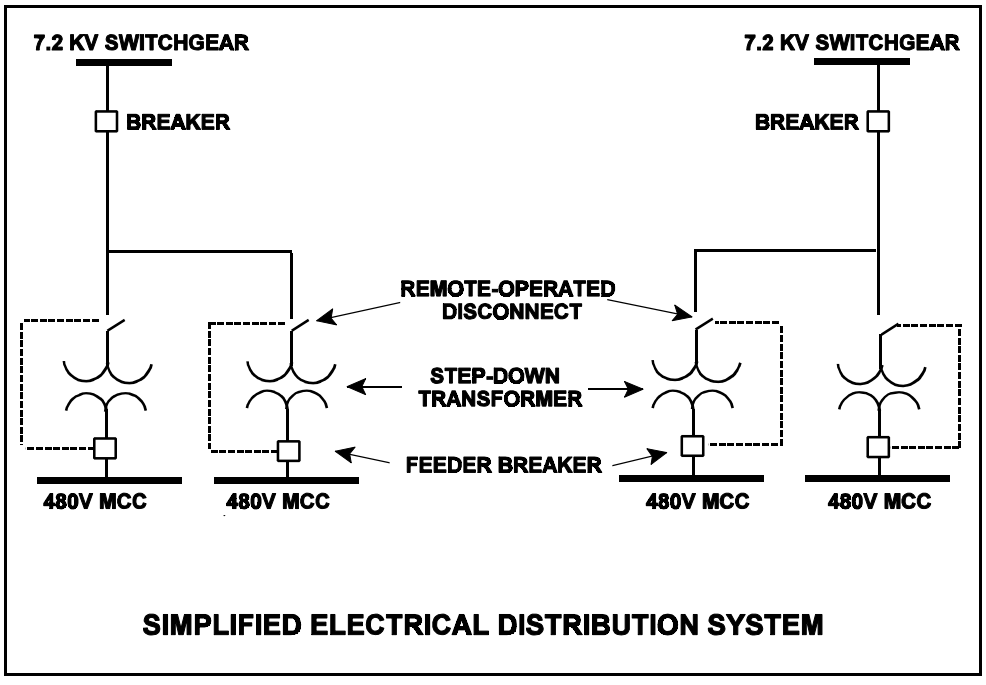
Which one of the following describes the interlock operating scheme that will provide the greatest protection for the disconnect?

A. Permits opening the feeder breaker only if the disconnect is closed.

B. Permits opening the feeder breaker only if the disconnect is open.

C. Permits opening the disconnect only if the feeder breaker is closed.

D. Permits opening the disconnect only if the feeder breaker is open.



SIMPLIFIED ELECTRICAL DISTRIBUTION SYSTEM

QUESTION: 45

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the delayed neutron is more likely to...

A. cause fast fission in the reactor fuel.

B. be captured by the moderator.

C. cause thermal fission in the reactor fuel.

D. be detected by excore nuclear instrumentation.

QUESTION: 46

The operator has just pulled control rods and changed the effective multiplication factor (K_{eff}) from 0.998 to 1.002. The reactor is...

A. prompt critical.

B. supercritical.

C. exactly critical.

D. subcritical.

QUESTION: 47

A nuclear plant has just completed a refueling outage. Reactor engineers have predicted a control rod configuration at which the reactor will become critical during the initial reactor startup following the refueling outage based on the expected core loading. However, the burnable poisons scheduled to be loaded were inadvertently omitted.

Which one of the following describes the effect of the burnable poison omission on achieving reactor criticality during the initial reactor startup following the refueling outage?

A. The reactor will become critical before the predicted critical control rod configuration is achieved.

B. The reactor will become critical after the predicted critical control rod configuration is achieved.

C. The reactor will be unable to achieve criticality because the fuel assemblies contain insufficient positive reactivity to make the reactor critical.

D. The reactor will be unable to achieve criticality because the control rods contain insufficient positive reactivity to make the reactor critical.

QUESTION: 48

A step positive reactivity addition of 0.001 ΔK/K is made to a reactor with a stable neutron population and an initial core K_{eff} of 0.99. Consider the following two cases:

Case 1: The reactor is near the beginning of core life.
Case 2: The reactor is near the end of core life.

Assume the initial core neutron population is the same for each case. Which one of the following correctly compares the prompt jump in core neutron population and the final stable core neutron population for the two cases?

A. The prompt jump will be greater for case 1, but the final stable neutron population will be the same for both cases.

B. The prompt jump will be greater for case 2, but the final stable neutron population will be the same for both cases.

C. The prompt jump will be the same for both cases, but the final stable neutron population will be greater for case 1.

D. The prompt jump will be the same for both cases, but the final stable neutron population will be greater for case 2.

QUESTION: 49

A reactor is operating at equilibrium 75% power with the following conditions:

Total power defect	= -0.0176 ΔK/K
Shutdown margin	= 0.0234 ΔK/K
Effective delayed neutron fraction	= 0.0067
Effective prompt neutron fraction	= 0.9933

How much positive reactivity must be added to make the reactor "prompt critical"?

A. 0.0067 ΔK/K

B. 0.0176 ΔK/K

C. 0.0234 ΔK/K

D. 0.9933 ΔK/K

QUESTION: 50

Refer to the drawing of a curve showing the neutron absorption characteristics of a typical U-238 nucleus at a resonance neutron energy (see figure below). The associated reactor is currently operating at steady-state 80% power.

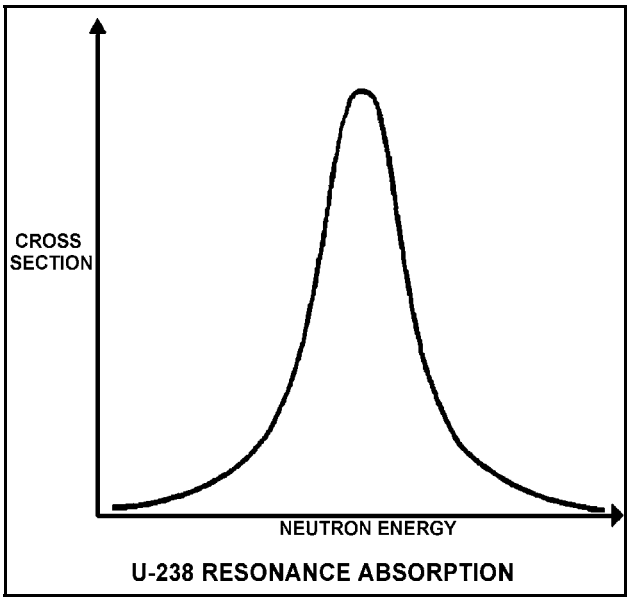
During a subsequent reactor power decrease to 70%, the curve will become _____; and the percentage of the core neutron population lost to resonance capture by U-238 will _____.

A. taller and more narrow; decrease

B. taller and more narrow; increase

C. shorter and broader; decrease

D. shorter and broader; increase



QUESTION: 51

The following are the initial conditions for a nuclear power plant:

Reactor power is 50%.
Average reactor coolant temperature is 570°F.

After a power increase, current plant conditions are as follows:

Reactor power is 80%.
Average reactor coolant temperature is 582°F.

Assume that the initial and current reactor coolant boron concentrations are the same. Which one of the following describes the current differential boron worth (DBW) in comparison to the initial DBW?

A. The current DBW is more negative because a 1°F increase in reactor coolant temperature will remove more boron-10 atoms from the core.

B. The current DBW is more negative because a 1 ppm increase in reactor coolant boron concentration will add more boron-10 atoms to the core.

C. The current DBW is less negative because a 1°F increase in reactor coolant temperature will remove fewer boron-10 atoms from the core.

D. The current DBW is less negative because a 1 ppm increase in reactor coolant boron concentration will add fewer boron-10 atoms to the core.

QUESTION: 52

Given the following initial parameters:

Total power coefficient	= -0.020% ΔK/K/%
Boron worth	= -0.010% ΔK/K/ppm
Rod worth	= -0.025% ΔK/K/inch inserted
Initial reactor coolant system (RCS) boron concentration	= 600 ppm

Which one of the following is the final RCS boron concentration required to support increasing plant power from 40% to 80% by boration/dilution with 40 inches of outward control rod motion? (Assume no change in core xenon -135 reactivity.)

A. 420 ppm

B. 580 ppm

C. 620 ppm

D. 780 ppm

QUESTION: 53

Neglecting the effects of changes in core Xe-135, which one of the following power changes requires the smallest amount of positive reactivity addition?

A. 3% power to 10% power

B. 10% power to 15% power

C. 15% power to 30% power

D. 30% power to 40% power

QUESTION: 54

Which one of the following expresses the relationship between differential rod worth (DRW) and integral rod worth (IRW)?

A. IRW is the slope of the DRW curve.

B. IRW is the inverse of the DRW curve.

C. IRW is the sum of the DRWs between the initial and final control rod positions.

D. IRW is the sum of the DRWs of all control rods at any specific control rod position.

QUESTION: 55

One purpose of using control rod bank/group overlap is to...

A. provide adequate shutdown margin.

B. provide a more uniform differential rod worth.

C. allow dampening of xenon-induced flux oscillation.

D. ensure control rod insertion limits are <u>not</u> exceeded.

QUESTION: 56

If core quadrant power distribution (sometimes referred as quadrant power tilt or azimuthal tilt) is maintained within design limits, which one of the following conditions is most likely?

A. Axial power distribution is within design limits.

B. Radial power distribution is within design limits.

C. Nuclear instrumentation is indicating within design accuracy.

D. Departure from nucleate boiling ratio is within design limits.

QUESTION: 57

Why are control rod insertion limits established for power operation?

A. To minimize the worth of a postulated dropped control rod.

B. To maintain a negative moderator temperature coefficient in the reactor.

C. To provide adequate shutdown margin after a reactor scram.

D. To ensure sufficient positive reactivity is available to compensate for the remaining power defect.

QUESTION: 58

A reactor has been operating at 100% power for several weeks with a symmetrical axial power distribution that is peaked at the core midplane. Reactor power is reduced to 50% using boration to control reactor coolant temperature while maintaining control rods fully withdrawn.

During the power reduction, the axial power distribution will...

A. shift toward the top of the core.

B. shift toward the bottom of the core.

C. peak at the top and the bottom of the core.

D. remain symmetrical and peaked at the core midplane.

QUESTION: 59

A reactor has been shut down for 5 days to perform maintenance. A reactor startup is performed and power is ramped to 75% over a 16 hour period.

When power reaches 75%, the concentration of core xenon-135 will be...

A. decreasing toward an upturn.

B. increasing toward a peak value.

C. decreasing toward an equilibrium value.

D. increasing toward an equilibrium value.

QUESTION: 60

A reactor has been operating at 100% power for eight weeks when a reactor trip occurs. The reactor is critical 6 hours later and power is increased to 100% over the next 6 hours.

What is the status of core xenon-135 concentration when power reaches 100%?

A. Increasing toward an equilibrium value.

B. Burning out faster than it is being produced.

C. Increasing toward a peak value.

D. At equilibrium.

QUESTION: 61

A reactor plant is initially operating at equilibrium 100% power in the middle of a fuel cycle. The operators decrease main generator load while adding boric acid to the RCS over a period of 30 minutes. At the end of this time period, reactor power is 70% and average reactor coolant temperature is 575°F. All control rods remain fully withdrawn and in manual control.

Given:

Total reactivity added by operator	$= -3.3 \times 10^{-3}$ ΔK/K
Total power coefficient	$= -1.1 \times 10^{-4}$ ΔK/K/% power

Assuming no additional RCS boration occurs and no other operator actions are taken, what will average reactor coolant temperature be after an additional 60 minutes?

A. 575°F and stable

B. Less than 575°F and increasing

C. Less than 575°F and decreasing

D. Less than 575°F and stable

QUESTION: 62

Following a reactor trip, negative reactivity from xenon initially increases due to...

A. xenon production from the decay of iodine-135.

B. xenon production from the spontaneous fission of uranium.

C. the reduction of xenon removal by decay.

D. the reduction of xenon removal by recombination.

QUESTION: 63

A reactor plant is initially operating at 100% power with equilibrium core xenon-135. Power is decreased to 75% over a 1-hour period and then stabilized. The operator then adjusts control rod height as necessary to maintain average reactor coolant temperature constant.

What will be the rod position and directional trend 30 hours after the power change?

A. Above the initial 75% power position and inserting slowly

B. Above the initial 75% power position and withdrawing slowly

C. Below the initial 75% power position and inserting slowly

D. Below the initial 75% power position and withdrawing slowly

QUESTION: 64

Why are burnable poisons installed in a new reactor core instead of using a larger reactor coolant boron concentration?

A. To prevent boron precipitation during normal operation.

B. To establish a more negative moderator temperature coefficient.

C. To minimize the distortion of the neutron flux distribution caused by soluble boron.

D. To allow the loading of excessive reactivity in the form of higher fuel enrichment.

QUESTION: 65

During a reactor startup, the first positive reactivity addition caused the count rate to increase from 20 to 30 cps. The second positive reactivity addition caused the count rate to increase from 30 to 60 cps. Assume k_{eff} was 0.97 prior to the first reactivity addition.

Which one of the following statements describes the magnitude of the reactivity additions?

A. The first reactivity addition was approximately 50% larger than the second.

B. The second reactivity addition was approximately 50% larger than the first.

C. The first and second reactivity additions were approximately the same.

D. There is not enough data given to determine the relationship of reactivity values.

QUESTION: 66

A reactor startup is in progress. The reactor is slightly subcritical with a constant startup rate of 0.0 decades per minute (dpm). A short control rod insertion will cause the reactor startup rate indication to initially decrease (become negative), and then...

A. gradually become less negative and return to 0.0 dpm.

B. gradually become more negative until neutron population reaches the source range equilibrium level, and then return to 0.0 dpm.

C. stabilize until neutron population reaches the source range equilibrium level, and then return to 0.0 dpm.

D. stabilize at -1/3 dpm until fission neutrons are no longer a significant contributor to the neutron population, and then return to 0.0 dpm.

QUESTION: 67

Refer to the drawing of three 1/M plots labeled A, B, and C (see figure below).

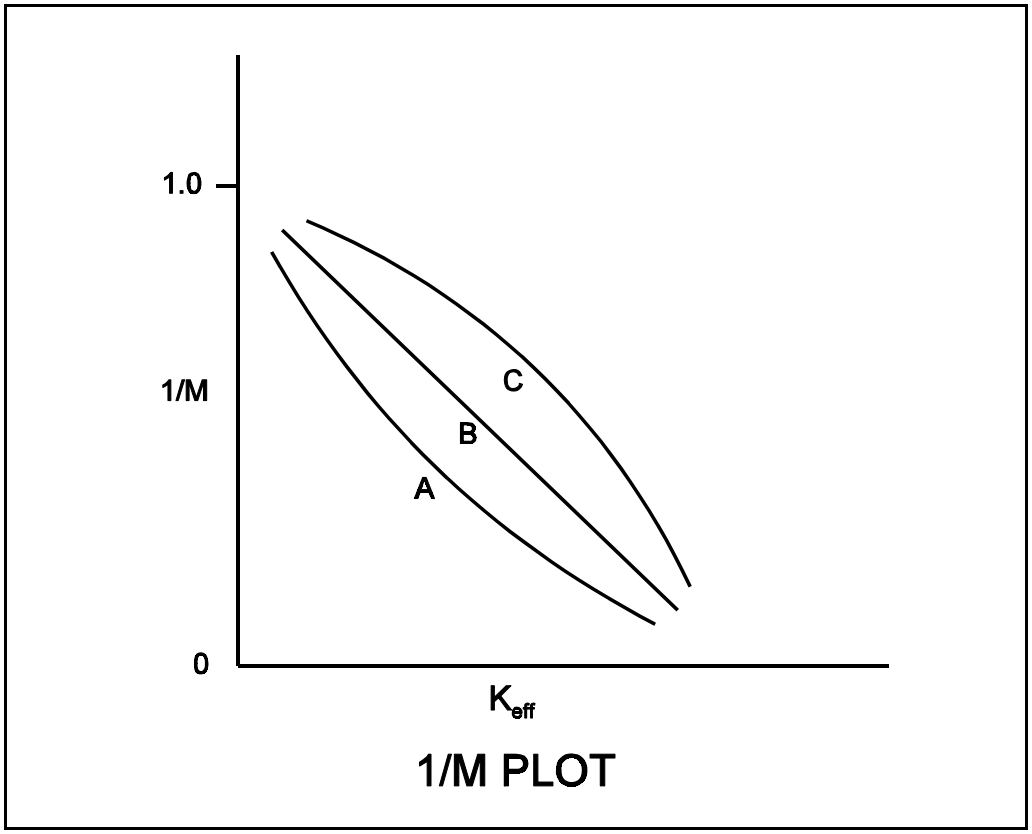
The least conservative approach to criticality is represented by plot _____ and could possibly be the result of recording count rates at _____ time intervals after incremental fuel loading steps compared to the situations represented by the other plots.

A. A; shorter

B. A; longer

C. C; shorter

D. C; longer



QUESTION: 68

A reactor is subcritical with a startup in progress. Which one of the following conditions will result in a critical rod position that is lower than the estimated critical rod position?

A. A malfunction resulting in control rod speed being faster than normal speed

B. A malfunction resulting in control rod speed being slower than normal speed

C. Delaying the time of startup from 3 hours to 5 hours following a trip from 100% power equilibrium conditions

D. An inadvertent dilution of reactor coolant system boron concentration

QUESTION: 69

A reactor is initially critical at 10,000 cps when a steam generator atmospheric relief valve fails open. Assume end of core life conditions, no reactor trip, and no operator actions are taken.

When the reactor stabilizes, the reactor coolant average temperature (T_{ave}) will be _____ than the initial T_{ave} and reactor power will be _____ the point of adding heat.

A. greater; at

B. greater; above

C. less; at

D. less; above

QUESTION: 70

A reactor is critical at the point of adding heat (POAH) when a small amount of negative reactivity is added to the core. If the same amount of positive reactivity is added to the core approximately 5 minutes later, reactor power will...

A. increase and stabilize at the POAH.

B. quickly stabilize at a power level below the POAH.

C. continue to decrease on a negative 80 second period until the shutdown equilibrium neutron level is reached.

D. continue to decrease with an unknown period until the shutdown equilibrium neutron level is reached.

QUESTION: 71

A nuclear power plant is operating at equilibrium 50% power level. Control rods are manually withdrawn for 5 seconds. Which one of the following plant parameter changes will be observed when the plant stabilizes?

A. Reactor coolant temperature will be higher.

B. Reactor coolant system pressure will be lower.

C. Reactor power will be higher.

D. Pressurizer level will be lower.

QUESTION: 72

DELETED

QUESTION: 73

Which one of the following is arranged from the highest pressure to the lowest pressure?

A. 2 psig, 12 inches Hg absolute, 8 psia

B. 2 psig, 18 inches Hg absolute, 8 psia

C. 12 psia, 20 inches Hg absolute, 2 psig

D. 12 psia, 30 inches Hg absolute, 2 psig

QUESTION: 74

Given the following:

- A saturated steam-water mixture with an inlet quality of 40% is flowing through a moisture separator.
- The moisture separator is 100% efficient for removing water.

How much water will be removed by the moisture separator from 50 lbm of the steam-water mixture?

A. 10 lbm

B. 20 lbm

C. 30 lbm

D. 40 lbm

QUESTION: 75

A 100 ft^3 vessel contains a saturated water-steam mixture at 1,000 psia. The water portion occupies 30 ft^3 and the steam portion occupies the remaining 70 ft^3. What is the approximate total mass of the mixture in the vessel?

A. 1,547 lbm

B. 2,612 lbm

C. 3,310 lbm

D. 4,245 lbm

QUESTION: 76

Which one of the following changes will directly decrease condensate depression of the water in the main condenser hotwell?

A. Decreased main turbine generator megawatt load

B. Decreased circulating water temperature

C. Increased circulating water flow

D. Increased vacuum in the main condenser

QUESTION: 77

Refer to the drawing of two 1,000 ft^3 pressure vessels with relief protection (see figure below).

Both vessels are in saturated conditions at 281°F and approximately 35 psig. Vessel A is completely filled with saturated water. Vessel B contains one-half saturated steam (100% quality) volume and one-half saturated water (0% quality) volume. Both vessels are protected by identical relief valves.

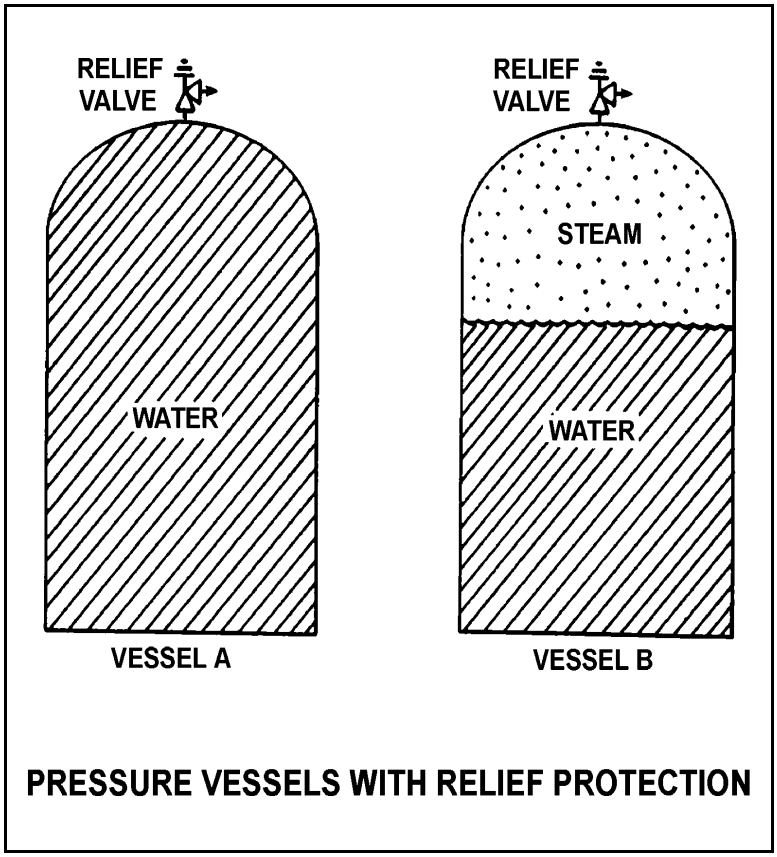
If both relief valves begin to leak at a rate of 0.1% of design flow, the higher temperature fluid will initially be leaving the relief valve of vessel _____. And, if 100 lbm of fluid is released through both relief valves, the larger pressure decrease will occur in vessel _____.

A. A; A

B. A; B

C. B; A

D. B; B



PRESSURE VESSELS WITH RELIEF PROTECTION

QUESTION: 78

A plant is operating at 90% of rated power. Main condenser pressure is 1.7 psia and hotwell condensate temperature is 120°F.

Which one of the following describes the effect of a 5% decrease in cooling water flow rate through the main condenser?

A. Overall steam cycle efficiency will increase because the work output of the turbine will increase.

B. Overall steam cycle efficiency will increase because condensate depression will decrease.

C. Overall steam cycle efficiency will decrease because the work output of the turbine will decrease.

D. Overall steam cycle efficiency will decrease because condensate depression will increase.

QUESTION: 79

Which one of the following describes why large steam lines are gradually warmed instead of suddenly admitting full steam flow?

A. To minimize the possibility of stress corrosion cracking of the steam lines

B. To minimize the total thermal expansion of the steam lines

C. To minimize the potential for water hammer in the steam lines

D. To minimize the heat loss from the steam lines

QUESTION: 80

Which one of the following describes the relationship between the main steam mass flow rate leaving a steam generator and the main feedwater mass flow rate entering the same steam generator at steady-state power operation? (Assume no auxiliary addition/removal of steam generator inventory.)

A. The mass flow rates will be the same only if downcomer level is constant.

B. The mass flow rates will be the same only if the reactor is operating near rated power.

C. The main steam mass flow rate is smaller than the main feedwater mass flow rate by the amount of moisture removed by the steam generator moisture separators.

D. The main steam mass flow rate is greater than the main feedwater mass flow rate by the amount of moisture removed by the steam generator moisture separators.

QUESTION: 81

A plant is recovering from a loss of offsite power that caused all reactor coolant pumps (RCPs) to stop. Pressurizer level indication is off-scale high.

Which one of the following is most likely to occur if the steam generator (S/G) temperatures are 50°F higher than their associated reactor coolant system (RCS) loop temperatures when an RCP is restarted?

A. Localized water hammer in the RCS

B. Pressurized thermal shock to the S/Gs

C. A large pressure spike throughout the RCS

D. Inadvertent lifting of a S/G atmospheric relief valve

QUESTION: 82

Refer to the drawing of a cooling water system (see figure below).

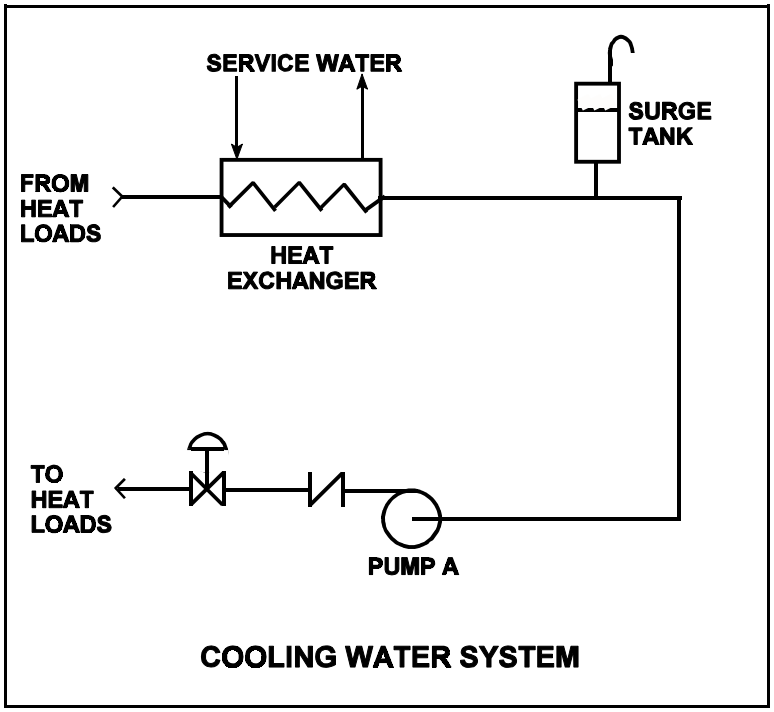
The centrifugal pump is circulating water at 100°F. Which one of the following will cause the centrifugal pump to operate closer to a condition in which gas/vapor binding can occur?

A. Surge tank level is raised by 5%.

B. Service water flow rate is decreased by 5%.

C. The pump discharge valve is used to decrease cooling water system flow rate by 5%.

D. Makeup water containing a high concentration of total dissolved solids is added to the cooling water system.



QUESTION: 83

A condensate pump is taking suction on a main condenser hotwell, containing water at 100°F, and discharging the water at a volumetric flow rate of 100,000 gpm to the main feedwater system. The main feedwater system heats the water to 400°F before it enters the steam generators. Assume there is no leakage, and no bypass or recirculation flow paths are in use.

What is the approximate volumetric flow rate of the feedwater entering the steam generators?

A. 100,000 gpm

B. 105,000 gpm

C. 109,000 gpm

D. 116,000 gpm

QUESTION: 84

Which one of the following describes a heat transfer flow path in which conduction is the most significant heat transfer mechanism?

A. From the reactor fuel to the core barrel during core uncovery

B. From the main turbine exhaust steam to the atmosphere via main condenser cooling water and a cooling tower during normal operation

C. From the reactor fuel to the steam outlet of the steam generators during a station blackout

D. From a fuel pellet to the fuel clad via the fuel rod fill gas during normal operation

QUESTION: 85

During steady state power operation, core thermal power can be most accurately determined by multiplying the total mass flow rate of the...

A. reactor coolant by the change in temperature across the core.

B. reactor coolant by the change in enthalpy in the steam generators.

C. feedwater by the change in enthalpy in the steam generators.

D. feedwater by the change in temperature across the core.

QUESTION: 86

Subcooled water is flowing into a fuel assembly in an operating reactor core. As the water flows upward through the fuel assembly, some of the water in contact with the fuel rods begins to boil.

If fuel assembly power is unchanged and system pressure is increased such that all of the water remains subcooled, the average fuel temperature in the fuel assembly would be _____ because boiling is a _____ efficient method of heat transfer.

A. higher; more

B. higher; less

C. lower; more

D. lower; less

QUESTION: 87

A reactor is operating at 100% power. Which one of the following will increase the likelihood of vapor bubble formation in the reactor coolant?

A. Surface scratches or cavities in the fuel clad

B. Subsurface void defect in the fuel clad

C. Increased coolant velocity past the fuel rods

D. Chemically inert material dissolved in the coolant

QUESTION: 88

If ΔT is the temperature difference between the fuel rod clad and the coolant, which one of the following describes heat transfer from a fuel rod at the departure from nucleate boiling?

A. Steam bubbles begin to form on the fuel rod clad, causing a rapid decrease in the heat flux from the fuel rod for a given ΔT.

B. Steam bubbles completely blanket the fuel rod clad, causing a rapid increase in the heat flux from the fuel rod for a given ΔT.

C. Steam bubbles begin to blanket the fuel rod clad, causing a rapid increase in the ΔT for a given heat flux.

D. Steam bubbles completely blanket the fuel rod, causing a rapid decrease in the ΔT for a given heat flux.

QUESTION: 89

If a reactor is being operated with DNBR at its limit, which one of the following is indicated?

A. None of the fuel rods are experiencing critical heat flux.

B. A small fraction of the fuel rods may be experiencing critical heat flux.

C. All radioactive fission products are being contained within the reactor fuel.

D. All radioactive fission products are being contained within either the reactor fuel or the reactor vessel.

QUESTION: 90

A nuclear power plant maintains the reactor coolant system (RCS) cold leg temperature (T_{cold}) at 557°F from 0% to 100% power. At 100% power, the reactor differential temperature (T_{hot} - T_{cold}) is 60°F.

If this plant also maintains RCS pressure constant at 2235 psig, which one of the following is the approximate RCS subcooling margin at 50% power?

A. 30°F

B. 36°F

C. 66°F

D. 96°F

QUESTION: 91

Adequate core bypass flow is needed to...

A. prevent stratification of reactor coolant inside the reactor vessel.

B. provide reactor coolant pump minimum flow requirements.

C. cool excore nuclear instrument detectors.

D. equalize temperature between the vessel and upper vessel head.

QUESTION: 92

A reactor is operating at 100% power when a loss of offsite power occurs, resulting in a reactor trip and a loss of forced reactor coolant circulation. Reactor coolant system (RCS) hot leg temperature is greater than cold leg temperature and all other parameters (e.g. steam generator (S/G) levels) are stable.

Which one of the following combinations of parameter trends, occurring 2 hours after the trip, indicates that natural circulation is <u>not</u> occurring? (CET = core exit thermocouples)

	RCS HOT LEG <u>TEMPERATURE</u>	RCS COLD LEG <u>TEMPERATURE</u>	S/G <u>PRESSURES</u>	RCS CET <u>SUBCOOLING</u>
A.	Stable	Stable	Decreasing	Decreasing
B.	Stable	Decreasing	Decreasing	Stable
C.	Decreasing	Decreasing	Decreasing	Increasing
D.	Decreasing	Stable	Stable	Increasing

QUESTION: 93

A reactor had been operating at steady state 100% power when a loss of all ac power occurred, thereby causing a reactor trip and a loss of forced reactor coolant flow. Natural circulation reactor coolant flow developed and stabilized approximately 30 minutes after the trip.

Which one of the following combinations of reactor power history and post-trip steam generator pressure will result in the highest stable natural circulation flow rate?

	DAYS AT FULL POWER	POST-TRIP STEAM GENERATOR PRESSURE
A.	12	1100 psia
B.	100	1100 psia
C.	12	1000 psia
D.	100	1000 psia

QUESTION: 94

A PWR core consists of 50,000 fuel rods; each fuel rod has an active length of 12 feet. The core is producing 1,800 MW of thermal energy. If the nuclear heat flux hot channel factor, $F_Q(z)$, (also called the total core peaking factor) is 1.5, what is the maximum local linear power density being produced in the core?

A. 4.5 kW/ft

B. 6.0 kW/ft

C. 9.0 kW/ft

D. 12.0 kW/ft

QUESTION: 95

The linear power density thermal limit is designed to prevent melting of the _____ during normal reactor plant operation; the limit is dependent on the axial and radial peaking factors, of which, the _____ peaking factor is the most limiting.

A. fuel clad; axial

B. fuel clad; radial

C. fuel pellets; axial

D. fuel pellets; radial

QUESTION: 96

The nil-ductility transition temperature of the reactor vessel (RV) is the temperature...

A. above which the RV metal will elastically deform as RCS pressure decreases.

B. above which the RV metal loses its ability to elastically deform as RCS pressure increases.

C. below which the RV metal will elastically deform as reactor coolant system (RCS) pressure decreases.

D. below which the RV metal loses its ability to elastically deform as RCS pressure increases.

QUESTION: 97

The probability of reactor vessel brittle fracture is decreased by minimizing...

A. oxygen content in the reactor coolant.

B. operation at high temperatures.

C. the time taken to cool down the reactor coolant system.

D. the amount of copper manufactured into the reactor vessel.

QUESTION: 98

A reactor is shut down for refueling following 18 months of operation at an average power level of 85%. During the shutdown, a reactor vessel metal specimen is removed from the reactor vessel for testing. The testing determines that the nil-ductility transition (NDT) temperature of the specimen has increased from 42°F to 44°F since the last refueling.

Which one of the following conclusions is warranted?

A. The test results are credible and the reactor vessel is more susceptible to brittle fracture now than after the last refueling.

B. The test results are credible and the reactor vessel is less susceptible to brittle fracture now than after the last refueling.

C. The test results are questionable because the vessel NDT temperature would not increase during the described 18-month period of operation.

D. The test results are questionable because the vessel NDT temperature would increase by at least 10°F during the described 18-month period of operation.

QUESTION: 99

Which one of the following would be most likely to cause pressurized thermal shock of a reactor vessel?

A. Starting a reactor coolant pump in an idle loop with the associated steam generator temperature less than RCS loop temperature.

B. Starting a reactor coolant pump in an idle loop with the associated steam generator temperature greater than RCS loop temperature.

C. Continuous emergency coolant injection to the RCS during and after a complete and unisolable rupture of a steam generator steam outlet nozzle.

D. Continuous emergency coolant injection to the RCS during and after a complete and unisolable rupture of a reactor vessel coolant outlet nozzle.

QUESTION: 100

A plant heatup is in progress using reactor coolant pumps. The heatup stress applied to the reactor vessel is...

A. tensile across the entire wall.

B. tensile at the inner wall and compressive at the outer wall.

C. compressive across the entire wall.

D. compressive at the inner wall and tensile at the outer wall.

***** FINAL ANSWER KEY *****

JUNE 2003 NRC GENERIC FUNDAMENTALS EXAMINATION
PRESSURIZED WATER REACTOR - ANSWER KEY

FORM A	FORM B	ANS	FORM A	FORM B	ANS	FORM A	FORM B	ANS	FORM A	FORM B	ANS
1	29	B	26	54	C	51	79	D	76	4	D
2	30	A	27	55	C	52	80	C	77	5	D
3	31	B	28	56	D	53	81	B	78	6	C
4	32	B	29	57	C	54	82	C	79	7	C
5	33	D	30	58	A	55	83	B	80	8	A
6	34	C	31	59	C	56	84	B	81	9	C
7	35	D	32	60	C	57	85	C	82	10	B
8	36	B	33	61	D	58	86	A	83	11	D
9	37	D	34	62	C	59	87	D	84	12	D
10	38	B	35	63	C	60	88	B	85	13	C
11	39	D	36	64	D	61	89	C	86	14	A
12	40	A	37	65	D	62	90	A	87	15	A
13	41	A	38	66	D	63	91	C	88	16	C
14	42	B	39	67	C	64	92	B	89	17	B
15	43	C	40	68	A	65	93	C	90	18	C
16	44	C	41	69	C	66	94	A	91	19	D
17	45	B	42	70	B	67	95	C	92	20	A
18	46	B	43	71	C	68	96	D	93	21	D
19	47	D	44	72	D	69	97	D	94	22	A
20	48	A	45	73	C	70	98	B	95	23	D
21	49	D	46	74	B	71	99	A	96	24	D
22	50	A	47	75	A	72	100	Deleted	97	25	D
23	51	C	48	76	B	73	1	B	98	26	A
24	52	B	49	77	A	74	2	C	99	27	C
25	53	B	50	78	A	75	3	A	100	28	D