FINAL SUBMITTAL

MCGUIRE EXAM 2000-301
50-369/2000-301 AND 50-370/2000-301

MAY 8 - 12, MAY 19,
MAY 22 - 25, 2000

FINAL RO/SRO WRITTEN EXAM

~~ANSWER KEY~~

Nuclear Regulatory Commission Senior Reactor Operator Licensing Examination

McGuire Nuclear Station

This document is removed from
Official Use Only category on
Date of examination

U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information

Name:	Region: I / II / III / IV
Date: **5/19/00**	Facility/Unit: **McGuire Nuclear Station**
License Level: RO / **SRO**	Reactor Type: **W** / CE / BW / GE
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected five hours after the examination starts.

Applicant Certification

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

_____
Applicant's Signature

Results

Examination Value	_____	Points
Applicant's Score	_____	Points
Applicant's Grade	_____	Percent

SENIOR REACTOR OPERATOR ANSWER SHEET

MULTIPLE CHOICE (Circle or X your choice)
If you change your answer, write your selection in the blank.

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(********** END OF EXAMINATION **********)

1. Cheating on the examination will result in a denial of your application and could result in more severe penalties.

2. After you complete the examination, sign the statement on the cover sheet indicating that the work is your own and you have not received or given assistance in completing the examination.

3. To pass the examination, you must achieve a grade of 80 percent or greater.

4. The point value for each question is indicated in parentheses after the question number.

5. There is a time limit of 5 hours for completing the examination.

6. Use only black ink or dark pencil to ensure legible copies.

7. Print your name in the blank provided on the examination cover sheet and the answer sheet.

8. Mark your answers on the answer sheet provided and do not leave any question blank.

9. If the intent of a question is unclear, as questions of the examiner only.

10. Restroom trips are permitted, but only one applicant at a time will be allowed to leave. Avoid all contact with anyone outside the examination room to eliminate even the appearance or possibility of cheating.

11. When you complete the examination, assemble a package including the examination questions, examination aids, and answer sheets and give it to the examiner or proctor. Remember to sign the statement on the examination cover sheet.

12. After you have turned in your examination, leave the examination area as defined by the examiner.

1 Pt(s)

A large break LOCA is in progress and the operators are responding in E-1 (Reactor Trip or Safety Injection). Given the following conditions:

- ND pump 1A is tagged out of service for maintenance.
- Containment pressure is 14 psig.
- FWST level is below the swap over setpoint.

When shifting to cold leg recirc using ES-1.3 (Transfer to Cold Leg Recirc), valve 1NI-184B (RB Sump to Train 1B ND & NS) fails to open. The operators implement ECA-1.1 (Loss of Emergency Coolant Recirculation).

FR-Z.1 (Response to High Containment Pressure) requires both NS pumps to be in operation. ECA-1.1 limits the operators to only one NS pump in step 11. Which of these two procedures takes priority under these conditions and what is the basis for this requirement?

A. FR-Z.1 takes priority because a total loss of ND causes the NS system to become relatively more important to reduce containment pressure.

B. FR-Z.1 takes priority because it was implemented in response to a red path and FRPs always have priority over ECA procedures.

C. ECA-1.1 takes priority because it conserves FWST water level as long as possible for injection while providing sufficient NS flow to mitigate containment pressure.

D. ECA-1.1 takes priority because ECA procedures always have priority over FRPs.

1 Pt(s) Unit 2 was operating at 100% power when an electrical fire started inside the auxiliary building cable spreading room. What type of fire suppression system is installed inside the cable spreading area and what are the hazards to personnel if they enter this room?

A. A manual deluge (Mulsifyre) System is installed. An electrical shock hazard exists due to the use of water to combat an electrical fire.

B. An automatic sprinkler system is installed. An electrical shock hazard exists due to the use of water to combat an electrical fire.

C. An automatic Halon system is installed. An asphyxiation hazard exists due to the presence of Halon gas.

D. A manual Cardox system is installed. An asphyxiation hazard exists due to the presence of carbon dioxide gas.

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1 Pt(s)

Unit 2 is recovering from a loss of 120 VAC instrument bus 2EKVA due to the loss of the 2EVIA static inverter. 2EKVA has been reenergized from the alternate supply. After repairs to inverter 2EVIA are completed, the operator is directed to restore the 2EKVA bus to the normal line up.

Which one of the following actions is necessary to restore the electrical lineup to a normal operating configuration after tags are cleared?

A. Manually transfer bus power from static inverter 2EVIB back to static inverter 2EVIA.

B. Enable the automatic transfer of power from static inverter 2EVIB back to 2EVIA.

C. Enable the automatic transfer of power from regulated power center 2KRP back to static inverter 2EVIA.

D. Manually transfer power from regulated load center 2KRP back to static inverter 2EVIA.

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1 Pt(s) Unit 1 is in the process of preparing to conduct a plant cooldown in Mode 3 for refueling. The OSM was asked by maintenance to tag shut 1ND-30A (TRAIN A ND TO HOT LEG ISOL) for valve stroke time testing.

What is the correct response to this request and what is the reason for this decision?

A. Closing 1ND-30A is permitted in mode 3, but would cause one ND train to be inoperable and is prohibited in Mode 4.

B. Closing 1ND-30A is not permitted because this would isolate the cross tie between the ND trains.

C. Closing 1ND-30A is permitted provided 1ND-15A is tagged open to ensure that the cross tie between ND trains is not isolated.

D. Closing 1ND-30A is not permitted because this will defeat the interlock with 1ND-58A (TRAIN A ND TO NV & NI PUMPS).

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1 Pt(s) Unit 1 was operating at 100% power. Given the following motor driven auxiliary feedwater pump operating parameters:

	0200	0210	0220	0230
Discharge Pressure (ft water)	3325	3325	3010	2950
Suction Pressure (ft water)	75	75	75	75
Pump flow rate (gpm)	420	480	520	560

What is the onset (earliest time) of pump cavitation conditions?

REFERENCES PROVIDED

A. 0200

B. 0210

C. 0220

D. 0230

1 Pt(s) A worker is preparing to enter a high radiation area to work on a valve in the reactor building. During the pre-job briefing. RP states that the expected whole body radiation level are as follows:

- Dose rate in the center of the room 20 ft away = 200 mrem/hr
- Dose rate 18 inches from valve = 700 mrem/hr
- Contact reading = 1100 mrem/hr

How should the area around the valve be classified?

A. The room is a radiation area; the valve is a hot spot

B. The room is a high radiation area; valve is NOT a hot spot

C. The room is a high radiation area; the valve is a hot spot

D. The room is an extra high radiation area; the valve is NOT a hot spot

1 Pt(s) The operators are conducting a reactor startup.

Given the following indications on the source range (SR) and intermediate range (IR) excore nuclear instruments:

Time	0200	0205	0210	0215
SR "A" (cps)	$1.5x10^{4}$	$2.5x10^{4}$	$2.8x10^{4}$	$1.0x10^{5}$
SR "B" (cps)	$1.4x10^{4}$	$2.3x10^{4}$	$2.7x10^{4}$	$9.8x10^{4}$
IR "A" (amps)	$7.6x10^{-11}$	$1.1x10^{-10}$	$1.5x10^{-10}$	$7.0x10^{-10}$
IR "B" (amps)	$7.9x10^{-11}$	$9.0x10^{-11}$	$1.1x10^{-10}$	$7.5x10^{-10}$

What is the earliest time that the operators may block the source range nuclear instruments?

A. 0200

B. 0205

C. 0210

D. 0215

1 Pt(s) Unit 1 was operating at 100% power when a total loss of feedwater occurred. The operators reached step 35 of FR-H.1 (Response to Loss of Secondary Heat Sink), which states:

> ***IF AT ANY TIME while in this procedure any S/G W/R level goes below 12% (17% ACC), THEN GO TO Enclosure 10 (Hot/Dry Steam Generator Limits)***

Given the following conditions:

	Loop A	Loop B	Loop C	Loop D
S/G (WR) [%]	0	15	9	10
NC T_{Hot} [°F]	150	555	530	545

- Containment pressure is 3.4 psig
- The TD CA pump is available to feed the S/Gs

Which one of the following statements correctly describes the bases for the restrictions for restoring feedwater flow following feed and bleed in FR-H.1?

A. **Restore flow to the A S/G because loop A T-hot is the lowest of the loops and this will reduce the chance of thermal shocking the S/G tube sheet. Flow should not be restored to the B and C S/Gs because they will be reserved for use later to provide a steam supply for the TD CA pump.**

B. **Restore flow to the B S/G because B S/G level is the highest and this will reduce the chance of thermal shocking the S/G tube sheet. Flow should be preferentially restored to the B or C S/G to maintain the TD CA pump steam supply.**

C. **Restore flow to the C S/G because loop C T-hot is less than loop B T-hot and this will reduce the chance of thermal shocking the S/G tube sheet. Flow should be preferentially restored to the B or C S/G to maintain the TD CA pump steam supply.**

D. **Restore flow to the D S/G because the D S/G is higher than A S/G level, which will reduce the risk of thermal shock. Flow should not be restored to the B and C S/Gs because they will be reserved for use later to provide a steam supply for the TD CA pump.**

1 Pt(s) Unit 1 is preparing for a reactor start up following a refueling outage. Given the following conditions:

- T_{avg} = 515 °F
- Plant heatup in progress using NCPs

At 0200, a Station Engineer reports that a mistake had been made in analyzing the containment Appendix J Leak Rate Test results that were conducted prior to exceeding 200 °F. Reanalysis indicated that the combined containment leak rate (Type A) had exceeded 1.0 L_a.

Which one of the following actions is required by Tech Specs in response to this situation?

REFERENCES PROVIDED

A. Commence a plant cooldown to reach Mode 5 within 30 hours.

B. Commence a plant cooldown to reach Mode 5 within 36 hours.

C. Commence a plant cooldown to reach Mode 5 within 37 hours.

D. Commence a plant cooldown to reach Mode 5 within 43 hours.

1 Pt(s) Which one of the following describes a responsibility associated with the Fuel Handling SRO during Fuel Handling operations?

A. Operate Fuel Handling Equipment, in accordance with approved procedure(s).

B. Directly observe Fuel Handling activities from the reactor building operating deck.

C. Physically latch/unlatch each fuel assembly, in accordance with approved procedure(s).

D. Supervise reactor vessel in-service inspections immediately after core off-load.

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1 Pt(s) Unit 1 was operating at 100% power in Mode 1. Given the following conditions:

- 2 main steam safety valves (MSSVs) on the 1D S/G have been gagged shut to prevent chattering

Which one of the following statements describes the required action(s) and a basis for these actions?

REFERENCES PROVIDED

A. **Reduce power below 39% to ensure that the reactor coolant pressure boundary is not over-pressurized.**

B. **Reduce power below 39% to ensure that the positive reactivity effect on NCS cooldown associated with the operation of the main steam system safety valves is minimized.**

C. **Reduce power below 19% to ensure that the reactor coolant pressure boundary is not over-pressurized.**

D. **Reduce power below 19% to ensure that the positive reactivity effect on NCS cooldown associated with the operation of the main steam system safety valves is minimized.**

1 Pt(s) Unit 1 is operating at 100% power when the supply breaker from 1LXG to Control Rod Drive MG set #2 opens. Which one of the following sequence of events will occur to the reactor trip breakers A or B (RTA/B) and the reactor trip bypass breakers A or B (BYA/B)?

A. RTA and BYB will open

B. RTB and BYA will open

C. BYA and BYB will open

D. No breakers will open

1 Pt(s) Unit 1 is operating at 100% power. Given the following conditions on the 1A NCP:

Time	0200	0210	0220	0230
Motor winding temp (F°):	312	315	320	324
Pump shaft vibration (mils):	15	16	18	21
#1 seal ΔP (psid):	201	196	223	235
#1 seal outlet temp (F°):	201	226	236	240

What is the earliest time that the operators are required to trip NCP-1A?

A. 0200

B. 0210

C. 0220

D. 0230

1 Pt(s) Unit 1 is conducting a plant startup in Mode 1. The operators have reached 8% power when a momentary electrical transient occurs resulting in the following conditions:

Bus	1TA	1TB	1TC	1TD
Frequency (Hz)	55	60	55	60
Voltage (VAC)	6410	6900	6410	6900

Which one of the following sequences would occur?

A. A reactor trip does NOT occur and NCPs 1A and 1C trip on under-frequency while NCPs 1B and 1D continue running.

B. A reactor trip occurs and NCPs 1A and 1C trip on under-voltage while NCPs 1B and 1D continue running.

C. A reactor trip does NOT occur and all four NCPs trip on under-frequency.

D. A reactor trip occurs and all four NCPs trip on under-frequency

1 Pt(s) Unit 1 was operating at 100% power. Given the following conditions:

- Pressurizer pressure controller is selected to "1-2"
- Pressurizer pressure controls are in AUTO
- Pressurizer pressure channel I detector fails LOW

Which one of the following describes the plant response with no operator action?

A. High pressurizer pressure reactor trip will occur.

B. PORV 1NC-34A will maintain NC system pressure 80 to 100 psig below normal.

C. PORV 1NC-34A will maintain NCS pressure from 100 psig above normal to 50 psig below normal.

D. PORVs 1NC-32B and 1NC-36B maintain NC system pressure 80 to 100 psig above normal.

1 Pt(s)

Unit 1 was operating at 100% power when a crud burst occurred. Given the following events and conditions:

- EMF-48 (Reactor Coolant Hi Rad) trip 2 alarm
- 1EMF-18 (Reactor Coolant Filter 1A) trip 2 alarm
- No clad damage has occurred

Which one of the following actions is required to reduce coolant activity due to a crud burst in the NC system?

A. Purge the VCT with nitrogen

B. Place/ensure both mixed bed demineralizers are in service

C. Increase letdown flow

D. Add hydrogen to the reactor coolant

1 Pt(s) Unit 1 is operating at 100% power. Given the following conditions:

- Rod control is in manual
- Control Bank D is at 200 steps

If the rods in control bank D start stepping out at 8 steps per minute, which one of the following actions is required at this time?

A. Select Control Bank D on the rod selector switch and manually insert Control Bank D

B. Select "AUTO" on the Bank Select Switch and see if rod motion stops

C. Commence emergency boration

D. Trip the reactor

1 Pt(s) Unit 1 is operating at 50% power. Given the following conditions:

- Pressurizer pressure is 2235 psig
- Pressurizer Relief Tank (PRT) pressure is 20 psig
- PRT temperature is 125 °F
- PRT level is 81%
- The PRT is being cooled by spraying from the RMWST
- A pressurizer code safety valve is suspected of leaking by it's seat

What temperature would be indicated on the associated safety valve discharge RTD if the code safety were leaking by?

REFERENCES PROVIDED:

A. 258-262 °F

B. 227-231 °F

C. 161-165 °F

D. 123 -127°F

1 Pt(s) Which one of the following statements complies with the requirements of OMP 4-3 regarding the rules of usage for abnormal procedures (APs) when the EOPs have been implemented?

A. APs may not be implemented when EOPs have been entered.

B. Only one AP at a time may be implemented when EOPs have been implemented. Concurrent implementation of APs when EOPs are in use is not allowed.

C. APs may be implemented concurrently with EOPs. However, the APs were written assuming that SI has not actuated and operators must be careful when using APs if SI has occurred.

D. APs may be implemented concurrently with EOPs with the exception of events where SI has actuated. APs were written assuming the SI had not occurred and cannot be used if SI has actuated.

1 Pt(s) A male worker needs to repack a valve in an area that has the following radiological characteristics:

- The worker's present exposure is 1800 mrem for the year.
- General area dose rate = 65 mrem/hr
- Airborne contamination concentration = 20 DAC

The job will take 4 hours with a mechanic wearing a full-face respirator. It will only take 2 hours if the mechanic does NOT wear the respirator.

Which of the following choices for completing this job would maintain the workers exposure within the Station ALARA requirements?

A. The worker should wear the respirator otherwise he will exceed 25% of the DAC limit.

B. The worker should NOT wear the respirator because the dose received will exceed neither NRC nor site dose limits.

C. The worker should wear the respirator because the total TEDE dose received will be less than if he does not wear one.

D. The worker should NOT wear the respirator because the total TEDE dose received will be greater than if he wears one.

1 Pt(s) Unit 2 was responding to a faulted steam generator event. The operators entered FR-P.1 (Response to Imminent PTS) and reached step 15 where they were directed to isolate cold leg accumulators (CLAs).

What is the EOP basis for isolating the CLAs in FR-P.1?

A. To prevent injecting the CLA nitrogen bubble into the reactor and creating a gas bubble in the vessel head region.

B. To prevent repressurizing the reactor vessel and adding pressure stress to thermal stress.

C. To prevent adding more cold water to the reactor vessel and increasing the thermal stress.

D. To prevent depleting CLA volume and to preserve a source of highly borated water to prevent recriticallity during cooldown.

1 Pt(s)

Unit 1 is recovering from a LOCA. The operators started the process of terminating safety injection at 2:00 AM. Given the following indications at the following times:

	Parameter	2:00	2:05	2:10	2:15
1)	Pressurizer level (%)	40	29	15	11
2)	NC pressure (psig)	280	285	290	295
3)	ND Flow	1000	1025	1075	1085
4)	Core exit T/Cs (°F)	690	702	695	685
5)	FWST level (inches)	183	179	149	113
6)	Containment Pressure (psig)	3.5	2.3	1.2	1.1

What is the earliest time that the operators should transition to ES-1.3, transfer to cold leg recirculation.

A. 0200

B. 0205

C. 0210

D. 0215

1 Pt(s) Unit 1 was responding to a small break LOCA. Containment pressure reached 3.5 psig. The Subcooling Margin Monitor currently indicated +35 °F. Which of the following statements correctly describes the status of subcooling in the core?

A. The core is subcooled by 35 °F

B. The core is superheated by 35 °F

C. The core is superheated by more than 35 °F due to the effects of adverse containment conditions

D. The core is subcooled by more than 35 °F due to the effects of adverse containment conditions

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1 Pt(s)

Unit 1 has a liquid radioactive waste release in progress from the Ventilation Unit Condensate Drain Tank (VUCDT) through the RC system. All lineups and authorizations have been properly made in accordance with OP/0/B/6200/35 using the normal path. 2 RC pumps are the minimum required under LWR document.

Given the following initial conditions:

- 2 RC pumps are running
- Controlling EMF properly adjusted for trip 1 and trip 2 settings
- No other releases are in progress

What automatic actions would terminate the release?

A. If flow through the WL-320 exceeds 60 gpm (MSRR)

B. If VUCDT pump discharge pressure exceeds 30 psig

C. If 1 RC pump trips

D. If EMF-49 (Liquid Waste) reaches the trip 2 setpoint

1 Pt(s) Unit 1 is responding to a LOCA. Given the following initial conditions:

- A reactor trip and safety injection actuation occurred at 0150
- MSIVs are shut.
- Phase B containment isolation has occurred

The operators reach step 2 in ES-1.1 (SI Termination) requiring a reset of the safety injection signal.

Given the following parameter trends at 0200:

- NC pressure = dropped to 1850 psig then stabilized at 1951 psig
- Steamline pressure = 771psig - decreasing slowly
- Containment pressure = 2.2 psig - decreasing slowly

Given the following sequence of operator actions:

0202 Blocks the low steam line pressure MSI signal
0203 Blocks the low PZR pressure SI signal
0204 Resets the phase B isolation signal

What is the earliest time that depressing the SI reset pushbuttons (trains A and B) would reset safety injection?

A. 0200

B. 0202

C. 0203

D. 0204

1 Pt(s) Unit 1 is responding to a large break LOCA into containment. Given the following events and conditions:

- Containment spray auto-actuated and reduced containment pressure
- Containment pressure is now at 0.24 psig and continues to increase
- NS actuation logic has been reset by the operators

Which one of the following describes the NS system response to an increase in containment pressure?

A. NS pumps will start and discharge valves will open when containment pressure reaches 3.0 psig.

B. NS pumps will start and discharge valves will open when containment pressure exceeds 0.8 psig.

C. NS pumps will start when containment pressure reaches 0.35 psig and discharge valves will open when containment pressure exceeds 0.8 psig.

D. Discharge valves will open when containment pressure exceeds 0.35 psig and NS pumps will start when containment pressure exceeds 0.8 psig.

1 Pt(s) Unit 1 is shutdown, Mode 6, in a refueling outage. Given the following conditions:

- Containment airlock doors are both open
- A full shift of qualified maintenance personnel are available inside containment
- The Refueling SRO is in the control room
- The Fuel Handling Supervisor is inside containment

Refueling has been completed and the Fuel Handling Supervisor (who is not a qualified SRO) requests permission to latch all control rods to prepare for the reactor startup. What additional requirements must be met (if any) to proceed with latching rods?

A. Latching rods may proceed at the discretion of the Fuel Handling Supervisor.

B. Latching rods may not proceed until after containment integrity has been restored.

C. Latching control rods may not proceed until after the Refueling SRO arrives inside containment to supervise.

D. Latching control rods may not proceed until after the Refueling SRO arrives inside containment and containment integrity has been restored.

1 Pt(s) Unit 1 is shutdown in a refueling outage. Given the following events and conditions:

- The VI system was in a normal lineup.
- The VS system was in a normal lineup.
- A VI header rupture occurs.
- The VI system completely depressurizes.

What effect does a total loss of the VI system have on the VS system?

A. VI-820 will auto-close as VI header pressure decreases below 90 psig and the VS air compressor will start automatically at 82 psig to maintain VS header pressure

B. VI-820 will auto-close as VI header pressure decreases below 82 psig and the VS air compressor must be manually started to maintain VS header pressure

C. Check valves in the VI - VS cross-connect line will close to isolate VS system pressure before it drops below 90 psig

D. VS pressure in the Fire Protection Pressurizer Tank will be lost until a VS air compressor can be started.

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1 Pt(s) The operators have just completed synchronizing the Unit 1 main generator on the power grid. The second generator breaker has been closed in.

Which one of the following sequences describes the correct operator actions for increasing the main generator load to 50% power?

A. **Select MW IN**
Raise the GV limit from 17% to 120%
Depress LOAD RATE pushbutton and enter desired load rate
Depress the REFERENCE pushbutton and enter the load
Depress the GO pushbutton
Transfer to sequential valve operating mode at 35% power

B. **Select MW IN**
Raise the GV limit from 17% to 120%
Depress STANDARD pushbutton and enter desired load and load rate using the keypad
Depress the GO pushbutton
Transfer to single valve operating mode at 35% power

C. **Select MW OUT**
Raise the GV limit from 17% to 100%
Depress STANDARD pushbutton and enter desired load and load rate using the keypad
Depress the GO pushbutton
Transfer to sequential valve operating mode at 35% power

D. **Select MW IN**
Raise the GV limit from 17% to 100%
Depress the REFERENCE pushbutton and enter the load
Depress LOAD RATE pushbutton and enter desired load rate
Depress the GO pushbutton
Transfer to single valve operating mode at 35% power

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1 Pt(s) Unit 1 is responding to a LOCA. Given the following events and conditions:

- Completed E-0 (Reactor Trip or Safety Injection)
- Entered E-1 (Loss of Reactor or Secondary Coolant)
- The STA reported the following valid critical safety functions:
  - Subcriticality - orange path
  - Integrity - red path
  - Heat Sink - red path
  - All other CSFs are green or yellow

Which one of the following statements correctly describes the proper procedure flow path?

A. Remain in E-1 (Loss of Reactor or Secondary Coolant)

B. Transition immediately to FR-S.1 (Response to Nuclear Generation /ATWS)

C. Transition immediately to FR-P.1 (Response to Imminent Pressurized Thermal Shock Condition)

D. Transition immediately to FR-H.1 (Response to Loss of Secondary Heat Sink)

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1 Pt(s)

Unit 1 is in the process of making a radioactive gaseous waste release from the waste gas decay tank in accordance with OP/0/A/6200/18. Given the following conditions:

- MRIRR = 21 CFM
- MOSRR = 40 CFM
- 1EMF-50 trip 1 setpoint = 1.0E5 CPM
- 1EMF-50 trip 2 = 2.0E5 CPM
- 1EMF-36 is in service

Time	0200	0215	0230	0245
Release rate (CFM)	22	25	41	37
EMF-50 (CPM)	1.8E5	2.2E5	2.1E5	3.2E5

If the operators reset 1EMF-50 whenever allowed by procedure, what is the earliest time (if any) that the operators are **required** to terminate the gaseous release.

A. 0200

B. 0215

C. 0230

D. 0245

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1 Pt(s)

Unit 2 was operating at 100% power when a terrorist attack in the control room caused the operators to rapidly evacuate to the Auxiliary Shutdown Panel. The operators were not able to perfonn AP/17 (Loss of Control Room) actions prior to evacuation at 0200.

The terrorists tripped the turbine but did not operate any other controls. There are no other local operator actions taken. Given the following steam generator narrow range levels:

	0200	0202	0204	0206	0208
2A S/G NR	65%	37%	22%	15%	25%
2B S/G NR	64%	38%	23%	18%	26%
2C S/G NR	63%	39%	25%	16%	24%
2D S/G NR	65%	38%	26%	20%	27%

Which one of the following statements describes the complete list of running feedwater pumps when the operators first arrive at the ASP at 0210 to take local control of the plant?

A. Both motor driven CA pumps

B. Both motor drive CA pumps and the turbine drive CA pump

C. Both motor driven CA pumps and both CF pumps (in roll-back hold)

D. Both motor driven CA pumps, the turbine driven CA pump and both CF pumps (in roll-back hold)

---

1 Pt(s)

Unit 1 was operating at 100% power when a reactor trip occurred due to a feedwater control valve malfunction. Given the following events and conditions:

- Both motor-driven CA pumps started
- The operators have entered E-0 (Reactor Trip or Safety Injection)
- Feedwater flow to each generator is greater than 450 gpm
- Given the following steam generator levels

Time	0200	0201	0202	0203	0205*
Steam Generator Level					
1A S/G (% NR)	8	12	22	39	45
1B S/G (% NR)	7	12	24	39	46
1C S/G (% NR)	5	13	25	40	47
1D S/G (% NR)	5	16	28	39	45
Containment pressure (psig)	1.5	3.5	2.5	1.5	0.6

***At 0205**, the operators reach step 16.c of E-0 that reads:

> ***WHEN N/R level in any S/G greater than 11% (32% ACC), THEN control CA flow to maintain N/R levels between 11%(32%) and 50%.***

Which one of the following statements correctly describes the earliest time that operators are allowed to reset and reduce CA flow to the steam generators?

A. Any time after 0201

B. Any time after 0202

C. Any time after 0203

D. Any time after 0205

1 Pt(s) Unit 2 is responding to a LOCA into the Auxiliary Building in ECA-1.2 (LOCA Outside of Containment). Upon completion of ECA-1.2, NC system pressure continues to decrease. Which one of the following statements correctly describes the correct mitigating strategy to assure continued removal of decay heat under these conditions?

A. Transition back to E-1 (Loss of Reactor or Secondary Coolant).

B. Transition to ECA-1.1 (Loss of Emergency Coolant Recirc).

C. Transition to ES-1.2 (Post LOCA Cooldown and Depressurization)

D. Transition to ES-1.3 (Transition to Cold Leg Recirc).

1 Pt(s) Unit 2 was in the process of starting up the reactor following a refueling outage. Given the following plant conditions and events:

- Reactor trip breakers are closed
- Shutdown bank rod withdrawal has commenced
- Train A of Wide Range Shutdown Monitoring is inoperable

If source range N-32 fails, which one of the following actions is required?

A. Startup may continue with train B of the Gamma-Metrics Shutdown Monitor System substituting for the failed N-32 source range channel

B. Immediately stop withdrawal of shutdown banks

C. Immediately open the reactor trip breakers

D. Immediately reinsert shutdown banks and open the reactor trip breakers

---

1 Pt(s) Unit 2 is operating at 75% power when a load rejection occurs. Which one of the following statements correctly describes the response of 2CM-420 (Load Rej Byp) to this transient?

A. 2CM-420 closes to prevent condensate water from being diverted to the suction of the hotwell booster pumps from the condensate booster pumps to assure minimum flow to the CF pumps.

B. 2CM-420 closes to prevent diversion of water from the "C" heater drain tank back to the UST thereby ensuring sufficient CF pump suction pressure.

C. 2CM-420 opens to divert condensate flow directly to the condensate booster pump suction to ensure that CF pumps have sufficient suction pressure.

D. 2CM-420 opens to divert condensate flow, bypassing around the condensate booster pumps, directly to the CF pumps to assure minimum flow requirements.

1 Pt(s) Unit 1 is operating at 28% power during a plant startup to 100%. Given the following conditions on the 1C steam generator:

- Main feedwater regulating valve (FRV) is in AUTO control at 25% open
- Bypass FRV is in MANUAL control at 100% open
- Steam flow channel I is the controlling channel
- Steam flow channel I fails high

Which one of the following statements correctly describes the plant response for the 1C steam generator FRVs??

A. Main FRV modulates open to increase feedwater flow and steam generator water level increases to the hi-hi level turbine/reactor trip setpoint (P-14).

B. Main FRV modulates shut to reduce feedwater flow and steam generator level decreases to the low-low level reactor trip setpoint.

C. Main FRV modulates open to increase feedwater flow but sufficient level error signal develops to restore CF flow to normal without tripping the reactor.

D. Main FRV modulates shut to reduce feedwater flow but sufficient level error signal develops to restore CF flow to normal without tripping the reactor.

---

1 Pt(s) Unit 2 was operating at 5% power during a plant startup when the following sequence of actions occurred.

- Opened 2NV-265B
- Started Boric Acid Transfer pump #2A

If no other operator actions occurred, which of the following statements correctly describes the response of reactor power and control rods?

A. **Power remains at 5%**
Control rods drive out

B. **Power remains at 5%**
Control rods do not move

C. **Power decreases**
Control rods drive in

D. **Power decreases**
Control rods do not move

---

1 Pt(s) Unit 1 was cooling down in Mode 4 when the 1A1 KC pump trips. Given the following conditions:

- Both trains of KC were initially in operation
- 1A2 KC pump was secured due to high KC flow
- Both trains of ND were aligned for RHR shutdown cooling
- NCS temperature was 205 °F

If train A KC pumps cannot be restarted, which one of the following list of actions is the **complete list** of actions that must be taken to prevent damage to equipment?

A. **Stop ND pump 1A**

B. **Stop ND pump 1A**
Isolate ND flow through the 1A ND heat exchanger

C. **Cross-connect KC flow to the 1A ND heat exchanger**
Cross-connect KC flow through the 1A ND Pump mechanical seal heat exchanger

D. **Stop ND pump 1A**
Isolate KC flow through the letdown heat exchanger

1 Pt(s) Unit 2 was operating at 99% power when a steamline rupture occurred. Given the following events and conditions:

0200 The operators enter AP/01 (Steam Leak)
0200 The operators reduce turbine load to match Tave and Tref
0201 The operators start a second NV pump and isolate letdown
0202 NLOs start investigating for the location of the steam leak
0203 "P/R OVER POWER ROD STOP" alarm – the RO reports that power has turned and is decreasing.
0204 STA reports pressurizer level is decreasing and cannot be maintained
0205 The turbine building operator reports that the line to the atmospheric dump valves has a steam leak and cannot be isolated

If no safety injection has occurred and pressurizer pressure is maintained, which one of the following operator responses is correct?

A. Manually trip the reactor at 0203

B. Manually trip the reactor at 0204

C. Manually trip the reactor at 0205

D. Commence a rapid down power using AP/04 at 0205

1 Pt(s) Unit 1 was operating at 100% power when a loss of condenser vacuum occurred. Given the following events and conditions:

- Condenser vacuum dropped to 10 inches
- The steam dump system was in a normal alignment
- All automatic protective actions occurred as designed

Which one of the following statements correctly describes the operation of the condenser dump valves?

A. Condenser steam dump valves do not open because the C-7A arming signal is blocked.

B. Condenser steam dump valves do not open because the load rejection controller is active.

C. Condenser steam dump valves isolate when condenser pressure drops below 20 inches of vacuum.

D. Condenser steam dump valves isolate when the P-12 block solenoid valves close.

1 Pt(s) During step 22 of ECA-0.0 (Loss of All AC Power), the operators are directed to depressurize intact S/Gs to 210 psig at the maximum rate if the standby makeup pump cannot be started. What is the basis for depressurizing at the maximum rate instead of a slower more controlled rate?

A. To cooldown as quickly as possible to prevent the loss of pressurizer level.

B. To reduce NC pressure as rapidly as possible to prevent voiding in the upper head region.

C. To maximize natural circulation flow to prevent excessive thermal stratification in the NC loops.

D. To minimize the loss of NC system inventory through the NCP seals.

1 Pt(s) Units 1 and 2 were operating at 100% power when a fire broke out in the back of the control room. Given the following conditions:

- The fire has not affected or degraded any control systems
- Heavy black smoke is throughout the control room
- The SRO implements AP/17 (Loss of Control Room)

Which one of the following statements correctly describes the operator response to this event?

A. Immediately trip both unit turbines and reactors and evacuate the control room to the auxiliary shutdown panels.

B. Evacuate the control room; trip both unit turbines and reactors on the way to the auxiliary shutdown panel.

C. Evacuate the control room; proceed to the auxiliary shutdown panels and direct the remaining control room operator to trip both unit turbines and reactors.

D. Evacuate the control room; proceed to the safe shutdown facility and direct the remaining control room operator to trip both unit turbines and reactors

1 Pt(s) Unit 2 was shutdown in Mode 4, cooling down to a refueling outage. The following annunciator lights are provided for identification purposes in answering the question below:

Annunciators on panel 2AD-10:
E-1 = *Upper Cont. Airlock Aux. Door Open*
F-1 = *Upper Cont. Airlock Rx. Door Open*
E-2 = *Lower Cont. Airlock Aux. Door Open*
F-2 = *Lower Cont. Airlock Rx. Door Open*

Annunciators on panel 2AD-13:
A-8 = *VE Door Open*

Approval was given for normal passage into the containment to perform work – no approval has been given for any compensatory measures.

Which combination of alarms requires corrective action under MSD 585, (Reactor Building Personnel Access and Material Control for Modes 1, 2, 3 and 4)?

A. 2AD-10 E-1 and 2AD-10 E-2 actuated

B. 2AD-10 F-1 and 2AD-10 F-2 actuated

C. 2AD-10 E-1 and 2AD-10 F-2 actuated

D. 2AD-10 E-2 and 2AD-13 A-8 actuated

1 Pt(s)

Unit 1 was responding to an internal flow blockage condition in the core that required a reactor trip and entry into FR-C.2 (Response to Degraded Core Cooling).

Step 15.e of FR-C.2 states:

> *Dump steam to condenser from intact S/Gs while maintaining cooldown rate in NC T-colds less than* 100 °F *in an hour.*

Given the following times and temperatures during the event:

Time	**0200**	**0210**	**0220**	**0230**	**0240**	**0250**	**0300**
NC T-cold °F	557	560	565	558	540	530	520

Time	**0300**	**0310**	**0320**	**0330**	**0340**	**0350**	**0400**
NC T-cold °F	520	495	468	467	444	428	420

Time	**0400**	**0410**	**0420**	**0430**	**0440**	**0450**	**0500**
NC T-cold °F	420	405	390	371	350	320	310

If the cooldown started at 0230, what time did the operators **first** exceed the cooldown limit of FR-C.2?

A. 0240

B. 0320

C. 0350

D. 0450

1 Pt(s) Unit 1 was conducting a plant startup at 5% power when a control rod in control bank "A" drops into the core. Given the following events and conditions:

- The reactor remains critical during the recovery of the control rod
- Tave is allowed to drop to 550°F

Which one of the following statements correctly describes the adverse considerations?

A. Reduced Tave could cause thermal shock on the pressurizer spray nozzle.

B. Thermal power best estimate would indicate higher than reactor power (by Power Range N/Is).

C. Moderator temperature coefficient (MTC) could exceed the minimum safety analysis value (i.e. become too positive) late in core life.

D. Moderator temperature coefficient (MTC) could exceed the minimum safety analysis value (i.e. become too positive) early in core life.

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1 Pt(s) Which one of the following selections correctly describes reflux boiling flow path during a large break LOCA.

Steam enters the ___(1)_____ of S/G U-tubes where the steam condenses and re-enters the core area via the S/G __(2)____.

	(1)	(2)
A.	**hot leg**	**hot leg**
B.	**hot leg**	**cold leg**
C.	**cold leg**	**hot leg**
D.	**cold leg**	**cold leg**

1 Pt(s) Unit 2 is responding to a small break LOCA in ES-1.1 (SI Termination). Given the following plant conditions:

- NCPs tripped
- Pressurizer level is steady
- Only one train of ECCS is injecting
- Loop A temperatures are representative of all 4 loops
- Steam generator pressures are the same as steam header pressure

Which one of the following sets of plant parameters is indicative of natural circulation occurring in the steam generators per enclosure 2 of ES-1.1?

	Time	0200	0205	0210	0215
A.	**Steam Header Pressure (psig)**	**1042**	**1009**	**976**	**945**
	NC System Pressure (psig)	**1968**	**1964**	**1960**	**1958**
	Loop A T-hot (°F)	**579**	**574**	**569**	**564**
	Loop A T-cold (°F)	**548**	**544**	**540**	**536**
B.	**Steam Header Pressure (psig)**	**1042**	**1009**	**976**	**945**
	NC System Pressure (psig)	**1968**	**1972**	**1975**	**1981**
	Loop A T-hot (°F)	**579**	**582**	**585**	**595**
	Loop A T-cold (°F)	**548**	**544**	**540**	**536**
C.	**Steam Header Pressure (psig)**	**1042**	**1047**	**1050**	**1052**
	NC System Pressure (psig)	**1968**	**1964**	**1960**	**1958**
	Loop A T-hot (°F)	**579**	**574**	**569**	**564**
	Loop A T-cold (°F)	**548**	**549**	**548**	**550**
D.	**Steam Header Pressure (psig)**	**1042**	**1047**	**1050**	**1052**
	NC System Pressure (psig)	**1968**	**1972**	**1975**	**1981**
	Loop A T-hot (°F)	**579**	**582**	**585**	**595**
	Loop A T-cold (°F)	**548**	**544**	**540**	**536**

1 Pt(s) Unit 1 was operating at 100% power when the 1A NV pump failed. Given the following events and conditions:

- 1B NV pump was tagged out of service for maintenance
- The Positive Displacement NV pump was tagged out of service
- The plant is at normal operating temperature, pressure and level
- Normal letdown is in service on the 75 gpm orifice
- Identified leakage is at the Tech Spec Limit
- Unidentified leakage is 1 cc/hr

If **no operator actions are taken**, how much time will elapse before the pressurizer level reaches the low level alarm and the heaters trip?

REFERENCES PROVIDED:

A. Less than 45 minutes

B. 45 -55 minutes

C. 55 - 65 minutes

D. Longer than 65 minutes

1 Pt(s) Unit 1 was operating at 25% power following a reactor startup when intermediate range channel N35 failed. Given the following conditions and events:

- N35 repairs have been made and N35 is being returned to service
- N36 reads 1.5×10^{-4} amps
- The N35 *"level trip"* switch was returned to the *"normal"* position

If all power range nuclear instruments and N36 have been properly adjusted, which of the following operator conditions (if any) would cause the reactor to trip?

A. N35 *"Operation Selector"* switch was left in "10^{-3} " position after retesting

B. N35 was significantly under-compensated

C. N35 control power fuses were never reinstalled

D. A reactor trip would not occur

1 Pt(s) Unit 2 was operating at 100% power when a reactor trip occurred. The reactor trip caused the initiation of a tube leak in the 2B S/G. The leak rate was 100 gpm. Given the following conditions:

- 2EMF-33 (Condenser Air Ejector Exhaust) alarms in trip 2

If all the automatic features operate as designed (without operator intervention), which one of the following indications will provide the best indication (most sensitive and timely) to confirm that a S/G tube leak has occurred?

A. Comparing S/G feed flow to steam flow mismatch

B. Observing 2EMF-10, 11, 12 and 13 (steamline hi rad)

C. Observing 2EMF-34 (S/G sample line lo range)

D. Observing 2EMF-71, 72, 73, 74 (N16 leakage)

1 Pt(s)

Unit 1 was operating at 100% when a steam generator tube rupture occurred in the 1B S/G. Given the following list of valves in the S/G sample and blowdown systems:

- 1NM-267 S/G Sample HDR RAD Monitor Inlet Isolation
- Blowdown Blowoff Automatic Isolation Valves
  - 1BB-119 = from the 1A S/G
  - 1BB-120 = from the 1B S/G
  - 1BB-121 = from the 1C S/G
  - 1BB-122 = from the 1D S/G
- S/G Sample HDR to Conventional Sample System valves
  - 1NM-269 = from the 1A S/G
  - 1NM-270 = from the 1B S/G
  - 1NM-271 = from the 1C S/G
  - 1NM-272 = from the 1D S/G

Which one of the following statements correctly describes the complete set of valves that would automatically close?

A. **1NM-267**

B. **1NM-267, 1BB-120, 1NM-270**

C. **1NM-267**
1NM-269, 1NM-270, 1NM-271, 1NM-272

D. **1NM-267**
1BB-119, 1BB-120, 1BB-121, 1BB-122,
1NM-269, 1NM-270, 1NM-271, 1NM-272

1 Pt(s) OP/0/A/6350/001C, (250 VDC Auxiliary Power System) contains the following precaution:

> ***"The DC bus ties will normally remain open. They are only to be closed during equalization charges of batteries, or on a loss of a battery or battery charger."***

Which one of the following is the basis for this precaution?

A. Prevents damage to the battery chargers resulting from both battery chargers simultaneously supplying the same bus at different voltage outputs.

B. Prevents overloading one battery if the battery terminal voltages are significantly different which would lead to excessive hydrogen evolution and a possible explosive hazard.

C. Ensures both battery chargers are operated in parallel to be able to reach the terminal voltage (~271 VDC) required for an equalization charge.

D. Ensure DC channels remain independent of each other and that a fault on one bus does not adversely affect the other bus

1 Pt(s) The Unit 1 SRO was monitoring a release from the waste monitor tank. Which one of the following alarms would terminate this release automatically?

A. 1EMF-31 (Turbine Bld Sump Disch) trip 2

B. 1EMF-44(L) (Cont Vent Drn Tank Out) trip 2

C. 1EMF-49(L) (Liquid Waste Disch) trip 2

D. 1EMF-50(L) (Waste Gas Disch) trip 2

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1 Pt(s) Unit 2 is conducting a core reload and one hundred thirty fuel assemblies have been loaded into the core. The following data has been recorded upon completion of each assembly reload sequence group:

Reload Sequence Group	No. of Assemblies Added	Total No. of Assemblies	Δρ Added by Sequence Group	Source Range Count Rate After Load
9	15	85	4500	300
10	10	95	2500	360
11	5	100	2000	400
12	5	105	3000	425
13	5	110	2500	460
14	10	120	2000	520
15	10	130	2500	600
16	15	145	4500	
17	15	160	3000	
18	15	175	4500	
19	18	193	4000	

Based on the given data, during which reload group (if any) would you predict that the reactor would reach criticality?

A. 16

B. 18

C. 19

D. The reactor will not reach criticality.

1 Pt(s) Unit 2 has just completed a plant shutdown after a record run when a leak was suspected from the relief valve on the waste gas decay tank that had been placed in service at the start of the shutdown. The tank was empty prior to being placed in service for the shutdown. The SRO directs RP to confirm the existence and determine the location of the suspected leak.

Which one of the following statements would be an effective method of locating the leak in the waste gas system?

A. Radiological Protection could monitor for alpha particle emission from the radioactive decay of entrained tritium gas.

B. Radiological Protection could monitor for flammable levels of Hydrogen gas that accumulate in the WGDTs from purging the VCT.

C. Radiological Protection could monitor for ammonia (NH_4) gas from the breakdown of ammonium hydroxide (NH_4OH), which is added to the NC system for pH control.

D. Radiological Protection could monitor for beta/gamma emission from the radioactive decay of particulate from long-lived fission product gaseous isotopes.

1 Pt(s) A large break LOCA occurred on Unit 1. The operators entered ECA-1.1 (Loss of Emergency Coolant Recirculation) for a complete loss of emergency coolant recirculation due to a blockage in the containment sumps, causing a large increase in containment temperatures and pressures. Which one of the following parameter changes would indicate that significant core uncovery was occurring?

A. Source range instruments show a rapid increase

B. Power range instruments show a rapid increase

C. 1EMF-51/52 (Containment TRN A/B High Range) shows a rapid increase

D. 1EMF-9 (Rx Bld Incore Inst Rm) radiation ARM shows a rapid increase

1 Pt(s) Unit 2 was operating at 100% when the following indications occurred:

- Pressurizer level began decreasing
- 2A NV Pump ammeter showed running amps decreased
- Normal letdown was in service

If all automatic control system appeared to operate normally, which one of the following conditions would cause the 2A NV pump running amps to decrease to the lowest value?

A. 2NV-238 (Charging Line Flow Control) failed open

B. 2NV-238 (Charging Line Flow Control) failed closed

C. 2NI-241 (Seal Inj Flow Control) failed open

D. 2NV-241 (Seal Inj Flow Control) failed closed

1 Pt(s) Unit 1 is operating at full power. Given the following events and conditions on the NCPs:

- An OAC alarm indicates loss of KC flow to the to the NCPs.
- The KC supply outside containment isolation valve (1KC-338) is closed.
- Seal injection flow rate to each NCP is 8 gpm.

What are the likely consequences if the operators do not respond to this alarm?

A. The NCPs should operate without KC indefinitely.

B. The NCP motor bearings will overheat causing motor damage.

C. The NCP stator windings will overheat causing motor damage.

D. The NCPs will experience seal failure within 3-5 minutes.

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1 Pt(s) Unit 2 was operating at 90% power after a start-up from a refueling outage. A pressurizer PORV is found to be leaking and the associated PORV block valve was shut. The PRT was cooled down to the following PRT conditions:

- PRT Level – 65%
- PRT Pressure – 9 psig
- PRT Temperature – 100°F
- Lower Containment Temperature - 118 °F

What actions are required to restore and maintain normal operating conditions to the PRT for the long term?

A. Vent/purge the PRT to containment.

B. Cool the PRT by pressurizing with nitrogen and initiating spray PRT spray flow from the NCDT.

C. Vent/purge the PRT to the waste gas system.

D. Lower the PRT level to 50%.

1 Pt(s) Unit 1 is recovering from a loss of offsite power in ES-0.2 (Natural Circulation Cooldown). The operators reach step 17 which states:

> ***IF AT ANY TIME*** *cooldown rate must be raised to greater than 50 °F in an hour, THEN* ***GO TO*** *EP/1/A/5000/ES-0.3 (Natural Cooldown with Steam Void in Vessel)*

Given the following plant conditions:

- T-hot = 560 °F
- NC Pressure = 1225 psig
- RVLIS = 100% upper range, 64% lower range
- FWST level = 405 inches
- All plant equipment is operating as designed
- Cooldown rate is 47 °F/hr

Which statement correctly describes the condition of the core and the proper procedure flow path?

REFERENCES PROVIDED:

A. The core is in a superheated condition – transition to ES-0.3 to continue the cooldown

B. The core is in a superheated condition – remain in ES-0.2

C. The core is in a subcooled condition - transition to ES-0.3 to continue the cooldown

D. The core is in a subcooled condition – remain in ES-0.2

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1 Pt(s) Unit 1 was operating at 100% power when a loss of VI system air pressure occurred. Which one of the following statements correctly describes the condition of the upper containment airlock seals?

A. The seals will slowly depressurize. They can be manually re-inflated using SA system air pressure.

B. The seals will slowly depressurize. They can be manually re-inflated using the VB system

C. The seals will remain pressurized by an air supply from local air tanks.

D. The seals will remain pressurized by a backup line from the SA system.

1 Pt(s) Unit 2 was responding to a large break LOCA in E-1 (Loss of Reactor or Secondary Coolant). Given the following events and conditions:

- The 4160/600 VAC supply transformer to load center 2ELXD failed
- Motor control center 2EMXD was deenergized

Which one of the following statements correctly describes the actions needed to start containment air return fan 2B?

A. Transfer 2ELXD to transformer 2ELXB

B. Transfer 2ELXD to transformer 2ELXF

C. Transfer 2EMXD to transformer 2ELXF

D. Manually start air return fan 2B

1 Pt(s) Unit 2 was operating at 5% power during a plant startup when a total loss of AC power (station blackout) occurred. Given the following events and conditions:

- The plant was operating within normal limits and bands
- All protection systems operated as designed
- All emergency diesel generators failed to start
- No safety injection occurred
- No operator action was taken

Which one of the following statements correctly describes the response of the reactor trip system?

A. No automatic reactor trip would occur and the reactor would remain critical.

B. The shunt coils in the reactor trip and bypass breakers would energize and a reactor trip would occur.

C. The under-voltage and shunt coils in the reactor trip breakers would energize and a reactor trip would occur.

D. The CRDMs would deenergize and the rods would drop into the core.

1 Pt(s) Unit 2 was operating at 100% power when an alarm was received on the 2B NCP standpipe level. Which one of the following statements correctly describes the cause of the standpipe level alarm?

A. A high standpipe level indicates excessive leakoff through the #2 seal.

B. A high standpipe level indicates reduced leakoff through the #3 seal.

C. A low standpipe level indicates excessive leakoff through the #2 seal.

D. A low standpipe level indicates reduced leakoff through the #3 seal.

---

1 Pt(s) Unit 2 was operating at 100% power with train B components in service and RN suction aligned to the low level intake. If a high strainer differential pressure alarm occurs on the 2B RN pump, what statement describes the RN system alignment upon completion of all automatic actions?

A. **2A RN pump is running from the SNSWP**
2A RN strainer is in service

B. **2A RN pump is running from the low level intake**
2B RN strainer is in backwashing

C. **2B RN pump is running from the SNSWP**
2B RN strainer is in backwashing

D. **2B RN pump is running from the low level intake**
2B RN strainer is backwashing

---

1 Pt(s) Unit 1 was operating at 5% power following a reactor startup after a refueling outage. Given the following conditions and events:

- A mixed bed demineralizer that had been isolated at the end of the last fuel cycle was placed in service
- T-ave = 558 °F
- All systems are aligned normally for the existing plant conditions

What will be the effect (if any) on T-ave?

A. T-ave will increase due to the exchange of Lithium ions

B. T-ave will increase due to the exchange of boric acid

C. T-ave will decrease due to the exchange of boric acid

D. T-ave will not change

1 Pt(s) Unit 1 was operating at 100% power when panel board 1EKVB was unintentionally deenergized. Which one of the following lists of ESS loads was deenergized.

A. **Process Protection Channel I**
Safeguards Test Cabinet Train A
SSPS Channel I (Trains A&B)
SSPS Train A Output Cabinet
Auxiliary Safeguards Cabinet Train A

B. **Process Protection Channel IV**
Safeguards Test Cabinet Train B
SSPS Channel IV (Trains A&B)
SSPS Train B Output Cabinet
Auxiliary Safeguards Cabinet Train

C. **Process Protection Channel II**
SSPS Channel II (Trains A & B)

D. **Process Protection Channel III**
SSPS Channel III (Trains A & B)

1 Pt(s) Unit 2 was responding to a small-break LOCA in E-1 (Loss of Reactor or Secondary Coolant). Given the following conditions:

- Containment pressure = 0.7 psig (at peak pressure for the event)
- 2ETA was deenergized due to a bus fault
- The VI header inside containment was depressurized and isolated due pipe rupture
- The VI system outside containment remained pressurized

Which one of the following statements correctly describes the positions of valves 2RV-79A and 2RV-80B?

REFERENCES PROVIDED

A. 2RV-79A is open, 2RV-80B is open

B. 2RV-79A is shut, 2RV-80B is open

C. 2RV-79A is open 2RV-80B is shut

D. 2RV-79A is shut 2RV-80B is shut

1 Pt(s) With Unit 1 was operating at 75% power with rods in automatic control when turbine load drops 10%. Which of the following correctly indicates the change in plant parameters when the transient is complete?

A. T-ave decreases approximately 2 to 3°F due to decreased Tref.

B. T-ave stays the same due to automatic rod motion.

C. T-ave increases approximately 2 to 3 °F due to rod motion.

D. T-ave stays the same due to decreased Tref.

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1 Pt(s) Which of the following statements correctly describes the major effect of a failure of a large number of lower ice condenser doors to open for an unisolable main steam line break with an associated SGTR (tube rupture on the faulted S/G) accident inside containment.

A. Containment peak pressure would be higher and would be achieved sooner in the event.

B. Containment peak pressure would be higher but would be achieved later in the event.

C. Containment sump water inventory would not be adequate after shift to recirculation mode.

D. Containment sump water inventory would not be adequate to maintain long-term subcriticality during the cooldown.

1 Pt(s) The Unit 2 NV system cold leg flow path balance test procedure throttles high pressure injection flow between a minimum value to limit ____(1)____ and a maximum value to limit ____(2)____.

	(1)	(2)
A.	**Pump overheating**	**pipe erosion**
B.	**Break flow**	**pipe erosion**
C.	**Pump overheating**	**pump runout**
D.	**Break flow**	**pump runout**

1 Pt(s) Unit 1 was responding to a station blackout in ECA-0.0 (Loss of all AC Power). What pressurizer heaters are available to control reactor pressure?

A. Group A backup heaters can be controlled from the SSF.

B. Group B backup heaters can be controlled from the ASP.

C. Group C backup heaters can be controlled from the ASP.

D. Group D backup heaters can be controlled from the SSF.

1 Pt(s) Unit 2 was operating at 100% power when the pressurizer spray valve failed open. Given the following conditions:

- PZR Channel Select is in 1-2 position
- PZR Pressure Control in AUTO
- NCS Pressure is 2245 psig

Which one of the following describes the response of the PZR pressure control system to these conditions?

A. PZR pressure does not decrease because the spray valves will not open below 2260 psig

B. PZR pressure decreases to 1945 psig where the RPS reactor trips.

C. PZR pressure decreases to 2210 psig, where the backup heaters take control of pressure.

D. PZR pressure decreases to 2185 psig where the spray line block valves close.

1 Pt(s) Which one of the following statements correctly describes the response of the turbine driven CA pump if turbine speed exceeds 4500 rpm?

A. A mechanical flyweight assembly unlatches a trip hook on the turbine stop valve

B. A mechanical flyweight assembly unlatches a trip hook on the turbine governor valve

C. The Woodward governor will generate a signal that trips the turbine stop valve tripping latch assembly

D. The Woodward governor will generate a trip signal that trips the turbine governor valve

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1 Pt(s)

Unit 1 was conducting refueling in Mode 6. RP requested the control room operator to independently verify the adjustment of the trip 2 setpoint for 1EMF-16 (Containment Refueling Bridge) area radiation monitor.

If the trip 2 setpoint was required to be set at ½ decade above the background and background radiation levels were 3.0 mR/hr, what is the correct value for the trip 2 setpoint?

A. 6 mR/hr

B. 9 mR/hr

C. 12 mR/hr

D. 15 mR/hr

1 Pt(s) Unit 1 was conducting a reactor startup. Given the following conditions:

- All shutdown rod banks have been fully withdrawn at 222 steps
- Control bank "A" rods are being withdrawn at 80 steps.
- The RPI Urgent Failure Annunciator alarms.

Which of the following conditions would cause this alarm?

A. A control bank "A" rod is misaligned from its bank position by 8 steps.

B. Data "A" failure has occurred on one or more rods in shutdown bank "A".

C. The rod control bank overlap unit has detected an improper rod step sequence.

D. A rod in shutdown bank "C" has dropped into the bottom of the reactor.

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1 Pt(s) Unit 1 was operating at 60% power. Given the following events and conditions:

- Pressurizer pressure decreased to 1940 psig.
- The SSPS train A low PZR pressure trip logic relay failed to actuate.

What effect would this failure have on the function of the reactor protection system?

A. The reactor would not trip because the Train A logic relay would not remove power from the UV coil for RTA.

B. The reactor would not trip because the Train B logic relay would not remove power from the UV coil for RTA.

C. The reactor would trip because the Train B logic relay would remove power from the UV coil for RTB.

D. The reactor would trip because the Train B logic relay would remove power from the UV coil for RTA.

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1 Pt(s) Unit 1 is operating at 35% power with all systems in normal alignment for plant conditions. Given the following plant conditions:

- The steam pressure input for Steam Flow for "B" Steam Generator fails HIGH (1300psig).

If the operators take no action, which one of the following describes the steam generator level control system initial response to the steam pressure failure until the level error signal counteracts the SM/CF flow mismatch?

A. Indicated steam flow decreases, due to the decrease in density compensation, and S/G Level will decrease.

B. Indicated steam flow decreases, due to the increase in density compensation, and S/G Level will increase.

C. Indicated steam flow increases, due to the decrease in density compensation, and S/G Level will decrease.

D. Indicated steam flow increases, due to the increase in density compensation, and S/G Level will increase.

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1 Pt(s) Unit 2 is responding in E-1 (Loss of Reactor or Secondary Coolant) to a LOCA inside containment. Given the following conditions:

- Phase B containment isolation actuated
- Containment pressure remained above 3 psig
- The FWST level decreased to 20 inches.

Which of the following statements correctly describes the steps necessary to prevent damaging the NS pumps?

A. Reset NS, stop the NS pumps.

B. Reset CPCS, stop the NS pumps.

C. Reset containment phase B isolation, stop the NS pumps.

D. Override CPCS, stop the NS pumps.

1 Pt(s)

Unit 1 was in the process of removing spent fuel from the core when a design basis earthquake caused a loss of all AC power (station blackout). Given the following events and conditions:

- Spent fuel pool (SFP) makeup had been aligned from the FWST.
- FWST level was at 200 inches.
- The operators entered ECA-0.0 (Loss of All AC Power)
- Spent fuel pool level was noted to have lowered by 7 inches

Which of the following events could explain the drop in spent fuel pool level?

A. The loss of ND cooling to the reactor cavity would cause a drop in cavity water level.

B. The loss of containment purge fans caused a change in the differential pressure between the spent fuel pool and the reactor cavity.

C. The FWST gravity makeup line to the spent fuel pool was not properly isolated and water has been siphoned back into the FWST.

D. The standby makeup pump was in operation.

1 Pt(s) Unit 1 was operating at 100% power when a steam generator tube rupture occurred in the 1B S/G. If the operators respond properly in E-3 (Steam Generator Tube Rupture) and isolate the 1B S/G, which of the following conditions are indicative of successful isolation prior to commencing the initial cooldown of the NC system?

A. **S/G level decreases as S/G water flows back through the break into the NC system.**
S/G pressure decreases as steam generator pressure equalizes with NC system pressure.

B. **S/G level decreases as S/G water flows back through the break into the NC system.**
S/G pressure increases as steam generator pressure equalizes with NC system pressure.

C. **S/G level increases as NC system coolant water flows through the break into the S/G.**
S/G pressure decreases as steam generator pressure equalizes with NC system pressure.

D. **S/G level increases as NC system coolant water flows through the break into the S/G.**
S/G pressure increases as steam generator pressure equalizes with NC system pressure.

1 Pt(s) Unit 2 has tripped due to instrument technician error during a surveillance test. The moisture separator reheaters (MSRs) did not reset. Assuming no operator action, what effect would this failure have on the plant response to this transient?

A. The NCS would be overcooled because the main steam supply to the MSRs would not isolate.

B. Safety injection will actuate on low SG pressure because MSR steam supply valve 2SM-15 fails to close.

C. Safety injection will actuate on low SG pressure because the main steam supply to the MSRs would not isolate.

D. The NCS would be overcooled because MSR steam supply valve 2SM-15 fails to close.

1 Pt(s) Which one of the following correctly describes the normal loading of the 125VDC vital battery chargers?

A. **(1) Battery on "float", (1) 125VDC DC distribution center, (1) 125VDC DC panel board, (1) 120VAC AC static inverter.**

B. **(1) Battery on "float", (1) 125VDC DC distribution center, (2) 125VDC DC panel boards, (2) 120VAC AC static inverters.**

C. **(1) Battery on "float", (1) 125VDC DC distribution center, (1) 125VDC DC panel board, (2) 120VAC AC static inverters.**

D. **(1) Battery on "float", (2) 125VDC DC distribution centers, (2) 125VDC DC panel boards, (2) 120VAC AC static inverters.**

1 Pt(s) Which of the following actions occur when an emergency diesel generator reaches 95% of rated speed during an emergency start?

A. Generator field flashed and voltage and frequency automatically controlled.

B. Low lube oil pressure trip reinstated and starting air secured.

C. Generator field flashed, and starting air secured.

D. Low lube oil pressure trip reinstated and voltage and frequency automatically controlled.

1 Pt(s) During preparation for a waste gas release. the pre-release surveillance test of 1EMF-50(L) (Waste Gas Disch (Lo Range)) revealed that there was no response to the source check. IAE reported that the scintillation detector had failed. What action is necessary to begin releasing the waste gas decay tank?

A. Take manual grab samples of the waste gas decay tank prior to any gaseous waste release.

B. Source check the GM detector for 1EMF-50(H) (Waste Gas Disch (Hi Range)) prior to any gaseous waste release.

C. Verify 1EMF-36(L) (Unit Vent Gas (Lo Range)) is in service prior to any gaseous waste release.

D. Repair 1EMF-50(L) prior to any gaseous waste release.

1 Pt(s) Which one of the following interlocks is designed to prevent a water hammer in the RC piping if all RC pumps trip?

A. The vacuum breaker valves automatically open.

B. There is a 45 second time delay before pump discharge valves close to allow coast down.

C. The pump discharge valves remain open until flow decreases below a preset value.

D. The pump discharge valves close over 120 seconds while the pump is coasting down.

1 Pt(s) On May 19th, the NLO was directed by the unit supervisor to perform a sequence of steps using a working copy of a procedure in progress that had previously been correctly validated against the controlled copy on May 7th.

Which one of the following statements correctly describes the required actions of the NLO in accordance with OMP 4-1 to complete this procedure?

A. Perform just the designated steps as directed using the existing working copy.

B. Re-validate the working copy of the procedure and perform just the designated steps from the existing working copy.

C. Obtain a new working copy of the procedure and perform just the designated steps from the new working copy.

D. Obtain a new working copy of the procedure and inform the shift supervisor that all procedure steps must be performed or validated from the first step in the procedure.

1 Pt(s) During a surveillance test of NI system valves, 2NI-9A (NC COLD LEG INJ FROM NV) did not respond to a safety injection signal. The SOM requests that the OSM issue a special order pre-assigning a dedicated operator by name on each shift to open 2NI-9A should a safety injection signal occur before the cause of this condition is corrected.

Which one of the following statements correctly describes the requirements for issuance of this special order?

A. The OSM is not authorized to issue special orders; only the SOM can issue a special order.

B. The special order cannot be authorized for any situation when a procedure change is required.

C. The special order cannot be issued until after an operability evaluation has been completed.

D. The special order cannot be issued until after the procedure change has been issued.

1 Pt(s) Unit 1 is at 1% power, starting up from a plant trip due to multiple power range nuclear instrument failures. Unit 2 is shutting down (30% power) to Mode 3, to investigate the potential common mode failure mechanism. The Unit 2 power range nuclear instrument channel N41 has been tagged out in preparation for the investigation.

Which of the following correctly describes the TSAIL entry for power range nuclear instrument inoperability during this maintenance for Unit 2?

A. No TSAIL entry is required because N41 will not be required to be operable in Mode 3.

B. A TSAIL entry is required because N41 is inoperable in Mode 1.

C. No TSAIL entry is required because N41 will be within the action statement time limits.

D. A TSAIL entry is required for tracking only

1 Pt(s) Unit 2 is operating at 100% power. There is a packing leak on a VI system containment isolation valve inside lower containment. You are reviewing an RWP that controls the work permit to inspect and repair the VI valve.

What are the minimum dosimetry requirements for this job?

A. Thermoluminescent and neutron dosimeters

B. Electronic alarming and neutron dosimeters

C. Electronic alarming and pocket ion chamber dosimeters

D. Thermoluminescent and electronic alarming dosimeters

1 Pt(s) Units 1 and 2 are at 100% power. Given the following conditions:

- Unit 2 has experienced 2 fuel pin failures.
- The mechanical seal has failed on NI pump 2B.
- The NI-2B pump room general area is 200 mrem/hr.
- In order to reach the NI-2B pump room the workers must transit through 6 rem/hr high radiation area for 1 minute and return.
- Worker A has an accumulated annual dose of 400 mrem, respectively.

What is the maximum allowable time that worker A can participate in the seal repair on NI Pump 2B without exceeding the alert flag exposure limit for external exposure?

A. No longer than 5 hours

B. No longer than 5.5 hours

C. No longer than 6 hours

D. No longer than 7 hours

1 Pt(s)

With the plant at 10% power, an Instrument Technician was allowed to adjust the limit switches on 1NS-32A (A NS PUMP DISCH CONT OUTSIDE ISOL) without a tag-out. He cycled the valve using the manual hand wheel to set up the limit switches. Upon completion of the work, the worker manually closed 1NS-32A and disengaged the manual hand wheel.

Which one of the following statements is correct at the end of the maintenance activity?

REFERENCES PROVIDED:

A. "A" NS train is operable following the maintenance but 1NS-32A must still be cycled electrically to comply with requirements of OMP 13-1 (Valves).

B. "A" NS train is operable following the maintenance but now requires an R&R (info sticker on control switch) to document manual positioning.

C. "A" NS train is inoperable following the maintenance and remains inoperable until after 1NS-32A has been cycled electrically.

D. "A" NS train is inoperable while 1NS-32A was being manually cycled but is now operable after the valve handwheel was disengaged

1 Pt(s) Unit 1 was conducting control rod drop tests during a plant startup at 2% reactor power when a complete loss of RN occurred. Given the following events and conditions:

- Control room operators enter AP/20 (Loss of RN)
- A and C NCP motor stator windings reach 327 °F
- The operators manually trip the reactor but the trip breakers fail to open
- Reactor power has increased to 5%
- Pressurizer pressure = 1930 psig

Which one of the following statements correctly describes the proper procedural flow path for these conditions?

A. Remain in AP/20, trip all NCPs and commence a reactor shutdown.

B. Implement FR-S.1 (Response to Nuclear Power Generation/ATWS) concurrently with AP/20.

C. Terminate AP/20, enter E-0 (Reactor Trip or Safety Injection) and immediately transition to FR-S.1.

D. Enter E-0 and immediately transition to FR-S.1 while continuing on in AP/20 as time and conditions permit.

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1 Pt(s) Unit 1 was operating at 100% power when a total loss of offsite power occurred. Given the following events and conditions:

- The diesel generators started and loaded as designed
- The operators completed E-0 (Reactor Trip Response)
- The operators reached step 11 of ES-0.1 (Natural Circulation Cooldown) which requires the cooldown of the NC system

Which one of the following components are necessary to prevent the formation of a void in the reactor vessel while cooling down the plant?

A. NI pumps

B. Head vent

C. VL/VU fans

D. CRDM fans

1 Pt(s) Which one of the following conditions would cause 1EMF-51A (Containment TRN A (Hi Range)) to increase.

A. An increase in alpha radiation from a tritium leak

B. A cloud of radioactive gas that emits beta radiation

C. An increase in gamma flux from a failed fuel event

D. An increase in neutron radiation from a criticality event

1 Pt(s) Unit 1 was operating in Mode 4, following a shutdown for refueling after a record run. Given the following conditions and events:

- A mixed bed demineralizer was being pre-treated in preparation for placing it in service.
- A cation bed demineralizer, which had previously been in service at the beginning of the fuel cycle, was isolated.
- Automatic makeup initiated caused by a drop in pressurizer level due to the cooldown
- Both trains of ND were in service.

Which one of the following statements correctly describes a condition that would cause an inadvertent dilution of the NCS during this makeup evolution?

A. NCS Boron depletion at the end of the fuel cycle.

B. 1NVSS5450 (BA FLOW CNTRL) for 1NV-267A had been incorrectly set to 5.0 when it should have been set at 6.7.

C. 1NVSS5460 (BA BLEND DISCH CNTRL) for 1NV-252A had been incorrectly set to 4.0 when it was required to be set at 5.5.

D. The cation bed demineralizer was inadvertently placed in service in place of the pre-treated mixed bed demineralizer.

1 Pt(s)

Unit 1 was in mode 6 following a refueling outage when a valve misalignment caused a complete drain-down of ND system water into the containment sump and loss of both trains of ND cooling. Given the following events and conditions:

- NC system temperature is 150 °F.
- Reactor water level is 50 inches above hot leg centerline.
- The core has been refueled.
- The upper internals have not been installed
- The refueling cavity has been drained in preparation for start up.
- Time after shutdown is 30 days.

How much time do the operators have before boiling will occur in the core?

REFERENCES PROVIDED:

A. Less than 30 minutes

B. 30 to 40 minutes

C. 40 to 50 minutes

D. Greater than 50 minutes

1 Pt(s) Unit 1 was in the process of conducting a reactor startup. Given the following events and conditions:

Control Bank D Group 2					
Time	0200	0201	0202	0203	0204
Step Counter Reading	50	56	58	62	68
Digital Rod Position Indication					
M-4	54	60	60	66	72
H-8	48	54	60	54	54
D-12	48	48	48	48	48

There were no alarms on the rod control or DRPI systems at 0200.

What is the earliest time that a control rod misalignment has occurred?

A. 0201

B. 0202

C. 0203

D. 0204

1 Pt(s) Unit 1 was responding to an ATWS in FR-S.1 (Response to Nuclear Power Generation/ATWS). Given the following events and conditions:

- Core exit thermocouples read 1205 °F and increasing
- FWST Level = 190 inches
- CA Storage Tank Level = 75%
- NC Pressure = 2100 psig

Which one of the following statements correctly describes the required EOP action?

A. Go to EP/1/A/5000/FR-C.1 (Response to Core Cooling)

B. Go to EP/1/A/5000/G-1 (Generic Enclosure) Enclosure 20 (Maintaining CA Suction Sources)

C. Go to AP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirc)

D. Go to EG/1/A/MSAM/SACGR1 (Severe Accident Control Room Guideline Initial Response)