

**U.S. Nuclear Regulatory Commission  
Site-Specific  
Written Examination****Applicant Information**

Name:	Region: IV
Date: April 10, 2000	Facility/Unit: DCPD / Units 1 & 2
License Level: RO	Reactor Type: W
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	100	Points
Applicant's Score	_____	Points
Applicant's Grade	_____	Percent

APPENDIX E  
POLICIES AND GUIDELINES FOR TAKING NRC EXAMINATIONS

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Each examinee shall be briefed on the policies and guidelines applicable to the examination category (written and/or operating test) being administered. The applicants may be briefed individually or as a group. Facility licensees are encouraged to distribute a copy of this appendix to every examinee before the examinations begin. All items apply to both initial and requalification examinations, except as noted.

**PART A - GENERAL GUIDELINES**

1. ***[Read Verbatim]*** Cheating on any part of the examination will result in a denial of your application and/or action against your license.
2. If you have any questions concerning the administration of any part of the examination, do not hesitate asking them before starting that part of the test.
4. SRO applicants will be tested at the level of responsibility of the senior licensed shift position (i.e., shift supervisor, senior shift supervisor, or whatever the title of the position may be).
5. You must pass every part of the examination to receive a license or to continue performing license duties. Applicants for an SRO-upgrade license may require remedial training in order to continue their RO duties if the examination reveals deficiencies in the required knowledge and abilities.
6. The NRC examiner is not allowed to reveal the results of any part of the examination until they have been reviewed and approved by NRC management. Grades provided by the facility licensee are preliminary until approved by the NRC. You will be informed of the official examination results about 30 days after all the examinations are complete.

**PART B - WRITTEN EXAMINATION GUIDELINES**

1. ***[Read Verbatim]*** 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.
2. To pass the examination, you must achieve a grade of 80.00 percent or greater; grades will not be rounded up to achieve a passing score. Every question is worth one point.
3. For an initial examination, the time limit for completing the examination is five hours.

For a requalification examination, the time limit for completing both sections of the examination is three hours. If both sections are administered in the simulator during a single three-hour period, you may return to a section of the examination that was already completed or retain both sections of the examination until the allotted time has expired.

4. You may bring pens, pencils, and calculators into the examination room. Use black ink to ensure legible copies; dark pencil should be used only if necessary to facilitate machine grading.
5. Print your name in the blank provided on the examination cover sheet and the answer sheet. You may be asked to provide the examiner with some form of positive identification.
6. Mark your answers on the answer sheet provided and do not leave any question blank. Use only the paper provided and do not write on the back side of the pages. If you are using ink and decide to change your original answer, draw a single line through the error, enter the desired answer, and initial the change.
7. If you have any questions concerning the intent or the initial conditions of a question, do *not* hesitate asking them before answering the question. Ask questions of the NRC examiner or the designated facility instructor *only*. When answering a question, do *not* make assumptions regarding conditions that are not specified in the question unless they occur as a consequence of other conditions that are stated in the question. For example, you should not assume that any alarm has activated unless the question so states or the alarm is expected to activate as a result of the conditions that are stated in the question.
8. 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.
9. When you complete the examination, assemble a package including the examination questions, examination aids, answer sheets, and scrap paper and give it to the NRC examiner or proctor. Remember to sign the statement on the examination cover sheet indicating that the work is your own and that you have neither given nor received assistance in completing the examination. The scrap paper will be disposed of immediately after the examination.
10. After you have turned in your examination, leave the examination area as defined by the proctor or NRC examiner. If you are found in this area while the examination is still in progress, your license may be denied or revoked.
11. Do you have any questions?

# ANSWER SHEET FOR REACTOR OPERATOR WRITTEN EXAMINATION

Multiple Choice (Circle or X your choice)

NAME: \_\_\_\_\_

If you change your answer, write your selection in the blank and initial.

001	A	B	C	D	_____	026	A	B	C	D	_____
002	A	B	C	D	_____	027	A	B	C	D	_____
003	A	B	C	D	_____	028	A	B	C	D	_____
004	A	B	C	D	_____	029	A	B	C	D	_____
005	A	B	C	D	_____	030	A	B	C	D	_____
006	A	B	C	D	_____	031	A	B	C	D	_____
007	A	B	C	D	_____	032	A	B	C	D	_____
008	A	B	C	D	_____	033	A	B	C	D	_____
009	A	B	C	D	_____	034	A	B	C	D	_____
010	A	B	C	D	_____	035	A	B	C	D	_____
011	A	B	C	D	_____	036	A	B	C	D	_____
012	A	B	C	D	_____	037	A	B	C	D	_____
013	A	B	C	D	_____	038	A	B	C	D	_____
014	A	B	C	D	_____	039	A	B	C	D	_____
015	A	B	C	D	_____	040	A	B	C	D	_____
016	A	B	C	D	_____	041	A	B	C	D	_____
017	A	B	C	D	_____	042	A	B	C	D	_____
018	A	B	C	D	_____	043	A	B	C	D	_____
019	A	B	C	D	_____	044	A	B	C	D	_____
020	A	B	C	D	_____	045	A	B	C	D	_____
021	A	B	C	D	_____	046	A	B	C	D	_____
022	A	B	C	D	_____	047	A	B	C	D	_____
023	A	B	C	D	_____	048	A	B	C	D	_____
024	A	B	C	D	_____	049	A	B	C	D	_____
025	A	B	C	D	_____	050	A	B	C	D	_____

## ANSWER SHEET FOR REACTOR OPERATOR WRITTEN EXAMINATION

Multiple Choice (Circle or X your choice)

NAME: \_\_\_\_\_

If you change your answer, write your selection in the blank and initial.

051	A	B	C	D	_____	076	A	B	C	D	_____
052	A	B	C	D	_____	077	A	B	C	D	_____
053	A	B	C	D	_____	078	A	B	C	D	_____
054	A	B	C	D	_____	079	A	B	C	D	_____
055	A	B	C	D	_____	080	A	B	C	D	_____
056	A	B	C	D	_____	081	A	B	C	D	_____
057	A	B	C	D	_____	082	A	B	C	D	_____
058	A	B	C	D	_____	083	A	B	C	D	_____
059	A	B	C	D	_____	084	A	B	C	D	_____
060	A	B	C	D	_____	085	A	B	C	D	_____
061	A	B	C	D	_____	086	A	B	C	D	_____
062	A	B	C	D	_____	087	A	B	C	D	_____
063	A	B	C	D	_____	088	A	B	C	D	_____
064	A	B	C	D	_____	089	A	B	C	D	_____
065	A	B	C	D	_____	090	A	B	C	D	_____
066	A	B	C	D	_____	091	A	B	C	D	_____
067	A	B	C	D	_____	092	A	B	C	D	_____
068	A	B	C	D	_____	093	A	B	C	D	_____
069	A	B	C	D	_____	094	A	B	C	D	_____
070	A	B	C	D	_____	095	A	B	C	D	_____
071	A	B	C	D	_____	096	A	B	C	D	_____
072	A	B	C	D	_____	097	A	B	C	D	_____
073	A	B	C	D	_____	098	A	B	C	D	_____
074	A	B	C	D	_____	099	A	B	C	D	_____
075	A	B	C	D	_____	100	A	B	C	D	_____

## RO Initial Written Examination

1 1.00

Which ONE of the following correctly delineates the order of power train components to the Reactor Trip Breakers:

- A 480VAC - Motor Breakers - Motor Generators - Generator Breakers - Reactor Trip Breakers
- B 480VAC - Generator Breakers - Motor Generators - Motor Breakers - Reactor Trip Breakers
- C 480VAC - Motor Breakers - Generator Breakers - Motor Generators - Reactor Trip Breakers
- D 480VAC - Generator Breakers - Motor Breakers - Motor Generators - Reactor Trip Breakers

2 1.00

What is the reason for maintaining the control banks above the setpoint for the "Rod Bank Lo Lo Insertion Limit" alarm?

- A Ensures the maintenance of acceptable power distribution limits, maintains minimum shutdown margin, and limits the potential effects of rod misalignment on the associated accident analysis.
- B Ensures adequate shutdown margin, maintains acceptable core thermal limits and limits the potential effects of rod misalignment on power operations.
- C Ensures adequate DNBR, limit fission gas release, and maintains fuel pellet temperature and cladding mechanical properties within design criteria.
- D Ensures that additional restrictions on thermal power and increased frequency of peaking factor measurements are not required.

3 1.00

Reactor and turbine power are stable at 20% with rods in AUTO when the generator output breakers trip open. The turbine and generator remain in service to supply plant loads.

Due to the above transient, rods will automatically insert

- A throughout the transient, but automatic rod withdrawal is prevented once **reactor power** is less than 15%.
- B until the **turbine load** reaches 15%, at which time auto insertion will be inhibited, requiring the operator to place the rods in manual to insert them.
- C until the **reactor power** reaches 15%, at which time auto insertion will be inhibited, requiring the operator to place the rods in manual to insert them.
- D throughout the transient, but automatic rod withdrawal is prevented once **turbine load** is less than 15%.

4 1.00

Given the following Unit 1 plant conditions:

The Unit is in MODE 2.  
All Shutdown rods are fully withdrawn.  
Control Bank A is being withdrawn.

Which ONE of the following describes the Limiting Condition for Operation (LCO) for the reactor coolant loops?

- A At least 2 RCPs shall be OPERABLE and ONE in operation.
- B At least 2 RCPs shall be OPERABLE and in operation.
- C At least 3 RCPs shall be OPERABLE and TWO in operation.
- D All 4 RCPs shall be OPERABLE and in operation.

5 1.00

Which ONE of the following best describes the CVCS system response in the event that 1-1 RCP #1 Seal fails COMPLETELY?

- A Seal water heat exchanger relief valve, 8123, outside of containment will open to protect the Seal Water Heat Exchanger from overpressure.
- B VCT level will decrease as seal return flow to charging pump suction increases.
- C Suction temperature of the CCP will decrease due to the increased cooling to the Seal Water Heat Exchanger.
- D Seal Injection flow will initially decrease as FCV-128 opens in response to decreasing pressurizer level.

6 1.00

A **Shutdown Bank D** rod drops at 75% power. After the appropriate lift coil disconnect switches are opened, the dropped rod is recovered.

What would be the expected status of the ROD CONTROL URGENT FAILURE ALARM during the recovery of the rod?

- A actuated by a logic error
- B actuated by a slave cycler failure
- C not actuated
- D actuated by a regulation failure



7 1.00

During a loss of offsite power, with all Emergency Diesels (EDG) running, a fire breaks out in EDG 1-1.

What effect will this have on the Diesel Fuel Oil System?

- A The EDG air receiver melt links will vent the air and dump fuel racks to stop the affected EDG
- B The Fuel Oil Day Tank melt links will close the fill valves, preventing any addition of fuel oil to the day tank
- C Fire protection relays will secure the fuel oil transfer pumps to prevent filling the Fuel Oil Day Tank
- D Fire protection equipment is disabled during a loss of AC and will not enable until AC power is restored to the S/U transformer

8 1.00

With the plant initially at 100% power, a loss of all offsite power results in a reactor trip.

When reactor power drops to about 8-9% (due to prompt drop after the trip), adequate core cooling exists because of:

- A ECCS flow
- B Continued forced flow
- C Sufficiently low core thermal power
- D Natural circulation flow

9 1.00

A reactor trip and loss of offsite power have occurred. Natural circulation has been established.

If the rate of dumping steam INCREASED, how would natural circulation flow be affected?

- A DECREASE due to the decrease in subcooling.
- B INCREASE due to the decrease in decay heat rate.
- C INCREASE due to the increased thermal gradient.
- D DECREASE due to the increased density of the cold leg.

10 1.00

From 100% power, electrical faults have caused a reactor trip and loss of offsite power. If the Non-Vital 480V AC Buses CANNOT be re-energized, what can be done to restore power to the Pressurizer Heaters?

- A Groups 1 & 3 can be aligned to 480 V Vital Bus 1F & 1G.
- B Groups 2 & 4 can be aligned to 480V Vital Bus 1F & 1H.
- C Groups 1 & 4 can be aligned to 480V Vital Bus 1F & 1H.
- D Groups 2 & 3 can be aligned to 480V Vital Bus 1G & 1H.

11 1.00

An instrument malfunction has caused excessive CCW flow to the Letdown Heat Exchanger, significantly DECREASING the letdown fluid temperature. The mixed bed demins are in service.

What will occur as a result of this malfunction?

- A PCV-135 "Letdown Pressure Control Valve" will CLOSE momentarily interrupting letdown flow.
- B Mixed bed demins will be ineffective for removing CRUD particles.
- C Mixed bed demins will begin to remove boric acid from letdown.
- D TCV-149 "Letdown Temperature Diversion Valve" will divert all letdown flow to the VCT.

12 1.00

Given the following:

Unit 2 has just tripped.

All rod bottom lights LIT, except rods D-4, K-2, and H-5.

Rod position indicators for rods D-4 and K-2 indicate mid-scale and H-5 indicates full out.

Assume that any emergency boration initiated via the reactor makeup control always achieves exactly the minimum flow rate required.

Which ONE of the following is the minimum required emergency boration time frame for these conditions?

- A 15 minutes
- B 30 minutes
- C 60 minutes
- D 90 minutes

13 1.00

The plant is operating at 100% power when a pressurizer safety valve inadvertently lifts. With PRT pressure at 5 PSIG, what would be the approximate tail pipe temperature of the safety valve?

- A 160 °F
- B 210 °F
- C 230 °F
- D 270 °F

14 1.00

Which ONE of the following does the Post-Accident Sampling System provide post-accident sampling capability from outside containment?

- A Reactor coolant system, control room ventilation intake, gaseous waste system effluent, and spent fuel pool
- B Component cooling water, reactor coolant system, steam generator blowdown, and containment exhaust
- C Residual heat removal system, component cooling water system, containment emergency sump, and containment atmosphere
- D Reactor coolant system, residual heat removal system, containment emergency sump, and containment atmosphere

15 1.00

The following lineup currently exists on the Reactor Makeup Control system.

FCV-110A (BA to Blender)	CLOSED
FCV-110B (Blender outlet to VCT outlet)	CLOSED
FCV-111A (PW to Blender)	THROTTLED
FCV-111B (Blender outlet to VCT inlet)	OPEN

The system is currently operating in the:

- A Alternate Dilute mode.
- B Automatic mode.
- C Dilute mode.
- D Borate mode.

16 1.00

Which ONE of the following is impacted by a MANUAL Phase A signal?

- A RHR
- B CFCU
- C CCW
- D AFW

17 1.00

While operating at 100% power, a 4 inch diameter small break LOCA occurs on the RCS HOT leg.

Comparing plant response with a 4 inch diameter LOCA in the COLD leg, more core uncover occurs in a:

- A HOT leg LOCA for a GREATER period of time.
- B COLD leg LOCA for a GREATER period of time.
- C COLD leg LOCA but for a SHORTER period of time.
- D HOT leg LOCA but the time of uncover is the same.

18 1.00

With the reactor at 100% power, vital instrument AC power from PY-11 (52-1115) and PY-12 (52-1215) is lost to Train A SSPS.

What will be the plant response?

- A Should an Automatic SI occur, all ESF equipment will respond as required, but SI Reset will NOT be available.
- B All ESF actuations controlled by the Train A will occur.
- C The reactor will automatically trip. ESF actuations performed by the Train A will NOT occur.
- D A reactor trip and a Train A ESF actuation will NOT automatically occur. However, manual reactor trip is available.

19 1.00

Given the following conditions:

Pressurizer pressure controller is selected to PT-455 as the controlling channel  
PT-474 is selected as the backup channel  
PT-474 fails low.

What would be the plant response?

- A PCV-456 and PCV-474 will fail open, and PCV-455C is capable of opening on a valid high pressure condition.
- B PCV-455C is prevented from opening, and PCV-456 and PCV-474 are capable of opening on a valid high pressure condition.
- C PCV-456, PCV-474, and PCV-455C are not effected since PT-474 was selected as the backup channel.
- D PCV-456, PCV-474, and PCV-455C are prevented from opening on a valid high pressure condition.

20 1.00

Given the following:

A large break LOCA occurred.  
A steam void exists in the Reactor Vessel Head.

Which of the following instrument failures could affect Reactor Vessel Level Indication System (RVLIS) Upper Range level indication?

- A Pressurizer pressure
- B Wide range RCS T-hot
- C Core exit thermocouple
- D Wide range RCS T-cold

21 1.00

Tech Specs state that in MODE 6, with the water level greater than or equal to 23 feet above the top of the vessel flange, AT LEAST one Residual Heat Removal (RHR) train shall be operable and in operation, except that pump may be de-energized for up to one hour (per eight hour period) under certain conditions. Which ONE of the following items describes one of these conditions?

- A One RHR pump remains operable, and no operations involving core alterations are initiated.
- B No operations are permitted that would cause a dilution of the RCS boron concentration to less than 2500 ppm.
- C Core outlet temperature is maintained at least 40 deg F. below saturation temperature.
- D Core alterations are performed in the vicinity of the reactor vessel hot legs.

22 1.00

Assuming the reactor Trip Breakers have opened, an automatically initiated Safety Injection Signal (SIS) may ONLY be reset if the:

- A high containment pressure was the initiating condition.
- B SIS Time Delay relay (TD1) has timed out.
- C Reactor Trip Breakers are re-closed.
- D initiating condition has cleared.



23 1.00

Assume that a MAIN STEAM LINE BREAK has occurred inside containment. Elevated containment temperature should cause INDICATED pressurizer level for LT-459 to be:

- A LOWER than actual level, because the density of the fluid on the reference side of the transmitter has decreased.
- B HIGHER than actual level, because the density of the fluid on the reference side of the transmitter has increased.
- C LOWER than actual level, because the density of the fluid on the reference side of the transmitter has increased.
- D HIGHER than actual level, because the density of the fluid on the reference side of the transmitter has decreased.

24 1.00

A large break LOCA has occurred. Both RHR pumps have tripped due to low RWST level.

What must be done in order to restart the RHR pumps for Cold Leg Recirculation and why?

- A Close 8980, (RWST to RHR pump suction.) This bypasses the RWST Low Level trip.
- B Verify SI is Reset. This removes RWST Low Level trip.
- C Open 8982 A or B (Containment Recirc Sump suction to RHR) for the applicable pump. This disables the RWST Low Level Trip.
- D Cutout one RWST LOW LEVEL TRIP TEST SWITCH. This bypasses the RWST Low Level trip.

25 1.00

Unit 1 was shutdown on 11/22/99 at 1300 hours due to excessive RCS leakage.

At 1100 hours on 11/26/99 while in mode 5, a total loss of RHR cooling occurs. The following pertinent plant conditions existed prior to the loss of RHR cooling:

RCS Tavg	120 deg F
Pzr temp	140 deg F
RCS level	hot leg centerline
SFP level	normal

Using Appendix B to OP AP SD-5, "Loss of Residual Heat Removal", determine which ONE of the choices below correctly indicates how long it will take the RCS to reach 200 degrees.

- A 8.2 min.
- B 9.5 min.
- C 11.0 min.
- D 17.4 min.

26 1.00

If safety injection flow has been terminated in accordance with EOP E-1, "Loss of Reactor or Secondary Coolant," which of the following meet the requirements for restarting the ECCS pumps?

- A RCS subcooling less than 25 degrees F and Pressurizer pressure less than 1820 psig.
- B RCS subcooling less than 30 degrees F or Pressurizer pressure less than 1820 psig.
- C RCS subcooling less than 30 degrees F and Pressurizer level less than 8%.
- D RCS subcooling less than 20 degrees F or Pressurizer level less than 4%.

27 1.00

ECA-2.1, "Uncontrolled Depressurization of All Steam Generators", cautions that a Minimum feed flow of 25 gpm must be maintained to each S/G with a narrow range level of less than 4%. The basis for this requirement is to minimize:

- A Additional overcooling caused by feedwater addition.
- B The magnitude of SG level overshoot.
- C Thermal shock to AFW components.
- D Thermal shock to S/G components.

28 1.00

A reactor trip and Safety Injection have been initiated due to low pressurizer pressure. The reactor trip breakers did NOT open.

How does the current position of the reactor trip breakers affect the operation of Protection and Control Interlocks?

- A CVI cannot be reset.
- B Steam Dumps cannot be placed in Steam Pressure mode.
- C Phase A cannot be reset.
- D Feedwater Isolation cannot be reset.

29 1.00

During a reactor startup, Intermediate range channels are tracking reactor power at a SUR of +0.2 dpm. NI-36 indicates approximately  $5.0\text{E-}11$  amps. NI-35 has tracked with NI-36 except it reads approximately one decade higher, and presently indicates  $5.8\text{E-}11$  amps. Which of the following is the likely cause of this indication?

- A Degraded compensating voltage to the NI-35 detector.
- B Current "spike" when the P-6 bistable tripped on NI-36.
- C Normal effects of control rod withdrawal and the corresponding control rod shadowing associated with the rod pattern.
- D Increase in compensating voltage to the NI-35 detector.

30 1.00

The plant was operating at 100% power when condenser vacuum dropped below the turbine trip setpoint. All plant systems functioned properly EXCEPT PCV-23, Auto Stop Oil EH Fluid Drain Valve (Interface valve), remains closed.

The turbine will:

- A Trip due to energizing the trip block solenoid valve.
- B NOT automatically trip, but manual trip is available from the control room.
- C Automatically trip by directly dumping EH emergency trip header fluid to drain via a solenoid actuated valve.
- D NOT automatically trip, but manual trip from the manual trip lever on the front standard is available.

31 1.00

The plant is operating at 100% steady state conditions, when the following indications are noted:

VCT level is decreasing  
PZR level is slowly decreasing  
Containment structure sump levels are rising  
Regen HX letdown temperature on TI-127 is 480°F  
Regen HX charging temperature on TI-126 is 480°F

These indications are consistent with a leak at what location?

- A Charging header downstream of 8107 (normal charging isolation valve) and upstream of the Regen HX
- B Charging header downstream of the Regen HX
- C Letdown line upstream of the Regen HX
- D Letdown line downstream of the Regen HX and upstream of the letdown orifice valves

32 1.00

Which ONE of the choices below represents the correct operator response upon receipt of an alarm which indicates introduction of smoke into the control room ventilation system from outside the control room?

- A Manually shift the control room ventilation system to Mode 3.
- B Ensure the control room ventilation system automatically shifts to Mode 3.
- C Manually shift the control room ventilation system to Mode 4.
- D Ensure the control room ventilation system automatically shifts to Mode 4.

33 1.00

Which ONE of the following describes the operation of the Power Range Nuclear Instrumentation Channel Current Comparator Circuit?

- A Compares detector B (lower) normalized signal to detector A (upper) normalized signal and generates an alarm when greater than 4% difference.
- B Compares each lower detector to the average of the lower detectors and each upper detector to the average of the upper detectors and generates an alarm when greater than 4% difference.
- C Compares total power from each channel to average power and generates an alarm when any one (1) is greater than 4% of average.
- D Compares total power from each channel and generates an alarm at 4% difference between the highest and lowest channels.

34 1.00

Which ONE of the following is the reason for the order that the valve positions are checked in step 3, "CHECK RCS is isolated" of ECA-0.0, "Loss of All AC Power"?

- A They are listed considering the control board arrangement
- B Those most likely to have no RNO corrective action outside the control room are first
- C They consider capacity of outflow lines and potential for inventory loss
- D Those most likely to fail in a loss of AC are listed first

35 1.00

Unit 2 is shutdown in MODE 5 when RHR flow is lost. The following conditions exist:

- All SG manways are installed
- Reactor Vessel Head in place, detensioned
- All RCPs cleared and uncoupled
- RCS temperature is increasing
- SG tubes are voided
- Reactor Vessel level is 108'
- 2-3 Charging Pump is available

Which ONE of the following methods of Decay Heat Removal (DHR) is used in this case?

- A Feed and Bleed
- B Reflux cooling
- C Natural Circulation
- D Fill and Spill

36 1.00

You are the BOPCO on Unit 1 and you walk by PAMS 3 and observe that the RED ALARM lights are ON and the GREEN NORMAL lights are de-energized.

Which (1) of the following will cause this condition?

- A Any failed CET
- B Less than two valid thermocouples per gradient are working correctly.
- C Any two of the three reference junction box RTD inputs are invalid.
- D Any of the valid CETs has exceeded 700°F.

37 1.00

Given the following:

Unit 1 is at 85% power

Power to Vital Instrument Bus Channel II (PY-12) has just been lost

Which ONE of the following describes the effect on the plant systems?

- A Loss of power to the hot shutdown panel
- B Control rods insert at the maximum rate
- C The RHR pump trip interlock on low level in RWST is activated, preventing RHR Train B actuation
- D Loss of power to one MFW startup station

38 1.00

Given the following conditions:

The plant was operating normally at 100% power

S/G 1 narrow range level rapidly decreases to 2%

S/Gs 2, 3 & 4 narrow range levels in operating band

The reactor and turbine do NOT trip

Auxiliary Feedwater pumps do NOT start

An Anticipated Transient Without Scram [ATWS] condition is announced

Control rods are manually inserted

Power Range Instrumentation is decreasing at 10% per minute due to rod insertion

Which of the following is the expected response of the ATWS Mitigating System Actuation Circuitry [AMSAC] system?

- A The AMSAC system will automatically trip the reactor which then causes a turbine trip.
- B The AMSAC system will not actuate since the required S/G low level logic has not been satisfied.
- C The AMSAC system will trip the turbine and automatically start all AFW pumps.
- D The AMSAC system is blocked from actuation since power level will be less than 40% power before the AMSAC time delay expires.



39 1.00

Which ONE of the choices below represents the correct response to a radiation monitor alarm in the intake of the control room ventilation system?

- A Automatic shift to Mode 4
- B Automatic shift to Mode 3
- C Manual shift to Mode 2
- D Manual shift to Mode 3

40 1.00

Given the following Containment Fan Cooling Unit (CFCU) conditions:

CFCUs 12, 14, & 15 running in high speed  
CFCUs 11 & 13 off  
CFCU drain valves open

What must be done in order to monitor for RCS leakage using Containment Fan Cooling Unit 12?

- A Shift CFCU 12 to low speed and close the CFCU drain valve.
- B Direct the Nuclear Operator to perform the local valve alignment for CFCU 12.
- C No action is required, the collection monitoring is already in service.
- D Close the CFCU 12 drain valve.

41 1.00

The unit is at 30% power with all systems normally aligned.

Which ONE of the following describes the affect of stopping a RCP will have on the Steam Generator in that loop?

The Steam Generator:

- A level will decrease as T-h approaches T-c with steam flow nearly zero.
- B automatic reactor trip occurs.
- C pressure will decrease as T-c for the loop decreases with steam flow nearly zero.
- D level will increase as T-h will increase after the RCP stops.

42 1.00

Given the following:

The control room is filling with dense smoke  
The control room is ordered evacuated  
OP AP-8A, Control Room Inaccessibility - Establishing Hot Standby, is entered  
The reactor is tripped from 100% power and the turbine trips

Which ONE of the following describes a required action to be performed prior to leaving the control room?

- A Open the emergency boration valve
- B Initiate safety injection
- C Verify 4kV vital busses energized from startup power
- D Verify VCT outlet valves LCV-112B and C are open

43 1.00

Assume both intermediate range channels are overcompensated. What effect might this have during a reactor start-up?

It will be more likely to reach the

- A P-6 setpoint before reaching 1E04 cps indication.
- B 20% power (current equivalent) rod stop before reaching P-10.
- C point of adding nuclear heat before reaching 1E-08 amps.
- D 1E05 cps source range trip before reaching P-6.

44 1.00

How would the following conditions affect the ability to open RHR-8701 and 8702?

RCS Wide Range pressure at 355 PSIG

PZR Vapor space temperature instrument has failed at 490°F

- A RHR-8701 & 8702 are both prevented from opening because RCS wide range pressure is greater than 350 PSIG.
- B RHR-8702 is prevented from opening because RCS wide range pressure is greater than 350 PSIG. RHR-8701 is not affected.
- C RHR-8701 is prevented from opening because pressurizer vapor space temperature is greater than 475 degrees. RHR-8702 is not affected.
- D There are NO interlocks associated with opening RHR 8701 & 8702.

45 1.00

What conditions in the Service Cooling Water System (SCW) will automatically start the standby pump?

- A Low head tank level, or high heat exchanger outlet temperature.
- B Low discharge header pressure, or the running pump breaker is open.
- C Low discharge header pressure, or low head tank level.
- D Low pump suction pressure, or the running pump breaker is open.

46 1.00

Which ONE of the following describes the impact of only ONE containment spray pump operating after the ESF actuation following a DBA LOCA?

- A Excess hydrogen may accumulate in the containment atmosphere, increasing the danger of explosion.
- B The peak containment pressure limit may be exceeded unless at least two(2) CFCUs are also running.
- C 10 CFR 100 limits may be exceeded due to inadequate iodine scrubbing.
- D The containment recirculation sump inventory will not have its proper pH value.

47 1.00

If the Pressurizer Level instrument selected as the primary controlling channel failed low, how would the plant respond, WITHOUT operator action?

- A Letdown isolates and charging increases. VCT level decreases until 5% auto switchover to RWST. Boration of the RCS causes RCS pressure to decrease until the reactor trips on OTΔT.
- B Charging increases which causes VCT level to decrease until the Charging Pumps lose suction. The loss of charging flow will cause PZR level to decrease out the bottom.
- C Charging increases which causes PZR level to increase, this will turn on the PZR heaters resulting in a high pressure reactor trip.
- D Letdown isolates and charging increases which causes Pressurizer level to increase until a reactor trip occurs from high Pressurizer level.

48 1.00

Which ONE of the following describes the RCP trip criteria while responding to a SGTR per EOP E-3, "Steam Generator Tube Rupture"?

- A RCPs should be tripped ANYTIME during E-3 if the criteria are met
- B RCPs should be tripped during E-3 ONLY if the criteria are met when the operator is specifically required to check the criteria
- C RCPs should be tripped during E-3 ONLY if the criteria are met before initiating cooldown
- D RCPs should be tripped during E-3 ONLY if the criteria are met before isolating the ruptured SG

49 1.00

Vital 4KV Bus F has been de-energized due to a fault on the Bus. The existing plant failure will not be quickly corrected.

What action should be done to the Digital Rod Position Indication (DRPI)?

- A Align DRPI to its alternate power supply, 1G.
- B Depress the Urgent Failure Alarm Reset Push-button on CC1.
- C Locally reset both of the DRPI data cabinets.
- D Place the DRPI Mode Selector Switch to the DATA "A ONLY" position.

50 1.00

Given the following plant conditions:

Unit 2 is at 55% power.  
Both Condensate Pumps are running.  
All controls are in automatic.  
Condensate Pump 2-2 trips.

Which ONE (1) of the following conditions will result?

- A Turbine run back to 35% power at 60%/min.
- B Main Feedwater Pump 2-2 will trip.
- C The unit will continue to operate at 55% power.
- D #2 heater drip pump will trip.

51 1.00

Step 14 of FR-C.1, "Response To Inadequate Core Cooling" directs the operator to stop all RCPs prior to depressurizing all intact SGs from 140 psig to atmospheric pressure. Which ONE (1) of the following is the reason for this action?

- A Remove RCP heat load from RCS
- B Ensure core exit thermocouple temperature will be reduced
- C Ensure RCP number 1 seal integrity
- D Enhance natural circulation cooling of the reactor core

52 1.00

The plant experienced a reactor trip and SI from 100% power. All systems responded as expected for the transient. What actions must be taken before the feedwater control valves can be opened?

- A Reset SI, heat up RCS above low Tavg setpoint, reset Feedwater Isolation.
- B Reset Feedwater Isolation.
- C Cycle the Reactor trip breakers, reset Feedwater Isolation.
- D Reset SI signal, cycle the Reactor trip breakers, reset Feedwater Isolation.

53 1.00

Given the following:

#1 S/G is FAULTED  
Safety Injection is actuated  
Containment Spray is actuated  
Safety Injection has been reset

Chemistry is now required to perform Steam Generator samples.

Which of the following signals must be reset prior to opening the Inside Containment Steam Generator Blowdown Isolation Valves (FCV-760, 761, 762, 763)?

- A Phase A Isolation ONLY
- B Steam Generator Blowdown High Radiation
- C Both Phase A & B Isolations
- D Phase B Isolation ONLY

54 1.00

Which ONE of the following statements describes the Technical Specifications BASES for removal of power to the accumulator power-operated isolation valves, 8808A, B, C, and D when operating in Modes 1, 2, and 3?

- A The valves fail to meet single failure criteria.
- B The valve motor operators have a history of overheating.
- C Ensures that the safety analysis assumptions used for accumulator pressure and volume are met.
- D Valve stroking time may exceed the accident analysis values.



55 1.00

Which ONE of the following are inputs to the High Power Mode of the Digital Feedwater Control System?

- A Feedwater flow, loop average steam flow, feedwater temperature, and turbine load
- B Feedwater temperature, narrow range steam generator level, turbine load and wide range steam generator level
- C Feedwater flow, steam flow, loop average steam flow and loop average steamline pressure
- D Loop average steamline pressure, feedwater header pressure, and narrow range steam generator level.

56 1.00

Unit 1 was at 100% power, when a steam pipe break for S/G 1-1 occurred, causing a reactor trip and eventual Safety Injection.

Present conditions are:

S/G 1-1 pressure = 550 psig  
S/G 1-2, 1-3, 1-4 pressures = 950 psig  
S/G 1-1 indicated steam flow =  $1 \times 10^6$  lbm/hr  
S/G 1-2, 1-3, 1-4 indicated steam flows = 0.0 lbm/hr  
containment pressure = +1.5 psig

Prior to the reactor trip, steam flow increased from all four steam generators. What was the reason for this increase?

- A The drop in steam pressure caused the density compensated steam flow indications for the unaffected Steam Generators to increase.
- B Steam flow from the three unaffected Steam Generators to the Main Turbine increased.
- C The reactivity transient caused by the steam leak caused the steam pressure in the unaffected steam generators to increase.
- D Back flow through the affected Steam Generator's MSIV.

57 1.00

A fire in diesel generator 1-1 will be extinguished by an actuation of the automatic CARDON system. Which ONE of the following explains the mechanism by which the CARDON system extinguishes the fire?

- A The expansion of the CARDON in the diesel generator room physically displaces the oxygen needed for combustion
- B The adiabatic expansion of the CARDON in the diesel generator room cools the room below the ignition point of most combustible materials found in the room
- C The expansion of the CARDON in the diesel generator room chemically removes the oxygen from the combustion process
- D The rapid expansion of the CARDON in the diesel generator room physically blows the flame off of the combustible material

58 1.00

Which ONE of the following describes 480V breaker operation if DC control power is lost to these breakers?

- A Breakers will remain in their "as is" condition and operation would only be possible by local operation
- B Automatic breaker trips would remain operational but remote operation of breakers would not be possible
- C Breakers could be operated remotely but automatic trip functions would become inoperable
- D Breakers would trip open and operation would only be possible by local operation

59 1.00

Following a loss of all offsite power, 1-2 Diesel Generator has started and is carrying minimal loads on its associated bus. No changes have been made to the 4kV system. Diesel control is still in AUTO.

If the governor speed control switch was taken to LOWER

- A there would be no change in D/G operation.
- B Voltage and frequency would change.
- C Voltage and megawatts would change.
- D Megawatts and frequency would change.

60 1.00

Which of the following statements concerning P-14, Steam Generator High-High, is correct?

- A Set to actuate at >75% on 1/3 channels on 2/4 steam generators.
- B Protects against a loss of heat sink.
- C Provides a Feedwater Isolation Signal and trips all feedwater pumps and the main turbine.
- D Provides an input to the ATWS Mitigation System Actuation Circuitry (AMSAC) to trip.

61 1.00

While proceeding through EOP E-0, "Reactor Trip Or Safety Injection", at step 19 a transition to EOP E-1, "Loss Of Reactor Or Secondary Coolant", Step 1 occurs. After the transition, the following conditions exist:

Charging pumps	running
SI pumps	running
RCS subcooling	40 degrees F
Containment pressure	55 psig
RCP	all running
SG pressures	increasing
Condenser off gas radiation	normal
SG narrow range levels	all between 20% and 40%
Pressurizer level	35% decreasing
Total auxiliary feedwater flow	220 gpm

Which of the following actions is required?

- A Stop all RCPs and open #1 seal bypass valve (CVCS 8142).
- B Manually start the Positive Displacement charging pump to maintain pressurizer level.
- C Transition to FR-H.1, "Response To Loss of Secondary Heat Sink".
- D Transition to FR-Z.1, "Response To High Containment Pressure".

62 1.00

Which of the following conditions will bring in the blue light (located on VB-4) associated with the 4kV vital bus auto transfer circuits?

- A A transfer to Diesel signal only
- B A transfer to S/U OR transfer to Diesel signal
- C A transfer to S/U signal only
- D An actuation of the shed load relay only

63 1.00

Which ONE of the following is the basis for reducing Tavg to less than 500 degrees F when the specific activity of the RCS is greater than 100/E microCuries per gram of gross radioactivity?

- A Minimize thermal stress on the fuel cladding.
- B Increase the solubility of the corrosion products in the coolant.
- C Prevent lifting the SG relief valves in the event of a SGTR.
- D Limit containment radiation levels in the event of a LOCA.

64 1.00

Which of following Containment Purge System valves are limited to 50° of travel by the Technical Specifications?

FCV- 660 CONTMT PURGE AIR SUPPLY FAN S-3 DISCH TO CONTMT  
FCV- 661 CONTMT PURGE AIR SUPPLY FAN S-3 DISCH TO CONTMT  
FCV- 662 CONTMT EXCESS PRESS AND VAC RELIEF  
FCV- 663 CONTMT EXCESS PRESS RELIEF TO AUX BLDG EXH FANS  
FCV- 664 CONTMT VAC RELIEF

- A FCV-661, 662, 664
- B FCV-660, 663, 664
- C FCV-660, 661
- D FCV-662, 663, 664

65 1.00

How would the liquid radwaste system respond if RE-18, Liquid Radwaste Rad Monitor, were to come in alarm during a discharge of a Floor Drain Receiver?

- A RCV-18 closes and FCV-477 opens. Flow is directed to the Equipment Drain Receiver that is on fill.
- B RCV-18 opens and FCV-477 closes. The tank that is on discharge will swap to recirculation.
- C RCV-18 closes. The running Floor Drain Receiver pump will receive a trip signal.
- D RCV-18 closes and FCV-477 opens. Flow is directed to the Floor Drain Receiver that is on fill.

66 1.00

Which of the following is a Tech Spec basis for the 164,678 gallons required in the CST?

- A Ensures an adequate heat sink is available for design base SGTR conditions and utilizing the maximum cooldown rate to < 350 degrees for the RHR system to be placed in service.
- B Allows maintaining of the RCS in Hot Standby conditions for 24 hours concurrent with no offsite power available.
- C Ensures an adequate NPSH exists for the Aux Feedwater pumps.
- D Allows cooldown of the RCS to < 350 degrees to allow for the RHR system to be placed in service.

67 1.00

Which ONE of the following is an input utilized by the Reactor Vessel Water Level instrumentation system?

- A Heated junction thermocouple
- B Reactor Vessel differential pressure
- C Loop 1 wide range pressure
- D Tcold instrument on Loop 3

68 1.00

After a long period of stable plant operation, the following plant response occurs:

Rods stepping in at an increasing rate  
Generator load decreasing rapidly in steps  
"RUNBACK OPER" light on the DEHC indication panel flashing at a steady low frequency.

Which of the following conditions is most likely to cause such a plant response?

- A Stator cooling water high conductivity
- B Stator cooling water flow low
- C All loops of OP $\Delta$ T (C-4) 3% below their calculated trip setpoint
- D Loop 1 OT $\Delta$ T (C-3) 1% below its calculated trip setpoint

69 1.00

While observing the containment purge radiation monitor (RM44A) radiation display unit (RDU), you notice that the HIGH ALARM and CVI BYP status lights on the panel are both on.

Based solely on the indications at the RDU, which of the following is true regarding the containment purge CVI status?

- A A CVI signal has been sensed and a CVI has occurred.
- B The status is normal; high radiation on R-44A will cause a CVI.
- C A CVI signal is sensed, but the CVI function is bypassed and it will not occur.
- D A CVI has not been sensed, but CVI actions will occur when it is sensed.

70 1.00

The present plant parameters are:

Reactor Trip	actuated
Safety Injection	actuated
Pressurizer level	5%
Pressurizer pressure	1450 psig

Given the above conditions, which of the following actions will result in energizing the pressurizer heaters?

- A The operator must reset the Safety Injection signal and take the heater switch to the "on" position.
- B The operator must take the heater switch to the "off" position then to the "on" or "auto" position after pressurizer level increases above 17%.
- C The operator must take the heater switch to the "on" position after pressurizer level increases above 17% and the pressurizer heater breakers have been reset locally.
- D The operator must take the heater switch to the "on" position after resetting the Safety Injection signal and the pressurizer heater breakers have been reset locally.



71 1.00

A leak has developed at the spent fuel pit pumps. If this leak is not isolated, Spent Fuel Pool level would decrease to approximately:

- A 10 feet below the normal level.
- B 12 feet above the top of the fuel assemblies.
- C 6 feet above the top of the fuel assemblies.
- D 4 feet below the normal level.

72 1.00

A reactor trip and SI have occurred five minutes ago and the following conditions exist:

MSIVs 1, 3, and 4 are shut.  
1-1 S/G pressure is 1005 psig.  
1-2 S/G pressure is 850 psig.  
1-3 S/G pressure is 975 psig.  
1-4 S/G pressure is 1005 psig.

Where is the turbine driven aux feed pump getting its motive steam?

- A Steam line 3 down stream of MSIV
- B Steam lines 1 and 4 upstream of MSIV
- C Steam lines 2 and 3 upstream of MSIVs
- D Steam line 3 upstream of MSIV

73 1.00

A reactor start up is in progress with the following plant conditions:

Control rods	Manual
Reactor power	5%
IR SUR	0
Steam Dumps	Pressure mode
HC-507	AUTO

What would happen if the steam dump pressure controller HC-507 pot setting were to be changed to 7.20? (Normal setting is 8.38)

- A Tav<sub>g</sub> would decrease and reactor power would increase.
- B Tav<sub>g</sub> would increase and reactor power remain the same.
- C Tav<sub>g</sub> would remain the same and reactor power would increase.
- D Tav<sub>g</sub> and reactor power would remain the same.

74 1.00

The plant is operating at 100% power. Pressurizer Level control is selected for LT-459/LT-461. What would be the plant response to Pressurizer Level Channel LT-460 failing high?

- A Letdown will isolate and all Pressurizer Heaters will de-energize.
- B PK05-21, PZR LEVEL HI/LO, annunciator will actuate.
- C Charging flow will increase, backup heaters will energize.
- D PZR HIGH LEVEL RX TRIP Bistable Status Light will energize.

75 1.00

During a secondary plant start-up, what is the effect on the MSR bypass valves (CV-1s) and supply valves (CV-2s) when the ramp push button, on the MSR controller, is depressed?

- A CV-1 valves open in 60 minutes based on feedback from hot reheat temperature. CV-2 valves open when CV-1 is 60% open.
- B CV-1 valves open in about 120 minutes. CV-2 valves open 30 minutes after CV-1 is full open.
- C CV-1 valves open based on main turbine first stage impulse pressure signal. CV-2 valves open after 400°F is sensed.
- D CV-1 valves open based on feedback from hot reheat temperature. CV-2 valves open when CV-1 is full open.

76 1.00

Subsequent to a reactor trip from 100% power, a severe water hammer causes the aux feedwater line to Feed Lead 2-1 to break.

The break is just upstream of the check valve that isolates main feedwater from aux feedwater.

How do the following AFW LCVs respond to this malfunction?

LCV-110 AFW PP 2-2 discharge to S/G 2-1  
LCV-111 AFW PP 2-2 discharge to S/G 2-2  
LCV-106 AFW PP 2-1 discharge to S/G 2-1

- A Low pressure on the AFW line to S/G 2-1 will send a signal to close LCV-110 and LCV-106. LCV-111 will be available to feed S/G 2-2.
- B Low AFW PP 2-2 discharge pressure will result in throttling LCV-110 and LCV-111. LCV-106 will remain open until closed by operator action.
- C High AFW flow to S/G 2-1 will result in LCV-110 throttling. LCV-111 will open in an attempt to feed S/G 2-2. LCV-106 will remain open until closed by operator action.
- D Low pressure on the AFW line will send a close signal to LCV-110. LCV-111 will open in an attempt to feed S/G 2-2. LCV-106 will remain open until closed by operator action.

77 1.00

If a pressurizer PORV fails open which ONE of the following actions concerning the Pressurizer Relief Tank (PRT) will occur assuming NO operator action?

- A The PRT primary water spray valve will automatically open at 3 psig.
- B The PRT vent valve to the waste gas vent header will automatically open at 10 psig.
- C The PRT relief valve will lift at 50 psig.
- D The PRT rupture disks will rupture at 100 psig.

78 1.00

A Gas Decay Tank discharge is in progress. Which ONE of the following malfunctions could result in the release exceeding the limits on the permit?

- A A loss of control power to system discharge valve FCV-410.
- B Isolation of air to system discharge valve FCV-410.
- C Waste gas vent monitor RM-22 fails high.
- D Waste gas vent monitor RM-22 fails low.

79 1.00

The plant has experienced a safety injection from 100% power due to a Main Steam Line Break inside containment. Containment pressure is at 27 psig.

What would be the status of the Containment Spray system?

- A CS pumps supplying the spray rings with only RWST water.
- B Spray additive tank outlet valves will be open but the CS pumps will NOT be running.
- C CS pumps supplying the spray rings with RWST water and NaOH.
- D CS pumps running with their discharge valves closed and the Spray additive tank outlet valves open.

80 1.00

An annunciator alarm, PK05-25, "PRT PRESS, LVL, TEMP," is received in the control room while operating at power. Which ONE of the following conditions will cause the indicated automatic actions to occur?

- A High PRT pressure will close the vent header control valve, PCV-472.
- B High PRT temperature will open the primary supply water stop valve, 8030, and the PRT drain to RCDT stop valve, 8031.
- C High PRT temperature will open the PRT nitrogen supply isolation valve, 8045.
- D High PRT pressure will open the PORV block valves 8000A, B, and C.

81 1.00

What combination of RCS temperature and pressure changes would cause the setpoint for C-3 (OTΔT Rod Stop & Turbine Runback) to INCREASE the most?

- A Tavg INCREASING with RCS pressure DECREASING
- B Tavg CONSTANT with RCS pressure INCREASING
- C Tavg DECREASING with RCS pressure INCREASING
- D Tavg DECREASING with RCS pressure CONSTANT

82 1.00

Given the following:

RCS pressure is 225 psig.  
RCS temperature is 200 degrees F.  
RHR Heat Exchanger Flow control valve (HCV-638) is 10% open.  
ONLY RHR train "A" is in operation.

Which ONE of the following describes the expected operator actions when a CCW SURGE TANK HI alarm on PK01-07 annunciates?

- A RHR Heat Exchanger flow control valve (HCV-638) will be OPENED to maintain desired RHR system flow rate and PZR Level maintained by increasing charging flow.
- B RHR Heat Exchanger bypass valve (HCV-670) will be CLOSED to bypass RHR Heat Exchanger and Train "B" placed in service.
- C RHR Heat Exchanger flow control valve (HCV-638) will be CLOSED and RHR pump recirculation flow control valve fully OPENED.
- D RHR Heat Exchanger flow control valve (HCV-638) will be CLOSED and HCV-133 to CVCS Letdown CLOSED.

83 1.00

Which ONE of the following is the correct classification of a fire in the Diesel Generator Fuel Day Tank?

- A Class A
- B Class B
- C Class C
- D Class D

84 1.00

With the unit at 100% power, a loss of a vital DC bus will:

- A Initiate closure of a train of phase "A" isolation valves.
- B Result in loss of a 4kV vital bus when the unit trips.
- C Prevent a reactor trip signal from being processed for the effected instrumentation channel.
- D Result in a loss of DC power to the main generator air side seal oil backup pump.

85 1.00

While conducting refueling operations in the FHB, the ALERT ALARM/TRIP 1 setpoint for the New Fuel Radiation monitor RE-59 is reached. Besides the local alarm in the FHB at radiation monitor RE-59 actuating, what automatic action(s) will occur due to this alarm?

- A FHB evacuation alarm will sound.
- B FHB Hi Rad Alarm (PK11-10) will annunciate.
- C No other automatic actions will occur.
- D FHB ventilation will switch to the Iodine Removal mode.

86 1.00

Which ONE of the following is the purpose of the Carbon Filter Units used in the auxiliary building ventilation system?

Removal of:

- A Radioiodine.
- B Hydrogen.
- C Ultra-fine particulates.
- D Steam.



87 1.00

Given the following:

A reactor trip occurred coincident with a loss of offsite power  
EOP E-0.4, "Natural Circulation Cooldown with Steam Void in Vessel (without RVLIS)" is in progress

The following conditions currently exist:

RCS pressure is 1600 psig  
RCS temperature is 450°F

Which ONE of the following is the reason for equalizing charging and letdown flows during the subsequent depressurization?

- A Allows Pressurizer level to be used for monitoring void growth
- B Assures RCS total mass does not exceed the maximum conditions assumed in FSAR analysis
- C Pressurizer level is not accurate during these conditions and flow matching assures the pressurizer will not go solid
- D Assures the volume control tank is not overstressed due to large fluctuations in charging and letdown

88 1.00

Which ONE of the following establishes the initial conditions for the accident analyses addressed in the FSAR?

- A Technical Specifications.
- B Site specific Probabilistic Risk Analysis Report.
- C Westinghouse Owners' Group Emergency Response Guidelines.
- D Westinghouse Transient and Accident Analysis Report.

89 1.00

Which of the following describes why a Main Steam Isolation Valve (MSIV) could stay OPEN after going to CLOSE on its control switch?

- A Loss of power to its solenoids.
- B No P-4 signal.
- C Insufficient air volume in the accumulators.
- D Loss of instrument air.

90 1.00

Which ONE of the following conditions will cause an alarm on an Area Radiation Monitor?

- A Steam Generator Tube Rupture.
- B Reactor Coolant System (RCS) to Component Cooling Water System (CCWS) leak.
- C Gas storage tank rupture.
- D RCP thermal barrier heat exchanger tube rupture.

91 1.00

Which ONE of the choices below correctly describes the plant response to pressure channel PT-455 failing HIGH while selected as the control channel with the plant at full power and without operator action?

- A The reactor will trip on high pressure.
- B The PORV block valve will shut when pressure reaches the interlock channel setpoint.
- C The reactor will trip on low pressure.
- D The spray valve will shut when pressure reaches the interlock channel setpoint.

92 1.00

Given the following Unit 1 plant conditions:

Unit was at 100% power when it tripped due to a LOCA.  
Containment pressure is now 16 psig and increasing.  
Hydrogen concentration is 3% and stable.  
Hydrogen Recombiners are being placed in service in accordance with FR-Z.1, "Response to High Containment Pressure."

Which ONE of the following indicates that recombination is occurring after having placed the Hydrogen Recombiners in service?

- A Containment pressure decreases after Hydrogen Recombiners are placed in service.
- B Hydrogen Recombiner average thermocouple temperature is above 1225 degrees F.
- C Containment dewpoint decreases after hydrogen recombiners are placed in service.
- D Hydrogen Recombiner power increases to 120 KW.

93 1.00

Which ONE of the following reflects the condition and the bases for Technical Specification 3.5.3 "Emergency Core Cooling Systems", requirement that ALL Safety Injection Pumps be verified INOPERABLE?

- A In Mode 4 to ensure that a mass addition transient can be relieved by one PORV.
- B In Mode 5 with water above the reactor vessel flange to ensure that a mass addition transient can be relieved by one pressurizer safety valve.
- C In Mode 5 with water below the reactor vessel flange to ensure that a mass addition transient can be relieved by one RHR suction relief valve.
- D In Mode 6 with the reactor vessel head removed and core alterations in progress in the vicinity of the reactor vessel hot legs.

94 1.00

Upon complete loss of instrument air which ONE of the following valves will an operator NOT be able to control?

- A LCV-459, Letdown isolation
- B PCV-455A, Pressurizer Spray
- C HCV-142, RCP seal back pressure control valve
- D PCV-19, Steam Generator 10% atmospheric dump valve

95 1.00

Which ONE of the following will AUTOMATICALLY terminate a Liquid Radwaste release?

- A RE-18 source check.
- B RE-18 placed in "LEVEL CAL".
- C High liquid radwaste discharge flow rate.
- D Low dilution water flow rate.

96 1.00

The applicability statement for Procedure EOP E-0, "Reactor Trip Or Safety Injection", indicates that this procedure is used for initiating events occurring in Modes 1, 2 and 3. Which of the following describes the applicability of EOP E-0 while in Mode 4?

- A E-0 can not be used in Mode 4, therefore procedure E-0.1, "Reactor Trip Response" must be used.
- B E-0 can not be used in Mode 4 since Abnormal Conditions Procedures must be used in Mode 4 through Mode 6.
- C E-0 can only be used in Mode 4 if so directed by the Critical Safety Function Status Trees.
- D E-0 can be used if a step by step evaluation is made to determine if the action is still applicable.

97 1.00

Given the following:

Unit 1 has tripped from 100% power due to a loss of coolant accident (LOCA).  
A loss of offsite power (LOOP) has also occurred.  
Containment pressure is 15 psig.  
Core Exit Thermocouples indicate 330 degrees F.  
RCS pressure is 400 psig.  
RWST level is 50%.  
Emergency Diesel Generator #1 has failed to start.  
NO flow is indicated for running Residual Heat Removal pump #2.

Which ONE of the following is the reason that RHR pump #2 has NO flow indication?

- A RCS pressure is above the RHR shutoff head.
- B RHR HX bypass valve (HCV-670) is closed.
- C SI cross-connect valves 8716A/B are OPEN.
- D RHR pump Containment Sump Suction valves have failed to open automatically on low RWST level.

98 1.00

Given the following conditions:

A normal plant cooldown is in progress.  
The CCW surge tank indicates a need for makeup.  
Auxiliary operator confirms there is no local problem.  
The water level in the surge tank is slowly DECREASING.  
The makeup valves to the surge tank are fully open.

Which ONE of the following is the source of the leak?

- A RCP thermal barrier heat exchanger
- B Seal water heat exchanger
- C Letdown heat exchanger
- D Primary sample coolers

99 1.00

A Nuclear Engineer calculates core thermal power using a heat balance, but neglects the effects of RCP horsepower and of S/G blowdown being in service.

Which of the following best describes how this will effect the calculated value versus actual thermal power?

- A Both effects make the calculated value higher.
- B Neglecting RCPs makes the calculated value higher, neglecting blowdown makes it lower.
- C Neglecting RCPs makes the calculated value lower, neglecting blowdown makes it higher.
- D Both effects make the calculated value lower.

100 1.00

Which ONE of the following statements describes the function of the pressure detectors located at the discharge of the Residual Heat Removal Pumps?

- A Provide an overpressure interlock that prevents opening 8701 A/B and 8702 A/B hot leg suction valves.
- B Provide an overpressure interlock that prevents opening 8812 A/B RWST suction valves.
- C Provide differential pressure input for flow indication.
- D Provide high pressure alarm.

## RO Initial Written Examination

1 1.00

Which ONE of the following correctly delineates the order of power train components to the Reactor Trip Breakers:

- A 480VAC - Motor Breakers - Motor Generators - Generator Breakers - Reactor Trip Breakers
- B 480VAC - Generator Breakers - Motor Generators - Motor Breakers - Reactor Trip Breakers
- C 480VAC - Motor Breakers - Generator Breakers - Motor Generators - Reactor Trip Breakers
- D 480VAC - Generator Breakers - Motor Breakers - Motor Generators - Reactor Trip Breakers

2 1.00

What is the reason for maintaining the control banks above the setpoint for the "Rod Bank Lo Lo Insertion Limit" alarm?

- A Ensures the maintenance of acceptable power distribution limits, maintains minimum shutdown margin, and limits the potential effects of rod misalignment on the associated accident analysis.
- B Ensures adequate shutdown margin, maintains acceptable core thermal limits and limits the potential effects of rod misalignment on power operations.
- C Ensures adequate DNBR, limit fission gas release, and maintains fuel pellet temperature and cladding mechanical properties within design criteria.
- D Ensures that additional restrictions on thermal power and increased frequency of peaking factor measurements are not required.



3 1.00

Reactor and turbine power are stable at 20% with rods in AUTO when the generator output breakers trip open. The turbine and generator remain in service to supply plant loads.

Due to the above transient, rods will automatically insert

- A throughout the transient, but automatic rod withdrawal is prevented once **reactor power** is less than 15%.
- B until the **turbine load** reaches 15%, at which time auto insertion will be inhibited, requiring the operator to place the rods in manual to insert them.
- C until the **reactor power** reaches 15%, at which time auto insertion will be inhibited, requiring the operator to place the rods in manual to insert them.
- D throughout the transient, but automatic rod withdrawal is prevented once **turbine load** is less than 15%.

4 1.00

Given the following Unit 1 plant conditions:

The Unit is in MODE 2.  
All Shutdown rods are fully withdrawn.  
Control Bank A is being withdrawn.

Which ONE of the following describes the Limiting Condition for Operation (LCO) for the reactor coolant loops?

- A At least 2 RCPs shall be OPERABLE and ONE in operation.
- B At least 2 RCPs shall be OPERABLE and in operation.
- C At least 3 RCPs shall be OPERABLE and TWO in operation.
- D All 4 RCPs shall be OPERABLE and in operation.

5 1.00

Which ONE of the following best describes the CVCS system response in the event that 1-1 RCP #1 Seal fails COMPLETELY?

- A Relief valve 8123 outside of containment will open to protect the Seal Water Heat Exchanger from overpressure.
- B VCT level will increase as seal return flow to charging pump suction increases.
- C Suction temperature of the CCP will decrease due to the increased cooling to the Seal Water Heat Exchanger.
- D Seal Injection flow will initially decrease as FCV-128 opens in response to decreasing pressurizer level.

6 1.00

A **Shutdown Bank D** rod drops at 75% power. After the appropriate lift coil disconnect switches are opened, the dropped rod is recovered.

What would be the expected status of the ROD CONTROL URGENT FAILURE ALARM during the recovery of the rod?

- A actuated by a logic error
- B actuated by a slave cyclor failure
- C not actuated
- D actuated by a regulation failure

7 1.00

During a loss of offsite power, with all Emergency Diesels (EDG) running, a fire breaks out in EDG 1-1.

What effect will this have on the Diesel Fuel Oil System?

- A The EDG air receiver melt links will vent the air and dump fuel racks to stop the affected EDG
- B The Fuel Oil Day Tank melt links will close the fill valves, preventing any addition of fuel oil to the day tank
- C Fire protection relays will secure the fuel oil transfer pumps to prevent filling the Fuel Oil Day Tank
- D Fire protection equipment is disabled during a loss of AC and will not enable until AC power is restored to the S/U transformer

8 1.00

With the plant initially at 100% power, a loss of all offsite power results in a reactor trip.

When reactor power drops to about 8-9% (due to prompt drop after the trip), adequate core cooling exists because of:

- A ECCS flow
- B Continued forced flow
- C Sufficiently low core thermal power
- D Natural circulation flow

9 1.00

A reactor trip and loss of offsite power have occurred. Natural circulation has been established.

If the rate of dumping steam INCREASED, how would natural circulation flow be affected?

- A DECREASE due to the decrease in subcooling.
- B INCREASE due to the decrease in decay heat rate.
- C INCREASE due to the increased thermal gradient.
- D DECREASE due to the increased density of the cold leg.

10 1.00

From 100% power, electrical faults have caused a reactor trip and loss of offsite power. If the Non-Vital 480V AC Buses CANNOT be re-energized, what can be done to restore power to the Pressurizer Heaters?

- A Groups 1 & 3 can be aligned to 480 V Vital Bus 1F & 1G.
- B Groups 2 & 4 can be aligned to 480V Vital Bus 1F & 1H.
- C Groups 1 & 4 can be aligned to 480V Vital Bus 1F & 1H.
- D Groups 2 & 3 can be aligned to 480V Vital Bus 1G & 1H.

11 1.00

An instrument malfunction has caused excessive CCW flow to the Letdown Heat Exchanger, significantly DECREASING the letdown fluid temperature. The mixed bed demins are in service.

What will occur as a result of this malfunction?

- A PCV-135 "Letdown Pressure Control Valve" will CLOSE momentarily interrupting letdown flow.
- B Mixed bed demins will be ineffective for removing CRUD particles.
- C Mixed bed demins will begin to remove boric acid from letdown.
- D TCV-149 "Letdown Temperature Diversion Valve" will divert all letdown flow to the VCT.

12 1.00

Given the following:

Unit 2 has just tripped.

All rod bottom lights LIT, except rods D-4, K-2, and H-5.

Rod position indicators for rods D-4 and K-2 indicate mid-scale and H-5 indicates full out.

Assume that any emergency boration initiated via the reactor makeup control always achieves exactly the minimum flow rate required.

Which ONE of the following is the minimum required emergency boration time frame for these conditions?

- A 15 minutes
- B 30 minutes
- C 60 minutes
- D 90 minutes

13 1.00

The plant is operating at 100% power when a pressurizer safety valve inadvertently lifts. With PRT pressure at 5 PSIG, what would be the approximate tail pipe temperature of the safety valve?

- A 160 °F
- B 210 °F
- C 230 °F
- D 270 °F

14 1.00

Which ONE of the following does the Post-Accident Sampling System provide post-accident sampling capability from outside containment?

- A Reactor coolant system, control room ventilation intake, gaseous waste system effluent, and spent fuel pool
- B Component cooling water, essential cooling water, steam generator blowdown, and reactor building exhaust
- C Residual heat removal system, component cooling water system, containment emergency sump, and containment atmosphere
- D Reactor coolant system, residual heat removal system, containment emergency sump, and containment atmosphere

15 1.00

The following lineup currently exists on the Reactor Makeup Control system.

FCV-110A (BA to Blender)	CLOSED
FCV-110B (Blender outlet to VCT outlet)	CLOSED
FCV-111A (PW to Blender)	THROTTLED
FCV-111B (Blender outlet to VCT inlet)	OPEN

The system is currently operating in the:

- A Alternate Dilute mode.
- B Automatic mode.
- C Dilute mode.
- D Borate mode.

16 1.00

Which ONE of the following is impacted by a MANUAL Phase A signal?

- A RHR
- B CFCU
- C CCW
- D AFW

17 1.00

While operating at 100% power, a 4 inch diameter small break LOCA occurs on the RCS HOT leg.

Comparing plant response with a 4 inch diameter LOCA in the COLD leg, more core uncover occurs in a:

- A HOT leg LOCA for a GREATER period of time.
- B COLD leg LOCA for a GREATER period of time.
- C COLD leg LOCA but for a SHORTER period of time.
- D HOT leg LOCA but the time of uncover is the same.

18 1.00

With the reactor at 100% power, vital instrument AC power from PY-11 (52-115) and PY-12 (52-1215) is lost to Train A SSPS.

What will be the plant response?

- A Should an Automatic SI occur, all ESF equipment will respond as required, but SI Reset will NOT be available.
- B All ESF actuations controlled by the Train A will occur.
- C The reactor will automatically trip. ESF actuations performed by the Train A will NOT occur.
- D A reactor trip and a Train A ESF actuation will NOT automatically occur. However, manual reactor trip is available.



19 1.00

Given the following conditions:

Pressurizer pressure controller is selected to PT-455 as the controlling channel  
PT-474 is selected as the backup channel  
PT-474 fails low.

What would be the plant response?

- A PCV-456 and PCV-474 will fail open, and PCV-455C is capable of opening on a valid high pressure condition.
- B PCV-455C is prevented from opening, and PCV-456 and PCV-474 are capable of opening on a valid high pressure condition.
- C PCV-456, PCV-474, and PCV-455C are not effected since PT-474 was selected as the backup channel.
- D PCV-456, PCV-474, and PCV-455C are prevented from opening on a valid high pressure condition.

20 1.00

Given the following:

A large break LOCA occurred.  
A steam void exists in the Reactor Vessel Head.

Which of the following instrument failures could affect Reactor Vessel Level Indication System (RVLIS) Upper Range level indication?

- A Pressurizer pressure
- B Wide range RCS T-hot
- C Core exit thermocouple
- D Wide range RCS T-cold

21 1.00

Tech Specs state that in MODE 6, with the water level greater than or equal to 23 feet above the top of the vessel flange, AT LEAST one Residual Heat Removal (RHR) train shall be operable and in operation, except that pump may be de-energized for up to one hour (per eight hour period) under certain conditions. Which ONE of the following items describes one of these conditions?

- A One RHR pump remains operable, and no operations involving core alterations are initiated.
- B No operations are permitted that would cause a dilution of the RCS boron concentration to less than 2500 ppm.
- C Core outlet temperature is maintained at least 40 deg F. below saturation temperature.
- D Core alterations are performed in the vicinity of the reactor vessel hot legs.

22 1.00

Assuming the reactor Trip Breakers have opened, an automatically initiated Safety Injection Signal (SIS) may ONLY be reset if the:

- A high containment pressure was the initiating condition.
- B SIS Time Delay relay (TD1) has timed out.
- C Reactor Trip Breakers are re-closed.
- D initiating condition has cleared.

23 1.00

Assume that a MAIN STEAM LINE BREAK has occurred inside containment. Elevated containment temperature should cause INDICATED pressurizer level for LT-459 to be:

- A LOWER than actual level, because the density of the fluid on the reference side of the transmitter has decreased.
- B HIGHER than actual level, because the density of the fluid on the reference side of the transmitter has increased.
- C LOWER than actual level, because the density of the fluid on the reference side of the transmitter has increased.
- D HIGHER than actual level, because the density of the fluid on the reference side of the transmitter has decreased.

24 1.00

A large break LOCA has occurred. Both RHR pumps have tripped due to low RWST level.

What must be done in order to restart the RHR pumps for Cold Leg Recirculation and why?

- A Close 8980, (RWST to RHR pump suction.) This bypasses the RWST Low Level trip.
- B Verify SI is Reset. This removes RWST Low Level trip.
- C Open 8982 A or B (Containment Recirc Sump suction to RHR) for the applicable pump. This disables the RWST Low Level Trip.
- D Cutout one RWST LOW LEVEL TRIP TEST SWITCH. This bypasses the RWST Low Level trip.

25 1.00

Unit I was shutdown on 11/22/90 at 1300 hours due to excessive RCS leakage.

At 1100 hours on 11/26/90 while in mode 5, a total loss of RHR cooling occurs. The following pertinent plant conditions existed prior to the loss of RHR cooling:

RCS Tavg	120 deg F
Pzr temp	140 deg F
RCS level	mid-loop
SFP level	normal

Using Appendix B to OP AP SD-5, "Loss of Residual Heat Removal", determine which ONE of the choices below correctly indicates how long it will take the RCS to reach 200 degrees.

- A 8.2 min.
- B 9.5 min.
- C 11.0 min.
- D 17.4 min.

26 1.00

If safety injection flow has been terminated in accordance with EOP E-1, "Loss of Reactor or Secondary Coolant," which of the following meet the requirements for restarting the ECCS pumps?

- A RCS subcooling less than 25 degrees F and Pressurizer pressure less than 1820 psig.
- B RCS subcooling less than 30 degrees F or Pressurizer pressure less than 1820 psig.
- C RCS subcooling less than 30 degrees F and Pressurizer level less than 8%.
- D RCS subcooling less than 20 degrees F or Pressurizer level less than 4%.

27 1.00

ECA-2.1, "Uncontrolled Depressurization of All Steam Generators", cautions that a Minimum feed flow of 25 gpm must be maintained to each S/G with a narrow range level of less than 4%. The basis for this requirement is to minimize:

- A Additional overcooling caused by feedwater addition.
- B The magnitude of SG level overshoot.
- C Thermal shock to AFW components.
- D Thermal shock to S/G components.

28 1.00

A reactor trip and Safety Injection have been initiated due to low pressurizer pressure. The reactor trip breakers did NOT open.

How does the current position of the reactor trip breakers affect the operation of Protection and Control Interlocks?

- A CVI cannot be reset.
- B Steam Dumps cannot be placed in Steam Pressure mode.
- C Phase A cannot be reset.
- D Feedwater Isolation cannot be reset.

29 1.00

During a reactor startup, Intermediate range channels are tracking reactor power at a SUR of +0.2 dpm. NI-36 indicates approximately  $5.0\text{E-}11$  amps. NI-35 has tracked with NI-36 except it reads approximately one decade higher, and presently indicates  $5.8\text{E-}11$  amps. Which of the following is the likely cause of this indication?

- A Degraded compensating voltage to the NI-35 detector.
- B Current "spike" when the P-6 bistable tripped on NI-36.
- C Normal effects of control rod withdrawal and the corresponding control rod shadowing associated with the rod pattern.
- D Increase in compensating voltage to the NI-35 detector.

30 1.00

The plant was operating at 100% power when condenser vacuum dropped below the turbine trip setpoint. All plant systems functioned properly EXCEPT PCV-23, Auto Stop Oil EH Fluid Drain Valve (Interface valve), remains closed.

The turbine will:

- A Trip due to energizing the trip block solenoid valve.
- B NOT automatically trip, but manual trip is available from the control room.
- C Automatically trip by directly dumping EH emergency trip header fluid to drain via a solenoid actuated valve.
- D NOT automatically trip, but manual trip from the manual trip lever on the front standard is available.

31 1.00

The plant is operating at 100% steady state conditions, when the following indications are noted:

VCT level is decreasing  
PZR level is slowly decreasing  
Containment structure sump levels are rising  
Regen HX letdown temperature on TI-127 is 480°F  
Regen HX charging temperature on TI-126 is 480°F

These indications are consistent with a leak at what location?

- A Charging header downstream of 8107 (normal charging isolation valve) and upstream of the Regen HX
- B Charging header downstream of the Regen HX
- C Letdown line upstream of the Regen HX
- D Letdown line downstream of the Regen HX and upstream of the letdown orifice valves

32 1.00

Which ONE of the choices below represents the correct operator response upon receipt of an alarm which indicates introduction of smoke into the control room ventilation system from outside the control room?

- A Manually shift the control room ventilation system to the Isolation Mode.
- B Ensure the control room ventilation system automatically shifts to the Isolation Mode.
- C Manually shift the control room ventilation system to the Emergency Recirculation Mode.
- D Ensure the control room ventilation system automatically shifts to the Emergency Recirculation Mode.

33 1.00

Which ONE of the following describes the operation of the Power Range Nuclear Instrumentation Channel Current Comparator Circuit?

- A Compares detector B (lower) normalized signal to detector A (upper) normalized signal and generates an alarm when greater than 4% difference.
- B Compares each lower detector to the average of the lower detectors and each upper detector to the average of the upper detectors and generates an alarm when greater than 4% difference.
- C Compares total power from each channel to average power and generates an alarm when any one (1) is greater than 4% of average.
- D Compares total power from each channel and generates an alarm at 4% difference between any two (2) channels.

34 1.00

Which ONE of the following is the reason for the order that the valve positions are checked in step 3, "CHECK RCS is isolated" of ECA-0.0, "Loss of All AC Power"?

- A They are listed considering the control board arrangement
- B Those most likely to have no RNO corrective action outside the control room are first
- C They consider capacity of outflow lines and potential for inventory loss
- D Those most likely to fail in a loss of AC are listed first



35 1.00

Unit 2 is shutdown in MODE 5 when RHR flow is lost. The following conditions exist:

- All SG manways are installed
- Reactor Vessel Head in place, detensioned
- All RCPs cleared and uncoupled
- RCS temperature is increasing
- SG tubes are voided
- Reactor Vessel level is 108'
- 2-3 Charging Pump is available

Which ONE of the following methods of Decay Heat Removal (DHR) is used in this case?

- A Feed and Bleed
- B Reflux cooling
- C Natural Circulation
- D Fill and Spill

36 1.00

You are the STA on Unit 1 and you walk by PAMS 3 and observe that the RED ALARM lights are ON and the GREEN NORMAL lights are de-energized.

Which (1) of the following will cause this condition?

- A Any failed CET
- B Less than two valid thermocouples per gradient are working correctly.
- C Any two of the three reference junction box RTD inputs are invalid.
- D Any of the valid CETs has exceeded 700°F.

37 1.00

Given the following:

Unit 1 is at 85% power

Power to Vital Instrument Bus Channel II (PY-12) has just been lost

Which ONE of the following describes the effect on the plant systems?

- A Loss of power to the remote shutdown panel
- B Control rods insert at the maximum rate
- C The RHR pump trip interlock on low level in RWST is activated, preventing RHR Train B actuation
- D Loss of power to one MFW startup station

38 1.00

Given the following conditions:

The plant was operating normally at 100% power

S/G 1 narrow range level rapidly decreases to 2%

S/Gs 2, 3 & 4 narrow range levels in operating band

The reactor and turbine do NOT trip

Auxiliary Feedwater pumps do NOT start

An Anticipated Transient Without Scram [ATWS] condition is announced

Control rods are manually inserted

Power Range Instrumentation is decreasing at 10% per minute due to rod insertion

Which of the following is the expected response of the ATWS Mitigating System Actuation Circuitry [AMSAC] system?

- A The AMSAC system will automatically trip the reactor which then causes a turbine trip.
- B The AMSAC system will not actuate since the required S/G low level logic has not been satisfied.
- C The AMSAC system will trip the turbine and automatically start all AFW pumps.
- D The AMSAC system is blocked from actuation since power level will be less than 40% power before the AMSAC time delay expires.

39 1.00

Which ONE of the choices below represents the correct response to a radiation monitor alarm in the intake of the control room ventilation system?

- A Automatic shift to emergency recirculation
- B Automatic shift to emergency ventilation
- C Manual shift to emergency isolation
- D Manual shift to emergency ventilation

40 1.00

Given the following Containment Fan Cooling Unit (CFCU) conditions:

CFCUs 12, 14, & 15 running in high speed  
CFCUs 11 & 13 off  
CFCU drain valves open

What must be done in order to monitor for RCS leakage using Containment Fan Cooling Unit 12?

- A Shift CFCU 12 to low speed and close the CFCU drain valve.
- B Direct the Nuclear Operator to perform the local valve alignment for CFCU 12.
- C No action is required, the collection monitoring is already in service.
- D Close the CFCU 12 drain valve.

41 1.00

The unit is at 100% power with all systems normally aligned.

Which ONE of the following describes the affect of stopping a RCP will have on the Steam Generator in that loop?

The Steam Generator:

- A level will decrease as T-h approaches T-c with steam flow nearly zero.
- B atmospheric relief valve will fully open due to increased heat transfer.
- C pressure will decrease as T-c for the loop decreases with steam flow nearly zero.
- D level will increase as T-h will increase after the RCP stops.

42 1.00

Given the following:

The control room is filling with dense smoke  
The control room is ordered evacuated  
OP AP-8A, Control Room Inaccessibility - Establishing Hot Standby, is entered  
The reactor is tripped from 100% power and the turbine trips

Which ONE of the following describes the action required to be performed prior to leaving the control room?

- A Open the emergency boration valve
- B Initiate safety injection
- C Verify 4kV vital busses energized from startup power
- D Verify VCT outlet valves LCV-112B and C are open

43 1.00

Assume both intermediate range channels are overcompensated. What effect might this have during a reactor start-up?

It will be more likely to reach the

- A P-6 setpoint before reaching 1E04 cps indication.
- B 20% power (current equivalent) rod stop before reaching P-10.
- C point of adding nuclear heat before reaching 1E-08 amps.
- D 1E05 cps source range trip before reaching P-6.

44 1.00

How would the following conditions affect the ability to open RHR-8701 and 8702?

RCS Wide Range pressure at 355 PSIG  
PZR Vapor space temperature instrument has failed at 490°F

- A RHR-8701 & 8702 are both prevented from opening because RCS wide range pressure is greater than 350 PSIG.
- B RHR-8702 is prevented from opening because RCS wide range pressure is greater than 350 PSIG. RHR-8701 is not affected.
- C RHR-8701 is prevented from opening because pressurizer vapor space temperature is greater than 475 degrees. RHR-8702 is not affected.
- D There are NO interlocks associated with opening RHR 8701 & 8702.

45 1.00

What conditions in the Service Cooling Water System (SCW) will automatically start the standby pump?

- A Low head tank level, or high heat exchanger outlet temperature.
- B Low discharge header pressure, or the running pump breaker is open.
- C Low discharge header pressure, or low head tank level.
- D Low pump suction pressure, or the running pump breaker is open.

46 1.00

Which ONE of the following describes the impact of only ONE containment spray pump operating after the ESF actuation following a DBA LOCA?

- A Excess hydrogen may accumulate in the containment atmosphere, increasing the danger of explosion.
- B The peak containment pressure limit may be exceeded unless at least two(2) CFCUs are also running.
- C 10 CFR 100 limits may be exceeded due to inadequate iodine scrubbing.
- D The containment recirculation sump inventory will not have its proper pH value.

47 1.00

If the Pressurizer Level instrument selected as the primary controlling channel failed low, how would the plant respond, WITHOUT operator action?

- A Letdown isolates and charging increases. VCT level decreases until 5% auto switchover to RWST. Boration of the RCS causes RCS pressure to decrease until the reactor trips on OTΔT.
- B Charging increases which causes VCT level to decrease until the Charging Pumps lose suction. The loss of charging flow will cause PZR level to decrease out the bottom.
- C Charging increases which causes PZR level to increase, this will turn on the PZR heaters resulting in a high pressure reactor trip.
- D Letdown isolates and charging increases which causes Pressurizer level to increase until a reactor trip occurs from high Pressurizer level.

48 1.00

Which ONE of the following describes the RCP trip criteria while responding to a SGTR per EOP E-3, "Steam Generator Tube Rupture"?

- A RCPs should be tripped ANYTIME during E-3 if the criteria are met
- B RCPs should be tripped during E-3 ONLY if the criteria are met when the operator is specifically required to check the criteria
- C RCPs should be tripped during E-3 ONLY if the criteria are met before initiating cooldown
- D RCPs should be tripped during E-3 ONLY if the criteria are met before isolating the ruptured SG

49 1.00

Vital 4KV Bus F has been de-energized due to a fault on the Bus. The existing plant failure will not be quickly corrected.

What action should be done to the Digital Rod Position Indication (DRPI)?

- A Align DRPI to its alternate power supply, 1G.
- B Depress the Urgent Failure Alarm Reset Push-button on CC1.
- C Locally reset both of the DRPI data cabinets.
- D Place the DRPI Mode Selector Switch to the DATA "A ONLY" position.

50 1.00

Given the following plant conditions:

Unit 2 is at 55% power.  
Both Condensate Pumps are running.  
All controls are in automatic.  
Condensate Pump 2-02 trips.

Which ONE (1) of the following conditions will result?

- A Turbine run back to 35% power at 60%/min.
- B Main Feedwater Pump 2-02 will trip.
- C The unit will continue to operate at 55% power.
- D The Condensate Transfer Pump will start.



51 1.00

Step 14 of FR-C.1, "Response To Inadequate Core Cooling" directs the operator to stop all RCPs prior to depressurizing all intact SGs from 140 psig to atmospheric pressure. Which ONE (1) of the following is the reason for this action?

- A Remove RCP heat load from RCS
- B Ensure core exit thermocouple temperature will be reduced
- C Ensure RCP number 1 seal integrity
- D Enhance natural circulation cooling of the reactor core

52 1.00

The plant experienced a reactor trip and SI from 100% power. All systems responded as expected for the transient. What actions must be taken before the feedwater control valves can be opened?

- A Reset SI, heat up RCS above low Tavg setpoint, reset Feedwater Isolation.
- B Reset Feedwater Isolation.
- C Cycle the Reactor trip breakers, reset Feedwater Isolation.
- D Reset SI signal, cycle the Reactor trip breakers, reset Feedwater Isolation.

53 1.00

Given the following:

#1 S/G is FAULTED  
Safety Injection is actuated  
Containment Spray is actuated  
Safety Injection has been reset

Chemistry is now required to perform Steam Generator samples.

Which of the following signals must be reset prior to opening the Inside Containment Steam Generator Blowdown Isolation Valves (FCV-760, 761, 762, 763)?

- A Phase A Isolation ONLY
- B Steam Generator Blowdown High Radiation
- C Both Phase A & B Isolations
- D Phase B Isolation ONLY

54 1.00

Which ONE of the following statements describes the Technical Specifications BASES for removal of power to the accumulator power-operated isolation valves, 8808A, B, C, and D when operating in Modes 1, 2, and 3?

- A The valves fail to meet single failure criteria.
- B The valve motor operators have a history of overheating.
- C Ensures that the safety analysis assumptions used for accumulator pressure and volume are met.
- D Valve stroking time may exceed the accident analysis values.

55 1.00

Which ONE of the following are inputs to the High Power Mode of the Digital Feedwater Control System?

- A Feedwater flow, loop average steam flow, feedwater temperature, and turbine load
- B Feedwater temperature, narrow range steam generator level, turbine load and wide range steam generator level
- C Feedwater flow, steam flow, loop average steam flow and loop average steamline pressure
- D Loop average steamline pressure, feedwater header pressure, and narrow range steam generator level.

56 1.000

Unit 1 was at 100% power, when a steam pipe break for S/G 1-1 occurred, causing a reactor trip and eventual Safety Injection.

Present conditions are:

S/G 1-1 pressure = 550 psig  
S/G 1-2, 1-3, 1-4 pressures = 950 psig  
S/G 1-1 indicated steam flow =  $1 \times 10^6$  lbm/hr  
S/G 1-2, 1-3, 1-4 indicated steam flows = 0.0 lbm/hr  
containment pressure = +1.5 psig

Prior to the reactor trip, steam flow increased from all four steam generators. What was the reason for this increase?

- A The drop in steam pressure caused the density compensated steam flow indications for the unaffected Steam Generators to increase.
- B Steam flow from the three unaffected Steam Generators to the Main Turbine increased.
- C The reactivity transient caused by the steam leak caused the steam pressure in the unaffected steam generators to increase.
- D Back flow through the affected Steam Generator's MSIV.

57 1.00

A fire in the relay cabinet area of the control room will be extinguished by an actuation of the automatic total flooding Halon system. Which ONE of the following explains the mechanism by which the Halon extinguishes the fire?

- A The expansion of the Halon in the relay room physically displaces the oxygen needed for combustion
- B The adiabatic expansion of the Halon in the relay room cools the room below the ignition point of most combustible materials found in the room
- C The expansion of the Halon in the relay room chemically removes the oxygen from the combustion process
- D The rapid expansion of the Halon in the relay room physically blows the flame off of the combustible material

58 1.00

Which ONE of the following describes 480V breaker operation if DC control power is lost to these breakers?

- A Breakers will remain in their "as is" condition and operation would only be possible by local operation
- B Automatic breaker trips would remain operational but remote operation of breakers would not be possible
- C Breakers could be operated remotely but automatic trip functions would become inoperable
- D Breakers would trip open and operation would only be possible by local operation

59 1.00

Following a loss of all offsite power, 1-2 Diesel Generator has started and is carrying minimal loads on its associated bus. No changes have been made to the 4kV system. Diesel control is still in AUTO.

If the governor speed control switch was taken to LOWER

- A there would be no change in D/G operation.
- B Voltage and frequency would change.
- C Voltage and megawatts would change.
- D Megawatts and frequency would change.

60 1.00

Which of the following statements concerning P-14, Steam Generator High-High, is correct?

- A Set to actuate at >75% on 1/3 channels on 2/4 steam generators.
- B Protects against a loss of heat sink.
- C Provides a Feedwater Isolation Signal and trips all feedwater pumps and the main turbine.
- D Provides an input to the ATWS Mitigation System Actuation Circuitry (AMSAC) to trip.

61 1.00

While proceeding through EOP-0, "Reactor Trip Or Safety Injection", at step 21 a transition to EOP-1, "Loss Of Reactor Or Secondary Coolant", Step 1 occurs. After the transition, the following conditions exist:

Charging pumps	running
HPSI pumps	running
RCS subcooling	40 degrees F
Containment pressure	55 psig
RCP	all running
SG pressures	increasing
Condenser off gas radiation	normal
SG narrow range levels	all between 15% and 40%
Pressurizer level	35% decreasing
Feedwater flow	220 gpm

Which of the following actions is required?

- A Stop all RCPs and close CCW isolation valves.
- B Manually start the Positive Displacement charging pump to maintain pressurizer level.
- C Transition to FR-H.1, "Response To Loss of Secondary Heat Sink".
- D Transition to FR-Z.1, "Response To High Containment Pressure".

62 1.00

Which of the following conditions will bring in the blue light (located on VB-4) associated with the 4kV vital bus auto transfer circuits?

- A A transfer to Diesel signal only
- B A transfer to S/U OR transfer to Diesel signal
- C A transfer to S/U signal only
- D An actuation of the shed load relay only

63 1.00

Which ONE of the following is the basis for reducing Tave to less than 500 degrees F when the specific activity of the RCS is greater than 100/E microCuries per gram of gross radioactivity?

- A Minimize thermal stress on the fuel cladding.
- B Increase the solubility of the corrosion products in the coolant.
- C Prevent lifting the SG relief valves in the event of a SGTR.
- D Limit containment radiation levels in the event of a LOCA.

64 1.00

Which of following Containment Purge System valves are limited to 50° of travel by the Technical Specifications?

FCV- 660 CONTMT PURGE AIR SUPPLY FAN S-3 DISCH TO CONTMT  
FCV- 661 CONTMT PURGE AIR SUPPLY FAN S-3 DISCH TO CONTMT  
FCV- 662 CONTMT EXCESS PRESS AND VAC RELIEF  
FCV- 663 CONTMT EXCESS PRESS RELIEF TO AUX BLDG EXH FANS  
FCV- 664 CONTMT VAC RELIEF

- A FCV-661, 662, 664
- B FCV-660, 663, 664
- C FCV-660, 661
- D FCV-662, 663, 664

65 1.00

How would the liquid radwaste system respond if RE-18, Liquid Radwaste Rad Monitor, were to come in alarm during a discharge of a Floor Drain Receiver?

- A RCV-18 closes and FCV-477 opens. Flow is directed to the Equipment Drain Receiver that is on fill.
- B RCV-18 opens and FCV-477 closes. The tank that is on discharge will swap to recirculation.
- C RCV-18 closes. The running Floor Drain Receiver pump will receive a trip signal.
- D RCV-18 closes and FCV-477 opens. Flow is directed to the Floor Drain Receiver that is on fill.

66 1.00

Which of the following is a Tech Spec basis for the 164,678 gallons required in the CST?

- A Ensures an adequate heat sink is available for design base SGTR conditions and utilizing the maximum cooldown rate to < 350 degrees for the RHR system to be placed in service.
- B Allows maintaining of the RCS in Hot Standby conditions for 24 hours concurrent with no offsite power available.
- C Ensures an adequate NPSH exists for the Aux Feedwater pumps.
- D Allows cooldown of the RCS to < 350 degrees to allow for the RHR system to be placed in service.



67 1.00

Which ONE of the following is an input utilized by the Reactor Vessel Water Level instrumentation system?

- A Heated junction thermocouple
- B Reactor Vessel differential pressure
- C Loop 1 wide range pressure
- D Tcold instrument on Loop 3

68 1.00

After a long period of stable plant operation, the following plant response occurs:

Rods stepping in at an increasing rate  
Generator load decreasing rapidly in steps  
"RUNBACK OPER" light on the DEHC indication panel flashing at a steady low frequency.

Which of the following conditions is most likely to cause such a plant response?

- A Stator cooling water high conductivity
- B Stator cooling water flow low
- C All loops of  $OP\Delta T$  (C-4) 3% below their calculated trip setpoint
- D Loop 1  $OT\Delta T$  (C-3) 1% below its calculated trip setpoint

69 1.00

While observing the containment purge radiation monitor (RM44A) radiation display unit (RDU), you notice that the HIGH ALARM and CVI BYP status lights on the panel are both on.

Based solely on the indications at the RDU, which of the following is true regarding the containment purge CVI status?

- A A CVI signal has been sensed and a CVI has occurred.
- B The status is normal; high radiation on R-44A will cause a CVI.
- C A CVI signal is sensed, but the CVI function is bypassed and it will not occur.
- D A CVI has not been sensed, but CVI actions will occur when it is sensed.

70 1.00

The present plant parameters are:

Reactor Trip	actuated
Safety Injection	actuated
Pressurizer level	5%
Pressurizer pressure	1450 psig

Given the above conditions, which of the following actions will result in energizing the pressurizer heaters?

- A The operator must reset the Safety Injection signal and take the heater switch to the "on" position.
- B The operator must reset the Safety Injection signal, take the heater switch to the "trip" position then to the "on" position after pressurizer level increases above 17%.
- C The operator must take the heater switch to the "on" position after pressurizer level increases above 17% and the pressurizer heater breakers have been reset locally.
- D The operator must take the heater switch to the "on" position after resetting the Safety Injection signal and the pressurizer heater breakers have been reset locally.

71 1.00

A leak has developed at the spent fuel pit pumps. If this leak is not isolated, Spent Fuel Pool level would decrease to approximately:

- A 10 feet below the normal level.
- B 12 feet above the top of the fuel assemblies.
- C 6 feet above the top of the fuel assemblies.
- D 4 feet below the normal level.

72 1.00

A reactor trip and SI have occurred five minutes ago and the following conditions exist:

MSIVs 1, 3, and 4 are shut.  
1-1 S/G pressure is 1005 psig.  
1-2 S/G pressure is 850 psig.  
1-3 S/G pressure is 975 psig.  
1-4 S/G pressure is 1005 psig.

Where is the turbine driven aux feed pump getting its motive steam?

- A Steam line 3 down stream of MSIV
- B Steam lines 1 and 4 upstream of MSIV
- C Steam lines 2 and 3 upstream of MSIVs
- D Steam line 3 upstream of MSIV

73 1.00

A reactor start up is in progress with the following plant conditions:

Control rods	Manual
Reactor power	5%
IR SUR	0
Steam Dumps	Pressure mode
HC-507	AUTO

What would happen if the steam dump pressure controller HC-507 pot setting were to be changed to 7.20? (Normal setting is 8.38)

- A Tav<sub>g</sub> would decrease and reactor power would increase.
- B Tav<sub>g</sub> would increase and reactor power remain the same.
- C Tav<sub>g</sub> would remain the same and reactor power would increase.
- D Tav<sub>g</sub> and reactor power would remain the same.

74 1.00

The plant is operating at 100% power. Pressurizer Level control is selected for LT-459/LT-461. What would be the plant response to Pressurizer Level Channel LT-460 failing high?

- A Letdown will isolate and all Pressurizer Heaters will de-energize.
- B PK05-21, PZR LEVEL HI/LO, annunciator will actuate.
- C Charging flow will increase, backup heaters will energize.
- D PZR HIGH LEVEL RX TRIP Bistable Status Light will energize.

75 1.00

During a secondary plant start-up, what is the effect on the MSR bypass valves (CV-1s) and supply valves (CV-2s) when the ramp push button, on the MSR controller, is depressed?

- A CV-1 valves open in 60 minutes based on feedback from hot reheat temperature. CV-2 valves open when CV-1 is 60% open.
- B CV-1 valves open in about 120 minutes. CV-2 valves open 30 minutes after CV-1 is full open.
- C CV-1 valves open based on main turbine first stage impulse pressure signal. CV-2 valves open after 400°F is sensed.
- D CV-1 valves open based on feedback from hot reheat temperature. CV-2 valves open when CV-1 is full open.

76 1.00

Subsequent to a reactor trip from 100% power, a severe water hammer causes the aux feedwater line to Feed Lead 2-1 to break.

The break is just upstream of the check valve that isolates main feedwater from aux feedwater.

How do the following AFW LCVs respond to this malfunction?

LCV-110 AFW PP 2-2 discharge to S/G 2-1

LCV-111 AFW PP 2-2 discharge to S/G 2-2

LCV-106 AFW PP 2-1 discharge to S/G 2-1

- A Low pressure on the AFW line to S/G 2-1 will send a signal to close LCV-110 and LCV-106. LCV-111 will be available to feed S/G 2-2.
- B Low AFW PP 2-2 discharge pressure will result in throttling LCV-110 and LCV-111. LCV-106 will remain open until closed by operator action.
- C High AFW flow to S/G 2-1 will result in LCV-110 throttling. LCV-111 will open in an attempt to feed S/G 2-2. LCV-106 will remain open until closed by operator action.
- D Low pressure on the AFW line will send a close signal to LCV-110. LCV-111 will open in an attempt to feed S/G 2-2. LCV-106 will remain open until closed by operator action.

77 1.00

If a pressurizer PORV fails open which ONE of the following actions concerning the Pressurizer Relief Tank (PRT) will occur assuming NO operator action?

- A The PRT primary water spray valve will automatically open at 3 psig.
- B The PRT vent valve to the waste gas vent header will automatically open at 10 psig.
- C The PRT relief valve will lift at 50 psig.
- D The PRT rupture disks will rupture at 100 psig.

78 1.00

A Gaseous Waste Processing System release is in progress. Which ONE of the following malfunctions could result in the release exceeding the limits on the permit?

- A A loss of control power to system discharge valve FCV-410.
- B Isolation of air to system discharge valve FCV-410.
- C Vent Stack radiation monitor fails high.
- D Aux. building vent duct monitor RM-44A/B fails low.

79 1.00

The plant has experienced a safety injection from 100% power due to a Main Steam Line Break inside containment. Containment pressure is at 27 psig.

What would be the status of the Containment Spray system?

- A CS pumps supplying the spray rings with only RWST water.
- B Spray additive tank outlet valves will be open but the CS pumps will NOT be running.
- C CS pumps supplying the spray rings with RWST water and NaOH.
- D CS pumps running with their discharge valves closed and the Spray additive tank outlet valves open.

80 1.00

Which ONE of the following describes a method used to cool the Pressurizer Relief Tank (PRT) that would NOT generate radwaste?

- A Spray from Reactor Makeup Water System and pump to the LWPS.
- B Spray water from the RCDT heat exchanger into the PRT.
- C Spray from RCDT pump and pump to the LWPS.
- D Sparging from the Charging Pump discharge.

81 1.00

What combination of RCS temperature and pressure changes would cause the setpoint for C-3 (OTΔT Rod Stop & Turbine Runback) to INCREASE the most?

- A Tavg INCREASING with RCS pressure DECREASING
- B Tavg CONSTANT with RCS pressure INCREASING
- C Tavg DECREASING with RCS pressure INCREASING
- D Tavg DECREASING with RCS pressure CONSTANT

82 1.00

Given the following:

RCS pressure is 225 psig.  
RCS temperature is 200 degrees F.  
RHR Heat Exchanger Flow control valve (HCV-638) is 10% open.  
ONLY RHR train "A" is in operation.

Which ONE of the following describes the expected operator actions when a CCW SURGE TANK HI alarm on PK01-07 annunciates?

- A RHR Heat Exchanger flow control valve (HCV-638) will be OPENED to maintain desired RHR system flow rate and PZR Level maintained by increasing charging flow.
- B RHR Heat Exchanger bypass valve (HCV-670) will be OPENED to bypass RHR Heat Exchanger and Train "2" placed in service.
- C RHR Heat Exchanger flow control valve (HCV-638) will be CLOSED and RHR pump recirculation flow control valve fully OPENED.
- D RHR Heat Exchanger flow control valve (HCV-638) will be CLOSED and HCV-133 to CVCS Letdown CLOSED.



83 1.00

Which ONE of the following is the correct classification of a fire in the Diesel Generator Fuel Day Tank?

- A Class A
- B Class B
- C Class C
- D Class D

84 1.00

With the unit at 100% power, a loss of a vital DC bus will:

- A Initiate closure of a train of phase "A" isolation valves.
- B Result in loss of a 4kV vital bus when the unit trips.
- C Prevent a reactor trip signal from being processed for the effected instrumentation channel.
- D Result in a loss of DC power to the main generator air side seal oil backup pump.

85 1.00

While conducting refueling operations in the FHB, the ALERT ALARM/TRIP 1 setpoint for the New Fuel Radiation monitor RE-59 is reached. Besides the local alarm in the FHB at radiation monitor RE-59 actuating, what automatic action(s) will occur due to this alarm?

- A FHB evacuation alarm will sound.
- B FHB Hi Rad Alarm (PK11-10) will annunciate.
- C No other automatic actions will occur.
- D FHB ventilation will switch to the Iodine Removal mode.

86 1.00

Which ONE of the following is the purpose of the Carbon Filter Units used in the Containment Ventilation System?

Removal of:

- A Radioiodine.
- B Hydrogen.
- C Ultra-fine particulates.
- D Steam.

87 1.00

Given the following:

A reactor trip occurred coincident with a loss of offsite power  
EOP E-0.4, "Natural Circulation Cooldown with Steam Void in Vessel (without RVLIS)" is in progress

The following conditions currently exist:

RCS pressure is 1600 psig  
RCS temperature is 450°F

Which ONE of the following is the reason for equalizing charging and letdown flows during the subsequent depressurization?

- A Allows Pressurizer level to be used for monitoring void growth
- B Assures RCS total mass does not exceed the maximum conditions assumed in FSAR analysis
- C Pressurizer level is not accurate during these conditions and flow matching assures the pressurizer will not go solid
- D Assures the volume control tank is not overstressed due to large fluctuations in charging and letdown

88 1.00

Which ONE of the following establishes the initial conditions for the accident analyses addressed in the FSAR?

- A Technical Specifications.
- B Site specific Probabilistic Risk Analysis Report.
- C Westinghouse Owners' Group Emergency Response Guidelines.
- D Westinghouse Transient and Accident Analysis Report.

89 1.00

Which of the following describes why a Main Steam Isolation Valve (MSIV) could stay OPEN after going to CLOSE on its control switch?

- A Loss of power to its solenoids.
- B No P-4 signal.
- C Insufficient air volume in the accumulators.
- D Loss of instrument air.

90 1.00

Which ONE of the following conditions will cause Area Radiation Monitoring System "Channel in High Alarm"?

- A Steam Generator Tube Rupture.
- B Reactor Coolant System (RCS) to Component Cooling Water System (CCWS) leak.
- C Gas storage tank rupture.
- D RCP thermal barrier heat exchanger tube rupture.

91 1.00

Which ONE of the choices below correctly describes the plant response to pressure channel PT-455 failing HIGH while selected as the control channel with the plant at full power and without operator action?

- A The reactor will trip on high pressure.
- B The PORV block valve will shut when pressure reaches the interlock channel setpoint.
- C The reactor will trip on low pressure.
- D The spray valve will shut when pressure reaches the interlock channel setpoint.

92 1.00

Given the following Unit 1 plant conditions:

Unit was at 100% power when it tripped due to a LOCA.  
Containment pressure is now 16 psig and increasing.  
Hydrogen concentration is 3% and stable.  
Hydrogen Recombiners are being placed in service in accordance with FR-Z.1, "Response to High Containment Pressure."

Which ONE of the following indicates that recombination is occurring after having placed the Hydrogen Recombiners in service?

- A Containment pressure decreases after Hydrogen Recombiners are placed in service.
- B Hydrogen Recombiner average thermocouple temperature is above 1225 degrees F.
- C Containment dewpoint decreases after hydrogen recombiners are placed in service.
- D Hydrogen Recombiner power increases to 120 KW.

93 1.00

Which ONE of the following reflects the condition and the bases for Technical Specification 3.5.4 "Emergency Core Cooling Systems", requirement that ALL Safety Injection Pumps be verified INOPERABLE?

- A In Mode 4 to ensure that a mass addition transient can be relieved by one Pressurizer safety valve.
- B In Mode 5 with water above the reactor vessel flange to ensure that a mass addition transient can be relieved by one PORV.
- C In Mode 5 with water below the reactor vessel flange to ensure that a mass addition transient can be relieved by one RHR suction relief valve.
- D In Mode 6 with the reactor vessel head removed and core alterations in progress in the vicinity of the reactor vessel hot legs.

94 1.00

Upon complete loss of instrument air which ONE of the following valves will an operator NOT be able to control?

- A LCV-459, Letdown isolation
- B PCV-455A, Pressurizer Spray
- C HCV-142, RCP seal back pressure control valve
- D PCV-19, Steam Generator 10% atmospheric dump valve

95 1.00

Which ONE of the following will AUTOMATICALLY terminate a Liquid Radwaste release?

- A Service Water Radiation Monitor Hi Hi.
- B Low dilution water flow rate.
- C High liquid radwaste discharge flow rate.
- D High dilution water flow rate.

96 1.00

The applicability statement for Procedure EOP E-0, "Reactor Trip Or Safety Injection", indicates that this procedure is used for initiating events occurring in Modes 1, 2 and 3. Which of the following describes the applicability of EOP E-0 while in Mode 4?

- A E-0 can not be used in Mode 4, therefore procedure E-0.1, "Reactor Trip Response" must be used.
- B E-0 can not be used in Mode 4 since Abnormal Conditions Procedures must be used in Mode 4 through Mode 6.
- C E-0 can only be used in Mode 4 if so directed by the Critical Safety Function Status Trees.
- D E-0 can be used if a step by step evaluation is made to determine if the action is still applicable.

97 1.00

Given the following:

Unit 1 has tripped from 100% power due to a loss of coolant accident (LOCA).  
A loss of offsite power (LOOP) has also occurred.  
Containment pressure is 15 psig.  
Core Exit Thermocouples indicate 330 degrees F.  
RCS pressure is 400 psig.  
RWST level is 50%.  
Emergency Diesel Generator #1 has failed to start.  
NO flow is indicated for running Residual Heat Removal pump #2.

Which ONE of the following is the reason that RHR pump #2 has NO flow indication?

- A RCS pressure is above the RHR shutoff head.
- B RHR HX bypass valve (HCV-670) is closed.
- C SI cross-connect valves 8716A/B are OPEN.
- D RHR pump Containment Sump Suction valves have failed to open automatically on low RWST level.

98 1.00

Given the following conditions:

A normal plant cooldown is in progress.  
The CCW surge tank indicates a need for makeup.  
Auxiliary operator confirms there is no local problem.  
The water level in the surge tank is slowly DECREASING.  
The makeup valves to the surge tank are fully open.

Which ONE of the following is the source of the leak?

- A RCP thermal barrier heat exchanger
- B Seal water heat exchanger
- C Letdown heat exchanger
- D Primary sample coolers



99 1.00

A Nuclear Engineer calculates core thermal power using a heat balance, but neglects the effects of RCP horsepower and of S/G blowdown being in service.

Which of the following best describes how this will effect the calculated value versus actual thermal power?

- A Both effects make the calculated value higher.
- B Neglecting RCPs makes the calculated value higher, neglecting blowdown makes it lower.
- C Neglecting RCPs makes the calculated value lower, neglecting blowdown makes it higher.
- D Both effects make the calculated value lower.

100 1.00

Which ONE of the following statements describes the function of the pressure detectors located at the discharge of the Residual Heat Removal Pumps?

- A Provide an overpressure interlock that prevents opening 8701 A/B and 8702 A/B hot leg suction valves.
- B Provide an overpressure interlock that prevents opening 8812 A/B RWST suction valves.
- C Provide differential pressure input for flow indication.
- D Provide high pressure alarm.

# ANSWER SHEET FOR REACTOR OPERATOR WRITTEN EXAMINATION

Multiple Choice (Circle or X your choice)

NAME:

KEY

001    A    B    C    D    \_\_\_\_\_

002    A    B    C    D    \_\_\_\_\_

003    A    B    C    D    \_\_\_\_\_

004    A    B    C    D    \_\_\_\_\_

005    A    B    C    D    \_\_\_\_\_

006    A    B    C    D    \_\_\_\_\_

007    A    B    C    D    \_\_\_\_\_

008    A    B    C    D    \_\_\_\_\_

009    A    B    C    D    \_\_\_\_\_

010    A    B    C    D    \_\_\_\_\_

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048    A    B    C    D    \_\_\_\_\_

049    A    B    C    D    \_\_\_\_\_

050    A    B    C    D    \_\_\_\_\_

# ANSWER SHEET FOR REACTOR OPERATOR WRITTEN EXAMINATION

Multiple Choice (Circle or X your choice)

NAME:

KEY

051 A B C D \_\_\_\_\_

052 A B C D \_\_\_\_\_

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

**Applicant Information**

Name:	Region: IV
Date:	Facility/Unit: DCP/ Units 1 & 2
License Level: SRO	Reactor Type: W
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

## APPENDIX E

### POLICIES AND GUIDELINES FOR TAKING NRC EXAMINATIONS

Each examinee shall be briefed on the policies and guidelines applicable to the examination category (written and/or operating test) being administered. The applicants may be briefed individually or as a group. Facility licensees are encouraged to distribute a copy of this appendix to every examinee before the examinations begin. All items apply to both initial and requalification examinations, except as noted.

#### PART A - GENERAL GUIDELINES

1. ***[Read Verbatim]*** Cheating on any part of the examination will result in a denial of your application and/or action against your license.
2. If you have any questions concerning the administration of any part of the examination, do not hesitate asking them before starting that part of the test.
4. SRO applicants will be tested at the level of responsibility of the senior licensed shift position (i.e., shift supervisor, senior shift supervisor, or whatever the title of the position may be).
5. You must pass every part of the examination to receive a license or to continue performing license duties. Applicants for an SRO-upgrade license may require remedial training in order to continue their RO duties if the examination reveals deficiencies in the required knowledge and abilities.
6. The NRC examiner is not allowed to reveal the results of any part of the examination until they have been reviewed and approved by NRC management. Grades provided by the facility licensee are preliminary until approved by the NRC. You will be informed of the official examination results about 30 days after all the examinations are complete.

#### PART B - WRITTEN EXAMINATION GUIDELINES

1. ***[Read Verbatim]*** 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.
2. To pass the examination, you must achieve a grade of 80.00 percent or greater; grades will not be rounded up to achieve a passing score. Every question is worth one point.
3. For an initial examination, the time limit for completing the examination is five hours.

For a requalification examination, the time limit for completing both sections of the examination is three hours. If both sections are administered in the simulator during a single three-hour period, you may return to a section of the examination that was already completed or retain both sections of the examination until the allotted time has expired.

4. You may bring pens, pencils, and calculators into the examination room. Use black ink to ensure legible copies; dark pencil should be used only if necessary to facilitate machine grading.
5. Print your name in the blank provided on the examination cover sheet and the answer sheet. You may be asked to provide the examiner with some form of positive identification.
6. Mark your answers on the answer sheet provided and do not leave any question blank. Use only the paper provided and do not write on the back side of the pages. If you are using ink and decide to change your original answer, draw a single line through the error, enter the desired answer, and initial the change.
7. If you have any questions concerning the intent or the initial conditions of a question, do *not* hesitate asking them before answering the question. Ask questions of the NRC examiner or the designated facility instructor *only*. When answering a question, do *not* make assumptions regarding conditions that are not specified in the question unless they occur as a consequence of other conditions that are stated in the question. For example, you should not assume that any alarm has activated unless the question so states or the alarm is expected to activate as a result of the conditions that are stated in the question.
8. 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.
9. When you complete the examination, assemble a package including the examination questions, examination aids, answer sheets, and scrap paper and give it to the NRC examiner or proctor. Remember to sign the statement on the examination cover sheet indicating that the work is your own and that you have neither given nor received assistance in completing the examination. The scrap paper will be disposed of immediately after the examination.
10. After you have turned in your examination, leave the examination area as defined by the proctor or NRC examiner. If you are found in this area while the examination is still in progress, your license may be denied or revoked.
11. Do you have any questions?

## ANSWER SHEET FOR SENIOR REACTOR OPERATOR WRITTEN EXAMINATION

Multiple Choice (Circle or X your choice)

NAME: \_\_\_\_\_

If you change your answer, write your selection in the blank and initial.

001	A	B	C	D	_____	026	A	B	C	D	_____
002	A	B	C	D	_____	027	A	B	C	D	_____
003	A	B	C	D	_____	028	A	B	C	D	_____
004	A	B	C	D	_____	029	A	B	C	D	_____
005	A	B	C	D	_____	030	A	B	C	D	_____
006	A	B	C	D	_____	031	A	B	C	D	_____
007	A	B	C	D	_____	032	A	B	C	D	_____
008	A	B	C	D	_____	033	A	B	C	D	_____
009	A	B	C	D	_____	034	A	B	C	D	_____
010	A	B	C	D	_____	035	A	B	C	D	_____
011	A	B	C	D	_____	036	A	B	C	D	_____
012	A	B	C	D	_____	037	A	B	C	D	_____
013	A	B	C	D	_____	038	A	B	C	D	_____
014	A	B	C	D	_____	039	A	B	C	D	_____
015	A	B	C	D	_____	040	A	B	C	D	_____
016	A	B	C	D	_____	041	A	B	C	D	_____
017	A	B	C	D	_____	042	A	B	C	D	_____
018	A	B	C	D	_____	043	A	B	C	D	_____
019	A	B	C	D	_____	044	A	B	C	D	_____
020	A	B	C	D	_____	045	A	B	C	D	_____
021	A	B	C	D	_____	046	A	B	C	D	_____
022	A	B	C	D	_____	047	A	B	C	D	_____
023	A	B	C	D	_____	048	A	B	C	D	_____
024	A	B	C	D	_____	049	A	B	C	D	_____
025	A	B	C	D	_____	050	A	B	C	D	_____

# ANSWER SHEET FOR SENIOR REACTOR OPERATOR WRITTEN EXAMINATION

Multiple Choice (Circle or X your choice)

NAME: \_\_\_\_\_

If you change your answer, write your selection in the blank and initial.

051	A	B	C	D	_____	076	A	B	C	D	_____
052	A	B	C	D	_____	077	A	B	C	D	_____
053	A	B	C	D	_____	078	A	B	C	D	_____
054	A	B	C	D	_____	079	A	B	C	D	_____
055	A	B	C	D	_____	080	A	B	C	D	_____
056	A	B	C	D	_____	081	A	B	C	D	_____
057	A	B	C	D	_____	082	A	B	C	D	_____
058	A	B	C	D	_____	083	A	B	C	D	_____
059	A	B	C	D	_____	084	A	B	C	D	_____
060	A	B	C	D	_____	085	A	B	C	D	_____
061	A	B	C	D	_____	086	A	B	C	D	_____
062	A	B	C	D	_____	087	A	B	C	D	_____
063	A	B	C	D	_____	088	A	B	C	D	_____
064	A	B	C	D	_____	089	A	B	C	D	_____
065	A	B	C	D	_____	090	A	B	C	D	_____
066	A	B	C	D	_____	091	A	B	C	D	_____
067	A	B	C	D	_____	092	A	B	C	D	_____
068	A	B	C	D	_____	093	A	B	C	D	_____
069	A	B	C	D	_____	094	A	B	C	D	_____
070	A	B	C	D	_____	095	A	B	C	D	_____
071	A	B	C	D	_____	096	A	B	C	D	_____
072	A	B	C	D	_____	097	A	B	C	D	_____
073	A	B	C	D	_____	098	A	B	C	D	_____
074	A	B	C	D	_____	099	A	B	C	D	_____
075	A	B	C	D	_____	100	A	B	C	D	_____



1

Due to a loss of all secondary heat sink FR-H.1, "Loss of Secondary Heat Sink," has been implemented. The conditions for establishing Bleed and Feed currently exist. SI has been actuated and a feed path verified. In an attempt to establish a bleed path, only one pressurizer PORV can be opened.

What action is required?

- A. Go to FR-C.1, "Response to Inadequate Core Cooling."
- B. Open the reactor vessel head vents (and depressurize at least one SG.)
- C. Go to FR Z.1, "Response to High Containment Pressure."
- D. Reduce SI flow.

2

A reactor trip and SI have occurred as a result of a large break LOCA. E-1.3, "Transfer to Cold Leg Recirculation," has just been completed.

The STA reports the following conditions associated with the Containment critical safety function:

- Containment pressure 2.0 PSIG
- Containment sump level 98 ft
- Containment radiation 1400 R/Hr

Which of the following is an immediate containment concern?

- A. Containment structural integrity.
- B. Erroneous instrumentation readings.
- C. Inadequate suction to the RHR pumps.
- D. Flooding vital equipment in containment.

3

A small break LOCA has occurred and E-1.2, "Post LOCA Cooldown and Depressurization," is in progress.

The following plant conditions exist:

- RCS pressure is 1500 psig
- All 4 RCPs are running
- PZR level is 5%
- Letdown is NOT in service

The crew is ready to commence step 13, "Depressurize RCS to Refill PZR." What impact will performing this step have on the plant?

- A. Safety Injection flow will INCREASE.
- B. Aux spray  $\Delta T$  may be exceeded.
- C. PRT pressure, level and temperature will INCREASE.
- D. Voids in the RCS may collapse.

4

A large break LOCA has occurred. ECA-1.1, "Loss of Emergency Coolant Recirculation," was entered from E-1, "Loss of Reactor or Secondary Coolant," when it was noted that BOTH Residual Heat Removal (RHR) pumps could NOT be started. While the crew is performing ECA-1.1, Step 11, "Establish One Train of SI Flow," power is restored to RHR pump 1-1.

What action should be taken next?

- A. Continue ECA-1.1, Step 11, "Establish One Train of SI Flow."
- B. Return to E-1, Step 11.a, "Verify Cold Leg Recirculation capability."
- C. Go to E-1.3, "Transfer to Cold Leg Recirculation."
- D. Return to ECA-1.1, Step 1, "TRY to Restore Emergency Coolant Recirculation Equipment."

5

An ATWS has occurred, and the crew has progressed to Step 9 of FR-S.1, Response to Nuclear Power Generation / ATWS, when a safety injection occurs.

What action(s) should be taken?

- A. Verify Steps 1 to 11 of E-0, Reactor Trip or Safety Injection.
- B. Implement E-0, Reactor Trip or Safety Injection.
- C. Continue in FR-S.1, and do NOT implement SI actions.
- D. Go to E-0, Reactor Trip or Safety Injection.

6

A reactor trip and safety injection have just occurred from 100% power, and E-0, "Reactor Trip or Safety Injection," has been entered. When DRPI indications are checked, two rods indicate FULLY WITHDRAWN and all other rods indicate FULLY INSERTED.

With current plant conditions, what action(s), if any, should be performed in response to the control rods while in E-0?

- A. Go to EP FR-S.1, "Response to Nuclear Power Generation/ATWS."
- B. Implement AP-6, "Emergency Boration."
- C. No additional actions are required.
- D. Implement STP R-19, "Shutdown Margin Calculation."

Technical Maintenance causes a spurious reactor trip from 100% power. SI has NOT actuated and is NOT required. E-0, "Reactor trip or Safety Injection," has been performed, and transition to the next appropriate procedure has been made. The following conditions currently exist:

- Tavg is 531°F and DECREASING
- All steam dumps are CLOSED
- MSRs are RESET
- Narrow Range levels in all S/Gs are 8% and STABLE
- Total AFW flow has been throttled to 200 GPM to maintain S/G levels at 8%
- S/G pressures are 950 psig and DECREASING slowly
- MSIVs have been closed by the operators
- Containment pressure is 0.1 PSIG

What action should be performed?

- A. Initiate emergency boration.
- B. Manually actuate Safety Injection.
- C. Raise TOTAL AFW flow to at least 425 GPM.
- D. Lower AFW flow to 25 GPM to each S/G.

A loss of all vital AC power has occurred. The operators are currently depressurizing intact steam generators to reduce RCS pressure to inject the accumulators per ECA-0.0, "Loss of All Vital AC Power."

The following conditions exist:

- o Containment pressure is 4 psig and INCREASING
- o AFW flow is 220 gpm per S/G from the TDAFP
- o S/G NR levels are as follows: 1-1 & 1-4 are 14%; 1-2 & 1-3 are 10%;  
all levels are DECREASING slowly
- o Pzr level is 8% and DECREASING rapidly
- o RCS pressure is 1450 psig and DECREASING rapidly

Based on the above conditions, the operators should:

- A. Continue depressurization at MAXIMUM rate while maintaining MAXIMUM AFW flow to ALL S/Gs.
- B. Stop depressurization until greater than 16% NR level is restored in at least ONE S/G.
- C. Stop depressurization until pressurizer level is greater than 36%.
- D. Continue depressurization at REDUCED rate while maintaining MAXIMUM AFW flow to ALL S/Gs.

9

Unit 1 Component Cooling Water System has the following configuration:

- CCW Pump 1-1 operating
- CCW Heat Exchanger 1-1 in service
- CCW Pump 1-3 operating
- CCW Heat Exchanger 1-2 Outlet Valve FCV 431 tagged out for repair of motor operator
- CCW Pump 1-2 tagged out for pump seal repair

What is the maximum time the plant can operate with this configuration before power reduction is required (assuming the above conditions just occurred)?

- A. 1 hour.
- B. 6 hours.
- C. 24 hours.
- D. 72 hours.

10

For a main steamline break, which of the following would most challenge the reactor shutdown margin, assuming the shutdown margin was at its minimum acceptable value for that condition?

- A. EOL, with the reactor at 100% power.
- B. BOL, with the reactor at 100% power.
- C. EOL, with Tavg at 200°F (Mode 5).
- D. EOL, with the reactor at hot zero power.

You are performing ECA-0.0, "Loss of All Vital AC Power,"  
Step 16, "Depressurize Intact S/Gs to Reduce RCS Pressure to Inject  
Accumulators."

The following conditions currently exist:

- Max rate SG depressurization is in progress
- All S/G pressures are 265 PSIG
- All S/G NR levels are 7%
- All RCS cold leg temperatures are 260°F
- Containment pressure is 2.5 PSIG

Based on the above conditions, you should

- A. continue depressurization to 240 PSIG in the S/Gs; accumulator water will be injected, but NOT nitrogen.
- B. stop depressurization; a secondary heat sink concern exists.
- C. stop depressurization; a PTS concern exists.
- D. continue depressurization; pressurizer level is NOT a concern.

A SGTR has occurred.

The following conditions exist:

- RCPs were secured due to RCP Trip Criteria
- Ruptured S/G has been IDENTIFIED and ISOLATED
- RCS cooldown to target temperature is COMPLETE
- RCS depressurization is COMPLETE
- Normal charging and letdown are IN SERVICE
- Pressurizer Level is 35%
- RVLIS Upper Range is 100%
- RCS Subcooling (YI-31) is 43 °F
- Ruptured S/G level is 56% NR and STABLE
- Containment pressure is 0.1 psig
- Containment radiation is background

What action(s) is(are) required regarding RCP status?

- A. Do NOT implement "APPENDIX B" to attempt RCP restart until pressurizer level has been increased to greater than 57%.
- B. Start one RCP, if "APPENDIX B" conditions are met.
- C. Start all RCPs that meet "APPENDIX-B" conditions for start.
- D. An RCP can NOT be started, manually close the Pzr spray valves and verify Natural Circulation.



13

Because of a Control Room Evacuation, Hot Standby is being established from outside the control room. 4KV vital busses F, G and H are noted to be DE-ENERGIZED.

The correct response is to:

- A. Refer to Appendix B, and go to ECA-0.0.
- B. Verify Appendix B is in progress, and refer to ECA-0.0.
- C. Refer to Appendix B, while continuing with AP-8A.
- D. Go to ECA-0.0, and refer to OP AP-8A.

14

Due to a problem with kelp at the Intake Structure, Condenser pressure has deteriorated to 4.2" Hg. absolute. Turbine load has been reduced to 300 MWe. Conditions have been stable for 5 minutes. The operating crew should take the following actions:

- A. Reduce load as necessary to restore Condenser pressure to less than 3.5" Hg. absolute
- B. Trip the reactor
- C. Valve in additional air ejectors
- D. Trip the turbine

15

What is the significance of not allowing RVLIS to fall below 76% full range when performing a natural circulation cooldown with voids in the reactor vessel head?

- A. Ensures that upper head voiding does not result in the upper range RVLIS from reading off scale low.
- B. Ensures that voids don't enter the hot leg and be swept to the SG U-tubes where they could inhibit natural circulation flow.
- C. Ensures that excessive upper head voiding does not cause the Pzr level to go solid.
- D. Ensures that the voids don't enter the cold legs where they could enter the reactor causing hot spots in the core.

16

During a loss of all vital AC event, the safeguards loads are isolated from the vital busses.

How are the Containment Fan Cooling Units (CFCUs) prevented from starting and loading when a vital bus is eventually energized?

- A. Control power fuses are pulled.
- B. Control switches are placed in stop.
- C. CFCU breakers are racked out.
- D. DC control power switches are opened.

17

The Auxiliary Feedwater Pumps are supplying the steam generators following a reactor trip. The Condensate Storage Tank level decreases to 10% and an alternate source of feedwater to the Auxiliary Feedwater System is necessary.

Which list has the sources of water in the preferred order of use?

- A.     Condensate Storage Tank from Condenser Hotwell,  
          Makeup Water Transfer Tank,  
          Raw Water Reservoir,  
          Fire Water Storage Tank
- B.     Raw Water Reservoir  
          Fire Water Storage Tank  
          Condensate Storage Tank from Condenser Hotwell  
          Makeup Water Transfer Tank
- C.     Fire Water Storage Tank,  
          Condensate Storage Tank from Condenser Hotwell,  
          Makeup Water Transfer Tank,  
          Raw Water Reservoir
- D.     Raw Water Reservoir,  
          Condensate Storage Tank from Condenser Hotwell,  
          Fire Water Storage Tank,  
          Makeup Water Transfer Tank

18

Steam Trap 104 on the Turbine Driven Auxiliary Feed Pump (TDAFP) is isolated due to excessive steam trap blow-by.

What action is required to maintain the TDAFP OPERABLE?

- A.     Open the Bypass Orifice Isolation Valve.
- B.     Check the remaining steam trap drain lines for condensate removal flow at least once per shift.
- C.     Open the upstream drain valve every eight hours to ensure adequate condensate removal.
- D.     Run the TDAFP at least once every eight hours to ensure adequate condensate removal.

19

Main Feed Pump #1 does NOT trip after a loss of vital DC bus #2. Why is it necessary to run the pump speed to minimum with the Lovejoy controller and then locally trip the pump?

- A. To prevent overpressurizing the main condenser.
- B. To prevent running the pump without lubricating oil.
- C. To prevent overspeeding the pump.
- D. To prevent overpressurizing the pump discharge.

20

Unit 1 is currently in Mode 3, Hot Standby, when Steam Generator Level Channel LT-527 is determined to be INOPERABLE. A Power increase to Mode 2 is currently in progress.

What action(s), if any, should be taken?

- A. The channel must be placed in the tripped condition within 1 hour for the startup to proceed.
- B. The channel must be placed in the tripped condition within 6 hours, and startup to Mode 2 can continue.
- C. A mode change from Mode 3 to Mode 2 can NOT be performed until the channel is restored to operable status.
- D. NO action is required until Mode 2 is achieved.

21

In addition to a Phase A isolation, when a SIS is initiated, the following CVCS pumps and valves will:

- A. Both centrifugal pumps start and SI-8803A/B close.
- B. Both centrifugal and the PDP pumps start and SI-8805A/B open.
- C. Both centrifugal pumps start and LCV-112B/C close.
- D. Both centrifugal and the PDP pumps start and CVCS 8107/8108 close.

22

A Loss of Coolant Accident results in the operators transitioning from E-0 to E-1, "Loss of Reactor or Secondary Coolant." The following conditions exist:

- Containment Pressure is 7 psig
- RCS Pressure is 1290 psig
- RCS Temperature is 540 F
- All ECCS pumps are running

What is the basis for stopping all RCPs based on these conditions?

- A. The RCPs are NOT designed to operate during adverse containment conditions.
- B. To reduce the heat input to the RCS from the RCPs during the loss of coolant accident.
- C. The continued operation of RCPs during certain SBLOCA events would cause deeper and longer core uncover.
- D. Operation of the RCPs with 2 phase flow will damage the RCPs because of excessive vibration.

Following a steamline break and Containment Spray actuation, containment pressure is 24 psig and containment radiation levels are normal.

Which of the following actions should be performed?

- A. Reset the containment spray signal and then secure the containment spray pumps and shut the spray additive tank outlet valves.
- B. Allow containment pressure to decrease below 20 psig and then reset containment spray, stop both spray pumps, shut the containment spray header stop valves, and shut the spray additive tank outlet valves.
- C. Allow containment pressure to decrease below 20 psig and then reset the containment spray signal after the spray time of two hours is met.
- D. Transition to FR-Z.1, "Response to High Containment Pressure".

The cold leg accumulator isolation valves (8808's) are:

- A. containment isolation valves and deenergized while at 100% power.
- B. containment isolation valves and fail closed on loss of power.
- C. NOT containment isolation valves and fail open on loss of power.
- D. NOT containment isolation valves and deenergized while at 100% power.

25

Reactor startup is in progress. Reactor power is 15%. Power range channel NI41 fails downscale.

IDENTIFY the response to this failure.

- A. If power were increased to 20%, C-1 would fail to operate due to one of its inputs failed downscale.
- B. Intermediate range trips would be reinstated, if previously blocked, due to the downscale failure of the power range.
- C. Intermediate range trips would be able to be blocked even with the failed power range.
- D. If not blocked, the trip at 25% power would fail to operate due to the failed instrument.

26

WHICH ONE (1) of the following is the speed droop setting and reason for that setting for an EDG running and supplying power to its vital bus?

- A. Set at MINIMUM to enable the EDG to change load without changing speed.
- B. Set at MINIMUM to enable the EDG to increase speed as load increases.
- C. Set at MAXIMUM to enable the EDG to change load without changing speed.
- D. Set at MAXIMUM to enable the EDG to increase speed as load increases.

Reactor power is 100%. Pressurizer pressure instruments are as follows:

- PT 455 supplying PT 455A
- PT 456 supplying PCV 456

PT 456 fails high with pressurizer pressure at 2235 psig. With no operator action and all systems in normal operating configuration, the SEQUENCE of events that will occur is:

- A. PCV 456 opens, block valves close, variable heaters full on, and backup heaters on.
- B. variable heaters full on, backup heaters on, PCV 456 opens, and block valves close.
- C. PCV 456 opens, variable heaters full on, backup heaters on, and block valves close.
- D. variable heaters full on, backup heaters on, block valves close, and block valves reopen.

The following SEQUENTIAL events have just occurred:

- charging flow decreased to minimum,
- pressurizer level decreased,
- letdown isolated and heaters turned off,
- pressurizer level increased to high level reactor trip.

Pressurizer level control selector switch is in the LT-459 position and pressure control is on PT-455. No operator actions have been taken. Which failure has occurred?

- A. Reference pressurizer level failed to the no load position.
- B. Auctioneered Tave failed Hi due to a failed RTD.
- C. Level channel 459 failed high.
- D. Level channel 459 failed low.



29

WHICH ONE (1) of the following is the reason for the INITIAL S/G swell as power INCREASES?

- A. INCREASES due to bubble formation and an INCREASE in S/G mass.
- B. INCREASES due to bubble formation and a DECREASE in S/G mass.
- C. INCREASES due to INCREASED S/G pressure and an INCREASE in S/G mass.
- D. INCREASES due to INCREASED S/G pressure and a DECREASE in S/G mass.

30

Which ONE of the following describes the effect that an safety inverter failure will have on vital (safety related) instrument power?

- A. No loss of power since vital instrument power is automatically backed up from 120 VAC Uninterruptable source.
- B. No loss of power since vital instrument power will be automatically supplied from the batteries if an inverter fails.
- C. Momentary loss of power until vital instrument power is automatically re-energized from 480 VAC via regulated transformers.
- D. A loss of power until vital instrument power can be manually re-energized from 480 VAC via regulated transformers.

31

Given the following:

- o RCS pressure is 225 psig.
- o RCS temperature is 200 degrees F.
- o RHR Heat Exchanger Flow control valve (HCV-638) is 10% open.
- o ONLY RHR train "1" is in operation.

WHICH ONE (1) of the following describes the expected operator actions when a CCW SURGE TANK HI alarm on PK01-07 annunciates?

- A. RHR Heat Exchanger flow control valve (HCV-638) will be OPENED to maintain desired RHR system flow rate and PZR Level maintained by increasing charging flow.
- B. RHR Heat Exchanger bypass valve (HCV-670) will be OPENED to bypass RHR Heat Exchanger and Train "2" placed in service.
- C. RHR Heat Exchanger flow control valve (HCV-638) will be CLOSED and RHR pump recirculation flow control valve fully OPENED.
- D. RHR Heat Exchanger flow control valve (HCV-638) will be CLOSED and HCV-133 to CVCS Letdown CLOSED.

32

The following Plant conditions exist:

MODE 1 with reactor power at 9%.  
Tave at 560 degrees F.  
Turbine Power is 6%  
Steam Dumps in AUTOMATIC in STEAM PRESSURE mode.

Which ONE of the following statements describes the plant response if (PT- 507) fails HIGH?

- A. Steam dumps remain closed because the arming signal is absent since the difference between reactor and turbine power is 3%.
- B. Steam dumps open with arming signal present since the steam header pressure is greater than the controller setpoint.
- C. Steam dumps open with arming signal present since Tave-Tref has greater than a 2 degree difference.
- D. Steam dumps remain closed because the arming signal is absent since Tave is less than the LOW Tave setpoint.

33

The #1 and #2 Component Cooling Water (CCW) pumps are operating when an SIS signal is received. Normal power is available.

IDENTIFY the response of the CCW system to this condition.

- A. The #1 and #2 CCW pumps will trip and be restarted. The #3 CCW pump will remain off.
- B. The #1, #2 and #3 CCW pumps will start and FCV-361 will close.
- C. The #1 and #2 CCW pumps will trip. The #3 CCW pump will be started.
- D. The #1 and #2 CCW pumps will continue to run. In addition the #3 CCW pump will be started and FCV-361 will stroke full open.

34

During the performance of the abnormal procedure to realign a Dropped Rod, the Pulse to Analog converter was mistakenly NOT held in "Manual". Later, the rods are driven in during a rapid power decrease.

What is the consequence of this mistake?

- A. Failure of rod bank LoLo limit alarm to come in when required.
- B. A Non-Urgent failure alarm occurs on inward rod motion.
- C. A disparity between bank demand and DRPI indication.
- D. An indicated misalignment between rods in the affected group.

35

Which of the following parameters is monitored to ensure the Heat Flux HCF, FQ(Z) limit is maintained within its limits?

- A. Quadrant Power Tilt Ratio.
- B. DNB parameters.
- C. RCS flow rate.
- D. Axial Flux Difference.

36

Given the following:

- The plant is in MODE 5 and has been shutdown 22 days.
- One (1) train of RHR is tagged out and one (1) train is supplying RCS cooling flow.
- The S/G primary side manways are open in preparation for Eddy current testing.
- RCS Temperature is 120 degrees F
- Pressurizer Temperature is 140 degrees F

WHICH ONE (1) of the following is the MINIMUM estimated time for the RCS to reach 200 degrees F when RHR flow is lost?

- A 17.2 minutes.
- B. 19.9 minutes.
- C. 23.0 minutes.
- D. 26.2 minutes.

A reactor trip AND safety injection occur. The operators perform the Immediate Actions of E-0, "REACTOR TRIP OR SAFETY INJECTION," with the following indications:

- Reactor trip breakers are OPEN
- Rod H-2 stuck at 228 steps (DRPI)
- Turbine governor and stop valves are CLOSED
- Electrical buses F, G, H are ENERGIZED
- Containment pressure is 5 psig
- Feed water isolation valves are CLOSED
- Phase A Light Box shows many WHITE LIGHTS ON

What action should the operators take next?

- A. Manually actuate Phase A Containment Isolation.
- B. Check that PK02-02, "SAFETY INJECTION INITIATE," is ON.
- C. Verify Containment Vent Isolation.
- D. Perform Emergency Boration per OP AP-6.

A reactor trip has occurred from 100% power. During performance of E-0, "Reactor Trip or Safety Injection," immediate actions, it is observed that the Main Turbine Stop and Governor valves are all OPEN.

What is the concern if this condition is NOT corrected?

- A. A rapid increase in PZR pressure.
- B. A rapid increase in RCS cold leg temperatures.
- C. Possible damage to the main turbine.
- D. An uncontrolled cooldown of the RCS.

The reactor is operating at 90% power with bank D at 200 steps and the rods in automatic. A single peripheral rod drop will cause:

- A. auctioneered hi NI to decrease, turbine impulse pressure to decrease, auctioneered Tavg to decrease, and rod motion to be blocked.
- B. auctioneered hi NI to increase, turbine impulse pressure to increase, auctioneered Tavg to increase, and rods to step in.
- C. auctioneered hi NI to increase, turbine impulse pressure to remain constant, auctioneered Tavg to decrease, and rod motion to be blocked.
- D. auctioneered hi NI to decrease, turbine impulse pressure to remain constant, auctioneered Tavg to decrease, and rods to step out.

A Liquid Radwaste Discharge Permit and Checklist have been completed in accordance with OP G-1 in preparation for overboard discharge of an Equipment Drain Receiver. Checklist status is as follows:

- One Circulating Water Pump is RUNNING
- One Aux Saltwater Pump is RUNNING
- RE-18, Radwaste Effluent Radiation Monitor, is OOS
- FR-20, Radwaste Effluent Recorder, is OOS

Based on the information given, should the Shift Foreman authorize the discharge?

- A. YES; the alternate radiation monitor and flow recorder could be used.
- B. YES; samples can be analyzed and flow rate can be estimated.
- C. NO; there is insufficient dilution flow.
- D. NO; both the discharge radiation monitor and the flow recorder are out of service.

Unit 1 shutdown recently and is in Mode 5 when a loss of all AC occurs. Operators take proper action to start decay heat removal using steam generators. While performing this task the operators are asked to allow the RCS pressure to INCREASE.

What is the purpose of allowing the RCS to repressurize?

- A. Enhance the natural circulation of the RCS.
- B. Enable the operators to control RWST gravity flow into the RCS.
- C. Prevent exceeding the maximum makeup capabilities of the rapid drain system to the steam generators.
- D. Provide the proper D/P across the RCP seals in anticipation of restarting the RCPs.

Given the following:

- o The crew is responding to a large break LOCA.
- o A CORE COOLING status tree MAGENTA path causes a transition to FR-C.2, "Response to Degraded Core Cooling."
- o During performance of FR-C.2, the CORE COOLING status tree changes from MAGENTA to YELLOW.
- o A MAGENTA path exists on the CONTAINMENT status tree.
- o FR-Z.1, "Response to High CTMT Pressure," is the procedure referenced by the CONTAINMENT status tree.

WHICH ONE (1) of the following is the required action?

- A. Complete FR-C.2 and then go to FR-Z.1, since CONTAINMENT is a lower priority path than CORE COOLING.
- B. Go to FR-Z.1, since a MAGENTA path has higher priority than a YELLOW path. Completion of FR-C.2 is not needed.
- C. Complete FR-C.2, after completing FR-Z.1, since the CORE COOLING status tree had been in a MAGENTA path.
- D. Perform FR-C.2 and FR-Z.1 together, since FR procedures of the same priority can be executed together.

43

Which ONE of the following describes the procedure method of controlling Tave while a dropped rod RETRIEVAL is in progress during at-power operations?

- A. Combination of rod bank movement and dilution/boration.
- B. Adjust the Main Turbine load as necessary.
- C. Moving other rods in another bank.
- D. Borating as necessary.

44

The containment atmosphere radiation monitors RM-44A AND RM-44B sample:

- A. containment atmosphere utilizing gaseous effluent and isolate the containment purge system upon a S signal.
- B. atmosphere inside the containment for the Hydrogen Control System and are not isolated by auto phase A actuation.
- C. atmosphere between the containment isolation valves on the mini-purge exhaust line and can initiate a CVI actuation.
- D. atmosphere from the containment purge exhaust line outside containment and can initiate a CVI actuation.



45

The trip of a running Circulating Water Pump at 100% power will:

- A. cause a turbine trip on low vacuum.
- B. require a load reduction to < 50%.
- C. have no effect because the other pump has enough capacity.
- D. cause reactor power to increase due to condenser efficiency decreasing.

46

Which ONE of the following describes the use of adverse containment values in the advent of a LOCA?

- A. If containment pressure or radiation exceeds the stated value on the foldout page, adverse containment values are used for the duration of the event.
- B. Once in adverse conditions normal values can be used, if both pressure and radiation decrease less than the foldout page values.
- C. Once in adverse conditions, a return to normal values can be made, if containment pressure was the only reason adverse conditions had been declared.
- D. Once in adverse conditions, a return to normal values can be made, if containment radiation was the only reason adverse conditions had been declared.

47

Which ONE of the following is the maximum allowable dose at the site boundary that should be received by a person following an inadvertent release from a Radioactive Gas Storage tank?

- A. A whole body dose of 0.002 rem over a one hour period.
- B. A thyroid dose of 0.27 rem over a two hour period.
- C. A thyroid dose of 0.017 rem over a one hour period.
- D. A whole body dose of 0.5 rem over a two hour period.

48

WHICH ONE (1) of the following are symptoms of both a steamline break inside containment and a LOCA that require the transition from E-0, "Reactor Trip or Safety Injection," to E-1, "Loss of Reactor or Secondary Coolant"?

- A. High containment radiation.  
High containment pressure.  
High containment recirculation sump level.
- B. Low RCS pressure.  
High containment pressure.  
High containment recirculation sump level.
- C. Low RCS pressure.  
Low pressurizer level.  
High containment recirculation sump level.
- D. Low RCS pressure.  
Low pressurizer level.  
High AFW flow.

49

WHICH ONE (1) of the following air operated valves inside containment fails closed on a loss of instrument air?

- A. RCP "1" seal water outlet valve (8141A).
- B. Reactor vessel flange leakoff valve (8032).
- C. Regenerative heat exchanger to loop 4 cold leg (8146).
- D. Pressurizer Relief Tank to Reactor Coolant Drain Tank (8031).

50

The following plant conditions exist:

- Reactor trip/ SI actuated
- RCS Temperature 500 degrees F
- pressurizer pressure 2000 psig
- steam generator (A,B,C) pressure 450 psig
- steam generator level A,B,C 50% wide range
- steam generator D pressure 0 PSIG
- steam generator level D 5% wide range
- auxiliary feedwater flow 100,000 lbm/hr to each SG
- containment pressure 10 psig

Which ONE of the following actions should be taken with the auxiliary feedwater system? (ASSUME MSIVs ARE SHUT)

- A. Reduce flow on all steam generators until 470 GPM total flow is achieved.
- B. Isolate auxiliary feedwater flow to D steam generator to minimize containment pressure and maintain greater than 470 GPM to the other 3 intact SGs.
- C. Maintain 15,000 lbm/hr to the D steam generator to avoid dryout and maintain the other 3 intact Sgs at 4% level.
- D. Isolate auxiliary feedwater flow to the D steam generator and reduce flow to less than 470 GPM to the other 3 intact SGs.

The unit is in the process of ramping to full power at 10% per hour with the following conditions:

- NIS power                    80%
- Turbine load                960 MWE
- Tave                            580 degrees F
- Pressurizer pressure    2205 psig

Which ONE of the following describes plant status with respect to Technical Specification's limitations?

Pressure is:

- A. less than the required DNB value; no action is required, since cause is due to the power ramp.
- B. less than the required DNB value; the required action is to restore temperature to within the specified limits or reduce thermal power.
- C. above the required DNB value; no action is required.
- D. less than the required DNB value; the required action is to restore pressure to within the specified limits or reduce thermal power.

The following plant conditions exist:

- The reactor is in Mode 1.
- A steam generator tube leak has been identified in "B" S/G and the crew initiated a plant shutdown per OP AP-3A, "Steam Generator Tube Leak".
- Steam Generator pressure in the "B" generator has remained less than 1085 psig.
- During the shutdown the plant experienced a loss of ALL site power and the Immediate Action steps of ECA-0.0, "Loss of All AC Power have been completed.
- Health Physics has just found indications of a radioactive release to the environment.
- Prior to the loss of AC power ALL components were in their normal Mode 1 configuration.

WHICH ONE (1) of the following components/systems is the radiation release point to the environment?

- A. Steam generator blowdown.
- B. Turbine Driven Auxiliary Feedwater Turbine.
- C. Steam generator sample lines.
- D. Steam Safety relief valves.

53

The following plant conditions exist:

- The reactor has been tripped due to a Steam Generator Tube Rupture.
- The Reactor Coolant Pumps are OFF.
- E-3, "Steam Generator Tube Rupture", step 23 (depressurization of the RCS using PZR PORV) is being performed.
- RCS pressure is 825 psig.
- Pressurizer level is zero (0)%.

WHICH ONE (1) of the following is the cause for the pressurizer level indication to return to scale during depressurization?

- A. Accumulators have injected into the core.
- B. RCS has reached saturation and the upper portion of the core has voided.
- C. Non-condensable gases have formed in the reactor vessel.
- D. The open PORV has reduced RCS pressure sufficiently to allow ECCS water to match break flow.

54

Containment isolation valve HCV-142 drifts to the CLOSED position resulting in a loss of normal charging.

Which ONE (1) of the following is the required procedure IMMEDIATE ACTION?

- A. Fully open FCV-128 to maximize charging flow.
- B. Start an idle charging pump.
- C. Start the PDP pump.
- D. Attempt to open CVCS-8403.

55

The following plant conditions exist:

- Reactor startup in progress.
- SRNI N31 reads 2E4 cps.
- SRNI N32 reads 1.7E4 cps.
- Both IRNIs read 4E-11 amps.
- SUR is 0 dpm.
- Control Bank D is at 62 steps.

Which ONE of the following describes the required IMMEDIATE ACTION if N32 channel suddenly fails to ZERO when Control Bank D is again withdrawn?

- A. Continue the startup using N31 as the valid channel/instrument.
- B. Stop rod withdrawal; place N31 Level Trip in BYPASS and continue the startup using the IRNI.
- C. Suspend all reactivity additions and rod motion until the N32 channel has been repaired.
- D. Insert all control banks; recommence the startup after the N32 channel has been repaired.

56

Pressurizer PORV 456 has lifted and failed to fully reseal resulting in the following plant conditions: (assume no other automatic actions)

-Rx trip	
-pressurizer pressure	1985 psig
-pressurizer vapor space temperature	635 degrees
-Tave	557 degrees
-PRT level	75 %
-PRT pressure	35 psig

The tailpipe temperature indication for Pressurizer PORVS should read:

- A. full scale high at 400 degrees F.
- B. 280 degrees F.
- C. 260 degrees F.
- D. 220 degrees F.

WHICH ONE (1) of the following is the basis for stopping the RCPs upon entering FR-H.1, "Response to Loss of Secondary Heat Sink"?

- A. Allows the operator time to establish a higher flow rate for high pressure SI thus increasing the RCS cooldown rate.
- B. Allows for a more controlled cooldown via natural circulation when feedwater is established.
- C. Allows the operator time to depressurize the intact steam generators in order to reduce RCS pressure and inject the accumulators.
- D. Allows the operator to reduce heat addition to the RCS and extend the inventory in the steam generators.

During a refueling operation with a fuel assembly near the transfer cart in transit from the Reactor Vessel to the Containment Building Upender, a HIGH RADIATION alarm, PK11-21 is received. Radiation Monitor RE-7, Incore Seal Table Area Monitor, is reading 57 mR/hr.

To place the fuel assembly in a "Safe Position," the fuel assembly should be:

- A. Placed in the upender, and upender lowered.
- B. Lowered in the refueling mast, gripper engaged, to the Refueling Pool floor.
- C. Taken back to the reactor vessel.
- D. Left as is.



E-0.2, "Natural Circulation Cooldown," step 15e, "Start Depressurization using Aux Spray or one PZR PORV and Continue Cooldown," is in progress. As pressure decreases, a large increase in pressurizer level occurs. Charging and letdown are in manual and approximately equal.

The procedurally required operator response is to

- A. isolate the ECCS accumulators to stop the level increase.
- B. increase the cooldown rate up to the maximum permitted rate of 50°F/hr to return pressurizer level to normal.
- C. minimize charging flow while maintaining letdown in service to return pressurizer level to normal.
- D. repressurize the RCS within the limits of the cooldown curve to return pressurizer level to normal.

A LOCA and loss of offsite power occur. The diesel generators start and energize all the safeguard buses.

The operators have just completed E-0, "REACTOR TRIP OR SAFETY INJECTION," and are about to enter E-1, "LOSS OF REACTOR OR SECONDARY COOLANT," but the CSF Status Tree data listed below is currently on display:

- RVLIS Train A Out of Service
- RVLIS Train B Full Range 70%
- RVLIS Dynamic Range 18%
- RCS Pressure 1900 psig
- All Core Exit Thermocouples 800 °F
- AFW flow to S/G 1-1 115 gpm
- AFW flow to S/G 1-2 125 gpm
- AFW flow to S/G 1-3 145 gpm
- AFW flow to S/G 1-4 135 gpm
- Containment Pressure 24 psig
- Containment Radiation 1850 R/HR

Based on the above indications the operators should go to:

- A. FR-Z.1, "RESPONSE TO CONTAINMENT HIGH PRESSURE."
- B. FR-C.2, "RESPONSE TO DEGRADED CORE COOLING."
- C. FR-Z.3, "RESPONSE TO CONTAINMENT HIGH RADIATION."
- D. FR-C.1, "RESPONSE TO INADEQUATE CORE COOLING."

Due to a reactor trip and subsequent loss of offsite power, procedure E-0.4, "Natural Circulation Cooldown with Steam Void in Vessel (without RVLIS)," step 8, is in progress. During depressurization to the target pressure, PZR level rapidly increases to 92%.

What action(s) should the operators take?

- A. Stop RCS depressurization, then energize pressurizer heaters to increase RCS pressure by 100 psig.
- B. Stop RCS depressurization, then isolate accumulators if RCS pressure is less than 1000 psig.
- C. Continue RCS depressurization until RCS pressure is within 50 psig of the average pressure of all SGs.
- D. Continue RCS depressurization until RCS pressure is less than 900 psig, then isolate accumulators.

The following plant conditions exist:

- The controlling pressurizer level channel fails low.
- No operator action is taken.

WHICH ONE (1) of the following sets of parameters describes the affect of this failure on the plant?

- A. Normal letdown remains in service, reactor partial trip alarms, charging flow increases.
- B. Normal letdown isolates, charging flow increases and reactor trip.
- C. Normal letdown isolates, reactor partial trip occurs, charging flow decreases.
- D. Normal letdown isolates, reactor trip occurs, charging flow decreases.

63

WHICH ONE (1) of the following will AUTOMATICALLY terminate a Liquid Radwaste release?

- A. Service Water Radiation Monitor Hi Hi.
- B. Low dilution water flow rate.
- C. High liquid radwaste discharge flow rate.
- D. High dilution water flow rate.

64

A LOCA has occurred, core exit thermocouple temperatures are indicating 690 degrees F and rapidly increasing.

Which ONE of the following is the expected response of the core exit thermocouples if core exit temperature continues to increase. ASSUME NO CORE COOLING IS PRESENT.

- A. The incore thermocouples will indicate lower than actual temperature as temperature core exit exceeds 700 degrees F.
- B. The incore thermocouples will indicate lower than actual temperature as core exit temperature exceeds 1200 degrees F.
- C. The incore thermocouples will become more accurate above 700 degrees F and provide satisfactory indication up to about 1200 degrees F.
- D. The incore thermocouples will become less accurate above 700 degrees F and provide satisfactory indication up to about 2300 degrees F.

65

WHICH ONE (1) of the following actions is correct concerning Letdown Temperature Diversion valve, TCV-149?

- A. It will divert to the VCT if letdown flow temperature from the letdown Hx increases to 136 deg. F.
- B. It will divert flow from the VCT to the demineralizers on a high VCT level.
- C. It will divert to the VCT if the BTRS reheat Hx outlet temperature increases to 137 deg. F.
- D. It will divert to the demineralizers on a loss of control air.

66

WHICH ONE (1) of the following is the basis for allowing two (2) hours to reduce the QUADRANT POWER TILT RATIO (QPTR) to within its limit with a tilt condition of greater than 1.02 but less than 1.09?

- A. Allows corrective action in the event of a xenon redistribution following power changes.
- B. Allows identification and repositioning of a dropped or misaligned rod.
- C. Allows boron concentration changes to restore QPTR to less than 1.02.
- D. Allows for identification and correction of a failed excore detector.

67

With the Steam Driven AFW Pump in normal standby, the speed controller is demanding the maximum signal from the Signal-Converter-Ramp Generator Module. With this maximum demand signal active, which ONE of the following prevents the Steam Driven AFW Pump from tripping on overspeed when started?

- A. There is no negative feedback signal, so the discriminator circuit places the ramp circuit in service when the pump is idle.
- B. The Governor Valve E/H circuit is not actuated.
- C. The Ramp Circuit is initiated when the trip/throttle valve is closed.
- D. The Low Selector outputs an idle speed setting to the Speed Reference Station.

68

The following plant conditions exist:

- The reactor has tripped.
- Safety Injection has actuated.
- The immediate actions of E-0, "Reactor Trip or Safety Injection", have been completed.

WHICH ONE (1) of the following represents the reason for an abnormal system status indication on the Containment Ventilation Status Panel?

- A. Hydrogen Mixing Fan running in fast speed.
- B. Containment Cooler Fan running in slow speed.
- C. Hydrogen Mixing Fan panel switch in the slow position.
- D. Containment Cooler fan panel switch in the slow position.

69

WHICH ONE (1) of the following sets of steam headers supply steam to the Turbine Driven Auxiliary Feedwater turbine?

- A. "1" & "2".
- B. "3" & "4".
- C. "2" & "3".
- D. "1" & "4".

70

WHICH ONE (1) of the following Refueling Machine interlocks prevents motion of the bridge AND trolley when the gripper is NOT in the FULL UP position?

- A. Hoist Lowering Interlock.
- B. Gripper Disengage Interlock.
- C. Fuel Transfer Interlock.
- D. Traverse Interlock.

A natural circulation cooldown is in progress per E-0.2, "Natural Circulation Cooldown."

The following parameters currently exist:

- 12 KV power is now available
- RCP seal differential pressures are 1000 psid
- 1-1, 1-3, & 1-4 RCP seal leakoff flows are 0.2 gpm
- 1-2 RCP seal leakoff flow is 0.4 gpm
- RCS hot leg temperatures are 410°F
- PZR level is 20%
- S/G 1-1, 1-2, 1-3, 1-4 narrow range levels are 33%
- CST level is 9%

Which of the following actions should be performed?

- A. Go to OP L-5, "Plant Cooldown from Minimum Load to Cold Shutdown."
- B. Actuate safety injection and go to E-0, "Reactor Trip or Safety Injection."
- C. Restart RCP 1-2 per Appendix B.
- D. Implement OP D-1:V, "Alternate AFW Supplies."

What action must be taken upon a COMPLETE LOSS of Emergency Diesel Generator (EDG) Room fire protection, assuming its associated fire doors are functional?

- A. Establish a fire watch patrol in the area within one hour.
- B. Establish a continuous fire watch with backup fire suppression equipment in the affected area within one hour.
- C. Declare the EDG inoperable and restore to OPERABLE status within 7 days or be in Hot Standby within the next 6 hours.
- D. Declare the EDG inoperable and restore to OPERABLE status within 72 hours or be in Hot Standby within the next 6 hours.

73

Operators are responding to a LOCA outside of containment and have entered ECA-1.1, "LOSS OF EMERGENCY COOLANT RECIRCULATION." Per procedure, the SFM directs the operator to establish only one train of SI flow to the core.

The basis for establishing one train of SI instead of both trains is:

- A. To prevent overfilling the pressurizer which may cause RCS overpressurization.
- B. To prepare for further RCS depressurization and cooldown.
- C. To guard against damaging all SI.
- D. To extend the time before RWST inventory is depleted.

74

A reactor trip and safety injection occur while operating at 22% power. The operators have just completed the Immediate Actions of E-0, "REACTOR TRIP OR SAFETY INJECTION."

The following conditions exist:

- S/G levels are 39% NR and STABLE
- S/G pressures are 950 psig and STABLE
- WR RCS pressure is 1820 psig and INCREASING
- SCMM reads 60°F and is INCREASING
- Pressurizer PORVs are CLOSED
- Pressurizer level is 56% and STABLE
- Secondary Radiation is NORMAL with NO monitors in ALARM
- Containment pressure is 0.3 psig
- Containment radiation is NORMAL with NO monitors in ALARM
- Containment WR, structure, and cavity sump levels are NORMAL

Based on these conditions, what procedure will be performed after E-0?

- A. E-2, "FAULTED STEAM GENERATOR ISOLATION."
- B. E-1, "LOSS OF REACTOR OR SECONDARY COOLANT."
- C. E-0.1, "REACTOR TRIP RESPONSE."
- D. E-1.1, "SI TERMINATION."



75

You are on watch in the control room as a licensed operator. Shifts are 12 hours long. All the shifts are manned to the minimum composition of OP1.DC12, "Conduct of Routine Operations." Your watch relief is NOT on site for shift turnover.

Which ONE (1) of the following describes the guidance of the above instruction in this situation?

- A. Shift composition may NOT drop below the minimum unless an operator exceeds 12 hours on watch. Turnover your watch station to the oncoming unit Shift Foreman and depart.
- B. Shift composition may be one less than the minimum while attempting to contact the absent individual. Turnover your watchstation to the oncoming unit Shift Foreman and attempt to contact the absent individual.
- C. Shift composition may NOT be one less than the minimum as a result of an oncoming watchstander being absent. Remain on watch.
- D. Shift composition may be one less than the minimum for two hours. Turnover your watchstation to the oncoming unit Shift Foreman but remain on site in standby.

76

Given the following:

- Unit 2 is at 100% power.
- A minor excursion of 2% reactor power has just occurred.

Which ONE (1) of the following is the MAXIMUM time in which to reduce reactor power to within limits?

- A. Within five (5) minutes.
- B. Within 15 minutes.
- C. Within 30 minutes.
- D. There is NO time limit provided the eight-hour power average is NOT exceeded.

77

WHICH ONE (1) of the following reflects the condition and the bases for Technical Specification 3.5.4 "Emergency Core Cooling Systems", requirement that ALL Safety Injection Pumps be verified INOPERABLE?

- A. In Mode 4 to ensure that a mass addition transient can be relieved by one Pressurizer safety valve.
- B. In Mode 5 with water above the reactor vessel flange to ensure that a mass addition transient can be relieved by one PORV.
- C. In Mode 5 with water below the reactor vessel flange to ensure that a mass addition transient can be relieved by one RHR suction relief valve.
- D. In Mode 6 with the reactor vessel head removed and core alterations in progress in the vicinity of the reactor vessel hot legs.

78

Given the following:

A twenty five (25) year old Maintenance Contractor with complete exposure records has the following exposure record for the current calendar year:

- Shallow Dose Equivalent 2.55 REM
- Committed Dose Equivalent 0.75 REM
- Deep Dose Equivalent 2.13 REM
- Lens Dose Equivalent 3.08 REM
- Committed Effective Dose Equivalent 1.95 REM

Which ONE (1) of the following is the individual's Total Dose Equivalent (TEDE) for the current calendar year?

- A. 2.88 REM
- B. 4.08 REM
- C. 5.21 REM
- D. 5.43 REM

Given the following:

- Unit 1 is at 100% power
- On-line risk assessment is being performed.

Which ONE (1) of the following situations would REQUIRE Operations Director approval prior to removing equipment from service for maintenance? AD7.DC6, "On-line Maintenance Risk Assessment," Attachment 9.13 is attached.

- A. YELLOW termini are present on the COMPONENT COOLING and CONTAINMENT Key Safety Functions are green.
- B. The scheduled duration of work is less than the PRA Allotted Outage Time.
- C. YELLOW termini are present on the HEAT SINK and RCS INTEGRITY Key Safety Functions, while all other Key Safety Functions are green.
- D. The PRA Allotted Outage Time is less than the threshold PRA Allotted Outage Time.

Which ONE (1) of the following responsibilities may be delegated by the Interim Site Emergency Coordinator (SEC)?

- A. Approval of emergency dose limits necessary to save a life.
- B. Classification of an emergency event.
- C. Notification of the Nuclear Regulatory Commission.
- D. Assignment of plant personnel to positions in the Site Emergency Organization.

81

Given the following:

- An earthquake of magnitude 0.04g was detected on Unit 1 at 1400.

Which ONE (1) of the following is the LATEST time the fire area (zones) must be inspected for possible undetected earthquake induced fires?

- A. 1500
- B. 1600
- C. 1700
- D. 1800

82

Which ONE (1) Of the following tasks can the Work Control Shift Foreman authorize with verbal concurrence of a Unit Shift Foreman?

- A. Performance of STP R-1A, "Exercising Full Length Control Rods"
- B. Performance of STP M-21C, "Main Turbine Valve Testing"
- C. Remove DG 1-2 from service for Governor replacement.
- D. Placement of CVCS Deborating Demin 1-2 in service.

Unit 1 DFWCS backup power supply needs replacement. A formal communication has been written to allow the MFW Regulation Valves and MFW pump controllers to be placed in manual for the duration of the replacement.

Which ONE (1) of the following should be prepared and attached to the formal communication before work is allowed to begin.

- A. Licensing Basis Impact Evaluation (LBIE).
- B. Operability Evaluation (OE).
- C. Licensing Basis Impact Evaluation (LBIE) Screen.
- D. Prompt Operability Assessment (POA)

Unit 1 is in Mode 5 with the following electrical equipment status:

- Startup Power is cleared for Transformer work.
- Aux. Power and Crosstie capability is operable.
- Diesel Generator 1-1 is cleared.
- Diesel Generator 1-2 & 1-3 are operable.

Using the attached reference(s) determine which ONE (1) of the following situations is required to allow Maintenance to place Diesel Generator 1-3 on its backup DC power source.

- A. After IY 13 is made available
- B. After Diesel Generator 1-1 is made available
- C. After Mode 6 transition
- D. After water level in reactor cavity greater than 23 Feet

85

An area in the Auxiliary Building has the following conditions:

Dose Rate      10 mrem/hr

Airborne        I-131      1.5 DAC

Surface Contamination   800 dpm/100 cm<sup>2</sup> gamma

Which ONE (1) of the following is the correct posting for this area?

- A.      Radiation Area only.
- B.      Surface Contamination Area and Airborne Radioactivity
- C.      Airborne Radioactivity Area only.
- D.      Radiation Area and Airborne Radioactivity Area.

86

WHICH ONE (1) of the following is the basis for reducing Tave to less than 500 deg. F. when the specific activity of the RCS is greater than 100/E microCuries per gram of gross radioactivity?

- A.      Elimination of CRUD bursts.
- B.      Elimination of the iodine spiking phenomenon.
- C.      Allows faster cleanup by the CVCS Mixed Bed Demineralizer
- D.      Prevents a release of activity in the event of a steam generator tube rupture.

87

A radwaste release is in progress, High Radiation alarm PK11-21 annunciator actuates.

Which ONE of the following lists the IMMEDIATE ACTION required?

- A. Verify FCV-477 closes and check TRENDS to validate the alarm per approved release permit.
- B. Notify Radwaste and verify RCV-18 is open.
- C. Check process monitors, then verify RCV-18 is closed and FCV-477 is open.
- D. Check process monitors, then verify RCV-18 is open and FCV-477 is closed.

88

Step 14 of FR-C.1, "Response To Inadequate Core Cooling" directs the operator to stop all RCPs prior to depressurizing all intact SGs from 140 psig to atmospheric pressure. Which ONE (1) of the following is the reason for this action?

- A Remove RCP heat load from RCS
- B Ensure core exit thermocouple temperature will be reduced
- C Ensure RCP number 1 seal integrity
- D Enhance natural circulation cooling of the reactor core

WHICH ONE (1) of the following radiation monitor(s) isolates the steam generator blowdown outside containment valves AND closes the isolation valves of the steam generator blowdown sample system?

- A. RM-19 or RM-23
- B. RM-22.
- C. RM 17A or 17B.
- D. RM-48

A LOCA has occurred. In response to a RED path on the CORE COOLING Critical Safety Function Status Tree, FR-C.1, "Response to Inadequate Core Cooling," is currently in progress.

Containment hydrogen concentration is 4.1%.

What action should be performed with the hydrogen recombiners, and why?

- A. Operate the hydrogen recombiner system to reduce the hydrogen concentration.
- B. Operate the hydrogen recombiners after receiving additional guidance from engineering.
- C. Do NOT operate the hydrogen recombiners since they could result in ignition of the hydrogen.
- D. Do NOT operate the hydrogen recombiners since the hydrogen recombiner system will not be effective at this concentration.



During the performance of an NIS Power Range Heat Balance and NI Channel Calibration per procedure PR STP I-2C1 at 100% power, an operator uses a Feedwater Temperature 30 degrees LOWER than actual. Would the calculated value of power be HIGHER or LOWER than actual power and would an adjustment of the NIS Power Range Channels, based on this value, be CONSERVATIVE or NON-CONSERVATIVE with respect to protection setpoints.

- A. higher/conservative
- B. higher/non-conservative
- C. lower/conservative
- D. lower/non-conservative

Which ONE of the following conditions must be met prior to resetting the Motor Driven AFAS?

- A. Indicated Steam Generator level in 3 of the 4 SG's above the lo-lo level setpoint.
- B. Both Main Feedwater Pumps reset.
- C. No undervoltage on Vital busses F, G, and H.
- D. AMSAC signal reset

The plant has experienced a large break LOCA. SI, Phase B, and CTMT Spray have actuated. When should the Containment Spray Pump suction be transferred to the RHR Cold Leg from sump Recirculation?

- A. RWST level Lo alarm and a lo-lo spray additive tank level.
- B. RWST level Lo alarm and containment pressure greater than 22 psig.
- C. A lo-lo spray additive tank level alarm and containment pressure greater than 22 psig.
- D. RWST Level Lo Lo alarm and containment pressure greater than 22 psig.

Select the ONE (1) statement which describes the Flow Control Valves for the Motor Driven Auxiliary Feedwater Pumps.

- A. The valves are electrohydraulically operated and provide automatic runout protection of the MDAFW pumps.
- B. The valves are motor operated and throttle close automatically at high flow rates to limit containment pressure increase caused by a steam line rupture in containment.
- C. The valves are air operated and throttle close automatically at high flow rates to prevent pump cavitation.
- D. The valves are electrohydraulically operated and throttle close automatically on a loss of hydraulic pressure.

A loss of the unit 1 TD AFW will result DIRECTLY from a loss of which of the following 125 VDC buses?

- A. 1-1
- B. 1-2
- C. 1-3
- D. PD-15

IDENTIFY the minimum elevation allowed in the fuel pool to ensure adequate water level above fuel during fuel movements.

- A. 110 Ft
- B. 115 Ft
- C. 124 Ft
- D. 137 Ft

97

Which ONE (1) of the following describes the design volume and the rupture disk design pressure of the Pressurizer Relief Tank (PRT)?

- A. 1800 cubic feet and 100 psig.
- B. 2000 cubic feet and 110 psig.
- C. 2400 cubic feet and 120 psig.
- D. 2800 cubic feet and 140 psig.

98

The plant is operating at 100% steady state conditions. At 1200 hours on September 5th, chemistry reports the following RCS DOSE EQUIVALENT I-131 sample results for the past 4 hours:

- 0800	0.05 microcuries/gram
- 0900	0.045 microcuries/gram
- 1000	1.2 microcuries/gram
- 1100	75.0 microcuries/gram

What action is required to be taken?

- A. Restore the Dose Equivalent I-131 within the limits by 1000 Sept 7th, or be in HOT STANDBY by 1600 on Sept 7th.
- B. Be in at least HOT STANDBY with  $T_{avg}$  less than 500°F by 1600.
- C. Be in at least HOT STANDBY with  $T_{avg}$  less than 500°F by 1700.
- D. Restore the Dose Equivalent I-131 within the limits by 1100 on Sept 7th, or be in HOT STANDBY by 1700 on Sept 7<sup>th</sup>.

Which ONE of the following instrument failures will result in an uncontrolled control rod group withdrawal accident if rod control is in automatic?

- A. Turbine first stage pressure fails low.
- B. Auctioneered T-Hot control fails high.
- C. Auctioneered T-Avg control fails low.
- D. Power range channel N-43 fails high.

While observing the containment purge radiation monitor (RM44A) radiation display unit (RDU), you notice that the HIGH ALARM and CVI BYP status lights on the panel are both on.

Based solely on the indications at the RDU, which of the following is true regarding the containment purge CVI status?

- A. A CVI signal has been sensed and a CVI has occurred.
- B. The status is normal; high radiation on R-44A will cause a CVI.
- C. A CVI signal is sensed, but the CVI function is bypassed and it will not occur.
- D. A CVI has not been sensed, but CVI actions will occur when it is sensed.

# ANSWER KEY FOR SENIOR REACTOR OPERATOR WRITTEN EXAMINATION

001	A	<u>B</u>	C	D	_____	026	<u>A</u>	B	C	D	_____
002	A	B	C	<u>D</u>	_____	027	A	B	<u>C</u>	D	_____
003	<u>A</u>	B	C	D	_____	028	A	B	<u>C</u>	D	_____
004	A	B	C	<u>D</u>	_____	029	<u>A</u>	B	C	D	_____
005	<u>A</u>	B	C	D	_____	030	<u>A</u>	B	C	D	_____
006	A	B	<u>C</u>	D	_____	031	A	B	C	<u>D</u>	_____
007	<u>A</u>	B	C	D	_____	032	A	<u>B</u>	C	D	_____
008	A	<u>B</u>	C	D	_____	033	A	<u>B</u>	C	D	_____
009	A	B	C	<u>D</u>	_____	034	<u>A</u>	B	C	D	_____
010	A	B	C	<u>D</u>	_____	035	A	B	C	<u>D</u>	_____
011	A	B	<u>C</u>	D	_____	036	<u>A</u>	B	C	D	_____
012	A	<u>B</u>	C	D	_____	037	<u>A</u>	B	C	D	_____
013	A	<u>B</u>	C	D	_____	038	A	B	C	<u>D</u>	_____
014	A	<u>B</u>	C	D	_____	039	A	B	C	<u>D</u>	_____
015	A	<u>B</u>	C	D	_____	040	A	<u>B</u>	C	D	_____
016	A	B	<u>C</u>	D	_____	041	<u>A</u>	B	C	D	_____
017	A	<u>B</u>	C	D	_____	042	<u>A</u>	B	C	D	_____
018	<u>A</u>	B	C	D	_____	043	A	<u>B</u>	C	D	_____
019	A	B	C	<u>D</u>	_____	044	A	B	C	<u>D</u>	_____
020	A	<u>B</u>	C	D	_____	045	A	<u>B</u>	C	D	_____
021	A	B	<u>C</u>	D	_____	046	A	B	<u>C</u>	D	_____
022	A	B	<u>C</u>	D	_____	047	A	B	C	<u>D</u>	_____
023	A	<u>B</u>	C	D	_____	048	<u>A</u>	B	C	D	_____
024	A	B	C	<u>D</u>	_____	049	A	B	C	<u>D</u>	_____
025	A	B	<u>C</u>	D	_____	050	A	<u>B</u>	C	D	_____

ANSWER KEY FOR SENIOR REACTOR OPERATOR WRITTEN EXAMINATION

051	A	B	C	<u>D</u>	_____	076	A	<u>B</u>	C	D	_____
052	A	<u>B</u>	C	D	_____	077	<u>A</u>	B	C	D	_____
053	A	<u>B</u>	C	D	_____	078	A	<u>B</u>	C	D	_____
054	A	B	C	<u>D</u>	_____	079	A	B	C	<u>D</u>	_____
055	A	B	<u>C</u>	D	_____	080	A	B	<u>C</u>	D	_____
056	A	<u>B</u>	C	D	_____	081	A	<u>B</u>	C	D	_____
057	A	B	C	<u>D</u>	_____	082	A	B	<u>C</u>	D	_____
058	<u>A</u>	B	C	D	_____	083	A	B	<u>C</u>	D	_____
059	A	B	C	<u>D</u>	_____	084	A	B	C	<u>D</u>	_____
060	A	<u>B</u>	C	D	_____	085	A	B	C	<u>D</u>	_____
061	<u>A</u>	B	C	D	_____	086	A	B	C	<u>D</u>	_____
062	A	<u>B</u>	C	D	_____	087	A	B	<u>C</u>	D	_____
063	A	<u>B</u>	C	D	_____	088	A	B	<u>C</u>	D	_____
064	A	B	C	<u>D</u>	_____	089	<u>A</u>	B	C	D	_____
065	<u>A</u>	B	C	D	_____	090	A	B	<u>C</u>	D	_____
066	A	<u>B</u>	C	D	_____	091	<u>A</u>	B	C	D	_____
067	A	<u>B</u>	C	D	_____	092	A	B	C	<u>D</u>	_____
068	<u>A</u>	B	C	D	_____	093	A	<u>B</u>	C	D	_____
069	A	B	C	<u>D</u>	_____	094	<u>A</u>	B	C	D	_____
070	A	B	<u>C</u>	D	_____	095	A	<u>B</u>	C	D	_____
071	A	B	C	<u>D</u>	_____	096	A	B	C	<u>D</u>	_____
072	<u>A</u>	B	C	D	_____	097	<u>A</u>	B	C	D	_____
073	A	B	C	<u>D</u>	_____	098	A	B	<u>C</u>	D	_____
074	A	B	C	<u>D</u>	_____	099	A	B	<u>C</u>	D	_____
075	A	B	<u>C</u>	D	_____	100	A	B	<u>C</u>	D	_____

