FINAL SUBMITTAL

H. B. ROBINSON EXAM
50-261/2001-301
MARCH 26 - 30, 2001
(OPERATING)
APRIL 2, 2001 (WRITTEN)

FINAL SRO WRITTEN EXAMINATION

AS-GIVEN WITH ANSWER KEY

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

Applicant Information

Name:	Region: II
Date:	Facility/Unit: **H.B. Robinson**
License Level: **SRO**	Reactor Type: **Westinghouse**
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 six 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

SUPPLIED REFERENCE MATERIALS FOR RNP NRC SENIOR REACTOR OPERATOR EXAMINATION

REFERENCE NUMBER	REFERENCE TITLE
NA	Steam Tables
AP-030, Attachment 7.1	Immediate (One Hour) Notifications to the NRC
AP-030, Attachment 7.2	Four Hour Notifications to the NRC
EPP-15, Attachment 1	Required Flow Rate Versus Time After Reactor Trip
EPP-17, Attachment 1	Containment Sump Level Vs. RWST Level
GP-005, Attachment 10.1	Reactor Power Ascension Indicator Log
OMM-046, Attachment 10.3	Available Contingency Actions
OMM-048, Attachment 10.2	PSA of On-Line Maintenance for H.B. Robinson Steam Electric Plant Unit 2
Plant Curve 3.5	Time to CV Closure
Plant Curve 5.3	Boron Addition – Coolant Hot - Gallons
Plant Curve 5.4	Boron Addition – Coolant Cold - Gallons
Plant Curve 5.7	Dilution – Coolant Hot - Gallons
Plant Curve 5.8	Dilution – Coolant Cold - Gallons
Plant Curve 7.6	System Resistance Curve, Post Accident Containment Venting System
Plant Curve 7.16	Total Hydrogen Generation Rate from All Sources
Plant Curve 7.19	Loss of Residual Heat Removal Cooling Water Level Between 0" to –10" Below Vessel Flange
Plant Curve 7.20	Loss of Residual Heat Removal Cooling Water Level Between –10" to –36" Below Vessel Flange
Plant Curve 7.21	Loss of Residual Heat Removal Cooling Water Level Between –36" to –72" Below Vessel Flange
TS 3.4.16	RCS Specific Activity

Question: 1

Given the following conditions:

- The unit is operating at 100% power.
- Annunciators APP-008-E7, S. SW HDR STRAINER PIT HI LEVEL, and APP-008-F7, SOUTH SW HDR LO PRESS, come in simultaneously.

Which ONE (1) of the following actions is required as an immediate action?

a. Stop 'A' and 'B' service water pumps

b. Close SW supply to south header valve V6-12A

c. Close SW supply to north header valve V6-12D

d. Close SW cross-connect valves V6-12B and V6-12C

Question: 2

Four Operators worked the following schedule at the RTGB position over the past six days:

HOURS WORKED (Shift turnover time not included. Do **NOT** assume any hours worked before or after this period.)

OPERATOR	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
1	10	14	off	12	12	12
2	14	12	14	10	off	11
3	off	off	off	13	11	14
4	11	13	14	off	11	12

Which ONE (1) of the operators would be permitted to work a 12 hour shift on Day 7 **WITHOUT** requiring permission to exceed normal overtime limits?

a. 1

b. 2

c. 3

d. 4

Question: 3

Given the following conditions:

- The unit was operating at 100% power when a pipe break occurred inside containment.
- Containment pressure is rising.
- RCS temperature is lowering.

Which ONE (1) of the following differentiates between a non-isolable main feed line break inside containment and a non-isolable main steam line break inside the containment of the same size?

a. RCS heat removal would be greater for the steam line break

b. Containment pressure would be greater for the feed line break

c. Containment sump level would be greater for the steam line break

d. RCS depressurization would be greater for the feed line break

Question: 4

Given the following plant conditions:

- The RCP Seal Injection filter has just been changed out.
- HP placed the filter in a lead container.
- Prior to placement of the container, R-4, Charging Pump Room Monitor, read 2 mr/hr.
- The container is on a pallet outside of the Charging Pump Room.
- The activity source in the filter is primarily Cobalt-60.
- The container is 5 feet away from R-4 detector, and R-4 reads 10 mr/hr.

If the container is moved to 10 feet away from the R-4 detector, R-4 will indicate ...

a. 4.0 mR/hr.

b. 4.5 mR/hr.

c. 6.0 mR/hr.

d. 7.0 mR/hr.

Question: 5

Given the following conditions:

- At 0110, a Reactor Trip and Safety Injection occurred following an accident.
- At 0112, an Alert was declared due to RCS leakage.
- At 0116, a Site Area Emergency was declared.
- At 0120, a General Emergency was declared.

Which ONE (1) of the following identifies the **LATEST** time that the **INITIAL** notification to State/County officials and the NRC must be completed?

	STATE / COUNTY	**NRC**
a.	0125	0210
b.	0127	0212
c.	0131	0216
d.	0135	0220

Question: 6

Given the following plant conditions:

- An emergency boration is in progress through MOV-350, BA to Charging Pmp Suct, per FRP-S.1, "Response to Nuclear Power Generation / ATWS."
- FI-110, Boric Acid Bypass Flow, indicates 33 gpm.
- FI-122, Charging Line Flow, indicates 75 gpm.
- VCT level is 23 inches.
- VCT Makeup is aligned for automatic operation.
- Normal letdown has been isolated.

VCT level will ...

a. remain essentially unaffected.

b. decrease to the auto makeup setpoint and stabilize.

c. decrease to the low-level setpoint and cause the charging pump suction to switch to the RWST.

d. decrease to the auto makeup setpoint and cycle between the makeup start and stop setpoints.

Question: 7

Given the following conditions:

- The unit is operating at 100% power.
- APP-003-C3, PRT HI PRESS and APP-003-D3, PRT HI/LO LVL have alarmed.
- PRT level and pressure are slowly increasing, but there is **NO** appreciable increase in PRT temperature.
- **NO** other annuciators are in alarm.

The PRT response is likely being caused by leakage past ...

a. PCV-455C, PZR PORV.

b. RC-551A, PZR Safety.

c. CVC-203A, High Pressure Letdown Line Relief.

d. CVC-382, Seal Water Return Line Relief.

Question: 8

Which ONE (1) of the following conditions would result in a reactor trip?

a. PT-447, First Stage Turbine Pressure, fails low with power level at 22%

b. NI-43, PR Channel N43, fails low with power level at 49%

c. PT-446, First Stage Turbine Pressure, fails high with power level at 1×10^{-8} amps

d. NI-44, PR Channel N44, fails high with power level at 1×10^{-8} amps

Question: 9

Which ONE (1) of the following describes the reason for RCP restart in FRP-P.1, "Response To Imminent Pressurized Thermal Shock", if the SI termination criteria **CANNOT** be satisfied?

a. Restores PZR spray to allow RCS depressurization in subsequent steps

b. Equalizes S/G pressures to allow simultaneous cooldown of all three loops in subsequent steps

c. Mixes Safety Injection water and RCS water to raise the fluid temperature entering the Reactor Vessel downcomer

d. Transfer core cooling to forced flow allowing the operators to terminate Safety Injection when the criteria are **NOT** satisfied

Question: 10

Given the following conditions:

- The plant has experienced a reactor trip.
- The CRSS directs the RO to manually initiate Safety Injection.
- The RO inadvertently depresses **BOTH** Containment Spray pushbuttons.

In addition to Containment Spray, which ONE (1) of the following are **ALL** expected to automatically occur?

a.
- Phase A
- Phase B

b.
- Phase A
- Containment Ventilation Isolation

c.
- Phase B
- Containment Ventilation Isolation

d.
- Phase A
- Phase B
- Containment Ventilation Isolation

Question: 11

Given the following conditions:

- A power reduction is in progress from 22% due to degrading condenser vacuum.
- The unit is currently at 8% power.
- REACTOR TRIP FROM TURB BLOCK P-7 permissive is illuminated.
- Condenser backpressure is 5.7 inches Hg Absolute and degrading slowly.
- **NO** cause has yet been identified.

Which ONE (1) of the following actions should be taken in accordance with AOP-012, "Partial Loss of Condenser Vacuum or Circulating Water Pump Trip"?

a. Trip the reactor and go to PATH-1

b. Trip the turbine and go to AOP-007, "Turbine Trip Without Reactor Trip Below P-7"

c. Trip the turbine and go to GP-006, "Normal Plant Shutdown From Power Operations to Hot Shutdown"

d. Begin a plant shutdown in accordance with GP-006, "Normal Plant Shutdown From Power Operations to Hot Shutdown"

Question: 12

Given the following conditions:

- The plant is shutdown following a reactor trip.
- RCPs are all secured.
- The Inadequate Core Cooling Monitor is **NOT** capable of providing subcooling margin.
- Primary Plant parameters indicate the following:

INSTRUMENT	PARAMETER	VALUE
PT-455	PZR Press	1485 psig
PT-456	PZR Press	1465 psig
PT-457	PZR Press	1515 psig
PT-402	RCS Press	1500 psig
PT-405	RCS Press	1525 psig
TI-453	PZR Temp (Surge Line)	524 °F
TI-454	PZR Temp (Vapor)	630 °F
TI-413	RCS Hot Leg WR Temp	538 °F
TI-423	RCS Hot Leg WR Temp	536 °F
TI-433	RCS Hot Leg WR Temp	534 °F
--	Highest Five (5) CETs	548 °F
		544 °F
		542 °F
		542 °F
		541 °F

The margin to saturation is ...

a. 46 °F.

b. 51 °F.

c. 56 °F.

d. 58 °F.

Question: 13

Given the following conditions:

- A 25 year old male started working for the Operations department at H.B. Robinson on March 3rd of this year.
- He previously worked this year at Shearon Harris as part of the Maintenance department.
- His exposure for this year at the Harris plant was 1200 mRem.
- He has received **NO** CP&L management exposure extensions and **NO** emergencies exist.

Which ONE (1) of the following is the **TOTAL ADDITIONAL** effective dose equivalent that the individual can receive **WITHOUT** management concurrence at Robinson this year?

a. 300 mRem

b. 800 mRem

c. 2000 mRem

d. 2800 mRem

Question: 14

Given the following conditions:

- A clearance is in effect with two (2) Maintenance department clearance holders (Clearance Holders A and B).
- Clearance Holder A has requested a temporary lift of a portion of the clearance to test equipment for one of the tasks.
- Clearance Holder B is **NOT** available on site and is **NOT** expected back for two (2) days.

Which ONE (1) of the following describes the process to temporarily lift the required portion of the clearance?

a. Obtain permission of Clearance Holder A and the Control Room Shift Supervisor, remove the tags as necessary, and reinstall the tags when complete

b. Obtain permission of Clearance Holder A and Clearance Holder B's supervisor, remove the tags as necessary, and reinstall the tags when complete

c. Obtain permission of Clearance Holder A and the Control Room Shift Supervisor, remove and cancel the entire clearance, and reissue a new clearance with different boundaries

d. Obtain permission of Clearance Holder A and Clearance Holder B's supervisor, remove and cancel the entire clearance, and reissue a new clearance with the same boundaries when complete

Question: 15

Given the following conditions:

- Fuel is in the vessel.
- RCS temperature is 120°F.
- It is 10 days after the shutdown.
- RCS Level is 8" below the vessel flange.
- RHR cooling is lost.

Using the supplied references, which ONE (1) of the following identifies how much time remains before boiling begins occurring in the RCS?

a. 15.5 minutes

b. 22 minutes

c. 29 minutes

d. 40.5 minutes

Question: 16

Given the following conditions:

- While performing a surveillance on LT-460, I&C personnel discovered at 1200 that the high level trip setpoint for the channel was 87.5%, which is outside the calibration tolerance band.
- The I&C personnel adjusted the LT-460 high level trip setpoint back to 91.0% at 1215 and completed the surveillance satisfactorily.
- They report the "as found" information to the Work Control SRO who determines that the channel was inoperable in the "as found" condition.
- The Work Control SRO notifies the SSO at 1230 of the inoperability of the channel in the "as found" condition.

Which ONE (1) of the following statements is correct concerning the operability of the channel in accordance with Technical Specifications?

a. An operability determination is **NOT** required since the setpoint deviation was less than 5%.

b. An operability determination is **NOT** required since the channel is now operable.

c. The channel is **NOT** operable and the bistables associated with LT-460 must be placed in a tripped condition no later than 1800.

d. The channel is **NOT** operable and he bistables associated with LT-460 must be placed in a tripped condition no later than 1830.

Question: 17

Given the following conditions:

- The unit has been shutdown for 30 days for refueling.
- Refueling cavity level is (-)18" below the flange.
- Initial water temperature is 106 °F.
- RHR cooling is lost.

Using the supplied references, which ONE (1) of the following indicates approximately how much time exists before Containment Closure is required?

a. 30 minutes

b. 35 minutes

c. 12.9 hours

d. 14.0 hours

Question: 18

Given the following conditions:

- SG Tube Leakage in excess of Technical Specification limits was detected with the unit at power.
- The leaking SG has been identified.
- AOP-035, "SG Tube Leak," is being implemented.
- The leaking SG has been isolated.
- The RCS has been cooled down to 480 °F by core exit thermocouple readings.
- The RCS has been depressurized to less than leaking SG pressure and stabilized.
- All RCPs are running .
- Pressurizer level is 85%.

Which ONE (1) of the following describes the actions the operators should take if the affected SG level begins to decrease?

a. Increase charging flow AND turn on pressurizer heaters

b. **ONLY** turn on pressurizer heaters

c. **ONLY** depressurize using normal sprays

d. Increase charging flow AND depressurize using normal sprays

Question: 19

Given the following conditions:

- The unit is operating at 40% power.
- An instrument air header break has occurred.
- Instrument air pressure at the receiver is 79 psig.
- Charging Pump 'A' speed has increased to maximum.
- HIC-121, Charging Flow, is fully open.
- VCT level has decreased to 11".

Which ONE (1) of the following actions should be directed to be taken?

a. Align the Charging Pump suction to the RWST and perform a plant shutdown per GP-006, "Normal Plant Shutdown From Power Operation to Hot Shutdown"

b. Align the Charging Pump suction to the RWST, trip the reactor, and go to PATH-1

c. Close HIC-121 and perform a plant shutdown per GP-006, "Normal Plant Shutdown From Power Operation to Hot Shutdown"

d. Close HIC-121, trip the reactor, and go to PATH-1

Question: 20

Given the following conditions:

- The unit is operating at 100% power.
- All plant systems are available.
- Maintenance is being planned on the following system trains that will make them each unavailable for between 42 and 48 hours:
  - PZR PORV 456
  - MDAFW Pump 'A'
  - SG 'C' PORV
  - RHR Pump 'A'

Using the supplied references, which ONE (1) of the following combinations are permitted to be taken out at the same time based on these planned maintenance times?

a.
- PZR PORV 456
- RHR Pump 'A'

b.
- PZR PORV 456
- MDAFW Pump 'A'

c.
- RHR Pump 'A'
- SG 'C' PORV

d.
- MDAFW Pump 'A'
- SG 'C' PORV

Question: 21

Given the following conditions:

- A reactor shutdown is in progress.
- APP-005-B2, N-35 LOSS OF COMP VOLT, is received.
- N-35 indicates 6.0x10E-10 amps.
- N-36 indicates 7.0x10E-11 amps.
- N-51 indicates 80 counts.
- N-52 indicates 90 counts.

Which ONE (1) of the following describes the **MINIMUM** action(s) required to obtain Source Range N-31 and N-32 indication?

a. Push **ONLY** the "Train A Source Range Logic Trip Defeat" button

b. Push **ONLY** the "Train A Permissive P-6 Defeat" button

c. Push **BOTH** the "Train A Source Range Logic Trip Defeat" AND the "Train B Source Range Logic Trip Defeat" buttons

d. Push **BOTH** the "Train A Permissive P-6 Defeat" AND the "Train B Permissive P-6 Defeat" buttons

Question: 22

Given the following conditions:

- The unit is operating at 100% power.
- **NO** scheduled releases are in progress.
- A small leak develops from the bottom of Waste Condensate Tank "A".
- All ventilation systems are in a normal configuration.

An indication that would alert the operators of the accidental liquid release in progress is an increase in the level of monitor ...

a. R-3, PASS Panel Area Monitor.

b. R-4, Charging Pump Room Area Monitor.

c. R-9, Letdown Line Area Monitor.

d. R-14C, Plant Effluent Noble Gas, Low Range Monitor.

Question: 23

Given the following conditions:

- The Control Room has filled with dense smoke from a fire on Unit 1.
- The reactor has been tripped manually by operators.
- The Control Room has been evacuated due to the dense smoke.

Which ONE (1) of the following identifies the procedure(s) that will be **INITIALLY** used to stabilize the plant?

a. EOP Path-1 and EPP-004, Reactor Trip Reponse

b. DSP-002, Hot Shutdown Using the Dedicated/Alternate Shutdown System

c. AOP-004, Control Room Inaccessibility

d. GP-006, Normal Plant Shutdown from Power Operation to Hot Shutdown

Question: 24

Given the following conditions:

- The unit is operating at 40% power.
- OST-011, "Rod Cluster Control Exercise & Rod Position Indication Monthly Interval," is being performed.
- Annunciator APP-005-E2, ROD CONT SYSTEM URGENT FAILURE, alarms just as Control Bank 'C' rods are being withdrawn.

Which ONE (1) of the following describes this condition and / or the actions that should be taken?

a.
- This is an expected alarm.
- Continue withdrawing Control Bank 'C' rods.

b.
- This makes more than one rod inoperable.
- Trip the reactor and go to PATH-1.

c.
- Place the ROD BANK SELECTOR switch in Manual.
- Restore Tavg to Tref by raising turbine load.

d.
- Place the ROD BANK SELECTOR switch in Manual.
- Restore Tavg to Tref by dilution.

Question: 25

Given the following conditions:

- The unit was operating at 100% power.
- A turbine runback is in progress.
- Power is currently at 93% and lowering as the turbine runback occurs.
- APP-005-D5, OTΔT/OPΔT TURBINE RUNBACK ROD STOP, is illuminated.
- APP-004-E3, OVERTEMP ΔT TRIP, is illuminated.
- All loop ΔT's indicate less than the OTΔT and OPΔT setpoints.
- All OTΔT and OPΔT bistables are extinguished.

Which ONE (1) of the following describes the actions to be taken?

a. Verify the turbine runback stops when power lowers to 90%

b. Verify the turbine runback stops when power lowers to 70%

c. Place the turbine in MANUAL due to a runback circuitry failure

d. Trip the reactor and go to PATH-1

Question: 26

Given the following conditions:

- A valid alarm has been acknowledged for R-1, Control Room Area Monitor.
- The CRSS has entered AOP-005, Radiation Monitoring System.
- Step 3 of Attachment 1 has the operator stop the HVS-1 Auxiliary Building Supply Fan by opening the supply breaker on MCC-5.

Which ONE (1) of the following is the basis for this step?

a. Ensures that any air-flow will be from the Control Room to the Auxiliary Building

b. Ensures that the air-borne contaminants in the Control Room will be exhausted to the Auxiliary Building for cleanup

c. Ensures that personnel in the Auxiliary Building will **NOT** be exposed to high airborne activity for a prolonged period

d. Ensures that personnel in the Control Room will **NOT** be exposed to high radiation condition for a prolonged period of time

Question: 27

Given the following conditions:

- A large break (DBA) LOCA has occurred.
- EPP-15, Loss of Emergency Coolant Recirculation, is being implemented.
- One SI Pump and one RHR pump are running.
- Time after trip and SI is 20 minutes.
- SI **CANNOT** be terminated due to insufficient subcooling.

Using the supplied references, which ONE (1) of the following states the **MINIMUM** SI flow for these conditions?

a. One RHR pump injecting, with flow manually throttled to approximately 260 gpm

b. One RHR pump injecting, with flow manually throttled to approximately 130 gpm

c. One SI pump injecting, with flow manually throttled to approximately 260 gpm

d. One SI pump injecting, with flow manually throttled to approximately 130 gpm

Question: 28

Given the following conditions:

- The unit is operating at 24% power during a plant startup.
- Rods are being withdrawn to raise RCS temperature.
- When the IN-HOLD-OUT lever is released, rods continue to step outward.

Which ONE (1) of the following actions should be taken?

a. Place the ROD BANK SELECTOR switch in Automatic and verify rod motion stops

b. Place the ROD BANK SELECTOR switch in Manual and verify rod motion stops

c. Manually trip the reactor in anticipation of an Intermediate Range High Flux Trip and go to PATH-1

d. Manually trip the reactor in anticipation of a Power Range High Flux (Low Setpoint) Trip and go to PATH-1

Question: 29

A Containment Purge is in progress.

Which ONE (1) of the following will automatically terminate the purge on a high radiation signal?

a. R-2, Containment Area

b. R-11, Containment Air and Plant Vent Particulate

c. R-14A, Plant Effluent Particulate

d. R-16, Containment HVH Cooling Water Radioactive Liquid

Question: 30

Given the following conditions:

- Reactor power is 35%.
- All control systems are in automatic.
- Pressurizer level transmitter LT-459 is selected for control.
- A small leak develops across the differential pressure bellows for LT-459, resulting in pressure equalizing across the bellows.

Assuming **NO** operator actions, which ONE (1) of the following describes the instrumentation and plant response to this leak?

	LI-459 PZR LVL	**LI-460 PZR LVL**
a.	Increases	Increases
b.	Increases	Decreases
c.	Decreases	Increases
d.	Decreases	Decreases

Question: 31

Given the following conditions:

- The plant is being shutdown because of high vibrations on Condensate Pump "A".
- The plant is currently at 65% power.
- Two Main Feedwater Pumps, two Condensate Pumps and a Heater Drain Tank Pump are in service.
- Condensate Pump "A" trips.

Which ONE (1) of the following actions should be taken?

a. Attempt to stabilize the plant at the current power level

b. Attempt to lower turbine load at a rate between 1% minute and 5% per minute and stablize the plant at or below 60% power

c. Attempt to lower turbine load at a rate between 1% minute and 5% per minute and stablize the plant at or below 50% power

d. Trip the reactor and go to PATH-1

Question: 32

Given the following excerpt from OP-922, "Post Accident Containment, Hydrogen Reduction/Venting System", and the following conditions:

- A design basis LOCA occurred 90 days ago.
- Hydrogen Concentration (Hydrogen Monitor Reading) is 2.5%.
- The H_2 Recombiner System is unavailable for Containment Hydrogen Reduction.

From OP-922:

"5.2.8 Determine the following data:

1. H_2 generation rate from Curve Book, Curve 7.16, Total Hydrogen Generation Rate From All Sources.

- Time following DBA _____ Days
- H_2 Generation Rate _____ SCFM (Curve 7.16)

2. H_2 Concentration from Containment Hydrogen Monitor located in the Control Room or from analysis of Containment samples:

- H_2 Concentration _____ %

5.2.9 Calculate the required exhaust flow:

1. $$Qe = 2400 \frac{G}{C}$$

- Qe is exhaust flow in SCFM
- G is H_2 Generation rate
- C is H_2 Concentration

Required exhaust flow _____ SCFM

NOTE: The Containment Air Exhaust Line (PACV "B") should be used in preference to the Pressure Relief Line (PACV "A").

Using the supplied references, in order to provide required exhaust flow through preferred exhaust path (Containment Air Exhaust), Containment pressure should be raised to approximately ...

a. 0.9 psig.

b. 1.1 psig.

c. 3.7 psig.

d. 4.6 psig.

Question: 33

Which ONE (1) of the following Fire Brigade qualified personnel would normally serve as the Fire Brigade Team Leader in the event of a fire in the Auxiliary Building of Unit 2?

a. Fire Protection Auxiliary Operator

b. WCC Senior Reactor Operator

c. Unit 1 Superintendent Shift Operations

d. Environmental & Radiation Control Supervisor

Question: 34

Given the following conditions:

- The unit is operating at 100% power.
- APP-~~001~~ 002-F7, INST AIR HDR LO PRESS, has illuminated.
- AOP-017, "Loss of Instrument Air", is being implemented.
- Instrument air pressure currently reads 79 psig and slowly decreasing.
- The Station Air Compressor is running.

SA to IA cross connect ...

a. valve, SA-5 will automatically OPEN to pass SA through the IA aftercoolers and separators to remove contaminants prior to passing into the IA header.

b. bypass filter isolation valves, SA-220 & SA-221, will automatically OPEN to pass SA through a filter to remove contaminants prior to passing into the IA header.

c. valve, SA-5 will be manually OPENED to pass SA through the IA aftercoolers and separators to remove contaminants prior to passing into the IA header.

d. bypass filter isolation valves, SA-220 & SA-221, will be manually OPENED to pass SA through a filter to remove contaminants prior to passing into the IA header.

Question: 35

Given the following conditions:

- The unit was operating at 100% with bank D rods at 218 steps when a failure of 'B' inverter occurred.
- **NO** reactor trip occurred.
- Rods **CANNOT** be withdrawn.

Which ONE (1) of the following is preventing rod motion?

a. Power range flux rod stop

b. Intermediate range flux rod stop

c. Overtemperature ΔT rod stop

d. Overpower ΔT rod stop

Question: 36

Given the following conditions:

- A reactor trip and safety injection have occurred due to a SGTR.
- A transition was made from PATH-1 to PATH-2.
- During the performance of PATH-2, an improper communication results in the CRSS incorrectly transitioning to EPP-17, "SGTR With Loss of Reactor Coolant: Subcooled Recovery."
- The first four (4) steps of EPP-17 either verify actions previously completed in PATH-1 or check plant indications only (**NO** ACTIONS ARE ACTUALLY PERFORMED).
- After completion of the first four (4) steps of EPP-17, the CRSS recognizes that the wrong procedure is being implemented.

Which ONE (1) of the following describes the actions that the CRSS should take to most quickly mitigate the consequences of the SGTR **WITHOUT** violating any procedures?

a. Continue on in EPP-17, transitioning to PATH-2, Entry Point J, when directed

b. Transition back to PATH-1, Entry Point A

c. Transition back to PATH-2, Entry Point J

d. Transition back to the point in PATH-2 where the incorrect transition was made

Question: 37

Given the following plant conditions:

- During a plant transient, Control Bank 'D' rods are moved inward.
- After the plant stabilizes, the Reactor Operator recognizes that two (2) Control Bank 'D' rods are misaligned by greater than allowed by Technical Specification limits.

Which ONE (1) of the following actions are to be taken?

a.
- Verify Shutdown Margin within 1 hour, and
- Realign the misaligned rods or be in Mode 3 within 2 hours

b.
- Verify Shutdown Margin within 1 hour, and
- Realign the misaligned rods or reduce power to < 70% within 2 hours

c.
- Verify Shutdown Margin within 1 hour, and
- Shutdown to Mode 3 within 6 hours

d.
- Trip the reactor, and
- Go to PATH-1

Question: 38

Using the supplied references, which ONE (1) of the following conditions would require a One-Hour Notification in accordance with AP-030, "NRC Reporting Requirements"?

a. A manual reactor trip is actuated from 20% power due to a break in the Main Turbine Electro Hydraulic Control system piping

b. An automatic safety injection is actuated at 100% power due to an I&C Technician lifting an incorrect lead

c. You receive a report that a previously reported employee's positive FFD test was erroneous and is due to an administrative error at the laboratory

d. While on your tour, you note that the WCC SRO's speech is slurred and you smell alcohol on his breath

Question: 39

Given the following conditions:

- The RCS is at 190°F during a plant cooldown.
- A break in the CCW system has resulted in all CCW pumps being tripped.
- All RCPs have been secured.
- Charging Pump 'B' is running, with Charging Pump 'A' secured.
- Charging Pump 'C' is under clearance.
- AOP-014, Attachment 1, "Emergency Cooling to Charging Pump," has just been started.

Which ONE (1) of the following describes how the Charging Pumps should be configured until emergency cooling is available?

a. All Charging Pumps should be stopped

b. Charging Pumps 'A' and 'B' should be alternately operated at minimum speed every 15 minutes

c. Charging Pump 'B' should be operated at minimum speed

d. Charging Pump 'B' should be operated at maximum speed

Question: 40

Given the following conditions:

- A reactor trip has occurred.
- A transition has been made from PATH-1 to EPP-4, "Post Trip Response."
- APP-004-B2, PZR LO PRESS TRIP, is flashing.
- RCS pressure is 1825 psig and decreasing at 10 psig per minute.
- Pressurizer level is 13% and decreasing at 2% per minute.
- Containment pressure is 3.1 psig and increasing at 0.2 psig per minute.
- RCS Temperature is 553 °F and lowering slowly.
- All Charging Pumps are running at maximum speed.

Based on the procedures in effect, which ONE (1) of the following describes the instructions the CRSS should give to the Reactor Operator?

a. Start **BOTH** Safety Injection Pumps

b. Initiate Containment Spray

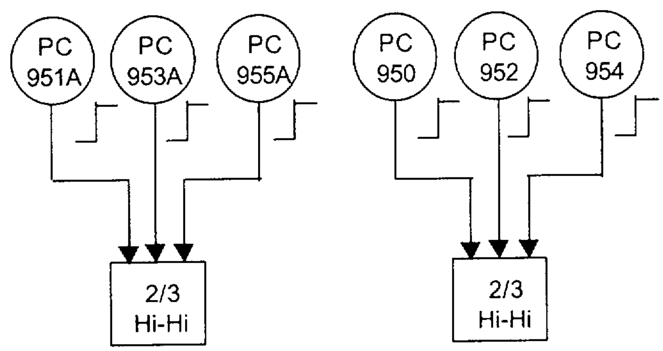
c. Initiate Safety Injection

d. Stabilize RCS temperature

Question: 41

Given the following conditions:

- Power has been lost to Containment Pressure channel 954.
- Containment Pressure transmitter PT-950 has failed low.
- **NO** actions in OWP-032, "Containment Pressure," have been performed.
- A large break LOCA occurs and actual Containment Pressure reaches 21 psig.



Which ONE (1) of the following describes the response of the Containment Spray system?

a. **NEITHER** train of Containment Spray will automatically actuate

b. **ONLY** Train 'A' of Containment Spray will automatically actuate

c. **ONLY** Train 'B' of Containment Spray will automatically actuate

d. **BOTH** trains of Containment Spray will automatically actuate

Question: 42

Given the following conditions:

- The unit is operating at 100% power.
- Normal letdown is in service.
- Pressurizer level control is in automatic
- Leakage passed the hydrogen pressure regulator to the VCT causes pressure in VCT to increase.

Which ONE (1) of the following describes the effect of this on RCP seal flow?

	No. 1 SEAL LEAKOFF FLOW	**No. 2 SEAL LEAKOFF FLOW**
a.	Increases	Increases
b.	Decreases	Decreases
c.	Decreases	Increases
d.	Increases	Decreases

Question: 43

Given the following conditions:

- A reactor trip occurred from 20% power.
- Coincident with the reactor trip, 480V Bus E-1 deenergized and was subsequently energized by the EDG.
- Twenty (20) seconds following the trip, SG levels are:

SG	LEVEL
'A'	12%
'B'	28%
'C'	26%

Which ONE (1) of the following describes the expected condition of the Auxiliary Feed Water pumps 20 seconds following the trip?

	MDAFW PUMP 'A'	MDAFW PUMP 'B'	SDAFW PUMP
a.	Running	Running	Off
b.	Off	Running	Running
c.	Off	Running	Off
d.	Off	Off	Running

Question: 44

Given the following conditions:

- The plant is operating at 50% power.
- All control systems are operating in automatic.
- The First Stage Pressure Channel Selector switch is aligned to the PT-447 position.
- First Stage Pressure Transmitter PT-446 fails low.

Which ONE (1) of the following plant reponses is expected?

a. Feedwater Regulating Valves throttle closed

b. Control Rods step inward

c. Automatic rod control is blocked

d. Steam Dumps have a demand signal

Question: 45

Given the following conditions:

- Due to low heat loads and extremely cold outside temperatures, Spent Fuel Pool (SFP) water temperature is 65°F.
- CC-775, CC FROM SPENT FUEL PIT HX BUTTERFLY Valve, has been throttled to the maximum allowed closed position.

Which ONE (1) of the following actions should be taken to raise Spent Fuel Pool water temperature?

a. Place the SFP on recirc to the RWST

b. Throttle the discharge valve of the in-service SFP Cooling pump

c. Shutdown the in-service SFP Cooling pump

d. Start an additional SFP Cooling pump

Question: 46

Given the following conditions:

- The plant is operating at 68% power.
- Power Range channel N-43 is out of service for repairs.
- N-43 has been removed from service in accordance with the OWP.
- While working on N-43, the technician causes the Control Power fuses to blow.

Which ONE (1) of the following describes the effect of this on the plant?

a. **NO** effect since the OWP places the DROPPED ROD MODE switch in the "Bypass" position

b. **NO** effect since the Dropped Rod Runback requires two-of-four (2/4) coincidence to actuate

c. The turbine will runback for 9 seconds at 200% per minute

d. The turbine will runback at a cyclic rate of 200% per minute

Question: 47

Given the following conditions:

- A LOCA has occurred inside containment.
- Due to electrical problems an entry was made to EPP-15, "Loss of Emergency Coolant Recirculation."
- One (1) Containment Spray pump was operating upon exiting EPP-15, with containment pressure at 16 psig.
- Subsequently, an entry was made to FRP-J.1, "Response to High Containment Pressure," due to containment pressure being at 14 psig and lowering slowly.

Which ONE (1) of the following describes the actions that are to be taken regarding the Containment Spray system?

a. Return to EPP-15 to determine Containment Spray system requirements

b. Stop the running Containment Spray pump

c. Maintain the current Containment Spray system configuration

d. Start the second Containment Spray pump

Question: 48

Given the following conditions:

- A recovery from a small break LOCA is in progress.
- **NO** RCPs are running.
- EPP-008, "Post-LOCA Cooldown and Depressurization," is being implemented.
- Depressurization of the RCS has commenced.
- Pressurizer level has just risen rapidly from off-scale low to 50%.

The depressurization of the RCS has ...

a. increased RHR and SI flow, which is rapidly refilling the pressurizer.

b. caused voiding to occur in the reactor vessel head, which is rapidly refilling the pressurizer.

c. increased auxiliary spray flow, which is rapidly refilling the pressurizer.

d. caused voiding in the pressurizer level reference leg, which is providing an indication of rapidly increasing pressurizer level.

Question: 49

Given the following conditions:

- The unit is operating at 100% power.
- Rod Control is in Manual.
- A safety valve fails open on SG 'B'.

Which ONE (1) of the following describes the **INITIAL** effect on indicated power and RCS Tavg?

	INDICATED NIS POWER	**RCS T-AVG**
a.	Increases	Remains Relatively Constant
b.	Increases	Decreases
c.	Remains Relatively Constant	Remains Relatively Constant
d.	Remains Relatively Constant	Decreases

Question: 50

Given the following conditions:

- The unit is operating at 85% power.
- Control Rod Bank 'D' Demand is at 195 steps.
- IRPI indication for Bank D Control Rods are as follows:

ROD	POSITION
D-8	123"
M-8	121"
H-4	120"
H-8	110"
H-12	122"

Design power peaking and Shutdown Margin Limits ...

a. are met under these conditions.

b. will be met if Control Rod H-8 is withdrawn to 115".

c. will be met if power is reduced below 80%.

d. will be met if Control Rod D-8 is inserted to 120".

Question: 51

Given the following conditions:

- A reactor trip and safety injection have occurred.
- Due to multiple failures, an entry has been made to EPP-16, "Uncontrolled Depressurization of All Steam Generators."
- Containment pressure is 8 psig.
- The RCS cooldown rate is 130 °F/hour.
- SG levels are:

SG	LEVEL
'A'	1%
'B'	3%
'C'	14%

Which ONE (1) of the following actions should be taken?

a. Secure all AFW to 'A' and 'B' SGs, while feeding 'C' SG at a rate between 80 gpm and 90 gpm using a MDAFW pump

b. Secure all AFW to 'A' and 'B' SGs, while feeding 'C' SG at a rate between 80 gpm and 90 gpm using the SDAFW pump

c. Feed 'A' and 'B' SGs at a rate between 80 gpm and 90 gpm, while feeding 'C' SG only as needed to maintain the RCS cooldown rate below 100 °F/hour

d. Feed all SGs at a rate between 80 gpm and 90 gpm

Question: 52

Given the following conditions:

- The unit is operating at 100% power.
- Testing is being performed on Reactor Trip Breaker 'B' and it is currently open.
- A loss of the 'A' 125 VDC Distribution Panel occurs.
- Reactor Trip Breaker 'A' fails to open.

Which ONE (1) of the following describes the expected response of the plant due to this sequence of events, assuming **NO** operator action?

a. **NO** reactor trip occurs

b. Reactor Trip Bypass Breaker 'B' opens on an Undervoltage trip **ONLY**, resulting in a reactor trip

c. Reactor Trip Bypass Breaker 'B' opens on a Shunt trip **ONLY**, resulting in a reactor trip

d. Reactor Trip Bypass Breaker 'B' opens on **BOTH** an Undervoltage trip and a Shunt trip, resulting in a reactor trip

Question: 53

Given the following conditions:

- The unit is in Hot Standby.
- A change in boron concentration from 500 ppm to 470 ppm is required.

Using the supplied references, which ONE (1) of the following identifies approximately how many gallons of primary water must be added to make this change?

a. 70 gallons

b. 90 gallons

c. 3000 gallons

d. 4500 gallons

Question: 54

Given the following conditions:

- Unit 2 is being ramped to 100% following a refueling outage.
- The following Plant Parameters are noted:

PARAMETER	**VALUE**
Loop 'A' Tavg	576°F
Loop 'B' Tavg	575°F
Loop 'C' Tavg	576°F
NI-41	100.0%
NI-42	99.0%
NI-43	99.0%
NI-44	100.0%
Loop 'A' ΔT	58.2°F
Loop 'B' ΔT	57.8°F
Loop 'C' ΔT	58.2°F
Loop 'A' Steam Flow	3.40×10^6 lbm/hr
Loop 'B' Steam Flow	3.40×10^6 lbm/hr
Loop 'C' Steam Flow	3.45×10^6 lbm/hr
Loop 'A' Feed Flow	3.40×10^6 lbm/hr
Loop 'B' Feed Flow	3.40×10^6 lbm/hr
Loop 'C' Feed Flow	3.50×10^6 lbm/hr
1st Stage Press (446)	545 psig
1st Stage Press (447)	546 psig
Generator Output	730 Mwe

Using the supplied references, reactor power is ...

a. 99.5%. The power ramp may continue until the plant is at 100%.

b. 99.5%. Power should be held constant to perform a calorimetric.

c. greater than 100%. Power should be held constant to perform a calorimetric.

d. greater than 100%. Power should be immediately lowered.

Question: 55

Given the following conditions:

- A Temporary Change (TC) to Revision 44 of OP-305, Boron Recycle Process, was issued on March 1, 2001.
- Revision 45 of OP-305 was issued on March 6, 2001.
- The Temporary Change was **NOT** incorporated into Revision 45, but was cancelled and subsequently reissued (using a new TC number) with the issuance of Revision 45.

The Temporary Change now expires on ...

a. March 15, 2001.

b. March 20, 2001.

c. March 22, 2001.

d. March 27, 2001.

Question: 56

Given the following conditions:

- GP-003, "Normal Plant Startup from Hot Shutdown to Critical," is being performed.
- The reactor is **NOT** critical.
- Two (2) doublings have been performed.
- The ECP extrapolated from the 1/M plot is 44 steps on CBD.
- The minimum calculated critical position for the startup is 62 steps on CBD and the maximum calculated critical position is 174 steps on CBD.

Which ONE (1) of the following choices describes the correct actions to be taken?

a. Add 250 gallons of boric acid to the RCS

b. Insert all Control Banks and Shutdown Bank B rods

c. Continue the reactor startup and perform an additional doubling

d. Perform a normal reactor shutdown per GP-006, "Normal Plant Shutdown From Power Operation to Hot Shutdown"

Question: 57

Given the following conditions:

- FRP-P.1, "Response to Pressurized Thermal Shock," is being performed.
- RCS temperature has been stable at 260 °F for the past 30 minutes.
- RCS pressure is 450 psig.

Which ONE (1) of the following describes an action that would be permissible during the next 30 minutes?

a. Increase SG level by adjusting the AFW flow controllers

b. Increase letdown by opening an additional orifice

c. Increase subcooling margin by adjusting the Steam Dump controller

d. Increase subcooling margin by energizing pressurizer heaters

Question: 58

Given the following conditions:

- Following a loss of all AC, EPP-1, "Loss of All AC Power," is being performed.
- Attachment 5, "Removing Control Power From Safeguard Equipment," has been completed.
- The SGs are being depressurized which results in a Safety Injection signal being actuated.
- The Safety Injection signal is reset after being actuated.
- During the SG depressurization, the Dedicated Shutdown Diesel Generator is started.
- Several minutes later, Emergency Diesel Generator 'A' is started.
- SW Pump 'A' automatically starts.
- SG pressures are stabilized by local operator action.

Plant conditions are now:

- EDG 'A' is running.
- SW Pump 'A' is running.
- **NO** other pumps are running.
- All SI valves are aligned in their pre-trip position.
- RCS pressure is 1400 psig.
- RCS temperature is 492 °F.
- RCS subcooling is 96 °F.
- Pressurizer level is 6%.

Which ONE (1) of the following identifies the procedure to be used for recovery from this condition?

a. EPP-2, "Loss Of All AC Power Recovery Without SI Required"

b. EPP-3, "Loss Of All AC Power Recovery With SI Required"

c. EPP-22, "Energizing Plant Equipment Using Dedicated Shutdown Diesel Generator"

d. EPP-25, "Energizing Supplemental Plant Equipment Using the DSDG"

Question: 59

Given the following conditions:

- The unit is in Mode 3.
- RCS temperature is at no-load Tavg.
- RCS pressure is 2235 psig.
- RCS gross activity is < 100/E-Bar μCi/gm.
- Dose Equivalent Iodine I-131 is 200 μCi/gm.
- These conditions have existed for the past 48 hours.

Using the supplied references, which ONE (1) of the following describes the requirements for these conditions?

a. Power may be increased, but **CANNOT** exceed 44%

b. No-load conditions may be maintained indefinitely, but the unit **CANNOT** be started up

c. RCS temperature must be reduced to < 500 °F within 6 hours

d. Mode 4 conditions must be established within 6 hours

Question: 60

Given the following conditions:

- A SGTR has occurred.
- Following the performance of PATH-1 and PATH-2, a transition has been made to EPP-17, "SGTR with Loss of Reactor Coolant: Subcooled Recovery."
- Containment pressure is 0.2 psig.

Using the supplied references, which ONE (1) of the following describes conditions requiring a transition from EPP-17 to EPP-18, "SGTR with Loss of Reactor Coolant: Saturated Recovery"?

a.
- RWST level at 63%
- Containment water level at 6"

b.
- RWST level at 46%
- Containment water level at 124"

c.
- Ruptured SG level at 76%
- RCS Subcooling at 58 °F

d.
- Ruptured SG level at 63%
- RCS Subcooling at 41 °F

Question: 61

Given the following conditions:

- A licensed operator who has an inactive license has been performing administrative duties in the Training Section for twelve (12) months.
- He is returning to Operations and is to be placed back on shift.
- All licensed operator continuing training and fire brigade qualifications are current.

Which ONE (1) of the following are the additional **MINIMUM** requirements for returning his license to an active status?

a. Complete **FOUR** normal shifts, including shift turnovers IAW plant procedures, before and after each watch, and review all the procedure changes for the past three (3) months

b. Complete **FOUR** normal shifts, including shift turnovers IAW plant procedures, before and after each watch, and conduct a complete plant tour

c. Complete **FIVE** normal shifts, including shift turnovers IAW plant procedures, before and after each watch, and review all the procedure changes for the past three (3) months

d. Complete **FIVE** normal shifts, including shift turnovers IAW plant procedures, before and after each watch, and conduct a complete plant tour

Question: 62

Given the following conditions:

- The unit is operating at 100% power.
- RCS Tavg is 575.4°F.
- PZR level is 53%
- VCT level is 23" and stable.
- Letdown flow is 45 gpm (FI-150).
- RCP seal injection flows are:

RCP	**SEAL INJ**
'A'	8.3 gpm
'B'	7.9 gpm
'C'	7.8 gpm

Which ONE (1) of the following would be the expected flow indication on FI-122A, Charging Header Flow, assuming **NO** RCS leakage?

a. 21 gpm

b. 30 gpm

c. 36 gpm

d. 54 gpm

Question: 63

The following personnel are entering the RCA to perform plant related activities:

1. Two operators doing a valve lineup in the RCA expect to receive a dose of about 125 mrem each.
2. Operators doing routine radwaste processing.
3. Electrical maintenance workers cleaning and inspecting an MCC breaker in the RCA.

Which ONE (1) of the following identifies ALL of the above activities which can be performed using a General RWP in accordance with HPP-006, "Radiation Work Permits"?

a. 1 and 2 **ONLY**

b. 1 and 3 **ONLY**

c. 2 and 3 **ONLY**

d. 1, 2, and 3

Question: 64

Given the following conditions:

- The unit was operating at 100% power.
- All IRPI indication fails to zero with **NO** rod bottom bistable lights.
- A Turbine Runback to 70% has occurred.
- APP-005-A3, PR DROP ROD ROD STOP, is illuminated.

Which ONE (1) of the following procedures should be used to mitigate this plant transient?

a. AOP-001, Malfunction of Reactor Control System

b. AOP-015, Secondary Load Rejection or Turbine Runback

c. AOP-024, Loss of Instrument Buses

d. AOP-025, RTGB Instrument Failures

Question: 65

Given the following conditions:

- A line break caused the Fire Header pressure to drop.
- Fire Header pressure eventually stabilized at 83 psig.

Which ONE (1) of the following expected fire system responses would have resulted in this condition?

a. The Electric Fire Pump automatically started, then the Diesel Fire Pump automatically started.

b. The Electric Fire Pump automatically started and the Diesel Fire Pump remained in standby.

c. The Diesel Fire Pump automatically started, then the Electric Fire Pump automatically started.

d. The Diesel Fire Pump automatically started and the Electric Fire Pump remained in standby.

Question: 66

Given the following conditions:

- Emergency Diesel Generator 'A' is in the process of being started on Unit 2 to parallel it to the E-1 Bus.
- A "Remote Manual Slow Speed Start" is being performed in accordance with OP-604, "Diesel Generators A and B."

Which ONE (1) of the following describes the operation of the diesel generator voltage control during this evolution?

a. The Voltage Regulator will automatically control voltage between 470 VAC and 490 VAC during the entire start after the field is automatically flashed at 200 RPM.

b. The Voltage Regulator must be manually shutdown after the field is automatically flashed at 200 RPM, and will be automatically reinstated when engine speed is above 900 RPM to control voltage between 470 VAC and 490 VAC.

c. The Voltage Regulator will be automatically shutdown 5 seconds after the field is flashed at 200 RPM if engine speed does **NOT** reach 900 RPM, and must be manually reinstated when engine speed is above 900 RPM to control voltage between 470 VAC and 490 VAC.

d. The Voltage Regulator must be manually shutdown after the field is automatically flashed at 200 RPM, and must be manually reinstated when engine speed is above 900 RPM to control voltage between 470 VAC and 490 VAC.

Question: 67

Given the following conditions:

- The unit is in Hot Standby.
- All systems are operating normally.
- SG "A" PORV is closed.
- SG "A" PORV automatic potentiometer is adjusted from "3.10" to "1.50".

Which ONE (1) of the following describes the effect adjusting the potentiometer will have on the PORV?

	SETPOINT	PORV
a.	Increases	Opens
b.	Decreases	Opens
c.	Increases	Remains Closed
d.	Decreases	Remains Closed

Question: 68

Given the following conditions:

- A small break LOCA has occurred.
- Entry has been made into FRP-C.1, "Response to Inadequate Core Cooling."
- CETs are all indicating between 740 °F and 760 °F and rising slowly.
- RCS pressure has stabilized at 1605 psig.
- PZR level is off-scale low.
- RVLIS Full Range is indicating 39% and lowering slowly.
- Charging flow is **NOT** available.
- SG pressures are all between 360 psig and 400 psig.

Which ONE (1) of the following actions should be taken?

a. Dump steam to cooldown and depressurize the RCS to provide Safety Injection flow

b. Open the RCS Vent System valves to depressurize the RCS to provide Safety Injection flow

c. Start an RCP immediately to provide forced cooling flow

d. Open the PZR PORVs to depressurize the RCS to provide Safety Injection flow

Question: 69

Given the following conditions:

- The unit is at operating at 35% power in preparation for increasing power to 100%.
- Circulating Water Pump 'A' is under clearance for maintenance.
- A fault occurs on 4KV Bus #4 and all loads are lost.

Which ONE (1) of the following describes the effect on the turbine to the above conditions?

a. The turbine will **NOT** automatically trip, but must be manually tripped when condenser back pressure increases to 5.5" HgA

b. The turbine will automatically trip due to all 3 Circulating Water Pump breakers being open

c. The turbine will automatically trip when condenser back pressure increases to 10" HgA unless load is lowered to within the capacity of the one remaining Circulating Water Pump

d. The turbine will **NOT** automatically trip due to load already being within the capacity of the one remaining Circulating Water Pump

Question: 70

Given the following conditions:

- The unit is operating at 2% power.
- The following RCP indications are observed:

INDICATION	RCP 'A'	RCP 'B'	RCP 'C'
Motor Bearing Temperatures	210°F and ↑ slowly	180°F and stable	195°F and ↑ slowly
#1 Seal Leakoff Temperatures	150°F and stable	150°F and stable	165°F and ↑ slowly
#1 Seal Leakoff Flow	5.8 gpm and stable	4.2 gpm and stable	3.8 gpm and stable
Thermal Barrier ΔP	10" and stable	10" and stable	8" and stable
Frame Vibration	3.6 mils and ↑ at 0.1 mil per hr	2.8 mils and stable	4 mils and ↑ at 0.05 mil per hr
Shaft Vibration	12 mils and stable	7 mils and stable	9.5 mils and ↑ at 0.6 mils per hour

Which ONE (1) of the following describes the actions required for this condition?

a. Stop 'A' RCP and enter Technical Specification 3.4.4, RCS Loops - Modes 1 & 2

b. Trip the reactor, stop 'A' RCP, and go to PATH-1

c. Stop 'C' RCP and enter Technical Specification 3.4.4, RCS Loops - Modes 1 & 2

d. Trip the reactor, stop 'C' RCP, and go to PATH-1

Question: 71

Which ONE (1) of the following requires entry into DSP-001, "Alternate Shutdown Diagnostic"?

a. A fire in the Main Turbine that has the potential to destroy the generator when the reactor is above 10% power

b. A fire in the Containment Vessel that has the potential to destroy the pressurizer heater power cables when in hot standby

c. A fire in the Control Room that has the potential to destroy RHR pump control cables when refueling

d. A fire in the Auxiliary Building that has the potential to destroy the running Charging Pump when in cold shutdown

Question: 72

CC-707, Component Cooling Water Surge Tank relief valve, is sized to accommodate the ...

a. maximum CCW insurge to the tank resulting from a loss of the Residual Heat Removal system.

b. maximum flowrate associated with a rupture of a Reactor Coolant Pump Thermal Barrier Heat Exchanger.

c. maximum CCW insurge to the tank resulting from a loss of the Service Water system.

d. maximum flowrate associated with a rupture of a Residual Heat Removal pump cooler during the recirculation phase of an accident.

Question: 73

Which ONE (1) following procedures is used to provide instructions in the event of a cask drop when loaded with spent fuel in Dry Shielded Canister (DSC)?

a. AOP-005, Radiation Monitoring System

b. AOP-008, Accidental Release of Liquid Waste

c. AOP-013, Fuel Handling Accident

d. AOP-028, ISFSI Abnormal Events

Question: 74

Given the following conditions:

- The unit is in Mode 2.
- PZR level transmitter LT-460 failed low and was removed from service.
- The PZR high-high level and low level bistables associated with LT-460 were placed in the TRIPPED condition.
- PZR level channel selector switch LM-459 was selected to "461 REPL 460".

Which ONE (1) of the following describes the function provided by PZR level transmitter LT-461 under these conditions?

a. Energizes the backup heaters on a high level deviation

b. Decreases charging pump speed on an increasing level

c. Deenergizes the proportional and backup heaters on a low level

d. Trips the reactor on a high-high level

Question: 75

Given the following conditions:

- Reactor power was initially 100%.
- All CCW flow has been lost to the RCPs and a reactor trip has been initiated.

Which ONE (1) of the following nuclear instrument indications would warrant entry into FRP-S.1, "Response To Nuclear Power Generation/ATWS"?

a. **BOTH** source range channels are energized and intermediate range startup rate is +0.1 dpm

b. Power range indicates 3%

c. Source range startup rate is +0.3 dpm

d. **NEITHER** source range channel is energized and intermediate startup rate is -0.1 dpm

Question: 76

Given the following conditions:

- A reactor trip and safety injection have occurred due to a large break LOCA.
- A transition has been made from PATH-1 to EPP-15, "Loss of Emergency Coolant Recirculation."
- The minimum required Safety Injection flow has been established in accordance with EPP-15.
- RVLIS is now indicating 78% Full Range and increasing slowly.
- Core Exit Thermocouples (CETs) are now indicating 568 °F and decreasing slowly.

Which ONE (1) of the following actions should be taken regarding Safety Injection flow?

a. Maintain flow at its current value

b. Decrease flow until either RVLIS stops increasing OR CETs stop decreasing

c. Increase flow to increase RVLIS level to $\geq$ 90% Full Range

d. Increase flow to decrease CETs to $\leq$ 547 °F

Question: 77

Given the following conditions:

- The unit is operating at 60% power.
- Chemistry reports that SG 'A' has exceeded Secondary Action Level (SAL) -2 limits for pH and Conductivity.

Which ONE (1) of the describes the actions that must be taken in response to exceeding the SAL-2 limits?

a. Return the parameters to within SAL-1 limits within 100 hours of initiating SAL-2 OR initiate a power reduction to less than 30%

b. Take immediate actions to reduce power to approximately 30% within 8 hours

c. Return the parameters to within its normal value within 100 hours of initiating SAL-2 OR commence a shutdown and cooldown to less than 250 °F

d. Take immediate actions to shutdown and cooldown to less than 250 °F as rapidly as plant constraints permit

Question: 78

Given the following plant conditions:

- The unit is operating at 100% power.
- A plant transient occurs.
- Pressurizer pressure stabilizes at 1950 psig.

Technical Specification 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," must be entered and pressurizer pressure must be restored above 2205 psig within 2 hours if the transient lowers power to ...

a. 73% over a 5 minute period.

b. 88% over a 5 second period.

c. 90% over a 3 minute period.

d. 77% over a 3 second period.

Question: 79

Given the following conditions:

- A seismic event has occurred.
- A reactor trip and safety injection have occurred following a SGTR.
- A transition is being made from PATH-1 to PATH-2 and the CRSS is conducting a shift brief.
- The following have occurred as a result of the seismic event:
  - A service water header break has occurred.
  - All instrument air compressors have tripped.
  - A fire header break has occurred inside containment.

Which ONE (1) of the following procedures should the CRSS direct an extra operator to perform while PATH-2 is being performed?

a. AOP-017, "Loss of Instrument Air"

b. AOP-021, "Seismic Disturbances"

c. AOP-022, "Loss of Service Water"

d. AOP-032, "Response to Flooding from the Fire Protection System"

Question: 80

Given the following conditions:

- A Component Cooling Water train was declared inoperable on March 1st, at 0530.
- At 0330 on March 4th, a Technical Specifications required shutdown was commenced.
- It is currently 0400 on March 4th.
- The unit is currently at 62% power.
- System Engineering has just notified the Control Room that a generic issue requires declaring ALL AFW pumps inoperable.
- They estimate that it will be approximately 12 hours before any AFW pump will be capable of being declared operable.

In accordance with Technical Specifications, which ONE (1) of the following describes the actions required?

a. Be in MODE 3 by 0930

b. Be in MODE 3 by 1100

c. Be in MODE 3 by 1130

d. Maintain MODE 1 until at least one AFW pump is declared operable

Question: 81

Given the following conditions:

- The unit is operating at 100% power.
- Channel III PZR Pressure PT-457 is failed, with all bistables in the TRIPPED condition.
- An electrical fault occurs which results in a loss of Instrument Bus 2.

Which ONE (1) of the following describes the impact that the loss of Instrument Bus 2 has on the plant?

a. A reactor trip and SI occur and **BOTH** trains of Engineered Safeguards loads are automatically started by the sequencers

b. A reactor trip and SI occur, but **ONLY** Train 'A' Engineered Safeguards loads are automatically started by the sequencers

c. A reactor trip and SI occur, but **ONLY** Train 'B' Engineered Safeguards loads are automatically started by the sequencers

d. A reactor trip occurs, but **NO** SI occurs.

Question: 82

Given the following conditions:

- The plant is in Hot Shutdown.
- A loss of 4KV Bus 2 occurs.

Which ONE (1) of the following identifies plant equipment that is affected by the power loss?

a.
- Reactor Coolant Pump 'B'
- Station Service Transformer 2B

b.
- Reactor Coolant Pump 'C'
- Station Service Transformer 2A and 2F

c.
- Main Feedwater Pump 'B'
- Station Service Tranformer 2D

d.
- Main Feedwater Pump 'B'
- Reactor Coolant Pump 'C'

Question: 83

In accordance with AOP-032, "Response To Flooding From The Fire Protection System," the concern for a fire water break in containment is ...

a. the adverse affects on safeguards equipment.

b. the thermal stress effects of water coming in contact with the reactor vessel.

c. the adverse impact on the instrumentation associated with systems in containment.

d. the unanalyzed dilution caused by the water in the event of a LOCA.

Question: 84

Given the following conditions:

- Inverter 'C', is being shut down in accordance with OP-601, "DC Supply System."
- The N-43 DROPPED ROD MODE switch is placed in the BYPASS position prior to aligning PP-26 to its alternate supply (IB-3).

Which ONE (1) of the following describes the consequences of failing to place the switch in the BYPASS position?

a. A turbine runback may occur due to an Instrument Bus transient

b. A reactor trip and safety injection may occur due to an Instrument Bus transient

c. The inverter power supply breaker may trip open

d. The backup power supply breaker may trip open when attempting to close

Question: 85

Given the following conditions:

- A batch release of Waste Condensate Tank 'E' is scheduled to be performed.
- The Waste Condensate Recirc Pump is out-of-service.

Waste Condensate Tank 'E' ...

a. can be recirculated after transferring to Waste Condensate Tank 'C'.

b. **CANNOT** be recirculated unless transferred to Waste Condensate Tank 'D'.

c. can be recirculated using Waste Condensate Pump 'B'.

d. **CANNOT** be recirculated until the Waste Condensate Recirc Pump is repaired.

Question: 86

Given the following conditions:

- The plant is being started up with the Feed Water Regulating Valves and Feed Water Regulating Bypass Valves all open.
- A Reactor Trip occurs.
- RCS Tavg stabilizes at no load Tavg.
- The Feed Water Regulating Valves automatically close.

Which ONE (1) of the following identifies the expected position of the Feed Water Regulating Bypass Valves (FRBVs) and the Feed Water Block Valves (FBVs)?

	FRBVs	**FBVs**
a.	Open	Open
b.	Open	Closed
c.	Closed	Open
d.	Closed	Closed

Question: 87

Given the following conditions:

- A small break LOCA has occurred.
- Due to problems with the Containment Cooling system, containment pressure increased to 6.1 psig.
- After establishing proper operation of the Containment Cooling system, containment pressure has been lowered to 3.2 psig.
- A step in one of the EPPs states:

"Depressurize RCS To Minimize RCS Leakage:

c. Check EITHER of the following:

PZR LEVEL - GREATER THAN 71% [60%]

OR

RCS SUBCOOLING – LESS THAN 45 °F [65 °F]

d. Stop RCS depressurization"

- As the RCS is being depressurized, PZR level is noted to be 62% and RCS Subcooling is 76 °F.

The RCS depressurization should ...

a. be stopped immediately.

b. continue until PZR level exceeds 71%.

c. continue until RCS subcooling drops below 65 °F.

d. continue until RCS subcooling drops below 45 °F.

Question: 88

Given the following conditions:

- The unit is in Hot Shutdown.
- The Startup Transformer (SUT) is supplying all 4KV buses.
- A severe short has resulted in a loss of the 'B' DC Bus.

Which ONE (1) of the following describes the response of the emergency diesel generators (EDG's)?

	EDG 'A'	EDG 'B'
a.	Starts, but field fails to flash	Does **NOT** start
b.	Does **NOT** start	Starts, but field fails to flash
c.	Starts and loads	Starts, but does **NOT** load
d.	Starts, but does **NOT** load	Starts and loads

Question: 89

Given the following conditions:

- The plant is operating at 90% power.
- Control Bank "D" Step Counters indicate 198 steps.
- A check of the Rod Position indications for Control Bank "D" shows the following rod positions:

  D8 at 124"
  M8 at 116"
  H4 at 120"
  H8 at 121"
  H12 at 131"

Which ONE (1) of the following describes the status of the rods in Control Bank 'D'?

a. **BOTH** rods M8 and H12 are misaligned from the bank

b. **ONLY** rod M8 is misaligned from the bank

c. **ONLY** rod H12 is misaligned from the bank

d. All rods are within rod alignment limits

Question: 90

Given the following condiditons:

- Pressurizer pressure transmitter PT-457 has failed low and is being removed from service in accordance with the OWP.
- The OWP requires the low pressure bistables in the Hagan racks be placed in the TRIPPED condition.

Which ONE (1) of the following describes the verification required for this function?

a. **NO** verification is required

b. Independent verification

c. Concurrent verification

d. Functional verification

Question: 91

Given the following conditions:

- The unit has just experienced a reactor trip.
- **NO** SI equipment has actuated.
- One (1) turbine stop valves is shut.
- Three (3) turbine governor valves are shut.
- RCS pressure is 1860 psig.
- Tavg is 542°F.
- All MSIVs are open.
- SG Pressures and Steam Flows are:

SG	**PRESSURE**	**STEAM FLOW**
'A'	925 psig	0.1×10^6 lbm/hr
'B'	935 psig	0.1×10^6 lbm/hr
'C'	845 psig	1.3×10^6 lbm/hr

The reactor is tripped, the turbine is ...

a. tripped, and SI is **NOT** required.

b. tripped, and SI is required.

c. **NOT** tripped, and SI is **NOT** required.

d. **NOT** tripped, and SI is required.

Question: 92

Given the following conditions:

- A reactor trip occurred due to a loss of offsite power.
- The plant is being cooled down on RHR per EPP-005, "Natural Circulation Cooldown."
- RVLIS upper range indicates greater than 100%.
- Both CRDM fans have been running during the entire cooldown.
- RCS cold leg temperatures are 190 °F.
- Steam generator pressures are 50 psig.

Steam should be dumped from all SGs to ensure ...

a. boron concentration is equalized throughout the RCS prior to taking a sample to verify cold shutdown boron conditions.

b. all inactive portions of the RCS are below 200 °F prior to complete RCS depressurization.

c. RCS and SG temperatures are equalized prior to any subsequent RCP restart.

d. RCS temperatures do **NOT** increase during the required 29-hour vessel soak period.

Question: 93

Given the following conditions:

- The unit is operating at 100% power.
- A release is in progress from Waste Gas Decay Tank 'A'.
- A loss of Instrument Bus 3 occurs, requiring termination of the release.

Which ONE (1) of the following describes how the release is terminated as a result of the loss of the Instrument Bus?

a. Automatically due to the loss of R-14, Plant Vent Monitor

b. Manually due to the loss of R-14, Plant Vent Monitor

c. Manually due to the loss of power to the Waste Disposal Boron Recycle Panel

d. Automatically due to the loss of power to the Waste Disposal Boron Recycle Panel

Question: 94

Which ONE (1) of the following conditions related to the Pressurizer would require entry into a Technical Specification action or a Technical Requirment Manual compensatory action, as applicable?

a. A pressurizer level control system fault results in level being at 68% with the plant operating at 2% power

b. A pressurizer pressure control system fault results in pressure being at 2184 psig with the plant operating at 14% power

c. SST-2A Disconnect, used to supply emergency power to the pressurizer heaters from EDG 'A', is removed from service for maintenance with the plant operating at 35% power

d. Auxiliary Spray, at 400 °F, is used to depressurize the RCS from 2235 psig, resulting in a cooldown rate of the Pressurizer of 135 °F per hour

Question: 95

Given the following conditions:

- The unit is operating at 70%.
- Rod Control is in AUTO.
- Bank 'D' control rods are at 195 steps.
- Tref is 566.9 °F.
- Loop Tavgs are:

LOOP	T-AVG
'A'	569 °F
'B'	567 °F
'C'	566 °F

Which ONE (1) of the following failures will cause control rods to step inward?

a. Loop 1 Thot fails high

b. Loop 1 Tcold fails low

c. Loop 2 Tcold fails high

d. Loop 3 Thot fails low

Question: 96

Given the following conditions:

- Following an outage, the core is being reloaded.
- You are the Refueling SRO.
- An assembly is fully withdrawn into the manipulator mast over the core being prepared to inserted into the core.
- APP-005-A1, SR DET LOSS OF DC, alarms.
- Both Source Range (SR) channels, N-31 and N-32, are determined to be inoperable.

Which ONE (1) of the following describes the required action to be taken?

a. Place the assembly in the upender and suspend refueling operations until at least one (1) SR channel is restored to operable

b. Place the assembly in the upender and suspend refueling operations until both SR channels are restored to operable

c. Place the assembly in the core, in either it's designated or alternate core location, and suspend refueling operations until at least one (1) SR channel is restored to operable

d. Place the assembly in the core, in either it's designated or alternate core location, and suspend refueling operations until both SR channels are restored to operable

Question: 97

Given the following conditions:

- An emergency event has been declared.
- The Technical Support Center has **NOT** been manned.
- You are the Site Emergency Coordinator.
- A critically injured man is located in a radiation field of 100 Rem/hr.
- A valuable piece of company property is located in a radiation field of 30 Rem/hr.
- The following operators have **NOT** volunteered to enter either area, but are available:

	AGE	**LIFETIME EXPOSURE**	**CURRENT ANNUAL EXPOSURE**
OPERATOR A	43	10 Rem	1900 mRem
OPERATOR B	43	15 Rem	1500 mRem
OPERATOR C	23	10 Rem	1500 mRem
OPERATOR D	23	15 Rem	1900 mRem

Which ONE (1) of the following would result in an acceptable exposure?

a. Operator A spending 20 minutes in the area to rescue the critically injured man

b. Operator B spending 45 minutes in the area to protect the valuable equipment

c. Operator C spending 30 minutes in the area to protect the valuable equipment

d. Operator D spending 15 minutes in the area to rescue the critically injured man

Question: 98

Given the following conditions:

- A reactor trip and safety injection have occurred due to a LOCA on the letdown line and a failure of the letdown line to automatically isolate.
- PATH-1 actions are being performed.
- The following conditions currently exist:
- Containment pressure is 7 psig and slowly decreasing.
- Total AFW flow to the intact SGs is 390 gpm.
- 'A' SG level is 6% and slowly increasing.
- 'B' SG level is 12% and slowly increasing.
- 'C' SG level is 14% and slowly increasing.
- RCS pressure is 1765 psig and rapidly increasing.
- Pressurizer level is 29% and stable.
- Core Exit Thermocouples are 530°F and stable.

Which ONE (1) of the following identifies the parameter that is inadequate to permit terminating SI?

a. Subcooling

b. Secondary heat sink

c. RCS pressure

d. RCS inventory

Question: 99

Given the following conditions:

- A reactor trip and safety injection have occurred.
- During the performance of PATH-1 a transition has been made to EPP-16, "Uncontrolled Depressurization of All SGs."
- Wide range SG levels are all between 12% and 18% and decreasing slowly.
- SG pressures are all between 180 psig and 200 psig and decreasing slowly.
- Feed flow has been reduced to 80 gpm to each SG per EPP-16 guidance.

Which ONE (1) of the following describes when FRP-H.1, "Loss of Heat Sink," guidance would be implemented to restore SG levels?

a. Wide range level in 2 SGs is still below 26%

b. Narrow range level in 1 SG is still below 10%

c. 2 SGs remain unisolated

d. Total feed flow is below 300 gpm due to other than operator actions

Question: 100

Given the following conditions:

- The reactor is defueled.
- The RWST is at the Technical Specification minimum allowed boron concentration.
- Over several days pure water is inadvertently added to the spent fuel pit (SFP).
- The following SFP chemistry exists:
  - Boron = 1995 ppm
  - Level = 37 ft

Using the supplied references, which ONE (1) of the following is the **MINIMUM** action required to restore key safety functions?

a. Add 1000 pounds of granulated boric acid to the SFP

b. Add 550 pounds of granulated boric acid to the SFP

c. Drain the SFP 4 feet and refill using the RWST

d. Drain the SFP 8 feet and refill using the RWST

SUPPLIED REFERENCE MATERIALS FOR RNP NRC SENIOR REACTOR OPERATOR EXAMINATION

REFERENCE NUMBER	REFERENCE TITLE
NA	Steam Tables
AP-030, Attachment 7.1	Immediate (One Hour) Notifications to the NRC
AP-030, Attachment 7.2	Four Hour Notifications to the NRC
EPP-15, Attachment 1	Required Flow Rate Versus Time After Reactor Trip
EPP-17, Attachment 1	Containment Sump Level Vs. RWST Level
GP-005, Attachment 10.1	Reactor Power Ascension Indicator Log
OMM-046, Attachment 10.3	Available Contingency Actions
OMM-048, Attachment 10.2	PSA of On-Line Maintenance for H.B. Robinson Steam Electric Plant Unit 2
Plant Curve 3.5	Time to CV Closure
Plant Curve 5.3	Boron Addition – Coolant Hot - Gallons
Plant Curve 5.4	Boron Addition – Coolant Cold - Gallons
Plant Curve 5.7	Dilution – Coolant Hot - Gallons
Plant Curve 5.8	Dilution – Coolant Cold - Gallons
Plant Curve 7.6	System Resistance Curve, Post Accident Containment Venting System
Plant Curve 7.16	Total Hydrogen Generation Rate from All Sources
Plant Curve 7.19	Loss of Residual Heat Removal Cooling Water Level Between 0" to –10" Below Vessel Flange
Plant Curve 7.20	Loss of Residual Heat Removal Cooling Water Level Between –10" to –36" Below Vessel Flange
Plant Curve 7.21	Loss of Residual Heat Removal Cooling Water Level Between –36" to –72" Below Vessel Flange
TS 3.4.16	RCS Specific Activity

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

10 CFR 50.72 states that immediate reports shall be made to the NRC Operations Center of these Emergency Events via the NRC Emergency Telecommunications System (ETS) as specified in the Emergency Plan. 10 CFR 50.72 additionally identifies Non-Emergency Events which are to be reported within One-Hour or Four-Hours to the NRC. ETS Telephones, which are identified, are located in the Control Room, the TSC, and the EOF.

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
NOTE: 10 CFR 50.72 recognizes the Emergency Plan and its four Emergency Classes of Unusual Event, Alert, Site Area Emergency and General Emergency.			
EMERGENCIES 10 CFR 50.72(a)(i) 10 CFR 30.32(i)(3)(viii) 10 CFR 40.31(i)(3)(viii)	Emergency Unusual Event Alert Site Area Emergency General Emergency	HBRSEP shall notify the NRC of the declaration of any of the Emergency Classes specified in the Emergency Plan.	– Declaration of an Unusual Event, Alert, Site Area Emergency, or General Emergency – Discovery of an event that should have resulted in an Emergency Classification, but no emergency was declared – Discovery that a declared emergency exceeded the Emergency Action Levels for a higher emergency declaration, but the higher classification was not declared
ERDS ACTIVATION 10 CFR 50.72(a)(4)	ERDS Emergency	HBRSEP shall activate the ERDS as soon as possible but not later than one hour after declaring an Alert, Site Area Emergency, or General Emergency.	– An Alert, Site Area Emergency, or General Emergency is declared.

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

If not reported as a declaration of an Emergency Class under paragraph (a) of 10 CFR 50.72, HBRSEP shall notify the NRC Operations Center via NRC Emergency Telecommunications System (ETS) as soon as practical and in all cases within one hour of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
SHUTDOWN REQUIRED BY TS 10 CFR 50.72(b)(1)(i)(A)	Shutdown TS Shutdown Power Reduction	The initiation of any shutdown required by the TS.	– Unplanned Shutdown initiated due to maximum specific activity of the Reactor Coolant Water (plant shutdown required by TS) – Reactor Coolant System Leakage in excess of 10 GPM for greater than 24 hours (plant shutdown required by TS) – Component Cooling Water Heat Exchanger inoperable (if not corrected prior to expiration of Required Action Completion Time)
DEVIATION FROM TS (10 CFR 50.54(X)) 10 CFR 50.72(b)(1)(i)(B)	Deviation Departure License Condition	Any deviation from the TS authorized pursuant to 10 CFR 50.54(x).	– Intentional deviation from an approved plant procedure in order to preserve plant safety 10 CFR 50.54(x) (See PRO-NGGC-0200)

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

If not reported as a declaration of an Emergency Class under paragraph (a) of 10 CFR 50.72, HBRSEP shall notify the NRC Operations Center via ETS as soon as practical and in all cases within one hour of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
PRINCIPAL SAFETY BARRIERS SERIOUSLY DEGRADED 10 CFR 50.72(b)(1)(ii)	Degraded Safety Barriers Fission Product Barrier	Any event or condition during operation that results in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded;	– Fuel cladding failures in the reactor, or in the storage pool, that exceed expected values, or that are unique or widespread, or that are caused by unexpected factors, and would involve a release of significant quantities of fission products – Cracks and breaks in the piping or reactor vessel, or major components in the reactor coolant system, that have safety relevance (steam generators, reactor coolant pumps, valves, etc.) – Significant welding or material defects in the RCS – Serious temperature or pressure transients – Loss of relief and/or safety valve functions during operation – Loss of Containment function or integrity - Complete loss of containment integrity function including (1) containment leakage rate greater than allowed value per SR 3.6.1.1 (i.e., entry into LCO 3.6.1 Condition A), (2) loss of containment penetration isolation functional capability (i.e., both barriers), or loss of containment spray capability
UNANALYZED PLANT CONDITION 10 CFR 50.72(b)(1)(ii)(A)	Safety Function Unanalyzed Condition	[or that resulted in the nuclear power plant being:] In an unanalyzed condition that significantly compromises plant safety;	– OTΔT changes are declared inoperable due to summator module lag constants. The channel response time exceeded the value assumed in the accident analysis. – Accumulation of voids in systems designed to remove heat from the reactor, that could inhibit the ability to adequately remove heat from the core, particularly under natural circulation conditions

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

If not reported as a declaration of an Emergency Class under paragraph (a) of 10 CFR 50.72, HBRSEP shall notify the NRC Operations Center via ETS as soon as practical and in all cases within one hour of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
CONDITION OUTSIDE DESIGN BASIS OF PLANT 10 CFR 50.72(b)(1)(ii)(B)	Design Bases Loss of Safety Function	[or that resulted in the nuclear power plant being:] In a condition that is outside the design basis of the plant;	– Discovery of design errors that renders a safety system inoperable – Discovery that a single train of a safety system has been incapable of performing its design function for an extended time (well beyond surveillance intervals or Required Action Completion Times) – Safety related piping found not to be seismically qualified in accordance with design bases requirements
CONDITION NOT COVERED BY OPERATING/EMERGENCY PROCEDURES 10 CFR 50.72(b)(1)(ii)(C)	OP AOP EOP PATH CSFST	[or that resulted in the nuclear power plant being:] In a condition not covered by the operating and emergency procedures.	– An event is occurring having significant implications for the health and safety of the public and no AOP or EOP is applicable to the condition.
NATURAL PHENOMENON OR CONDITION THREATENING PLANT SAFETY 10 CFR 50.72(b)(1)(iii)	Earthquake Hurricane Tornado Weather Explosion Railroad	Any natural phenomenon or other external condition that poses an actual threat to the safety of the nuclear power plant or significantly hampers site personnel in the performance of duties necessary for the safe operation of the plant.	– Natural phenomenon (ice storm that significantly hampers personnel in the conduct of activities necessary for safe operation of the plant). – External hazards (railroad tank car explosion that poses an actual threat to Plant safety)
ECCS DISCHARGE INTO RCS 10 CFR 50.72(b)(1)(iv)	ECCS Actuation Safety Injection	Any event that results or should have resulted in ECCS discharge into the reactor coolant system as a result of a valid signal.	– Manual or automatic Safety Injection System actuation in response to a valid signal (Section 4.5 of this procedure)

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

If not reported as a declaration of an Emergency Class under paragraph (a) of 10 CFR 50.72, HBRSEP shall notify the NRC Operations Center via ETS as soon as practical and in all cases within one hour of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
LOSS OF EMERGENCY ASSESSMENT, OFF-SITE RESPONSE, OR COMMUNICATIONS CAPABILITY 10 CFR 50.72(b)(1)(v)	Selective Signaling System Sirens ETS	Any event that results in a major loss of emergency assessment capability, off-site response capability, or communications capability (e.g., significant portion of control room indication, ETS, or off-site notification system).	– Loss of 23 or more of 45 Public Warning Sirens (≥50%) as indicated on the siren activation system for a period of at least 30 minutes at any one time. – Loss of greater than 50% of communications capability (i.e., offsite communications systems which include the Selective Signaling System, the Essex System and the Local Government Radio System). – Loss of greater than 50% of the ability of the TSC or EOF to function. – Loss of instrumentation indication capability to the extent that an Emergency Action Level cannot be determined to exceed an emergency classification. – Loss of ETS if identified by the plant (Not reportable if identified by NRC) – Loss of commercial telephone system to the extent that required communications could not be made to official offsite locations (e.g., EOCs, Warning Points)
INTERNAL THREAT TO PLANT SAFETY (FIRES, TOXIC GAS, RADIOLOGICAL RELEASE) 10 CFR 50.72(b)(1)(vi)	Fire Toxic Explosive Release Personnel Safety	Any event that poses an actual threat to the safety of the nuclear power plant or significantly hampers site personnel in the performance of duties necessary for the safe operation of the nuclear power plant including fires, toxic gas releases, or radioactive releases.	– Fire confirmed inside Protected Area (if fire poses an actual threat to plant safety or significantly hampers site personnel in the performance of duties necessary for the safe operation of the plant). – Unplanned release of radioactive gases or toxic gas inside Protected Area (if release significantly hampered site personnel in the performance of duties necessary for safe operation of the plant).

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

HBRSEP shall immediately notify the NRC Operations Center via ETS as soon as practical and in all cases within one hour of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
SAFETY LIMIT, LIMITING SAFETY SYSTEM SETTING EXCEEDED 10 CFR 50.36(c)(1)(i)(A)	Safety Limit Limiting Safety System Setting	If any safety limit is exceeded, shut down the reactor. HBRSEP shall notify the [NRC within 1 hour via ETS per 10 CFR 50.72(a)(1), See Emergency Plan Procedures]. Operation must not be resumed until authorized by the NRC.	– Reactor pressure exceeds 2735 psig while at power – The limits of TS Table 2.1.1-1 are exceeded – Limiting Safety System Settings in TS Table 3.3.1-1 are exceeded
SAFETY SYSTEM DOES NOT FUNCTION AS REQUIRED 10 CFR 50.36(c)(1)(ii)(A)	ESF RPS Limiting Safety System Setting	HBRSEP shall notify the NRC if the automatic safety system [to correct an abnormal situation before a safety limit is exceeded] has been determined not to function as required.	– A failure mechanism is discovered that indicates that the RPS will not function to trip the reactor under certain required conditions.

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - SECURITY SAFEGUARDS EVENTS

HBRSEP shall notify the NRC Operations Center via the ETS within one hour after discovery of the safeguards events described as follows (10 CFR 73.71(b)(1)):

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
THEFT/UNLAWFUL DIVERSION OF SNM OR SPENT FUEL SHIPMENT 10 CFR 73.71(a)(1)	SNM Spent Fuel Security Safeguards	Any discovery of the loss of any shipment of SNM or spent fuel, and within one hour after recovery of or accounting for such lost shipment	– Shipment Emergency Event
THEFT/UNLAWFUL DIVERSION OF SNM 10 CFR 73.71(b)(1) 10 CFR 73, Appendix G, I(a)(1)	Theft of SNM Diversion Security Safeguards	Any event in which there is reason to believe that a person has committed or caused, or attempted to commit or cause, or has made a credible threat to commit or cause: (1) A theft or unlawful diversion of SNM	– Shipment Emergency Event
SABOTAGE OF PLANT EQUIPMENT 10 CFR 73.71(b)(1) 10 CFR 73, Appendix G, I(a)(2)	Sabotage Damage to Plant SNM Spent Fuel Security Safeguards	[Any event in which there is reason to believe that a person has committed or caused, or attempted to commit or cause, or has made a credible threat to commit or cause:] (2) Significant physical damage to a power reactor...or its equipment or carrier equipment transporting nuclear fuel or spent nuclear fuel, or to the nuclear fuel or spent fuel a facility or carrier possesses.	– Shipment Emergency Event – Security Event (Reference 2.11)

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - SECURITY SAFEGUARDS EVENTS

HBRSEP shall notify the NRC Operations Center via the ETS within one hour after discovery of the safeguards events described as follows (10 CFR 73.71(b)(1)):

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
UNAUTHORIZED TAMPERING WITH PLANT EQUIPMENT 10 CFR 73, Appendix G, I(a)(3)	Unauthorized Use Tampering Security System Safeguards	[Any event in which there is reason to believe that a person has committed or caused, or attempted to commit or cause, or has made a credible threat to commit or cause:] (3) Interruption of normal operation of HBRSEP through the unauthorized use of or tampering with its machinery, components, or controls including the security system.	– Security Event (Reference 2.11)
ENTRY OF UNAUTHORIZED PERSON INTO PROTECTED OR VITAL AREA 10 CFR 73, Appendix G, I(b)	Unauthorized Entry Security Safeguards	An actual entry of an unauthorized person into a protected area, material access area, controlled access area, vital area, or transport.	– Security Event (Reference 2.11)
FAILURE, DEGRADATION, OR DISCOVERED VULNERABILITY OF SAFEGUARD SYSTEM 10 CFR 73, Appendix G, I(c) Procedure SEC-NGGC-2147	Degradation Vulnerability Safeguards Unauthorized Undetected Access Security	Any failure, degradation, or the discovered vulnerability in a safeguard system that could allow unauthorized or undetected access to a protected area, material access area, controlled access area, vital area or transport for which compensatory measures have not been employed.	
INTRODUCTION OF CONTRABAND INTO VITAL OR PROTECTED AREA 10 CFR 73, Appendix G, I(d)	Contraband Unauthorized Security Safeguards	The actual or attempted introduction of contraband into a protected area, material process area, vital area, or transport.	Contraband applies to items that could be used to commit radiological sabotage as defined in 10 CFR 73.2.

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - SOURCE, BYPRODUCT AND SNM

HBRSEP shall immediately notify the NRC Operations Center via ETS, when:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
LOSS OR THEFT OF LICENSED MATERIAL (>1000X 10 CFR 20 LIMITS) 10 CFR 20.2201(a)(i)	Loss Theft Missing Licensed Radioactive Material	Immediately notify the NRC, after its occurrence becomes known, any lost, stolen, or missing licensed material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in [10 CFR 20] Appendix C under such circumstances that it appears to HBRSEP that an exposure could result to persons in unrestricted areas.	– A radiography source is discovered missing. The source is licensed to the radiography contractor. If the contractor does not make the required notification, HBRSEP should notify the NRC Operations Center via ETS.
EXTERNAL EXPOSURE FROM BYPRODUCT, SOURCE, OR SNM (5X ANNUAL LIMIT) 10 CFR 20.2202(a)(1)	Byproduct Source SNM Exposure Dose Release Occupational	Notwithstanding any other requirements for notification, immediately notify the NRC of any event involving byproduct, source, or SNM possessed by HBRSEP that may have caused or threatens to cause any of the following conditions: 1. An individual to receive: (i) A total effective dose equivalent of 25 rems or more; or (ii) An eye dose equivalent of 75 rems or more; or (iii) A shallow dose equivalent to the skin or extremities of 250 rads or more; or 2. The release of radioactive material, inside or outside the restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the occupational annual limit on intake.	

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - SOURCE, BYPRODUCT AND SNM			
HBRSEP shall immediately notify the NRC Operations Center via ETS, when:			
EVENT	**KEY WORDS**	**REQUIREMENT**	**EXAMPLES**
INTERNAL EXPOSURE FROM BYPRODUCT, SOURCE, SNM (>5X OCCUPATIONAL LIMIT) 10 CFR 20.2201(a)(i)	Intake Ingestion Release Source Byproduct SNM	The release of radioactive material, inside or outside the restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the occupational annual limit on intake.	

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - ISFSI			
HBRSEP shall immediately notify the NRC Operations Center via ETS, when:			
EVENT	**KEY WORDS**	**REQUIREMENT**	**EXAMPLES**
ISFSI - ACCIDENTAL CRITICALITY OR LOSS OF SNM 10 CFR 72.74	ISFSI Criticality SNM Loss	The licensee shall notify the NRC Operations Center via ETS within one hour of discovery of accidental criticality or any loss of SNM.	– Unusually high radiation readings discovered in the vicinity of the ISFSI that could indicate possibility of a criticality event
IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - SNM SHIPMENTS			
HBRSEP shall notify the NRC Operations Center via the ETS within one hour of the following:			
LOST OR UNACCOUNTED SHIPMENT OF SNM 10 CFR 70.52(b) 10 CFR 73.71(a)(1)	Shipment Loss SNM Spent Fuel Theft Diversion Safeguards Security	HBRSEP shall notify the NRC Operations Center via the ETS within one hour after discovery of any loss of any shipment of SNM or spent fuel or any incident in which an attempt has been made, or is believed to have been made, to commit a theft or unlawful diversion of SNM.	– Shipment Emergency Event – Security Event (Reference 2.11)
LOST OR UNACCOUNTED SHIPMENT OF SNM - RECOVERY 10 CFR 73.71(a)(1)	Recovery Accounting Shipment SNM Security Safeguards	HBRSEP shall notify the NRC Operations Center via the ETS within one hour after recovery of, or accounting for, any lost shipment of SNM.	

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - FOLLOW-UP

With respect to the telephone notifications made under paragraphs (a) and (b) of 10 CFR 50.72, in addition to making the required initial notification, HBRSEP shall during the course of the event immediately report:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
FOLLOW-UP NOTIFICATION 10 CFR 50.72(c)(1)	Degradation Emergency Class Change Update Termination	(i) any further degradation in the level of safety of the plant or other worsening plant conditions, including those that require the declaration of any of the Emergency Classes, if such a declaration has not been previously made, or (ii) any change from one Emergency Class to another, or (iii) a termination of the Emergency Class.	– Refer to Reference 2.27
FOLLOW-UP NOTIFICATION 10 CFR 50.72(c)(2)	Result Evaluation Effectiveness Unknown	(i) the results of ensuing evaluations or assessments of plant conditions, (ii) the effectiveness of response or protective measures taken, and (iii) information related to plant behavior that is not understood.	
FOLLOW-UP NOTIFICATION 10 CFR 50.72(c)(3)	Open Continuous Communication	Maintain an open, continuous communication channel with the <u>NRC Operations Center</u> <u>upon request</u> by the NRC.	– Refer to Reference 2.27

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS - NRC REGION II OFFICE

HBRSEP shall immediately notify the final delivery carrier and, by telephone and telegram, mailgram, or facsimile, the NRC Region II Office when:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
THEFT/UNLAWFUL DIVERSION OF TRITIUM 10 CFR 30.55(c)	Incident Theft Tritium Attempt Security Safeguards	Any incident in which an attempt has been made or is believed to have been made to commit a theft of more than 10 curies of tritium (outside of spent fuel) at any one time or more than 100 curies of tritium in one calendar year.	– 10 Curies of tritium discovered missing from the Chemistry Laboratory, and reason exists to suspect that the tritium was stolen
THEFT/UNLAWFUL DIVERSION OF SOURCE MATERIAL 10 CFR 40.64(c)	Incident Attempt Theft Diversion Source Security Safeguards	Any incident in which an attempt has been made or is believed to have been made to commit a theft or unlawful diversion of more than 15 pounds of Source Material at any one time or 150 pounds of Source Material in any one calendar year.	– A source assembly is discovered missing from a new fuel shipment.
SHIPPING PACKAGE RADIOACTIVELY CONTAMINATED 10 CFR 20.1906(d)(1)	Contamination Shipment	Removable radioactive surface contamination exceeds the limits of 10 CFR 71.87;	– New or Spent Fuel Shipment Cask arrives with surface contamination in excess of limits.
SHIPPING PACKAGE EXCEEDING EXTERNAL DOSE RATE LIMITS 10 CFR 20.1906(d)(2)	Radiation Dose Rate Shipment	External radiation levels exceeds of the limits of 10 CFR 71.47.	– New or Spent Fuel Shipment Cask arrives with external radiation levels in excess of limits.

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC

IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - FFD The NRC Region II Administrator must be notified immediately by telephone of the following:			
EVENT	**KEY WORDS**	**REQUIREMENT**	**EXAMPLES**
NRC EMPLOYEE NOT FIT FOR DUTY 10 CFR 26.27(d)	Alcohol Influence Substance NRC employee FFD Fitness for Duty	If HBRSEP has a reasonable belief that an NRC employee may be under the influence of any substance, or unfit for duty...the Region II Administrator must be notified immediately by telephone. During other than normal working hours, the NRC Operations Center via ETS must be notified.	
IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - FFD The NRC Operations Center via ETS must be notified immediately by telephone of the following:			
FALSE POSITIVE ERROR ON FFD SPECIMEN 10 CFR 26, Appendix A, Subpart B, 2.8(e)(5)	FFD Fitness for Duty False Positive Specimen Laboratory	Should a false positive error occur on a blind performance test specimen and the error is determined to be an administrative error, HBRSEP shall promptly notify the NRC.	
IMMEDIATE (ONE HOUR) NOTIFICATIONS TO THE NRC - IAEA The NRC Director, NRR or Director, NMSS must be notified immediately by telephone of the following:			
SURPRISE VISIT OF IAEA OFFICIAL 10 CFR 75.7	IAEA International Atomic Energy Agency Credential	HBRSEP shall immediately communicate by telephone, with respect to the credentials of any other person who claims to be an IAEA representative and shall accept telephone confirmation of such credentials by the Commission.	- Person arrives on site bearing IAEA credentials, who is not accompanied by an NRC employee, and has had no prior confirmation in writing of credentials.

FOUR HOUR NOTIFICATIONS TO THE NRC

FOUR HOUR NOTIFICATIONS TO THE NRC

If not reported under paragraphs (a) or (b)(1) of 10 CFR 50.72, HBRSEP shall notify the NRC Operations Center via ETS as soon as practical and in all cases, within four hours of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
DEGRADED SAFETY BARRIERS DISCOVERED WHILE SHUT DOWN 10 CFR 50.72(b)(2)(i)	Shutdown Safety Barrier Fission Product Barriers Degrade Unanalyzed	Any event, found while the reactor is shut down, that, had it been found while the reactor was in operation, would have resulted in the nuclear power plant, including its principal safety barriers, being seriously degraded or being in an unanalyzed condition that significantly compromises plant safety.	– Corrosion of Reactor Coolant System piping found while shutdown (indicative of a material problem that caused abnormal degradation of the RCS pressure boundary). – Significant degradation of Reactor Fuel Rod Cladding identified during testing of fuel assemblies (Reference 2.19).

FOUR HOUR NOTIFICATIONS TO THE NRC

FOUR HOUR NOTIFICATIONS TO THE NRC

If not reported under paragraphs (a) or (b)(1) of 10 CFR 50.72, HBRSEP shall notify the NRC Operations Center via ETS as soon as practical and in all cases, within four hours of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
ESF OR RPS INITIATION (MANUAL/AUTOMATIC) 10 CFR 50.72(b)(2)(ii)	Manual Automatic Actuation Engineered Safety Feature ESF Valid Clearance Ventilation System Reactor Protection System RPS Reactor Trip	Any event or condition that results in a manual or automatic actuation of any ESF, including the RPS, except when: (A) The actuation results from and is part of a pre-planned sequence during testing or reactor operation; (B) The actuation is invalid and: (1) Occurs while the system is properly removed from service; (2) Occurs after the safety function has been already completed; or (3) Involves only the following specific ESFs or their equivalent systems: (i) Not Applicable (ii) Control Room emergency ventilation system; (iii) Reactor building ventilation system; (iv) Fuel building ventilation system; or (v) Auxiliary building ventilation system.	– Safety Injection System actuation (also see Emergency Plan Procedures) – Reactor Trip (Manual or Automatic). – EDG start due to a valid undervoltage trip signal on emergency bus E1 or E2 – A single train of Containment Isolation actuates. – A valid signal for Containment Ventilation Isolation occurs. -- All ESF actuations are reportable except the following three categories. 1) An invalid ESF or RPS actuation occurs when the system is already properly removed from service if all requirements of plant procedures for removing equipment from service have been met. This includes required clearance documentation, equipment and control board tagging, and properly positioned valves and power supply breakers. 2) An invalid ESF or RPS actuation occurs after the safety function has already been completed (e.g., an invalid containment isolation signal while the containment isolation valves are already closed, or an invalid actuation of the RPS when all rods are fully inserted). 3) ESF actuations that are caused by non-ESF systems may be excluded because these are not considered ESF actuations of safety significance. (Reference 2.19) 4) Invalid actuations of the listed ventilation systems.

FOUR HOUR NOTIFICATIONS TO THE NRC

If not reported under paragraphs (a) or (b)(1) of 10 CFR 50.72, HBRSEP shall notify the NRC Operations Center via ETS as soon as practical and in all cases, within four hours of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
CONDITION THAT COULD PREVENT FULFILLMENT OF SAFETY FUNCTIONS 10 CFR 50.72(b)(2)(iii)	Loss of Safety Function Residual Heat Mitigation Shutdown Generic Setpoint Drift Engineering Evaluation Operability Determination Common Mode Failure	Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to: (A) Shut down the reactor and maintain it in a safe shutdown condition. (B) Remove residual heat, (C) Control the release of radioactive material, or (D) Mitigate the consequences of an accident.	– Loss (inoperability) of both Trains, e.g., ECCS, Low Temperature Overpressure Protection System, or Lake Robinson water level below LCO 3.7.8 limit. 1) Overpressurization of the RCS (if Overpressure Protection System fails to perform its intended function) - Loss of one Train of required equipment, and the cause of the failure could fail the other train, and there is a reasonable expectation that the other train would not fulfill its safety function if required. 1) Contaminated lubrication fluid degrades SI Pump operation (a single condition could prevent fulfillment of a safety function if both trains could be reasonably expected to be inoperable). 2) EDG Air Start Solenoids (if it demonstrates a design, procedural, or equipment deficiency that could prevent the fulfillment of a safety function, i.e., if both diesels are susceptible to same problem) - Multiple equipment inoperability or unavailability. 1) Generic setpoint drift (if indicative of a generic and/or repetitive problem with switches used in safety systems) 2) Oversized breaker wiring lugs (incompatible pigtails and lugs could cause one or more safety systems to fail to perform their intended functions) – Control Rod failure (if failure prevented the fulfillment of a safety function) – Operator action to inhibit the RPS (actions would prevent fulfillment of a safety function)

FOUR HOUR NOTIFICATIONS TO THE NRC

FOUR HOUR NOTIFICATIONS TO THE NRC

If not reported under paragraphs (a) or (b)(1) of 10 CFR 50.72, HBRSEP shall notify the NRC Operations Center via ETS as soon as practical and in all cases, within four hours of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
AIRBORNE RELEASE TO UNRESTRICTED AREA (>20X 10 CFR 20 LIMITS) 10 CFR 50.72(b)(2)(iv)(A)	Airborne Release Unrestricted Public Radioactive Effluent	Any airborne radioactive release that, when averaged over a time period of 1 hour, results in concentrations in unrestricted area that exceeds 20 times the applicable concentration specified in Appendix B to 10 CFR 20, Table 2, Column 1.	– Unplanned gaseous release (if release exceeded 20 times the applicable concentrations specified in Appendix B, Table 2, Column 1 of 10 CFR 20 averaged over a time period of one hour)
LIQUID EFFLUENT RELEASE TO UNRESTRICTED AREA (>20X 10 CFR 20 LIMITS) 10 CFR 50.72(b)(2)(iv)(B)	Liquid Release Unrestricted Public Radioactive Effluent Concentration Discharge	Any liquid effluent release that, when averaged over a time period of 1 hour, exceeds 20 times the applicable concentration specified in Appendix B to 10 CFR 20 , Table 2, Column 2, at the point of entry into the receiving waters (i.e., unrestricted area) for all radionuclides except tritium and dissolved noble gases.	– Radioactive release exceeding TS (if release exceeds 20 times the applicable limit of Appendix B, Table 2, Column 2 of 10 CFR 20 when averaged over one hour)
TRANSPORT OF CONTAMINATED INJURED PATIENT 10 CFR 50.72(b)(2)(v)	Contaminate Injured Person Medical Transport Rescue Hospital	Any event requiring the transport of a radioactively contaminated person to an off-site medical facility for treatment.	– Any event requiring the transport of a radioactively contaminated or potentially contaminated (Reference 2.19) person to an off-site medical facility for treatment

FOUR HOUR NOTIFICATIONS TO THE NRC

FOUR HOUR NOTIFICATIONS TO THE NRC

If not reported under paragraphs (a) or (b)(1) of 10 CFR 50.72, HBRSEP shall notify the NRC Operations Center via ETS as soon as practical and in all cases, within four hours of the occurrence of any of the following:

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
PRESS RELEASES AND GOVERNMENT NOTIFICATIONS 10 CFR 50.72(b)(2)(vi)	News Release Press Radio Television Fatality Environment Public Health and Safety Release	Any event or situation, related to the health and safety of the public or on-site personnel, or protection of the environment, for which a news release is planned or notification to other government agencies has been or will be made. Such an event may include an on-site fatality or inadvertent release of radioactively contaminated materials.	– Any News release concerning - A fatality, - Inadvertent release of radioactively contaminated materials to public areas - unusual or abnormal releases of radioactive effluents, or - Information associated with an Emergency Event except when the ERO is activated (Reference 2.27) – Notification to other government agencies concerning - A fatality on site, - Health and safety of the public or site personnel, - Inadvertent release of radioactively contaminated materials to public areas, - Discovered endangered species kill.

FOUR HOUR NOTIFICATIONS TO THE NRC

FOUR HOUR NOTIFICATIONS TO THE NRC

HBRSEP shall notify the NRC Operations Center via ETS as soon as possible but not later than 4 hours after the discovery of any of the following events or conditions involving spent fuel.

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
ISFSI - EXPOSURES TO RADIATION OR RADIOACTIVE MATERIALS IN EXCESS OF LIMITS, OR RELEASES IN EXCESS OF LIMITS 10 CFR 72.75(b)(1)	ISFSI Release Exposure Fire Explosion Toxic	Any event that prevents immediate actions necessary to avoid exposures to radiation or radioactive materials that could exceed regulatory limits, or releases of radioactive materials that could exceed regulatory limits (e.g., events such as fires, explosions, and toxic gas releases).	– Explosion or fire involves ISFSI resulting in radiological releases
ISFSI - DEFECT IMPORTANT TO SAFETY 10 CFR 50.72(b)(2)(vii)(A) 10 CFR 72.75(b)(2)	ISFSI Defect Safety	A defect in any spent fuel storage structure, system, or component which is important to safety.	– A defect discovered in the design or construction of ISFSI units that could result in releases or radiation doses to the public in excess of 10 CFR 20 limits
ISFSI - REDUCTION IN EFFECTIVENESS 10 CFR 50.72(b)(2)(vii)(B) 10 CFR 72.75(b)(3)	ISFSI Confinement Reduction Effectiveness	A significant reduction in the effectiveness of any spent fuel storage cask confinement system during use.	– Wear or degradation of ISFSI units that could result in releases or radiation doses to the public in excess of 10 CFR 20 limits
ISFSI - DEPARTURE FROM LICENSE CONDITION 10 CFR 72.75(b)(4)	ISFSI Emergency Departure Deviation Health and Safety License Condition	An action taken in an emergency that departs from a condition or a technical specification contained in a license or certificate of compliance issued under 10 CFR 72 when the action is immediately needed to protect the public health and safety and no action consistent with license conditions or technical specifications that can provide adequate or equivalent protection is immediately apparent.	– Action taken in an emergency that departs from procedure that is deemed necessary to prevent releases or radiation doses to the public in excess of 10 CFR 20 limits (See PRO-NGGC-0200)

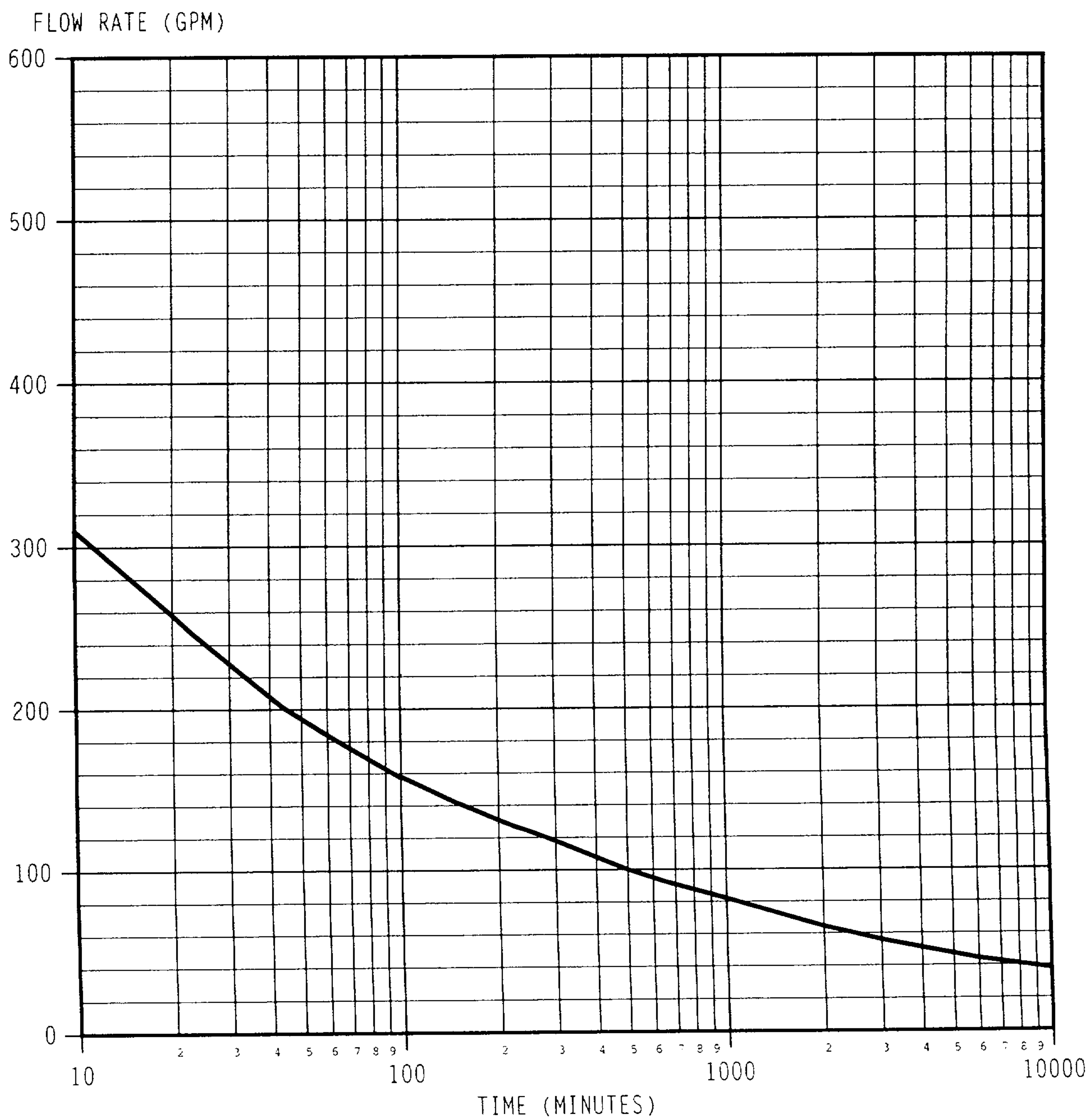
FOUR HOUR NOTIFICATIONS TO THE NRC

FOUR HOUR NOTIFICATIONS TO THE NRC

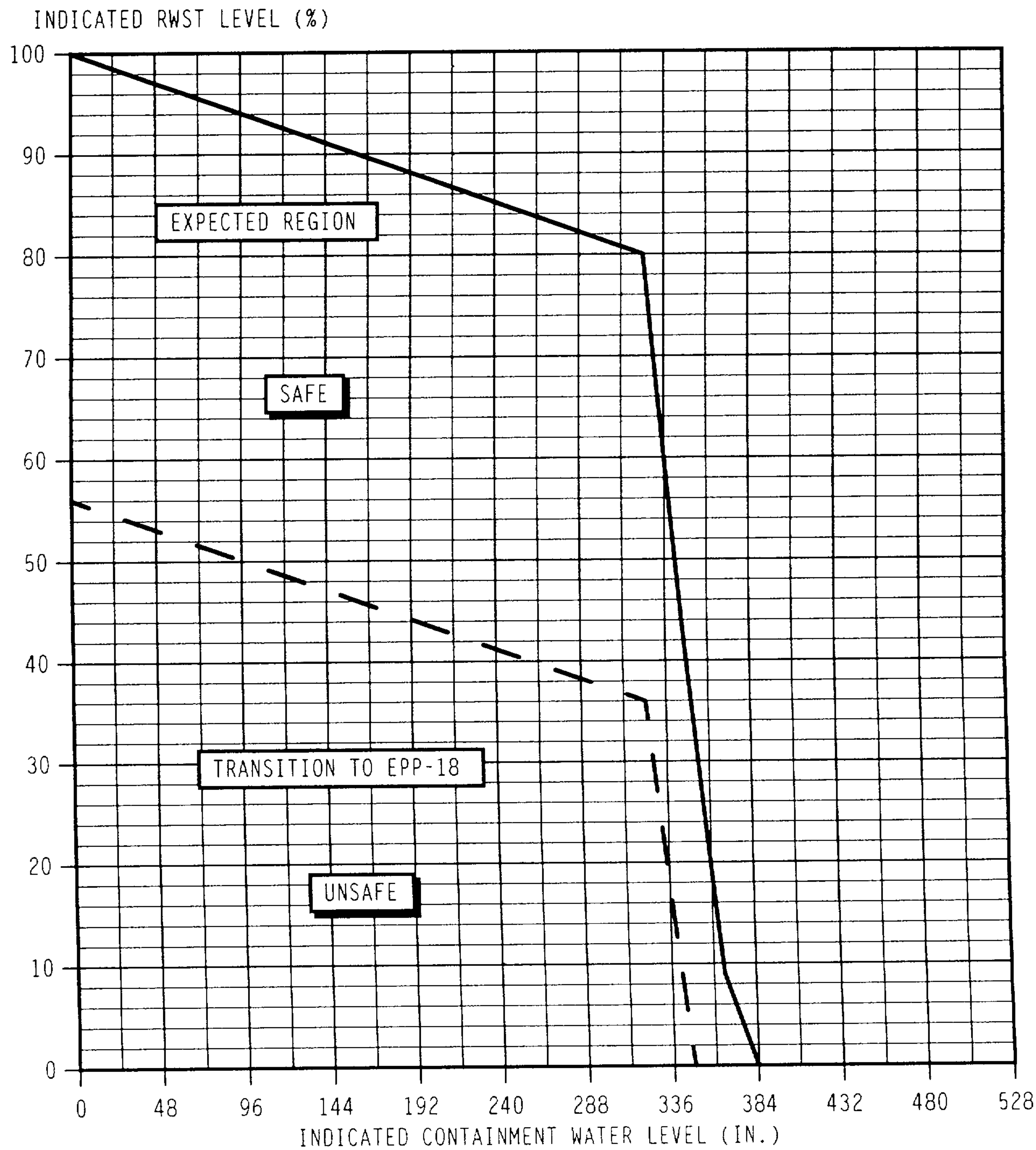
HBRSEP shall notify the NRC Operations Center via ETS as soon as possible but not later than 4 hours after the discovery of any of the following events or conditions involving spent fuel.

EVENT	KEY WORDS	REQUIREMENT	EXAMPLES
ISFSI - TREATMENT OF CONTAMINATED PERSON AT OFFSITE MEDICAL FACILITY 10 CFR 72.75(b)(5)	ISFSI Contaminate Injured Person Medical Transport Rescue Hospital	An event that requires unplanned medical treatment at an offsite medical facility of an individual with radioactive contamination on the individual's clothing or body which could cause further radioactive contamination.	– An individual is injured requiring offsite medical treatment and receives contamination from ISFSI(s) that cannot be removed prior to transport
ISFSI - FIRE OR EXPLOSION 10 CFR 72.75(b)(6)	ISFSI Fire Explosion Damage Integrity	An unplanned fire or explosion damaging any spent fuel, or any device, container, or equipment containing spent fuel when the damage affects the integrity of the material or its container	– ISFSI unit is damaged by an external explosion and the integrity of the ISFSI unit is potentially affected

ATTACHMENT 1
REQUIRED FLOW RATE VERSUS TIME AFTER REACTOR TRIP
Page 1 of 1



ATTACHMENT 1
CONTAINMENT SUMP LEVEL VS. RWST LEVEL
Page 1 of 1



ATTACHMENT 10.1
Page 1 of 1

REACTOR POWER ASCENSION INDICATOR LOG

AVG PWR % (1)	NI-35 amps	NI-36 amps	NI-41A %	NI-42A %	NI-43A %	NI-44A %	LOOP ΔT °F (1)	LOOP 1 ΔT °F	LOOP 2 ΔT °F	LOOP 3 ΔT °F	1st STAGE PRESS psig (1)	PI-446 **OR** 447 psig (2)	NET MWe MAX (1)	NET MWe	CCP % PWR (3)	NR-45 (4)	SSO (1)
15-20							9-11.5				68-90		73				
25-30							14.5-17				113-135		153				
35-40							20-23				158-180		235				
45-50							26-28.5				207-230		316				
55-60							32-34.5				261-285		398				
65-70							37-40				320-345		480				
75-80							43-46				384-410		562				
85-90							49-51.5				449-475		643				
95-100							55-57.5				513-540		725				

(1) Listed ranges and Net MWe maximums are predicted based on past plant performance. The maximum value of each indication is the maximum target value for each power increase. The SSO shall initial if plant management has determined that indications are acceptable to continue with the power escalation.

(2) Use indicator that corresponds to the channel selected on the 1st STAGE PRESSURE selector switch.

(3) Record Continuous Calorimetric Program % Power.

(4) Verify NR-45 is selected to the highest reading channel.

AVAILABLE CONTINGENCY ACTIONS

INFORMATION USE

1.0 Decay Heat Removal:

1) In the case of a loss of the normal decay heat removal equipment while the Residual Heat Removal System is aligned for shutdown cooling, AOP-020 should be followed.

NOTE: In order to supply power to the RHR pump in accordance with the referenced procedure (EPP-025) in the following step, electrical terminations are required.

2) If a loss of station power is the cause of the loss of normal decay heat removal equipment, the backup diesel power that is required by OMP-003 should be placed in service automatically or, manually if necessary, by the normal operating procedures listed on the appropriate attachment to this procedure. (OP's 601,603,604). If the normal diesel backup power is not available, or fails to operate, then the contingency actions necessary to provide alternate power to the decay heat removal equipment provided in EPP-025 should be performed, and heat removal capability restored.

3) In the event that the Reactor is completely defueled and the normal supplies of cooling water to the SFP heat exchanger are lost, the engine driven fire pump in conjunction with the alignment of the fire water system to the SFP heat exchanger, will provide an available backup to all other supply pumps that are powered from the onsite or offsite power supplies in the event that all onsite and offsite power is lost

4) The steps necessary to connect the fire water system to the SFP heat exchanger as a temporary cooling water supply can be found in OP-306, Component Cooling Water System, Section 8.3 Spent Fuel Pit Heat Exchanger Emergency Cooling.

5) Spent Fuel Pit Cooling Pump "A" is powered form 480v Bus No.3, and 480v Bus No. 3 may be powered from the Dedicated Shutdown Diesel Generator (DSDG) via the Dedicated Shutdown (DS) Bus in the event that offsite and onsite backup power is lost. Alignment of the DS Bus to 480v Bus No. 3 is contained in EPP-025.

AVAILABLE CONTINGENCY ACTIONS

NOTE: This attachment provides the available contingency actions for the operations personnel to restore the "Shutdown Safety Functions" under conditions of either fuel in the Containment or with the Reactor completely "defueled".

2.0 Electrical Power:

1) IF the normal 115KV switch yard supply to the Start Up Transformer has been lost due to relay action, and the normal "Backfeed" method is not available (downstream equipment unavailable). The dispatcher should be contacted to determine if switching instructions may be issued to reenergize one section of the 115KV bus. This section of 115KV bus may then supply the Start Up Transformer, via the auto transformer, from the 230KV switch yard. Under these conditions the fault that caused the original relay action must be verified not to be on the section of 115KV bus to be used.

NOTE: In order to supply power to the RHR pump in accordance with the referenced procedure (EPP-025) in the following step, electrical terminations are required.

2) With fuel in the Reactor, or with the Reactor completely defueled, the contingency actions associated with EPP-025 will supply power to the minimum equipment necessary to maintain the Decay Heat Removal, and Inventory Control "Shutdown Safety Functions"

AVAILABLE CONTINGENCY ACTIONS

3.0 Inventory Control:

1) Normal inventory maintenance is controlled by the Operating Procedures. In the event that excessive leakage occurs with the refueling cavity full, AOP-020 - Loss of Residual Heat Removal (Shutdown Cooling), should be followed to isolate the leak, establish makeup to the cavity at the maximum available rate, and place the RHR system in the recirculation mode if the leakage cannot be isolated and the CV sump level rises to the minimum required to operate the RHR pumps in the recirculation mode.

2) In the event that leakage from the Spent Fuel Pit occurs while the Reactor has been offloaded to the Spent Fuel Pit, OP-910 - Spent Fuel Pit Cooling and Purification System, or OP-913, Refueling Water Purification Pump Operation, are used to initiate make up to the spent fuel pit.

3) The following Procedures are also available to establish alternative means to make-up to the Spent Fuel Pit:

a. OP-301 Chemical And Volume Control System, may be used to initiate blended make-up to the RWST, and OP-913, Refueling Water Purification Pump Operation used to subsequently make-up to the SFP.

CAUTION
The flow path aligned in the following step is non-borated water and may lead to a dilution accident in the SFP if used to make up for a large loss of SFP inventory.

b. The demineralized water system may be connected directly to the SFP clean up loop for make-up through the valves listed below:

- DW-215 - DEMINERALIZED WATER TO PLANT COMPONENTS
- SFPC-808 - DEMIN WATER INLET

AVAILABLE CONTINGENCY ACTIONS

4.0 Reactivity Control:

1) Borated makeup sources, and all components necessary to inject the borated water are required to be operable in accordance with OMP-003 when fuel is in the vessel. Other means of borated makeup when the RCS is intact include the flow path through the RCP seals, however this should only be used as a last resort. Normal letdown if available when fuel is in the vessel, may be used to divert displaced inventory to the CVCS Hold Up Tank (HUT). As an alternate means of increasing the Boron Concentration in the Refueling cavity when the vessel head has been removed, 100 lb. bags of Granulated Boric Acid may be added to the cavity. One 100 lb. bag of Granulated Boric Acid will increase the Cavity Boron Concentration approximately 6 ppm. Contact the Reactor Engineer to provide guidance IAW the Reactivity Management Program. (SOER 94-2)

2) When the core is offloaded to the SFP, borated make-up is available from the RWST in accordance with the procedure listed on Attachment 10.2 of this procedure, however if the SFP is at the full level and no more inventory can be added, Boron Concentration may be increased by adding Granulated Boric Acid to SFP locally. One 100 lb. bag of Granulated Boric Acid will increase the Boron Concentration of the SFP approximately 6 ppm. Contact the Reactor Engineer to provide guidance IAW the Reactivity Management Program. (SOER 94-2)

AVAILABLE CONTINGENCY ACTIONS

5.0 Containment:

1) Containment Closure is controlled by the Improved Technical Specifications and plant procedures based on the current plant status, the procedures listed below are intended to maintain the applicable degree of isolation at the plant conditions indicated in the procedures and are either successful or are performed until the proper degree of isolation is achieved, therefore there are no contingency actions applicable that are not contained in the controlling procedures:

   a. GP-002 - COLD SOLID TO HOT SUBCRITICAL AT NO LOAD $T_{\text{-}avg}$ (establishes "Containment Integrity" in accordance with OP-923 when RCS is at 200°F)

   b. OMM-033 - IMPLEMENTATION OF CV CLOSURE (controls closure of CV penetrations when RCS temperature is less than 200°F)

   c. GP-010 - REFUELING (establishes "Containment Closure" for refueling when the Reactor Vessel head is removed and core components are being moved)

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

1.0 INTRODUCTION

This document identifies the risk impact of various combinations of equipment safety functions being unavailable due to maintenance during reactor critical and power operation ("on-line maintenance"). The risk impact measure for this analysis is core damage frequency (CDF), as calculated using the current probabilistic safety analysis (PSA) model of the Robinson plant. While this analysis provides risk insights that can be obtained in no other way, it is intended that the information contained in this document be used in conjunction with design basis information, operational experience, and engineering judgment to determine the extent and scope of any planned on-line maintenance activity. Because the PSA only measures risk impact, and not defense in depth, the allowed out of service times presented in this document may be different than those of the plant's technical specifications. This document shall not be used as a basis for extending a Tech. Spec. Action Statement but should be observed when the recommended limits of this document are more restrictive than the limits imposed by technical specifications.

2.0 METHODOLOGY

2.1 Determination of Train Combinations for On-line Maintenance

Systems identified as safety significant by the maintenance rule expert panel were evaluated for on-line maintenance impact on core damage risk. These systems were broken down into two major trains and separated on the 12-week on-line schedule. This schedule was used to determine the presentation of results.

Note that the 12-week on-line schedule contains some systems or trains that are maintained on-line but whose function is not impaired by the maintenance action. These systems were not included in the PSA analysis, since the PSA considers the impact of unavailable functions when determining risk impact. However, some maintenance actions, even if they do not render the system incapable of performing its accident mitigation function, may increase the likelihood of a transient or other initiating events. Systems or trains in this category were included in the analysis.

2.2 Calculation of Core Damage Frequencies

In order to determine the risk impact of planned maintenance, a "baseline" core damage frequency was required. This baseline core damage frequency served as the basis for determining whether the calculated risk increase for a given equipment configuration was safety significant or non-safety significant. This baseline CDF was determined by setting all unavailability events in the PSA model to the "in service" value of zero. The model was then quantified to obtain the baseline CDF.

In order to assess the relative impact of performing on-line maintenance on a single system or a pair of systems, the system train function was made unavailable. All other system functions in the PSA model except those being taken out for on-line maintenance were made available. The PSA model was then solved for this combination of equipment out of service to determine the new core damage frequency for that condition.

If maintenance could increase the likelihood of a transient or other initiating event, this impact had to be considered in the analysis. This was addressed by assuming that the maintenance would cause the appropriate initiating event in the model to increase in frequency by a factor of ten. An example of this "environmental event" would be work on Reactor Protection Logic. While planned logic testing at power would not remove the reactor trip function, the likelihood of a reactor trip initiating event is considered greater than during periods when no testing is conducted. Another example is switchyard work. Switchyard work is not considered safety significant in itself and is not included in the matrices. However, switchyard work in combination with EDG or AFW steam driven pump maintenance is a higher risk impact evolution due to the increased potential for a station blackout, and should be avoided.

2.3 *Determination of Significant Risk Increase due to On-line Maintenance*

There are several criteria for determining whether a given risk increase is safety significant or non-safety significant. The criteria utilized in this analysis were based on the EPRI PSA Applications Guide. Three thresholds for safety significance were applied in the present analysis:

- The instantaneous value of CDF calculated for the given condition should not be above 1E-3 per year.
- The change in core damage probability for the condition, which is the product of the instantaneous CDF increase (over the baseline) for the given condition and the length of time the condition would exist, should not be allowed to exceed 1E-6 without consideration of additional, non-quantifiable factors.
- The change in core damage probability for the condition may exceed 1E-6 provided: 1) the change in core damage probability does not exceed 1E-5; 2) additional, non-quantifiable factors (possibly including contingency measures) are considered; 3) an appropriate level of management approval is obtained.

These three thresholds were applied, using the calculated CDF for each combination of equipment functions unavailable, the baseline CDF with no equipment in test or maintenance, and an assumed equipment unavailable time of 72 hours.

3.0 RESULTS

3.1 Assumptions and Considerations

This analysis does not consider all Safety Significant Systems identified by the maintenance rule expert panel, but rather is limited to those systems whose maintenance activities may contribute to core damage through unavailability of system train functions. Some electrical systems whose functions are not made unavailable while on-line are not included in the list of system train functions. These systems are discussed in Section 3.2 and in the Notes on Table 1.

The EPRI PSA applications guide recommends an evaluation of Large Early Release Frequency (LERF) for applications. A review of the level 2 (containment performance) PSA analysis reveals that functional failures of containment safeguards systems (containment isolation, containment spray, containment fan coolers) do not significantly contribute to the potential for large early releases from sever accidents. LERF scenarios are dominated by interfacing-system LOCAs (RHR-750/751) and steam generator tube ruptures, which by nature create a release path. The status of the containment safeguards systems have little impact on large early releases, and would not be considered Safety Significant based on their limited impact on the PSA results.

Since the on-line maintenance matrix was quantified with core damage as the end-state, containment systems were not included on the matrix. However, if consideration is given to potential performance degradation of containment isolation, the frequency of large early releases would increase. Therefore, maintenance activities that render a containment isolation valve open (non-isolatable) or that compromise Main Steam isolation via the SRVs, PORVs or MSIVs should not be done while any core-damage mitigating system function listed in Table 1 is unavailable.

While instantaneous CDF and increase in core damage probability (delta CDF * time out of service) were considered, the cumulative safety impact associated with on-line maintenance activity over the entire cycle was not included. The impact of maintenance activity on initiating event frequencies, where applicable, was assumed to be an increase by a factor of ten.

As stated in the introduction, this analysis is intended to be used in conjunction with design basis information, operational experience, and engineering judgment to determine the extent and scope of any planned on-line maintenance activity.

3.2 Presentation of Results

The results of the analysis are presented in matrix format to facilitate determination of the safety significance of system train functions being unavailable. Because of the amount of information resulting from this study, a number of different views of the results are presented. The matrices and other information are contained in Tables 1 and 2.

Table 1 lists the maintenance events that were analyzed. The table lists the maintenance event description, the system or train accident mitigation function, and the assumed impact on initiating events, if applicable. The table details the safety function to be maintained for combinations that are considered safety significant. A number of power systems, that will not have planned maintenance out of service time, have been removed from the matrix: 4KV AC (5170), 480V AC (5175 non-safety related), 208/120V AC (5185), and transformers and switchyard (5120). However, testing of these systems may introduce a higher probability of an undervoltage initiator. Therefore, work on the AFW steam driven pump and the EDGs should not be performed in conjunction with maintenance or test on these systems due to the increased potential for a station blackout.

Table 2 is a matrix which shows the number of hours that a combination of equipment can be unavailable before the change in core damage probability (delta CDF * time) would exceed 1E-6. Note that the 1E-6 core damage probability threshold is only one part of the analysis. Cells marked with an X are not recommended because the instantaneous CDF would exceed the 1E-3 threshold.

It is made up of three separate matrices: One for train A equipment, one for train B equipment, and one for "cross-train" equipment. These matrices list the maintenance events across the top and down the left side

Maintenance that exceeds the allowed hours in Table 2 will place the plant in a potentially High Risk Impact configuration and is not recommended. Planning maintenance to exceed the hours in Table 2 should be accompanied with plant general manager approval per Attachment 10.4 and a review of non-quantifiable factors (e.g. reason maintenance is necessary on-line). Any maintenance, planned or emergent, which exceeds the hours in Table 2 should be accompanied with risk impact insights from PSA, and development of contingency plans.

3.3 Use of the On-line Maintenance Matrices

The matrices apply only for reactor critical and power operation (all trips and actuation signals in place) and only for combinations of one or two system trains at a time. If three or more system train functions need to be unavailable at the same time, then further analysis needs to be performed.

The matrices only address best estimate risk impact, and not defense in depth. The most limiting configurations must be determined through a combination of Technical Specifications, the matrix, and other design basis documents.

When using these results to determine appropriate on-line maintenance, it is important to remember that all functions listed in Table 1, which are not designated as unavailable, are assumed to be functional. The scope of this application assumes that equipment must be available to provide its safety function. If the system, structure or component (SSC) is in service providing the safety function, some components may be defeated such that the ability to maintain the function is not degraded. Existing plant procedures shall be used to determine the availability of an SSC.

In case of emergent equipment unavailability, a review of the equipment functions already unavailable must be performed. Potential high risk impact situations need to be identified and non-quantifiable factors and contingency plans must be identified. An example of a non-quantifiable factor would be the need to shutdown the plant if the repair is not expedited. Plant shutdowns introduce additional risk through challenging safety systems which in itself is not quantifiable. The potential High Risk Impact configurations need to be avoided or limited in duration as much as practical. It is not recommended to intentionally enter what are potentially high risk impact configurations.

3.4 *Matrix Limitations*

Not all high safety significant SSC are included directly in the matrices. Any maintenance activities or emergent conditions that could degrade any of these safety functions should be evaluated against other equipment that is unavailable. These SSCs fall in the following categories:

- Normally passive high safety significant SSCs:
  - Reactor coolant system boundary
  - Containment structure
- SSCs for which on-line maintenance or unavailability is not expected:
  - Pressurizer safety valves
  - Steam generator safety valves
  - Safety injection accumulators
  - Main steam isolation valves
  - Feedwater isolation valves
  - Station batteries

Note: The unavailability of these SSCs is controlled through short duration Tech Specs. Restoration of the unavailable function should be a top priority.

- SSCs that support containment integrity and environmental control
  - Containment spray
  - Service water booster pumps
  - Containment cooling

Note: When performing maintenance or removing these components from service, a qualitative assessment addressing the remaining defense in depth should be performed.

- Support systems
  - Diesel fuel oil
  - Nitrogen supply to PORVS
  - Auxiliary building HVAC

Note: Maintenance activities and unavailability of these systems should be evaluated for the impact on the supported front-line system.

- Other
  - Control room emergency filtration and pressurization

Note: Maintenance activities and unavailability or these components are adequately controlled through Tech Spec adherence.

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

Table 1. Matrix Event Description And Safety Function

SYS	TRAIN (Note 1)	MATRIX EVENT DESCRIPTION (Note 5)	SHORT NAME (see matrices)	TRAIN SAFETY FUNCTION To Be Maintained for Not Recommended Combinations	MODELLING NOTES
1080	A	RPS Channel A Logic In Test & Maintenance (Includes RX Trip Bkr 1065, And Safeguards Train A)	RPS CHANNEL A	Prevent Inadvertent RX Trip, Provide RX Trip and Safeguards Actuation Logic on Valid Transient. (See Note 2)	Conservatively assumed train A SI actuation signal Fails. Increase frequency of ATWS and RX Trip.
2005	A	RCS PZR PORV Train A Unavailable (RC-456, N2 Header, Block Valve RC-535)	RCS PZR PORV 456	Provide a Bleed Path for Feed and Bleed Cooling, and Maintain RCS Integrity.	Assumes PORV or Block Valve will not open. Stuck open Block Valve not analyzed. See Block Valve entry under train B.
2045	A	RHR Train A Unavailable	RHR PUMP A	Provide RCS Inventory Control and Decay Heat Removal	
2060	A	CVCS Charging Pump B Unavailable (Train A)	CVCS CHGP B	Provide RCP Seal Injection. If removal of function is permitted, prevent total loss of CVCS which could lead to a plant trip.	Increased frequency of total loss of CVCS initiator not included.
2080	A	SI Pump A Unavailable (Train A)	SI PUMP A	Provide RCS Inventory Control	Pump B can be swapped to the A train to maintain function.
3020	A	S/G A PORV RV-1 Unavailable (Includes Specific IA Support Manifold)	S/G A PORV RV-1	Provide Ability for Cooldown From Hot to Cold Shutdown	Open function failed: Results conservative by allowing reclose failures in cutsets.
3020	A	S/G B PORV RV-2 Unavailable (Includes Specific IA Support Manifold)	S/G B PORV RV-2	Provide Ability for Cooldown From Hot to Cold Shutdown	Open function failed: Results conservative by allowing reclose failures in cutsets.
3020	A	S/G C PORV RV-3 Unavailable (Includes Specific IA Support Manifold)	S/G C PORV RV-3	Provide Ability for Cooldown From Hot to Cold Shutdown	Open function failed: Results conservative by allowing reclose failures in cutsets.
3050	A	MFW Pump Train A Unavailable	MFWP A	Prevent Loss Causing Plant Trip, and mitigate ATWS or Loss of AFW	Assumes A train MFW or CND pumps are unavailable and increased frequency of Total Loss of MFW initiator.
3065	A	AFW MD Pump Train A Unavailable (Includes Actuation Channel)	AFW MDP A	Automatically Deliver Condensate From the CST to the S/Gs Following a Plant Trip (See Note 3)	

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

Table 1 .Matrix Event Description And Safety Function

SYS	TRAIN (Note 1)	MATRIX EVENT DESCRIPTION (Note 5)	SHORT NAME (see matrices)	TRAIN SAFETY FUNCTION To Be Maintained for Not Recommended Combinations	MODELLING NOTES
3065	A	AFW SD Pump Train Unavailable	AFW SDP	Automatically Deliver Condensate From the CST to the S/Gs Following a Plant Trip (See Notes 3 and 4)	Pump is unavailable when 2 or 3 S/Gs are unavailable to supply steam or receive flow via MS-V1-8A,B,C or AFW-V2-14A,B,C
4060	A	SW Pump A Unavailable	SW PUMP A	Provide Cooling for Safety Related Equipment, Prevent Loss of SW Initiator	
4060	A	SW Pump B Unavailable	SW PUMP B	Provide Cooling for Safety Related Equipment, Prevent Loss of SW Initiator	
4080	A	CCW Pump A Unavailable (Train DS)	CCW PUMP A	Provide Cooling for Safety Related Equipment, Prevent Loss of CCW Initiator	
4080	A	CCW Pump B Unavailable (Train A)	CCW PUMP B	Provide Cooling for Safety Related Equipment, Prevent Loss of CCW Initiator	
5095	A	EDG A Unavailable (Includes Room Cooling 8210, And Fuel Oil 5100)	EDG A	Provide Power to the Emergency Bus (See Note 4)	
5175	A	480V Emergency Bus E1 In Test Or Maintenance, Assumed Available	EMERGENCY BUS E1	Prevent Bus Undervoltage Initiator and Provide Power to Emergency Bus and Safety Related MCC Loads	Assumes increased frequency of Loss of Emergency Bus E1 Initiator.
5235	A	DC, One Train A Battery Charger Unavailable	DC BAT CHG A/A1	DC Bus, supplied by a Battery Charger, Must be Available to Provide Control Power.	Assumes increased frequency of Loss of DC Bus A Initiator.
6135	A	Air Compressor A Unavailable	AIR COMP A	Prevent Loss of Instrument Air, and Provide Instrument Air to S/G PORVs and CVCS	Increased frequency of loss of Instrument Air initiator not included.
6135	A	Air, Primary Air Compressor Unavailable	AIR COMP PRIM	Prevent Loss of Instrument Air, and Provide Instrument Air to S/G PORVs and CVCS	Increased frequency of loss of Instrument Air Initiator not included.
6175	A	Fire Pump, Engine Driven Unavailable	FIRE PUMP DIESEL	Provide Alternate Cooling to SI, AFW, and Charging Pumps	
6270	A	Deepwell Pump B Unavailable	DEEPWELL PUMP B	Provide Makeup to CST or Alternate AFW Supply	

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

Table 1 .Matrix Event Description And Safety Function

SYS	TRAIN (Note 1)	MATRIX EVENT DESCRIPTION (Note 5)	SHORT NAME (see matrices)	TRAIN SAFETY FUNCTION To Be Maintained for Not Recommended Combinations	MODELLING NOTES
1080	B	RPS Channel B Logic In Test & Maintenance (Includes RX Trip Bkr 1065, And Safeguards Train B)	RPS CHANNEL B	Prevent Inadvertent RX Trip, Provide RX Trip and Safeguards Actuation Logic on Valid Transient. (See Note 2)	Conservatively assumed train B SI actuation signal fails, Increase frequency of ATWS and RX trip.
2005	B	RCS PZR PORV Train B Unavailable (RC-455C, N2 Header, Block Valve RC-536)	RCS PZR PORV 455C	Provide a Bleed Path for Feed and Bleed Cooling, and Maintain RCS Integrity Given a Stuck Open PORV.	Assumes PORV or Block Valve will not open. Stuck open Block Valve not analyzed.
2005	B	Both RCS PZR Block Valves Closed But Available	RCS BLOCK VALVES	Provide at Least One Path to Mitigate a Pressure Challenge	Assumes PORV is operable when Block Valve is open. See Block Valve entry below.
2045	B	RHR Train B Unavailable	RHR PUMP B	Provide RCS Inventory Control and Decay Heat Removal	
2060	B	CVCS Charging Pump A Unavailable (Train DS)	CVCS CHGP A	Provide RCP Seal Injection. If removal of function is permitted, prevent total loss of CVCS which could lead to a plant trip.	
2060	B	CVCS Charging Pump C Unavailable (Train B)	CVCS CHGP C	Provide RCP Seal Injection. If removal of function is permitted, prevent total loss of CVCS which could lead to a plant trip.	
2080	B	SI Pump C Unavailable (Train B)	SI PUMP C	Provide RCS Inventory Control	Pump B can be swapped to the B train to maintain function.
3050	B	MFW Pump Train B Unavailable	MFWP B	Prevent Loss Causing Plant Trip, and mitigate ATWS or Loss of AFW	Assumes B train MFW or CND pumps are unavailable and increased frequency of total loss of MFW initiator.
3065	B	AFW MD Pump Train B Unavailable (Includes Actuation Channel)	AFW MDP B	Automatically Deliver Condensate From the CST to the S/Gs Following a Plant Trip	
4060	B	SW Pump C Unavailable	SW PUMP C	Provide Cooling for Safety Related Equipment, Prevent Loss of SW Initiator	

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

Table 1 .Matrix Event Description And Safety Function

SYS	TRAIN (Note 1)	MATRIX EVENT DESCRIPTION (Note 5)	SHORT NAME (see matrices)	TRAIN SAFETY FUNCTION To Be Maintained for Not Recommended Combinations	MODELLING NOTES
4060	B	SW Pump D Unavailable	SW PUMP D	Provide Cooling for Safety Related Equipment, Prevent Loss of SW Initiator	
4080	B	CCW Pump C Unavailable (Train B)	CCW PUMP C	Provide Cooling for Safety Related Equipment, Prevent Loss of CCW Initiator	
5095	B	EDG B Unavailable (Includes Room Cooling 8210, And Fuel Oil 5100)	EDG B	Provide Power to the Emergency Bus (See Note 4)	
5098	B	DSDG (Includes DS Fuel Oil 5100) Unavailable	DSDG	Provide Power to the DS Bus	Taking out the DSDG is not as limiting as taking out the DS Bus.
5114	B	DS Bus Unavailable	DS BUS	Provide Power to Chg Pump A, CCW Pump A (Alternate for SW Pump D, MCC5 and Deepwell Pumps)	Taking out the DS Bus takes out the DSDG, CCWA, CVCS CHGP A and can be considered one function.
5175	B	480V Emergency Bus E2 In Test Or Maintenance, Assumed Available	EMERGENCY BUS E2	Prevent Bus Undervoltage Initiator and Provide Power to Emergency Bus and Safety Related MCC Loads	Assumes increased frequency of Loss of Emergency Bus E2.
5235	B	DC, One Train B Battery Charger Unavailable	DC BAT CHG B/B1	DC Bus, supplied by a Battery Charger, Must be Available to Provide Control Power.	Assumes increased frequency of Loss of DC Bus B Initiator.
6135	B	Air Compressor B Unavailable	AIR COMP B	Prevent Loss of Instrument Air, and Provide Instrument Air to S/G PORVs and CVCS	Increased frequency of loss of Instrument Air Initiator not included.
6135	B	Air Compressor D Unavailable	AIR COMP D	Prevent Loss of Instrument Air, and Provide Instrument Air to S/G PORVs and CVCS	Increased frequency of loss of Instrument Air Initiator not included.

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

Table 1 .Matrix Event Description And Safety Function

SYS	TRAIN (Note 1)	MATRIX EVENT DESCRIPTION (Note 5)	SHORT NAME (see matrices)	TRAIN SAFETY FUNCTION To Be Maintained for Not Recommended Combinations	MODELLING NOTES
6175	B	Fire Pump, Motor-Driven Unavailable	FIRE PUMP MOTOR	Provide Alternate Cooling to SI, AFW, and Charging Pumps	
6270	B	Deepwell Pump A Unavailable	DEEPWELL PUMP A	Provide Makeup to CST or Alternate AFW Supply	
6270	B	Deepwell Pump C Unavailable	DEEPWELL PUMP C	Provide Makeup to CST or Alternate AFW Supply	

NOTES:
1. Trains as designated by 12 week on-line schedule.
2. Do not perform RPS channel logic test for combinations designated as not allowed. Matrix assumes that test does not remove RX Trip and actuation function.
3. The CST must be available to provide suction to the AFW Pumps otherwise all three pumps are considered unavailable.
4. A number of power systems that will not have planned maintenance unavailabilities, are not included on the matrix: 4KV AC (5170), 480V AC (5175 non -safety related), 208/120V AC (5185) and transformers and switchyard (5120). However, testing or maintenance activities on these systems may introduce additional risk of an undervoltage initiator. Therefore, do not perform testing or maintenance activities on these systems while performing EDG or AFW SDP maintenance due to increased risk of a station blackout.
5. This matrix considers risk only from a Core Damage.

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

Table 1 .Matrix Event Description And Safety Function

SYS	TRAIN (Note 1)	MATRIX EVENT DESCRIPTION (Note 5)	SHORT NAME (see matrices)	TRAIN SAFETY FUNCTION To Be Maintained for Not Recommended Combinations	MODELLING NOTES
6175	B	Fire Pump, Motor-Driven Unavailable	FIRE PUMP MOTOR	Provide Alternate Cooling to SI, AFW, and Charging Pumps	
6270	B	Deepwell Pump A Unavailable	DEEPWELL PUMP A	Provide Makeup to CST or Alternate AFW Supply	
6270	B	Deepwell Pump C Unavailable	DEEPWELL PUMP C	Provide Makeup to CST or Alternate AFW Supply	

NOTES:

1. Trains as designated by 12 week on-line schedule.
2. Do not perform RPS channel logic test for combinations designated as not allowed. Matrix assumes that test does not remove RX Trip and actuation function.
3. The CST must be available to provide suction to the AFW Pumps otherwise all three pumps are considered unavailable.
4. A number of power systems that will not have planned maintenance unavailabilities, are not included on the matrix: 4KV AC (5170), 480V AC (5175 non -safety related), 208/120V AC (5185) and transformers and switchyard (5120). However, testing or maintenance activities on these systems may introduce additional risk of an undervoltage initiator. Therefore, do not perform testing or maintenance activities on these systems while performing EDG or AFW SDP maintenance due to increased risk of a station blackout.
5. This matrix considers risk only from a Core Damage.

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

Table 2. Matrix Showing Allowable Hours for Plant Configurations To Remain Non-Risk Significant

(DELTA CDP<1E-06)

Train A Matrix

Exceeding these allowed hours require PGM approval, review of non-quantifiable factors, contingency planning and PSA insights. **X - Safety Significant Exceeds Maximum Instantaneous CDF of 1E-3 and SHOULD BE AVOIDED**		RPS CHANNEL A	RCS PZR PORV 456	RHR PUMP A	CVCS CHGP B	SI PUMP A	S/G A PORV RV-1	S/G B PORV RV-2	S/G C PORV RV-3	MFWP A	AFW MDP A	AFW SDP	SW PUMP A	SW PUMP B	CCW PUMP A	CCW PUMP B	EDG A	EMERGENCY BUS E1	DC BAT CHG A/A1	AIR COMP A	AIR COMP PRIM	FIRE PUMP DIESEL	DEEPWELL PUMP B
		1080	2005	2045	2060	2080	3020	3020	3020	3050	3065	3065	4060	4060	4080	4080	5095	5175	5235	6135	6135	6175	6270
RPS CHANNEL A	1080	804	56	136	461	326	117	117	117	296	78	71	584	584	466	471	122	718	639	804	775	617	303
RCS PZR PORV 456	2005	56	93	11	85	26	54	54	54	39	37	26	86	85	83	76	24	91	90	91	87	92	79
RHR PUMP A	2045	136	11	174	149	169	22	22	22	116	65	60	161	161	154	155	106	169	165	173	172	164	143
CVCS CHGP B	2060	461	85	149	1081	147	124	124	124	363	95	96	718	718	506	279	165	932	804	1068	1043	789	461
SI PUMP A	2080	326	26	169	147	576	83	83	83	278	78	86	456	456	404	407	188	531	489	576	569	484	337
S/G A PORV RV-1	3020	117	54	22	124	83	136	52	52	109	59	59	128	128	124	124	80	134	131	136	136	131	117
S/G B PORV RV-2	3020	117	54	22	124	83	52	136	52	109	59	59	128	128	124	124	80	134	131	136	136	131	117
S/G C PORV RV-3	3020	117	54	22	124	83	52	52	136	109	59	59	128	128	124	124	80	134	131	136	136	131	117
MFWP A	3050	296	39	116	363	278	109	109	109	548	14	45	438	438	389	393	144	506	468	548	541	463	311
AFW MDP A	3065	78	37	65	95	78	59	59	59	14	104	9	98	98	97	97	73	102	101	104	102	100	93
AFW SDP	3065	71	26	60	96	86	59	59	59	45	9	105	92	90	98	98	14	100	92	105	102	100	93
SW PUMP A	4060	584	86	161	718	456	128	128	128	438	98	92	2190	73	782	850	184	1718	1307	2190	2086	903	551
SW PUMP B	4060	584	85	161	718	456	128	128	128	438	98	90	73	2190	834	850	184	1718	1307	2190	2086	913	551
CCW PUMP A	4080	466	83	154	506	404	124	124	124	389	97	98	782	834	1348	X	161	995	834	1348	1307	932	506
CCW PUMP B	4080	471	76	155	279	407	124	124	124	393	97	98	850	850	X	1390	172	1153	963	1369	1327	942	509
EDG A	5095	122	24	106	165	188	80	80	80	144	73	14	184	184	161	172	196	190	184	196	194	131	128
EMERGENCY BUS E1	5175	718	91	169	932	531	134	134	134	506	102	100	1718	1718	995	1153	190	6738	2137	6257	5475	2037	706
DC BAT CHG A/A1	5235	639	90	165	804	489	131	131	131	468	101	92	1307	1307	834	963	184	2137	3129	3129	2920	1537	93
AIR COMP A	6135	804	91	173	1068	576	136	136	136	548	104	105	2190	2190	1348	1369	196	6257	3129	8760	8760	2920	804
AIR COMP PRIM	6135	775	87	172	1043	569	136	136	136	541	102	102	2086	2086	1307	1327	194	5475	2920	8760	8760	2738	789
FIRE PUMP DIESEL	6175	617	92	164	789	484	131	131	131	463	100	100	903	913	932	942	131	2037	1537	2920	2738	2920	635
DEEPWELL PUMP B	6270	303	79	143	461	337	117	117	117	311	93	93	551	551	506	509	128	706	93	804	789	635	804

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

Table 2. Matrix Showing Allowable Hours for Plant Configurations To Remain Non-Risk Significant

(DELTA CDP<1E-06)

Train B Matrix

Exceeding these allowed hours require PGM approval, review of non-quantifiable factors, contingency planning and PSA insights.
X - Safety Significant Exceeds Maximum Instantaneous CDF of 1E-3 and SHOULD BE AVOIDED

		RPS CHANNEL B	RCS PZR PORV 455C	RCS BLOCK VALVES	RHR PUMP B	CVCS CHGP A	CVCS CHGP C	SI PUMP C	MFWP B	AFW MDP B	SW PUMP C	SW PUMP D	CCW PUMP C	EDG B	DSDG	DS BUS	EMERGENCY BUS E2	DC BAT CHG B/B1	AIR COMP B	AIR COMP D	FIRE PUMP MOTOR	DEEPWELL PUMP A	DEEPWELL PUMP C
		1080	2005	2005	2045	2060	2060	2080	3050	3065	4060	4060	4080	5095	5098	5114	5175	5235	6135	6135	6175	6270	6270
RPS CHANNEL B	1080	804	56	400	168	409	461	503	326	124	105	101	479	89	163	66	558	712	804	730	226	701	303
RCS PZR PORV 455C	2005	56	93	92	15	85	85	36	40	44	57	56	86	10	85	52	88	91	91	87	72	90	79
RCS BLOCK VALVES	2005	400	92	2738	210	654	775	932	244	148	143	137	952	76	241	90	1095	1947	2576	1825	293	1947	596
RHR PUMP B	2045	168	15	210	229	180	188	199	143	85	91	89	198	78	121	66	204	221	229	222	135	222	178
CVCS CHGP A	2060	409	85	654	180	859	153	95	370	147	124	83	466	85	207	93	576	762	859	782	238	768	417
CVCS CHGP C	2060	461	85	775	188	153	1081	97	404	153	132	126	283	107	192	38	679	922	1068	963	252	932	461
SI PUMP C	2080	503	36	932	199	95	97	1413	411	122	137	131	718	110	216	49	804	1168	1413	1217	267	1184	512
MFWP B	3050	326	40	244	143	370	404	411	644	23	122	117	447	100	184	78	476	588	644	600	217	528	173
AFW MDP B	3065	124	44	148	85	147	153	122	23	178	75	73	158	72	98	51	162	169	177	136	116	173	146
SW PUMP C	4060	105	57	143	91	124	132	137	122	75	151	27	137	67	93	56	140	148	151	148	76	145	79
SW PUMP D	4060	101	56	137	89	83	126	131	117	73	27	144	131	57	92	56	128	141	144	142	73	139	76
CCW PUMP C	4080	479	86	952	198	466	283	718	447	158	137	131	1460	110	201	X	819	1200	1436	1234	268	1200	518
EDG B	5095	89	10	76	78	85	107	110	100	72	67	57	110	119	26	22	111	116	119	117	87	117	102
DSDG	5098	163	85	241	121	207	192	216	184	98	93	92	201	26	258	93	225	248	258	250	145	249	196
DS BUS	5114	66	52	90	66	93	38	49	78	51	56	56	X	22	93	93	78	91	93	92	70	91	74
EMERGENCY BUS E2	5175	558	88	1095	204	576	679	804	476	162	140	128	819	111	225	78	1825	1436	1825	1510	278	1348	528
DC BAT CHG B/B1	5235	712	91	1947	221	762	922	1168	588	169	148	141	1200	116	248	91	1436	6738	6257	3809	313	3021	695
AIR COMP B	6135	804	91	2576	229	859	1068	1413	644	177	151	144	1436	119	258	93	1825	6257	8760	5153	328	6738	804
AIR COMP D	6135	730	87	1825	222	782	963	1217	600	136	148	142	1234	117	250	92	1510	3809	5153	8760	316	3809	701
FIRE PUMP MOTOR	6175	226	72	293	135	238	252	267	217	116	76	73	268	87	145	70	278	313	328	316	328	314	234
DEEPWELL PUMP A	6270	701	90	1947	222	768	932	1184	528	173	145	139	1200	117	249	91	1348	3021	6738	3809	314	6738	21
DEEPWELL PUMP C	6270	303	79	596	178	417	461	512	173	146	79	76	518	102	196	74	528	695	804	701	234	21	804

PSA OF ON-LINE MAINTENANCE FOR H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2

Table 2. Matrix Showing Allowable Hours for Plant Configurations To Remain Non-Risk Significant

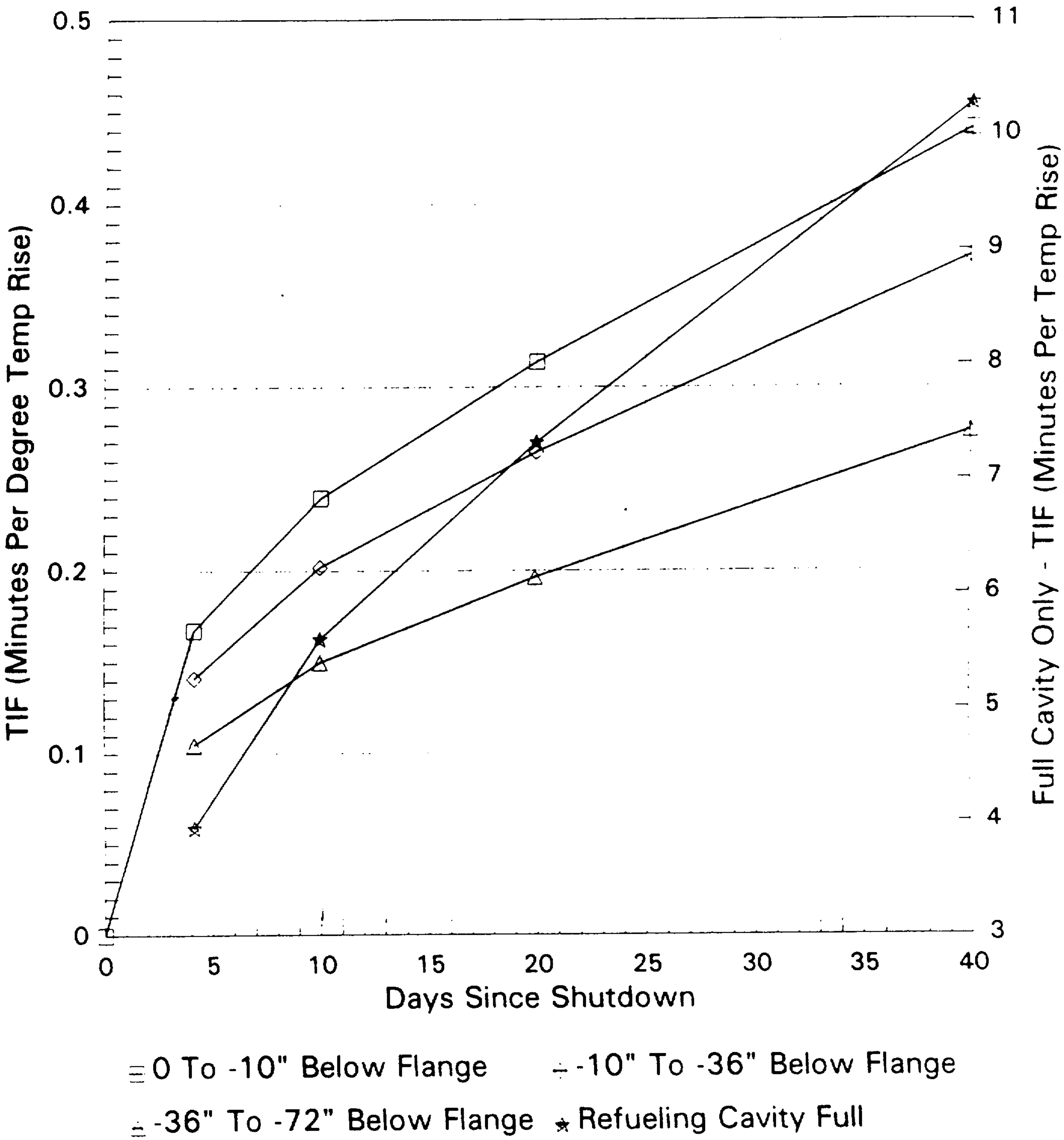
(DELTA CDP<1E-06)

Train A by Train B Matrix

Exceeding these allowed hours require PGM approval, review of non-quantifiable factors, contingency planning and PSA insights. X - Safety Significant Exceeds Maximum Instantaneous CDF of 1E-3 and SHOULD BE AVOIDED		RPS CHANNEL B	RCS PZR PORV 455C	RCS BLOCK VALVES	RHR PUMP B	CVCS CHGP A	CVCS CHGP C	SI PUMP C	MFWP B	AFW MDP B	SW PUMP C	SW PUMP D	CCW PUMP C	EDG B	DSDG	DS BUS	EMERGENCY BUS E2	DC BAT CHG B/B1	AIR COMP B	AIR COMP D	FIRE PUMP MOTOR	DEEPWELL PUMP A	DEEPWELL PUMP C
		1080	2005	2005	2045	2060	2060	2080	3050	3065	4060	4060	4080	5095	5098	5114	5175	5235	6135	6135	6175	6270	6270
RPS CHANNEL A	1080	105	56	400	168	409	461	421	326	124	105	101	479	89	163	66	558	712	804	730	226	701	303
RCS PZR PORV 456	2005	56	72	93	15	85	85	36	40	44	57	56	86	10	85	52	88	91	91	87	72	90	79
RHR PUMP A	2045	136	11	134	X	144	149	155	119	86	81	78	155	20	104	60	159	167	173	170	113	169	143
CVCS CHGP B	2060	461	85	775	188	376	487	97	404	153	132	126	521	102	192	44	679	922	1068	963	252	932	461
SI PUMP A	2080	326	26	289	164	142	147	X	301	136	119	116	413	21	178	60	436	531	576	541	209	534	337
S/G A PORV RV-1	3020	117	54	130	22	121	124	65	113	77	71	70	124	64	89	56	128	134	136	134	97	134	117
S/G B PORV RV-2	3020	117	54	130	22	121	124	65	113	77	71	70	124	64	89	56	128	134	136	134	97	134	117
S/G C PORV RV-3	3020	117	54	130	22	121	124	65	113	77	71	70	124	64	89	56	128	134	136	134	97	134	117
MFWP A	3050	296	39	229	138	336	363	370	85	106	119	114	398	98	176	79	152	348	548	515	205	461	311
AFW MDP A	3065	78	40	94	71	93	95	97	77	10	61	60	97	22	74	49	17	27	104	102	79	102	93
AFW SDP	3065	71	26	80	65	94	96	94	51	15	45	43	98	12	74	49	79	93	105	100	76	104	93
SW PUMP A	4060	584	87	1217	207	541	718	859	498	164	76	59	876	69	217	66	649	1653	2190	1752	159	1390	551
SW PUMP B	4060	584	85	1217	207	548	718	859	498	164	77	59	876	65	211	65	649	1653	2190	1752	159	1390	551
CCW PUMP A	4080	466	83	903	196	167	528	690	436	157	136	131	X	100	218	93	718	1109	1348	1168	265	1138	506
CCW PUMP B	4080	471	76	894	196	459	515	701	440	157	136	131	X	83	155	X	724	1138	1369	1184	265	1153	509
EDG A	5095	122	24	145	72	116	155	98	150	43	48	40	151	X	29	23	154	188	196	191	122	190	128
EMERGENCY BUS E1	5175	718	91	1947	221	762	932	1153	548	121	25	25	1043	116	247	83	X	3244	6257	3650	204	3021	706
DC BAT CHG A/A1	5235	639	90	1460	206	679	804	826	231	27	34	34	867	113	238	85	1068	2137	3129	2037	231	2190	93
AIR COMP A	6135	804	91	2576	229	859	1068	1413	644	177	151	144	1436	119	258	93	1825	6257	2920	5153	328	6738	804
AIR COMP PRIM	6135	775	87	2137	226	842	1043	1369	635	177	151	144	1390	119	256	93	1752	5153	8760	1436	326	5840	789
FIRE PUMP DIESEL	6175	617	92	1413	213	782	789	963	531	167	136	90	973	92	248	91	1138	2037	2920	2190	26	2086	635
DEEPWELL PUMP B	6270	303	79	596	178	417	461	512	173	146	79	76	518	102	196	74	528	695	804	701	234	21	21

Curve 3.5 - Time To CV Closure

Time = (200 - Initial Water Temp.) x Thermal Inertia Factor (TIF)



Based on Calculation RNP-M/MECH-1590

Use Thermal Inertia Factor = 0.00167 x t(hrs) prior to 100 Hours After Shutdown

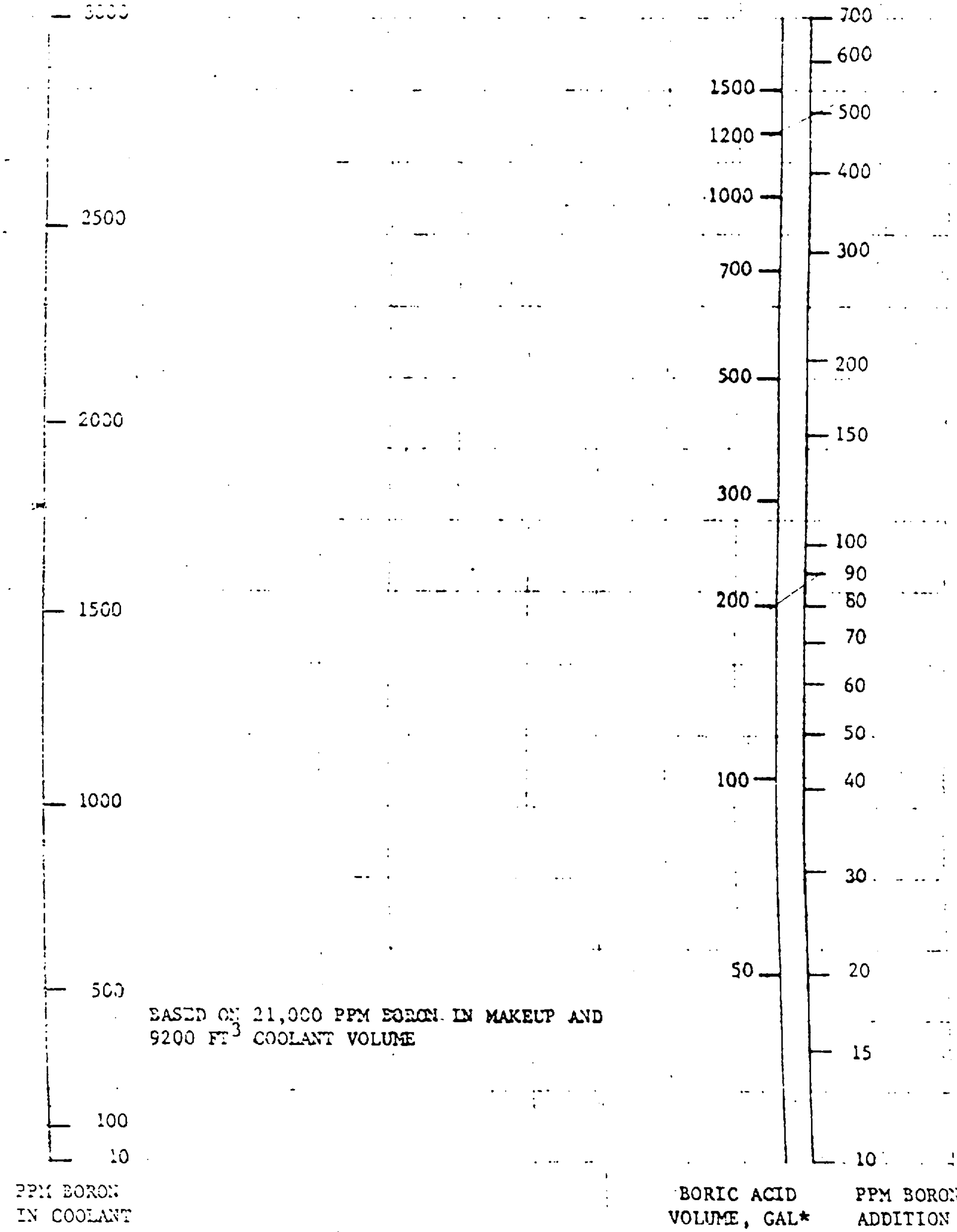


FIGURE S-3.1-3 BORON ADDITION - COOLANT HOT (~580°F)

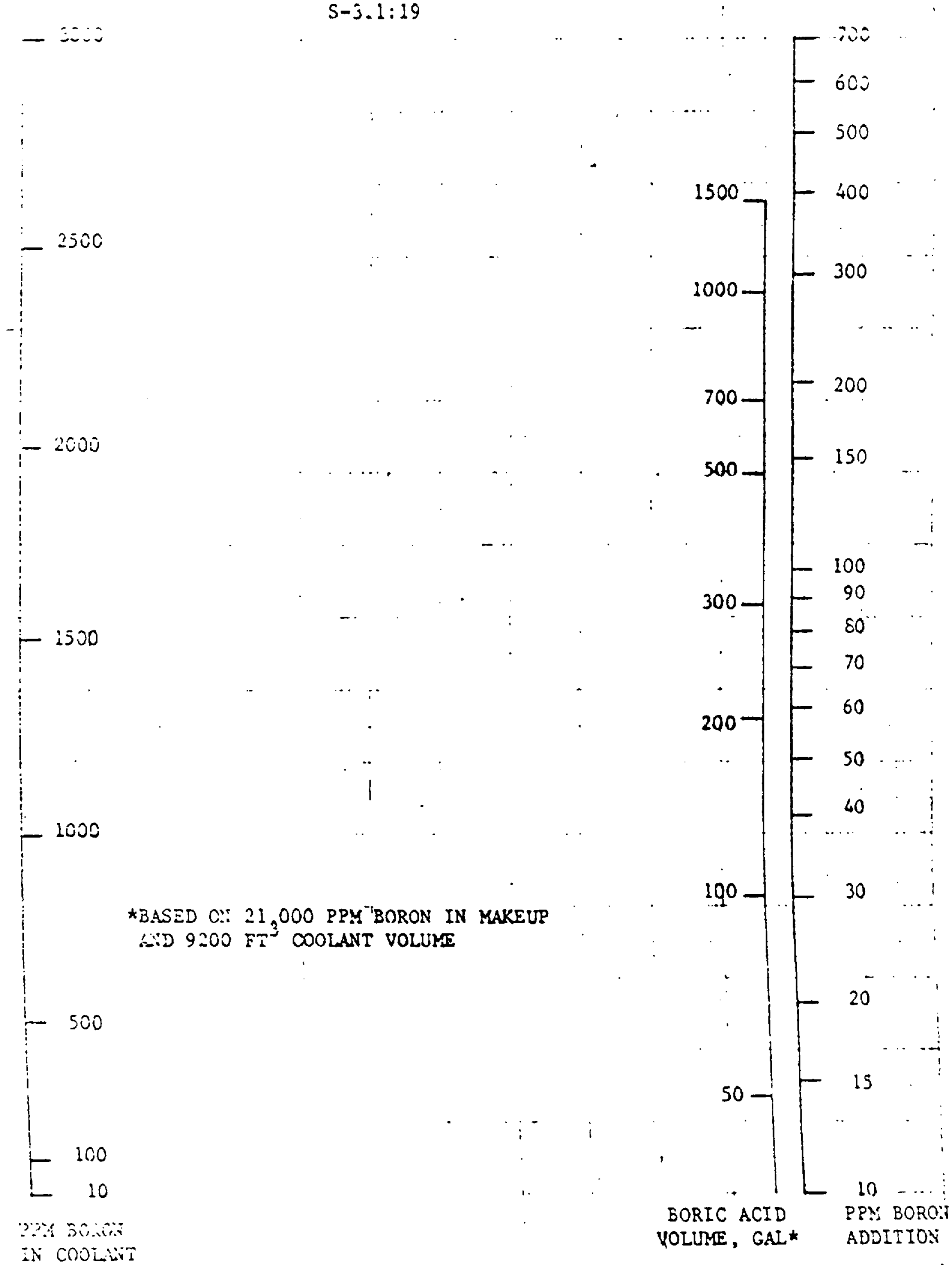


FIGURE S-3.1-4 BORON ADDITION - COOLANT COLD (~100°F)

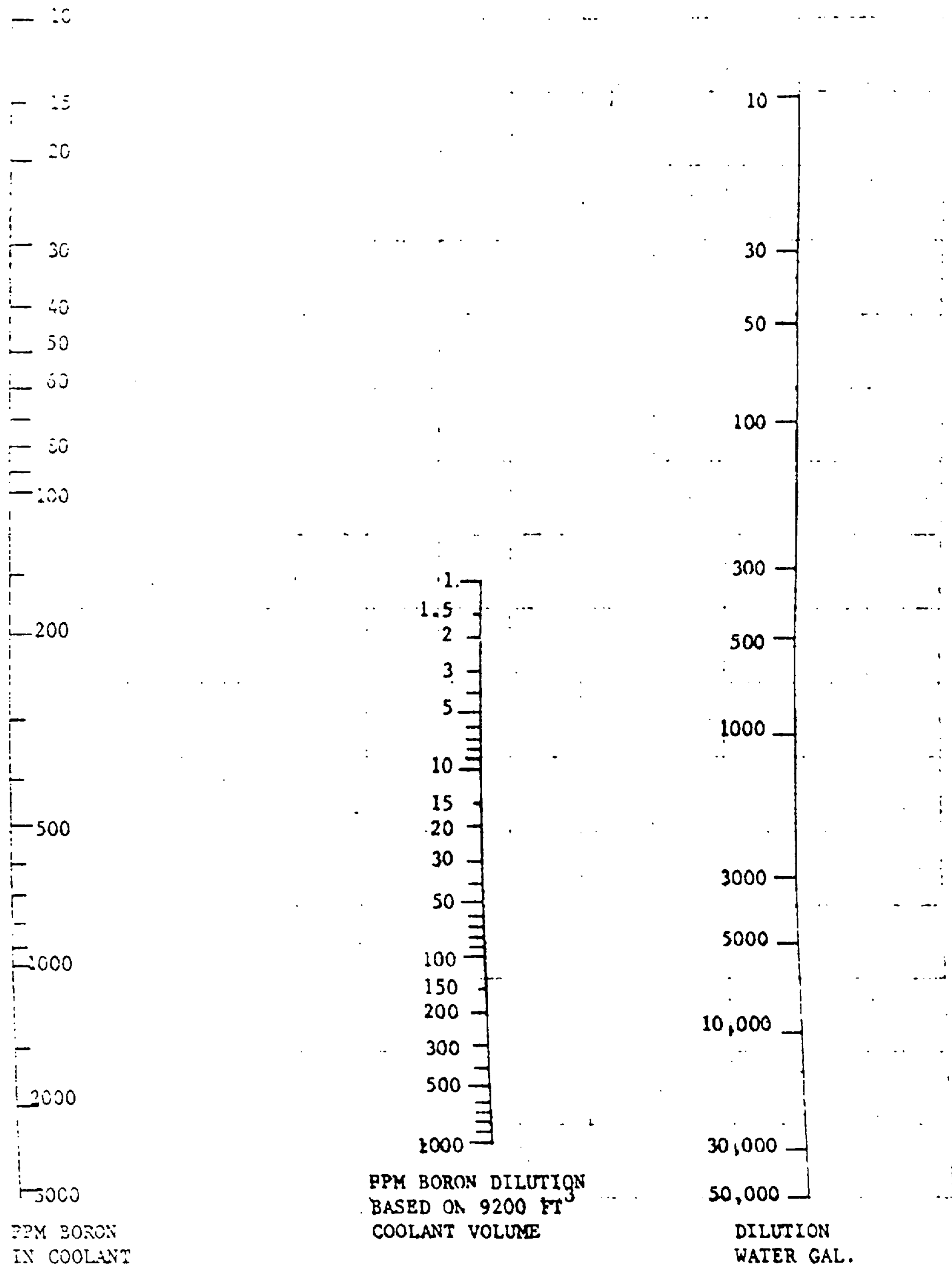


FIGURE S-3.1-7 DILUTION NOMOGRAPH - COOLANT HOT (~580°F)

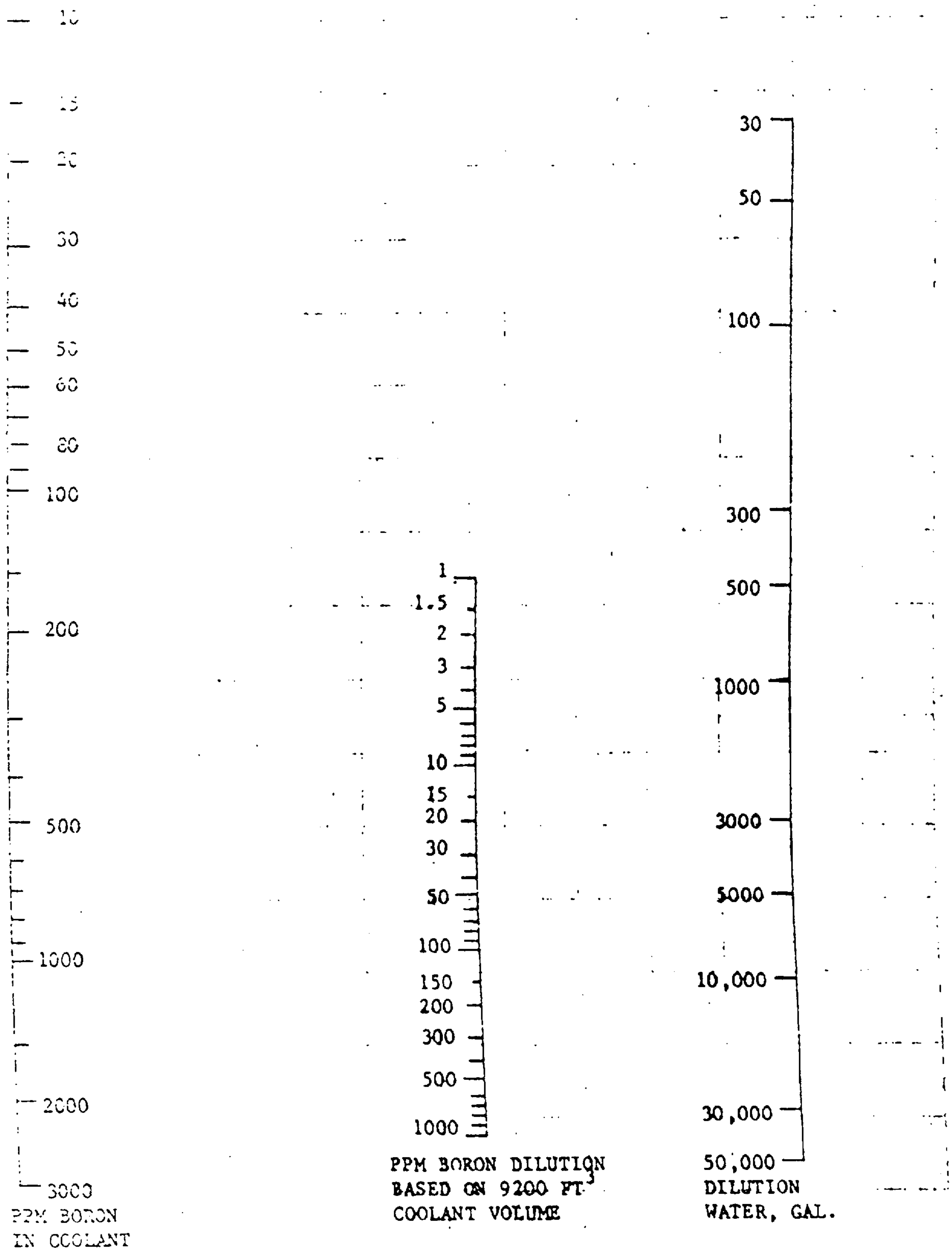


FIGURE S-3.1-8 DILUTION NOMOGRAPH - COOLANT COLD (~100°F)

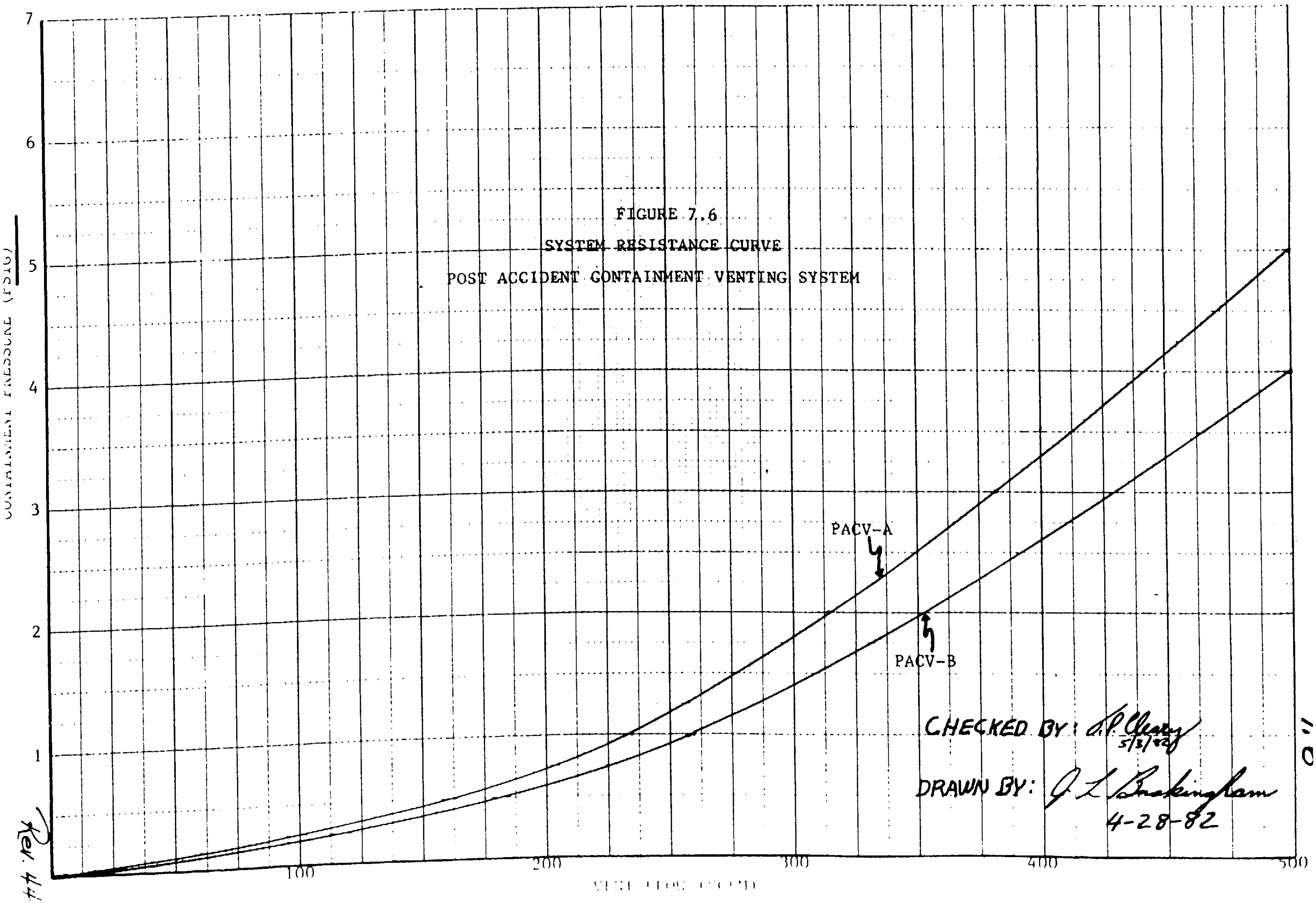
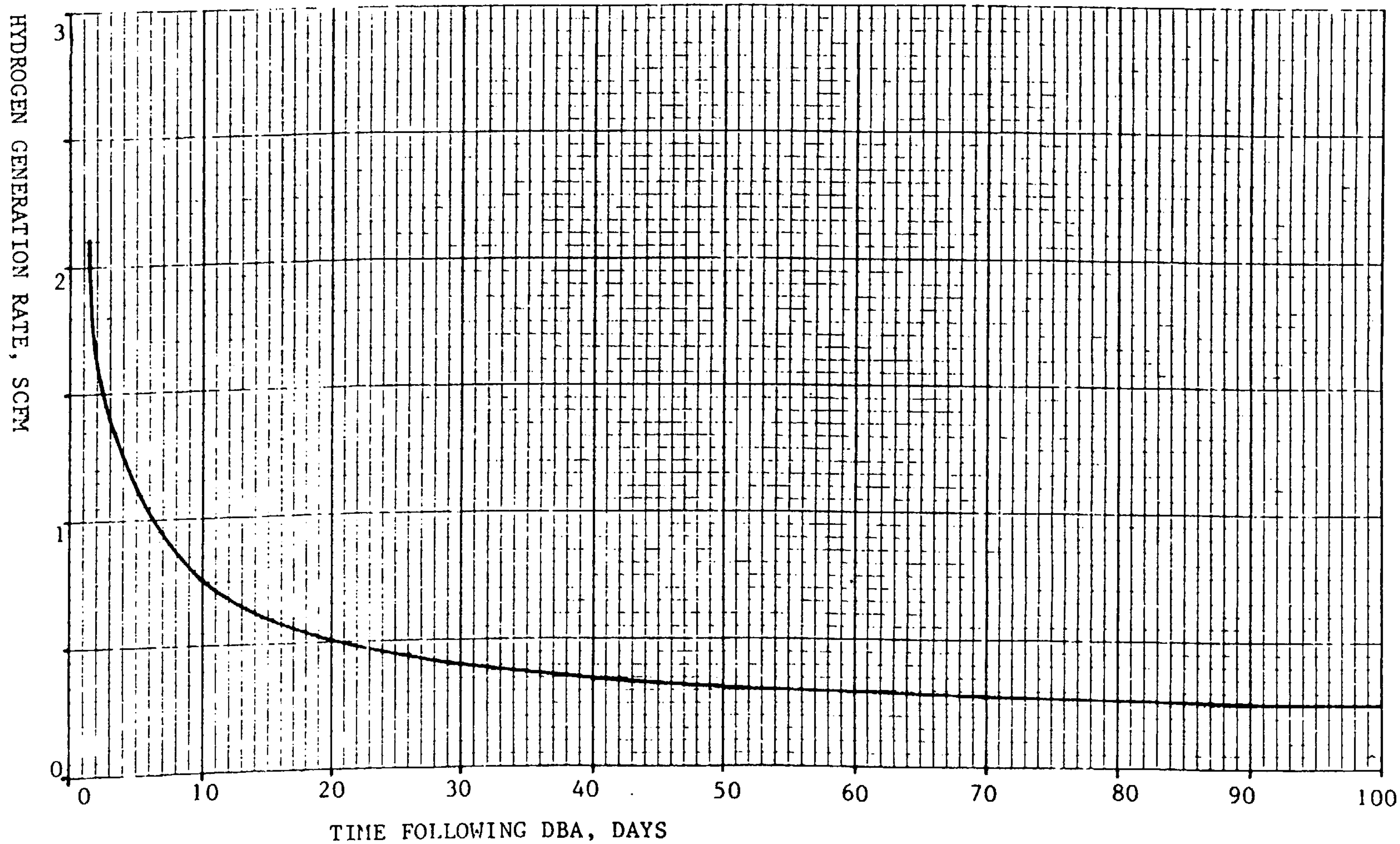


FIGURE 7.6
SYSTEM RESISTANCE CURVE
POST ACCIDENT CONTAINMENT VENTING SYSTEM



CURVE 7.16 TOTAL HYDROGEN GENERATION RATE FROM ALL SOURCES.

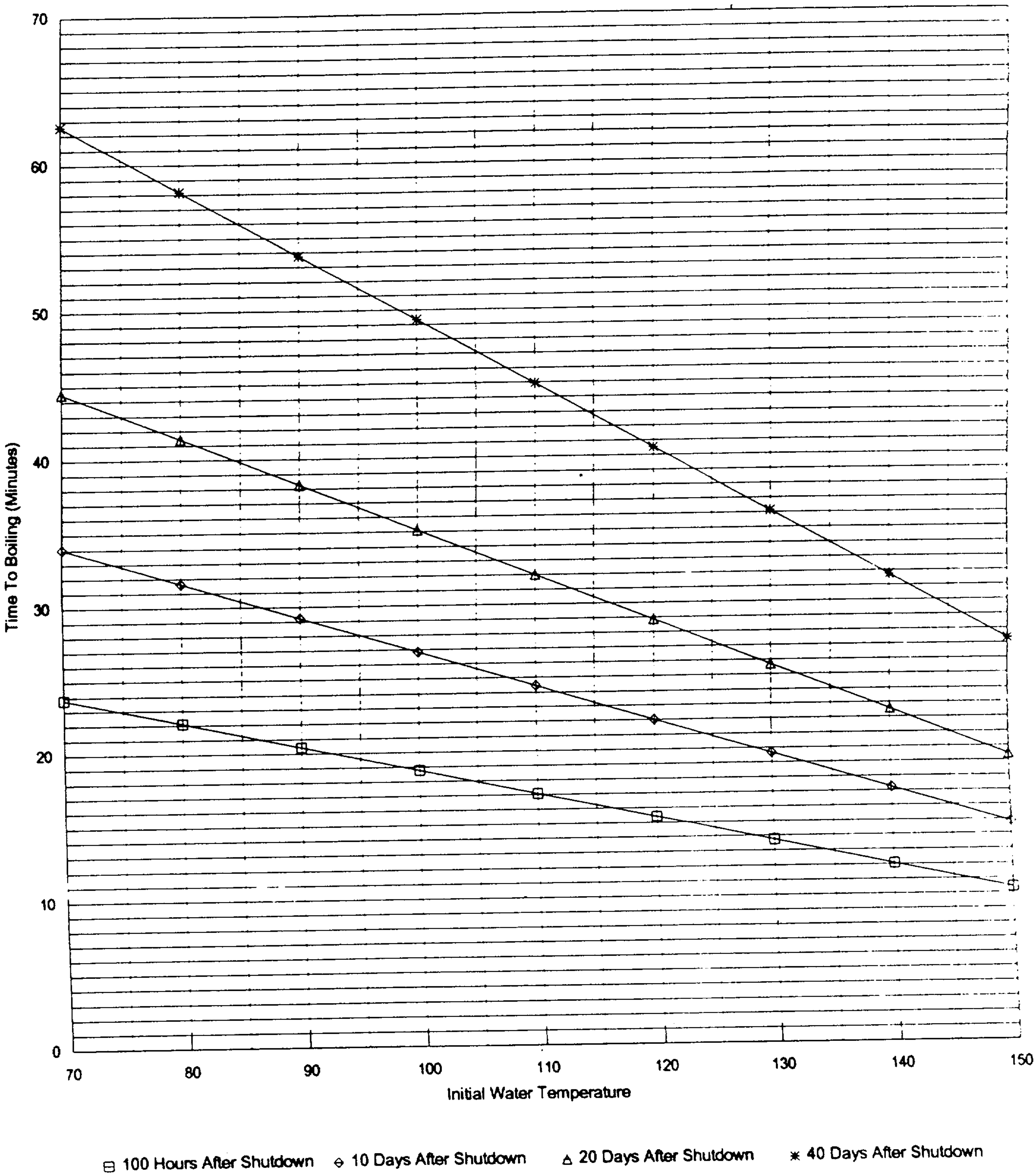
Drawn By: [illegible] 10-19-84

Checked By: [illegible] 10/19/84

830 Day Full Power TID Core
DBA Conditions
Hydrogen Sources:

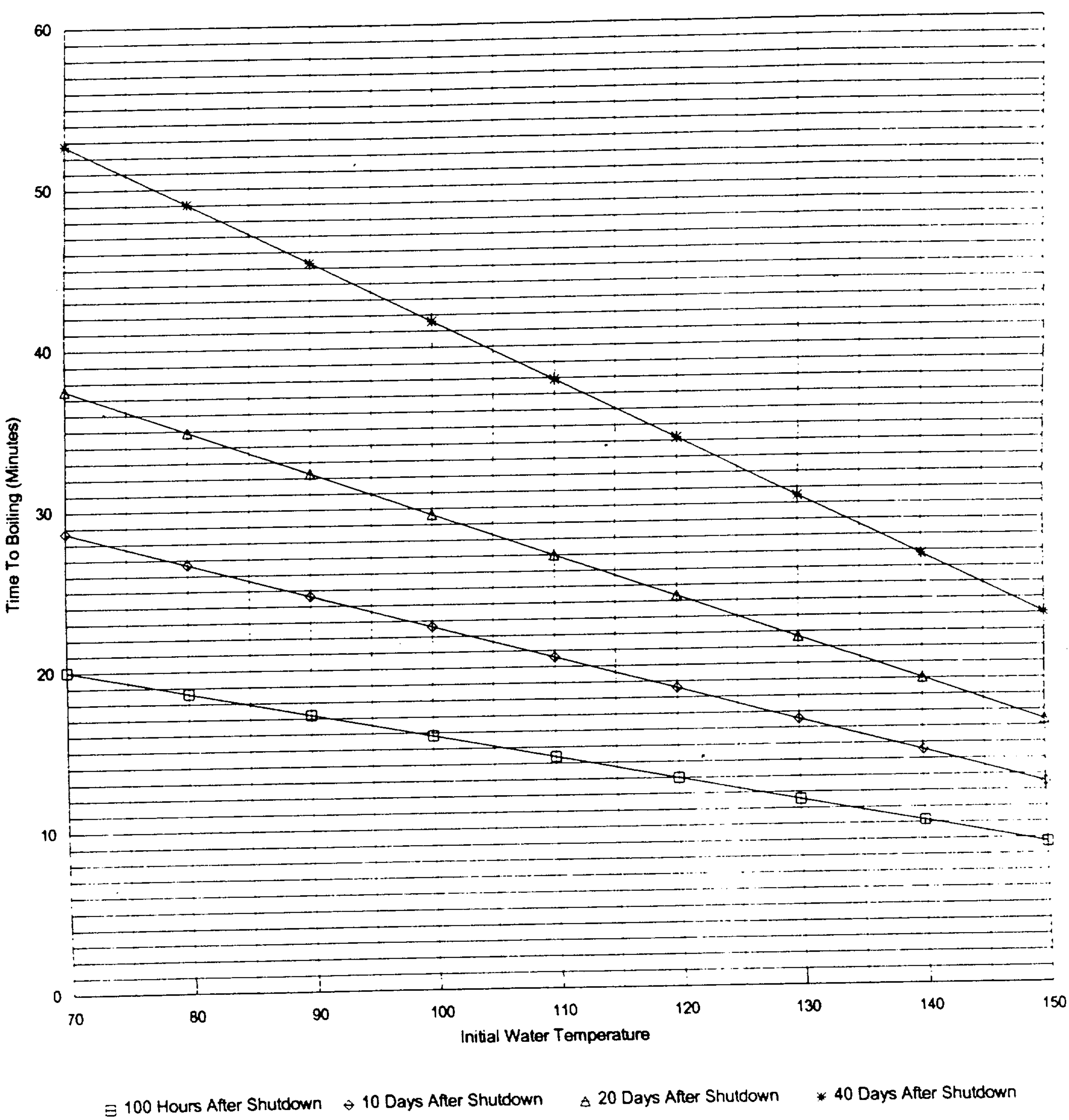
- Zirconium-Water Reaction
- Aluminum Corrosion
- Core Solution Radiolysis
- Sump Solution Radiolysis

Curve 7.19 - Loss of Residual Heat Removal Cooling Water Level Between 0" to -10" Below Vessel Flange



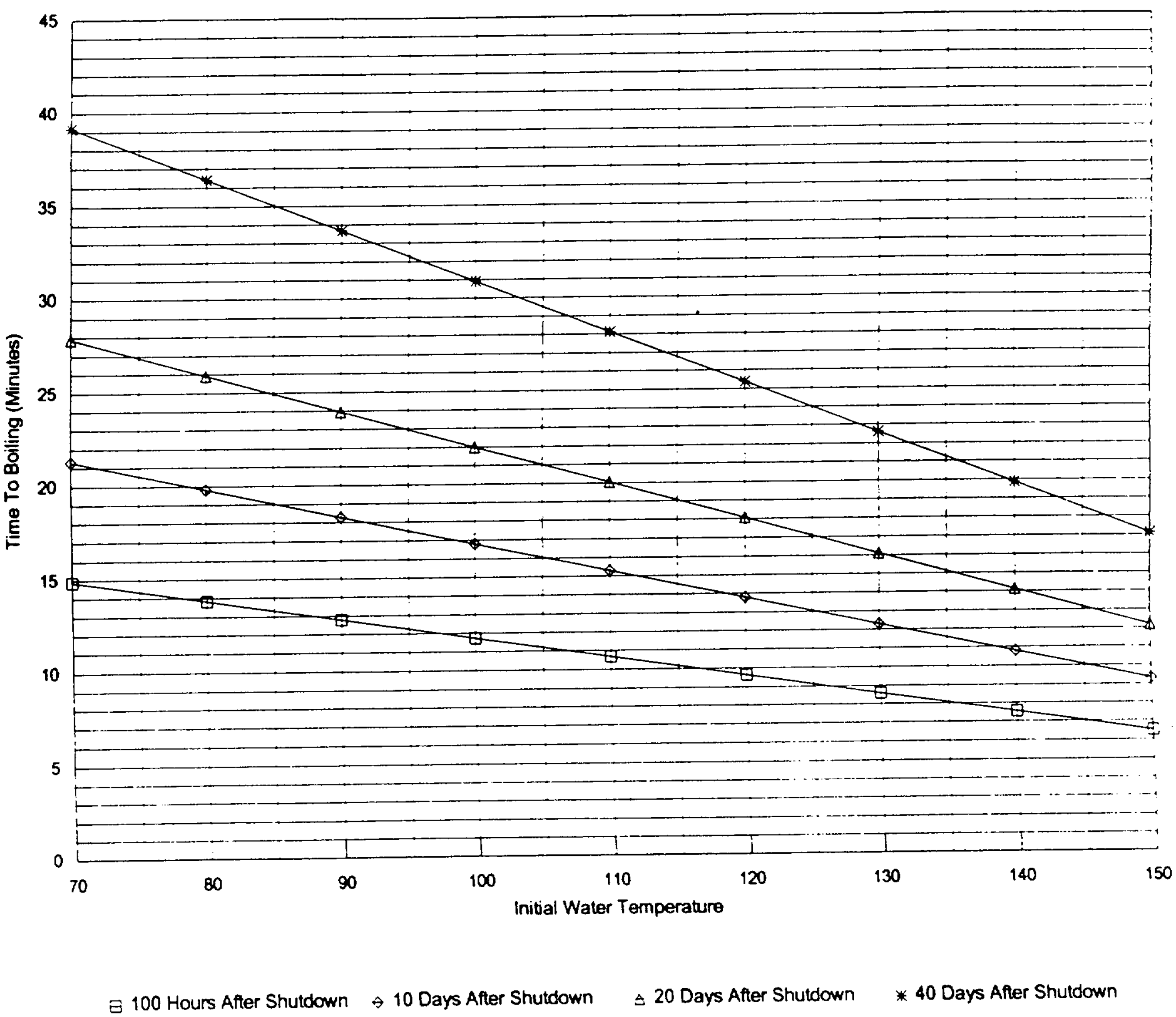
Based on calculation RNP-M/MECH-1590

Curve 7.20 - Loss of Residual Heat Removal Cooling Water Level Between -10" to -36" Below Vessel Flange



Based on calculation RNP-M/MECH-1590

Curve 7.21 - Loss of Residual Heat Removal Cooling
Water Level Between -36" to -72" Below Vessel Flange



Based on calculation RNP-M/MECH-1590

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

LCO 3.4.16 The specific activity of the reactor coolant shall be within limits.

APPLICABILITY: MODES 1 and 2,
MODE 3 with RCS average temperature (T_{avg}) ≥ 500°F.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 > 1.0 µCi/gm.	------------Note------------ LCO 3.0.4 is not applicable. ----------------------------	
	A.1 Verify DOSE EQUIVALENT I-131 within the acceptable region of Figure 3.4.16-1.	Once per 4 hours
	<u>AND</u>	
	A.2 Restore DOSE EQUIVALENT I-131 to within limit.	48 hours
B. Gross specific activity of the reactor coolant not within limit.	B.1 Be in MODE 3 with T_{avg} < 500°F.	6 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A not met. <u>OR</u> DOSE EQUIVALENT I-131 in the unacceptable region of Figure 3.4.16-1.	C.1 Be in MODE 3 with T_{avg} < 500°F.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.16.1	Verify reactor coolant gross specific activity ≤ 100/Ē μCi/gm.	7 days
SR 3.4.16.2	------------------NOTE------------------ Only required to be performed in MODE 1. -- Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤ 1.0 μCi/gm.	14 days <u>AND</u> Between 2 and 6 hours after a THERMAL POWER change of ≥ 15% RTP within a 1 hour period

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.16.3	-----------------NOTE----------------- Not required to be performed until 31 days after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours. -------------------------------------- Determine $\bar{E}$ from a sample taken in MODE 1 after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.	184 days

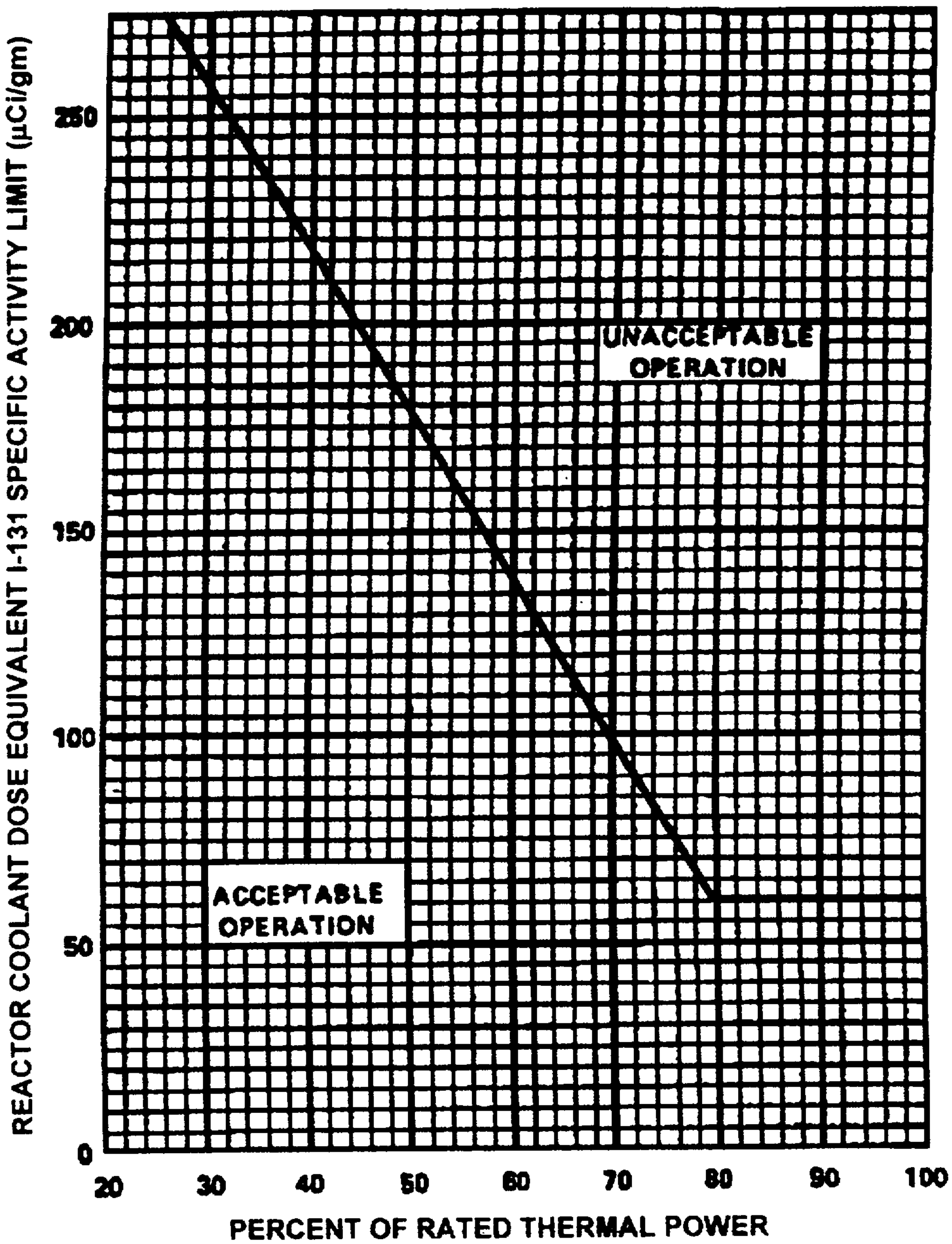


Figure 3.4.16-1
Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity
Limit Versus Percent of RATED THERMAL POWER

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

Applicant Information

Name:	ANSWER KEY	Region:	II
Date:		Facility/Unit:	H.B. Robinson
License Level:	SRO	Reactor Type:	Westinghouse
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 six 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

Question: 1

Given the following conditions:

- The unit is operating at 100% power.
- Annunciators APP-008-E7, S. SW HDR STRAINER PIT HI LEVEL, and APP-008-F7, SOUTH SW HDR LO PRESS, come in simultaneously.

Which ONE (1) of the following actions is required as an immediate action?

a. Stop 'A' and 'B' service water pumps

b. Close SW supply to south header valve V6-12A

c. Close SW supply to north header valve V6-12D

d. Close SW cross-connect valves V6-12B and V6-12C

Answer:

d. Close SW cross-connect valves V6-12B and V6-12C

Question: 2

Four Operators worked the following schedule at the RTGB position over the past six days:

HOURS WORKED (Shift turnover time not included. Do **NOT** assume any hours worked before or after this period.)

OPERATOR	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
1	10	14	off	12	12	12
2	14	12	14	10	off	11
3	off	off	off	13	11	14
4	11	13	14	off	11	12

Which ONE (1) of the operators would be permitted to work a 12 hour shift on Day 7 **WITHOUT** requiring permission to exceed normal overtime limits?

a. 1

b. 2

c. 3

d. 4

Answer:

a. 1

Question: 3

Given the following conditions:

- The unit was operating at 100% power when a pipe break occurred inside containment.
- Containment pressure is rising.
- RCS temperature is lowering.

Which ONE (1) of the following differentiates between a non-isolable main feed line break inside containment and a non-isolable main steam line break inside the containment of the same size?

a. RCS heat removal would be greater for the steam line break

b. Containment pressure would be greater for the feed line break

c. Containment sump level would be greater for the steam line break

d. RCS depressurization would be greater for the feed line break

Answer:

a. RCS heat removal would be greater for the steam line break

Question: 4

Given the following plant conditions:

- The RCP Seal Injection filter has just been changed out.
- HP placed the filter in a lead container.
- Prior to placement of the container, R-4, Charging Pump Room Monitor, read 2 mr/hr.
- The container is on a pallet outside of the Charging Pump Room.
- The activity source in the filter is primarily Cobalt-60.
- The container is 5 feet away from R-4 detector, and R-4 reads 10 mr/hr.

If the container is moved to 10 feet away from the R-4 detector, R-4 will indicate ...

a. 4.0 mR/hr.

b. 4.5 mR/hr.

c. 6.0 mR/hr.

d. 7.0 mR/hr.

Answer:

a. 4.0 mR/hr.

Question: 5

Given the following conditions:

- At 0110, a Reactor Trip and Safety Injection occurred following an accident.
- At 0112, an Alert was declared due to RCS leakage.
- At 0116, a Site Area Emergency was declared.
- At 0120, a General Emergency was declared.

Which ONE (1) of the following identifies the **LATEST** time that the **INITIAL** notification to State/County officials and the NRC must be completed?

	STATE / COUNTY	NRC
a.	0125	0210
b.	0127	0212
c.	0131	0216
d.	0135	0220

Answer:

b.	0127	0212

Question: 6

Given the following plant conditions:

- An emergency boration is in progress through MOV-350, BA to Charging Pmp Suct, per FRP-S.1, "Response to Nuclear Power Generation / ATWS."
- FI-110, Boric Acid Bypass Flow, indicates 33 gpm.
- FI-122, Charging Line Flow, indicates 75 gpm.
- VCT level is 23 inches.
- VCT Makeup is aligned for automatic operation.
- Normal letdown has been isolated.

VCT level will ...

a. remain essentially unaffected.

b. decrease to the auto makeup setpoint and stabilize.

c. decrease to the low-level setpoint and cause the charging pump suction to switch to the RWST.

d. decrease to the auto makeup setpoint and cycle between the makeup start and stop setpoints.

Answer:

d. decrease to the auto makeup setpoint and cycle between the makeup start and stop setpoints.

Question: 7

Given the following conditions:

- The unit is operating at 100% power.
- APP-003-C3, PRT HI PRESS and APP-003-D3, PRT HI/LO LVL have alarmed.
- PRT level and pressure are slowly increasing, but there is **NO** appreciable increase in PRT temperature.
- **NO** other annuciators are in alarm.

The PRT response is likely being caused by leakage past ...

a. PCV-455C, PZR PORV.

b. RC-551A, PZR Safety.

c. CVC-203A, High Pressure Letdown Line Relief.

d. CVC-382, Seal Water Return Line Relief.

Answer:

d. CVC-382, Seal Water Return Line Relief.

Question: 8

Which ONE (1) of the following conditions would result in a reactor trip?

a. PT-447, First Stage Turbine Pressure, fails low with power level at 22%

b. NI-43, PR Channel N43, fails low with power level at 49%

c. PT-446, First Stage Turbine Pressure, fails high with power level at $1x10^{-8}$ amps

d. NI-44, PR Channel N44, fails high with power level at $1x10^{-8}$ amps

Answer:

c. PT-446, First Stage Turbine Pressure, fails high with power level at $1x10^{-8}$ amps

Question: 9

Which ONE (1) of the following describes the reason for RCP restart in FRP-P.1, "Response To Imminent Pressurized Thermal Shock", if the SI termination criteria **CANNOT** be satisfied?

a. Restores PZR spray to allow RCS depressurization in subsequent steps

b. Equalizes S/G pressures to allow simultaneous cooldown of all three loops in subsequent steps

c. Mixes Safety Injection water and RCS water to raise the fluid temperature entering the Reactor Vessel downcomer

d. Transfer core cooling to forced flow allowing the operators to terminate Safety Injection when the criteria are **NOT** satisfied

Answer:

c. Mixes Safety Injection water and RCS water to raise the fluid temperature entering the Reactor Vessel downcomer

Question: 10

Given the following conditions:

- The plant has experienced a reactor trip.
- The CRSS directs the RO to manually initiate Safety Injection.
- The RO inadvertently depresses **BOTH** Containment Spray pushbuttons.

In addition to Containment Spray, which ONE (1) of the following are **ALL** expected to automatically occur?

a.
- Phase A
- Phase B

b.
- Phase A
- Containment Ventilation Isolation

c.
- Phase B
- Containment Ventilation Isolation

d.
- Phase A
- Phase B
- Containment Ventilation Isolation

Answer:

c.
- Phase B
- Containment Ventilation Isolation

Question: 11

Given the following conditions:

- A power reduction is in progress from 22% due to degrading condenser vacuum.
- The unit is currently at 8% power.
- REACTOR TRIP FROM TURB BLOCK P-7 permissive is illuminated.
- Condenser backpressure is 5.7 inches Hg Absolute and degrading slowly.
- **NO** cause has yet been identified.

Which ONE (1) of the following actions should be taken in accordance with AOP-012, "Partial Loss of Condenser Vacuum or Circulating Water Pump Trip"?

a. Trip the reactor and go to PATH-1

b. Trip the turbine and go to AOP-007, "Turbine Trip Without Reactor Trip Below P-7"

c. Trip the turbine and go to GP-006, "Normal Plant Shutdown From Power Operations to Hot Shutdown"

d. Begin a plant shutdown in accordance with GP-006, "Normal Plant Shutdown From Power Operations to Hot Shutdown"

Answer:

d. Begin a plant shutdown in accordance with GP-006, "Normal Plant Shutdown From Power Operations to Hot Shutdown"

Question: 12

Given the following conditions:

- The plant is shutdown following a reactor trip.
- RCPs are all secured.
- The Inadequate Core Cooling Monitor is **NOT** capable of providing subcooling margin.
- Primary Plant parameters indicate the following:

INSTRUMENT	**PARAMETER**	**VALUE**
PT-455	PZR Press	1485 psig
PT-456	PZR Press	1465 psig
PT-457	PZR Press	1515 psig
PT-402	RCS Press	1500 psig
PT-405	RCS Press	1525 psig
TI-453	PZR Temp (Surge Line)	524 °F
TI-454	PZR Temp (Vapor)	630 °F
TI-413	RCS Hot Leg WR Temp	538 °F
TI-423	RCS Hot Leg WR Temp	536 °F
TI-433	RCS Hot Leg WR Temp	534 °F
--	Highest Five (5) CETs	548 °F
		544 °F
		542 °F
		542 °F
		541 °F

The margin to saturation is ...

a. 46 °F.

b. 51 °F.

c. 56 °F.

d. 58 °F.

Answer:

a. 46 °F.

Question: 13

Given the following conditions:

- A 25 year old male started working for the Operations department at H.B. Robinson on March 3rd of this year.
- He previously worked this year at Shearon Harris as part of the Maintenance department.
- His exposure for this year at the Harris plant was 1200 mRem.
- He has received **NO** CP&L management exposure extensions and **NO** emergencies exist.

Which ONE (1) of the following is the **TOTAL ADDITIONAL** effective dose equivalent that the individual can receive **WITHOUT** management concurrence at Robinson this year?

a. 300 mRem

b. 800 mRem

c. 2000 mRem

d. 2800 mRem

Answer:

b. 800 mRem

Question: 14

Given the following conditions:

- A clearance is in effect with two (2) Maintenance department clearance holders (Clearance Holders A and B).
- Clearance Holder A has requested a temporary lift of a portion of the clearance to test equipment for one of the tasks.
- Clearance Holder B is **NOT** available on site and is **NOT** expected back for two (2) days.

Which ONE (1) of the following describes the process to temporarily lift the required portion of the clearance?

a. Obtain permission of Clearance Holder A and the Control Room Shift Supervisor, remove the tags as necessary, and reinstall the tags when complete

b. Obtain permission of Clearance Holder A and Clearance Holder B's supervisor, remove the tags as necessary, and reinstall the tags when complete

c. Obtain permission of Clearance Holder A and the Control Room Shift Supervisor, remove and cancel the entire clearance, and reissue a new clearance with different boundaries

d. Obtain permission of Clearance Holder A and Clearance Holder B's supervisor, remove and cancel the entire clearance, and reissue a new clearance with the same boundaries when complete

Answer:

b. Obtain permission of Clearance Holder A and Clearance Holder B's supervisor, remove the tags as necessary, and reinstall the tags when complete

Question: 15

Given the following conditions:

- Fuel is in the vessel.
- RCS temperature is 120°F.
- It is 10 days after the shutdown.
- RCS Level is 8" below the vessel flange.
- RHR cooling is lost.

Using the supplied references, which ONE (1) of the following identifies how much time remains before boiling begins occurring in the RCS?

a. 15.5 minutes

b. 22 minutes

c. 29 minutes

d. 40.5 minutes

Answer:

b. 22 minutes

Question: 16

Given the following conditions:

- While performing a surveillance on LT-460, I&C personnel discovered at 1200 that the high level trip setpoint for the channel was 87.5%, which is outside the calibration tolerance band.
- The I&C personnel adjusted the LT-460 high level trip setpoint back to 91.0% at 1215 and completed the surveillance satisfactorily.
- They report the "as found" information to the Work Control SRO who determines that the channel was inoperable in the "as found" condition.
- The Work Control SRO notifies the SSO at 1230 of the inoperability of the channel in the "as found" condition.

Which ONE (1) of the following statements is correct concerning the operability of the channel in accordance with Technical Specifications?

a. An operability determination is **NOT** required since the setpoint deviation was less than 5%.

b. An operability determination is **NOT** required since the channel is now operable.

c. The channel is **NOT** operable and the bistables associated with LT-460 must be placed in a tripped condition no later than 1800.

d. The channel is **NOT** operable and he bistables associated with LT-460 must be placed in a tripped condition no later than 1830.

Answer:

b. An operability determination is **NOT** required since the channel is now operable

Question: 17

Given the following conditions:

- The unit has been shutdown for 30 days for refueling.
- Refueling cavity level is (-)18" below the flange.
- Initial water temperature is 106 °F.
- RHR cooling is lost.

Using the supplied references, which ONE (1) of the following indicates approximately how much time exists before Containment Closure is required?

a. 30 minutes

b. 35 minutes

c. 12.9 hours

d. 14.0 hours

Answer:

a. 30 minutes

Question: 18

Given the following conditions:

- SG Tube Leakage in excess of Technical Specification limits was detected with the unit at power.
- The leaking SG has been identified.
- AOP-035, "SG Tube Leak," is being implemented.
- The leaking SG has been isolated.
- The RCS has been cooled down to 480 °F by core exit thermocouple readings.
- The RCS has been depressurized to less than leaking SG pressure and stabilized.
- All RCPs are running .
- Pressurizer level is 85%.

Which ONE (1) of the following describes the actions the operators should take if the affected SG level begins to decrease?

a. Increase charging flow AND turn on pressurizer heaters

b. **ONLY** turn on pressurizer heaters

c. **ONLY** depressurize using normal sprays

d. Increase charging flow AND depressurize using normal sprays

Answer:

b. **ONLY** turn on pressurizer heaters

Question: 19

Given the following conditions:

- The unit is operating at 40% power.
- An instrument air header break has occurred.
- Instrument air pressure at the receiver is 79 psig.
- Charging Pump 'A' speed has increased to maximum.
- HIC-121, Charging Flow, is fully open.
- VCT level has decreased to 11".

Which ONE (1) of the following actions should be directed to be taken?

a. Align the Charging Pump suction to the RWST and perform a plant shutdown per GP-006, "Normal Plant Shutdown From Power Operation to Hot Shutdown"

b. Align the Charging Pump suction to the RWST, trip the reactor, and go to PATH-1

c. Close HIC-121 and perform a plant shutdown per GP-006, "Normal Plant Shutdown From Power Operation to Hot Shutdown"

d. Close HIC-121, trip the reactor, and go to PATH-1

Answer:

b. Align the Charging Pump suction to the RWST, trip the reactor, and go to PATH-1

Question: 20

Given the following conditions:

- The unit is operating at 100% power.
- All plant systems are available.
- Maintenance is being planned on the following system trains that will make them each unavailable for between 42 and 48 hours:
  - PZR PORV 456
  - MDAFW Pump 'A'
  - SG 'C' PORV
  - RHR Pump 'A'

Using the supplied references, which ONE (1) of the following combinations are permitted to be taken out at the same time based on these planned maintenance times?

a.
- PZR PORV 456
- RHR Pump 'A'

b.
- PZR PORV 456
- MDAFW Pump 'A'

c.
- RHR Pump 'A'
- SG 'C' PORV

d.
- MDAFW Pump 'A'
- SG 'C' PORV

Answer:

d.
- MDAFW Pump 'A'
- SG 'C' PORV

Question: 21

Given the following conditions:

- A reactor shutdown is in progress.
- APP-005-B2, N-35 LOSS OF COMP VOLT, is received.
- N-35 indicates 6.0x10E-10 amps.
- N-36 indicates 7.0x10E-11 amps.
- N-51 indicates 80 counts.
- N-52 indicates 90 counts.

Which ONE (1) of the following describes the **MINIMUM** action(s) required to obtain Source Range N-31 and N-32 indication?

a. Push **ONLY** the "Train A Source Range Logic Trip Defeat" button

b. Push **ONLY** the "Train A Permissive P-6 Defeat" button

c. Push **BOTH** the "Train A Source Range Logic Trip Defeat" AND the "Train B Source Range Logic Trip Defeat" buttons

d. Push **BOTH** the "Train A Permissive P-6 Defeat" AND the "Train B Permissive P-6 Defeat" buttons

Answer:

d. Push **BOTH** the "Train A Permissive P-6 Defeat" AND the "Train B Permissive P-6 Defeat" buttons

Question: 22

Given the following conditions:

- The unit is operating at 100% power.
- **NO** scheduled releases are in progress.
- A small leak develops from the bottom of Waste Condensate Tank "A".
- All ventilation systems are in a normal configuration.

An indication that would alert the operators of the accidental liquid release in progress is an increase in the level of monitor ...

a. R-3, PASS Panel Area Monitor.

b. R-4, Charging Pump Room Area Monitor.

c. R-9, Letdown Line Area Monitor.

d. R-14C, Plant Effluent Noble Gas, Low Range Monitor.

Answer:

d. R-14C, Plant Effluent Noble Gas, Low Range Monitor.

Question: 23

Given the following conditions:

- The Control Room has filled with dense smoke from a fire on Unit 1.
- The reactor has been tripped manually by operators.
- The Control Room has been evacuated due to the dense smoke.

Which ONE (1) of the following identifies the procedure(s) that will be **INITIALLY** used to stabilize the plant?

a. EOP Path-1 and EPP-004, Reactor Trip Reponse

b. DSP-002, Hot Shutdown Using the Dedicated/Alternate Shutdown System

c. AOP-004, Control Room Inaccessibility

d. GP-006, Normal Plant Shutdown from Power Operation to Hot Shutdown

Answer:

c. AOP-004, Control Room Inaccessibility

Question: 24

Given the following conditions:

- The unit is operating at 40% power.
- OST-011, "Rod Cluster Control Exercise & Rod Position Indication Monthly Interval," is being performed.
- Annunciator APP-005-E2, ROD CONT SYSTEM URGENT FAILURE, alarms just as Control Bank 'C' rods are being withdrawn.

Which ONE (1) of the following describes this condition and / or the actions that should be taken?

a.
- This is an expected alarm.
- Continue withdrawing Control Bank 'C' rods.

b.
- This makes more than one rod inoperable.
- Trip the reactor and go to PATH-1.

c.
- Place the ROD BANK SELECTOR switch in Manual.
- Restore Tavg to Tref by raising turbine load.

d.
- Place the ROD BANK SELECTOR switch in Manual.
- Restore Tavg to Tref by dilution.

Answer:

d.
- Place the ROD BANK SELECTOR switch in Manual.
- Restore Tavg to Tref by dilution.

Question: 25

Given the following conditions:

- The unit was operating at 100% power.
- A turbine runback is in progress.
- Power is currently at 93% and lowering as the turbine runback occurs.
- APP-005-D5, OTΔT/OPΔT TURBINE RUNBACK ROD STOP, is illuminated.
- APP-004-E3, OVERTEMP ΔT TRIP, is illuminated.
- All loop ΔT's indicate less than the OTΔT and OPΔT setpoints.
- All OTΔT and OPΔT bistables are extinguished.

Which ONE (1) of the following describes the actions to be taken?

a. Verify the turbine runback stops when power lowers to 90%

b. Verify the turbine runback stops when power lowers to 70%

c. Place the turbine in MANUAL due to a runback circuitry failure

d. Trip the reactor and go to PATH-1

Answer:

d. Trip the reactor and go to PATH-1

Question: 26

Given the following conditions:

- A valid alarm has been acknowledged for R-1, Control Room Area Monitor.
- The CRSS has entered AOP-005, Radiation Monitoring System.
- Step 3 of Attachment 1 has the operator stop the HVS-1 Auxiliary Building Supply Fan by opening the supply breaker on MCC-5.

Which ONE (1) of the following is the basis for this step?

a. Ensures that any air-flow will be from the Control Room to the Auxiliary Building

b. Ensures that the air-borne contaminants in the Control Room will be exhausted to the Auxiliary Building for cleanup

c. Ensures that personnel in the Auxiliary Building will **NOT** be exposed to high airborne activity for a prolonged period

d. Ensures that personnel in the Control Room will **NOT** be exposed to high radiation condition for a prolonged period of time

Answer:

a. Ensures that any air-flow will be from the Control Room to the Auxiliary Building

Question: 27

Given the following conditions:

- A large break (DBA) LOCA has occurred.
- EPP-15, Loss of Emergency Coolant Recirculation, is being implemented.
- One SI Pump and one RHR pump are running.
- Time after trip and SI is 20 minutes.
- SI **CANNOT** be terminated due to insufficient subcooling.

Using the supplied references, which ONE (1) of the following states the **MINIMUM** SI flow for these conditions?

a. One RHR pump injecting, with flow manually throttled to approximately 260 gpm

b. One RHR pump injecting, with flow manually throttled to approximately 130 gpm

c. One SI pump injecting, with flow manually throttled to approximately 260 gpm

d. One SI pump injecting, with flow manually throttled to approximately 130 gpm

Answer:

c. One SI pump injecting, with flow manually throttled to approximately 260 gpm

Question: 28

Given the following conditions:

- The unit is operating at 24% power during a plant startup.
- Rods are being withdrawn to raise RCS temperature.
- When the IN-HOLD-OUT lever is released, rods continue to step outward.

Which ONE (1) of the following actions should be taken?

a. Place the ROD BANK SELECTOR switch in Automatic and verify rod motion stops

b. Place the ROD BANK SELECTOR switch in Manual and verify rod motion stops

c. Manually trip the reactor in anticipation of an Intermediate Range High Flux Trip and go to PATH-1

d. Manually trip the reactor in anticipation of a Power Range High Flux (Low Setpoint) Trip and go to PATH-1

Answer:

a. Place the ROD BANK SELECTOR switch in Automatic and verify rod motion stops

Question: 29

A Containment Purge is in progress.

Which ONE (1) of the following will automatically terminate the purge on a high radiation signal?

a. R-2, Containment Area

b. R-11, Containment Air and Plant Vent Particulate

c. R-14A, Plant Effluent Particulate

d. R-16, Containment HVH Cooling Water Radioactive Liquid

Answer:

b. R-11, Containment Air and Plant Vent Particulate

Question: 30

Given the following conditions:

- Reactor power is 35%.
- All control systems are in automatic.
- Pressurizer level transmitter LT-459 is selected for control.
- A small leak develops across the differential pressure bellows for LT-459, resulting in pressure equalizing across the bellows.

Assuming **NO** operator actions, which ONE (1) of the following describes the instrumentation and plant response to this leak?

	LI-459 PZR LVL	**LI-460 PZR LVL**
a.	Increases	Increases
b.	Increases	Decreases
c.	Decreases	Increases
d.	Decreases	Decreases

Answer:

b.	Increases	Decreases

Question: 31

Given the following conditions:

- The plant is being shutdown because of high vibrations on Condensate Pump "A".
- The plant is currently at 65% power.
- Two Main Feedwater Pumps, two Condensate Pumps and a Heater Drain Tank Pump are in service.
- Condensate Pump "A" trips.

Which ONE (1) of the following actions should be taken?

a. Attempt to stabilize the plant at the current power level

b. Attempt to lower turbine load at a rate between 1% minute and 5% per minute and stablize the plant at or below 60% power

c. Attempt to lower turbine load at a rate between 1% minute and 5% per minute and stablize the plant at or below 50% power

d. Trip the reactor and go to PATH-1

Answer:

c. Attempt to lower turbine load at a rate between 1% minute and 5% per minute and stablize the plant at or below 50% power

Question: 32

Given the following excerpt from OP-922, "Post Accident Containment, Hydrogen Reduction/Venting System", and the following conditions:

- A design basis LOCA occurred 90 days ago.
- Hydrogen Concentration (Hydrogen Monitor Reading) is 2.5%.
- The H_2 Recombiner System is unavailable for Containment Hydrogen Reduction.

From OP-922:

"5.2.8 Determine the following data:

1. H_2 generation rate from Curve Book, Curve 7.16, Total Hydrogen Generation Rate From All Sources.

- Time following DBA _____ Days
- H_2 Generation Rate _____ SCFM (Curve 7.16)

2. H_2 Concentration from Containment Hydrogen Monitor located in the Control Room or from analysis of Containment samples:

- H_2 Concentration _____ %

5.2.9 Calculate the required exhaust flow:

1. $$Qe = 2400 \frac{G}{C}$$

- Qe is exhaust flow in SCFM
- G is H_2 Generation rate
- C is H_2 Concentration

Required exhaust flow _____ SCFM

NOTE: The Containment Air Exhaust Line (PACV "B") should be used in preference to the Pressure Relief Line (PACV "A").

Using the supplied references, in order to provide required exhaust flow through preferred exhaust path (Containment Air Exhaust), Containment pressure should be raised to approximately …

a. 0.9 psig.

b. 1.1 psig.

c. 3.7 psig.

d. 4.6 psig.

Answer:

a. 0.9 psig.

Question: 33

Which ONE (1) of the following Fire Brigade qualified personnel would normally serve as the Fire Brigade Team Leader in the event of a fire in the Auxiliary Building of Unit 2?

a. Fire Protection Auxiliary Operator

b. WCC Senior Reactor Operator

c. Unit 1 Superintendent Shift Operations

d. Environmental & Radiation Control Supervisor

Answer:

b. WCC Senior Reactor Operator

Question: 34

Given the following conditions:

- The unit is operating at 100% power.
- APP-~~001~~ 002-F7, INST AIR HDR LO PRESS, has illuminated.
- AOP-017, "Loss of Instrument Air", is being implemented.
- Instrument air pressure currently reads 79 psig and slowly decreasing.
- The Station Air Compressor is running.

SA to IA cross connect ...

a. valve, SA-5 will automatically OPEN to pass SA through the IA aftercoolers and separators to remove contaminants prior to passing into the IA header.

b. bypass filter isolation valves, SA-220 & SA-221, will automatically OPEN to pass SA through a filter to remove contaminants prior to passing into the IA header.

c. valve, SA-5 will be manually OPENED to pass SA through the IA aftercoolers and separators to remove contaminants prior to passing into the IA header.

d. bypass filter isolation valves, SA-220 & SA-221, will be manually OPENED to pass SA through a filter to remove contaminants prior to passing into the IA header.

Answer:

d. bypass filter isolation valves, SA-220 & SA-221, will be manually OPENED to pass SA through a filter to remove contaminants prior to passing into the IA header.

Question: 35

Given the following conditions:

- The unit was operating at 100% with bank D rods at 218 steps when a failure of 'B' inverter occurred.
- **NO** reactor trip occurred.
- Rods **CANNOT** be withdrawn.

Which ONE (1) of the following is preventing rod motion?

a. Power range flux rod stop

b. Intermediate range flux rod stop

c. Overtemperature ΔT rod stop

d. Overpower ΔT rod stop

Answer:

a. Power range flux rod stop

Question: 36

Given the following conditions:

- A reactor trip and safety injection have occurred due to a SGTR.
- A transition was made from PATH-1 to PATH-2.
- During the performance of PATH-2, an improper communication results in the CRSS incorrectly transitioning to EPP-17, "SGTR With Loss of Reactor Coolant: Subcooled Recovery."
- The first four (4) steps of EPP-17 either verify actions previously completed in PATH-1 or check plant indications only (**NO** ACTIONS ARE ACTUALLY PERFORMED).
- After completion of the first four (4) steps of EPP-17, the CRSS recognizes that the wrong procedure is being implemented.

Which ONE (1) of the following describes the actions that the CRSS should take to most quickly mitigate the consequences of the SGTR **WITHOUT** violating any procedures?

a. Continue on in EPP-17, transitioning to PATH-2, Entry Point J, when directed

b. Transition back to PATH-1, Entry Point A

c. Transition back to PATH-2, Entry Point J

d. Transition back to the point in PATH-2 where the incorrect transition was made

Answer:

d. Transition back to the point in PATH-2 where the incorrect transition was made

Question: 37

Given the following plant conditions:

- During a plant transient, Control Bank 'D' rods are moved inward.
- After the plant stabilizes, the Reactor Operator recognizes that two (2) Control Bank 'D' rods are misaligned by greater than allowed by Technical Specification limits.

Which ONE (1) of the following actions are to be taken?

a.
- Verify Shutdown Margin within 1 hour, and
- Realign the misaligned rods or be in Mode 3 within 2 hours

b.
- Verify Shutdown Margin within 1 hour, and
- Realign the misaligned rods or reduce power to < 70% within 2 hours

c.
- Verify Shutdown Margin within 1 hour, and
- Shutdown to Mode 3 within 6 hours

d.
- Trip the reactor, and
- Go to PATH-1

Answer:

c.
- Verify Shutdown Margin within 1 hour, and
- Shutdown to Mode 3 within 6 hours

Question: 38

Using the supplied references, which ONE (1) of the following conditions would require a One-Hour Notification in accordance with AP-030, "NRC Reporting Requirements"?

a. A manual reactor trip is actuated from 20% power due to a break in the Main Turbine Electro Hydraulic Control system piping

b. An automatic safety injection is actuated at 100% power due to an I&C Technician lifting an incorrect lead

c. You receive a report that a previously reported employee's positive FFD test was erroneous and is due to an administrative error at the laboratory

d. While on your tour, you note that the WCC SRO's speech is slurred and you smell alcohol on his breath

Answer:

c. You receive a report that a previously reported employee's positive FFD test was erroneous and is due to an administrative error at the laboratory

Question: 39

Given the following conditions:

- The RCS is at 190°F during a plant cooldown.
- A break in the CCW system has resulted in all CCW pumps being tripped.
- All RCPs have been secured.
- Charging Pump 'B' is running, with Charging Pump 'A' secured.
- Charging Pump 'C' is under clearance.
- AOP-014, Attachment 1, "Emergency Cooling to Charging Pump," has just been started.

Which ONE (1) of the following describes how the Charging Pumps should be configured until emergency cooling is available?

a. All Charging Pumps should be stopped

b. Charging Pumps 'A' and 'B' should be alternately operated at minimum speed every 15 minutes

c. Charging Pump 'B' should be operated at minimum speed

d. Charging Pump 'B' should be operated at maximum speed

Answer:

d. Charging Pump 'B' should be operated at maximum speed

Question: 40

Given the following conditions:

- A reactor trip has occurred.
- A transition has been made from PATH-1 to EPP-4, "Post Trip Response."
- APP-004-B2, PZR LO PRESS TRIP, is flashing.
- RCS pressure is 1825 psig and decreasing at 10 psig per minute.
- Pressurizer level is 13% and decreasing at 2% per minute.
- Containment pressure is 3.1 psig and increasing at 0.2 psig per minute.
- RCS Temperature is 553 °F and lowering slowly.
- All Charging Pumps are running at maximum speed.

Based on the procedures in effect, which ONE (1) of the following describes the instructions the CRSS should give to the Reactor Operator?

a. Start **BOTH** Safety Injection Pumps

b. Initiate Containment Spray

c. Initiate Safety Injection

d. Stabilize RCS temperature

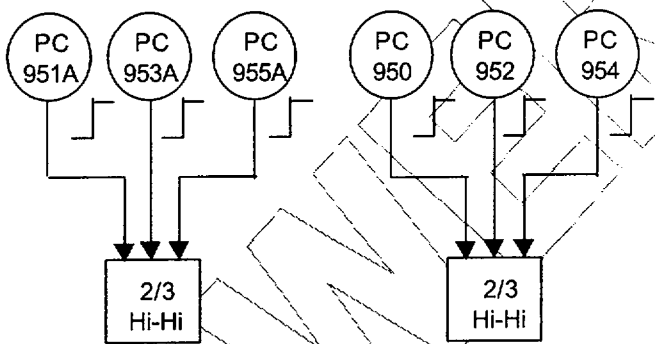
Answer:

c. Initiate Safety Injection

Question: 41

Given the following conditions:

- Power has been lost to Containment Pressure channel 954.
- Containment Pressure transmitter PT-950 has failed low.
- **NO** actions in OWP-032, "Containment Pressure," have been performed.
- A large break LOCA occurs and actual Containment Pressure reaches 21 psig.



Which ONE (1) of the following describes the response of the Containment Spray system?

a. **NEITHER** train of Containment Spray will automatically actuate

b. **ONLY** Train 'A' of Containment Spray will automatically actuate

c. **ONLY** Train 'B' of Containment Spray will automatically actuate

d. **BOTH** trains of Containment Spray will automatically actuate

Answer:

a. **NEITHER** train of Containment Spray will automatically actuate

Question: 42

Given the following conditions:

- The unit is operating at 100% power.
- Normal letdown is in service.
- Pressurizer level control is in automatic
- Leakage passed the hydrogen pressure regulator to the VCT causes pressure in VCT to increase.

Which ONE (1) of the following describes the effect of this on RCP seal flow?

	No. 1 SEAL LEAKOFF FLOW	No. 2 SEAL LEAKOFF FLOW
a.	Increases	Increases
b.	Decreases	Decreases
c.	Decreases	Increases
d.	Increases	Decreases

Answer:

c.	Decreases	Increases

Question: 43

Given the following conditions:

- A reactor trip occurred from 20% power.
- Coincident with the reactor trip, 480V Bus E-1 deenergized and was subsequently energized by the EDG.
- Twenty (20) seconds following the trip, SG levels are:

SG	LEVEL
'A'	12%
'B'	28%
'C'	26%

Which ONE (1) of the following describes the expected condition of the Auxiliary Feed Water pumps 20 seconds following the trip?

	MDAFW PUMP 'A'	MDAFW PUMP 'B'	SDAFW PUMP
a.	Running	Running	Off
b.	Off	Running	Running
c.	Off	Running	Off
d.	Off	Off	Running

Answer:

c.	Off	Running	Off

Question: 44

Given the following conditions:

- The plant is operating at 50% power.
- All control systems are operating in automatic.
- The First Stage Pressure Channel Selector switch is aligned to the PT-447 position.
- First Stage Pressure Transmitter PT-446 fails low.

Which ONE (1) of the following plant reponses is expected?

a. Feedwater Regulating Valves throttle closed

b. Control Rods step inward

c. Automatic rod control is blocked

d. Steam Dumps have a demand signal

Answer:

d. Steam Dumps have a demand signal

Question: 45

Given the following conditions:

- Due to low heat loads and extremely cold outside temperatures, Spent Fuel Pool (SFP) water temperature is 65°F.
- CC-775, CC FROM SPENT FUEL PIT HX BUTTERFLY Valve, has been throttled to the maximum allowed closed position.

Which ONE (1) of the following actions should be taken to raise Spent Fuel Pool water temperature?

a. Place the SFP on recirc to the RWST

b. Throttle the discharge valve of the in-service SFP Cooling pump

c. Shutdown the in-service SFP Cooling pump

d. Start an additional SFP Cooling pump

Answer:

c. Shutdown the in-service SFP Cooling pump

Question: 46

Given the following conditions:

- The plant is operating at 68% power.
- Power Range channel N-43 is out of service for repairs.
- N-43 has been removed from service in accordance with the OWP.
- While working on N-43, the technician causes the Control Power fuses to blow.

Which ONE (1) of the following describes the effect of this on the plant?

a. **NO** effect since the OWP places the DROPPED ROD MODE switch in the "Bypass" position

b. **NO** effect since the Dropped Rod Runback requires two-of-four (2/4) coincidence to actuate

c. The turbine will runback for 9 seconds at 200% per minute

d. The turbine will runback at a cyclic rate of 200% per minute

Answer:

c. The turbine will runback for 9 seconds at 200% per minute

Question: 47

Given the following conditions:

- A LOCA has occurred inside containment.
- Due to electrical problems an entry was made to EPP-15, "Loss of Emergency Coolant Recirculation."
- One (1) Containment Spray pump was operating upon exiting EPP-15, with containment pressure at 16 psig.
- Subsequently, an entry was made to FRP-J.1, "Response to High Containment Pressure," due to containment pressure being at 14 psig and lowering slowly.

Which ONE (1) of the following describes the actions that are to be taken regarding the Containment Spray system?

a. Return to EPP-15 to determine Containment Spray system requirements

b. Stop the running Containment Spray pump

c. Maintain the current Containment Spray system configuration

d. Start the second Containment Spray pump

Answer:

c. Maintain the current Containment Spray system configuration

Question: 48

Given the following conditions:

- A recovery from a small break LOCA is in progress.
- **NO** RCPs are running.
- EPP-008, "Post-LOCA Cooldown and Depressurization," is being implemented.
- Depressurization of the RCS has commenced.
- Pressurizer level has just risen rapidly from off-scale low to 50%.

The depressurization of the RCS has ...

a. increased RHR and SI flow, which is rapidly refilling the pressurizer.

b. caused voiding to occur in the reactor vessel head, which is rapidly refilling the pressurizer.

c. increased auxiliary spray flow, which is rapidly refilling the pressurizer.

d. caused voiding in the pressurizer level reference leg, which is providing an indication of rapidly increasing pressurizer level.

Answer:

b. caused voiding to occur in the reactor vessel head, which is rapidly refilling the pressurizer.

Question: 49

Given the following conditions:

- The unit is operating at 100% power.
- Rod Control is in Manual.
- A safety valve fails open on SG 'B'.

Which ONE (1) of the following describes the **INITIAL** effect on indicated power and RCS Tavg?

	INDICATED NIS POWER	**RCS T-AVG**
a.	Increases	Remains Relatively Constant
b.	Increases	Decreases
c.	Remains Relatively Constant	Remains Relatively Constant
d.	Remains Relatively Constant	Decreases

Answer:

b.	Increases	Decreases

Question: 50

Given the following conditions:

- The unit is operating at 85% power.
- Control Rod Bank 'D' Demand is at 195 steps.
- IRPI indication for Bank D Control Rods are as follows:

ROD	POSITION
D-8	123"
M-8	121"
H-4	120"
H-8	110"
H-12	122"

Design power peaking and Shutdown Margin Limits ...

a. are met under these conditions.

b. will be met if Control Rod H-8 is withdrawn to 115".

c. will be met if power is reduced below 80%.

d. will be met if Control Rod D-8 is inserted to 120".

Answer:

b. will be met if Control Rod H-8 is withdrawn to 115".

Question: 51

Given the following conditions:

- A reactor trip and safety injection have occurred.
- Due to multiple failures, an entry has been made to EPP-16, "Uncontrolled Depressurization of All Steam Generators."
- Containment pressure is 8 psig.
- The RCS cooldown rate is 130 °F/hour.
- SG levels are:

SG	LEVEL
'A'	1%
'B'	3%
'C'	14%

Which ONE (1) of the following actions should be taken?

a. Secure all AFW to 'A' and 'B' SGs, while feeding 'C' SG at a rate between 80 gpm and 90 gpm using a MDAFW pump

b. Secure all AFW to 'A' and 'B' SGs, while feeding 'C' SG at a rate between 80 gpm and 90 gpm using the SDAFW pump

c. Feed 'A' and 'B' SGs at a rate between 80 gpm and 90 gpm, while feeding 'C' SG only as needed to maintain the RCS cooldown rate below 100 °F/hour

d. Feed all SGs at a rate between 80 gpm and 90 gpm

Answer:

d. Feed all SGs at a rate between 80 gpm and 90 gpm

Question: 52

Given the following conditions:

- The unit is operating at 100% power.
- Testing is being performed on Reactor Trip Breaker 'B' and it is currently open.
- A loss of the 'A' 125 VDC Distribution Panel occurs.
- Reactor Trip Breaker 'A' fails to open.

Which ONE (1) of the following describes the expected response of the plant due to this sequence of events, assuming **NO** operator action?

a. **NO** reactor trip occurs

b. Reactor Trip Bypass Breaker 'B' opens on an Undervoltage trip **ONLY**, resulting in a reactor trip

c. Reactor Trip Bypass Breaker 'B' opens on a Shunt trip **ONLY**, resulting in a reactor trip

d. Reactor Trip Bypass Breaker 'B' opens on **BOTH** an Undervoltage trip and a Shunt trip, resulting in a reactor trip

Answer:

b. Reactor Trip Bypass Breaker 'B' opens on an Undervoltage trip **ONLY**, resulting in a reactor trip

Question: 53

Given the following conditions:

- The unit is in Hot Standby.
- A change in boron concentration from 500 ppm to 470 ppm is required.

Using the supplied references, which ONE (1) of the following identifies approximately how many gallons of primary water must be added to make this change?

a. 70 gallons

b. 90 gallons

c. 3000 gallons

d. 4500 gallons

Answer:

c. 3000 gallons

Question: 54

Given the following conditions:

- Unit 2 is being ramped to 100% following a refueling outage.
- The following Plant Parameters are noted:

PARAMETER	**VALUE**
Loop 'A' Tavg	576°F
Loop 'B' Tavg	575°F
Loop 'C' Tavg	576°F
NI-41	100.0%
NI-42	99.0%
NI-43	99.0%
NI-44	100.0%
Loop 'A' ΔT	58.2°F
Loop 'B' ΔT	57.8°F
Loop 'C' ΔT	58.2°F
Loop 'A' Steam Flow	3.40×10^6 lbm/hr
Loop 'B' Steam Flow	3.40×10^6 lbm/hr
Loop 'C' Steam Flow	3.45×10^6 lbm/hr
Loop 'A' Feed Flow	3.40×10^6 lbm/hr
Loop 'B' Feed Flow	3.40×10^6 lbm/hr
Loop 'C' Feed Flow	3.50×10^6 lbm/hr
1st Stage Press (446)	545 psig
1st Stage Press (447)	546 psig
Generator Output	730 Mwe

Using the supplied references, reactor power is ...

a. 99.5%. The power ramp may continue until the plant is at 100%.

b. 99.5%. Power should be held constant to perform a calorimetric.

c. greater than 100%. Power should be held constant to perform a calorimetric.

d. greater than 100%. Power should be immediately lowered.

Answer:

d. greater than 100%. Power should be immediately lowered.

Question: 55

Given the following conditions:

- A Temporary Change (TC) to Revision 44 of OP-305, Boron Recycle Process, was issued on March 1, 2001.
- Revision 45 of OP-305 was issued on March 6, 2001.
- The Temporary Change was **NOT** incorporated into Revision 45, but was cancelled and subsequently reissued (using a new TC number) with the issuance of Revision 45.

The Temporary Change now expires on ...

a. March 15, 2001.

b. March 20, 2001.

c. March 22, 2001.

d. March 27, 2001.

Answer:

c. March 22, 2001.

Question: 56

Given the following conditions:

- GP-003, "Normal Plant Startup from Hot Shutdown to Critical," is being performed.
- The reactor is **NOT** critical.
- Two (2) doublings have been performed.
- The ECP extrapolated from the 1/M plot is 44 steps on CBD.
- The minimum calculated critical position for the startup is 62 steps on CBD and the maximum calculated critical position is 174 steps on CBD.

Which ONE (1) of the following choices describes the correct actions to be taken?

a. Add 250 gallons of boric acid to the RCS

b. Insert all Control Banks and Shutdown Bank B rods

c. Continue the reactor startup and perform an additional doubling

d. Perform a normal reactor shutdown per GP-006, "Normal Plant Shutdown From Power Operation to Hot Shutdown"

Answer:

c. Continue the reactor startup and perform an additional doubling

Question: 57

Given the following conditions:

- FRP-P.1, "Response to Pressurized Thermal Shock," is being performed.
- RCS temperature has been stable at 260 °F for the past 30 minutes.
- RCS pressure is 450 psig.

Which ONE (1) of the following describes an action that would be permissible during the next 30 minutes?

a. Increase SG level by adjusting the AFW flow controllers

b. Increase letdown by opening an additional orifice

c. Increase subcooling margin by adjusting the Steam Dump controller

d. Increase subcooling margin by energizing pressurizer heaters

Answer:

b. Increase letdown by opening an additional orifice

Question: 58

Given the following conditions:

- Following a loss of all AC, EPP-1, "Loss of All AC Power," is being performed.
- Attachment 5, "Removing Control Power From Safeguard Equipment," has been completed.
- The SGs are being depressurized which results in a Safety Injection signal being actuated.
- The Safety Injection signal is reset after being actuated.
- During the SG depressurization, the Dedicated Shutdown Diesel Generator is started.
- Several minutes later, Emergency Diesel Generator 'A' is started.
- SW Pump 'A' automatically starts.
- SG pressures are stabilized by local operator action.

Plant conditions are now:

- EDG 'A' is running.
- SW Pump 'A' is running.
- **NO** other pumps are running.
- All SI valves are aligned in their pre-trip position.
- RCS pressure is 1400 psig.
- RCS temperature is 492 °F.
- RCS subcooling is 96 °F.
- Pressurizer level is 6%.

Which ONE (1) of the following identifies the procedure to be used for recovery from this condition?

a. EPP-2, "Loss Of All AC Power Recovery Without SI Required"

b. EPP-3, "Loss Of All AC Power Recovery With SI Required"

c. EPP-22, "Energizing Plant Equipment Using Dedicated Shutdown Diesel Generator"

d. EPP-25, "Energizing Supplemental Plant Equipment Using the DSDG"

Answer:

b. EPP-3, "Loss Of All AC Power Recovery With SI Required"

Question: 59

Given the following conditions:

- The unit is in Mode 3.
- RCS temperature is at no-load Tavg.
- RCS pressure is 2235 psig.
- RCS gross activity is < 100/E-Bar μCi/gm.
- Dose Equivalent Iodine I-131 is 200 μCi/gm.
- These conditions have existed for the past 48 hours.

Using the supplied references, which ONE (1) of the following describes the requirements for these conditions?

a. Power may be increased, but **CANNOT** exceed 44%

b. No-load conditions may be maintained indefinitely, but the unit **CANNOT** be started up

c. RCS temperature must be reduced to < 500 °F within 6 hours

d. Mode 4 conditions must be established within 6 hours

Answer:

c. RCS temperature must be reduced to < 500 °F within 6 hours

Question: 60

Given the following conditions:

- A SGTR has occurred.
- Following the performance of PATH-1 and PATH-2, a transition has been made to EPP-17, "SGTR with Loss of Reactor Coolant: Subcooled Recovery."
- Containment pressure is 0.2 psig.

Using the supplied references, which ONE (1) of the following describes conditions requiring a transition from EPP-17 to EPP-18, "SGTR with Loss of Reactor Coolant: Saturated Recovery"?

a.
- RWST level at 63%
- Containment water level at 6"

b.
- RWST level at 46%
- Containment water level at 124"

c.
- Ruptured SG level at 76%
- RCS Subcooling at 58 °F

d.
- Ruptured SG level at 63%
- RCS Subcooling at 41 °F

Answer:

b.
- RWST level at 46%
- Containment water level at 124"

Question: 61

Given the following conditions:

- A licensed operator who has an inactive license has been performing administrative duties in the Training Section for twelve (12) months.
- He is returning to Operations and is to be placed back on shift.
- All licensed operator continuing training and fire brigade qualifications are current.

Which ONE (1) of the following are the additional **MINIMUM** requirements for returning his license to an active status?

a. Complete **FOUR** normal shifts, including shift turnovers IAW plant procedures, before and after each watch, and review all the procedure changes for the past three (3) months

b. Complete **FOUR** normal shifts, including shift turnovers IAW plant procedures, before and after each watch, and conduct a complete plant tour

c. Complete **FIVE** normal shifts, including shift turnovers IAW plant procedures, before and after each watch, and review all the procedure changes for the past three (3) months

d. Complete **FIVE** normal shifts, including shift turnovers IAW plant procedures, before and after each watch, and conduct a complete plant tour

Answer:

b. Complete **FOUR** normal shifts, including shift turnovers IAW plant procedures, before and after each watch, and conduct a complete plant tour

Question: 62

Given the following conditions:

- The unit is operating at 100% power.
- RCS Tavg is 575.4°F.
- PZR level is 53%
- VCT level is 23" and stable.
- Letdown flow is 45 gpm (FI-150).
- RCP seal injection flows are:

RCP	SEAL INJ
'A'	8.3 gpm
'B'	7.9 gpm
'C'	7.8 gpm

Which ONE (1) of the following would be the expected flow indication on FI-122A, Charging Header Flow, assuming **NO** RCS leakage?

a. 21 gpm

b. 30 gpm

c. 36 gpm

d. 54 gpm

Answer:

b. 30 gpm

Question: 63

The following personnel are entering the RCA to perform plant related activities:

1. Two operators doing a valve lineup in the RCA expect to receive a dose of about 125 mrem each.
2. Operators doing routine radwaste processing.
3. Electrical maintenance workers cleaning and inspecting an MCC breaker in the RCA.

Which ONE (1) of the following identifies ALL of the above activities which can be performed using a General RWP in accordance with HPP-006, "Radiation Work Permits"?

a. 1 and 2 **ONLY**

b. 1 and 3 **ONLY**

c. 2 and 3 **ONLY**

d. 1, 2, and 3

Answer:

c. 2 and 3 **ONLY**

Question: 64

Given the following conditions:

- The unit was operating at 100% power.
- All IRPI indication fails to zero with **NO** rod bottom bistable lights.
- A Turbine Runback to 70% has occurred.
- APP-005-A3, PR DROP ROD ROD STOP, is illuminated.

Which ONE (1) of the following procedures should be used to mitigate this plant transient?

a. AOP-001, Malfunction of Reactor Control System

b. AOP-015, Secondary Load Rejection or Turbine Runback

c. AOP-024, Loss of Instrument Buses

d. AOP-025, RTGB Instrument Failures

Answer:

a. AOP-001, Malfunction of Reactor Control System

Question: 65

Given the following conditions:

- A line break caused the Fire Header pressure to drop.
- Fire Header pressure eventually stabilized at 83 psig.

Which ONE (1) of the following expected fire system responses would have resulted in this condition?

a. The Electric Fire Pump automatically started, then the Diesel Fire Pump automatically started.

b. The Electric Fire Pump automatically started and the Diesel Fire Pump remained in standby.

c. The Diesel Fire Pump automatically started, then the Electric Fire Pump automatically started.

d. The Diesel Fire Pump automatically started and the Electric Fire Pump remained in standby.

Answer:

a. The Electric Fire Pump automatically started, then the Diesel Fire Pump automatically started.

Question: 66

Given the following conditions:

- Emergency Diesel Generator 'A' is in the process of being started on Unit 2 to parallel it to the E-1 Bus.
- A "Remote Manual Slow Speed Start" is being performed in accordance with OP-604, "Diesel Generators A and B."

Which ONE (1) of the following describes the operation of the diesel generator voltage control during this evolution?

a. The Voltage Regulator will automatically control voltage between 470 VAC and 490 VAC during the entire start after the field is automatically flashed at 200 RPM.

b. The Voltage Regulator must be manually shutdown after the field is automatically flashed at 200 RPM, and will be automatically reinstated when engine speed is above 900 RPM to control voltage between 470 VAC and 490 VAC.

c. The Voltage Regulator will be automatically shutdown 5 seconds after the field is flashed at 200 RPM if engine speed does **NOT** reach 900 RPM, and must be manually reinstated when engine speed is above 900 RPM to control voltage between 470 VAC and 490 VAC.

d. The Voltage Regulator must be manually shutdown after the field is automatically flashed at 200 RPM, and must be manually reinstated when engine speed is above 900 RPM to control voltage between 470 VAC and 490 VAC.

Answer:

d. The Voltage Regulator must be manually shutdown after the field is automatically flashed at 200 RPM, and must be manually reinstated when engine speed is above 900 RPM to control voltage between 470 VAC and 490 VAC.

Question: 67

Given the following conditions:

- The unit is in Hot Standby.
- All systems are operating normally.
- SG "A" PORV is closed.
- SG "A" PORV automatic potentiometer is adjusted from "3.10" to "1.50".

Which ONE (1) of the following describes the effect adjusting the potentiometer will have on the PORV?

	SETPOINT	PORV
a.	Increases	Opens
b.	Decreases	Opens
c.	Increases	Remains Closed
d.	Decreases	Remains Closed

Answer:

c.	Increases	Remains Closed

Question: 68

Given the following conditions:

- A small break LOCA has occurred.
- Entry has been made into FRP-C.1, "Response to Inadequate Core Cooling."
- CETs are all indicating between 740 °F and 760 °F and rising slowly.
- RCS pressure has stabilized at 1605 psig.
- PZR level is off-scale low.
- RVLIS Full Range is indicating 39% and lowering slowly.
- Charging flow is **NOT** available.
- SG pressures are all between 360 psig and 400 psig.

Which ONE (1) of the following actions should be taken?

a. Dump steam to cooldown and depressurize the RCS to provide Safety Injection flow

b. Open the RCS Vent System valves to depressurize the RCS to provide Safety Injection flow

c. Start an RCP immediately to provide forced cooling flow

d. Open the PZR PORVs to depressurize the RCS to provide Safety Injection flow

Answer:

a. Dump steam to cooldown and depressurize the RCS to provide Safety Injection flow

Question: 69

Given the following conditions:

- The unit is at operating at 35% power in preparation for increasing power to 100%.
- Circulating Water Pump 'A' is under clearance for maintenance.
- A fault occurs on 4KV Bus #4 and all loads are lost.

Which ONE (1) of the following describes the effect on the turbine to the above conditions?

a. The turbine will **NOT** automatically trip, but must be manually tripped when condenser back pressure increases to 5.5" HgA

b. The turbine will automatically trip due to all 3 Circulating Water Pump breakers being open

c. The turbine will automatically trip when condenser back pressure increases to 10" HgA unless load is lowered to within the capacity of the one remaining Circulating Water Pump

d. The turbine will **NOT** automatically trip due to load already being within the capacity of the one remaining Circulating Water Pump

Answer:

b. The turbine will automatically trip due to all 3 Circulating Water Pump breakers being open

Question: 70

Given the following conditions:

- The unit is operating at 2% power.
- The following RCP indications are observed:

INDICATION	RCP 'A'	RCP 'B'	RCP 'C'
Motor Bearing Temperatures	210°F and ↑ slowly	180°F and stable	195°F and ↑ slowly
#1 Seal Leakoff Temperatures	150°F and stable	150°F and stable	165°F and ↑ slowly
#1 Seal Leakoff Flow	5.8 gpm and stable	4.2 gpm and stable	3.8 gpm and stable
Thermal Barrier ΔP	10" and stable	10" and stable	8" and stable
Frame Vibration	3.6 mils and ↑ at 0.1 mil per hr	2.8 mils and stable	4 mils and ↑ at 0.05 mil per hr
Shaft Vibration	12 mils and stable	7 mils and stable	9.5 mils and ↑ at 0.6 mils per hour

Which ONE (1) of the following describes the actions required for this condition?

a. Stop 'A' RCP and enter Technical Specification 3.4.4, RCS Loops - Modes 1 & 2

b. Trip the reactor, stop 'A' RCP, and go to PATH-1

c. Stop 'C' RCP and enter Technical Specification 3.4.4, RCS Loops - Modes 1 & 2

d. Trip the reactor, stop 'C' RCP, and go to PATH-1

Answer:

a. Stop 'A' RCP and enter Technical Specification 3.4.4, RCS Loops - Modes 1 & 2

Question: 71

Which ONE (1) of the following requires entry into DSP-001, "Alternate Shutdown Diagnostic"?

a. A fire in the Main Turbine that has the potential to destroy the generator when the reactor is above 10% power

b. A fire in the Containment Vessel that has the potential to destroy the pressurizer heater power cables when in hot standby

c. A fire in the Control Room that has the potential to destroy RHR pump control cables when refueling

d. A fire in the Auxiliary Building that has the potential to destroy the running Charging Pump when in cold shutdown

Answer:

b. A fire in the Containment Vessel that has the potential to destroy the pressurizer heater power cables when in hot standby

Question: 72

CC-707, Component Cooling Water Surge Tank relief valve, is sized to accommodate the …

a. maximum CCW insurge to the tank resulting from a loss of the Residual Heat Removal system.

b. maximum flowrate associated with a rupture of a Reactor Coolant Pump Thermal Barrier Heat Exchanger.

c. maximum CCW insurge to the tank resulting from a loss of the Service Water system.

d. maximum flowrate associated with a rupture of a Residual Heat Removal pump cooler during the recirculation phase of an accident.

Answer:

b. maximum flowrate associated with a rupture of a Reactor Coolant Pump Thermal Barrier Heat Exchanger.

Question: 73

Which ONE (1) following procedures is used to provide instructions in the event of a cask drop when loaded with spent fuel in Dry Shielded Canister (DSC)?

a. AOP-005, Radiation Monitoring System

b. AOP-008, Accidental Release of Liquid Waste

c. AOP-013, Fuel Handling Accident

d. AOP-028, ISFSI Abnormal Events

Answer:

d. AOP-028, ISFSI Abnormal Events

Question: 74

Given the following conditions:

- The unit is in Mode 2.
- PZR level transmitter LT-460 failed low and was removed from service.
- The PZR high-high level and low level bistables associated with LT-460 were placed in the TRIPPED condition.
- PZR level channel selector switch LM-459 was selected to "461 REPL 460".

Which ONE (1) of the following describes the function provided by PZR level transmitter LT-461 under these conditions?

a. Energizes the backup heaters on a high level deviation

b. Decreases charging pump speed on an increasing level

c. Deenergizes the proportional and backup heaters on a low level

d. Trips the reactor on a high-high level

Answer:

c. Deenergizes the proportional and backup heaters on a low level

Question: 75

Given the following conditions:

- Reactor power was initially 100%.
- All CCW flow has been lost to the RCPs and a reactor trip has been initiated.

Which ONE (1) of the following nuclear instrument indications would warrant entry into FRP-S.1, "Response To Nuclear Power Generation/ATWS"?

a. **BOTH** source range channels are energized and intermediate range startup rate is +0.1 dpm

b. Power range indicates 3%

c. Source range startup rate is +0.3 dpm

d. **NEITHER** source range channel is energized and intermediate startup rate is -0.1 dpm

Answer:

a. **BOTH** source range channels are energized and intermediate range startup rate is +0.1 dpm

Question: 76

Given the following conditions:

- A reactor trip and safety injection have occurred due to a large break LOCA.
- A transition has been made from PATH-1 to EPP-15, "Loss of Emergency Coolant Recirculation."
- The minimum required Safety Injection flow has been established in accordance with EPP-15.
- RVLIS is now indicating 78% Full Range and increasing slowly.
- Core Exit Thermocouples (CETs) are now indicating 568 °F and decreasing slowly.

Which ONE (1) of the following actions should be taken regarding Safety Injection flow?

a. Maintain flow at its current value

b. Decrease flow until either RVLIS stops increasing OR CETs stop decreasing

c. Increase flow to increase RVLIS level to ≥ 90% Full Range

d. Increase flow to decrease CETs to ≤ 547 °F

Answer:

a. Maintain flow at its current value

Question: 77

Given the following conditions:

- The unit is operating at 60% power.
- Chemistry reports that SG 'A' has exceeded Secondary Action Level (SAL) -2 limits for pH and Conductivity.

Which ONE (1) of the describes the actions that must be taken in response to exceeding the SAL-2 limits?

a. Return the parameters to within SAL-1 limits within 100 hours of initiating SAL-2 OR initiate a power reduction to less than 30%

b. Take immediate actions to reduce power to approximately 30% within 8 hours

c. Return the parameters to within its normal value within 100 hours of initiating SAL-2 OR commence a shutdown and cooldown to less than 250 °F

d. Take immediate actions to shutdown and cooldown to less than 250 °F as rapidly as plant constraints permit

Answer:

b. Take immediate actions to reduce power to approximately 30% within 8 hours

Question: 78

Given the following plant conditions:

- The unit is operating at 100% power.
- A plant transient occurs.
- Pressurizer pressure stabilizes at 1950 psig.

Technical Specification 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," must be entered and pressurizer pressure must be restored above 2205 psig within 2 hours if the transient lowers power to ...

a. 73% over a 5 minute period.

b. 88% over a 5 second period.

c. 90% over a 3 minute period.

d. 77% over a 3 second period.

Answer:

c. 90% over a 3 minute period.

Question: 79

Given the following conditions:

- A seismic event has occurred.
- A reactor trip and safety injection have occurred following a SGTR.
- A transition is being made from PATH-1 to PATH-2 and the CRSS is conducting a shift brief.
- The following have occurred as a result of the seismic event:
  - A service water header break has occurred.
  - All instrument air compressors have tripped.
  - A fire header break has occurred inside containment.

Which ONE (1) of the following procedures should the CRSS direct an extra operator to perform while PATH-2 is being performed?

a. AOP-017, "Loss of Instrument Air"

b. AOP-021, "Seismic Disturbances"

c. AOP-022, "Loss of Service Water"

d. AOP-032, "Response to Flooding from the Fire Protection System"

Answer:

a. AOP-017, "Loss of Instrument Air"

Question: 80

Given the following conditions:

- A Component Cooling Water train was declared inoperable on March 1st, at 0530.
- At 0330 on March 4th, a Technical Specifications required shutdown was commenced.
- It is currently 0400 on March 4th.
- The unit is currently at 62% power.
- System Engineering has just notified the Control Room that a generic issue requires declaring ALL AFW pumps inoperable.
- They estimate that it will be approximately 12 hours before any AFW pump will be capable of being declared operable.

In accordance with Technical Specifications, which ONE (1) of the following describes the actions required?

a. Be in MODE 3 by 0930

b. Be in MODE 3 by 1100

c. Be in MODE 3 by 1130

d. Maintain MODE 1 until at least one AFW pump is declared operable

Answer:

d. Maintain MODE 1 until at least one AFW pump is declared operable

Question: 81

Given the following conditions:

- The unit is operating at 100% power.
- Channel III PZR Pressure PT-457 is failed, with all bistables in the TRIPPED condition.
- An electrical fault occurs which results in a loss of Instrument Bus 2.

Which ONE (1) of the following describes the impact that the loss of Instrument Bus 2 has on the plant?

a. A reactor trip and SI occur and **BOTH** trains of Engineered Safeguards loads are automatically started by the sequencers

b. A reactor trip and SI occur, but **ONLY** Train 'A' Engineered Safeguards loads are automatically started by the sequencers

c. A reactor trip and SI occur, but **ONLY** Train 'B' Engineered Safeguards loads are automatically started by the sequencers

d. A reactor trip occurs, but **NO** SI occurs.

Answer:

c. A reactor trip and SI occur, but **ONLY** Train 'B' Engineered Safeguards loads are automatically started by the sequencers

Question: 82

Given the following conditions:

- The plant is in Hot Shutdown.
- A loss of 4KV Bus 2 occurs.

Which ONE (1) of the following identifies plant equipment that is affected by the power loss?

a.
- Reactor Coolant Pump 'B'
- Station Service Transformer 2B

b.
- Reactor Coolant Pump 'C'
- Station Service Transformer 2A and 2F

c.
- Main Feedwater Pump 'B'
- Station Service Tranformer 2D

d.
- Main Feedwater Pump 'B'
- Reactor Coolant Pump 'C'

Answer:

b.
- Reactor Coolant Pump 'C'
- Station Service Transformer 2A and 2F

Question: 83

In accordance with AOP-032, "Response To Flooding From The Fire Protection System," the concern for a fire water break in containment is ...

a. the adverse affects on safeguards equipment.

b. the thermal stress effects of water coming in contact with the reactor vessel.

c. the adverse impact on the instrumentation associated with systems in containment.

d. the unanalyzed dilution caused by the water in the event of a LOCA.

Answer:

d. the unanalyzed dilution caused by the water in the event of a LOCA.

Question: 84

Given the following conditions:

- Inverter 'C', is being shut down in accordance with OP-601, "DC Supply System."
- The N-43 DROPPED ROD MODE switch is placed in the BYPASS position prior to aligning PP-26 to its alternate supply (IB-3).

Which ONE (1) of the following describes the consequences of failing to place the switch in the BYPASS position?

a. A turbine runback may occur due to an Instrument Bus transient

b. A reactor trip and safety injection may occur due to an Instrument Bus transient

c. The inverter power supply breaker may trip open

d. The backup power supply breaker may trip open when attempting to close

Answer:

a. A turbine runback may occur due to an Instrument Bus transient

Question: 85

Given the following conditions:

- A batch release of Waste Condensate Tank 'E' is scheduled to be performed.
- The Waste Condensate Recirc Pump is out-of-service.

Waste Condensate Tank 'E' …

a. can be recirculated after transferring to Waste Condensate Tank 'C'.

b. **CANNOT** be recirculated unless transferred to Waste Condensate Tank 'D'.

c. can be recirculated using Waste Condensate Pump 'B'.

d. **CANNOT** be recirculated until the Waste Condensate Recirc Pump is repaired.

Answer:

d. **CANNOT** be recirculated until the Waste Condensate Recirc Pump is repaired.

Question: 86

Given the following conditions:

- The plant is being started up with the Feed Water Regulating Valves and Feed Water Regulating Bypass Valves all open.
- A Reactor Trip occurs.
- RCS Tavg stabilizes at no load Tavg.
- The Feed Water Regulating Valves automatically close.

Which ONE (1) of the following identifies the expected position of the Feed Water Regulating Bypass Valves (FRBVs) and the Feed Water Block Valves (FBVs)?

	FRBVs	FBVs
a.	Open	Open
b.	Open	Closed
c.	Closed	Open
d.	Closed	Closed

Answer:

a.	Open	Open

Question: 87

Given the following conditions:

- A small break LOCA has occurred.
- Due to problems with the Containment Cooling system, containment pressure increased to 6.1 psig.
- After establishing proper operation of the Containment Cooling system, containment pressure has been lowered to 3.2 psig.
- A step in one of the EPPs states:

"Depressurize RCS To Minimize RCS Leakage:

c. Check EITHER of the following:

PZR LEVEL - GREATER THAN 71% [60%]

OR

RCS SUBCOOLING – LESS THAN 45 °F [65 °F]

d. Stop RCS depressurization"

- As the RCS is being depressurized, PZR level is noted to be 62% and RCS Subcooling is 76 °F.

The RCS depressurization should ...

a. be stopped immediately.

b. continue until PZR level exceeds 71%.

c. continue until RCS subcooling drops below 65 °F.

d. continue until RCS subcooling drops below 45 °F.

Answer:

a. be stopped immediately.

Question: 88

Given the following conditions:

- The unit is in Hot Shutdown.
- The Startup Transformer (SUT) is supplying all 4KV buses.
- A severe short has resulted in a loss of the 'B' DC Bus.

Which ONE (1) of the following describes the response of the emergency diesel generators (EDG's)?

	EDG 'A'	EDG 'B'
a.	Starts, but field fails to flash	Does **NOT** start
b.	Does **NOT** start	Starts, but field fails to flash
c.	Starts and loads	Starts, but does **NOT** load
d.	Starts, but does **NOT** load	Starts and loads

Answer:

b.	Does **NOT** start	Starts, but field fails to flash

Question: 89

Given the following conditions:

- The plant is operating at 90% power.
- Control Bank "D" Step Counters indicate 198 steps.
- A check of the Rod Position indications for Control Bank "D" shows the following rod positions:

  D8 at 124"
  M8 at 116"
  H4 at 120"
  H8 at 121"
  H12 at 131"

Which ONE (1) of the following describes the status of the rods in Control Bank 'D'?

a. **BOTH** rods M8 and H12 are misaligned from the bank

b. **ONLY** rod M8 is misaligned from the bank

c. **ONLY** rod H12 is misaligned from the bank

d. All rods are within rod alignment limits

Answer:

c. **ONLY** rod H12 is misaligned from the bank

Question: 90

Given the following condiditons:

- Pressurizer pressure transmitter PT-457 has failed low and is being removed from service in accordance with the OWP.
- The OWP requires the low pressure bistables in the Hagan racks be placed in the TRIPPED condition.

Which ONE (1) of the following describes the verification required for this function?

a. **NO** verification is required

b. Independent verification

c. Concurrent verification

d. Functional verification

Answer:

c. Concurrent verification

Question: 91

Given the following conditions:

- The unit has just experienced a reactor trip.
- **NO** SI equipment has actuated.
- One (1) turbine stop valves is shut.
- Three (3) turbine governor valves are shut.
- RCS pressure is 1860 psig.
- Tavg is 542°F.
- All MSIVs are open.
- SG Pressures and Steam Flows are:

SG	PRESSURE	STEAM FLOW
'A'	925 psig	0.1×10^6 lbm/hr
'B'	935 psig	0.1×10^6 lbm/hr
'C'	845 psig	1.3×10^6 lbm/hr

The reactor is tripped, the turbine is ...

a. tripped, and SI is **NOT** required.

b. tripped, and SI is required.

c. **NOT** tripped, and SI is **NOT** required.

d. **NOT** tripped, and SI is required.

Answer:

c. **NOT** tripped, and SI is **NOT** required.

Question: 92

Given the following conditions:

- A reactor trip occurred due to a loss of offsite power.
- The plant is being cooled down on RHR per EPP-005, "Natural Circulation Cooldown."
- RVLIS upper range indicates greater than 100%.
- Both CRDM fans have been running during the entire cooldown.
- RCS cold leg temperatures are 190 °F.
- Steam generator pressures are 50 psig.

Steam should be dumped from all SGs to ensure ...

a. boron concentration is equalized throughout the RCS prior to taking a sample to verify cold shutdown boron conditions.

b. all inactive portions of the RCS are below 200 °F prior to complete RCS depressurization.

c. RCS and SG temperatures are equalized prior to any subsequent RCP restart.

d. RCS temperatures do **NOT** increase during the required 29-hour vessel soak period.

Answer:

b. all inactive portions of the RCS are below 200 °F prior to complete RCS depressurization.

Question: 93

Given the following conditions:

- The unit is operating at 100% power.
- A release is in progress from Waste Gas Decay Tank 'A'.
- A loss of Instrument Bus 3 occurs, requiring termination of the release.

Which ONE (1) of the following describes how the release is terminated as a result of the loss of the Instrument Bus?

a. Automatically due to the loss of R-14, Plant Vent Monitor

b. Manually due to the loss of R-14, Plant Vent Monitor

c. Manually due to the loss of power to the Waste Disposal Boron Recycle Panel

d. Automatically due to the loss of power to the Waste Disposal Boron Recycle Panel

Answer:

a. Automatically due to the loss of R-14, Plant Vent Monitor

Question: 94

Which ONE (1) of the following conditions related to the Pressurizer would require entry into a Technical Specification action or a Technical Requirment Manual compensatory action, as applicable?

a. A pressurizer level control system fault results in level being at 68% with the plant operating at 2% power

b. A pressurizer pressure control system fault results in pressure being at 2184 psig with the plant operating at 14% power

c. SST-2A Disconnect, used to supply emergency power to the pressurizer heaters from EDG 'A', is removed from service for maintenance with the plant operating at 35% power

d. Auxiliary Spray, at 400 °F, is used to depressurize the RCS from 2235 psig, resulting in a cooldown rate of the Pressurizer of 135 °F per hour

Answer:

b. A pressurizer pressure control system fault results in pressure being at 2184 psig with the plant operating at 14% power

Question: 95

Given the following conditions:

- The unit is operating at 70%.
- Rod Control is in AUTO.
- Bank 'D' control rods are at 195 steps.
- Tref is 566.9 °F.
- Loop Tavgs are:

LOOP	T-AVG
'A'	569 °F
'B'	567 °F
'C'	566 °F

Which ONE (1) of the following failures will cause control rods to step inward?

a. Loop 1 Thot fails high

b. Loop 1 Tcold fails low

c. Loop 2 Tcold fails high

d. Loop 3 Thot fails low

Answer:

c. Loop 2 Tcold fails high

Question: 96

Given the following conditions:

- Following an outage, the core is being reloaded.
- You are the Refueling SRO.
- An assembly is fully withdrawn into the manipulator mast over the core being prepared to inserted into the core.
- APP-005-A1, SR DET LOSS OF DC, alarms.
- Both Source Range (SR) channels, N-31 and N-32, are determined to be inoperable.

Which ONE (1) of the following describes the required action to be taken?

a. Place the assembly in the upender and suspend refueling operations until at least one (1) SR channel is restored to operable

b. Place the assembly in the upender and suspend refueling operations until both SR channels are restored to operable

c. Place the assembly in the core, in either it's designated or alternate core location, and suspend refueling operations until at least one (1) SR channel is restored to operable

d. Place the assembly in the core, in either it's designated or alternate core location, and suspend refueling operations until both SR channels are restored to operable

Answer:

b. Place the assembly in the upender and suspend refueling operations until both SR channels are restored to operable

Question: 97

Given the following conditions:

- An emergency event has been declared.
- The Technical Support Center has **NOT** been manned.
- You are the Site Emergency Coordinator.
- A critically injured man is located in a radiation field of 100 Rem/hr.
- A valuable piece of company property is located in a radiation field of 30 Rem/hr.
- The following operators have **NOT** volunteered to enter either area, but are available:

	AGE	**LIFETIME EXPOSURE**	**CURRENT ANNUAL EXPOSURE**
OPERATOR A	43	10 Rem	1900 mRem
OPERATOR B	43	15 Rem	1500 mRem
OPERATOR C	23	10 Rem	1500 mRem
OPERATOR D	23	15 Rem	1900 mRem

Which ONE (1) of the following would result in an acceptable exposure?

a. Operator A spending 20 minutes in the area to rescue the critically injured man

b. Operator B spending 45 minutes in the area to protect the valuable equipment

c. Operator C spending 30 minutes in the area to protect the valuable equipment

d. Operator D spending 15 minutes in the area to rescue the critically injured man

Answer:

d. Operator D spending 15 minutes in the area to rescue the critically injured man

Question: 98

Given the following conditions:

- A reactor trip and safety injection have occurred due to a LOCA on the letdown line and a failure of the letdown line to automatically isolate.
- PATH-1 actions are being performed.
- The following conditions currently exist:
- Containment pressure is 7 psig and slowly decreasing.
- Total AFW flow to the intact SGs is 390 gpm.
- 'A' SG level is 6% and slowly increasing.
- 'B' SG level is 12% and slowly increasing.
- 'C' SG level is 14% and slowly increasing.
- RCS pressure is 1765 psig and rapidly increasing.
- Pressurizer level is 29% and stable.
- Core Exit Thermocouples are 530°F and stable.

Which ONE (1) of the following identifies the parameter that is inadequate to permit terminating SI?

a. Subcooling

b. Secondary heat sink

c. RCS pressure

d. RCS inventory

Answer:

d. RCS inventory

Question: 99

Given the following conditions:

- A reactor trip and safety injection have occurred.
- During the performance of PATH-1 a transition has been made to EPP-16, "Uncontrolled Depressurization of All SGs."
- Wide range SG levels are all between 12% and 18% and decreasing slowly.
- SG pressures are all between 180 psig and 200 psig and decreasing slowly.
- Feed flow has been reduced to 80 gpm to each SG per EPP-16 guidance.

Which ONE (1) of the following describes when FRP-H.1, "Loss of Heat Sink," guidance would be implemented to restore SG levels?

a. Wide range level in 2 SGs is still below 26%

b. Narrow range level in 1 SG is still below 10%

c. 2 SGs remain unisolated

d. Total feed flow is below 300 gpm due to other than operator actions

Answer:

d. Total feed flow is below 300 gpm due to other than operator actions

Question: 100

Given the following conditions:

- The reactor is defueled.
- The RWST is at the Technical Specification minimum allowed boron concentration.
- Over several days pure water is inadvertently added to the spent fuel pit (SFP).
- The following SFP chemistry exists:
  - Boron = 1995 ppm
  - Level = 37 ft

Using the supplied references, which ONE (1) of the following is the **MINIMUM** action required to restore key safety functions?

a. Add 1000 pounds of granulated boric acid to the SFP

b. Add 550 pounds of granulated boric acid to the SFP

c. Drain the SFP 4 feet and refill using the RWST

d. Drain the SFP 8 feet and refill using the RWST

Answer:

a. Add 1000 pounds of granulated boric acid to the SFP