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Question No. 1 **QID: 0023**

The following conditions exist immediately after a reactor trip:

- Group 2, Rod 4 failed to fully insert into the core
- RCS pressure is at 1750 psig and trending down
- Pressurizer level is at 50 inches and trending down
- A OTSG pressure is at 880 psig and trending down
- B OTSG pressure is at 885 psig and trending down
- CETs are 560°F and stable
- Turbine Trip Solenoid Power Available light is OFF

Which of the following contains the required operator response as well as the reason for the response?

A. Manually actuate MSLI for affected SG(s) and EFW due to overcooling.

B. Commence emergency boration per RT-12 for the stuck rod.

C. Trip all Reactor Coolant Pumps due to loss of subcooling margin.

D. Initiate High Pressure Injection per RT-2 due to low pressurizer level and low RCS pressure.

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Question No. 2 **QID: 0027**

The following plant conditions exist:

- Pressurizer temperature is 588 °F
- Pressurizer level is 285 inches and rising
- RCS Pressure is 1400 psig and lowering
- Quench Tank pressure is 0 psig and stable
- The ERV acoustic monitor indicates flow noise

What would be the expected temperature as indicated on the ERV PSV-1000 Outlet Temp on the Safety Parameter Display System (SPDS)?

A. Approximately 212 °F

B. Approximately 260 °F

C. Approximately 280 °F

D. Approximately 588 °F

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Question No. 3 **QID: 0404**

Given:

- Small Break LOCA has occurred and Subcooling Margin was lost.
- ESAS actuated with all components operating properly.
- RCS pressure is now 1200 psig and rising slowly.
- CETs are 500°F and dropping slowly.
- Source of LOCA has been isolated.

Which of the following conditions will allow you to transition to the Reactor Trip EOP, 1202.001?

A. Uncontrolled RCS cooldown is occurring due to HPI/Break flow.

B. Primary to secondary heat transfer is NOT established.

C. Steam generator tube leakage is indicated.

D. Primary to secondary heat transfer is in progress.

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Question No. 4 **QID: 0491**

ESAS has actuated.
A4 bus is locked out and cannot be re-energized.

LPI/HPI flow rates for the past twenty-five minutes have been as follows:

- "A" LPI flow--3300 gpm
- "A" HPI pump flow throttled to 100 gpm through CV-1220

Which of the following actions are required per the ESAS EOP for these conditions?

A. Restore full HPI flow on "A" HPI pump.

B. Secure the "A" HPI pump.

C. Energize bus B-6 from bus B-5.

D. Swap to RB sump recirculation.

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Question No. 5 **QID: 0452**

The following conditions exist:

- Plant is currently at 100% power.
- The following annunciators alarm:
  RCP SEAL INJ FLOW LO (K08-A7)
  RCP SEAL COOLING FLOW LO (K08-E7)
  RCP BLEED OFF TEMP HI (K08-C7)

- CBOT reports that all above annunciators are caused by one RCP, P-32C.

Which of the following actions specifies the correct sequence per 1203.031, Reactor Coolant Pump and Motor Emergency,
for the above conditions?

A. Reduce power at 10%/min. to 60% power and trip P-32C RCP.

B. Trip P-32C RCP, trip reactor, and go to 1202.001, Reactor Trip.

C. Trip P-32C RCP and isolate seal bleedoff to all RCPs.

D. Trip reactor, trip P-32C RCP, and go to 1202.001, Reactor Trip.

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Question No. 6 **QID: 0549**

Given the following:

- Plant is at 100% power.
- HPI pump discharge pressure is oscillating from 1500 to 2500 psig.
- Makeup flow rate is oscillating from 0 to 70 gpm.
- Seal Injection total flow is oscillating from 30 to 60 gpm.
- Pressurizer level is 215 inches and dropping.
- Letdown flow is 80 gpm and stable.

Which of the following actions, and reasons for those action, should be perfomed in response to these indications?

A. Trip HPI pump and isolate Letdown by closing Letdown Isolation, CV-1221, due to indications of loss of suction.

B. Take manual control of RC Pumps Total Injection Flow, CV-1207, and maintain 30-40 gpm to prevent RCP seal damage.

C. Take manual control of Pressurizer Level Control, CV-1235, and stabilize Pressurizer level due to automatic valve control malfunction.

D. Trip HPI pump, trip reactor, and go to EOP 1202.001, Reactor Trip, due to loss of seal injection at power.

Question No. 7 **QID: 0033**

Given:
- RCS is in reduced inventory for nozzle dam installation.
- Annunciator K09-D8, DECAY HEAT VORTEX WARNING, is in alarm.
- DH flow is oscillating from 1000 gpm to 3000 gpm.

Which of the following is the first action performed per 1203.028, Loss of DH Removal, due to vortexing?

A. Close at least one DH suction valve from the RCS.

B. Start the other DH pump to makeup to RCS from BWST.

C. Initiate containment closure per Att. G of 1203.028.

D. Stabilize flow by throttling one of the DH discharge flowpath valves.

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Question No. 8 **QID: 0284**

Insufficient Pressurizer spray valve bypass spray flow can result in low spray line temperatures.

What is the Tech Spec limit on spray fluid to Pressurizer differential temperature?

A. 460 degrees F

B. 430 degrees F

C. 400 degrees F

D. 370 degrees F

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Question No. 9 **QID: 0328**

Plant is operating at 100% power.
You are the CBOR and you observe the following indications:

- "A" and "B" Main Feedwater Pumps are tripped
- CRD groups 1, 2, 3, and 4 are at the out limit.
- CRD groups 5, 6, and 7 are at the in limit.
- NI-3 indicates 1 E-8 and lowering.

What action should be performed FIRST?

A. Depress the CRD Power Supply Breaker Trip Pushbuttons.

B. Dispatch an operator to open the CRD AC Power Supply Breakers.

C. Commence Emergency Boration per RT-12.

D. Manually insert CRD groups 1, 2, 3, and 4.

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Question No. 10 **QID: 0332**

What EOP action is designed to reduce the rate of leakage into a ruptured OTSG?

A. Controlling reactor coolant system pressure low within the limits of Figure 3.

B. Concurrently performing 1203.014, Control of Secondary System Contamination.

C. Isolation of the OTSG with the ruptured tube.

D. Cooling down the reactor coolant system to less than 500 °F.

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Question No. 11 **QID: 0663**

Given:

A steam line rupture on "A" S/G has occurred resulting in an Overcooling transient.
The leak is between the Reactor Building and the MSIV.
RCS Tcold = 510 °F
SCM is adequate.

Which of the following is NOT a concern with the given conditions?

A. Loss of pressurizer level.

B. Loss of RCS pressure control.

C. Pressurized Thermal Shock.

D. Possible S/G tube damage.

Question No. 12 **QID: 0662**

Given:
Recovery from an Overheating condition is in progress.
Auxiliary Feedwater Pump, P-75 is the only available source of water.
"A" S/G level is 18 inches and stable.
"B" S/G level is 21 inches and lowering.
Subcooling Margin is adequate.

Which of the following indicate the proper action to take and why?

A. Neither S/G can be fed with P-75 due to unanalyzed stresses of feeding a dry S/G with Aux Feedwater.

B. "A" S/G can not be fed with P-75 due to unanalyzed stresses of feeding a dry S/G with Aux Feedwater.
"B" S/G can be fed with P-75 while monitoring tube to shell delta T until primary to secondary heat transfer is established

C. Both S/G can be fed with P-75 while monitoring tube to shell delta T until primary to secondary heat transfer is established.

D. Both S/G can be fed with P-75, tube to shell delta T is not a concern until primary to secondary heat transfer is established, then maintain tube to shell delta T within limits.

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Question No. 13 **QID: 0338**

Given:

- All DC power has been lost.
- "A" Emergency Diesel Generator (EDG) has been manually started.
- "A" EDG voltage is low outside of the normal band due to starting additional loads.

Which one of the following operator actions are required to adjust EDG voltage?

A. Select OFF on the auto/manual control and voltage will follow load changes proportionally.

B. Select AUTO on the auto/manual control and adjust the MANUAL voltage adjust rheostat.

C. Select MANUAL on the auto/manual control and voltage will follow load changes proportionally.

D. Select MANUAL on the auto/manual control and adjust the MANUAL voltage adjust rheostat.

Question No. 14 **QID: 0664**

Given:

Loss of Off-Site Power has occurred.
CRS is in the Blackout EOP 1202.008.

Which of the following actions in 1202.008 will the CRS direct you to perform?

A. Bypass MSLI.

B. Place all 3 ICW Pumps in Pull-to-Lock.

C. Align RCP Seal bleedoff to the quench tank.

D. Contact Unit 2 to crosstie instrument air systems.

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Question No. 15 **QID: 0336**

Given:

- Plant is at 100% power,
- Turbine Lockout Relay DC Failure (K04-B5),
- D01 Undervoltage (K01-A7),
- D01 Trouble (K01-D7),
- Loss of breaker position indicator lights for plant buses on left side of C10.

Which action, with the correct reason for the action, should be performed?

A. Start both Diesel Generators from C-10 due to loss of power to undervoltage relays.

B. Trip the Generator Output Breakers to prevent the Main Generator from motoring.

C. Transfer D11 to its Emergency Power Supply to energize generator lockout relays.

D. Line up Battery Charger D03A or D03B to the D01 Bus to restore DC power.

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Question No. 16 **QID: 0554**

Plant heat up is in progress with RCS temperature at 200 degrees F.
Service water is lost to the in-service DH cooler.

What action is required during the re-establishment of SW flow through the DH cooler and why?

A. Establish SW slowly to prevent DH cooler water hammer.

B. Establish SW slowly to prevent SW pump runout.

C. Establish SW slowly to prevent DH cooler thermal shock.

D. Establish SW quickly to prevent RCS heat up.

Question No. 17 **QID: 0108**

Given:

Plant operating at 100% power.

The instrument air line to Turbine Bypass Valve (CV-6688) valve operator is severed, causing the instrument air accumulator for CV-6688 to depressurize.

What effect will this have on CV-6688 operation?

A. CV-6688 will go OPEN due to system pressure.

B. CV-6688 will respond to NORMAL control signals.

C. CV-6688 will remain CLOSED due to system pressure.

D. CV-6688 will only respond to MANUAL control signals.

Question No. 18 **QID: 0556**

Given:
- All MFW and EFW has been lost.
- HPI cooling is in progress per RT-4.

Why is the ERV manually cycled vs. allowing the ERV to cycle automatically?

A. To reduce RCS pressure and reduce flow out the ERV.

B. To prevent thermal binding of the ERV.

C. To increase HPI flow while preventing ESAS and maintaining SCM.

D. To prevent the code safeties from lifting.

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Question No. 19 **QID: 0021**

The plant is operating at 100% power.
A failure of an ICS module downstream of the SASS circuitry causes the Nuclear Instrumentation input to the Reactor Demand station to fail low resulting in a large negative neutron error.

Assuming no operator action, how will this failure affect control rods and main feedwater flows?

A. Control rods will insert and main feedwater flows will rise.

B. Control rods will withdraw and main feedwater flows will rise.

C. Control rods will insert and main feedwater flows will drop.

D. Control rods will withdraw and main feedwater flows will drop.

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Question No. 20 **QID: 0467**

Given:

- Plant is at 40% power.
- You are in the process of taking turnover.
- A control rod (Grp 6 Rod 4) dropped at 0530.
- The control rod was declared inoperable.
- SDM has been verified to be within limits of COLR at 0600.

Per Technical Specifications, by what time must SDM margin again be verified?

A. 0700

B. 1000

C. 1200

D. 1800

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Question No. 21 **QID: 0665**

Given:

Plant operating at 100% power.
The following annunciators come into alarm simultaniously.
PZR LEVEL LO LO (K09-A3)
PZR LEVEL LO (K09-D3)
LRS-1001 on C04 indicates 0 inches.
LIS-1002 on C04 indicates 0 inches.
Pressurizer levels on SPDS also indicates 0 inches (L1001 and L10002).

Which action should be taken for the given condition?

A. Isolate letdown by closing CV-1221, Letdown Coolers Inlet Isolation valve.

B. Adjust CV-1235, Pzr Level Control Valve, in hand to maintain previous slope of MUT level recorder.

C. Verify proportional Pressurizer Heater Controls hand/auto station in hand and full on to maintain RCS pressure.

D. Verify at least one Makeup Pump recirc valve CV-1300 or CV-1301 is open to ensure minimum recirc flow for the M/U Pump.

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Question No. 22 **QID: 0257**

Given:

- Reactor startup is in progress
- Group 6 is 50% withdrawn.
- NI-1 source range indicates .1 cps
- NI-2 source range indicates 30 cps

Which of the following would cause these indications?

A. Source range NI-2 discriminator voltage is set too high.

B. Inverter Y-28 failed resulting in a loss of power.

C. Inverter Y-11 failed resulting in a loss of power.

D. Source range NI-1 discriminator voltage is set too low.

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Question No. 23 **QID: 0511**

Given:

The following are in alarm:

- SG-A N-16 AVG Leakrate GPM (SGALRGPM)
- SG-A N-16 Leakrate ROC (Rate of Change) GPM/HR (SGAROC1)
- A OTSG N-16 TROUBLE (K07-A5)

The crew has just initiated a controlled shutdown from 100% power in accordance with 1203.023, SMALL STEAM GENERATOR TUBE LEAKS.

The CBOT reports that SG-A N-16 AVG Leakrate GPM (SGALRGPM) has risen to 11 gpm.

What is the required action to take?

A. Enter EOP 1202.006, TUBE RUPTURE because leakrate is >1gpm.

B. Continue in AOP 1203.023, Attachment 1, to use correlation table for N-16 since power is less than 100% and N-16 detectors are normally set to Gross mode.

C. Continue in AOP 1203.023, Attachment 1, to use PMS indications for leak rate and rate of change.

D. Enter EOP 1202.006, TUBE RUPTURE because leakrate is > 10 gpm.

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Question No. 24 **QID: 0206**

The Main Control Room Ceiling Halon system has been properly placed in Inhibit by taking the switch on the right side of Module B3-2L to the down position in Fire Protection Panel (C463).

Which of the following is a true statement concerning the actuation capability of the Main Control Room Ceiling Halon system.

A. It will automatically actuate if both detector strings have valid detection signals present.

B. It can ONLY be actuated locally from the Halon bottles in the Auxiliary Building.

C. The Halon System can NOT be actuated with the system in Inhibit.

D. It can be actuated by placing the MAN TRIP switch on C463 to the OPERATED position.

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Question No. 25 **QID: 0498**

Given:

- Alternate shutdown is in progress due to a fire in the Unit 1 Control Room
- All immediate evacuation follow-up actions inside the control room have been completed.
- The CRS, RO #1, and RO#2 have gone out into the field to establish plant control.

Identify the desired OTSG level band and which pump / suction source which will be initially used:

A. SG levels controlled at 300" to 340" with Electric EFW Pump (P-7B) and Condensate Storage Tank (T-41)

B. SG levels controlled at 300" to 340" with Steam Driven EFW Pump (P-7A) and Q-Condensate Storage Tank (T41B)

C. SG levels controlled at 370" to 410" with Steam Driven EFW Pump (P-7A) and Q-Condensate Storage Tank (T41B)

D. SG levels controlled at 370" to 410" with Electric EFW Pump (P-7B) and Condensate Storage Tank (T-41)

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Question No. 26 **QID: 0020**

Given the following indications/alarms:

- SASS Mismatch alarm (fast flash)
- SG BTU Limit alarm (slow flash)
- SG "B" FW Temp signal select switch selected to SASS Enable (Auto) with the white indicating light off and the blue "Y" light on.

What operator action is procedurally required per the annunciator corrective actions for K07-B4, SASS MISMATCH?

A. Place the SG "B" FW Temp signal select switch to the "Y" position.

B. Depress the Auto pushbutton for SG "B" FW Temp on the SASS panel in C47-2.

C. No action necessary, SASS has automatically transferred to "X" NNI.

D. Place both FW loop demands in manual.

Question No. 27 **QID: 0004**

The plant is in a degraded power situation with natural circulation cooldown in progress. The ERV isolation valve CV-1000 has been closed due to leakage past the ERV.

Which of the following describes the required action concerning operation of CV-1000 during the cooldown?

A. CV-1000 should remain closed during the cooldown until repairs to the ERV are completed.

B. CV-1000 should be cycled open and closed during cooldown to prevent thermal binding of the valve.

C. CV-1000 should be opened to allow the pressurizer to go solid and transition to a HPI Cooldown.

D. CV-1000 should be deenergized and hold carded to prevent operation of the valve during cooldown.

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Question No. 28 **QID: 0559**

Given:
- Plant heatup in progress from refueling outage.
- P-32A and P-32B RCPs are running.
- Seal injection flow has been balanced and is in auto at 16 gpm total flow.
- Non-nuclear ICW to RCP motor cooling flow is 275 gpm.
- Nuclear ICW to RCP seal cooling flow is 35 gpm.
- RCS loop A & B cold leg temps are 370°F.
- RCP lift oil pressure is 1600 psig.

A start of RCP P-32C is attempted but is unsuccessful. Why?

A. Nuclear ICW to RCP seal cooling flow is low.

B. Seal injection flow is low.

C. RCP lift oil pressure is low.

D. RCS cold leg temps are low.

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Question No. 29 **QID: 0653**

The following conditions exist:

Unit 1 is operating at 100% power.
Annunciator RCP MOTOR COOLING FLOW LO (K08-E6) is in alarm.

Which of the following motor conditions would require tripping the affected RCP?

A. RCP P-32A seal bleedoff temperature indicates 170 degrees F.

B. RCP P-32B current indicates 700 amps.

C. RCP P-32C winding temperature is 320 degrees F.

D. RCP P-32D bearing temperature indicates 190 degrees F.

Question No. 30 **QID: 0657**

"A" HPI pump is operating, "C" HPI pump is in ES Standby.
"B" HPI pump MOD is closed on A-4, while "B" HPI pump bus selector is selected to A-3.

Which of the following best describes "B" HPI pump ES operation?

A. "B" HPI pump will start on A-3 if "A" HPI pump fails.

B. "B" HPI pump will start on A-4 if "A" HPI pump fails.

C. "B" HPI pump will start on A-4 if "C" HPI pump fails.

D. "B" HPI pump will not auto start on either "A" or "C" HPI pump failure.

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Question No. 31 **QID: 0654**

The makeup and purification system is in operation with 70 gpm letdown flow, when the following indications are observed.

Letdown flow-- 0 gpm
Letdown pressure-- 200 psig
Makeup tank level-- 76" decreasing

Which of the following transients caused the above indications?

A. Loss of power to the letdown demineralizer inlet valves.

B. Loss of Inst. Air to the letdown block orifice inlet and bypass valves.

C. Letdown isolation due to high temperature.

D. Inadvertent closure of the Makeup Tank Outlet Isolation.

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Question No. 32 **QID: 0293**

Given:

- Plant is in Mode 5
- P-34A Decay Heat pump is running

Which of the following would cause a loss of Decay Heat Removal?

A. A-1 voltage of 2425 volts

B. A-2 voltage of 2425 volts

C. B-5 voltage of 435 volts

D. B-6 voltage of 435 volts

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Question No. 33 **QID: 0166**

During an OTSG tube rupture with RCS temperature at 485° F, which of the following would require isolation of the bad SG?

A. Bad OTSG level 370" and rising.

B. BWST level 20' and dropping.

C. Projected activity at the site boundary is at NUE criteria.

D. Tube-to-shell differential temperature 60°F tubes hotter.

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Question No. 34 **QID: 0655**

Given:

- Plant is at 100% power
- All CETs indicate 602 °F

Subsequently, ICC train "A" Core Exit Thermocouple (CET) TE-1171 indicates 510 °F.

What is the effect of this failure?

A. CET TE-1171 must be removed from the average by I&C.

B. CET TE-1171 will be removed from the average automatically.

C. ICC Core Exit Thermocouple indication will go to ~594 °F.

D. "TRAIN A ICC EVENT" annunciator will alarm.

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Question No. 35 **QID: 0658**

Given:
Plant is in Mode 1

In order to provide sufficient quench - cooling volume for pressurizer transients:

What is the minimal level allowed in the Quench Tank per 1103.005 Pressurizer Operations?

A. 2500 gallons

B. 3000 gallons

C. 3500 gallons

D. 4000 gallons

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Question No. 36 **QID: 0226**

Given:

- Reactor has tripped.
- Soon after the trip a loss of DC bus D01 occurs which resulted in an actuation of all ES even digital channels.

This has caused a loss of ICW cooling to all RCPs, what RCP cooling has NOT been lost?

A. Seal coolers

B. Seal return coolers

C. Lube oil coolers

D. motor coolers

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Question No. 37 **QID: 0212**

Given:
100% Power operations.

Which one of the following conditions has a T.S. Completion Time of one hour or less?

A. The Boric Acid Addition Tank (BAAT) temperature drops to a temperature that is 5 degrees above crystallization temperature.

B. The Q CST (T-41B) level has dropped to a level of 8 feet.

C. A Pressurizer Code Safety valve becomes inoperable.

D. One circuit of the control room emergency air conditioning and isolation system becomes inoperable.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 38 **QID: 0659**

Given:

Plant is operating at 100% power.
A plant transinet occurs.

Which of the following parameters would indicate a failure of the Reactor Protection System (RPS), and
require the operator to manually trip the reactor?

A. Reactor Building pressure 3.5 psig.

B. Pressurizer level 95 inches and lowering.

C. RCS Cold Leg Temperature 540 °F.

D. Reactor Coolant System Pressure 1750 psig.

Question No. 39 **QID: 0192**

Reactor Building Pressure Transmitter (PT-2407) has failed high causing an ES CH3 Trip (analog 3) and the ESAS Partial Trip annunciator (K11-F6) to come into alarm.

With the above conditions, a power loss to which of the following would cause an ESAS actuation?

A. RS1

B. B11

C. RS3

D. B21

Question No. 40 **QID: 0430**

The plant is operating at 100% power.
An ESAS actuation occurs.

What action is required to reset the ESAS channels?

A. Depress the ESAS reset on panel C04.

B. Depress resets on actuation bistables.

C. Reset the digital signals then reset the analog signals.

D. Reset the analog signals then reset the digital signals.

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Question No. 41 **QID: 0660**

Given:
Plant is operating at 100% power.
1104.029 Supplement 5, RB Coolong unit VCC-2C & VCC-2D Flow Test, surveillance in progress.
CV-3813, SW Inlet valve to RB Cooling Coils VCC-2C/2D will not open. All efforts to open valve have failed.

What effect does this have on the plant?

A. None, VCC-2C/D remains operable as long as the chilled water supply remains available.

B. VCC-2C/D is inoperable, No T.S. time clock required per T.S. 3.6.5.

C. VCC-2C/D is inoperable, Enter 7 day time clock per T.S. 3.6.5.B to restore cooling train.

D. VCC-2C/D is inoperable, Enter T.S. 3.0.3 immediately per T.S. 3.6.5.G

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Question No. 42 **QID: 0661**

Which of the following concerning Decay Heat Room Coolers, VUC1A & VUC1B automatic start feature is correct?

A. Both start when P34A and P35A start.

B. Both start when P34A or P35A start.

C. VUC1A starts when P35A starts.

D. VUC1B starts when P35B starts.

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Question No. 43 **QID: 0223**

Given:

- Plant is in cold shutdown.
- All necessary components have been aligned per 1305.006, Integrated ES System Test.
- All ES EVEN Digital Channels actuated per procedure using RB pressure transmitters.

Which of the following is a properly actuated ES component for this test?

A. P-35A RB Spray pump flow ~1500 gpm.

B. Red Train BWST Outlet valve (CV-1407) open.

C. P-35B RB Spray Block valve (CV-2400) open.

D. P-35B NaOH Tank Outlet valve (CV-1617) open.

Question No. 44 **QID: 0656**

Unless bypassed, Main Steam Line Isolation (MSLI) will actuate at:

A. 700 psig

B. 650 psig

C. 600 psig

D. 550 psig

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Question No. 45 **QID: 0667**

Which of the following conditions would require a manual Reactor Trip by the operator?

A. CV-2695, "A" Main Steam Isolation Valve goes closed.

B. Condenser Vacuum 24"Hg and turbine load at 250 Mwe.

C. "B" S/G level 18 inches and rising.

D. Pressurizer level 280 inches and lowering.

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Question No. 46 **QID: 0268**

Given:

- Both Main Feedwater Loop Demands and "A" MFW Pump are in Hand.
- All other ICS stations which may be in Auto are in Auto.
- The operator is performing a controlled plant shutdown.
- When the "A" Main Feedwater Block Valve starts to go shut, the operator continues to lower "A" MFW Pump speed.

What will this result in?

A. Cross limits increasing Reactor power.

B. Delta Tc opening the "B" Low Load Control Valve to compensate.

C. The "A" Main Feedwater Block Valve stopping its movement.

D. The Turbine rejecting to "Operator Auto."

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Question No. 47 **QID: 0668**

Given:

ESAS has actuated on Reactor Building pressure.
SCM is adequate.
RCP's have been secured per RT-10
"A" S/G pressure is 900 psig.
"B" S/G pressure is 750 psig.

Which of the following fill rates would indicate proper EFW flow control by EFIC?

A. "A" S/G Filling at 2.4 " / min AND "B" S/G Isolated by Vector due to >100 psig below "A" S/G

B. "A" S/G Filling at 4.4 " / min AND "B" S/G Isolated by Vector due to >100 psig below "A" S/G

C. "A" S/G Filling at 2.4 " / min AND "B" S/G Filling at 2 " / min

D. "A" S/G Filling at 4.4 " / min AND "B" S/G Filling at 2 " / min

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 48 **QID: 0669**

Given:

Plant operating at 100% power
Y-11 and Y-15 Inverters are In Service.
The Inside AO and Turbine Operator have been directed to Place Y-13 Inverter In Service and remove Y-15 from service.

Which of the following would you observe in the control room if the transfer is performed incorrectly?

A. Reactor trip due to a loss of ICS power.

B. Reactor trip due to a loss of RCP Contact Monitor input to RPS.

C. K08-C3, RPS Trouble, due to a loss of power to "A" RPS Cabinet.

D. K11-F6, ESAS Partial Trip, due to a loss of power to Analog Channel 3

Question No. 49 **QID: 0670**

Given:
All Switchyard Auxiliary Power Throw-over Switches are in the Normally Closed position.

Which of the following is providing power to the switchyard battery chargers?

A. 22 Kv bus in switchyard.

B. Plant 480 V Bus B-3.

C. Plant 480 V Bus B-5.

D. Plant 480 V Bus B-6.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 50 **QID: 0671**

Emergency Diesel #1 is out of service. A large break LOCA occurs coincident with a loss of offsite power. P-7A, Steam Driven EFW Pump has tripped and cannot be reset.

What action is necessary to allow supplying A-3 from A-4 in order to run P-7B, Motor Driven EFW Pump?

A. ES channel #1 electrical alignment placed in manual.

B. ES channel #2 electrical alignment placed in manual.

C. ES channel #1 & 2 electrical alignment placed in manual.

D. De-energize DC control power to Emergency Diesel #1.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 51 **QID: 0672**

What type of detector is used by the Main Condenser Air Discharge Radiation Monitor to monitor for steam generator tube leaks?

A. Scintillation Detector

B. Geiger - Mueller Detector

C. Ion Chamber Detector

D. Beta Radiation Detector

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 52 **QID: 0046**

Given:

- Degraded Power
- Both EDGs operating
- ESAS has NOT actuated
- P4C failed to start
- P4B out of service

Which of the following actions should be accomplished?

A. Close SW Loop II Isolation Valve (SW-10C).

B. Open SW Loop I & II Crossconnects (SW-5 and SW-6).

C. Close ACW Loop Isolation (CV-3643).

D. Cross-tie SW Loops at Makeup Pump (SW-14 thru SW-17).

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 53 **QID: 0405**

Given:

- Plant is at 100% power.
- P-4B SW pump is inoperable due to high vibrations on last surveillance.
- P-4A SW pump is supplying Loop 1 SW
- P-4C SW pump is supplying Loop 2 SW
- Maintenance is complete on P-4B.
- Pre-evolution brief has been conducted and the surveillance is ready to be performed to prove operability of P-4B.

Are any compensatory measures needed to be in place while running the P-4B SW pump on Loop 1?

a. No actions needed due to P-4A and P-4C operable and powered from independent buses.

b. Enter Tech Spec 3.3.6 for inoperable SW loop during the surveillance.

c. No actions needed since P-4A will start on ESAS signal.

d. A dedicated licensed operator stationed to monitor SW, with no other duties.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 54 **QID: 0673**

Given:
K12-B3, INST AIR HEADER PRESS LO, is in alarm.
Instrument Air header pressure is continueing to lower.
Plant shutdown has been commenced at 10%/minute.

At what pressure will the service air to instrument air crossover valve automatically open?

A. 35 psig

B. 50 psig

C. 60 psig

D. 75 psig

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 55 **QID: 0158**

Given:

- The plant is at 100% power.
- The outside door of the personnel air lock was opened to replace a seal gasket 48 hours ago. All work is complete, no more entries are required.

How long do we have to perform an LLRT on the personnel air lock before a loss of containment
integrity will exist per the entry conditions of 1203.005, Loss of Reactor Building Integrity?

A. 24 hours

B. 5 days

C. 12 days

D. 28 days

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 56 **QID: 0674**

Given:

Approach to criticality is in progress.
Groups 1 - 5 are fully withdrawn.
Group 6 is at 30% withdrawn.
Group 6 Rod 4 and Group 6 Rod 5 both drop into the core.
K08-C2, Control Rod Asymmetric in alarm.

Which of the following actions should be taken for the given condition?

A. Relatch Group 6 Rods 4 & 5 and withdrawl to 30% in increments of <25%.

B. Insert Group 6 rods and verify reactor is shutdown.

C. Insert Group 5 and Group 6 rods in sequence and verify reactor is shutdown.

D. Trip the reactor.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 57 **QID: 0675**

Which of the following loss of coolant accidents results in the DBA (Design Bases Accident) for reactor building pressure?

A. A 5 square ft hot leg break.

B. A 14 square ft hot leg break.

C. An Ejected Rod.

D. A double ended shear of a cold leg.

Question No. 58 **QID: 0381**

The CONTROL ROD ASYMMETRIC annunciator (K08-C2) in alarm indicates:

A. A rod is greater than 7 inches from its group average as measured by Relative Position Indication (RPI).

B. A rod is greater than 7 inches from its group average as measured by Absolute Position Indication (API).

C. A rod is greater than 9 inches from its group average as measured by Relative Position Indication (RPI).

D. A rod is greater than 9 inches from its group average as measured by Absolute Position Indication (API).

Question No. 59 **QID: 0058**

A startup is in progress.
The reactor is critical.
The CBOR is commencing power escalation to <2% reactor power.

The following indications are observed:

NI-3 1 x 10-8 amps
NI-4 8 x 10-9 amps
NI-5 0.8%
NI-6 1.1%
NI-7 1.3%
NI-8 1.2%

What conclusion should you deduce from the above indications?

A. Power Range channel 5 requires calibration.

B. The Intermediate Range channels are overcompensated.

C. The POAH has not yet been reached.

D. The Intermediate Range channels are undercompensated.

Question No. 60 **QID: 0309**

Given:

- The plant is operating at 100% power.
- Loop "A" T-cold Narrow Range Temperature instrument fails HIGH.

If this instrument was hard selected by the SASS selector switch, what ICS HAND/AUTO stations should be placed in HAND?

A. Both Feedwater Loop Demands, Reactor Demand and Diamond Panel.

B. SG/Rx Master, Loop Delta Tc and Reactor Demand

C. Both Feedwater Loop Demands, SG/Rx Master and Loop Delta Tc.

D. Both MFW Pumps, Loop Delta Tc and Turbine (EHC).

Question No. 61 **QID: 0059**

During a large break LOCA the value on the ICCMDS CET Subcooling Margin Display is negative and flashing.

What does this indicate?

A. An ICCMDS communications error.

B. CET readings are invalid.

C. ICCMDS ability to calculate SCM is lost.

D. CET readings indicate superheat.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 62 **QID: 0474**

Given:

- A LOCA has occurred.
- Post-LOCA Reactor Building pressure is 25 psia.
- Pre-LOCA RB temperature was 90 degrees F.

What power setting is required when placing hydrogen recombiner M55B in service?
(Reference Provided)

A. 66 KW

B. 67 KW

C. 68 KW

D. 69 KW

Question No. 63 **QID: 0199**

Identify the correct response concerning the Reactor Building Purge Isolation Valves (CV-7401, 7402, 7403, & 7404).

A. The valves receive an ESAS actuation signal from ESAS channels 3 & 4.

B. The valves receive an ESAS actuation signal from ESAS channels 7 & 8.

C. The valves receive an ESAS actuation signal from ESAS channels 9 & 10.

D. The valves do not receive an ESAS actuation signal.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 64 **QID: 0200**

A break has occurred on the discharge line downstream of the discharge valve of the in service
Spent Fuel Cooling Pump (P-40A). The pump is stopped and the discharge valve is closed.

Which of the following statements is correct concerning the Spent Fuel Pool inventory?

A. The SFP will drain to ~ 2 feet above the spent fuel assemblies.

B. Emergency makeup from service water will be needed to prevent the SFP level from reaching the spent fuel assemblies.

C. The SFP level will stay relatively constant due to siphon holes in the discharge piping.

D. The SFP level will drop ~3 feet to the bottom of the pipe.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 65 **QID: 0470**

When a high radiation condition occurs in the Waste Gas Discharge Header, the radiation monitor will cause what automatic actions to occur?

1. C-9A and C-9B Waste Gas Compressors power supply breakers will trip open.
2. The Aux. Building Vent Header diverts to the Waste Gas Surge Tank.
3. The Waste Gas Decay Tank effluent control valve (CV-4820) shuts.
4. The Gas Collection Vent Header diverts to the Waste Gas Decay Tank in service.

A. 1 and 2

B. 2 and 3

C. 3 and 4

D. 1 and 4

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 66 **QID: 0676**

In accordance with EN-OP-115 Conduct of Operations, some routine activities are allowed to be performed without a procedure in hand.

Which of the following evolutions is NOT exempt from the requirement to have the procedure in hand while performing?

A. Setting up the Batch Controller.

B. Releasing the Neutralizing Tank.

C. Pumping the Turbine Building Trench.

D. Pumping the Aux Building Equipment Drain Tank (T-11).

Question No. 67 **QID: 0677**

P-4C Service Water Pump surveillance is in progress.
"C" Service Water Bay level is 340 feet.
P-4C flow is 6100 gpm.

Which of the following discharge pressures would result in the pump performance falling within the limiting range for the surveillance test? (Reference Provided)

A. 85 psig

B. 76 psig

C. 68 psig

D. 64 psig

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 68 **QID: 0245**

The feedwater/condensate system startup is in progress.
A main feedwater isolation valve had been closed by operation of the manual handwheel to isolate the system.

Prior to declaring this valve operable what action must be taken?

A. The valve must be fully opened using the local handwheel.

A. Electricians must check the torque switch adjustment.

C. The measured torque value required to remove the valve from its seat is below the limit.

D. The valve must be stroked electrically to confirm proper clutch engagement.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 69 **QID: 0477**

During plant startup at approximately 170 Mwe which of the following control manipulations are performed?

A. Place the second MFW pump in service at C02.

B. Remove the Auxiliary FW pump from service at C12.

C. Close the High Pressure Turbine drains at C02.

D. Place Heater Drain Pumps in service at C12.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 70 **QID: 0233**

An NI calibration was performed yesterday.

Today due to a problem with a Condenser Vacuum pump, reactor power had to be lowered to 89% and has subsequently been returned to 100%.

When is the next NI calibration required to be performed?

A. Within the next 7 days.

B. Within the next 3 days.

C. Within the next 36 hours.

D. Within the next 24 hours.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 71 **QID: 0231**

Which of the following conditions is correct with regard to preparation and installation authorization of a common unit tagout?

A. Installation may be authorized by either the Unit 1 or the Unit 2 Operations Supervisor.

B. Preparers and reviewers from both units must be licensed operators.

C. Preparer and reviewer may be non-licensed if authorized by both Unit Operations Supervisors.

D. Preparer may be non-licensed as long as the opposite unit reviewer is licensed.

Question No. 72 **QID: 0121**

What is the federal occupational exposure limit to the whole body TEDE (Total Effective Dose Equivalent) in accordance with 10CFR20?

A. 0.1 rems/calendar year

B. 5.0 rems/calendar year

C. 15.0 rems/calendar year

D. 50.0 rems/calendar year

Question No. 73 **QID: 0436**

The WCO is preparing to commence a liquid release on TWMT T-16A when he notices that there is no tag hanging on T-16A inlet valve CZ-47A (tank was sampled several hours ago).

What action should be taken?

A. Document discrepancy via CR, install tag on CZ-47A, and continue with the release.

B. Terminate the release, install tag on CZ-47A and submit new release permit to nuclear chemistry.

C. Install tag on CZ-47A and continue with the release.

D. Install tag on CZ-47A, inform nuclear chemistry and resample with current release permit.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 74 **QID: 0019**

Fuel pin leakage has caused higher than normal activity in the reactor coolant system.

Which of the following indications on the Failed Fuel Monitor (RI-1237) would be indicative of failed fuel and require power reduction?

A. A marked rise by 20% in the IODINE/GROSS ratio.

B. A marked rise by 40% in the GROSS/IODINE ratio.

C. A marked drop by 20% in the IODINE/GROSS ratio.

D. A marked drop by 40% in the GROSS/IODINE ratio.

ANO Unit 1 - 2007 RO NRC Written Examination

Question No. 75 **QID: 0010**

Given:

- K05-B2, CONDENSER VACUUM LO is in alarm
- K05-B3, VACUUM PUMP AUTO START is in alarm
- Power reduction is in progress due to rapidly lowering condenser vacuum.
- Plant is operating at 60% power
- E-11A North Waterbox is OOS for maintenance

Choose the appropriate operator actions:

A. Trip the reactor and turbine if vacuum falls below 26.5 inches Hg.

B. Trip the reactor and turbine if vacuum falls below 24.5 inches Hg.

C. Trip the turbine only, if vacuum falls below 26.5 inches Hg.

D. Trip the turbine only, if vacuum falls below 24.5 inches Hg.

ANO Unit 1 - 2007 RO NRC Written Exam KEY

Question No. 1 **QID: 0023** **Point Value: 1**

Answer:

A. Manually actuate MSLI for affected SG(s) and EFW due to overcooling.

Question No. 2 **QID: 0027** **Point Value: 1**

Answer:

B. Approximately 260 °F

Question No. 3 **QID: 0404** **Point Value: 1**

Answer:

D. Primary to secondary heat transfer is in progress.

Question No. 4 **QID: 0491** **Point Value: 1**

Answer:

B. Secure the "A" HPI pump.

Question No. 5 **QID: 0452** **Point Value: 1**

Answer:

D. Trip reactor, trip P-32C RCP, and go to 1202.001, Reactor Trip.

Question No. 6 **QID: 0549** **Point Value: 1**

Answer:

A. Trip HPI pump and isolate Letdown by closing Letdown Isolation, CV-1221, due to indications of loss of suction.

Question No. 7 **QID: 0033** **Point Value: 1**

Answer:

D. Stabilize flow by throttling one of the DH discharge flowpath valves.

ANO Unit 1 - 2007 RO NRC Written Exam KEY

Question No. 8 **QID: 0284** **Point Value: 1**

Answer:
B. 430 degrees F

Question No. 9 **QID: 0328** **Point Value: 1**

Answer:
A. Depress the CRD Power Supply Breaker Trip Pushbuttons.

Question No. 10 **QID: 0332** **Point Value: 1**

Answer:
a. Controlling reactor coolant system pressure low within the limits of Figure 3.

Question No. 11 **QID: 0663** **Point Value: 1**

Answer:
C. Pressurized Thermal Shock.

Question No. 12 **QID: 0662** **Point Value: 1**

Answer:
C. Both S/G can be fed with P-75 while monitoring tube to shell delta T until primary to secondary heat
transfer is established.

Question No. 13 **QID: 0338** **Point Value: 1**

Answer:
D. Select MANUAL on the auto/manual control and adjust the MANUAL voltage adjust rheosta

Question No. 14 **QID: 0664** **Point Value: 1**

Answer:
B. Place all 3 ICW Pumps in Pull-to-Lock.

ANO Unit 1 - 2007 RO NRC Written Exam KEY

Question No. 15 **QID: 0336** **Point Value: 1**

Answer:

C. Transfer D11 to its Emergency Power Supply to energize generator lockout relays.

Question No. 16 **QID: 0554** **Point Value: 1**

Answer:

A. Establish SW slowly to prevent DH cooler water hammer.

Question No. 17 **QID: 0108** **Point Value: 1**

Answer:

A. CV-6688 will go OPEN due to system pressure.

Question No. 18 **QID: 0556** **Point Value: 1**

Answer:

C. To increase HPI flow while preventing ESAS and maintaining SCM.

Question No. 19 **QID: 0021** **Point Value: 1**

Answer:

D. Control rods will withdraw and main feedwater flows will drop.

Question No. 20 **QID: 0467** **Point Value: 1**

Answer:

D. 1800

Question No. 21 **QID: 0665** **Point Value: 1**

Answer:

B. Adjust CV-1235, Pzr Level Control Valve, in hand to maintain previous slope of MUT level recorder.

ANO Unit 1 - 2007 RO NRC Written Exam KEY

Question No. 22 **QID: 0257** **Point Value: 1**

Answer:

C. Inverter Y-11 failed resulting in a loss of power.

Question No. 23 **QID: 0511** **Point Value: 1**

Answer:

D. Enter EOP 1202.006, TUBE RUPTURE because leakrate is > 10 gpm.

Question No. 24 **QID: 0206** **Point Value: 1**

Answer:

D. It can be actuated by placing the MAN TRIP switch on C463 to the OPERATED position.

Question No. 25 **QID: 0498** **Point Value: 1**

Answer:

B. SG levels controlled at 300" to 340" with Steam Driven EFW Pump (P-7A) and Q-Condensate Storage Tank (T41B)

Question No. 26 **QID: 0020** **Point Value: 1**

Answer:

A. Place the SG "B" FW Temp signal select switch to the "Y" position.

Question No. 27 **QID: 0004** **Point Value: 1**

Answer:

B. CV-1000 should be cycled open and closed during cooldown to prevent thermal binding of the valve.

Question No. 28 **QID: 0559** **Point Value: 1**

Answer:

C. RCP lift oil pressure is low.

ANO Unit 1 - 2007 RO NRC Written Exam KEY

Question No. 29 **QID: 0653** **Point Value: 1**

Answer:

C. RCP P-32C winding temperature is 320 degrees F.

Question No. 30 **QID: 0657** **Point Value: 1**

Answer:

C. "B" HPI pump will start on A-4 if "C" HPI pump fails.

Question No. 31 **QID: 0654** **Point Value: 1**

Answer:

A. Loss of power to the letdown demineralizer inlet valves.

Question No. 32 **QID: 0293** **Point Value: 1**

Answer:

A. A-1 voltage of 2425 volts

Question No. 33 **QID: 0166** **Point Value: 1**

Answer:

B. BWST level 22' and dropping.

Question No. 34 **QID: 0655** **Point Value: 1**

Answer:

B. CET TE-1171 will be removed from the average automatically.

Question No. 35 **QID: 0658** **Point Value: 1**

Answer:

D. 4000 gallons

ANO Unit 1 - 2007 RO NRC Written Exam KEY

Question No. 36 **QID:** 0226 **Point Value:** 1

Answer:
B. seal return coolers

Question No. 37 **QID:** 0212 **Point Value:** 1

Answer:
C. A Pressurizer Code Safety valve becomes inoperable.

Question No. 38 **QID:** 0659 **Point Value:** 1

Answer:
D. Reactor Coolant System Pressure 1750 psig.

Question No. 39 **QID:** 0192 **Point Value:** 1

Answer:
A. RS1

Question No. 40 **QID:** 0430 **Point Value:** 1

Answer:
D. Reset the analog signals then reset the digital signals.

Question No. 41 **QID:** 0660 **Point Value:** 1

Answer:
C. VCC-2C/D is inoperable, Enter 7 day time clock per T.S. 3.6.5.B to restore cooling train.

Question No. 42 **QID:** 0661 **Point Value:** 1

Answer:
C. VUC1A starts when P35A starts.

ANO Unit 1 - 2007 RO NRC Written Exam KEY

Question No. 43 **QID: 0223** **Point Value: 1**

Answer:
D. P-35B NaOH Tank Outlet valve (CV-1617) open.

Question No. 44 **QID: 0656** **Point Value: 1**

Answer:
C. 600 psig

Question No. 45 **QID: 0667** **Point Value: 1**

Answer:
A. CV-2695, "A" Main Steam Isolation Valve goes closed.

Question No. 46 **QID: 0268** **Point Value: 1**

Answer:
C. The "A" Main Feedwater Block Valve stopping its movement.

Question No. 47 **QID: 0668** **Point Value: 1**

Answer:
D. "A" S/G Filling at 4.4 " / min AND "B" S/G Filling at 2 " / min

Question No. 48 **QID: 0669** **Point Value: 1**

Answer:
D. K11-F6, ESAS Partial Trip, due to a loss of power to Analog Channel 3

Question No. 49 **QID: 0670** **Point Value: 1**

Answer:
A. 22 Kv bus in switchyard.

ANO Unit 1 - 2007 RO NRC Written Exam KEY

Question No. 50 **QID: 0671** **Point Value: 1**

Answer:
C. ES channel #1 & 2 electrical alignment placed in manual.

Question No. 51 **QID: 0672** **Point Value: 1**

Answer:
A. Scintillation Detector

Question No. 52 **QID: 0046** **Point Value: 1**

Answer:
C. Close ACW Loop isolation (CV-3643).

Question No. 53 **QID: 0405** **Point Value: 1**

Answer:
d. A dedicated licensed operator stationed to monitor SW, with no other duties.

Question No. 54 **QID: 0673** **Point Value: 1**

Answer:
B. 50 psig

Question No. 55 **QID: 0158** **Point Value: 1**

Answer:
B. 5 days

Question No. 56 **QID: 0674** **Point Value: 1**

Answer:
C. Insert Group 5 and Group 6 rods in sequence and verify reactor is shutdown.

Question No. 57 **QID: 0675** **Point Value: 1**

Answer:

A. A 5 square ft hot leg break.

Question No. 58 **QID: 0381** **Point Value: 1**

Answer:

B. A rod is greater than 7 inches from its group average as measured by Absolute Position Indication (API).

Question No. 59 **QID: 0058** **Point Value: 1**

Answer:

B. The Intermediate Range channels are overcompensated.

Question No. 60 **QID: 0309** **Point Value: 1**

Answer:

A. Both Feedwater Loop Demands, Reactor Demand and Diamond Panel.

Question No. 61 **QID: 0059** **Point Value: 1**

Answer:

D. CET readings indicate superheat.

Question No. 62 **QID: 0474** **Point Value: 1**

Answer:

C. 68 KW

Question No. 63 **QID: 0199** **Point Value: 1**

Answer:

A. The valves receive an ESAS actuation signal from ESAS channels 3 & 4.

Question No. 64 **QID: 0200** **Point Value: 1**

Answer:

C. The SFP level will stay relatively constant due to siphon holes in the discharge piping.

Question No. 65 **QID: 0470** **Point Value: 1**

Answer:

B. 2 and 3

Question No. 66 **QID: 0676** **Point Value: 1**

Answer:

B. Releasing the Neutralizing Tank.

Question No. 67 **QID: 0677** **Point Value: 1**

Answer:

B. 76 psig

Question No. 68 **QID: 0245** **Point Value: 1**

Answer:

D. The valve must be stroked electrically to confirm proper clutch engagement.

Question No. 69 **QID: 0477** **Point Value: 1**

Answer:

C. Close the High Pressure Turbine drains at C02.

Question No. 70 **QID: 0233** **Point Value: 1**

Answer:

D. Within the next 24 hours.

ANO Unit 1 - 2007 RO NRC Written Exam KEY

Question No. 71 **QID:** 0231 **Point Value:** 1

Answer:

b. Preparers and reviewers from both units must be licensed operators.

Question No. 72 **QID:** 0121 **Point Value:** 1

Answer:

B. 5.0 rems/calendar year

Question No. 73 **QID:** 0436 **Point Value:** 1

Answer:

B. Terminate the release, install tag on CZ-47A and submit new release permit to nuclear chemistry.

Question No. 74 **QID:** 0019 **Point Value:** 1

Answer:

D. A marked drop by 40% in the GROSS/IODINE ratio.

Question No. 75 **QID:** 0010 **Point Value:** 1

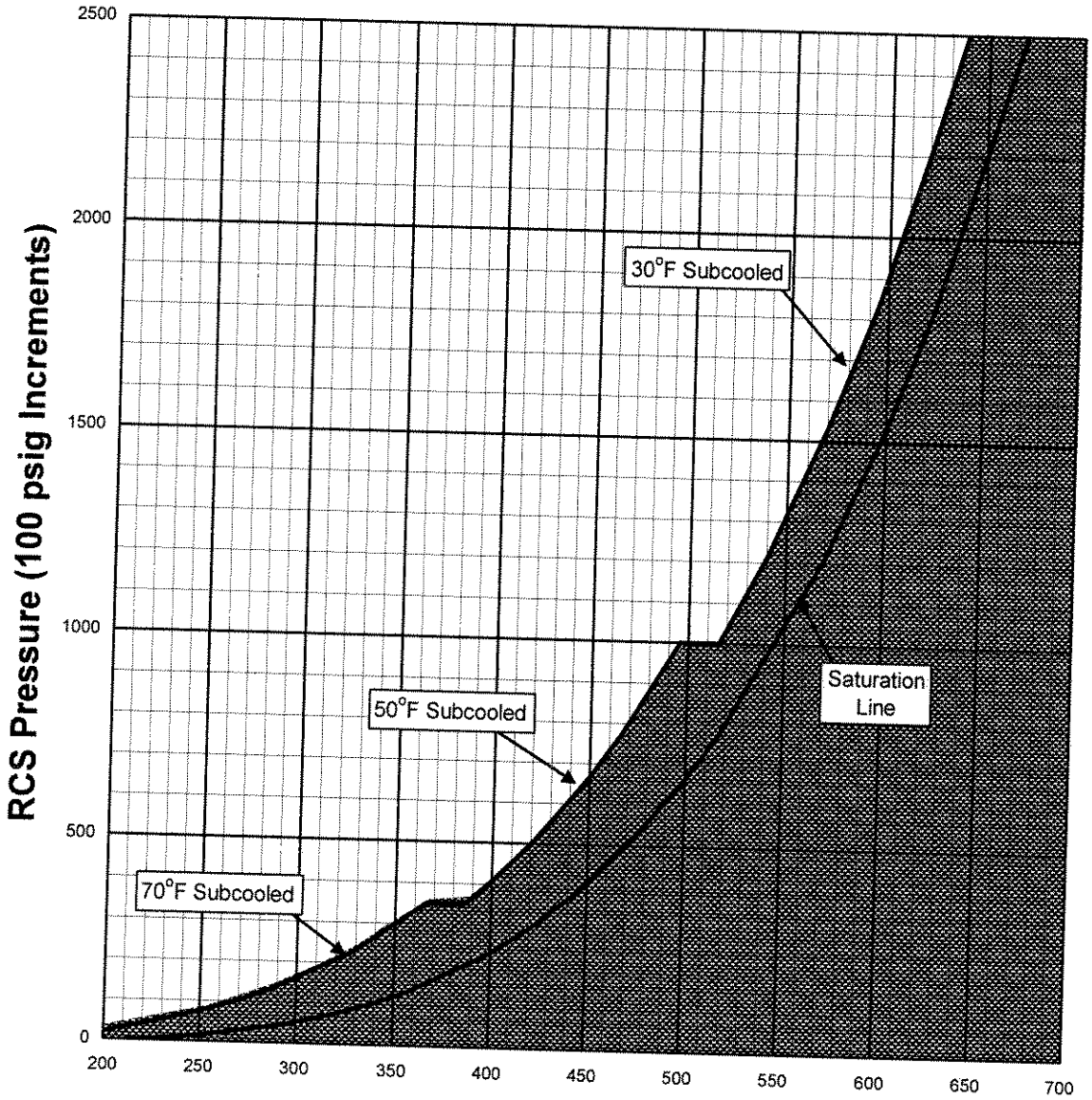
Answer:

B. Trip the reactor and turbine if vacuum falls below 24.5 inches Hg.

RO

Handout

FIGURE 1
Saturation and Adequate SCM



RCS Pressure	Adequate SCM
>1000 psig	≥30°F
350 to 1000 psig	≥50°F
<350 psig	≥70°F

FIGURE 2
SG Pressure vs T-sat

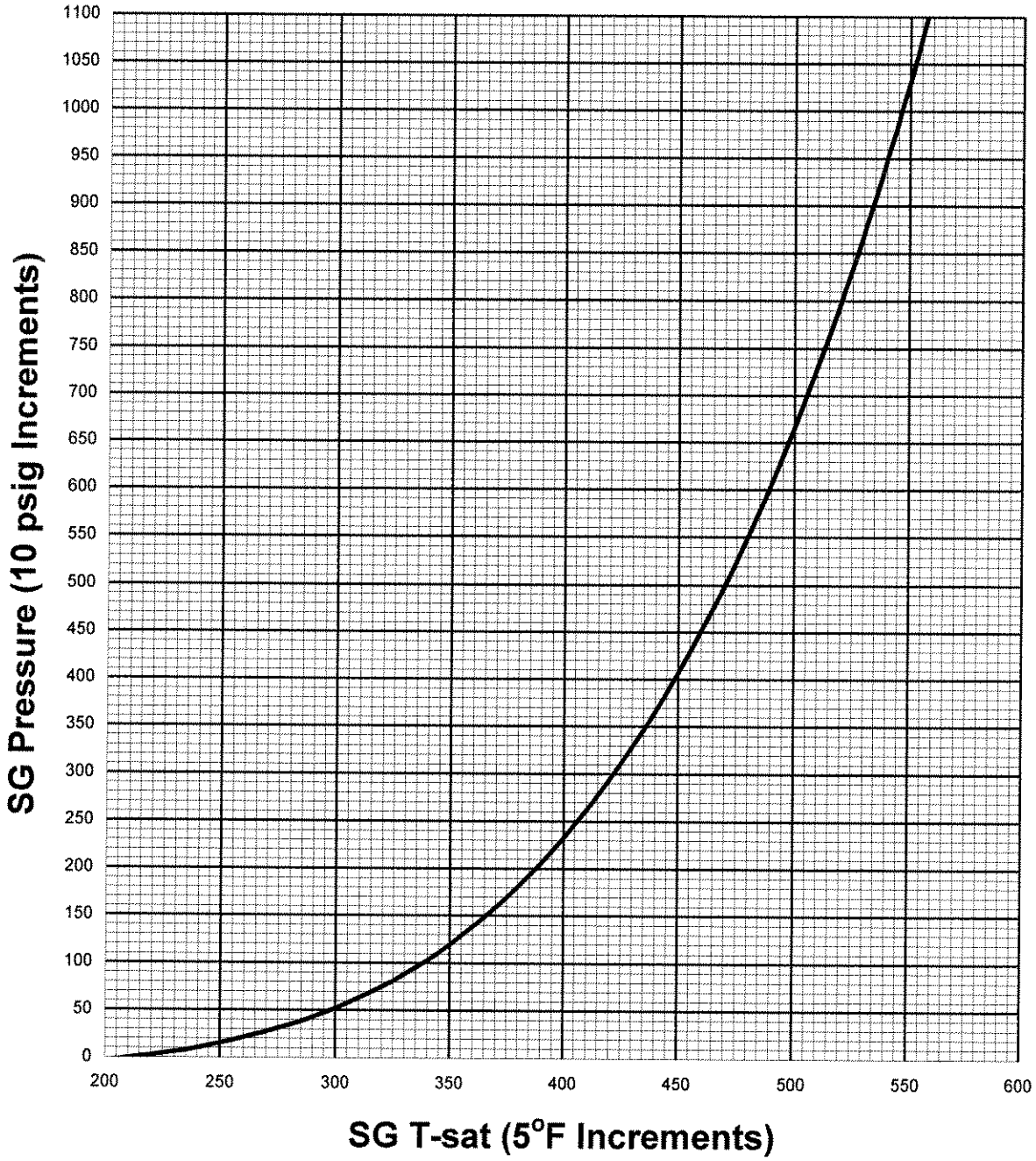


FIGURE 3
RCS Pressure vs Temperature Limits

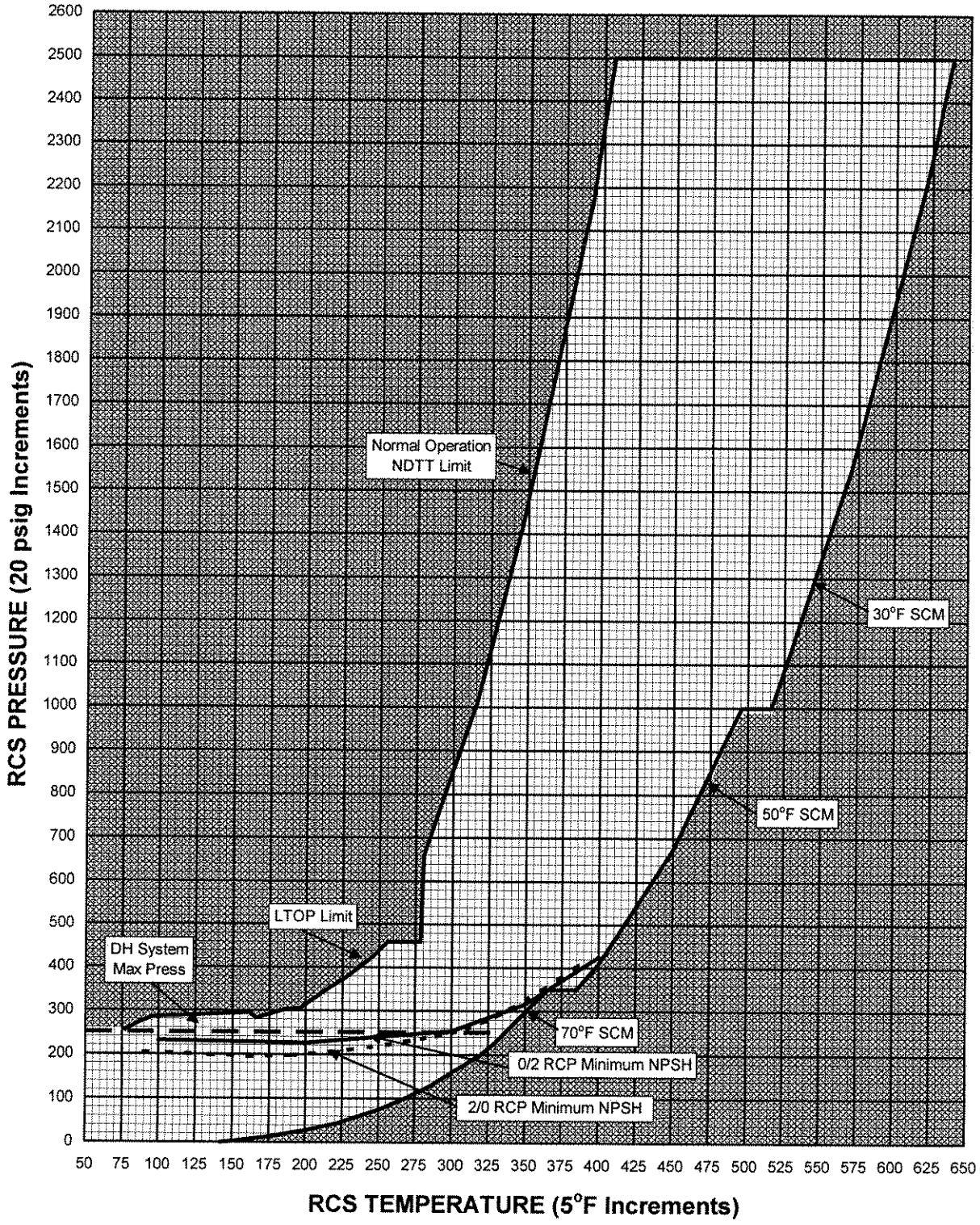


FIGURE 4
Core Exit Thermocouple for Inadequate Core Cooling

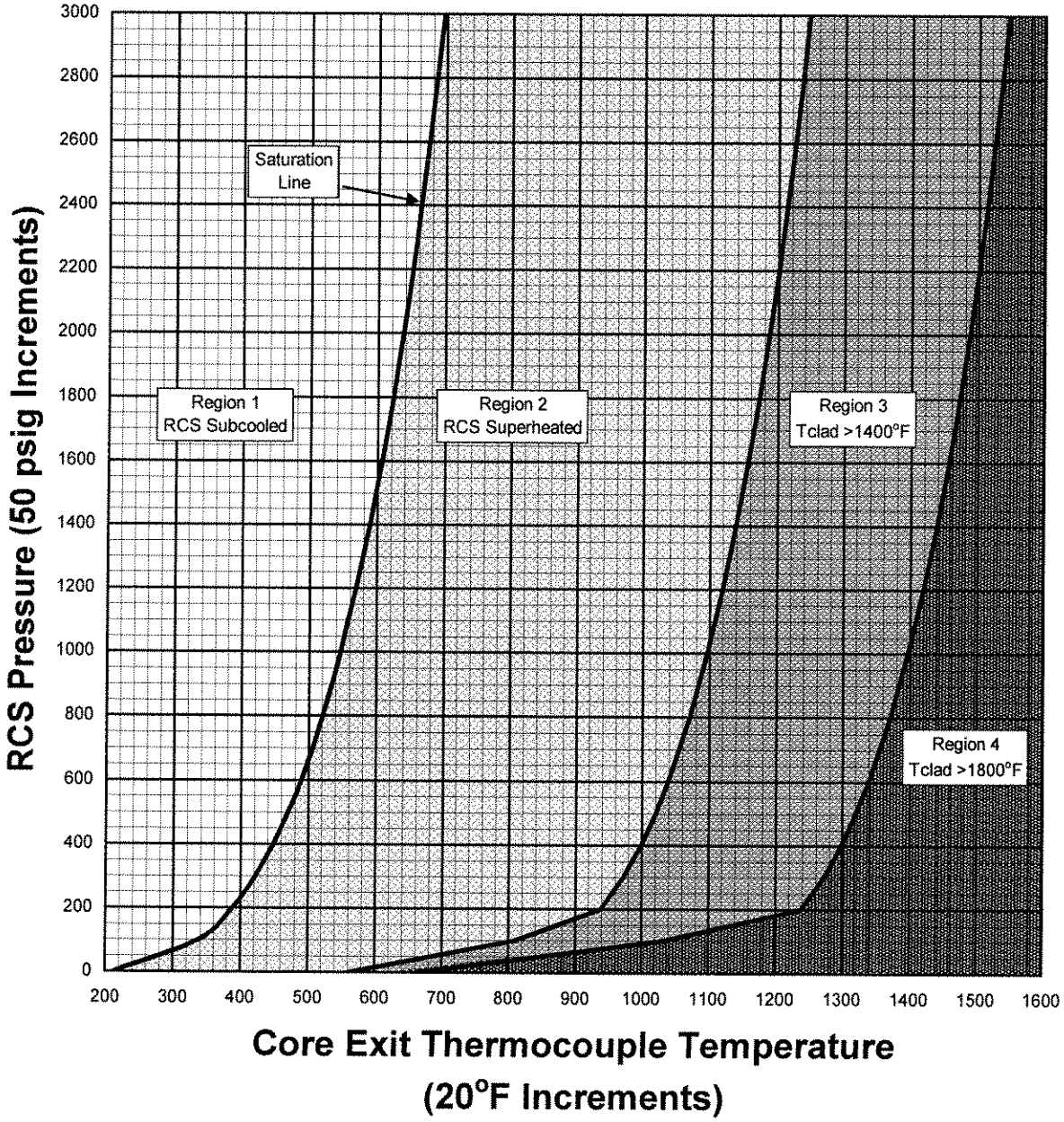


FIGURE 5

SG Pressure to Establish 40° to 60°F Primary to Secondary ΔT

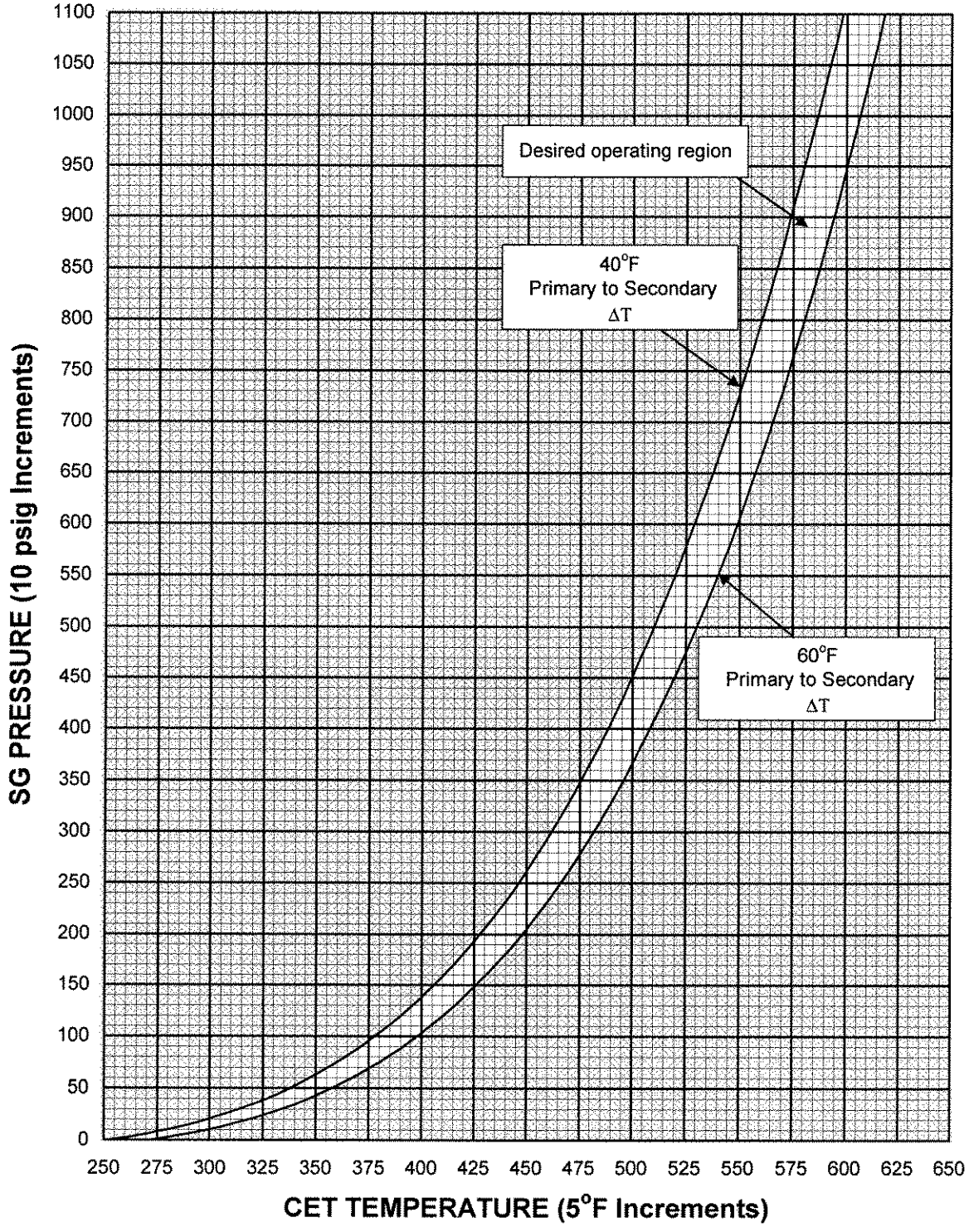
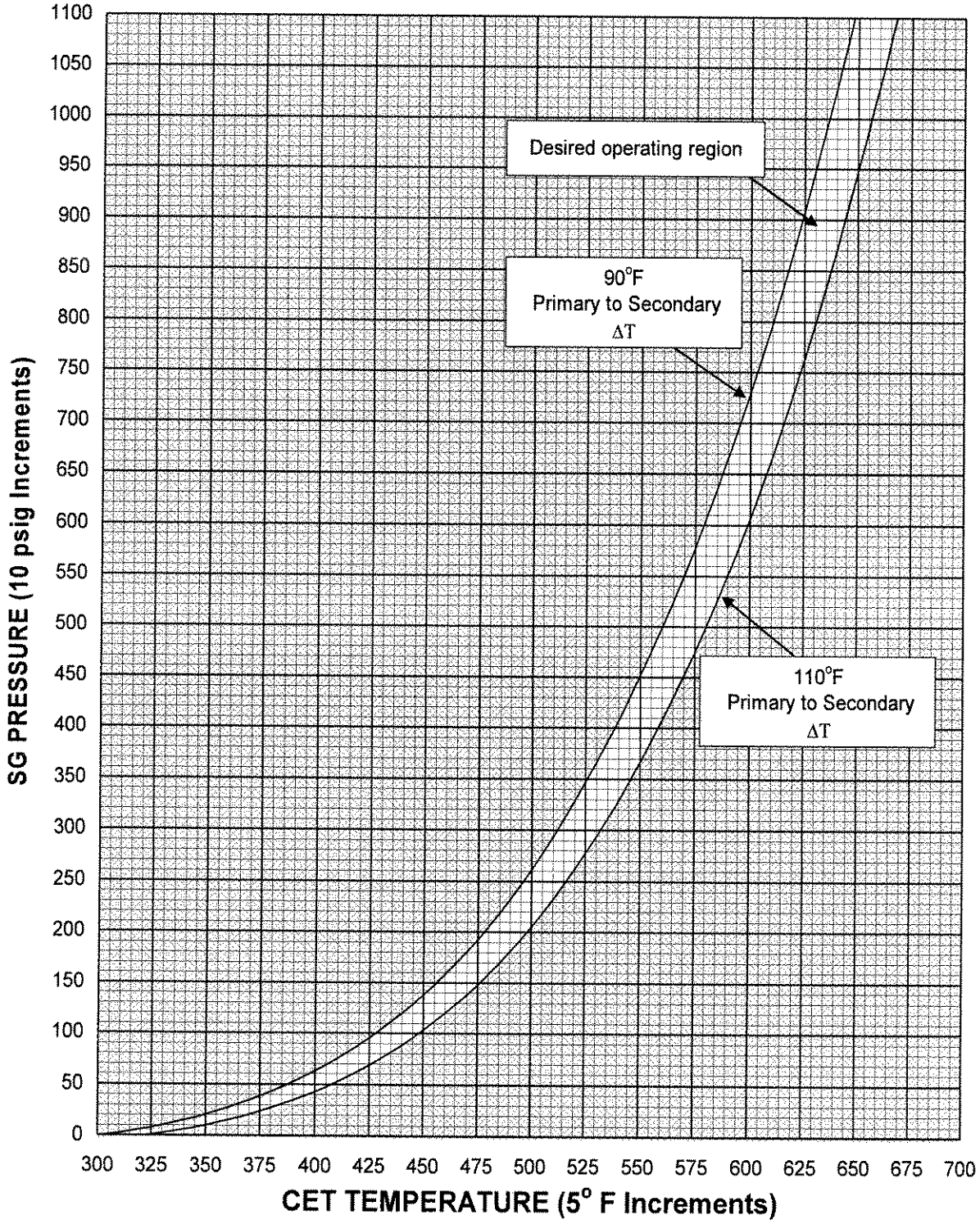


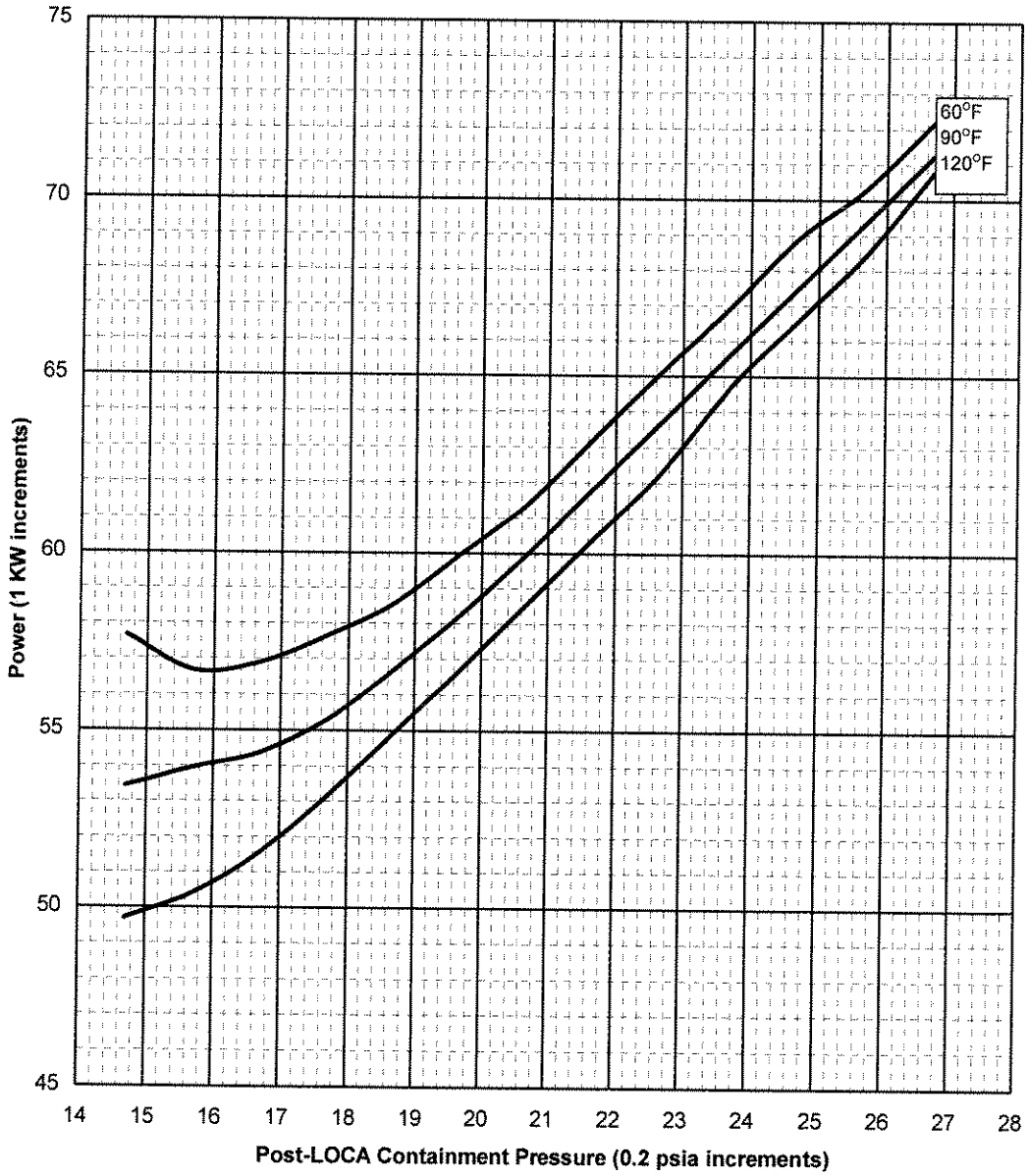
FIGURE 6

SG Pressure to Establish 90° to 110°F Primary to Secondary ΔT



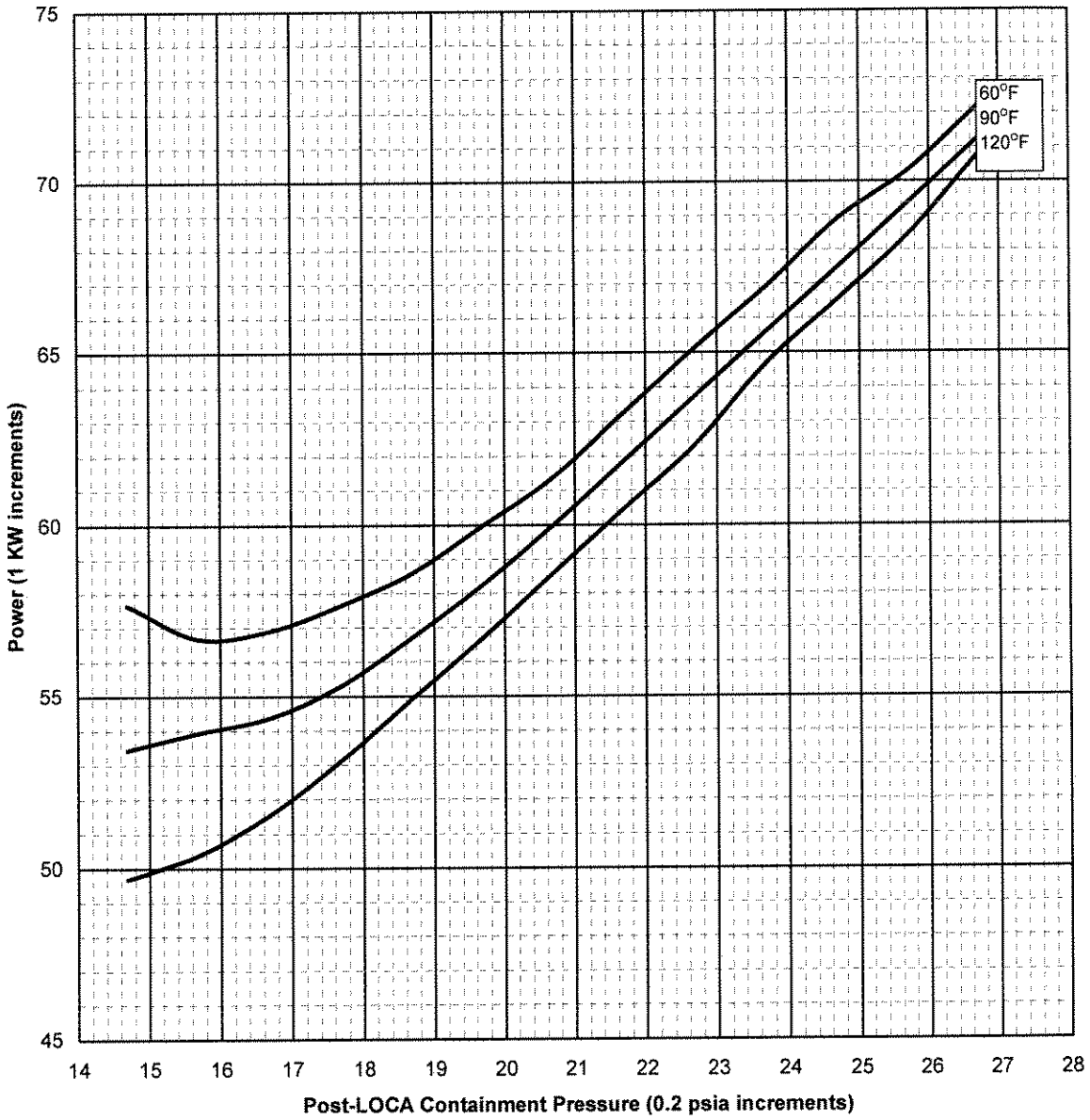
ATTACHMENT B

RECOMBINER POWER (M-55A)
VERSUS
CONTAINMENT PRESSURE



Note: Use pre- LOCA average Reactor Building Temperature from SPDS (TAVRB1) from history file if available. Otherwise use logs.

RECOMBINER POWER (M-55B) VERSUS CONTAINMENT PRESSURE



Note: Use pre- LOCA average Reactor Building Temperature from SPDS (TAVRB1) from history file if available. Otherwise use logs.

3.0 continued

TABLE 2

TEST QUANTITY	INSTRUMENT (Circle Instrument Used)	MEASURED VALUES	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA WITHIN LIMITING RANGE Circle YES or NO
"C" SW Bay Level	SPDS/Alt Test Inst	FEET	N/A	> 332 feet	YES (1) NO
Suction Press. (calculated)***	SPDS/Alt Test Inst	PSIG	N/A	N/A	N/A
SW Loop II Press	SPDS/Alt Test Inst	PSIG	N/A	N/A	N/A
	PI-3607	PSIG			
Discharge Press	PI-3610 (Local)	PSIG	N/A	N/A	N/A
Loop II Flow	SPDS/Alt Test Inst	GPM	Acceptable Normal and Limiting Range values are shown on P-4C Pump Curve on following page		YES (1) NO
**Actual (ΔP_A) Pump ΔP	Discharge plus suction press.	PSI			
Baseline (ΔP_B) Pump ΔP	Baseline ΔP for Loop II Flow	PSI	N/A	N/A	N/A
Motor, (Radial) Upper Brg. Vib.	*(1) Vibrometer	IN/SEC	<0.292 IN/SEC	<0.7 IN/SEC	YES (1) NO
Motor, (Radial) Upper Brg. Vib.	*(2) Vibrometer	IN/SEC	<0.325 IN/SEC	<0.7 IN/SEC	YES (1) NO
Motor, (Axial) Upper Brg. Vib.	*(3) Vibrometer	IN/SEC	<0.217 IN/SEC	<0.522 IN/SEC	YES (1) NO
Motor, Upper Brg. Temp.	TE-3611 (P1290 or TR-3651)	°F	<180°F	N/A	N/A
Motor, Lower Brg. Temp.	TE-3612 (P1291 or TR-3651)	°F	<180°F	N/A	N/A

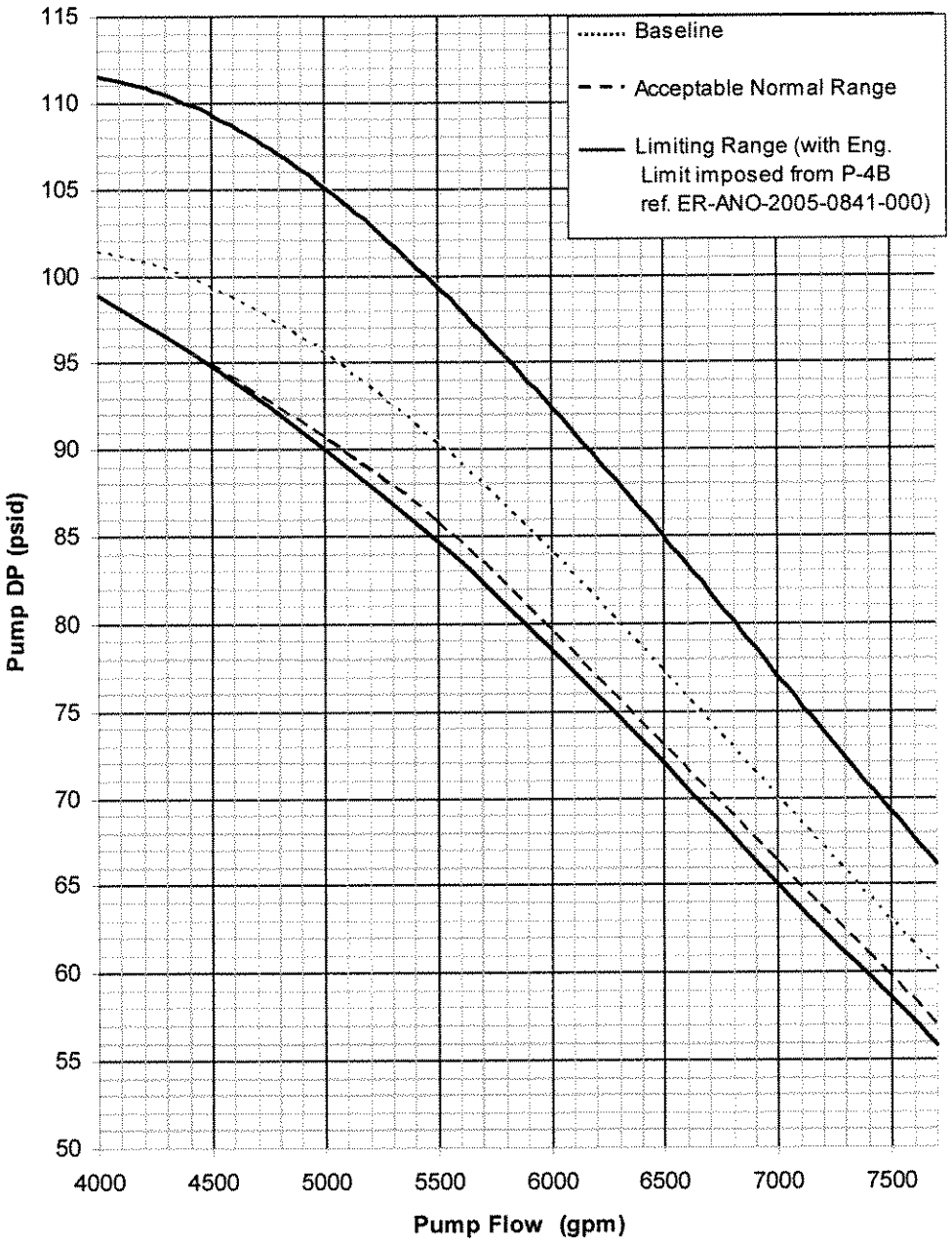
* See attached drawing for vibration point locations.

** Use local discharge pressure for calculating ΔP.

*** Suction pressure is calculated on SPDS display. To calculate:
SUCT PRESS = (356.5-Bay Level)0.433

Note 1: Refer to step 3.3 for corrective actions if NO is circled in Table 2.

P-4C Pump Curve



ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 76 **QID: 0638**

Given:
- Rx power 100%
- HPI PUMP TRIP, K10-A6, in alarm
- RCP BLEEDOFF FLOW HI, K08-B7, in alarm

The CBO reports that RCP P-32B Seal Bleedoff Flow is 2.8 gpm.

Which of the following are the correct procedures and responses to the above conditions?

A. Trip RCP per 1203.012G, Annunciator K08 Corrective Action, and go to 1202.001, Reactor Trip.

B. Trip RCP per Section 2, Seal Failure, of 1203.031, Reactor Coolant Pump and Motor Emergency, and go to 1202.001, Reactor Trip.

C. Reduce power using 1203.045, Rapid Plant Shutdown, then stop RCP per Section 1, Seal Degradation, of 1203.031, Reactor Coolant Pump and Motor Emergency.

D. Reduce power using 1102.004, Power Operations, then stop RCP per 1103.006, Reactor Coolant Pump Operation, and go to 1203.022, Reactor Coolant Pump Trip.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 77 **QID: 0639**

Given:
- Plant is in Mode 5
- Decay Heat Removal is in service
- Decay Heat Removal flow is steady at 1900 gpm.
- All RCPs are OFF

Which of the following is an entry condition for Section 2, DH Removal System Leak, of 1203.028, Loss of Decay Heat Removal?

A. RB sump level rising

B. RI-3809, Loop "A" Decay Heat process radiation monitor, in alarm

C. DECAY HEAT VORTEX WARNING (K09-D8) in alarm

D. RI-3814, Loop I Service Water process radiation monitor, in alarm

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 78 **QID: 0640**

The plant is at 100% power when the following condtions are noticed:

- RCS pressure at 2075 psig and dropping
- PZR level is 220" and steady
- Main Feedwater total flow is 11.0 x e6 lbm/hr
- Subcooling margin is 30°F and dropping
- No radiation monitors are in alarm
- RB sump level is 32% and steady

Which of the following procedures should be used to mitigate this transient?

A. 1203.039, Excess RCS Leakage

B. 1202.003, Overcooling

C. 1203.026, Loss of Reactor Coolant Makeup

D. 1203.015, Pressurizer Systems Failure

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 79 **QID: 0279**

Given:

- The plant is in a blackout condition.
- Startup transformer #1 primary voltage is 19 KV.
- Unit 2 vital and non-vital buses are aligned to startup transformer #2.
- Startup transformer #2 voltage is 155 KV.

How should off-site power be restored to the plant? (Reference Provided)

A. Verify 1202.008, Att. 1, "Blackout Breaker Alignment and UV Relay Defeat", complete then close feeder breakers from startup transformer #1.

B. Check acceptable loading on startup transformer #2 then close the feeder breakers from startup transformer #2.

C. Verify 1202.008, Att. 2, "Recovery from Blackout Breaker Alignment and UV Relay Defeat", complete then close feeder breakers from startup transformer #1.

D. Check the autotransformer is aligned to startup transformer #2, then close the feeder breakers from startup transformer #2.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 80 **QID: 0412**

Given:

- Plant at 100% power.
- RPS Channel "C" inoperable and in the tripped state.
- I&C IS performing RPS Channel "B" monthly calibration.

Subsequently, RS1 INVERTER TROUBLE (K01-A5) alarms. The Inside AO reports that Inverter Y-11 has a fault and the static switch failed to operate.

Which of the following procedures contain the immediate actions that should be in use?

A. Reactor Trip, 1202.001

B. Loss of NNI Power, 1203.047

C. Loss of 125 VDC, 1203.036

D. ESAS, 1202.010

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 81 **QID: 0641**

Given:

- Plant is at 100% ambient temperature ~55°F
- SW Pump P-4C is out-of-service for scheduled motor replacement
- SW Pump P-4B is in service on Loop II

The Outside AO notifies the Control Room that the gantry crane operator has pulled the center roof plug for the Intake Structure.

Which of the following actions would you recommend to the Shift Manager? (Reference Provided)

A. Restore Loop II SW to operable status within 72 hours.

B. Unit must be placed in Mode 3 within 6 hours.

C. Unit must be placed in Mode 3 within 7 hours per Tech Spec 3.0.3.

D. No Tech Spec action required as long as ambient temperature remains <70°F.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 82 **QID: 0642**

Given:

- Rx has tripped with two CRDs stuck full out.
- Core lifetime = 250 EFPD
- Batch Controller is OOS
- Emergency Boration has commenced from BWST
- Initial Pressurizer level = 100 in.
- RCS temp = 554°F
- RCS initial Boron concentration = 638 ppm
- BWST initial Boron concentration = 2417 ppm
- Initial BWST Level = 40.0 feet

(Reference Provided)

What will the final BWST level be following an Emergency Boration that establishes the EXACT required RCS Boron concentration?

A. 32.7 to 32.9 ft

B. 33.0 to 33.2 ft

C. 33.3 to 33.5 ft

D. 33.6 to 33.8 ft

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 83 **QID: 0643**

A SG tube rupture is in progress.
The plant is at 30% power and contintuing to shutdown.

Annunciator K10-B1, AREA MONITOR RADIATION HI, alarms.
The CBO reports that RE-8015, Condensate Demineralizer, is in alarm and reading 12 mR/hr.

No other area monitors are in alarm.

What action should be taken?

A. Perform an Offsite Evacuation per 1903.011, Emergency Response/Notifications.

B. Perform an Exclusion Area Evacuation per 1903.011, Emergency Response/Notifications.

C. Perform a Localized Evacuation per 1903.030, Evacuation.

D. No evacuation required.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 84 **QID: 0420**

A LOCA has occurred and the following conditions exist:

- Core Exit Thermocouples = 620 degrees F (average) and rising.
- RCS pressure = 1900 psig and steady.
- ICC subcooling margin is INOPERABLE.
- RCPs are NOT running.

Which EOP should be performed to mitigate this event?

A. 1202.001, Reactor Trip

B. 1202.002, Loss of Subcooling Margin

C. 1202.004, Overheating

D. 1202.005, Inadequate Core Cooling

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 85 **QID: 0342**

Given:

- Reactor at 80% power.
- Failed fuel ratio, as indicated by the WCO logs, has dropped by 45%.

Identify the value Reactor power should be reduced to.

A. 45% power

B. 40% power

C. 35% power

D. 30% power

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 86 **QID: 0647**

Given:
- Plant is at 43% power with power escalation to 70% in progress
- RCPs P-32A, P-32C and P-32D are in service, P-32B was secured due to motor fault

Subsequently, a 6.9KV bus H2 lockout occurs.

Which of the following procedural actions should be performed for these conditions?

A. Verify main feedwater loop flow ratio responding to match RCS loop flow ratio per Reactor Coolant Pump Trip, 1203.022.

B. Go to Reactor Trip, 1202.001.

C. Go to Reactor Coolant Pump and Motor Emergency, 1203.031.

D. Verify ICS in track and runback in progress per per Reactor Coolant Pump Trip, 1203.022.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 87 **QID: 0648**

After a LOCA causing ES actuation and transfer to RB sump recirculation, the following indications are observed:
- RB Sump level dropped
- RB Flood level is steady
- Both LPI Pump Discharge pressures dropping to 100 psig and rising up to 160 psig
- Both RB Spray P-35A/B ES Failure annunciators are coming in and subsequently clearing
- HPI Flow Indications are erratic
- SPING 4 on Penetration Room Ventilation is in alarm

Which of the following actions should be taken for these conditions?

A. Verify BWST Outlet Valves CV-1407 and CV-1408 open per RT-10, Verify Proper ESAS Actuation.

B. Override and throttle both LPI Pumps close to but not below 2800 gpm per pump per 1202.010 Att. 1, Shift to RB Sump Suction.

C. Override and stop both RB Spray Pumps per 1202.010 Att. 1, Shift to RB Sump Suction.

D. Override and throttle both RB Spray Pumps to 1050 - 1200 gpm each per RT-10, Verify Proper ESAS Actuation

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 88 **QID: 0649**

Given:
- Saturday, 4th of July weekend
- VCH-4A North Emergency Switchgear Room Chiller has failed
- No other cooling failures are present
- North Battery Room temperature = 74°F
- North Battery Charger area temperature = 73°F
- A4 Switchgear Room temperature = 72°F
- Design Engineering is unavailable

Mechanical Maintenance estimates that the VCH-4A Chiller will be fixed by Tuesday AM.

Which of the following actions will NOT be required as a result of these conditions?
(Reference Provided)

A. Initiate a Priority One Work Order.

B. Enter 30 hour administrative time clock.

C. Enter 30 day administrative time clock.

D. Enter applicable sections of Technical Specification 3.8.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 89 **QID: 0646**

Given:

- #1 EDG has one Air Start Compressor and it's associated Air Receiver Tanks tagged out.
- The remaining Air Start Compressor on #1 EDG trips while EDG is running for a surveillance.
- The Air Receiver Tanks' pressure is 145 psig.

In accordance with Technical Specifications, what is the required action for the above conditions? (Reference Provided)

A. No actions are necessary since the EDG is running and an air start system is not needed.

B. Restore required starting air receiver pressure to within limits in 48 hours.

C. Delare #1EDG inoperable immediately.

D. Be in Mode 3 within 12 hours.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 90 **QID: 0650**

The CBO investigates panels C24 and C25 due to annunciator K10-C1 "RADIATION MONITOR TROUBLE" in alarm.
He reports that a FAIL light is illuminated on RE-7461, RB Atmos Gaseous Monitor.

Which one of the following procedures or manuals would contain operability information for this detector?

A. ODCM App. 1

B. 1305.001, Radiation Monitoring System Check or Test

C. 1104.033, Reactor Building Ventilation

D. 1203.039, Excess RCS Leakage

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 91 **QID: 0450**

Given:

- Refueling is in progress.
- A fuel assembly is being moved toward the upender in the Fuel Transfer Canal.
- Source Range channel NI-502 power supply fails.

Which of the following actions is appropriate for these conditions?

A. All refueling operations may continue as long as one Source Range channel is operable.

B. The fuel assembly may be placed in any alternate core location during repairs.

C. The fuel assembly may be moved to the Spent Fuel Pool but core alterations are not allowed.

D. The fuel assembly must be placed back in its original position in the core.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 92 **QID: 0399**

A plant shutdown is in progress due to a primary-to-secondary tube leak in accordance with 1203.023, Small Steam Generator Tube Leaks.

- Several tubes fail catastrophically
- RCS pressure drops to 1400 psig
- CET's indicate 550°F
- Reactor Building sump level is trending upward.

Which of the following procedures should be in use?

A. Reactor Trip and Overcooling

B. Tube Rupture and Overheating

C. Loss of Subcooling Margin and ESAS

D. Tube Rupture and Reactor Trip

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 93 **QID: 0014**

A fire watch reported a severe fire in the Lower South Electrical Equipment Room and the fire brigade has been dispatched.

What guidance will allow the control room staff to quickly mitigate the consequences of potentially affected components?

A. Go to procedure 1203.049, Fires in Areas Affecting Safe Shutdown.

B. Go to procedure 1107.001, Electrical System Operations, breaker alignment attachments.

C. Determine affected components from the Fire Zone drawings maintained in the control room.

D. Go to the ANO Pre-Fire Plan for the affected fire zone for a listing of affected components.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 94 **QID: 0492**

Given the plant conditions following a reactor trip:

- RCS temperature: 605 degrees stable
- RCS pressure: 2300 psig slowly dropping
- ERV: open in AUTO
- OTSG shell temperature: 552 degrees
- OTSG levels 20 inches, steady
- PZR level 180 inches, rising

Which of the following actions are required?

A. Initiate HPI Cooling per RT 4.

B. Isolate the ERV per 1202.001, Reactor Trip.

C. Select the reflux boiling setpoint per RT-5.

D. Initiate Full HPI per RT 3.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 95 **QID: 0457**

Given the following:

- Fuel assembly initial enrichment is 3.7 w/o U-235
- Fuel assembly burnup is 32 GWD/MTU

Using Technical Specification 3.7.15, where can this fuel assembly be stored? (Reference Provided)

A. The fuel assembly can only be stored in Region 1 of the spent fuel pool.

B. The fuel assembly can only be stored in Region 2 of the spent fuel pool.

C. The fuel assembly can be stored in Region 1 or Region 2 of the spent fuel pool with no restrictions.

D. The fuel assembly can be stored in Region 1 of the spent fuel pool or in Region 2 restricted to checkerboard pattern.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 96 **QID: 0409**

Which of the following changes would require a 10 CFR 50.59 Screening per EN-LI-101, 10 CFR 50.59 Review Program, rather than only a PAD review per EN-LI-100, Process Applicability Determination?

A. A change to the table of contents for 1203.017, Moderator Dilution.

B. A change in the title of Shift Superintendent to Shift Manager.

C. A change to correct a HPI injection valve number on a P&ID used in the SAR.

D. A change to the acceptance criteria for the LPI pumps' surveillance.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 97 **QID: 0651**

In addition to notifying the NRC Operation Center within 1 hour.
Which of the following represents the COMPLETE action requirement from Technical Specifications for violating the RCS pressure safety limit in the given modes?

A. In MODE 1 or 2, restore compliance with limits within 1 hour.

B. In MODES 3. 4, and 5, restore compliance with limits within 15 minutes.

C. In MODE 1 or 2, restore RCS pressure to ≤ 2750 psig within 5 minutes.

D. In MODES 3, 4, and 5, restore RCS pressure to ≤ 2750 psig within 5 minutes.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 98 **QID: 0122**

A WCO is assigned to align "A" Decay Heat Removal during a shutdown.
It is estimated the job will take 40 minutes.
High RCS activity has created a TEDE dose rate of 4.5 R/hr in this area.
The WCO has an accumulated exposure of 0.525 Rem for the year.
The WCO makes the statement that he can complete the job without exceeding exposure limits.

Do you agree or disagree with the WCO's statement and why?

A. Agree, the WCO will NOT receive a dose sufficient to exceed the Administrative Dose Control Level.

B. Disagree, the WCO will exceed the Administrative Dose Control Level within 20 minutes.

C. Agree, the WCO is allowed to exceed the Administrative Dose Control Level as long as the federal limit is not exceeded.

D. Disagree, the WCO will exceed the Administrative Dose Control Level within 15 minutes.

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 99 **QID: 0313**

Given:

- RCS pressure is 1800 psig,
- RCS temperature is 545 °F,
- "A" OTSG pressure is 650 psig,
- "B" OTSG pressure is 970 psig,
- Reactor Building Pressure is 6 psig.

Actions required to stop this transient and restore the jeopardized safety function are found in the:

A. 1202.010, ESAS

B. 1202.003, Overcooling

C. 1203.040, Forced Flow Cooldown

D. 1202.002, Loss of Subcooling Margin

ANO Unit 1 - 2007 SRO NRC Written Examination

Question No. 100 **QID: 0129**

A small break LOCA occurred three hours ago.

The following indications are current:

- HPI flow ~250 gpm total
- CNTMT High Range Rad Monitors are both reading 6000 R/hr

What Emergency Direction and Control Checklist should you use? (Reference Provided)

A. 1903.011J, NUE

B. 1903.011M, Alert

C. 1903.011P, SAE

D. 1903.011S, GE

ANO Unit 1 - 2007 SRO NRC Written Exam KEY

Question No. 76 **QID: 0638** **Point Value: 1**

Answer:

C. Reduce power using 1203.045, Rapid Plant Shutdown, then stop RCP per Section 1, Seal Degradation,
of 1203.031, Reactor Coolant Pump and Motor Emergency.

Question No. 77 **QID: 0639** **Point Value: 1**

Answer:

B. RI-3809, Loop "A" Decay Heat process radiation monitor, in alarm

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Question No. 78 **QID: 0640** **Point Value: 1**

Answer:

D. 1203.015, Pressurizer Systems Failure

Question No. 79 **QID: 0279** **Point Value: 1**

Answer:

A. Verify 1202.008, Att. 1, "Blackout Breaker Alignment and UV Relay Defeat", complete then close feeder breakers from startup transformer #1.

Question No. 80 **QID: 0412** **Point Value: 1**

Answer:

A. Reactor Trip, 1202.001

Question No. 81 **QID: 0641** **Point Value: 1**

Answer:

A. Restore Loop II SW to operable status within 72 hours.

Question No. 82 **QID: 0642** **Point Value: 1**

Answer:

D. 33.6 to 33.8 ft

Question No. 83 **QID: 0643** **Point Value: 1**

Answer:

C. Perform a Localized Evacuation per 1903.030, Evacuation.

ANO Unit 1 - 2007 SRO NRC Written Exam KEY

Question No. 84 **QID: 0420** **Point Value: 1**

Answer:

B. 1202.002, Loss of Subcooling Margin

Question No. 85 **QID: 0342** **Point Value: 1**

Answer:

B. 40% power

Question No. 86 **QID: 0647** **Point Value: 1**

Answer:

A. Verify main feedwater loop flow ratio responding to match RCS loop flow ratio.

Question No. 87 **QID: 0648** **Point Value: 1**

Answer:

B. Override and throttle both LPI Pumps close to but not below 2800 gpm per pump per 1202.010 Att. 1, Shift to RB Sump Suction.

Question No. 88 **QID: 0649** **Point Value: 1**

Answer:

C. Enter 30 day administrative time clock.

Question No. 89 **QID: 0646** **Point Value: 1**

Answer:

C. Delare #1EDG inoperable immediately.

Question No. 90 **QID: 0650** **Point Value: 1**

Answer:

C. 1104.003, Reactor Building Ventilation

Question No. 91 **QID: 0450** **Point Value: 1**

Answer:

C. The fuel assembly may be moved to the Spent Fuel Pool but core alterations are not allowed.

ANO Unit 1 - 2007 SRO NRC Written Exam KEY

Question No. 92 **QID: 0399** **Point Value: 1**

Answer:

D. Tube Rupture and Reactor Trip

Question No. 93 **QID: 0014** **Point Value: 1**

Answer:

A. Go to procedure 1203.049, Fires in Areas Affecting Safe Shutdown.

Question No. 94 **QID: 0492** **Point Value: 1**

Answer:

B. Isolate the ERV per 1202.001, Reactor Trip.

Question No. 95 **QID: 0457** **Point Value: 1**

Answer:

C. The fuel assembly can be stored in Region 1 or Region 2 of the spent fuel pool with no restrictions.

Question No. 96 **QID: 0409** **Point Value: 1**

Answer:

D. A change to the acceptance criteria for the LPI pumps' surveillance.

Question No. 97 **QID: 0651** **Point Value: 1**

Answer:

D. In MODES 3, 4, and 5, restore RCS pressure to ≤ 2750 psig within 5 minutes.

Question No. 98 **QID: 0122** **Point Value: 1**

Answer:

B. Disagree, the WCO will exceed the Administrative Dose Control Level within 20 minutes.

Question No. 99 **QID: 0313** **Point Value: 1**

Answer:

B. 1202.003, Overcooling

ANO Unit 1 - 2007 SRO NRC Written Exam KEY

Question No. 100 **QID: 0129** **Point Value: 1**

Answer:

C. 1903.011P, SAE

SRO

Handout

INSTRUCTIONS

7. Check off-site power available AND ≥22KV on SU1.

CONTINGENCY ACTIONS

7. Perform the following:

A. IF SU1 or SU2 L.O. RELAY TRIP is alarming on K02,
THEN determine cause AND correct before energizing bus from affected X-FMR, while continuing with this procedure.

B. IF power is available in the switchyard
AND
SU1 is de-energized,
AND
switchyard breaker 0125 is open,
THEN have dispatcher close 0125.

1) IF SU1 is available with voltage ≥22KV,
THEN GO TO step 8.

C. IF SU1 is not available with voltage ≥22KV,
THEN perform the following:

NOTE
SU2 is considered available if all the following conditions are met:

- SU2 voltage ≥157KV
- AUTO X-FMR energized from 500KV
- AUTO X-FMR aligned to SU2

- No Unit 2 buses powered from SU2
- SU2 V REG 3% reduction disabled

1) IF SU2 is available,
THEN GO TO step 8.

(7. CONTINUED ON NEXT PAGE)

INSTRUCTIONS

CONTINGENCY ACTIONS

7. (Continued).

NOTE
Off-site power is considered degraded if SU1 voltage is <22KV **AND any** of the following conditions exist:

- SU2 <157KV
- Auto X-FMR **not** energized from 500KV
- Auto X-FMR **not** aligned to SU2

- Unit 2 on SU2
- SU2 V REG 3% reduction enabled

D. **IF** off-site power is unavailable **OR** degraded,
THEN perform the following:

1) Notify Dispatcher to take emergency actions to restore power, including system load shed **if** necessary.

2) **GO TO step 33.**

8. **IF Attachment 1, "Blackout Breaker Alignment and UV Relay Defeat" was performed,
THEN dispatch an operator to perform Attachment 2, "Recovery From Blackout Breaker Alignment and UV Relay Defeat".**

9. **Re-energize A1, A2, H1, and H2 by performing the following for each bus:**

A. Check associated bus L.O. RELAY TRIP alarm clear on K02.

A. Determine **AND** correct cause of L.O. RELAY TRIP before energizing bus, while continuing with this procedure (Refer to Electrical System Operation (1107.001), "Re-closing Tripped Bus or MCC Feeder Breakers" section).

B. **IF** buses are to be energized from SU2,
THEN notify Unit 2.

(9. CONTINUED ON NEXT PAGE)

INSTRUCTIONS	CONTINGENCY ACTIONS
9. (Continued).	
C. Remove associated bus feeder breaker handswitch from PULL-TO-LOCK **AND** check bus energized.	C. Turn SYNC switch for associated bus feeder breaker ON **AND** close breaker from handswitch. 1) **IF** breaker fails to close, **THEN** reset breaker anti-pump feature by taking handswitch to PULL-TO-LOCK **AND** releasing. 2) **IF neither** A1 **nor** 2 is energized, **THEN GO TO step 33**.
10. Restore power to buses A3 and A4 from A1 and A2 by performing the following for each bus:	
A. Check associated bus L.O. RELAY TRIP alarm clear on K02.	A. Determine **AND** correct cause of L.O. RELAY TRIP before energizing bus, while continuing with this procedure (Refer to Electrical System Operation (1107.001), "Re-closing Tripped Bus or MCC Feeder Breakers" section).
B. Notify personnel attempting to restore DGs that A3 and A4 are about to be energized from off-site power.	
C. Turn SYNC switch for A-309 (A-409) ON **AND** defeat undervoltage trip by holding handswitch in CLOSE position until bus is energized.	

(10. CONTINUED ON NEXT PAGE)

INSTRUCTIONS	CONTINGENCY ACTIONS
10. (Continued). D. Verify both A3 and A4 energized.	D. **IF** only one 4160V Vital bus is energized **AND** the other Vital bus is required to run necessary equipment, **THEN** crosstie A3 and A4 using ES Electrical System Operation (1107.002), Bus A3 to A4 Crosstie to Energize Dead Bus" section. 1) **IF** DG or Non-vital 4160V bus becomes available for Vital bus powered through crossties, **THEN** restore buses to normal using 1107.002, "Returning Paralleled Buses A3 and A4 to Normal" section.
11. Check previously running Service Water pumps restart after 15-second time delay (P4A, B, C).	11. Establish two Service Water pumps running. A. **IF** only one Service Water pump is available **AND** ESAS has **not** actuated, **THEN** perform the following: 1) Close ACW Isolation (CV-3643). 2) Verify both Service Water to ICW Coolers Supply valves open (CV-3811 and 3820).
12. IF any of the following conditions exist, THEN initiate HPI as necessary to restore applicable parameter (RT 2): • SCM approaching minimum adequate • PZR level < 30" • RCS press < 1700 psig	

INSTRUCTIONS	CONTINGENCY ACTIONS
13. Start EFW pump (P7B) as follows:	
A. Place P7B EFW CNTRL valves in HAND **AND** close (CV-2646 and 2648).	
B. Remove P7B handswitch from PULL-TO-LOCK.	
C. Start P7B	C. **IF** P7A is **not** available, **THEN** initiate HPI Cooling (RT 4). 1) **IF no** HPI pumps are available, THEN allow ERV to cycle in AUTO. a) **IF** ERV fails open, **THEN** close ERV Isolation valve (CV-1000). b) **GO TO step 16.** 2) **IF** ERV **cannot** be opened, **THEN** perform the following: a) **IF** necessary to prevent violating NDTT curve of Figure 3, **THEN** throttle HPI. Otherwise allow PZR Code Safeties to lift. 3) **GO TO step 16.**
D. **IF** P7A is already supplying EFW, **THEN** operate P7B EFW CNTRL valves (CV-2646 and 2648) as desired (RT 5).	D. **IF** P7A is **not** supplying EFW, **THEN** restore EFW using P7B per RT 16, regardless of current SG level.
14. IF any abnormal indications other than blackout occur, THEN perform 1202.001, "REACTOR TRIP" procedure, in conjunction with this procedure.	
15. Operate PZR Htrs in MANUAL as necessary to return PZR to saturation (reference Figure 1).	
A. **WHEN** PZR is returned to saturation, **THEN** place PZR Htrs in AUTO.	

INSTRUCTIONS	CONTINGENCY ACTIONS
16. Maximize RB cooling (RT 9).	
17. Restore ICW cooling as follows:	
A. Verify at least one Service Water to ICW Coolers Supply open (CV-3811 or 3820).	
B. Dispatch an operator to restart Condensate Transfer pump (P9A or B).	
C. Verify at least one Instrument Air Compressor running (C28A/B).	C. **IF** C28A and B are **not** available, **THEN** dispatch an operator to restart Instrument Air Compressors (C2A and B). 1) **IF** C2A and B are **not** available, **THEN** dispatch an operator to cross-connect with Breathing Air using Breathing Air System (1104.012).
D. Restart two ICW pumps (P33A, B, C).	D. **IF** only one ICW pump is available, **THEN** open ICW Suction and Discharge Crossconnects (CV-2238, 2239, 2240, and 2241).
E. Verify CRD Cooling pump running (P79A or B).	E. P79A or B.
F. Verify RCP Seal Cooling pump running (P114A or B) **AND** record current time for references in step 22.	F. **IF** P114A and B are **not** available, **THEN** open Pump Bypass (CV-2287) **AND** record current time for references in step 22.

INSTRUCTIONS	CONTINGENCY ACTIONS
18. Restore normal Makeup as follows:	
A. Open BWST Outlet to OP HPI pump (CV-1407 or 1408).	
B. Place RC Pump Seals Total INJ Flow in HAND **AND** close (CV-1207).	
C. Place PZR level Control in HAND **AND** close (CV-1235).	
D. Verify RCP Seal INJ Block closed (CV-1206).	
E. Verify P36B Bus Select MOD Control selected to energized bus.	
F. Start AUX Lube Oil pump for OP or STBY HPI pump.	
G. Start OP or STBY HPI pump.	G. Initiate HPI as necessary to control PZR level 90 to 110" (RT 2). 1) **GO TO step 19.**
H. Stop AUX Lube Oil pump.	
I. Verify Pressurizer Level Control Setpoint at 100".	
1) Place CV-1235 in AUTO.	
2) Check CV-1235 operates to control PZR level 90 to 110".	2) Operate CV-1235 in HAND to control PZR level 90 to 110".
19. Unless fuel damage or RCS to ICW leak is suspected, restore Letdown flow (RT 13).	
20. Restart Spent Fuel Cooling pump (P40A or B).	

INSTRUCTIONS

CONTINGENCY ACTIONS

21. Verify proper MSLI actuation (RT 6).

A. Verify ATM Dump Control System operates to maintain stable CET temps.

SG A		SG B
CV-2676	ATM Dump ISOL	CV-2619
CV-2668	ATM Dump CNTRL	CV-2618

22. IF desired,
THEN restart RCPs as follows:

A. Refer to Reactor Coolant Pump and Motor Emergencies (1203.031), "Simultaneous Loss of Seal Injection and Seal Cooling Flow" section to establish Seal Bleedoff, determine if RCPs should be restarted, and restore Seal Injection, while continuing with this procedure.

B. Restart RCPs (RT 11).

23. Verify Turbine Bearing LO pumps (P-19 and 21) and HP Lift Oil pump (P-76) running.

24. Verify Generator Seal Oil pumps running (P23 and 24).

25. Check Main Turbine on turning gear.

25. Place Main Turbine on turning gear using Main Turbine Generator turning Gear Operation (1106.020).

26. Check MFWP Turbines on turning gear.

26. Place MFWP Turbines on turning gear using Condensate, Feedwater, and Steam System Operation (1106.016).

27. Check Condenser Vacuum Breakers closed (CV-2854 and 2855).

27. Notify operator opening Vacuum Breakers that Breakers are being closed.

A. Close Vacuum Breakers.

28. Check SU Boiler supplying Gland Steam.

28. Dispatch an operator to place SU Boiler in service using Startup Boiler Operations (1106.022) and Gland Steam System (1106.013).

INSTRUCTIONS	CONTINGENCY ACTIONS
29. Verify Condenser Vacuum pump running (C5A or B).	
30. Restart Circ Water pumps using Circulating Water and Water Box Vacuum System Operation (1104.008).	
31. Check Condenser Vacuum >23" **AND** **depress Low Vacuum Reset PBs on C02.**	
A. Re-open MSIVs using Condensate, Feedwater, and Steam System Operation (1106.016).	
B. Check TURB BYP valves operate to maintain stable CET temps.	B. Operate TURB BYP valves in HAND to stabilize CET temps.
32. GO TO 1202.001, "REACTOR TRIP" procedure.	

END

INSTRUCTIONS | **CONTINGENCY ACTIONS**

33. Check SU1 and SU2 X-FMR voltage indication on C10 AND perform the following:

NOTE

Off-site power is considered restored to normal if either of the following conditions exists:

- SU1 ≥22KV
- SU2 ≥157KV **AND all** of the following conditions are met:
  - Auto X-FMR energized from 500KV
  - Auto X-FMR aligned to SU2
  - **No** Unit 2 buses powered from SU2
  - SU 2 V REG 3% reduction disabled

A. **IF** off-site power is restored to normal, **THEN RETURN TO step 8.**

NOTE

Off-site power is considered restored degraded if SU1 voltage is <22KV **AND any** of the following conditions exists:

- SU2 <157KV
- Auto X-FMR **not** energized from 500KV
- Auto X-FMR **not** aligned to SU2
- Unit 2 on SU2
- SU2 V REG 3% reduction enabled

B. **IF** voltage is indicated on either SU X-FMR **AND** is degraded, **THEN GO TO step 44.**

C. **IF** voltage on both SU X-FMRs is zero, **THEN GO TO step 34.**

END

INSTRUCTIONS | **CONTINGENCY ACTIONS**

34. IF off-site power becomes available, THEN RETURN TO step 33.

35. Dispatch an operator to take manual control of EFW pump (P7A) using Emergency Feedwater pump Operation (1106.006), to prevent overspeed trip when battery power to governor is depleted.

36. Request TSC consider implementing SAMG Developed Strategies for supplying power from Unit 2 to Unit 1 via AAC Gen bus 2A9.

37. As time permits, dispatch an operator to perform the following:

A. Begin Main Generator purge using Generator Hydrogen System (1106.002), "Purging Hydrogen with CO_2 During Emergency Conditions" section.

WARNING

High noise requires use of ear protection while manually opening Condenser Vacuum Breakers.

B. Manually open Condenser Vacuum Breakers (CV-2854 and 2855).

38. Stop RCP Emergency HP Oil Lift pumps (P80A, B, C, and D).

39. WHEN MFW pumps stop rotating, THEN stop MFW Pump Emergency Lube Oil pumps (P28A and B).

40. WHEN 15 bottles of CO_2 have been added to Main Generator, THEN stop Air Side Generator Seal Oil pump (P25).

41. IF additional manpower becomes available, THEN dispatch an operator with a radio to hand jack ATM Dump CNTRL valves (CV-2618 and 2668) as directed by Control Room to maintain stable CET temp (refer to Alternate Shutdown (1203.002), Exhibit A).

INSTRUCTIONS	CONTINGENCY ACTIONS
42. Check EFW CST (T-41B) level remains ≥ 5.1'.	42. **IF** T-41B level drops below 5.1', **THEN** dispatch an operator to unlock **AND** open COND SUPP (T-41) to EFW SUCT (CS-275).
43. Maintain Mode 3, >525°F, unless directed otherwise by Operations Manager AND perform the following: A. **IF** a DG is placed in service, **THEN GO TO 1202.007, "DEGRADED POWER"** procedure. B. **IF** off-site power becomes available, **THEN RETURN TO step 33.**	

END

INSTRUCTIONS	CONTINGENCY ACTIONS
44. Dispatch an operator to perform Attachment 1, "Blackout Breaker Alignment and UV Relay Defeat".	

NOTE

Off-site power is considered restored to normal if either of the following conditions exists:

- SU1 ≥22KV
- SU2 ≥157KV **AND all** of the following conditions are met:
  - Auto X-FMR energized from 500KV
  - Auto X-FMR aligned to SU2
  - **No** Unit 2 buses powered from SU2
  - SU 2 V REG 3% reduction disabled

A. **IF** off-site power is restored to normal, **THEN** dispatch an operator to perform Attachment 2, "Recovery From Blackout Breaker Alignment and UV Relay Defeat" **AND** RETURN TO step 8.	
45. WHEN Attachment 1 is complete, THEN re-energize A1, A2, H1, and H2 by performing the following for each bus:	
A. Check associated bus L.O. RELAY TRIP alarm clear on K02.	A. Determine **AND** correct cause of L.O. RELAY TRIP before energizing bus, while continuing with this procedure (Refer to Electrical System Operation (1107.001), "Re-closing Tripped Bus or MCC Feeder Breakers" section).
B. **IF** buses are to be energized from SU2, **THEN** notify Unit 2.	
C. Turn SYNC switch for associated bus feeder breaker ON **AND** close breaker from handswitch.	C. Reset breaker anti-pump feature by taking handswitch to PULL-TO-LOCK **AND** releasing. 1) **IF** neither A1 nor A2 is energized, **THEN RETURN TO step 33.**

INSTRUCTIONS	CONTINGENCY ACTIONS
46. Re-energize A3 and A4 by performing the following for each bus.	
A. Check associated bus L.O. RELAY TRIP alarm clear on K02.	A. Determine **AND** correct cause of L.O. RELAY TRIP before energizing bus, while continuing with this procedure (Refer to Electrical System Operation (1107.001), "Re-closing Tripped Bus or MCC Feeder Breakers" section).
B. Turn SYNC switch for associated bus feeder breaker ON **AND** close breaker from handswitch.	B. **IF** non-vital bus voltage is <3160V, **THEN** dispatch an operator to close A3 and A4 feeder breakers in LOCAL to override Sync-check Relays (A-309 and 409).

CAUTION

- During degraded voltage conditions the following problems may occur:
  - Motors may trip on overload, overheat due to high running currents, or stall.
  - MCC starter may **not** pick up to energize loads.
  - AC auxiliary relays may **not** pick up to provide interlock or load energization features.
- Motors should be started one at a time and allowed to reach run speed to minimize further voltage degradation.
- If both Units are aligned to SU2, coordination between Units is required when starting loads.

47. Restart only equipment absolutely necessary to protect the core as follows:

A. Verify suction and discharge flow path aligned.

B. Review system operating procedure to ensure essential pump services available.

C. Consider closing centrifugal pump discharge valve before starting to reduce starting current.

(47. CONTINUED ON NEXT PAGE)

INSTRUCTIONS	CONTINGENCY ACTIONS
47. (Continued). D. Dispatch an operator to close DC Control Power breaker for motors to be started **AND** place breaker control in REMOTE. E. **IF** both Unit 1 and Unit 2 are aligned to SU2, **THEN** coordinate starting loads with Unit 2. F. Start loads necessary to protect the core. G. Monitor motor windings temp if available.	
48. Check EFW CST (T-41B) level remains ≥ 5.1'.	48. **IF** T-41B level drops below 5.1', **THEN** dispatch an operator to unlock **AND** open COND SUPP (T-41) to EFW SUCT (CS-275). A. **WHEN** all sources of condensate are depleted, **THEN** align EFW pump to take suction from Service Water system as follows: 1) Open EFW SERV WTR Loop I and II Isolation (CV-3850 and 3851). 2) Place P7B Suction Select in SW position. 3) Verify P7B Suction from CST closes (CV-2800). 4) Verify P7B Suction from Service Water opens (CV-2803). 5) **WHEN** P7B suction transfer is verified, **THEN** place P7A Suction Select in SW position. 6) Verify P7A Suction from CST closes (CV-2802).

(48. CONTINUED ON NEXT PAGE)

INSTRUCTIONS	CONTINGENCY ACTIONS
48. (Continued).	7) Verify P7A Suction from Service Water opens (CV-2806). 8) Dispatch an operator to close Tell-Tale Vents (SW-1085A and B).

NOTE

Off-site power is considered restored to normal if either of the following conditions exists:

- SU1 ≥22KV
- SU2 ≥157KV **AND all** of the following conditions are met:
  - Auto X-FMR energized from 500KV
  - Auto X-FMR aligned to SU2
  - **No** Unit 2 buses powered from SU2
  - SU 2 V REG 3% reduction disabled

49. Maintain Mode 3, >525°F until off-site power is restored to normal

OR

directed otherwise by Operations Manager.

50. IF off-site power is restored to normal, THEN dispatch an operator to perform Attachment 2, "Recovery From Blackout Breaker Alignment and UV Relay Defeat"

AND

RETURN TO step 11.

END

INSTRUCTIONS | **CONTINGENCY ACTIONS**

NOTE

- This section is used for rapid RCS cooldown if adequate SCM is lost
  AND
  HPI flow is < full flow from one HPI pump
  AND
  RV Head void is indicated.
- Cooldown rate limits do **not** apply.
- During this cooldown, primary to secondary heat transfer will be temporarily lost as the primary level drops from the bottom of the hot leg bend to below the secondary level or below the EFW nozzles if EFW flow exists.

51. IF conditions requiring rapid cooldown are met,
THEN begin rapid cooldown as follows:

A. Dispatch an operator to begin rapid cooldown at maximum attainable rate by fully opening ATM Dump valves.

SG A		SG B
CV-2676	ATM Dump ISOL	CV-2619
CV-2668	ATM Dump CNTRL	CV-2618

1) Maintain SG press ≥70 psig as long as P7A is the only source of feed.

B. Place **all** EFW CNTRL valves in VECTOR OVERRIDE:

SG A	SG B
CV-2645	CV-2647
CV-2646	CV-2648

C. Place **all** EFW ISOL valves in MANUAL:

SG A	SG B
CV-2627	CV-2620
CV-2670	CV-2626

(51. CONTINUED ON NEXT PAGE)

INSTRUCTIONS	CONTINGENCY ACTIONS
51. (Continued).	
D. Actuate MSLI **AND** verify MSIVs close to prevent cooldown due to normal steam leakage (CV-2691 and 2692). 1) **WHEN** Vital AC power is restored, **THEN** verify proper MSLI actuation (RT 6).	
E. Request TSC consider implementing SAMG Developed Strategies for supplying power from Unit 2 to Unit 1 via AAC Gen bus 2A9.	
F. Close RB Leak Detector Isolations (SV-7454 and 7456) on C26.	
G. Continue to maintain SG level 370 to 410", regardless of heat transfer status.	
H. Check RCS press remains <2450 psig.	H. Manually cycle ERV (PSV-1000) whenever RCS press reaches 2450 psig as follows, while continuing with this procedure: 1) Open ERV until RCS press ≤1600 psig. 2) **WHEN** RCS press ≤1600 psig, **THEN** place ERV in AUTO. 3) **IF** ERV fails OPEN, **THEN** close ERV Isolation (CV-1000).
I. Check CFT Outlet valve open (CV-2415 and 2419).	I. **IF** power becomes available, **THEN** dispatch an operator to un-isolate CFTs as follows: 1) Unlock **AND** close CFT Outlet supply breakers (B5661 and 5545). 2) Open CFT Outlet valves (CV-2415 and 2419). 3) Open **AND** lock B5661 and 5545.

(51. CONTINUED ON NEXT PAGE)

INSTRUCTIONS

CONTINGENCY ACTIONS

51. (Continued).

J. **IF** HPI ≥ full flow from one HPI pump becomes available,
THEN initiate full HPI (RT 3).

K. **IF** adequate SCM is restored,
THEN adjust ATM Dump Control System as necessary to maintain RCS cooldown rate within limits:

CET Temp	C/D Rate **without** RV Head bubble	C/D Rate **with** RV Head bubble
>300°F	≤100°/hr	≤50°/hr
300°F to 170°F	≤50°/hr	≤50°/hr

L. **IF** a DG is placed in service
THEN GO TO 1202.007, "DEGRADED POWER" procedure.

M. **IF** off-site power is available,
THEN verify steps **1** through **6** complete
AND GO TO step 7.

N. **IF** RCS press reaches 140 psig before LPI becomes available,
THEN using SG press control, attempt to hold RCS press near 140 psig until **one** of the following conditions is met:

- LPI becomes available
- **Both** CFTs are isolated

END

11.0 Sluice Gate Operations with Interlock Circuit De-energized or Disabled

NOTE

During maintenance activities or a loss of power, opening sluice gates electrically is prevented due to portions of the interlock circuitry being de-energized. Use of this procedure is not intended to bypass the intent of the interlock circuitry. These instructions are intended solely to preclude manual operation of sluice gates to save time and manpower. If it becomes necessary to change sluice gate positions under these circumstances, use these instructions.

CAUTION

- Operable SW pumps should have the capability of being supplied from the Lake AND ECP.
- SW could be totally lost in the event of sluice gate failures during suction transfer if both SW trains are being transferred at once.
- Emergency Pond will drain if SW Pump Suction from the Lake and from the Pond are crossconnected.

11.1 Verify positions of all sluice gates prior to any manipulations. If indication is not available in control room, use current shift check list (Form 1015.015B) or local position indicator at intake structure.

11.2 Station operator at intake structure to manually operate sluice gates, if necessary.

CAUTION

There are NO electrical interlocks to prevent closing of any energized sluice gate. Be certain of sequence required to open necessary sluice gate(s) prior to isolating suction to any SW bay.

11.3 Per Exhibit "A", determine which relays, if any, will have to be manually overridden to allow opening desired sluice gate(s).

NOTE

All relays pertaining to this transfer evolution are located in rear of C-26 cabinet in Unit 1 Control Room.

11.4 Using proper electrical safety precautions and low voltage rubber gloves, remove covers from relays identified in previous step as needing to be overridden.

NOTE

- The following steps will require (2) operators. One in rear of C-26, wearing low voltage gloves, to manually actuate relays, and another in front of C-26 to manipulate sluice gate handswitches.
- Relays are overridden by using hand to hold in on upper center portion of relay to cause contacts at top of relay to close (make-up). Relays must be held in the closed (made-up) position during sluice gate travel. If relay is released, gate travel will stop.

11.5 Align SW bays per section 10.0 "Sluice Gate and Service Water Discharge Valve Operation" while HOLDING necessary relays in the closed (made-up) position.

11.6 Upon completion of SW bay alignment, replace all relay covers that have been removed.

12.0 Operability

12.1 Discussion -- This section aids in determining system operability so that consistency will be maintained. This is NOT a listing of all requirements necessary for system operability.

12.2 Testing Inoperable SW Pump On Operable SW Loop

An inoperable SW pump may be tested on an operable SW loop, IN Modes 1-4 without rendering the SW loop inoperable, provided certain compensatory measures are taken. A pre-evolution briefing must be conducted. A licensed operator, with no other duties, must be designated as dedicated operator until the pump is declared operable or secured. Should a loss of off-site power occur, the dedicated operator must monitor SW system response and notify the CRS of any improper response.

12.3 Running Uncoupled SW Pump Motor

An uncoupled SW pump motor may be run on the same bus as an operating SW pump provided certain compensatory measures are taken. A pre-evolution briefing must be conducted. A licensed operator must be dedicated to secure the uncoupled SW pump should a loss of off-site power occur.

12.4 Intake Structure Roof Plugs

Removal of an intake structure roof plug to access the SW pump motor renders the associated SW pump inoperable while the plug is removed.

12.5 Intake Structure Ventilation

12.5.1 Degraded Power Conditions

During degraded power conditions, normal intake structure ventilation is de-energized. Adequate SW pump motor cooling is dependent on natural circulation air flow from the lower level of the intake structure out through the upper level roof plugs. For this reason, the roof plugs must remain in the elevated position at all times. Door #172, on north end of intake structure, is normally open during summer months to provide more ventilation and may be opened at any time if a high temperature condition occurs. Having Door #172 open is not required for operability.

12.5.2 Post Accident Cooling Design Basis

If outside ambient temperature is ≤70°F during normal operations with no more than 2 SW pumps operating continuously, hatches may be installed AND operation may proceed without time limit AND without additional operator actions. If a DBA accident or a fire occurs, OR if fans VEF-25 AND VEF-32 become inoperable, AND outside ambient temperature remains ≤70°F AND no more than 2 SW pumps are operating continuously, no additional operator action is required.

If outside ambient temperature increases >70°F during normal operations, with no more than 2 SW pumps operating continuously, OR following a DBA or fire event, OR if fans VEF-25 and VEF-32 become inoperable, then door hatches (HTC-70 and HTC-71) must be removed and locked before outside ambient temperature exceeds 80°F in order for the SW pumps to remain operable. This results in the following limits based on outside ambient temperature:

- The maximum temperature limit is 70°F.
- The operability limit is 80°F.

Continuous concurrent operation of three SW pumps with no forced ventilation and door hatches (HTC-70, HTC-71) installed is beyond the scope of and not permitted by evaluation for CR-ANO-C-2004-1848 Operability Version 2. Transient operation of three SW pumps, such as during pump swap, is acceptable.

12.6 SW Pump Strainer Differential Pressure

A SW Pump strainer ΔP of 10 psid leaves a minimum margin of operability for SW flow to various components. If SW Pump strainer ΔP exceeds 10 psid, System Engineering must be contacted to evaluate SW system/component operability.

3.7 PLANT SYSTEMS

3.7.7 Service Water System (SWS)

LCO 3.7.7 Two SWS loops shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SWS loop inoperable.	A.1 ----------NOTES---------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for diesel generator made inoperable by SWS. 2. Enter Applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops - MODE 4," for decay heat removal made inoperable by SWS. ---------- Restore SWS loop to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. <u>AND</u> B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.7.1	----------NOTE---------- Isolation of SWS flow to individual components does not render the SWS inoperable. ---------- Verify each SWS manual, power operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.7.2	Verify each SWS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months
SR 3.7.7.3	Verify each required SWS pump starts automatically on an actual or simulated signal.	18 months

ATTACHMENT A.6
CONTINUOUS FEED AND BLEED FROM BWST
(Work Sheet)

1.0 Record the following initial conditions:

RCS Temp. = _____°F

PZR Level = _____in.

Cr_i = _____ppmB = Initial RCS Boron Concentration

C_f = _____ppmB = Boron Concentration of BWST

Cr_f = _____ppmB = Final Desired RCS Boron Concentration

ln = natural logarithm

2.0 From Attachment C, for RCS Temp. and PZR Level

Mr = _____lbm = Mass of Reactor Coolant

3.0 To determine mass of feed (M_f) of boric acid of concentration C_f:

M_f = (Mr) ln [(C_f - Cr_i)/(C_f - Cr_f)]

M_f = (_____) ln [(_____ - _____)/(_____ - _____)]

M_f = _____lbm

4.0 To Determine feed volume (F), amount of boric acid of concentration C_f that must be fed to change boron concentration from Cr_i to Cr_f:

$F = (M_f) (v_f) (7.48) \frac{\text{lbm ft}^3\text{-gal.}}{\text{lbm ft}^3}$

F = (Mf) (0.0161) (7.48)

F = (_____) (0.1204)

F = _____ gallons. boric acid

5.0 Calculate desired BWST level drop and final BWST level:

L_i = _____ft. = Initial BWST level. $L_f = (L_i) - (L_\Delta)$

L_Δ = (F) / 9756 gallons per foot L_f = ( ) - ( )

L_Δ = ( ) / 9756 = _____ft. L_f = _____

Performed By: _____ Time_____ Date_____

Calculations Reviewed/
Verified by CRS/SM: _____ Time_____ Date_____

ATTACHMENT C

MASS OF REACTOR COOLANT VS. PRESSURIZER LEVEL

NOTE

- When using the BORON program, any operating conditions may be input.
- Attachment C and the BORON program automatically add 167,000 lb. to the reactor coolant mass when RCS temperature is $\leq$ 250.0°F, to account for the decay heat system.

The reactor coolant mass table on the next pages is based on the following assumptions:

1. RCS volume given in Core Flood System Operating Procedure (1104.001), Rev. 0, taking into account the variation in RCS volume with temperature.

2. Uses specific volume data computed from Formula (18), page 21 of "The Thermodynamic Properties of Steam" by Keenan and Keys.

3. To account for decay heat system, 167,000 lbs. is added when the RCS temperature is $\leq$ 250°F.

4. The makeup system mass is included, with constant Makeup Tank (T-4) level of 75 inches.

5. A constant mass (29950.0 lbs.) is added in to correct the RCS mass to measured results.

ATTACHMENT C

MR (MASS OF REACTOR COOLANT AT GIVEN TEMP., LBS.)

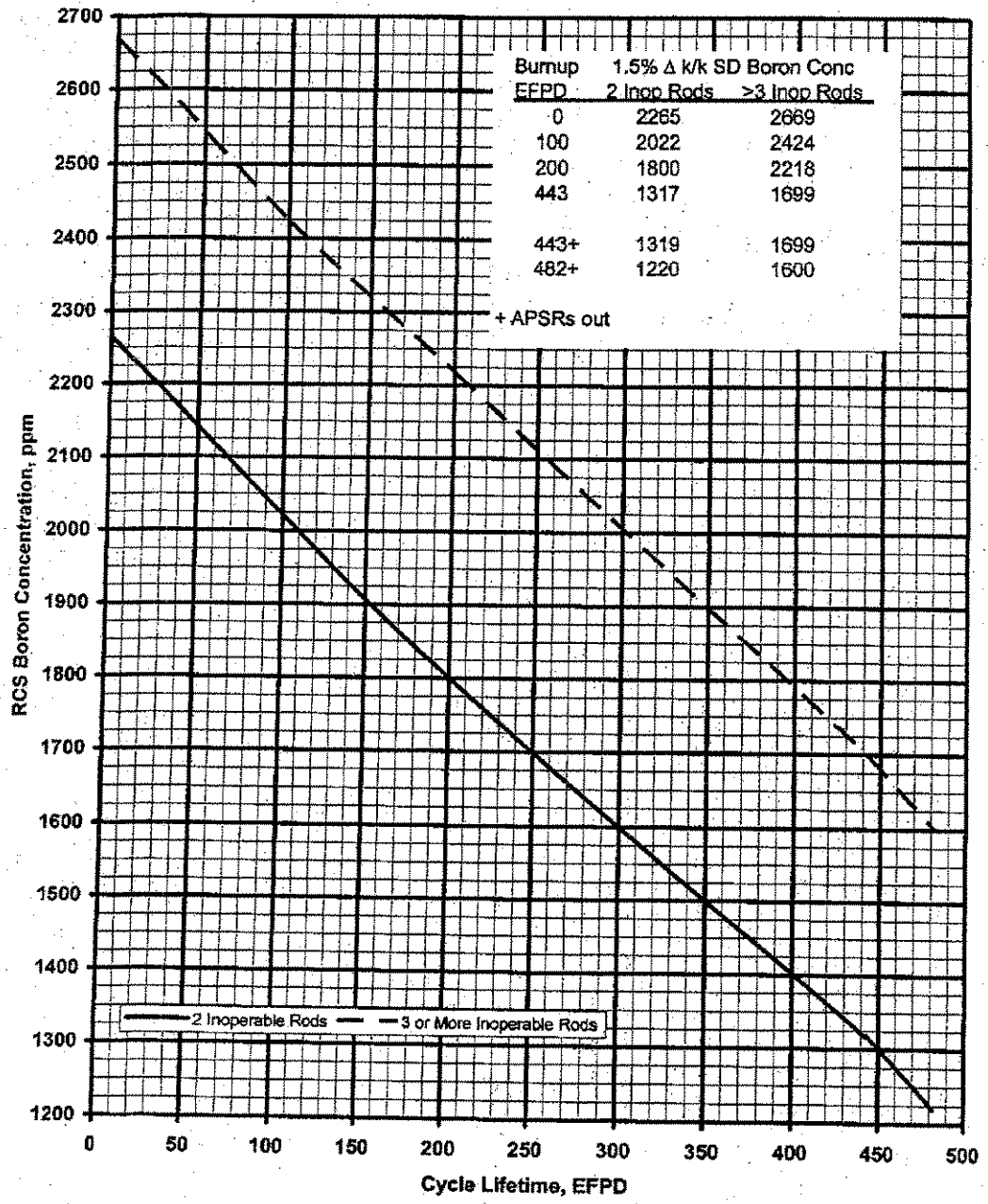
PZR LVL (IN.)	70.0°F	140.0°F	200.0°F	240.0° F	300.0°F	532.0°F	579.0°F
0.0	890368.2	881136.7	867971.1	857127.8	671122.7	561741.5	527881.0
5.0	891367.9	882121.8	868936.1	858076.2	672042.5	562497.6	528486.6
10.0	892367.4	883106.9	869901.0	859024.7	672962.2	563253.6	529192.3
15.0	893366.8	884091.8	870865.7	859972.9	673881.7	564009.5	529897.7
20.0	894366.4	885076.9	871830.7	860921.4	674801.4	564765.6	530603.4
25.0	895366.1	886062.1	872795.6	861869.9	675721.1	565521.6	531309.1
30.0	896365.7	887047.2	873760.6	862818.4	676640.9	566277.7	532014.7
35.0	897365.2	888032.3	874725.5	863766.8	677560.6	567033.7	532720.3
40.0	898364.6	889017.2	875690.2	864715.1	678480.1	567789.6	533425.8
45.0	899364.2	890002.3	876655.2	865663.5	679399.8	568545.7	534131.4
50.0	900363.9	890987.4	877620.1	866612.0	680319.5	569301.7	534837.1
55.0	901363.4	891972.6	878585.1	867560.4	681239.2	570057.8	535542.7
60.0	902363.1	892957.7	879550.1	868508.9	682158.9	570813.9	536248.4
65.0	903362.4	893942.6	880514.7	869457.2	683078.4	571569.8	536953.9
70.0	904362.1	894927.7	881479.7	870405.6	683998.2	572325.9	537659.5
75.0	905361.6	895912.8	882444.7	871354.1	684917.9	573081.9	538365.1
80.0	906361.2	896897.9	883409.6	872302.6	685837.6	573838.0	539070.7
85.0	907380.9	897883.1	884374.6	873251.1	686757.4	574594.1	539776.4
90.0	908360.2	898867.9	885339.3	874199.2	687676.9	575349.9	540481.9
95.0	909359.8	899853.1	886304.2	875147.7	688596.6	576106.0	541187.5
100.0	910359.4	900838.2	887269.2	876096.2	689516.3	576862.1	541893.2
105.0	911359.1	901823.2	888234.1	877044.7	690436.0	577618.1	542598.8
110.0	912358.7	902808.4	889199.1	877993.1	691355.7	578374.2	543304.4
115.0	913358.1	903793.2	890163.8	878941.4	692275.2	579130.1	544009.9
120.0	914357.6	904778.4	891128.7	879889.9	693194.9	579886.1	544715.6
125.0	915357.2	905763.5	892093.7	880838.3	694114.7	580642.2	545421.2
130.0	916356.9	906748.6	893058.7	881786.8	695034.4	581398.2	546126.9
135.0	917356.5	907733.7	894023.6	882735.2	695954.1	582154.3	546832.5
140.0	918355.8	908718.6	894988.4	883683.5	696873.6	582910.2	547537.9
145.0	919355.4	909703.7	895953.3	884631.9	697793.3	583666.3	548243.6
150.0	920355.1	910688.9	896918.2	885580.4	698713.1	584422.4	548949.2

ATTACHMENT C

MR (MASS OF REACTOR COOLANT AT GIVEN TEMP., LBS.)

PZR LVL (IN.)	70.0°F	140.0°F	200.0°F	240.0°F	300.0°F	532.0°F	579.0°F
155.0	921354.7	911674.0	897883.2	886528.9	699632.8	585178.4	549654.9
160.0	922354.2	912659.1	898848.2	887477.4	700552.5	585934.5	550360.6
165.0	923353.6	913644.0	899812.9	888425.6	701472.0	586690.4	551066.0
170.0	924353.2	914629.1	900777.8	889374.1	702391.7	587446.4	551771.6
175.0	925352.9	915614.2	901742.7	890322.5	703311.4	588202.5	552477.3
180.0	926352.4	916599.4	902707.7	891271.0	704231.2	588958.6	553182.9
185.0	927352.1	917584.5	903672.7	892219.4	705150.9	589714.6	553888.6
190.0	928351.4	918569.4	904637.4	893167.7	706070.4	590470.5	554594.1
195.0	929351.1	919554.5	905602.4	894116.2	706990.1	591226.6	555299.7
200.0	930350.6	920539.6	906567.3	895064.6	707909.8	591982.6	556005.3
205.0	931350.2	921524.7	907532.2	896013.1	708829.6	592738.7	556711.0
210.0	932349.9	922509.9	908497.2	896961.6	709749.2	593494.7	557416.6
215.0	933349.2	923494.7	909461.9	897909.8	710668.7	594250.7	558122.1
220.0	934348.9	924479.9	910426.9	898858.2	711588.5	595006.7	558827.7
225.0	935348.4	925465.0	911391.8	899806.7	712508.2	595762.8	559533.4
230.0	936348.1	926450.1	912356.8	900755.2	713427.9	596518.9	560239.0
235.0	937347.7	927435.2	913321.7	901703.7	714347.7	597274.9	560944.7
240.0	938347.1	928420.1	914286.4	902651.9	715267.2	598030.8	561650.1
245.0	939346.6	929405.2	915251.4	903600.4	716186.9	598786.9	562355.7
250.0	940346.2	930390.3	916216.4	904548.9	717106.6	599542.9	563061.4
255.0	941345.9	931375.4	917181.3	905497.3	718026.3	600299.0	563767.1
260.0	942345.5	932360.6	918146.2	906445.8	718946.1	601055.1	564472.7
265.0	943344.8	933345.4	919111.0	907394.0	719865.6	601810.9	565178.2
270.0	944344.4	934830.6	920075.9	908342.5	720785.2	602567.0	565883.8
275.0	945344.1	935315.7	921040.9	909290.9	721705.0	603323.1	566589.4
280.0	946343.7	936300.8	922005.8	910239.4	722624.7	604079.1	567295.1
285.0	947343.2	937285.9	922970.8	911187.9	723544.4	604835.2	568000.7
290.0	948342.6	938270.8	923935.5	912136.1	724463.9	605591.1	568706.2
295.0	949342.2	939255.9	924900.4	913084.6	725383.6	606347.2	569411.9
300.0	950341.9	940241.1	925865.4	914033.1	726303.4	607103.2	570117.5

Attachment B-16: Boron Concentration for 1.5% Shutdown Margin During Emergency Boration



9.2 North Emer Swgr Room Clr (VCH-4A) and other Green Train Inoperability in Modes 1 through 4

NOTE

- Due to the multiple conditions addressed, each step in the sub-section should be examined for applicability. Attachments B and C of this procedure present electrical system operability in a flow chart form to aid the operator in determining applicable actions when in Modes 1 through 4.
- Phrases referring to future conditions, e.g., "condition will apply", used in this section refers to action that is planned or is imminent, such as planned maintenance.
- Design Engineering may be able to extend the 30 hour administrative time clock (see Discussion at 9.0) on a case by case basis by re-performing room heat-up calculations using specific data for the current situation. This should not be necessary unless estimated time of inoperability is >30 hours. Tech Spec 3.0.3 is NOT applicable to this administrative time clock.
- Per the Tech Spec definition of operability, all necessary support equipment required for a system to perform its designed function must be capable of performing related support function(s). Heat load and room heat-up rate calculations have determined that under worst case ambient temperature conditions with normal cooling and area fans operable, the ES Switchgear, electrical equipment, battery, and DC equipment areas do not require chilled water system cooling to maintain their operability until at least 30 hours after a Design Basis Accident (DBA).

9.2.1 IF ANY of the following three conditions apply OR will apply,

- North Emer Swgr Room Chiller (VCH-4A) inoperable
- ES Switchgear Rm Unit Clr (VUC-2D) inoperable
- North Batt Rm Emerg Clng Unit (VUC-14A) inop, AND Pent Room Ventilation is operable, AND temperature in rooms 95 and 98 is ≤81°F

THEN enter 30 hour administrative time clock.

9.2.2 IF VCH-4A has failed,
THEN initiate a Priority 1 WR/WO for repair.

9.2.3 IF VCH-4A has failed,
OR will be inoperable,
THEN verify the following safety related fan units available to provide forced ventilation and avoid hotspots in their respective areas:

- North Battery Rm Emerg Clng Unit (VUC-14A)

NOTE
North Batt Rm Exhaust Fan (VEF-34) should be run if available, but is not required to maintain operability of Green Train switchgear.

- North Batt Rm Exhaust Fan (VEF-34)

9.2.4 IF North Battery Rm Emerg Clng Unit (VUC-14A) is not available,
THEN declare electrical components in affected area inoperable AND perform required actions for applicable conditions of TS 3.8.

NOTE
The Penetration Room Ventilation system will provide a post-accident ventilation pathway for Corridor 98, North Batt Rm (Room 95), and Upper North Elec Equip Area (Room 149).

9.2.5 IF ANY of the following conditions apply,
OR will apply:

- VCH-4A inoperable
- VUC-14A coil inoperable
- North Elect Equip Rm Emer Clg Unit (VUC-14B) inoperable

AND BOTH trains of Penetration Room Ventilation System are inoperable,

THEN declare electrical components in affected room(s) (95, 98, and/or 149) inoperable AND perform required actions for applicable conditions of TS 3.8.

9.2.6 For the applicable condition(s), verify temperature in affected area(s) are initially below the following limits (no limit in Upper North Elec Equip Room [Room 149]):

- VCH-4A OR VUC-14A coil inoperable:
  - North Battery room (Room 95) 81°F
  - North Battery Charger room (Room 98) 81°F
- VCH-4A OR VUC-2D inoperable:
  - A4 North Swgr room (Room 99) 90°F

A. IF temperature in areas which receive emergency cooling from VCH-4A are initially above limits, THEN declare electrical components in affected area inoperable AND perform required actions for applicable conditions of TS 3.8.

9.2.7 Verify normal cooling systems for affected areas in-service.

9.2.8 IF normal room cooling is unavailable, or becomes unavailable,
AND EITHER of the following conditions apply, or will apply:

- VCH-4A inoperable
- individual room coolers inoperable

THEN monitor VCH-4A local control panel (C155) for high room temp alarm(s).

A. IF high room temp alarm(s),
THEN establish contingency cooling for the affected area(s) per the following step(s) as applicable.

9.2.9 IF needed,
THEN establish contingency cooling in North Battery Rm (95)/Corridor 98 (Rm 98), (TS-7854) as follows:

- Start VUC-14A.
- Establish a Firewatch AND block open Door 52 into North Batt Room.
- Establish a Security watch AND block open BOTH sides of Door 56 into Corridor 98.
- Verify Penetration Room Ventilation system operable (Refer to step 9.2.5).

9.2.10 IF needed,
THEN establish contingency cooling in the North ES Switchgear A-4 Room (99),(TS-7856) as follows:

NOTE

VUC-2D is stopped because the benefit from forced ventilation without chill water is offset by the added heat load from fan and motor.

- Verify VUC-2D stopped.
- Establish a Security watch and block open BOTH sides of Door 56 into Corridor 98.
- Establish a Firewatch and block open BOTH sides of Door 46 out of A-4 Swgr Rm.

NOTE

Shifting MCC B55/56 to the load center/room with an operable chiller will lower the heat load, but is not required to maintain operability of the switchgear with the inoperable chiller. Other conditions such as DG operability or ES Pump alignment might prohibit shifting B55/56 (ref. 1015.015 Shift Turnover Checklist).

- IF other conditions do NOT prohibit,
  THEN shift B55/56 to load center B-5.

9.2.11 IF needed,
THEN establish contingency cooling in the Upper North Electrical Equipment/Penetration Areas (Room 149),(TS-7852) as follows:

NOTE

VUC-14B is stopped because the benefit from forced ventilation without chill water is offset by the added heat load from fan and motor.

- Verify VUC-14B stopped.
- Verify Penetration Room Ventilation system operable (Refer to step 9.2.5).
- Maintain doors into UNEPR area closed except during personnel entry or exit.

NOTE

With ambient outdoor temperature ≤93°F, contingent cooling methods provide reasonable assurance of ES Switchgear operability while VCH-4A is inoperable. These contingent cooling methods are valid for DBA duration provided that, 1) ambient outdoor temperature remains <93°F, and 2) safety related room fans are available to provide forced ventilation. Using the maximum historic outside ambient temperature for the site (2SAR Section 2.3.2.2.2) it can be safely projected that ambient outdoor temperature will not exceed 93°F for the months of November through January.

9.2.12 IF ambient outdoor temperature is projected to remain ≤93°F (i.e., November through January) during estimated time of inoperability,
THEN enter 30 day administrative time clock.

9.2.13 IF estimated time of inoperability is >30 hour administrative time clock
AND ambient outdoor temperature is and projected to remain ≤93°F (i.e., February through October),
THEN proceed as follows:

A. Declare affected electrical components inoperable and perform required actions for applicable conditions of TS 3.8.

B. Direct Design Engineering and Nuclear Safety to re-calculate room heat-up rate and allowable administrative time clock based on current situation.

C. IF estimated time of inoperability for VCH-4A is greater than allowable administrative time clock provided by engineering based on current situation,
THEN proceed as directed by TS 3.8.

D. IF allowable administrative time clock provided by engineering based on the current situation is greater than the estimated time of inoperability,
THEN proceed as follows:

1. Exit TS 3.8 Actions.

2. Enter administrative time clock provided by engineering, based on current situation.

9.2.14 IF during inoperability of Emergency Switchgear Cooling System, it becomes evident that the system will not be made operable during the administrative time clock (30 hour or 30 day),
THEN perform required actions for applicable conditions of TS 3.8.

9.2.15 WHEN the system is operable,
THEN proceed as follows:

A. Restore any contingent cooling alignments that have been made.

B. Perform Supplement 1 of this procedure to prove operability of Emergency Switchgear Cooling System.

9.3 South Emer Swgr Room Clr (VCH-4B) and other Red Train Inoperability in Modes 1 through 4

NOTE

- Due to the multiple conditions addressed, each step in the sub-section should be examined for applicability. Attachments B and C of this procedure present electrical system operability in a flow chart form to aid the operator in determining actions when in Modes 1 through 4.
- Phrases referring to future conditions, e.g., "condition will apply", used in this section refers to action that is planned or is imminent, such as planned maintenance.
- Design Engineering may be able to extend the 30 hour administrative time clock (see Discussion at 9.0) on a case by case basis by re-performing room heat-up calculations using specific data for the current situation. This should not be necessary unless estimated time of inoperability is >30 hours. Tech Spec 3.0.3 is NOT applicable to this administrative time clock.
- Per the Tech Spec definition of operability, all necessary support equipment required for a system to perform its designed function must be capable of performing related support function(s). Heat load and room heat-up rate calculations have determined that under worst case ambient temperature conditions with normal cooling and area fans operable, the ES Switchgear, electrical equipment, battery, and DC equipment areas do not require chilled water system cooling to maintain their operability until at least 30 hours after a Design Basis Accident (DBA).

9.3.1 IF ANY of the following three conditions apply,
OR will apply:

- South Emer Swgr Room Chiller (VCH-4B) inoperable
- ES Switchgear Rm Unit Clr (VUC-2B) inoperable
- South Batt Rm Emerg Clng Unit (VUC-14C) inop, AND Pent Vent Room Ventilation is operable, AND temperature in rooms 109 and 110 is ≤81°F,

THEN enter 30 hour administrative time clock.

9.3.2 IF VCH-4B has failed,
THEN initiate a Priority 1 WR/WO for repair.

9.3.3 IF VCH-4B has failed,
OR will be inoperable,
THEN verify the following safety related fan units available to provide forced ventilation AND avoid hotspots in their respective areas:

A. South Battery Rm Emerg Clng Unit (VUC-14C)

NOTE
South Batt Rm Exhaust Fan (VEF-33) should be run, if available, but is not required to maintain operability of "RED TRAIN" switchgear.

B. South Batt Rm Exhaust Fan (VEF-33)

9.3.4 IF South Batt Rm Emerg Clng Unit (VUC-14C) is NOT available,
THEN declare electrical components in affected area inoperable AND perform required actions for applicable conditions of TS 3.8.

NOTE
The Penetration Room Ventilation system will provide a post-accident ventilation pathway for Lower South Electrical Equipment area (Room 104).

9.3.5 IF ANY of the following conditions apply
OR will apply:

- VCH-4B inoperable
- VUC-14C coil inoperable
- South Elec Equip Rm Emer Clg Unit (VUC-14D) inoperable

AND BOTH trains of Penetration Room Ventilation system are inoperable,

THEN declare electrical components in Room 104 inoperable AND perform required actions for applicable conditions of TS 3.8.

9.3.6 For the applicable conditions(s), verify temperature in affected area(s) are initially below the following limits:

- VCH-4B or VUC-14C coil inoperable:
  - South Battery room (Room 110) ---------- 81°F
  - South Battery Charger room (Room 109) ---------- 81°F
  - Lower South Elec Equip room (Room 104) ---------- 90°F
- VCH-4B or VUC-2B inoperable
  - A3 South Switchgear room (Room 100) ---------- 90°F
  - Lower South Elec Equip room (Room 104) ---------- 90°F

A. IF temperature in area(s) which receive emergency cooling from VCH-4B are initially above limits, THEN declare electrical components in affected area(s) inoperable AND perform required actions for applicable conditions of TS 3.8.

9.3.7 Verify normal cooling systems for affected areas in-service.

9.3.8 IF normal cooling is unavailable, or becomes unavailable, AND EITHER of the following conditions apply, or will apply:

- VCH-4B inoperable
- individual room coolers inoperable

THEN monitor VCH-4B local control panel (C154) for high room temperature alarm(s).

A. IF high room temp alarm(s),
THEN establish contingency cooling for the affected area(s) per the following step(s) as applicable.

9.3.9 IF needed,
THEN establish contingency cooling in D-01 area Rm 109)/South Batt Rm (Rm 110), (TS-7855) as follows:

- Start VUC-14C by placing switch (HS-7845) to HAND.
- Establish a Security Watch AND block open BOTH sides of Door 56 into Corridor 98.
- Close fire damper (FD-98-250), located in north wall of D-01 room.
- Verify Penetration Room Ventilation system operable. (Refer to step 9.3.5)
- IF contingencies are being taken as a result of a loss of HVAC due to an external fire,
THEN establish a fire watch AND block open Door 480 into D-01 area.

9.3.10 IF needed,
THEN establish contingency cooling in South ES Switchgear A-3 Room (Room 100), (TS-7857)

NOTE
VUC-2B is stopped because the benefit from forced fan ventilation , without chill water is offset by the added heat load from fan and blower.

- Verify VUC-2B stopped.
- Establish a Security Watch AND block open Door 48 out of A-3 Switchgear RM.

NOTE
Shifting MCC B55/56 supply to the load center in the switchgear room supplied by the operable ES Switchgear chiller will lower the heat load in the switchgear room with inoperable chiller, but is NOT required to maintain operability of the switchgear whose chiller is inoperable. Other conditions such as DG operability or ES Pump alignment might prohibit shifting B55/56 (ref. 1015.015 Shift Turnover Checklist)

- IF other conditions do not prohibit,
  THEN shift MCC B55/56 supply to load center B-6.

9.3.11 IF needed,
THEN establish contingency cooling in Lower South Electrical Equipment/Penetration Room areas (Room 104), (TS-7853).

NOTE
VUC-14D is stopped because the benefit from forced fan ventilation , without chill water is offset by the added heat load from fan and blower.

- Verify VUC-14D stopped.
- Verify Penetration Room Ventilation system operable. (Refer to step 9.3.5)
- Establish a Fire Watch AND block open Door 49 into LSEER.

9.3.12 Repair Emergency Switchgear Cooling System within 30 hours.

9.3.13 IF estimated time of inoperability is >30 hour administrative time clock,
THEN proceed as follows:

A. Declare affected electrical components inoperable AND perform required actions for applicable conditions of TS 3.8.

B. Direct Design Engineering and Nuclear Safety to re-calculate room heat-up rate and allowable administrative time clock, based on current situation.

C. IF estimated time of inoperability for VCH-4B is greater than allowable administrative time clock provided by engineering based on current situation,
THEN proceed as directed by TS 3.8.

D. IF allowable administrative time clock provided by engineering based on the current situation is greater than the estimated time of inoperability,
THEN proceed as follows:

1. Exit TS 3.8 Actions.

2. Enter administrative time clock provided by engineering, based on current situation.

9.3.14 IF during inoperability of Emergency Switchgear Cooling System, it becomes evident that the system will not be made operable during the administrative time clock,
THEN perform required actions for applicable conditions of TS 3.8.

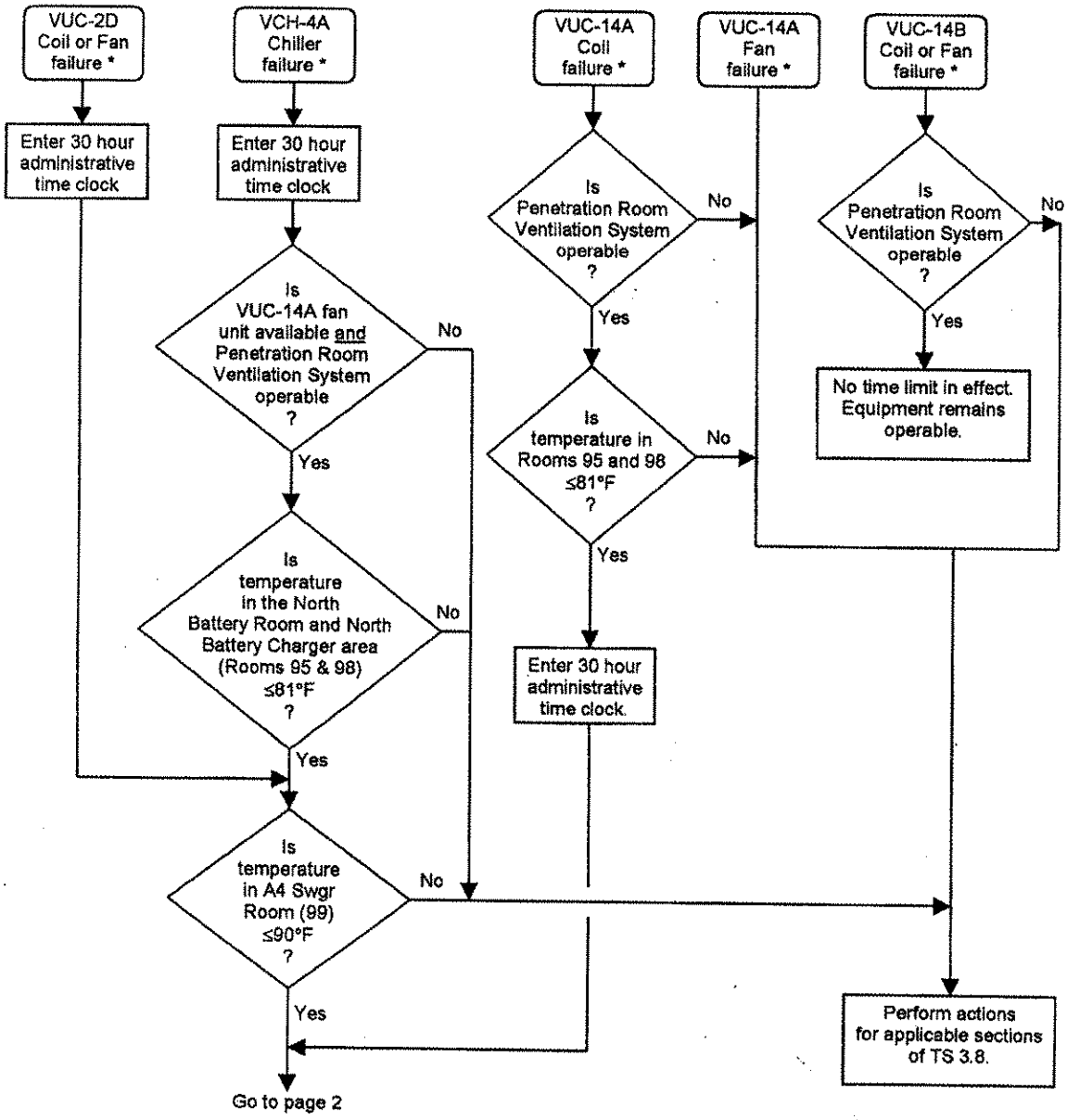
9.3.15 WHEN system is no longer inoperable,
THEN proceed as follows:

A. Restore any contingent cooling alignments that have been made.

B. Perform Supplement 2 of this procedure to prove operability of Emergency Switchgear Cooling System.

ATTACHMENT B

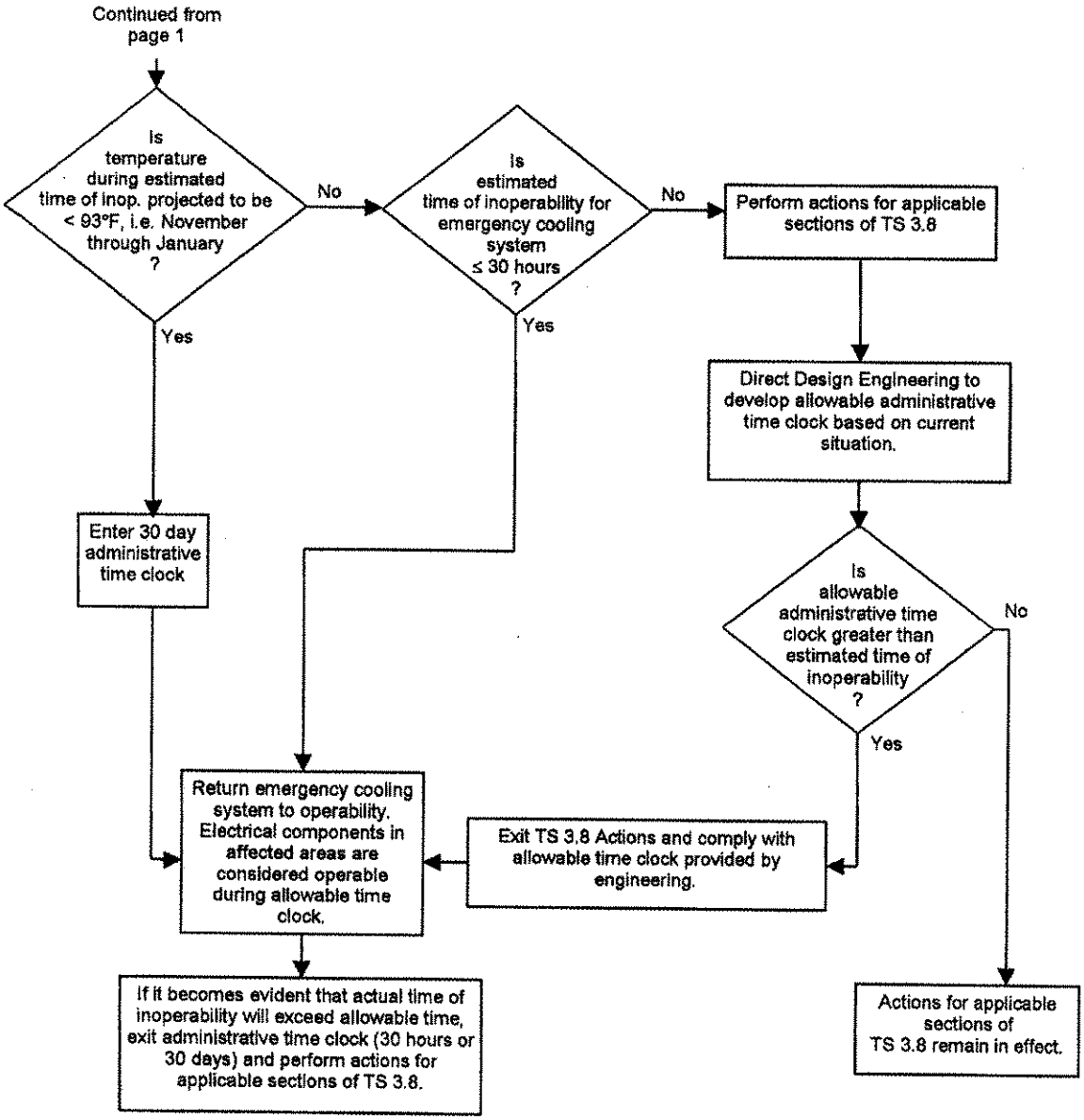
VCH-4A and Associated Green Train Room Coolers
Operability Determination Flowchart - Modes 1 thru 4



* If normal cooling for affected area is not available or becomes unavailable, see "LCO/Contingent Cooling Requirements for VCH-4A/VCH-4B Failure" section of this procedure.

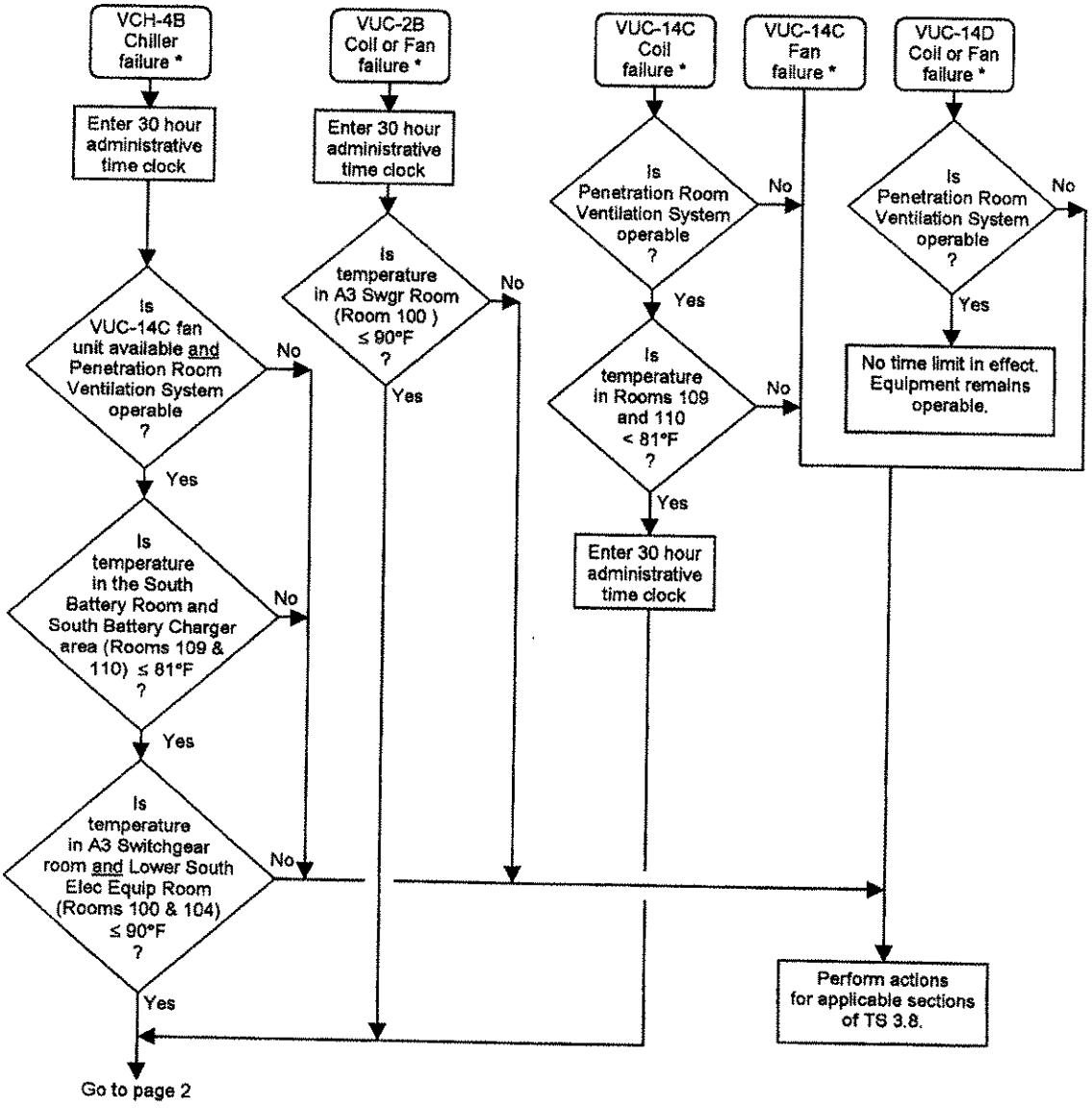
ATTACHMENT B

VCH-4A and Associated Green Train Room Coolers
Operability Determination Flowchart - Modes 1 thru 4



ATTACHMENT C

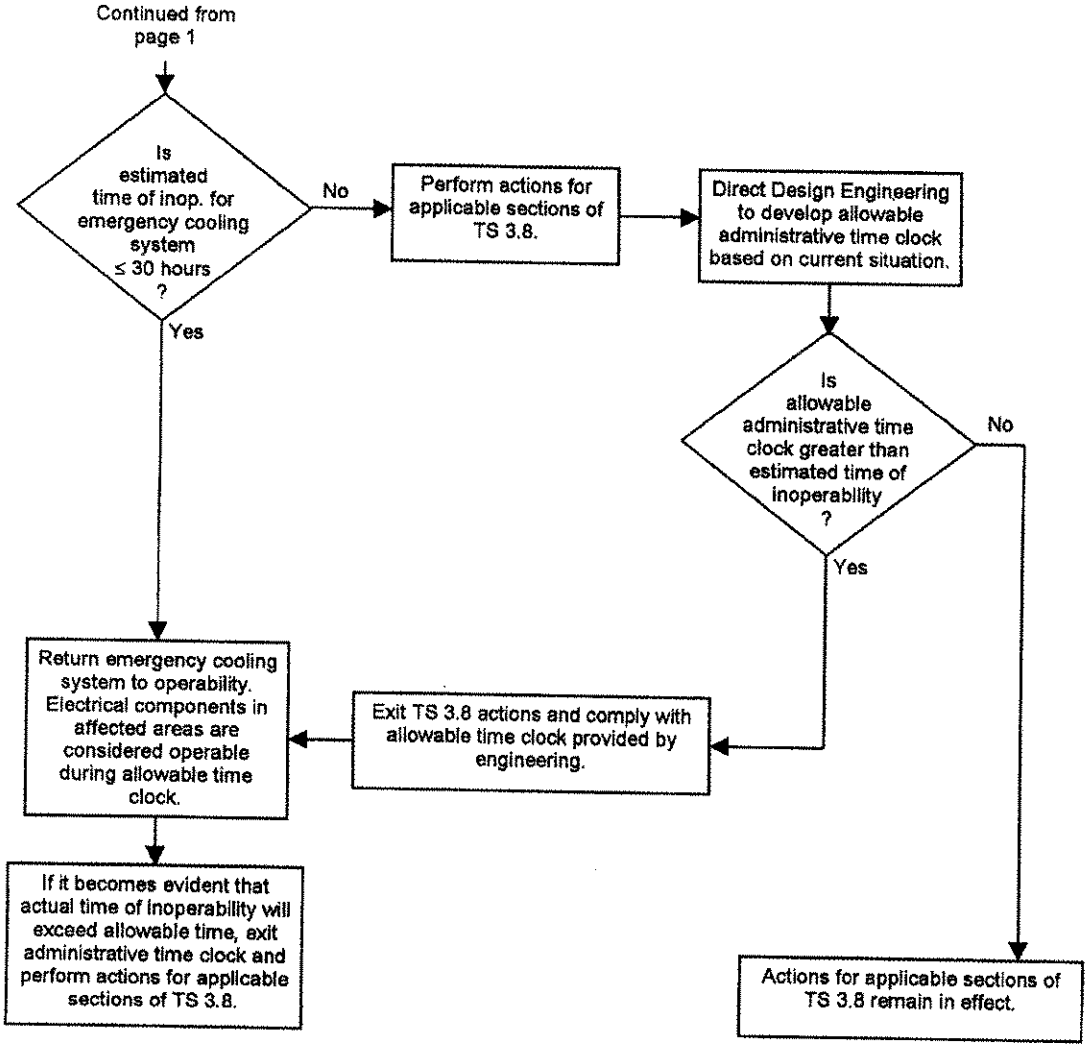
VCH-4B and Associated Red Train Room Coolers
Operability Determination Flowchart - Modes 1 thru 4



* If normal cooling for affected area is not available or becomes unavailable, see "LCO/Contingent Cooling Requirements for VCH-4A/VCH-4B Failure" section of this procedure.

ATTACHMENT C

VCH-4B and Associated Red Train Room Coolers
Operability Determination Flowchart - Modes 1 thru 4



3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil and Starting Air

LCO 3.8.3 The stored diesel fuel oil and starting air subsystem shall be within limits for each required diesel generator (DG).

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more DG fuel oil storage tank(s) with fuel volume < 20,000 gallons and > 17,140 gallons.	A.1 Restore fuel oil volume to within limits.	48 hours
B. One or more DGs with stored fuel oil total particulates not within limit.	B.1 Restore fuel oil total particulates to within limits.	7 days
C. One or more DGs with new fuel oil properties not within limits.	C.1 Restore stored fuel oil properties to within limits.	30 days
D. One or more DGs with required starting air receiver pressure < 175 psig and ≥ 158 psig.	D.1 Restore required starting air receiver pressure to within limits.	48 hours

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time not met. OR One or more DGs with diesel fuel oil or required starting air subsystem not within limits for reasons other than Condition A, B, C, or D.	E.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify each fuel oil storage tank contains ≥ 20,000 gallons of fuel.	31 days
SR 3.8.3.2	Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.3	Verify each DG required air start receiver pressure is ≥ 175 psig.	31 days
SR 3.8.3.4	Check for and remove accumulated water from each fuel oil storage tank.	31 days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil and Starting Air

BASES

BACKGROUND

Each diesel generator (DG) is provided with fuel oil storage capacity sufficient to operate that diesel for a period of 3.5 days while the DG is supplying maximum post loss of coolant accident load demand discussed in the SAR, Section 8.3 (Ref. 1). The maximum load demand is calculated using the assumption that at least two DGs are initially available. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time needed to replenish the onsite supply from outside sources.

Fuel oil is transferred from either storage tank to either day tank by either transfer pump (one pump is associated with each storage tank). Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve or tank to result in the loss of more than one DG. All required outside tanks, pumps, and piping are located underground.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 2) addresses the recommended fuel oil practices. The fuel oil properties governed by these SRs are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and impurity level. See Specification 5.5.13, "Diesel Fuel Oil Testing Program," for details.

Each DG has a designed air start system consisting of two redundant banks of two tanks (receivers) each. One bank of the two tanks contains adequate capacity (i.e., design margin) for five successive start attempts on the DG without recharging the air start receivers.

APPLICABLE SAFETY ANALYSES

The applicable Design Basis Accident (DBA) and transient analyses for the Diesel Fuel Oil and Starting Air systems are the same as for the DGs which they support. See the appropriate discussions in the Bases for LCO 3.8.1, "AC Sources – Operating" and LCO 3.8.2, "AC Sources – Shutdown."

Since diesel fuel oil and the air start subsystem support the operation of the standby AC power sources, they satisfy Criterion 3 of 10 CFR 50.36 (Ref. 3).

LCO

Stored diesel fuel oil is required to have sufficient supply for 3.5 days of full load operation. It is also required to meet specific standards for quality. This requirement supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an abnormality or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in LCO 3.8.1 and 3.8.2.

The starting air system is required to have a minimum capacity for five successive DG start attempts without recharging the air start receivers.

APPLICABILITY

The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an abnormality or a postulated DBA. Since stored diesel fuel oil and the starting air subsystem support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil and starting air are required to be within limits when the associated DG is required to be OPERABLE.

ACTIONS

The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) are governed by separate Condition entry and application of associated Required Actions.

A.1

In this Condition, the required fuel oil supply for a DG of 20,000 gallons (i.e., 138 inches) is not available. However, the Condition is restricted to fuel oil level reductions, that maintain at least a 3 day supply of 17,140 gallons (i.e., 118 inches). These circumstances may be caused by events, such as full load operation required after an inadvertent start while at minimum required level. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 3 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

ACTIONS (continued)

B.1

This Condition is entered as a result of a failure to meet the acceptance criterion of Specification 5.5.13. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling, and re-analysis of the DG fuel oil.

C.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.2 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.

D.1

With starting air receiver pressure < 175 psig in the required receivers, sufficient capacity for five successive DG start attempts does not exist. However, as long as the receiver pressure is ≥ 158 psig, there is adequate capacity for at least one start attempt, and the DG can be considered OPERABLE while the air receiver pressure is restored to the required limit. A period of 48 hours is considered sufficient to complete restoration to the required pressure prior to declaring the DG inoperable. This period is acceptable based on the remaining air start capacity, the fact that the credited DG start is accomplished on the first attempt, and the low probability of an event during this brief period.

E.1

With a Required Action and associated Completion Time not met, or one or more DGs with fuel oil or required starting air subsystem not within limits for reasons other than addressed by Conditions A through D, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks, when combined with the volume contained in the DG fuel oil day tanks, to support each DG's operation for 3.5 days at full load. The 3.5 day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location. An indicated tank level of 138 inches of fuel oil assures the required volume of 20,000 gallons for tanks T-57A and T-57B.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

The tests of fuel oil prior to addition to the storage tanks are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate, detrimental impact on diesel engine operation. If results from these tests are within acceptable limits, the fuel oil may be added to the storage tanks without concern for contaminating the entire volume of fuel oil in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage tank(s), but in no case is the time between sampling (and associated results) of new fuel and addition of new fuel oil to the storage tank(s) to exceed 31 days. The tests, limits, and applicable ASTM Standards for the tests listed in Specification 5.5.13, "Diesel Fuel Oil Testing Program," are as follows:

a. Sample the new fuel oil in accordance with ASTM D4057-88 (Ref. 4); and

b. Verify in accordance with the tests specified in ASTM D975-81 (Ref. 4) that the sample has:

   1. an absolute specific gravity at 60/60°F of ≥ 0.83 and ≤ 0.89 or an API gravity at 60°F of ≥ 27°, ≤ 39°,

   2. a kinematic viscosity at 40°C of ≥ 1.9 centistokes and ≤ 4.1 centistokes,

   3. a flash point of ≥ 125°F, and

   4. water and sediment within limits.

Failure to meet any of the above limits is cause for rejecting the new fuel oil, but does not represent a failure to meet the LCO since the fuel oil is not added to the storage tanks.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.2 (continued)

Following the initial new fuel oil sample, the fuel oil is analyzed to establish that the other properties specified in Table 1 of ASTM D975-81 (Ref. 4) are met for new fuel oil when tested in accordance with ASTM D975-81 (Ref. 4), except that the analysis for sulfur may be performed in accordance with ASTM D1552-90 (Ref. 4) or ASTM D2622-87 (Ref. 4). These additional analyses are required by Specification 5.5.13, "Diesel Fuel Oil Testing Program," to be performed within 31 days following sampling and addition. This 31 days is intended to assure: 1) that the sample taken is not more than 31 days old at the time of adding the fuel oil to the storage tank, and 2) that the results of a new fuel oil sample (sample obtained prior to addition but not more than 31 days prior to) are obtained within 31 days after addition. For circumstances where multiple fuel oil additions are made within a short period of time, the samples taken for each batch added to the storage tank can be composited for a single follow-up analysis. The 31 day period is acceptable because the fuel oil properties of interest, even if they were not within stated limits, would not have an immediate effect on DG operation. This Surveillance ensures the availability of high quality fuel oil for the DGs.

Fuel oil degradation during long term storage shows up as an increase in particulate, due mostly to oxidation. The presence of particulate does not mean the fuel oil will not burn properly in a diesel engine. The particulate can cause fouling of filters and fuel oil injection equipment, however, which can cause engine failure.

Particulate concentrations should be determined in accordance with ASTM D2276-88, Method A (Ref. 4). This method involves a gravimetric determination of total particulate concentration in the fuel oil and has a limit of 10 mg/l. It is acceptable to obtain a field sample for subsequent laboratory testing in lieu of field testing. Each tank is considered and tested separately.

The Frequency of this test takes into consideration fuel oil degradation trends that indicate that particulate concentration is unlikely to change significantly between Frequency intervals.

SR 3.8.3.3

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of five engine start cycles without recharging. The pressure specified in this SR is intended to reflect the lowest value at which the five starts can be accomplished.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.4

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.

REFERENCES

1. SAR, Section 8.3.

2. Regulatory Guide 1.137.

3. 10 CFR 50 36.

4. ASTM Standards: D4057-88; D975-81; D4176-86; D1552-90; D2622-87; D2276-88, Method A.

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical power sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and

b. Two diesel generators (DGs) each capable of supplying one train of the onsite Class 1E AC Electrical Power Distribution System.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable.	A.1 Perform SR 3.8.1.1 for OPERABLE required offsite circuit. AND	1 hour AND Once per 12 hours thereafter
	A.2 Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable. AND	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 ----------NOTE---------- Startup Transformer No. 2 may be removed from service for up to 30 days for preplanned preventative maintenance. This 30 day Completion Time may be applied not more than once in any 10 year period. The provisions of LCO 3.0.4 are not applicable to Startup Transformer No. 2 during this 30 day preventative maintenance period. ----------	
	Restore required offsite circuit to OPERABLE status.	72 hours AND 10 days from discovery of failure to meet LCO
B. One DG inoperable.	B.1 Perform SR 3.8.1.1 for OPERABLE required offsite circuit(s).	1 hour AND Once per 12 hours thereafter
	AND	
	B.2 Declare required feature(s) supported by the inoperable DG inoperable when its redundant required feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperablity of redundant required feature(s)
	AND	
	B.3.1 Determine OPERABLE DG is not inoperable due to common cause failure.	24 hours
	OR	

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.3.2 Perform SR 3.8.1.2 for OPERABLE DG. AND B.4 Restore DG to OPERABLE status.	24 hours 7 days AND 10 days from discovery of failure to meet LCO
C. Two required offsite circuits inoperable.	C.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable. AND C.2 Restore one required offsite circuit to OPERABLE status.	12 hours from discovery of Condition C concurrent with inoperability of redundant required feature(s) 24 hours
D. One required offsite circuit inoperable. AND One DG inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.6, "Distribution Systems – Operating," when Condition D is entered with no AC power source to any train. ---------- D.1 Restore required offsite circuit to OPERABLE status. OR D.2 Restore DG to OPERABLE status.	 12 hours 12 hours
E. Two DGs inoperable.	E.1 Restore one DG to OPERABLE status.	2 hours

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and Associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	12 hours 36 hours
G. Three or more required AC sources inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required offsite circuit.	7 days
SR 3.8.1.2	----------NOTE---------- All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. ---------- Verify each DG starts from standby conditions and, in ≤ 15 seconds achieves "ready-to-load" conditions.	31 days
SR 3.8.1.3	----------NOTES---------- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and follow, without shutdown, a successful performance of SR 3.8.1.2. ---------- Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load ≥ 2475 kW and ≤ 2750 kW.	31 days

	SURVEILLANCE	FREQUENCY
SR 3.8.1.4	Verify each day tank contains ≥ 160 gallons of fuel oil.	31 days
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	31 days
SR 3.8.1.6	Verify the fuel oil transfer system operates to transfer fuel oil from storage tanks to the day tank.	31 days
SR 3.8.1.7	----------NOTE---------- This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. ---------- Verify automatic transfer of AC power sources to the selected offsite circuit and manual transfer to the alternate required offsite circuit.	18 months
SR 3.8.1.8	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify on an actual or simulated loss of offsite power signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. achieves "ready-to-load" conditions in ≤ 15 seconds, 2. energizes permanently connected loads, 3. energizes auto-connected shutdown load through automatic load sequencing timers, and 4. supplies connected loads for ≥ 5 minutes.	18 months

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. achieves "ready-to-load" conditions in ≤ 15 seconds, 2. energizes permanently connected loads, 3. energizes auto-connected emergency loads through load sequencing timers, and 4. supplies connected loads for ≥ 5 minutes.	18 months

3.7 PLANT SYSTEMS

3.7.15 Spent Fuel Pool Storage

LCO 3.7.15 The combination of initial enrichment and burnup of each spent fuel assembly stored in Region 2 shall be within the acceptable range of Figure 3.7.15-1 or in accordance with Specification 4.3.1.1.

APPLICABILITY: Whenever any fuel assembly is stored in Region 2 of the spent fuel pool.

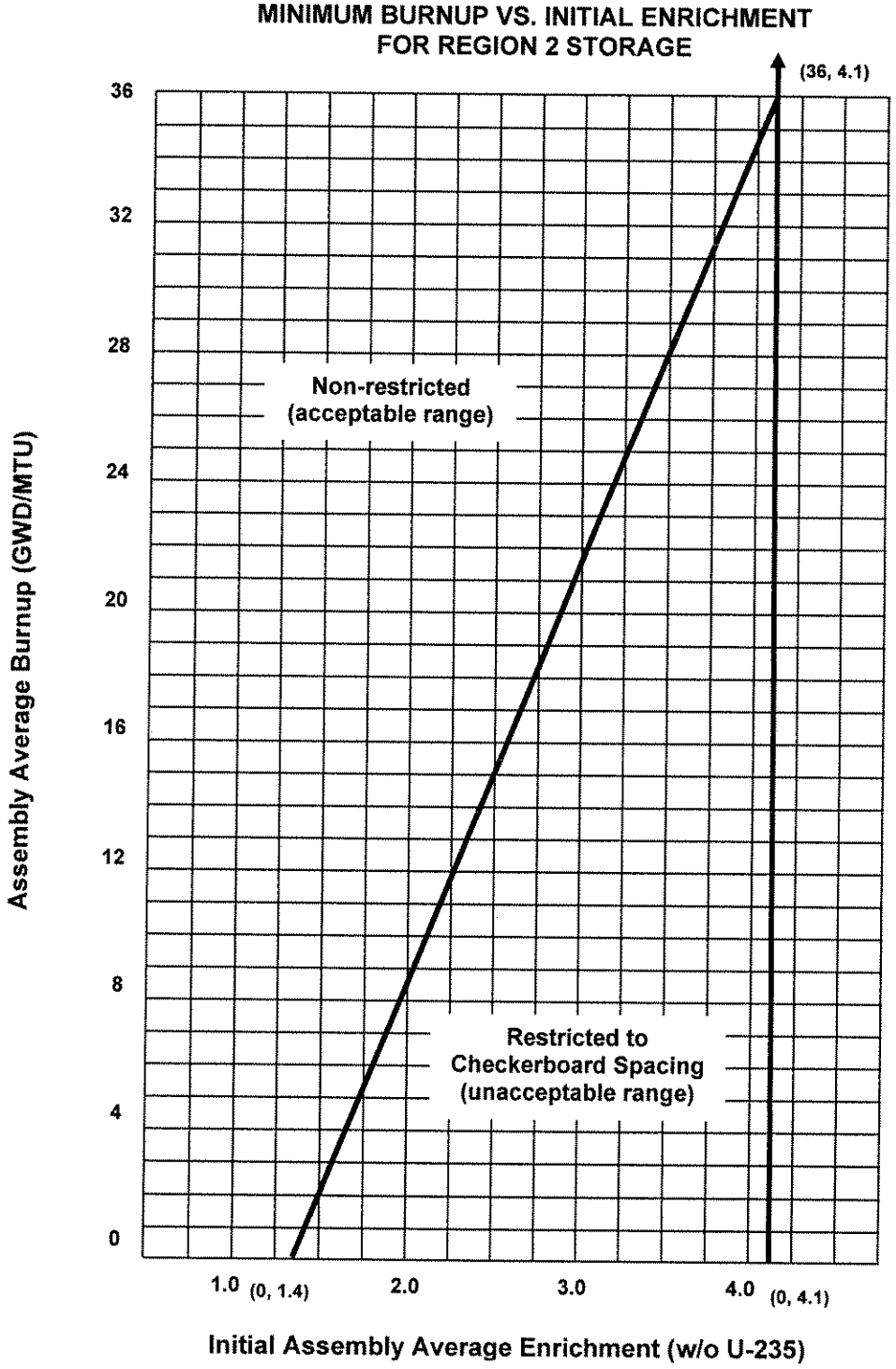
ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	A.1 ----------NOTE---------- LCO 3.0.3 is not applicable. ---------- Initiate action to move the noncomplying fuel assembly from Region 2.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.15.1	Verify by administrative means the initial enrichment and burnup of the fuel assembly is in accordance with Figure 3.7.15-1 or Specification 4.3.1.1.	Prior to storing the fuel assembly in Region 2

Figure 3.7.15-1
Burnup versus Enrichment Curve for
Spent Fuel Storage Racks



B 3.7 PLANT SYSTEMS

B 3.7.15 Spent Fuel Pool Storage

BASES

BACKGROUND

The spent fuel assembly storage facility is designed to store either new (nonirradiated) nuclear fuel assemblies, or burned (irradiated) fuel assemblies in a vertical configuration underwater. The spent fuel pool is sized to store 968 fuel assemblies and is connected to a pit for loading shipping or dry fuel storage casks. The spent fuel storage cells are installed in parallel rows with center to center spacing of 10.65 inches in each direction. The cask configuration is in accordance with the cask venders Certificate of Compliance.

The spent fuel storage pool is divided into two separate and distinct regions as shown in SAR Figure 9-53 which, for the purpose of criticality considerations, are considered as separate pools. Region 1 is designed to accommodate new fuel with a maximum enrichment of 4.10 wt% U-235, or spent (irradiated) fuel regardless of the discharge fuel burnup. Region 2 is designed to accommodate fuel of various initial enrichments which have accumulated minimum burnups within the acceptable domain according to Figure 3.7.15-1. Fuel assemblies not meeting the criteria of Figure 3.7.15-1 shall be stored in accordance with paragraph 4.3.1.1.e in SAR Section 4.3, Fuel Storage. The criticality considerations for the cask are the same as required for Region 1 of the spent fuel pool storage locations.

APPLICABLE SAFETY ANALYSES

Criticality of fuel assemblies in the spent fuel storage rack and casks is prevented by the design of the rack or cask, which limits fuel assembly interaction. This is done by fixing the minimum separation between assemblies and inserting neutron poison between assemblies in Region 1. Region 2 controls fuel assembly interaction by fixing the minimum separation between assemblies and by setting enrichment and burnup criterion to limit fissile materials. This is sufficient to maintain a k_{eff} of ≤ 0.95 for spent fuel of original enrichment of up to 4.10%. However, fuel assemblies to be stored in the spent fuel pool Region 2 which do not meet enrichment and burnup criterion must be stored in a checkerboard pattern to maintain a k_{eff} of 0.95 or less. In order to prevent inadvertent fuel assembly insertion into two adjacent storage locations, vacant spaces adjacent to the faces of any fuel assembly which does not meet the Region 2 burnup criteria (unrestricted) are physically blocked before any such fuel assembly is placed in Region 2 (Ref. 1). In addition, the area designated for checkerboard arrangement is divided from the normal storage in Region 2 by a row of vacant storage spaces (Ref. 2).

The spent fuel pool storage satisfies Criterion 2 of 10 CFR 50.36 (Ref. 3).

LCO

The restrictions on the placement of fuel assemblies within the fuel pool, according to Figure 3.7.15-1 or equivalent cask criticality analysis, ensure that the k_{eff} of the spent fuel pool and cask loading pit will always remain ≤ 0.95 assuming the pool to be flooded with unborated water. The restrictions are consistent with the criticality safety analysis performed for the spent fuel pool. Fuel assemblies not meeting the enrichment and burnup criteria shall be stored in accordance with Specification 4.3.1.1.

In the event a checkerboard storage configuration is deemed necessary for a portion of Region 2, vacant spaces adjacent to the faces of any fuel assembly which does not meet the Region 2 burnup criteria (non-restricted) shall be physically blocked before any such fuel assembly may be placed in Region 2. This will prevent inadvertent fuel assembly insertion into two adjacent storage locations.

APPLICABILITY

This LCO applies whenever any fuel assembly is stored in Region 2 of the spent fuel pool.

ACTIONS

A.1

Required Action A.1 is modified by a Note indicating that LCO 3.0.3 does not apply. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operation. Therefore, in either case, inability to move fuel assemblies is not sufficient reason to require a reactor shutdown.

When the configuration of fuel assemblies stored in the spent fuel pool is not in accordance with Figure 3.7.15-1, immediate action must be taken to make the necessary fuel assembly movement(s) to bring the configuration into compliance with Figure 3.7.15-1 or Specification 4.3.1.1.

SURVEILLANCE REQUIREMENTS

SR 3.7.15.1

This SR verifies by administrative means that the initial enrichment and burnup of the fuel assembly is in accordance with Figure 3.7.15-1 in the accompanying LCO or Specification 4.3.1.1. For fuel assemblies in the unacceptable range of Figure 3.7.15-1, performance of the SR will ensure compliance with Specification 4.3.1.1.

REFERENCES

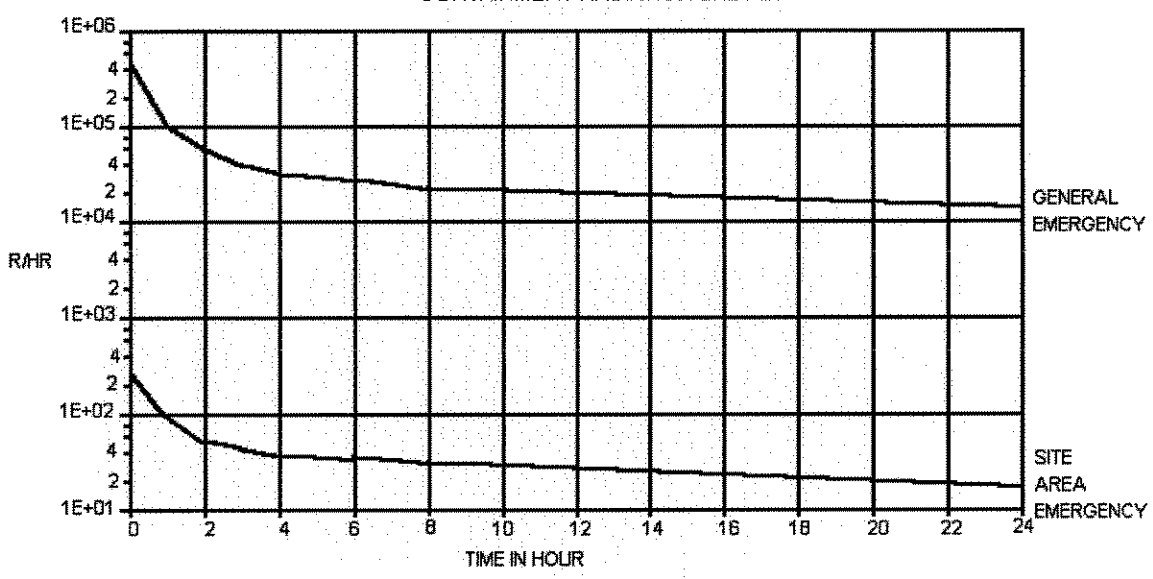
1. SAR, Section 9.6.2.

2. SER for ANO-1 License Amendment No. 76, Section 2.1 (0CNA048314), dated April 15, 1983.

3. 10 CFR 50.36.

ATTACHMENT 5
UNIT 1

CONTAINMENT RADIATION EAL PLOT



INSTRUCTIONS

CAUTION

* In the absence of a significant containment temperature transient, monitor readings should be considered valid.
* In the event of a significant containment temperature transient, monitor readings may be erratic for a short duration (Ref.IN-97-45, Supplement 1)

A. Determine the containment radiation level.

1. If the plant has been operating at 100% for the past 30 days, use the reading from RE-8060 or RE-8061.
2. If the plant has been operating at less than 100% power for the past 30 days, determine the radiaiton level as follows:

$$\text{Rad level} = \text{Reading from RE-8060 or RE-8061 X } \frac{100\%}{\text{estimated ave. power for the past 30 days}}$$

B. Determine the time after shutdown (in hours).
C. Find the intersection of the values from A and B on the graph.
D. Determine the emergency class.
   1. SITE AREA EMERGENCY - intersection is between the two curves
   2. GENERAL EMERGENCY - intersection is above the upper curve

NOTE

Upper Curve correlates to 50% Fuel Overheat with Containment Spray

Lower Curve correlates to 1% Cladding Failure with Containment Spray