U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-400

License No.: NPF-63

Report No.: 50-400/98-301

Licensee: Carolina Power and Light Company

Facility: Harris Nuclear Power Plant

Location: New Hill, NC

Dates: October 5-8, 1998

Examiners: _____
Ronald F. Aiello, Chief License Examiner

M. Ernstes, License Examiner
P. Steiner, License Examiner

Approved by: _____
Thomas A. Peebles, Chief
Operator Licensing and Human Performance Branch
Division of Reactor Safety

EXECUTIVE SUMMARY
Shearon Harris Nuclear Power Plant
NRC Examination Report No. 50-400/98-301

During the period of October 5-8, 1998, NRC examiners conducted an announced operator licensing initial examination in accordance with the guidance of Examiner Standards, NUREG-1021, Interim Revision 8. This examination implemented the operator licensing requirements of 10 CFR §55.41, §55.43, and §55.45.

Operations

- The examiners identified an inconsistency among procedure AOP-010, Revision 13, Feedwater (FW) Malfunctions, AOP-002, Revision 12, Emergency Boration and the facility approved Technical Specifications (TS) 3.1.1.1, Shutdown Margin and TS 3.1.3.6, Control Rod insertion Limits. This inconsistency is identified as an IFI (Paragraph O3).

- Five Senior Reactor Operator (SRO) candidates and two Reactor Operator (RO) candidates received written examinations and operating tests. All examinations were administered by NRC operator licensing examiners. The written examination was administered by the facility on October 2, 1998, and the operating tests were administered by the NRC October 5-8, 1998. (Section O5.1)

- Candidate Pass/Fail

	SRO	RO	Total	Percent
Pass	5	2	7	100
Fail	0	0	0	0

- The NRC noted the quality of the licensee's proposed examination was satisfactory (Paragraph O5.2).

- The majority of the Job Performance Measures (JPMs) and JPM questions complied with the guidance of NUREG-1021, Operator Licensing Examination Standards for Power Reactors, Revision 8. Minimal changes were needed to make the walkthrough examinations meet the guidelines of NUREG-1021 (Paragraph O5.2).

- The examiners concluded that the candidates' performance on the written and operating examinations was satisfactory. The candidates displayed good usage of the Annunciator Response Procedures (ARPs). Inconsistencies were noted in reactivity management during the conduct of the scenarios (Paragraph O5.4).

Report Details

Summary of Plant Status

During the period of the examinations the unit was at 100 percent power.

I. Operations

O3 Procedures

The examiners identified an inconsistency among procedures AOP-010, Revision 13, FW Malfunctions, AOP-002, Revision 12 Emergency Boration, Technical Specifications (TS) 3.1.1.1, Shutdown Margin, and TS 3.1.3.6 Control Rod insertion Limits. TS 3.1.3.6 stated, in part, that the control banks shall be limited in physical insertion as specified in the Core Operating Limits Report (COLR). Action statement 3.1.3.6 stated, in part, that with the control banks inserted beyond the insertion limit specified in the COLR, except for surveillance testing pursuant to Specification 4.1.3.1.2, restore the control banks to within the insertion limit specified in the COLR within 2 hours, or reduce thermal power within 2 hours .... or be in at least Hot Standby within 6 hours.

T.S. 3.1.1.1 stated, in part, that the Shutdown Margin (SDM) shall be greater than or equal to 1770 pcm for 3-loop operation. With the SDM less than 1770 pcm, immediately initiate and continue boration at greater than or equal to 30 gpm of a solution containing greater than or equal to 7000 ppm boron or equivalent until the required SDM is restored.

AOP-010, FW Malfunctions, contained a note that stated, a bank low-low insertion alarm may be received. Control rod insertion may continue with this alarm lit. The examiner noted that it was not clear where the rods should be when T.S. 3.1.1.1 SDM is at its minimum of 1770 pcm. AOP-002 Emergency Boration, stated several conditions that require emergency boration. One of them was control rods below the rod insertion limit during stable plant conditions. This apparent inconsistency was identified as Inspector Follow-up Item (IFI) 50-400/98-301-01, Emergency Boration Verses Rod Insertion Limits.

O5 Operator Training and Qualifications

O5.1 General Comments

NRC examiners conducted regular, announced operator licensing initial examinations during the period October 5-8, 1998. NRC examiners administered examinations developed by the licensee's training department, under the requirements of an NRC security agreement, in accordance with the guidelines of the Examiner Standards (ES), NUREG-1021, Interim Revision 8. Five Senior Reactor Operator (SRO) instant and two Reactor Operator (RO) candidates received written examinations and operating tests.

O5.2 Pre-Examination Activities

a. Scope

The NRC reviewed the licensee's examination submittal using the criteria specified for examination development contained in NUREG 1021, Interim Revision 8.

b. Observations and Findings

The licensee developed the SRO and RO written examinations, two JPM sets, and four dynamic simulator scenarios for use during this examination. All materials were submitted to the NRC on time. NRC examiners reviewed, modified, and approved the examination prior to administration. The NRC conducted an on-site preparation visit during the week of September 21, 1998, to validate examination materials and to familiarize themselves with the details required for examination administration.

(1) Written Examination Development

The written examination was submitted on time. The organization of the submitted examination with some of the reference material attached expedited the examination review process.

This was the licensee's first attempt at developing the examinations under the new NUREG 1021 Interim Rev 8 examination development program. Aside from minor editorial changes to clarify or improve the language of the questions, the number of technical errors noted were minimal. The licensee worked diligently to resolve the NRC comments. The final version of the written examination met the criteria specified in NUREG 1021, Interim Revision 8.

(2) Operating Test Development

The NRC reviewed two JPM sets and two administrative sections of the examination for the walk-through portion of the examination. The examiners found that the majority of the JPMs and JPM questions complied with the guidance of the Examiner Standards (ES). Minimal changes were needed to make the walkthrough examinations meet the guidelines of NUREG-1021.

Six of the forty JPM questions were expanded in order to give a more discriminating evaluation of the examinee's understanding of the Knowledge and Ability (K/A) statement as described in section B.6 of Appendix C of NUREG-1021. For example rather than requiring only a list of five parameters that are monitored to discern a steam break from a LOCA, an explanation of how and why the parameters varied between the two events was required to receive credit for understanding the K/A.

Three of the forty JPM questions were changed from open reference to closed reference based on the guidance found in ES-301, section D.1.l. These particular questions tested interlocks, automatic actions or setpoints.

ES-301, D.1.e states that SRO candidates will be tested in the highest on-shift position. Accordingly, the JPMs for the SROs were modified to not provide the applicable procedure name in the initiating cue in order to test the SRO candidates' ability to determine which procedures apply.

The NRC reviewed four simulator scenarios for the examination. Some changes and additions were made to the scenarios to enhance the examiners opportunity to observe the candidates perform the required competencies. Overall, the scenarios were found to be challenging and at a discriminating level of difficulty.

c. Conclusion

The NRC noted that the quality of the licensee's proposed examination was satisfactory. The portions of the examination that had low discriminatory value were modified or replaced. The final product was consistent with the guidelines of NUREG 1021, Interim Revision 8.

O5.3 Examination Administration

The written examination was administered by the facility licensee on October 2, 1998. The NRC administered the operating test during the week of October 5, 1998.

O5.4 Examination Results

a. Scope

The preliminary written results were received by the NRC on October 9, 1998. No official facility post examination comments were provided.

The examiners reviewed the results of the written examination and evaluated the candidates' compliance with and use of plant procedures during the simulator scenarios and JPMs. The guidelines of NUREG-1021, Forms ES-303-3 and ES-303-4, "Competency Grading Worksheets for Integrated Plant Operations," were used as a basis for the operating test evaluations.

Observations and Findings

The examiners reviewed the results of the written examination and found that all seven candidates passed. Overall, the candidates' performance on the written examination was satisfactory. The examiner's post-examination review of the written examination identified the following generic knowledge weaknesses.

- Four of the seven candidates (RO/SRO combined) were weak in fuel pool cooling pump and fuel pool pump room fan configuration following a sequencer actuation (RO/SRO question #45).

- Four of the seven candidates (RO/SRO combined) did not understand the T.S. bases for maintaining control rods above BANK LOW-LOW INSERTION LIMIT (RO/SRO question #61).

- Four of the seven candidates (RO/SRO combined) did not understand why the pressurizer level control band is changed to between 25% and 90% when the decision is made to cooldown when in AOP-004, Remote Shutdown (RO/SRO question #95).

Question five answer key on both the RO and SRO written examinations was amended to reflect the correct answer. The answer was changed from "B" to "D." The original justification for "B" was determined to be incorrect. The question read as follows:

While preparing to perform a reactor startup at End of Life (EOL), the Reactor Operator is reviewing the data on the Estimated Critical Conditions (ECC). He

notes that the pre-trip power level was 30% and the ECC indicates that the power defect added the correct value for power defect, except that power defect was calculated to be a negative value instead of a positive value.

How will this error affect the position of the rods when the reactor is taken critical, assuming all other parameters are correct?

A. Rods will be higher than predicted, but within 500 pcm of the ECC

B. Rods will be higher than predicted, and more than 500 pcm off the ECC

C. Rods will be lower than predicted, but within 500 pcm of the ECC

D. Rods will be lower than predicted, and more than 500 pcm off the ECC

"D" was selected to be the correct answer because the candidate must approximate that a power defect of 30% is more than 500 pcm (closer to 800 pcm), but since the sign of the power defect is incorrect the effect of this error is doubled. This will cause the ECC to be off by more than 500 pcm. Since the erroneous ECC uses a negative value for power defect, the calculation will assume that the rods must add significantly more positive reactivity. The actual critical rod position will therefore be lower than the erroneously predicted position. This re-grade did NOT affect the overall pass/fail results.

The examiners also identified weaknesses in the candidates' performance during the operations portion of the examination. The details of the weaknesses are described in each individual's examination report, Form ES-303-1, "Operator Licensing Examination Report." Copies of the evaluations have been forwarded to the Training Manager in order to enable the licensee to evaluate the weaknesses and provide appropriate remedial training for those operators as necessary. The following inconsistencies were noted:

- Different methodologies were used to calculate boron additions and dilutions. This was primarily due to a memo (which was neither correct nor in effect) that was out some time ago that stated that the power defect should be cut in half to allow for the combination of both boron and rod effects.

- One crew used the zero power curve instead of the full power curve to do the boron/dilution calculation. This caused the calculation to be off by a factor of two (over boration)

All of the candidates demonstrated good usage of the ARPs.

c. Conclusion

The examiners concluded that the candidates' performance on the written and operating examinations was satisfactory with some weaknesses. The candidates displayed good usage of the ARPs when required.

O8 Miscellaneous Operations Issues

O8.1 (Closed) Follow-up Item 50-400/97-300-01 Closed: Merits of re-initiating Safety Injection (SI) in step 13 of FR-H.1. EOP-FRP-H.1, "Response to Loss of Secondary Heat Sink," step 13 stated to "Actuate SI" (Safety Injection) prior to establishing a feed and bleed pathway. One crew re-initiated SI, while the other crew merely verified that SI had been initiated and subsequently reset. The crew that re-initiated SI delayed establishment of the feed and bleed path.

The instructions to "Actuate SI" are part of the initiation of Reactor Coolant System (RCS) feed and bleed. Even though SI may already be in service when the step is reached, the operator is expected to actuate SI. Although this may lengthen the time it takes to eventually restore secondary heat sink, actuation of the SI signal is required to place the plant in the configuration consistent with that analyzed for a loss of secondary heat sink. Actuation of SI will isolate FW. However, at this point in the procedure where SI is actuated, a clear determination has already been made that secondary heat sink has been lost. Thus, isolating FW (in itself) will have no negative consequences and the operator should focus his attention on establishing core cooling via RCS feed and bleed. This item is considered closed.

O8.2 (Closed) Follow-up Item 50-400/97-300-02, Closed: EOP-FRP-S.1, "Response to Nuclear Power Generation/ATWS," Step 6 requires local operation of the reactor trip breakers to de-energize the control rods. During a FW line break scenario, one candidate took preemptive action and immediately announced to trip the breakers over the Public Address (PA) system (but did not follow-up with direct communication). Another candidate waited until he read the procedural step which took approximately two minutes. Delaying this action allowed the steam generators to steam down to the point where they went dry. Preventing generator dryout is the basis for immediately tripping the turbine during an Anticipated Transient Without Scram (ATWS). Preemptive action was warranted, however, was not proceduralized.

The facility has added a step to the RNO column of EOP-FRP-S.1, Revision 10, step 1. Step RNO a.2 now states "Direct an operator to immediately contact or report to the main control room to receive instructions to locally trip the reactor." The facility has shown, during simulator LOR training, that crews delayed performing step 3 (Verify All AFW Pumps - RUNNING) due to taking the extra time to ensure the reactor was tripped locally prior to step 6 (Check Trip Status). Therefore, step 3, mentioned above, has been made an immediate operator action. This item is considered closed.

Management Meetings

X1. Exit Meeting Summary

At the conclusion of the site visit, the examiners met with representatives of the plant staff listed on the following page to discuss the results of the examinations and other issues.

None of the material provided to the examiners was identified by the licensee as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Licensee
*B. Clark, Plant General Manager
D. Corlett, Superintendent Operations Support
*J. Eads, Supervisor Licensing
*D. Field, Manager Nuclear Assessment
*R. Garner, Supervisor, Operations Training Unit
*M. Keef, Training Manager
*R. Moore, Operations Manager
*E. McCartney, Superintendent Work Control
*C. VanDenburgh, Manager Regulatory Affairs
*M. Wallace, Sr. Analysts Licensing

NRC

*J. Brady, Senior Resident Inspector

* Attended NRC exit

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

IFI 50-400\98-301-01	Emergency Boration Verses Rod Insertion Limits (Paragraph O3)

Closed

IFI 50-400/97-300-01	Merits of re-initiating SI in step 13 of FR-H.1.(Paragraph 08.1)
IFI 50-400/97-300-02	EOP-FRP-S.1, "Response to Nuclear Power Generation/ATWS," (Paragraph 08.2)

ENCLOSURE 2

SIMULATION FACILITY REPORT

Facility Licensee: Carolina Power and Light - Harris Nuclear Power Plant

Facility Docket No.: 50-400

Operating Tests Administered on: October 5-8, 1998

This form is to be used only to report observations. These observations do not constitute audit or inspection findings and are not, without further verification and review, indicative of noncompliance with 10 CFR 55.45(b). These observations do not affect NRC certification or approval of the simulation facility other than to provide information that may be used in future evaluations. No licensee action is required in response to these observations.

While conducting the simulator portion of the operating tests, no simulator configuration or fidelity items were observed.

Harris Master
RO-98-301

ES-401 | Site-Specific Written Examination Cover Sheet | Form ES-401-7

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

Applicant Information

Name:	Region: I / (II) / III / IV
Date:	Facility/Unit: Shearon Harris
License Level: (RO) / SRO	Reactor Type: (W) / CE / BW / GE
Start Time:	Finish Time:

Instructions

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

Applicant Certification

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

_____
Applicant's Signature

Results

Examination Value	100. Points
Applicant's Score	_____ Points
Applicant's Grade	_____ Percent

DISTRIBUTION CODE
IE42

Question: 1

The unit is operating at 95% power when rods begin to step out continuously in **AUTOMATIC** control.

Which of the following lists of reactor trips will terminate the transient if the operator fails to take **MANUAL** control of rods?

A.
- OTΔT
- OPΔT
- Pressurizer high level

B.
- OTΔT
- Pressurizer high pressure
- Pressurizer high level

C.
- OPΔT
- Pressurizer high pressure
- Pressurizer high level

D.
- OTΔT
- OPΔT
- Pressurizer high pressure

Question: 2

An entry into FRP-S.1, Response to Nuclear Power Generation/ATWS, has been made from PATH-1, Step 2. The following conditions currently exit:

- The reactor trip breakers are closed.
- Rods are being inserted manually.
- Control Bank D is at 12 steps.
- Power Ranges are all indicating 6%.
- Intermediate Range SUR is NEGATIVE

What condition(s) must be met in FRP-S.1 allow a return to PATH-1?

A. One of the reactor trip breakers must be opened.

B. Both of the reactor trip breakers must be opened.

C. Reactor power must be reduced below 5%.

D. Control Bank A must be inserted fully.

Question: 3

The plant is operating at 50% power. The PRESSURIZER LEVEL CONTROLLER SELECTOR switch is in the 459/460 position. A small leak occurs across the differential pressure (ΔP) transmitter for LT-459.

How will 1CS-231, Charging Flow Control Valve FCV-122, respond?

ASSUME NO PRZ HIGH LEVEL TRIP OR LETDOWN ISOLATION OCCURS.

A. 1CS-231 will throttle closed and then reopen to its original position

B. 1CS-231 will throttle open and then reclose to its original position

C. 1CS-231 will throttle closed and then reopen to a new position further closed than the original position

D. 1CS-231 will throttle open and then reclose to a new position further open than the original position

Question: 4

Following a large break LOCA, EPP-010, Transfer to Cold Leg Recirculation, is being implemented. One (1) CCW Pump has tripped and **CANNOT** be restarted.

The running CCW Pump is aligned to ...

A. both RHR loops and the non-essential header.

B. only its associated RHR loop and the non-essential header.

C. both RHR loops. The non-essential header is isolated.

D. only its associated RHR loop. The non-essential header is isolated.

Question: 5

While preparing to perform a reactor startup at EOL, the Reactor Operator is reviewing the data on the Estimated Critical Conditions (ECC). He notes that the pre-trip power level was 30% and the ECC indicates that the power defect added the correct value for power defect, except that power defect was calculated to be a negative value instead of a positive value.

How will this error affect the position of the rods when the reactor is taken critical, assuming all other parameters are correct?

A. Rods will be higher than predicted, but within 500 pcm of the ECC

B. Rods will be higher than predicted, and more than 500 pcm off the ECC

C. Rods will be lower than predicted, but within 500 pcm of the ECC

D. Rods will be lower than predicted, and more than 500 pcm off the ECC

Question: 6

The plant is operating at 80% power when a MFW pump trips. Rod Control and PK-444, Pressurizer Pressure Master Controller, are in MANUAL following earlier failures. Which of the following describes how the pressurizer responds if steam dumps do **NOT** function?

ASSUME NO OPERATOR RESPONSE.

A. Pressurizer pressure decreases; Pressurizer level decreases

B. Pressurizer pressure decreases; Pressurizer level increases

C. Pressurizer pressure increases; Pressurizer level increases

D. Pressurizer pressure increases; Pressurizer level decreases

Question: 7

A large break LOCA has occurred and PATH-1 is being performed.

The following have been reset:

- Safety Injection
- Phase A Isolation
- Phase B Isolation

The RWST level subsequently decreases to the Low-Low level setpoint.

Which of the following describes the response of the Containment Sump Suction Valves to the RHR Pumps and to the Containment Spray Pumps?

A. Both the RHR Containment Sump Suction Valves and the Containment Spray Containment Sump Suction Valves will automatically open

B. The RHR Containment Sump Suction Valves must be manually opened, but the Containment Spray Containment Sump Suction Valves will automatically open

C. The RHR Containment Sump Suction Valves will automatically open, but the Containment Spray Containment Sump Suction Valves must be manually opened

D. Both the RHR Containment Sump Suction Valves and the Containment Spray Containment Sump Suction Valves must be manually opened

Question: 8

The unit is operating at 50% power. PT-457, Channel III Pressurizer Pressure, has failed and all associated bistables are in the tripped condition. Power is subsequently lost to UPS Bus IDP-1A-SI.

Which train(s) of Safety Injection will actuate, if any?

A. Neither train

B. Train SA only

C. Train SB only

D. Both trains

Question: 9

The plant is at 100% power when a MFW Pump trips. Control Bank 'D' rods are at 215 steps. As rods step inward while responding to the transient, the RO notices that Control Bank 'D' rod K-6 is not inserting. Rod speed has decreased to 8 steps per minute.

Which of the following actions should be taken?

A. Allow rods to continue to insert automatically and realign rod K-6 when the transient is completed

B. Place rods in manual, insert rods to shut the steam dumps, and realign rod K-6 when the transient is completed

C. Place rods in manual to stop all rod insertion

D. Manually trip the reactor

Question: 10

The unit is operating at 20% power with all systems in automatic. Bank 'D' control rods are at 120 steps. Control Bank 'C' rod H6 drops to the bottom of the core. No rod control urgent failure alarms occur.

Where will thermal power and RCS Tavg stabilize in response to the dropped rod without any operator action?

A. Reactor thermal power will be lower than prior to the dropped rod; RCS Tavg will be more than 5°F lower than the temperature prior to the dropped rod.

B. Reactor thermal power will be lower than prior to the dropped rod; RCS Tavg will be within 1°F of the temperature prior to the dropped rod.

C. Reactor thermal power will be the same as prior to the dropped rod; RCS Tavg will be within 1°F of the temperature prior to the dropped rod.

D. Reactor thermal power will be the same as prior to the dropped rod; RCS Tavg will be more than 5°F lower than the temperature prior to the dropped rod.

Question: 11

The plant is operating at full power when 1RC-114, Pressurizer PORV 444 SB, fails open and cannot be closed or isolated.

Assume PRT initial pressure is 5 psig and containment pressure is 5 psig when pressurizer pressure reaches 1000 psig.

As the RCS blows down from operating pressure to 1000 psig, PRZ PORV tail pipe temperature will ...

A. remain constant at 310°F.

B. go from an initial temperature of 310°F to a final temperature of 230°F.

C. go from an initial temperature of 230°F to a final temperature of 310°F.

D. go from an initial temperature of 650 °F to a final temperature of 545°F.

Question: 12

A liquid waste discharge from a Waste Monitor Tank is in progress when a high radiation condition is detected in the discharge stream.

Which of the following terminates the discharge on a high radiation condition?

A. The running Waste Monitor Tank pump will automatically trip.

B. An operator must take manual action to shut the discharge isolation valve.

C. The running Waste Monitor Tank Pump recirc valve will automatically open.

D. The discharge isolation valve will automatically close.

Question: 13

Power has been stabilized at 10^{-8} amps to take critical data.

If rods are withdrawn 5 steps at this time, power will ...

A. remain at 10^{-8} amps.

B. increase and stabilize below the Point of Adding Heat.

C. increase and stabilize above the Point of Adding Heat.

D. continue increasing above the Point of Adding Heat.

Question: 14

Following a small break LOCA, the following conditions are observed:

- Core exit thermocouple temperatures are approximately 618°F and stable
- RCS hot legs temperatures are approximately 550°F
- RCS pressure is 1100 psig
- RCS cold leg temperatures are approximately 330°F

What is the status of RCS inventory and core cooling?

A. The core is covered and being cooled by natural circulation

B. The core is partially un-covered and being cooled by natural circulation

C. The core is covered and being cooled by reflux boiling

D. The core is partially un-covered and being cooled by reflux boiling

Question: 15

CCW Pump A-SA is in service. CCW Pump B-SB is in standby.

A large leak out of the CCW system has resulted in the operators tripping the reactor and the RCPs.

To prevent the CCW pumps from automatically starting ...

A. the DC control power knife switches are opened for **BOTH** CCW Pumps prior to stopping CCW Pump A-SA.

B. the DC control power knife switch is opened for **ONLY** CCW Pump B-SB prior to stopping CCW Pump A-SA.

C. the control switches for **BOTH** CCW Pump A-SA and CCW Pump B-SB are held in STOP until CCW system pressure is < 61 psig.

D. the control switch for **ONLY** CCW Pump A-SA is held in STOP until CCW system pressure is < 61 psig.

Question: 16

Several Fuel Handling Building (FHB) area radiation monitors on both trains have reached the high alarm setpoint. AOP-005 has directed the operator to verify that the FHB ventilation has shifted to the emergency exhaust lineup.

Which of the following alignments is expected?

A.
- Both FHB Emergency Exhaust Fans, E-12 and E-13, **RUNNING**
- FHB Emergency Exhaust Fan Inlets, 1FV-2 SA and 1FV-4 SB, **OPEN**
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **OPEN**

B.
- Both FHB Emergency Exhaust Fans, E-12 and E-13, **RUNNING**
- FHB Emergency Exhaust Fan Inlets, 1FV-2 SA and 1FV-4 SB, **OPEN**
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **RUNNING**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **OPEN**

C.
- Both FHB Emergency Exhaust Fans, E-12 and E-13, **RUNNING**
- FHB Emergency Exhaust Fan Inlets, 1FV-2 SA and 1FV-4 SB, **OPEN**
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **SECURED**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

D.
- Both FHB Emergency Exhaust Fans, E-12 and E-13, **RUNNING**
- FHB Emergency Exhaust Fan Inlets, 1FV-2 SA and 1FV-4 SB, **OPEN**
- All FHB Operating Floor Supply Fans, AH-56, AH-57, AH-58, and AH-59, **RUNNING**
- FHB Normal Exhaust Isolation Dampers, FL-D4, FL-D5, FL-D21 and FL-D22, **SHUT**

Question: 17

At 1315, the Reactor Operator must leave the Control Room for a short period of time. All requirements for this short term relief have been conducted and an entry has been made into OMM-002, Attachment 16, "Documentation of Short Term Assumption of Duties."

An entry must also be made in the Control Operators Log Book if the relieved operator does not resume the watch by ...

A. 1330.

B. 1345.

C. 1415.

D. 1515.

Question: 18

Power is at 36% during a power increase following a short maintenance outage. Rod K-6 in Control Bank 'D' is determined to be inoperable due to a power cabinet malfunction. The rod, determined to be at 120 steps, is not capable of being moved, but is considered to be trippable. The crew realigns the remaining rods in Control Bank 'D' with the inoperable rod.

What is the maximum power level that can be achieved under these conditions?

A. 36%

B. 50%

C. 64%

D. 75%

Question: 19

A large leak in the normal letdown line resulted in a Safety Injection actuation. The following actions have been taken:

- Letdown is isolated.
- SI has been terminated.
- Normal charging flow is being controlled to maintain pressurizer level.

The operators encounter a step in EPP-008, SI Termination, which directs them to establish letdown.

Why must the operators wait until seal return is established before establishing **EXCESS LETDOWN**?

A. Ensure adequate backpressure is available to limit excess letdown flow

B. Ensure discharges from the RCS to the PRT are limited

C. Ensure excess letdown does not back up into the RCP seals

D. Ensure adequate capacity is available in the VCT

Question: 20

PATH-2 is in progress following a SGTR on 'C' SG. Pressurizer pressure is 1950 psig.

What is the effect of placing the MAIN STEAM PRESSURE TRAIN 'A' SI & MS ISOL BLOCK and MAIN STEAM PRESSURE TRAIN 'B' SI & MS ISOL BLOCK switches in BLOCK?

A. SI and Main Steam Line Isolation are inhibited.

B. SI and Main Steam Line Isolation will occur on a high negative rate on main steam pressure.

C. SI will occur on a high negative rate on main steam pressure; Main Steam Line Isolation will occur on low main steam pressure.

D. SI due to low main steam pressure is inhibited; Main Steam Line Isolation will occur on a high negative rate on main steam pressure.

Question: 21

The crew has entered FRP-H.2, Response to Steam Generator Overpressure due to a high pressure in 'B' SG. They are directed to cooldown the Reactor Coolant System using the A and 'C' SGs.

.Cooling down the RCS to less than 545°F...

A. minimizes primary-to-secondary leakage in the event the overpressure condition is caused by a tube leak.

B. causes the 'B' SG to shrink, resulting in a reduction in SG pressure.

C. ensures that 'B' SG pressure remains below the lift setpoint for the lowest SG safety valve.

D. provides verification that AFW flow capability to the 'A' and 'C' SGs exist.

Question: 22

The plant is being maintained at 1900 psig. RCS temperature is 500°F and stable. Excess letdown and normal letdown are both in service. The following indications are noted:

- Normal letdown is 55 gpm
- Excess letdown is 12 gpm
- RCP 1A seal injection flow is 9 gpm
- RCP 1B seal injection flow is 7 gpm
- RCP 1C seal injection flow is 8 gpm
- RCP 1A seal leakoff flow is 2.5 gpm
- RCP 1B seal leakoff flow is 2.0 gpm
- RCP 1C seal leakoff flow is 2.5 gpm

In order to maintain pressurizer level constant, charging flow should be adjusted to indicate ...

A. 38 gpm.

B. 43 gpm.

C. 50 gpm.

D. 74 gpm.

Question: 23

The plant is at 56% power.

Which of the following will result in an automatic reactor trip?

A. A failed Undervoltage relay on RCP 'A'

B. A failed Underfrequency relay on RCP 'A'

C. A leak on RCS Loop 'A' Flow Detector FT-415 low pressure tap

D. A leak on RCS Loop 'A' Flow Detector FT-414 high pressure tap

Question: 24

Testing is being performed on Train SA Solid State Protection System. The output MODE SELECTOR switch is in the TEST position and the INPUT ERROR INHIBIT switch is in the INHIBIT position.

Which of the following conditions will result in a reactor trip signal?

A. A loss of 120 VAC Vital Instrument Bus IDP-1B-SII

B. Racking in and closing the Train SA Reactor Trip Bypass Breaker

C. A loss of 6.9 KV Bus 1B-SB

D. Taking the Train SA LOGIC 'A' switch out of the OFF position

Question: 25

The unit is operating at 100% power with all systems in automatic. PT-446, Turbine First Stage Pressure, has failed low.

Subsequently, a turbine load rejection to 50% power occurs before any operator action is taken in response to the PT-446 failure.

How will this affect the Steam Dump System?

A. Steam dumps will arm; but will not actuate.

B. Steam dumps will actuate and attempt to control RCS temperature at approximately 557°F.

C. Steam dumps will actuate and attempt to control RCS temperature at approximately 569°F.

D. Steam dumps will have a demand signal, but will not actuate.

Question: 26

An Auxiliary Operator must perform a plant evolution following an accident. Dose rates in the area are determined to be 250 mRem/hour. His total exposure for the year prior to this evolution is 1.75 Rem TEDE.

How long can he work in this area without exceeding his CP&L Annual Administrative Dose Limit without receiving any extensions?

A. 1 hour

B. 5 hours

C. 9 hours

D. 13 hours

Question: 27

Following a large break LOCA, the crew has completed the transfer to Cold Leg Recirculation. Only one (1) CSIP is operating.

When re-aligning for **Hot Leg** Recirculation, the operating CSIP is aligned to inject through ...

A. SI-1, 2, 3, and 4, BIT Inlet and Outlet Valves.

B. SI-86, High Head SI to Hot Leg, only.

C. SI-107, Alternate High Head SI to Hot Leg, only.

D. both SI-86, High Head SI to Hot Leg, and SI-107, Alternate High Head SI to Hot Leg.

Question: 28

The following conditions exist:

- The plant is in Mode 6.
- Fuel handling operations are in progress.
- There is a spent fuel assembly lying on transfer cart in the Containment, ready to send to the FHB.
- SG 'A' has a secondary manway open and SG maintenance is in progress.

An AO reports that a blank flange is missing from a safety valve on SG 'A'.

Which of the following actions is required as a result of these conditions?

A. Immediately terminate all movement of irradiated fuel or core alterations.

B. Immediately reinsert the fuel assembly in its designated core location.

C. Replace the missing blank flange within the next 4 hours.

D. Immediately terminate all work in Containment until the flange is replaced.

Question: 29

A safety injection has occurred due to a faulted SG. The operators have completed the actions of EPP-14, Faulted Steam Generator Isolation, and have transitioned to PATH-1, Entry Point C.

The following conditions currently exist:

- Containment pressure is 7 psig and slowly dropping
- Total AFW flow to the intact SGs is 235 KPPH
- 'A' SG level is 26%
- 'C' SG level is 33%
- Primary pressure on SPDS is 1725 psig and rapidly increasing
- All pressurizer level channels indicate 39%
- Core Exit T/Cs on SPDS are 520°F and stable

SI **CANNOT** be terminated under these conditions because ...

A. subcooling is not sufficient.

B. secondary heat sink is not sufficient.

C. RCS pressure is not sufficient.

D. RCS inventory is not sufficient.

Question: 30

Reactor power is 30% when Reactor Coolant Pump 'C' is stopped.

Once the plant stabilizes, what will the RCS Loop ΔTs be indicating?

A. All RCS Loop ΔTs will indicate 30%

B. RCS Loop 'A' and 'B' ΔTs will indicate 30%; RCS Loop 'C' ΔT will indicate 0%

C. RCS Loop 'A' and 'B' ΔTs will indicate 45%; RCS Loop 'C' ΔT will indicate 0%

D. RCS Loop 'A' and 'B' ΔTs will indicate 60%; RCS Loop 'C' ΔT will indicate 0%

Question: 31

The plant is solid in Mode 5 with one (1) RCP in operation. RHR Pump A-SA is providing letdown flow with PK-145.1, LTDN PRESSURE 1CS-38, in MAN. CSIP A-SA is providing RCS makeup and seal injection.

If instrument air is lost to 1CS-38 (PCV-145), the operator should ...

A. trip CSIP A-SA.

B. trip RHR Pump A-SA.

C. control letdown flow using HC-142.1, RHR Letdown 1CS-28.

D. close RHR Letdown 1CS-28 (HCV-142).

Question: 32

Power is 43%. 120VAC Vital Bus IDP-1B-SII becomes deenergized.

Outward rod motion is inhibited by ...

A. C-1,Intermediate Range rod stop.

B. C-2, Power Range rod stop.

C. C-3, OTΔT rod stop.

D. C-4, OPΔT rod stop.

Question: 33

The unit is operating at 630 MWe net with PS-1006, Turbine Impulse Pressure Switch, failed low. Subsequently, Main Feedwater Pump 'A' trips.

How will the Main Turbine respond to these conditions?

A. The turbine will not runback

B. The turbine will runback to approximately 540 Mwe net

C. The turbine will runback to approximately 475 Mwe net

D. The turbine will runback until load is 0 Mwe net

Question: 34

A plant shutdown occurred 80 days ago. The plant is being operated at Mid Loop with fuel in the vessel when a complete loss of RHR occurs. RCS temperature is 100°F.

How much time is available to provide an alternate means of decay heat removal before core uncovery will occur?

A. 60 minutes

B. 92 minutes

C. 310 minutes

D. 850 minutes

Question: 35

A LOCA outside containment has resulted in unsafe radiological conditions in the RAB. The crew has taken all the actions of EPP-013, LOCA Outside Containment, to isolate the break.

Which of the following is the primary indication used in EPP-013 that the actions taken have been successful?

A. RAB temperatures decreasing

B. RAB sump level alarms clearing

C. RHR penetrations and PASS sampling isolated

D. RCS pressure increasing

Question: 36

The standby Condenser Vacuum Pump will automatically start if ...

A. the running Condenser Vacuum Pump trips on low lube oil pressure.

B. Condenser vacuum decreases to ≤ 5.0"Hg with the turbine below 60% load.

C. Condenser vacuum decreases to ≤ 7.5"Hg with the turbine above 60% load.

D. the running Condenser Vacuum Pump trips on high discharge temperature.

Question: 37

EPP-012, Loss of Emergency Coolant Recirculation, has been entered following a small break LOCA. The crew is beginning a depressurization of the RCS using a Pressurizer PORV.

The crew is directed to depressurize the RCS to maintain subcooling margin between 10°F and 20°F to ...

A. maximize CSIP injection flow prior to RWST depletion.

B. inject the SI Accumulators.

C. allow the CSIPs to inject while taking a suction off the VCT.

D. minimize RCS break flow.

Question: 38

During SSPS slave relay testing on Train SB, an inadvertant Phase A signal is generated.

Which of the following conditions should be expected?

A. Normal charging is isolated

B. Seal injection flow is isolated

C. Letdown is isolated

D. CSIP suction is aligned to the RWST

Question: 39

If a Containment Ventilation Isolation (CVI) signal occurred, which of the following Containment Ventilation fans would **NOT** trip directly from the CVI signal, but would trip as a result of being interlocked with other fans?

A. Normal Purge Supply fans (AH-82 A & B)

B. Airborne Radioactivity Removal fans (S-1A & B)

C. Pre-Entry Purge Makeup fans (AH-81 A & B)

D. CNMT Pre-entry Purge Exhaust fans (E-5 A & B)

Question: 40

FRP-S.1, Response to Nuclear Power Generation/ATWS, provides instructions to respond to an ATWS condition and to all of the following events **EXCEPT** a(n) ...

A. steam generator tube rupture.

B. faulted steam generator.

C. inadvertant dilution.

D. operator controlled cooldown.

Question: 41

Which of the following actions would be **INAPPROPRIATE** to perform prior to direction in an EOP?

A. Isolating AFW flow to a single faulted SG.

B. Throttling AFW flow to control a ruptured SG level within the required level band.

C. Securing a CSIP to prevent overfilling the pressurizer following an inadvertant SI.

D. Shutting the MSIVs to isolate a steamline break which has not resulted in an SI.

Question: 42

The crew is terminating Safety Injection per EPP-008, SI Termination. The following conditions exist:

- CSIP A-SA is secured.
- BIT Outlet valves 1SI-3 and 1SI-4 are shut.
- Pressurizer level is 10% and decreasing.
- Pressurizer pressure is 1800 psig and decreasing.
- RCS temperature is stable.
- Charging flow is 150 gpm.
- Letdown has not been established.

The crew should ...

A. actuate SI and transition to PATH-1, Entry Point C.

B. re-establish BIT flow and transition to PATH-1, Entry Point C.

C. actuate SI and transition to EPP-009, Post LOCA Cooldown and Depressurization.

D. restart CSIP A-SA and continue in EPP-008.

Question: 43

Which of the following VCT level transmitter failures could possibly result in a loss of CSIP suction source, assuming **NO** operator intervention?

A. LT-112 failed high

B. LT-112 failed low

C. LT-115 failed high

D. LT-115 failed low

Question: 44

Containment average temperature is 124°F and increasing slowly.

What is the **MAXIMUM** total number of Containment Fan Cooler Units (AH-1/2/3/4) that are permitted to be operating in **HIGH** speed?

A. 2

B. 4

C. 6

D. 8

Question: 45

Following a sequencer actuation, what is the expected configuration of the Fuel Pool Cooling Pumps and Fuel Pool Pump Room Fans (AH-17-1-4A-SA, AH-17-1-4B SB), assuming no operator actions have been taken?

A. Pumps **RUNNING**; Fans **RUNNING**

B. Pumps **RUNNING**; Fans **SECURED**

C. Pumps **SECURED**; Fans **RUNNING**

D. Pumps **SECURED**; Fans **SECURED**

Question: 46

During the performance of the EOPs, the SCO directs you to check "SG PRESSURES STABLE OR INCREASING."

Under which of the following conditions should SG pressure be considered to be stable or increasing?

A. All SG pressures decreasing from 900 to 600 due to the max rate cooldown during a-SGTR recovery.

B. All SG pressures decreasing from 900 to 800 psig due to a leaking safety on SG_A with all MSIVs open.

C. SG A pressure decreasing from 900 to 700 psig due to a leaking safety valve with all MSIVs shut.

D. SG A pressure decreasing from 600 to 500 psig following SI termination, with the cause unknown.

Question: 47

Reactor power is being increased and is at 47% when ALB-008-4-3, RCP 'B' SEAL #1 LEAKOFF HIGH/LOW FLOW, annunciates.

All indications for 'A' and 'C' RCPs are determined to be normal.

Given the following conditions for 'B' RCP:

- #1 seal leakoff flow has stabilized at 7.0 gpm.
- Vibration levels are 6 mils shaft and 2.0 mils frame.
- Upper radial bearing temperature is 172°F and stable.
- Lower radial bearing temperature is 176°F and stable.
- Thrust bearing temperature is 168°F and stable.
- Seal inlet water temperature is 160°F and increasing slowly.
- Pump bearing water temperature is 158°F and increasing slowly.
- Motor winding temperatures are 210°F and stable.

Which of the following actions should be taken?

A. Trip the reactor and trip 'B' RCP within 5 minutes

B. Trip 'B' RCP within 5 minutes and perform a plant shutdown

C. Trip 'B' RCP within 8 hours

D. Continue operating 'B' RCP

Question: 48

Following a Safety Injection actuation, the RO is directed to verify the Emergency Service Water (ESW) system is in the correct alignment.

Operator action is required if ...

A. 1SW-179, Header A to CVCS Chillers, and 1SW-206, SW from CVCS Chillers to Header A, are **OPEN**.

B. 1SW-1055, SW from WC-2 A SA Condenser, is **OPEN**.

C. ESW Screen Wash Pump 1A-SA is **RUNNING**.

D. 1SW-116, AH-2 & 3 SW Return Orifice Bypass Isolation Valve, is **SHUT**.

Question: 49

During a plant cooldown and depressurization, a decision is made to maintain RCS pressure stable at 2000 psig using the Pressurizer Pressure Master Controller, PK-444A.

The automatic setpoint required to maintain this pressure is ...

A. 17.5%.

B. 37.5%.

C. 62.5%.

D. 80%.

Question: 50

Following a steam break inside containment, the crew is taking actions to regain control of plant equipment. Containment pressure is at 2.5 psig. The following are reset in accordance with EOP-PATH-1:

- Safety Injection
- Phase A
- Phase B
- Containment Spray

Several minutes after securing Containment Spray, containment pressure increases to 11 psig.

Which of the following describes the expected final configuration of the Containment Spray System, assuming no operator intervention?

A. Both pumps running, with discharge valves open

B. Both pumps running, with discharge valves closed

C. Neither pump running, with discharge valves open

D. Neither pump running, with discharge valves closed

Question: 51

During refueling operations, the official fuel assembly status board is required to be maintained in the ...

A. Fuel Handling Building.

B. Containment.

C. Control Room.

D. Work Coordination Center.

Question: 52

What is an advantage and a disadvantage of the Steam Dump method of Post-SGTR Cooldown compared to the other methods provided by the EOPs?

A. Fastest method of depressurization, but has the largest reactivity risks.

B. Fastest method of depressurization, but has the largest radiological risks.

C. Limits spread of contamination, but is limited by storage and processing capabilities.

D. Limits spread of contamination, but has the largest reactivity risks.

Question: 53

A reactor trip occurred due to a loss of offsite power. The plant is being cooled down on RHR per EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS.

- RCS cold leg temperatures are 190°F.
- Steam generator pressures are 50 psig.
- RVLIS upper range indicates greater than 100%.
- Three CRDM fans have been running during the entire cooldown.

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

A. boron concentration is equalized throughout the RCS.

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

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

D. RCS temperatures do not increase during the required 29 hour vessel soak period.

Question: 54

The compensating voltage on Intermediate Range (IR) channel N-35 is set too low, resulting in N-35 stabilizing at 2×10^{-10} amps during a reactor shutdown.

When IR channel N-36 drops below 5×10^{-11} amps ...

A. both SR NIs will automatically energize.

B. only SR channel N-31 will automatically energize.

C. only SR channel N-32 will automatically energize.

D. neither SR NI will automatically energize.

Question: 55

The plant has experienced a Safety Injection due to improper work in the PIC cabinets. Conditions in the PIC cabinets have been restored to normal.

What action(s), if any, is(are) required to allow another automatic Safety Injection to occur?

A. No additional action is required

B. Reset SI **ONLY**

C. Reset SI **AND** close the Reactor Trip Breakers

D. Close the Reactor Trip Breakers **ONLY**

Question: 56

The plant was at 100% power when a loss of offsite power occurred. All equipment operated as designed following the power loss.

The crew is checking the status of the S-2 (Primary Shield Cooling Fans) and the S-4 (Reactor Support Cooling Fans).

Which of these sets of fans should be running, if any?

A. Neither

B. S-2 only

C. S-4 only

D. Both

Question: 57

The following conditions exist:

- The plant is operating at 50% power.
- STM GEN 'A' FW FLOW CONTROL & RECORDER SELECTOR is in the CHAN 477 (Channel III) position
- STM GEN 'A' STM FLOW CONTROL & RECORDER SELECTOR is in the CHAN 474 (Channel III) position
- SG 'A' level begins to increase.
- SG levels 'B' and 'C' are stable at approximately 66%.

Which of the following is the most likely cause of the level increase in SG 'A'?

A. LT-476 CHAN III 'A' LEVEL has failed high

B. PT-475 'A' SG CHAN III STM PRESSURE has failed high

C. FT-474 'A' SG CHAN III STM FLOW has failed low

D. FT-477 'A' SG CHAN III FW FLOW has failed high

Question: 58

The following conditions exist:

- A reactor trip has occurred.
- Rod J3 (Shutdown Bank 'A') indicates fully withdrawn.
- Rod N7 (Shutdown Bank 'A') indicates fully withdrawn.
- Rod B8 (Control Bank 'D') indicates 6 steps.
- RCS boron concentration is 1200 ppm.

The operator should Emergency Borate until RCS boron concentration is at least ...

A. 1490 ppm.

B. 1780 ppm.

C. 2070 ppm.

D. 2300 ppm.

Question: 59

Following a loss of offsite power, SG 'B' was diagnosed with a SGTR.

Power was subsequently restored and the crew is performing EPP-017, Post-SGTR Cooldown Using Backfill. The crew is getting ready to start a RCP. RCS temperature is 400°F

Which pump should be the first RCP started, and why?

A. RCP 'B' to allow for optimal RCS pressure control

B. RCP 'B' to increase the rate of SG backfill

C. RCP 'A' to prevent an inadvertant criticality

D. RCP 'A' to prevent pressurized thermal shock of the reactor vessel

Question: 60

A loss of all AC power has occurred. EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses, has directed the crew to depressurize all SGs to 190 psig.

Which SG PORV(s) can be controlled from the Control Room?

A. SG 'A' PORV only

B. SG 'B' PORV only

C. SG 'C' PORV only

D. SG 'B' and SG 'C' PORVs

Question: 61

While operating at 100% at EOL, a control rod system malfunction results in rods inserting in **AUTO**. Annunciator ALB-013-8-3, BANK LOW-LOW INSERTION LIMIT, alarms and the operator immediately places rod in **MANUAL**, stopping all inward rod motion.

If rods are maintained below the rod insertion limit, which of the following Technical Specification limits may be violated?

A. Enthalpy Rise Hot Channel Factor

B. Departure from Nucleate Boiling Parameters

C. Quadrant Power Tilt Ratio

D. Minimum Temperature for Criticality

Question: 62

A HI-2 Containment Pressure signal has been generated.

Which of the following lists **ALL** valves which are closed as a direct result of this signal?

A.
- Main Steam Isolation Valves

B.
- Main Steam Isolation Valves
- Main Steam Isolation Valve Bypass Valves

C.
- Main Steam Isolation Valves
- Main Steam Isolation Valve Bypass Valves
- Main Steam Isolation Drain Isolations Before MSIVs

D.
- Main Steam Isolation Valves
- Main Steam Isolation Valve Bypass Valves
- Main Steam Isolation Drain Isolations Before MSIVs
- Main Steam Aux Feedwater Turbine Header Drain Isolation valves

Question: 63

The plant is at 100% power. 1A-SA CCW Pump is in operation. A large leak has occurred in RCP 'C' thermal barrier heat exchanger.

Which of the following actions will automatically occur?

A. 1CC-252, RCP Thermal Barrier Flow Control, will **CLOSE**

B. 1CC-208, CCW To RCPs, will **CLOSE**

C. 1B-SB CCW Pump will **AUTO START**

D. 1CC-305, CCW To Gross Failed Fuel Detector, will **CLOSE**

Question: 64

EPP-001, Loss of AC Power to 1A-SA and 1B-SB Buses, is being implemented. The crew is directed to depressurize the SGs at maximum rate.

This depressurization is performed to ...

A. cooldown the RCS as far as possible before SG inventory is depleted.

B. minimize the RCS inventory loss in the event of a subsequent RCP seal failure.

C. lower RCS pressure to prevent RCP seal degradation.

D. inject the accumulators to raise RCS boron concentration.

Question: 65

The crew is implementing FRP-H.1, Response to Loss of Secondary Heat Sink.

Reactor Coolant Pumps are tripped prior to initiating bleed and feed to ...

A. minimize the likelihood of distractions preventing RCP trip when CCW isolates to the RCPs.

B. limit the heat input into the RCS.

C. prevent pumping a two-phase mixture out the open Pzr PORVs.

D. lower RCS pressure to reduce flow out the open Pzr PORVs.

Question: 66

Indicated power on each of the Power Range NIs is as follows:

- N-41 indicates 96%
- N-42 indicates 96.5%
- N-43 indicates 97%
- N-44 indicates 98%

Actual reactor power, as calculated by performing OST-1004, Power Range Heat Balance, is 98.6%.

The gain must be adjusted on Power Range NI channel(s) ...

A. N-41 only.

B. N-41 and N-42 only.

C. N-41, N-42, and N-43 only.

D. N-41, N-42, N-43, and N-44.

Question: 67

Following a loss of all AC power, how long are the safety-related 125 VDC batteries designed to allow equipment operation?

A. 1 hour

B. 1.5 hours

C. 2 hours

D. 4 hours

Question: 68

A large break LOCA has occurred and RCS pressure is approximately 30 psig. The STA reports that a RED path condition exists on HEAT SINK following implementation of the CSFSTs. A transition is made to FRP-H.1, Response to Loss of Secondary Heat Sink.

Upon entering FRP-H.1 the following conditions exist:

- 'A' SG level is 5% WR.
- 'B' SG level is 10% WR.
- 'C' SG level is 5% WR.
- All MFW Pumps and AFW Pumps have tripped.
- All SG pressures are 200 psig and slowly decreasing.

Why would the crew be directed to transition to PATH-1, Entry Point C, as soon as the above conditions are verified?

A. Feed and bleed is ineffective in removing heat at this RCS pressure.

B. FRP-H.1 only has directions to restore feedwater flow if the reason for the lost of feed is related to an electrical loss.

C. The SGs are "hot and dry" and feedwater should not be established to them.

D. Establishing a secondary heat sink would not provide any additional heat removal from the RCS.

Question: 69

What initial power level would result in the **LOWEST** RCS pressure following a SG safety valve failing open, and why?

A. 0% power, due to the greater inventory in the SG

B. 0% power, due to the larger amount of stored energy in the RCS

C. 100% power, due to the greater inventory in the SG

D. 100% power, due to the larger amount of stored energy in the RCS

Question: 70

Following a LOCA, the following containment conditions are noted:

- Containment pressure increases to 4.2 psig and decreases back down to 0.5 psig.
- Containment radiation level increases to $4x10^{3}$ R/hr and decreases back down to $3x10^{-1}$ R/hr.
- Integrated containment radiation exposure has not yet been determined.

While checking the condition of the CORE COOLING Critical Safety Function Status Tree, RCS Subcooling is required to be **greater than 10°F [42°F] - C or greater than 20°F [50°F] – M.**

The STA is calculating subcooling because ERFIS is **NOT** available.

How much subcooling is required to satisfy the CORE COOLING tree?

A. 10°F

B. 20°F

C. 42°F

D. 50°F

Question: 71

During an accident, the Shift Technical Advisor reports that some Incore Thermocouples are "offscale high."

What is the **MAXIMUM** temperature indication for the Incore Thermocouples?

A. 1200°F

B. 2200°F

C. 2500°F

D. 3000°F

Question: 72

The following series of procedure transitions are made:

- A transition is made from PATH-1, Step 38, to PATH-2, Entry Point J
- While performing PATH-2, Step 16, a transition to EPP-020, SGTR with Loss of Reactor Coolant: Subcooled Recovery, is made.
- During the implementation of EPP-020, Step 4, a MAGENTA path for CONTAINMENT is identified and a transition is made to FRP-J.1, Response to High Containment Pressure.

The last step in FRP-J.1 states, "Return to Procedure and Step in Effect."

The crew should transition to ...

A. PATH-1, Step 38.

B. PATH-2, Entry Point J.

C. PATH-2, Step 16

D. EPP-020, Step 4.

Question: 73

The load dispatcher has notified the plant that several transmission lines are down and grid voltage has become unstable.

The following conditions exist:

- CSIP 1A-SA is in operation.
- The Main Generator is **NOT** supplying plant loads.

What actions should be taken regarding the Emergency Diesel Generators?

A. Parallel both EDGs with offsite power and maintain them paralleled.

B. Parallel EDG 1A-SA with offsite power and maintain it paralleled. Maintain EDG 1B-SB in standby.

C. Open EMERGENCY BUS A-SA TO AUX BUS D TIE BREAKER 105 SA and verify EDG 1A-SA starts and energizes 6.9 KV Bus 1A-SA. Maintain EDG 1B-SB in standby.

D. Open EMERGENCY BUS B-SB TO AUX BUS E TIE BREAKER 125 SB and verify EDG 1B-SB starts and energizes 6.9 KV Bus 1B-SB. Then perform the same actions for EMERGENCY BUS A-SA TO AUX BUS D TIE BREAKER 105 SA and EDG 1A-SA.

Question: 74

Which of the following identifies **BOTH** reasons why SI Termination criteria is less restrictive in FRP-P.1, Response to Imminent Pressurized Thermal Shock, than in other procedures?

A.
- To allow subsequent depressurization of the RCS
- To minimize the energy addition to containment

B.
- To reduce the rate of RWST depletion
- To limit the cooldown rate of the RCS

C.
- To limit the cooldown rate of the RCS
- To allow subsequent depressurization of the RCS

D.
- To minimize the energy addition to containment
- To reduce the rate of RWST depletion

Question: 75

A safety injection has just occurred.

How is the operation of the Containment Fan Cooler Unit fans affected?

A. The lead fan in each unit starts in **SLOW** speed and the other fan remains **OFF**.

B. The lead fan in each unit starts in **FAST** speed and the other fan remains **OFF**.

C. Both fans in each unit start in **SLOW** speed.

D. Both fans in each unit start in **FAST** speed.

Question: 76

While operating at 20% power with MFW Pump 'A' in operation, an event results in the MDAFW Pump 'A' and the TDAFW Pump starting automatically. MDAFW Pump 'B' does **NOT** get a start signal.

Which of the following would result in this condition?

A. Low-low level in SG 'A'

B. Trip of MFW Pump 'A'

C. AMSAC actuation

D. Undervoltage on 6.9 KV Bus 1A-SA

Question: 77

Which of the following ventilation systems will **BOTH** respond to a high radiation level on an airborne radiation monitor?

A.
- Operations Support Center
- Technical Support Center

B.
- Joint Information Center
- Emergency Operations Facility

C.
- Operations Support Center
- Joint Information Center

D.
- Technical Support Center
- Emergency Operations Facility

Question: 78

All of the following are symptoms of a partial loss of condenser vacuum **EXCEPT** ...

A. decreasing Condensate Pump discharge temperature.

B. increasing Turbine Exhaust Hood temperature.

C. increasing Turbine vibration.

D. abnormal Gland Seal Steam pressure.

Question: 79

While operating at 90% power, 'B' Main Feed Pump trips. The operators start all AFW pumps, isolate SG blowdown, and begin inserting control rods in MANUAL.

If alarm ALB-013-8-3, BANK LOW-LOW INSERTION LIMIT, is received, the RO should ...

A. stop inserting rods.

B. stop inserting rods and immediately initiate emergency boration.

C. continue inserting rods until the steam dumps close.

D. continue inserting rods until the steam dumps close and immediately initiate emergency boration.

Question: 80

Which of the following would require an Independent Verification instead of Concurrent Verification?

A. Installing a jumper in SSPS

B. Positioning a throttle valve four (4) turns open

C. Positioning a valve full open and locking it

D. Removing fuses from an NIS drawer

Question: 81

On a Safety Injection signal, the Emergency Service Water (ESW) System is designed to isolate from the Normal Service Water (NSW) System.

How is this isolation established in the event of a single train loss of power?

A. Check valves on the return line to NSW will close due to the difference in pressure between ESW and NSW

B. Air-operated valves on the return line to NSW fail closed on a loss of power

C. Motor-operated individual header return valves to NSW are powered from one train and the common return header valve to NSW is powered from the other train

D. Manual isolation valves on the return line to NSW must be locally closed

Question: 82

While attempting to start Emergency Diesel Generator A-SA from the control room, the engine speed only reaches 390 RPM and then slowly starts decreasing.

Why must the DIESEL GENERATOR A-SA control switch be placed in **STOP** following this unsuccessful start attempt?

A. Prevent a possible fire in the Generator Control Panel

B. Restore the Diesel Generator to automatic start status

C. Reset the diesel engine governor to prevent an overspeed trip on the next attempted start

D. Allow the starting air compressors to restore pressure in the starting air receivers

Question: 83

The plant is operating at 100% power.

A loss of both Heater Drain Pumps causes a turbine runback to ...

A. ensure sufficient feedwater capability to maintain SG levels.

B. avoid reaching an OTΔT or OPΔT trip or runback setpoint.

C. minimize extraction steam flow to #4 Feedwater Heaters.

D. prevent reaching runout flow conditions on the Condensate Pumps.

Question: 84

Which of the following types of changes **CANNOT** be performed under an Administrative Correction to a procedure?

A. A correction made to the List of Effective Pages and Table of Contents

B. A correction to the title of an organizational position when there is no change in authority, responsibility, or reporting relationships

C. A correction to a typographical error indicating an incorrect setpoint or acceptance criteria

D. A correction to a note or caution that is a result of changes to AP-100, Procedure Use and Adherence

Question: 85

The plant is in Mode 3. Alarm window ALB-30 (7-1), FIRE DETECTION SYSTEM TROUBLE, annunciates. To determine the location of the trouble alarm, reference ...

A. Local Fire Detection Control Panel – 1.

B. the Fire Detection Computer.

C. FPP-002, Fire Emergency.

D. FPP-012, Fire Pre-Plans.

Question: 86

Power is currently at 32% during a plant startup. Instrument Bus IDP-1B-SIV deenergized as a result of a fault in PIC CAB-4. PIC CAB-4 has been isolated from Instrument Bus SIV and will be deenergized for approximately eight (8) hours while repairs are being made.

Which of the following actions must be taken?

A. Place all PIC CAB-4 Reactor Trip instruments in the tripped condition

B. Place all PIC CAB-4 ESF instruments in the tripped condition

C. Place all MFW Regulating Valves in MANUAL

D. Perform a plant shutdown per Technical Specification 3.0.3

Question: 87

The unit is operating at 28% power with two (2) Condensate Pumps, 'A' Condensate Booster Pump, and 'A' Main Feedwater Pump in operation. The 'A' Condensate pump trips.

How does this affect the status of the Condensate Booster Pumps and the Main Feedwater Pumps?

A. The 'A' Condensate Booster Pump and the 'A' Main Feedwater Pump will continue to operate.

B. The 'A' Condensate Booster Pump will continue to operate. The 'A' Main Feedwater Pump will trip and the 'B' Main Feedwater Pump will autostart.

C. The 'A' Condensate Booster Pump will trip and the 'B' Condensate Booster Pump will autostart. The 'A' Main Feedwater Pump will continue to operate.

D. The 'A' Condensate Booster Pump and the 'A' Main Feedwater Pump will trip. The 'B' Condensate Booster Pump and the 'B' Main Feedwater Pump will autostart.

Question: 88

An Operations Reliability Test (ORT) is performed ...

A. to satisfy surveillance requirements of Technical Specifications.

B. to comply with commitments identified in the FSAR.

C. to comply with commitments identified in ANSI standards.

D. to demonstrate proper performance of equipment as a good operating practice.

Question: 89

SSPS testing is being performed on a Phase B slave relay.

If the output relay is not properly blocked during the testing, which of the following components is most likely to be affected?

A. Containment Spray Pump

B. Charging/SI Pump

C. Reactor Coolant Pump

D. Containment Fan Cooler Unit

Question: 90

A Safety Injection has just occurred.

Which of the following subsystems of the Liquid Waste Processing System (LWPS) is affected?

A. Reactor Auxiliary Building Equipment Drains

B. Containment Building Equipment Drains

C. Waste Processing Building Equipment Drains

D. Fuel Handling Building Equipment Drains

Question: 91

The unit is being operated in Mode 2 with SG levels being maintained using the Motor-Driven Auxiliary Feedwater Pumps with all Flow Control Valves throttled in mid-position. The Turbine Driven Auxiliary Feedwater Pump is in standby with all Flow Control Valves full open. All AFW Isolation Valves are open.

How will the AFW System respond to an AFW Isolation Signal on 'B' SG?

A.
- The MDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The TDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The MDAFW Flow Control Valve for 'B' SG will **REMAIN OPEN.**
- The TDAFW Flow Control Valve for 'B' SG will **REMAIN OPEN.**

B.
- The MDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The TDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The MDAFW Flow Control Valve for 'B' SG will **CLOSE.**
- The TDAFW Flow Control Valve for 'B' SG will **REMAIN OPEN.**

C.
- The MDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The TDAFW Isolation Valve for 'B' SG will **REMAIN OPEN.**
- The MDAFW Flow Control Valve for 'B' SG will **CLOSE.**
- The TDAFW Flow Control Valve for 'B' SG will **REMAIN OPEN.**

D.
- The MDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The TDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The MDAFW Flow Control Valve for 'B' SG will **CLOSE.**
- The TDAFW Flow Control Valve for 'B' SG will **CLOSE.**

Question: 92

When completing an electrical lineup checklist, a breaker which is supposed to be CLOSED has a clearance on it requiring it to be OPEN.

How is this discrepancy documented in accordance with plant procedures?

A. Enter the actual position of the breaker in the INITIALS space and circle it

B. Leave the INITIALS space blank and make a note in the COMMENTS section

C. Enter the clearance number in the INITIALS space

D. Initial that the breaker has been checked in the INITIALS space and make a note in the COMMENTS section

Question: 93

Which of the following describes the start sequence of the Fire Pumps?

A. The Motor Driven Fire Pump will only start after a 30 second time delay if the Diesel Driven Fire Pump has received a start signal and is not maintaining ≥ 100 psig.

B. The Motor Driven Fire Pump will start at ≤ 93 psig and the Diesel Driven Fire Pump will start at ≤ 83 psig.

C. The Diesel Driven Fire Pump will start at ≤ 93 psig and the Motor Driven Fire Pump will start at ≤ 83 psig.

D. The Diesel Driven Fire Pump will only start after a 30 second time delay if the Motor Driven Fire Pump has received a start signal and is not maintaining ≥ 100 psig.

Question: 94

The unit is operating at 100% power.

If 125 VDC Bus 1A-SA deenergizes due to a fault on the bus ...

A. the reactor will trip due to an undervoltage (UV) trip of Train SA reactor trip breaker.

B. the reactor will trip due to a shunt trip of Train SA reactor trip breaker.

C. Train SA reactor trip breaker will **NOT** be capable of opening due to an undervoltage trip.

D. Train SA reactor trip breaker will **NOT** be capable of opening due to a shunt trip.

Question: 95

AOP-004, Remote Shutdown, requires that pressurizer level be controlled between 25% and 51% while maintaining the plant stable at normal operating temperature.

Why is the pressurizer level control band changed to between 25% and 90% when the decision is made to cooldown?

A. Ensures pressurizer level will remain above the heaters if an RCP is started and a bubble exists in the vessel head

B. Allows for cooldown rates approaching 100°F/hour without uncovering the pressurizer heaters

C. Allows for more charging flow to achieve required RCS boron concentration

D. Ensures a greater amount of flexibility in cooldown rate due to less operator control of AFW flow and steaming rate

Question: 96

The unit has been operating at 100% power for the past 60 days. A power reduction to 2% has just been completed to allow personnel to enter the containment to perform an inspection inside the Biowall. Two (2) teams of personnel will be making the entry and will be physically located in different areas.

What are the requirements for HP coverage during this entry?

A. Each team must have an HP escort.

B. One HP escort will enter with the teams and provide monitoring as required.

C. No HP escort is required and each team member is responsible for radiological monitoring.

D. No HP escort is required and each team leader is responsible for radiological monitoring.

Question: 97

A waste gas release is in progress when the WPB Stack 5 PIG radiation monitor, REM-1WV-3546, exceeds the high alarm setpoint.

How will the release be terminated?

A. Waste Gas Decay Tanks E & F to Plant Vent, 3WG-229, **CLOSES**

B. Running Waste Gas Compressor **TRIPS**

C. Filtered Exhaust Fans, E-46, E-47, E-48, and E-49 **TRIP**

D. Gas Decay Tanks to Plant Vent Isolation Valve, 3WG-230, **CLOSES**

Question: . 98

During the implementation of the ERGs, when can a Reactor Coolant Pump be started without having all of its associated support systems available?

A. The pressurizer is empty and a bubble has formed in the vessel head.

B. A RED path on RCS INTEGRITY has been diagnosed.

C. A RED path on CORE COOLING has been diagnosed.

D. A heat sink has been reestablished and feed and bleed has been terminated.

Question: 99

The unit is being operated at 40% power with pressurizer level at program. RCS temperature is within 0.1°F of Tref.

If power is raised from 40% to 60% and all control systems are maintained on program, pressurizer level will increase from approximately ...

A. 35% to approximately 41%.

B. 35% to approximately 46%.

C. 39% to approximately 41%.

D. 39% to approximately 46%.

Question: 100

During the implementation of EPP-017, Post-SGTR Cooldown Using Backfill, directions are given to control ruptured SG level between 45% and 75%.

The intent of this step is to ...

A. continuously feed the ruptured SG to maintain a more even cooldown rate of the RCS.

B. continuously feed the ruptured SG to minimize pressure changes in the secondary side of the SG.

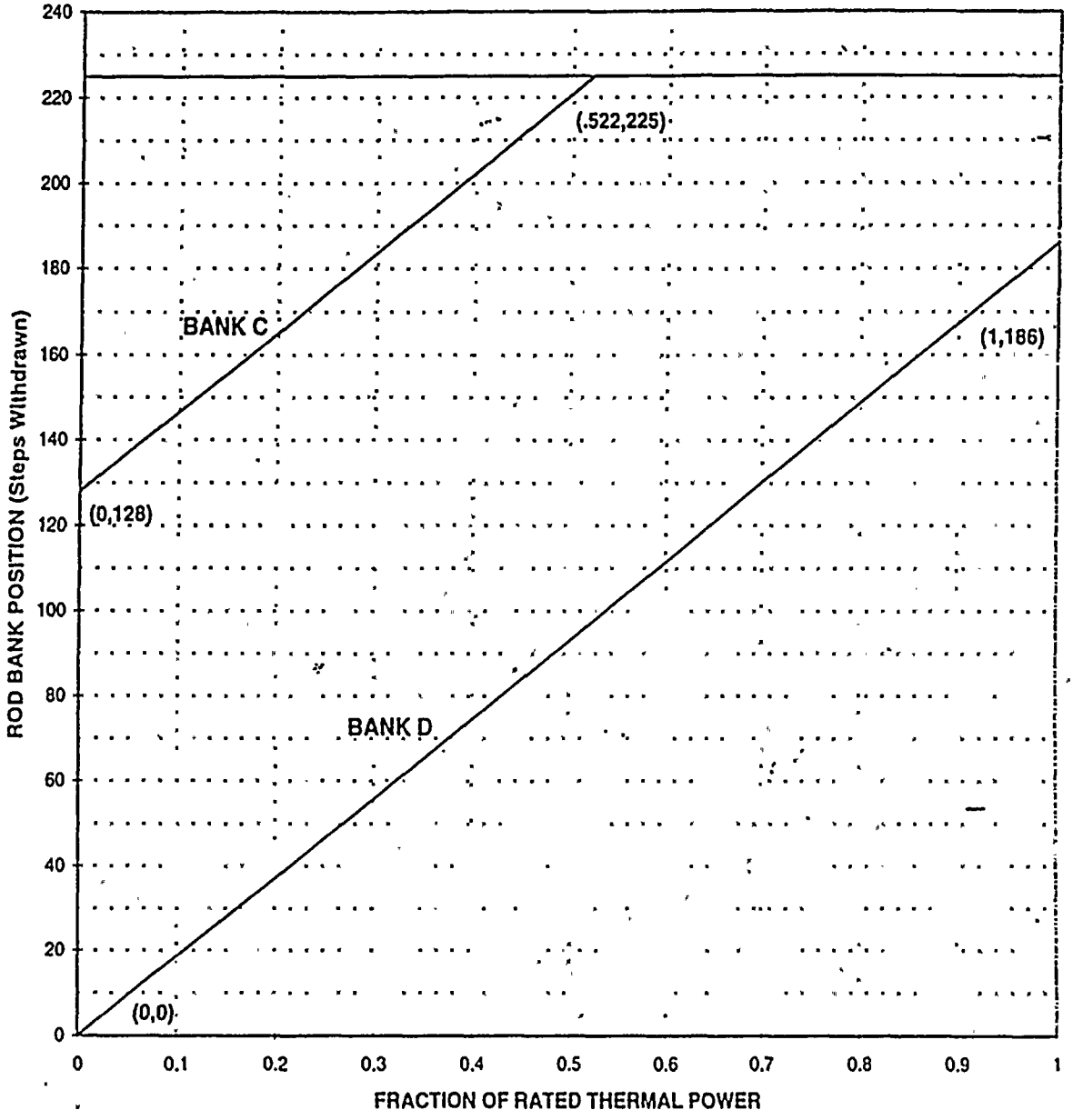
C. allow the ruptured SG to drain to 45% and then refill it to 75% to provide more effective cooling of the steam space materials.

D. allow the ruptured SG to drain to 45% and then refill it to 75% to minimize the amount of time an AFW pump is operating at low flow.

Harris Unit 1 Cycle 8
Core Operating Limits Report - Rev. 0

Figure 2

**Rod Group Insertion Limits Versus Thermal Power
(Three-Loop Operation)**

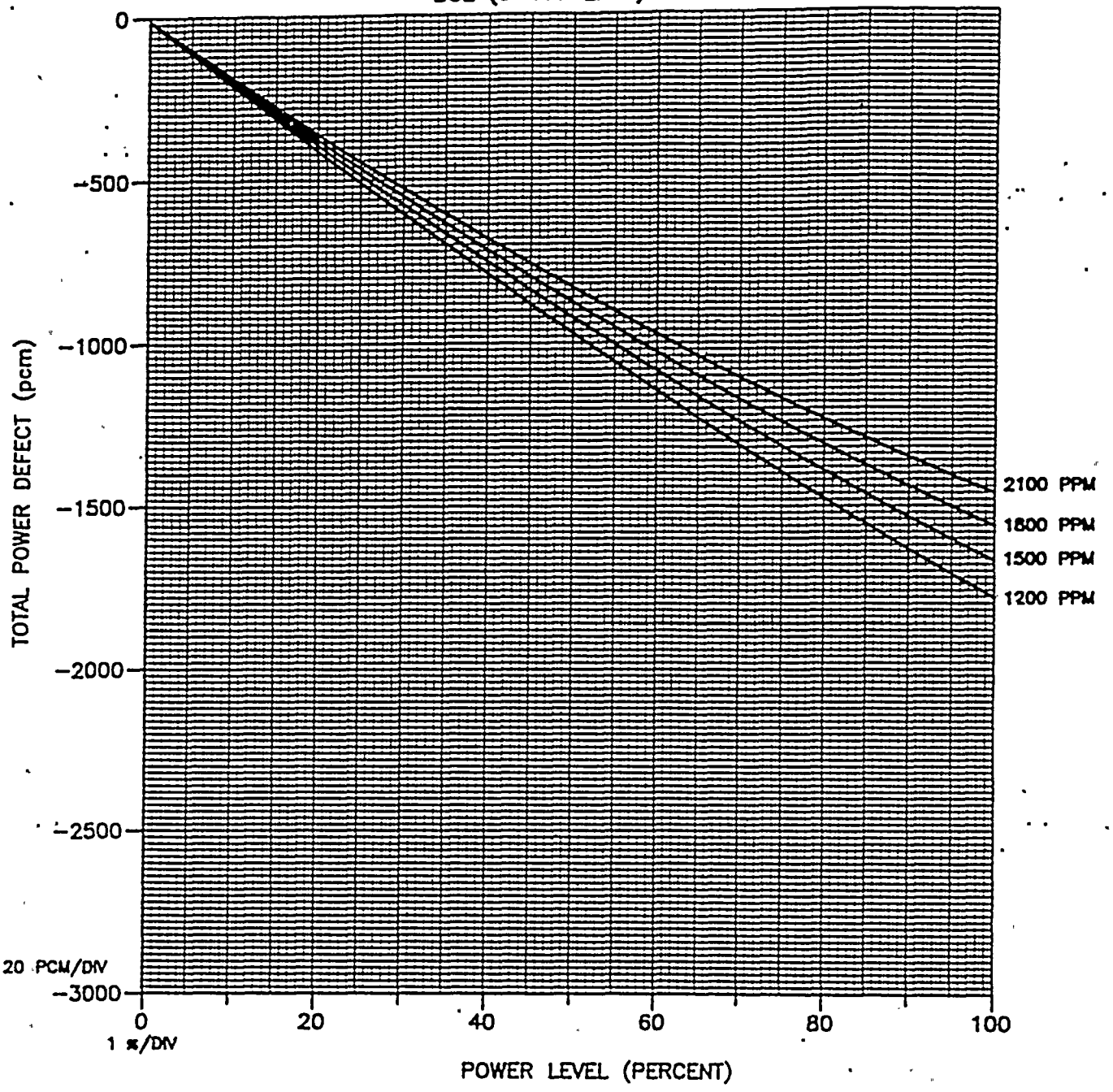


(Fully withdrawn shall be 225 steps)

Note: Control Banks A and B must be withdrawn from the core prior to power operation.

HARRIS UNIT 1 CYCLE 8
POWER DEFECT vs. POWER LEVEL
for VARIOUS BORON CONCENTRATIONS

BOL (0-167 EFPD)

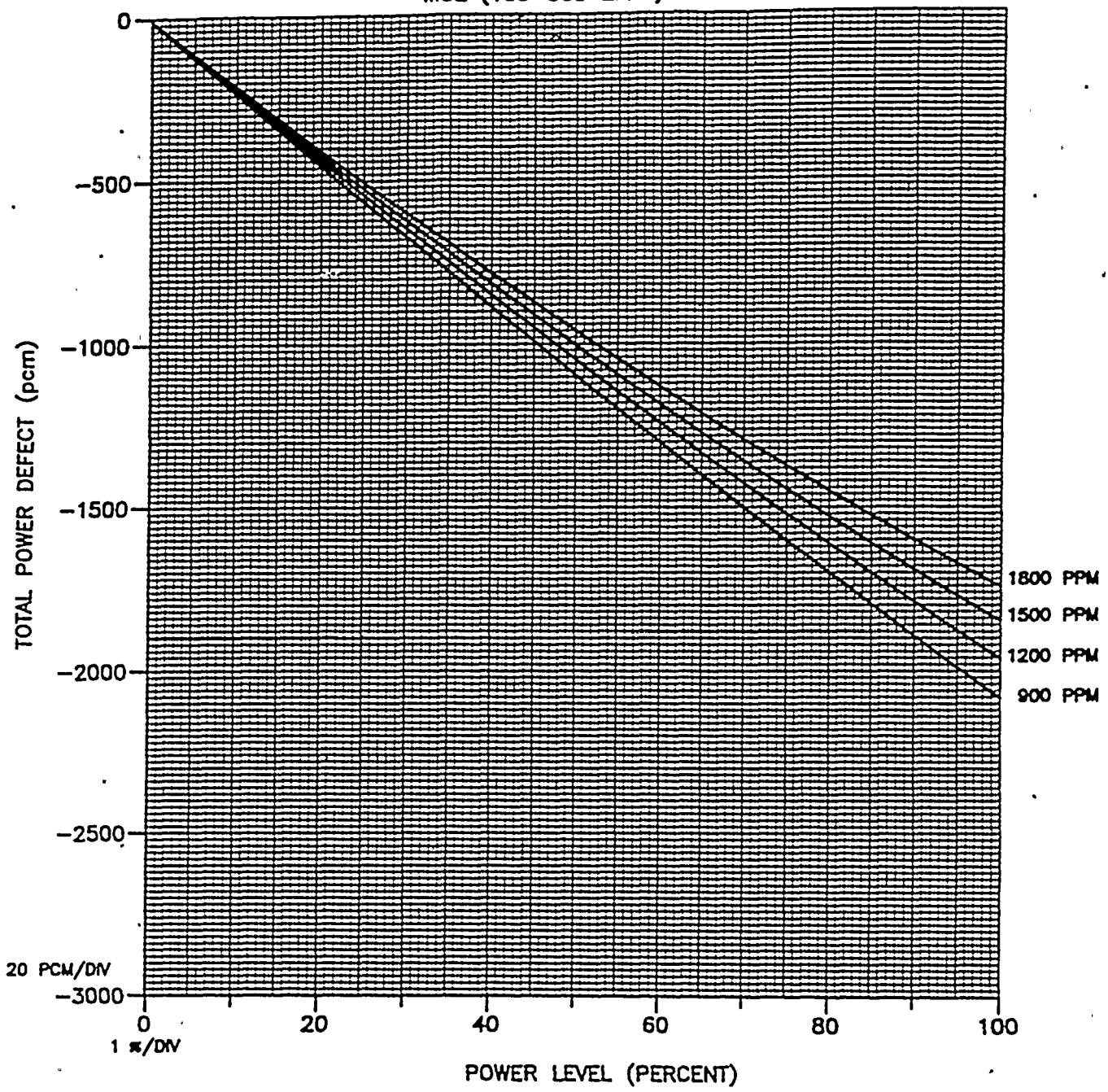


CURVE NO.	C-8-1	REV. NO.	0
ORIGINATOR		DATE	5-16-97
SUPERVISOR		DATE	5/19/97
SUPERINTENDENT			
SHIFT OPERATIONS		DATE	5-23-97

C-8-1

HARRIS UNIT 1 CYCLE 8
POWER DEFECT vs. POWER LEVEL
for VARIOUS BORON CONCENTRATIONS

MOL (168–335 EFPD)

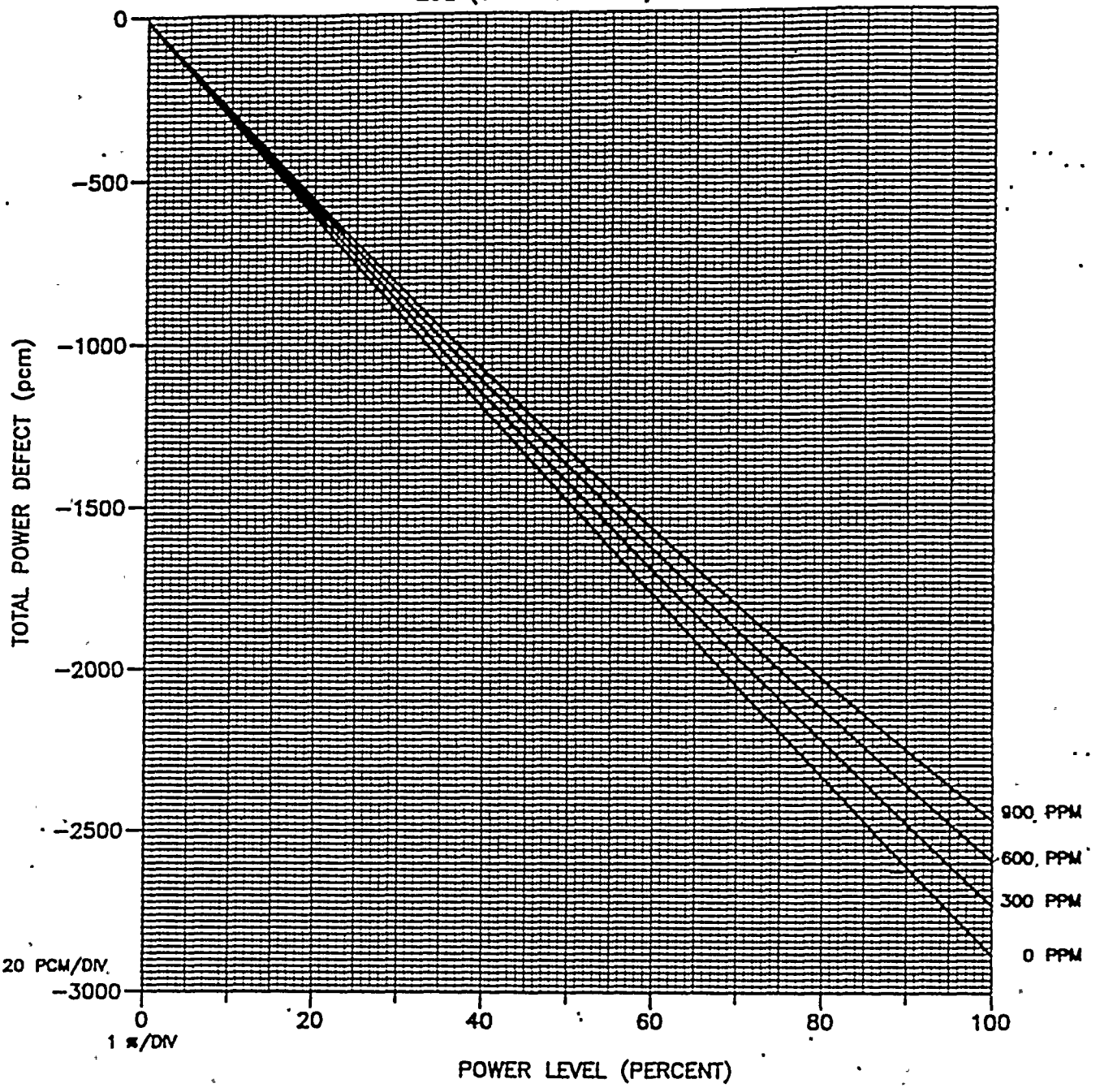


CURVE NO.	C-8-2	REV. NO.	0
ORIGINATOR		DATE	5-16-97
SUPERVISOR		DATE	5/19/97
SUPERINTENDENT			
SHIFT OPERATIONS		DATE	5-23-97

C-8-2

HARRIS UNIT 1 CYCLE 8
POWER DEFECT vs. POWER LEVEL
for VARIOUS BORON CONCENTRATIONS

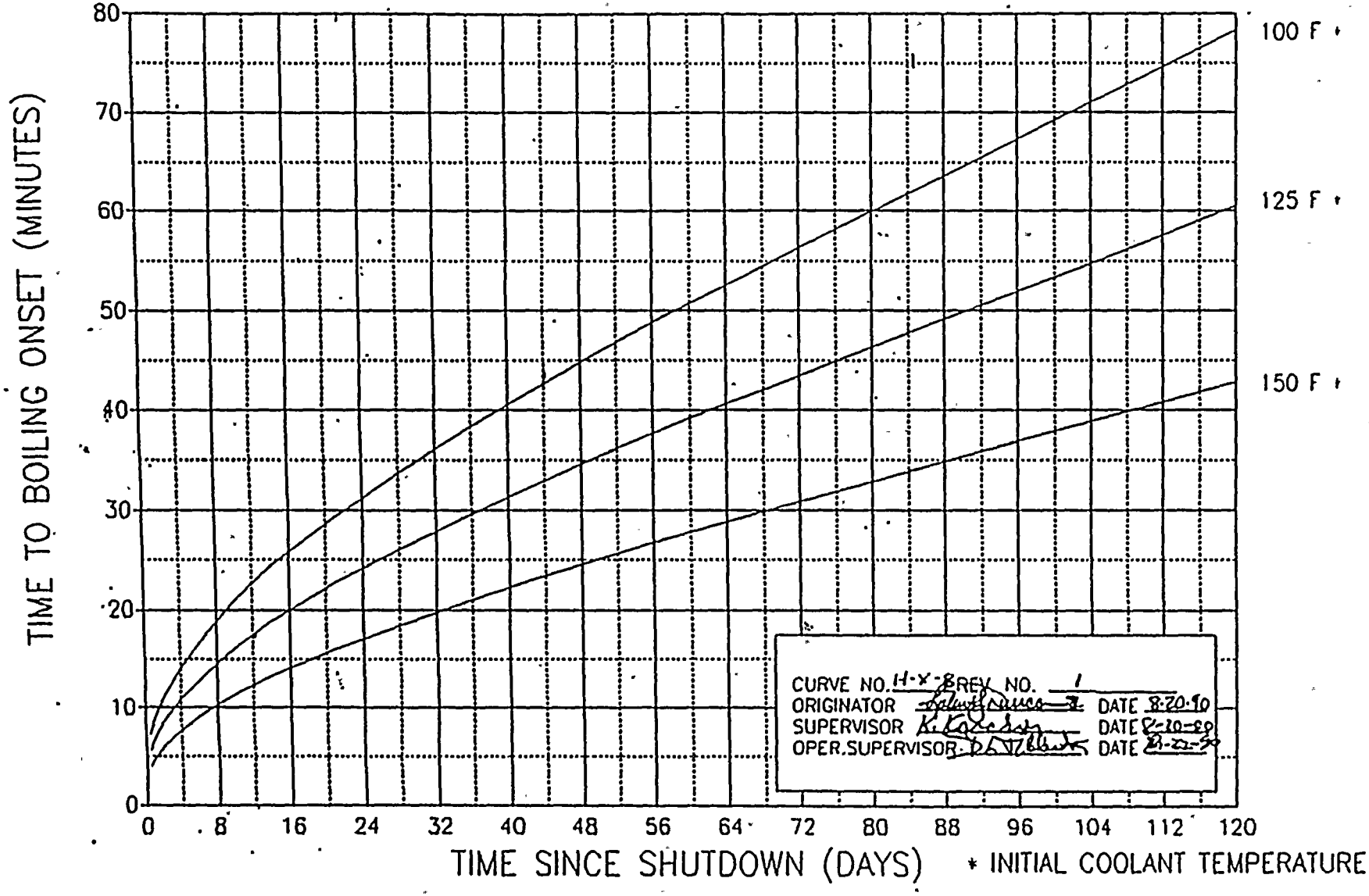
EOL (336-513 EFPD)



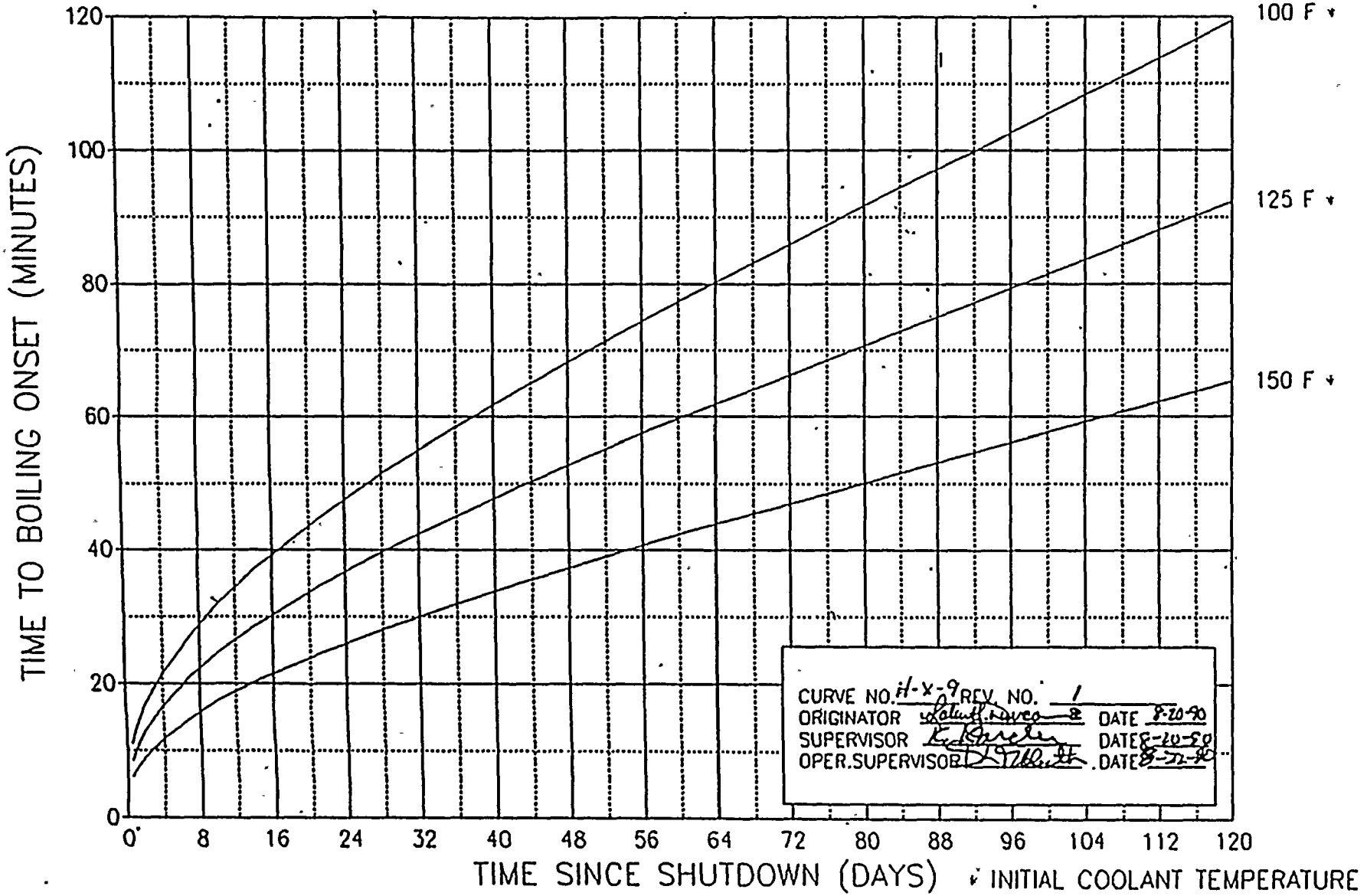
CURVE NO.	C-8-3	REV. NO.	0
ORIGINATOR		DATE	5-16-97
SUPERVISOR		DATE	5/19/97
SUPERINTENDENT	—		
SHIFT OPERATIONS		DATE	5-23-97

C-8-3

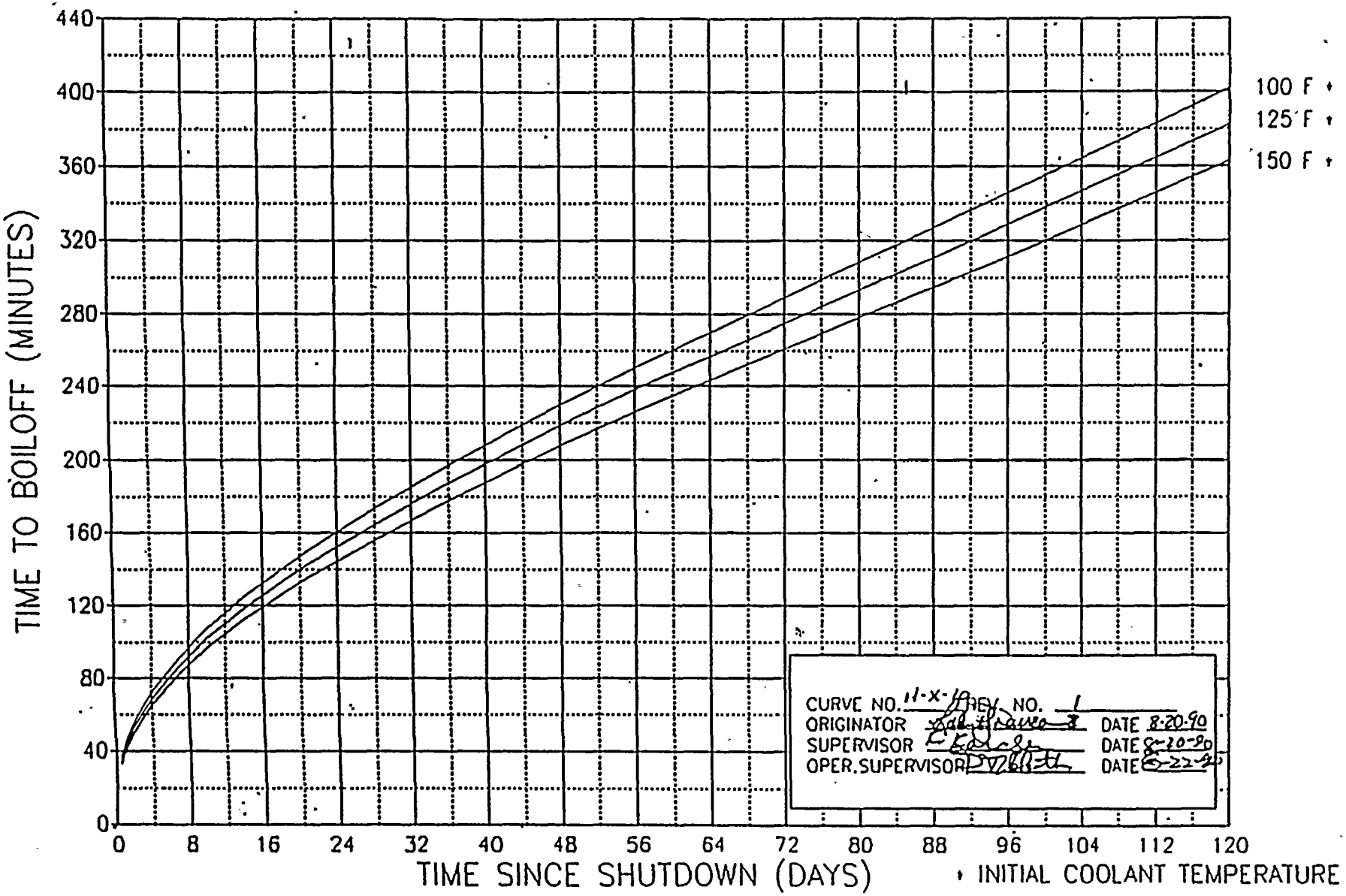
LOSS OF RHR
RCS BOILING CURVES FROM MIDLOOP



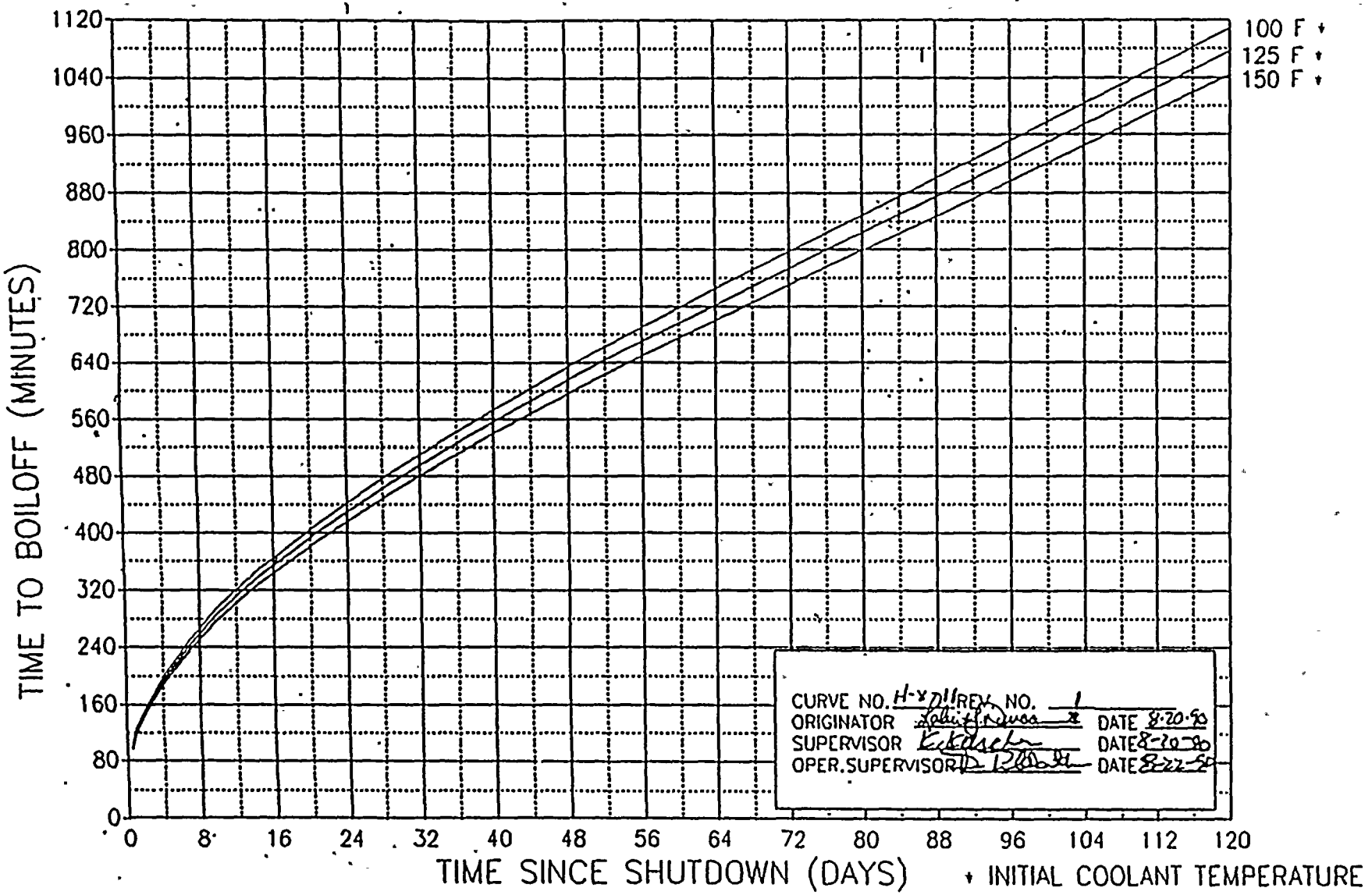
LOSS OF RHR
RCS BOILING CURVES AT VESSEL FLANGE



LOSS OF RHR
RCS BOILOFF CURVES FROM MID LOOP TO TOP OF FUEL



LOSS OF RHR
RCS BOILOFF CURVES FROM VESSEL FLANGE TO TOP OF FUEL



Harris Master
SRO 98-301

ES-401 | Site-Specific Written Examination Cover Sheet | Form ES-401-7

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

Applicant Information

Name:	Region: I / (II) / III / IV
Date:	Facility/Unit: Shearon Harris
License Level: RO / (SRO)	Reactor Type: (W) / CE / BW / GE
Start Time:	Finish Time:

Instructions

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

Applicant Certification

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

_____
Applicant's Signature

Results

Examination Value	100	Points
Applicant's Score	_____	Points
Applicant's Grade	_____	Percent

DISTRIBUTION CODE
IE42

Question: 1

The unit is operating at 95% power when rods begin to step out continuously in **AUTOMATIC** control.

Which of the following lists of reactor trips will terminate the transient if the operator fails to take **MANUAL** control of rods?

A.
- OTΔT
- OPΔT
- Pressurizer high level

B.
- OTΔT
- Pressurizer high pressure
- Pressurizer high level

C.
- OPΔT
- Pressurizer high pressure
- Pressurizer high level

D.
- OTΔT
- OPΔT
- Pressurizer high pressure

Question: 2

An entry into FRP-S.1, Response to Nuclear Power Generation/ATWS, has been made from PATH-1, Step 2. The following conditions currently exit:

- The reactor trip breakers are closed.
- Rods are being inserted manually.
- Control Bank D is at 12 steps.
- Power Ranges are all indicating 6%.
- Intermediate Range SUR is NEGATIVE

What condition(s) must be met in FRP-S.1 allow a return to PATH-1?

A. One of the reactor trip breakers must be opened.

B. Both of the reactor trip breakers must be opened.

C. Reactor power must be reduced below 5%.

D. Control Bank A must be inserted fully.

Question: 3

The plant is operating at 50% power. The PRESSURIZER LEVEL CONTROLLER SELECTOR switch is in the 459/460 position. A small leak occurs across the differential pressure (ΔP) transmitter for LT-459.

How will 1CS-231, Charging Flow Control Valve FCV-122, respond?

ASSUME NO PRZ HIGH LEVEL TRIP OR LETDOWN ISOLATION OCCURS.

A. 1CS-231 will throttle closed and then reopen to its original position

B. 1CS-231 will throttle open and then reclose to its original position

C. 1CS-231 will throttle closed and then reopen to a new position further closed than the original position

D. 1CS-231 will throttle open and then reclose to a new position further open than the original position

Question: 4

A large break loss of coolant accident occurred approximately 10 minutes ago. PATH-1 is being performed and instructions are given to implement functional restoration procedures as required. RCS pressure is 25 psig and RHR pumps are injecting at maximum rate. A RED path condition exists for RCS Integrity.

Which of the following actions are to be taken?

A. Continue in PATH-1 as this RED path is expected

B. Transition to FRP-P.1, Response to Imminent Pressurized Thermal Shock, and complete all actions, including the required soak, prior to returning to PATH-1

C. Transition to FRP-P.1, Response to Imminent Pressurized Thermal Shock, and complete all actions, except the required soak, prior to returning to PATH-1

D. Transition to FRP-P.1, Response to Imminent Pressurized Thermal Shock, and return to PATH-1 after verifying RCS pressure below RHR shutoff head and RHR pumps injecting

Question: 5

While preparing to perform a reactor startup at EOL, the Reactor Operator is reviewing the data on the Estimated Critical Conditions (ECC). He notes that the pre-trip power level was 30% and the ECC indicates that the power defect added the correct value for power defect, except that power defect was calculated to be a negative value instead of a positive value.

How will this error affect the position of the rods when the reactor is taken critical, assuming all other parameters are correct?

A. Rods will be higher than predicted, but within 500 pcm of the ECC

B. Rods will be higher than predicted, and more than 500 pcm off the ECC

C. Rods will be lower than predicted, but within 500 pcm of the ECC

D. Rods will be lower than predicted, and more than 500 pcm off the ECC

Question: 6

The plant is operating at 80% power when a MFW pump trips. Rod Control and PK-444, Pressurizer Pressure Master Controller, are in MANUAL following earlier failures. Which of the following describes how the pressurizer responds if steam dumps do **NOT** function?

ASSUME NO OPERATOR RESPONSE.

A. Pressurizer pressure decreases; Pressurizer level decreases

B. Pressurizer pressure decreases; Pressurizer level increases

C. Pressurizer pressure increases; Pressurizer level increases

D. Pressurizer pressure increases; Pressurizer level decreases

Question: 7

A large break LOCA has occurred and PATH-1 is being performed.

The following have been reset:

- Safety Injection
- Phase A Isolation
- Phase B Isolation

The RWST level subsequently decreases to the Low-Low level setpoint.

Which of the following describes the response of the Containment Sump Suction Valves to the RHR Pumps and to the Containment Spray Pumps?

A. Both the RHR Containment Sump Suction Valves and the Containment Spray Containment Sump Suction Valves will automatically open

B. The RHR Containment Sump Suction Valves must be manually opened, but the Containment Spray Containment Sump Suction Valves will automatically open

C. The RHR Containment Sump Suction Valves will automatically open, but the Containment Spray Containment Sump Suction Valves must be manually opened

D. Both the RHR Containment Sump Suction Valves and the Containment Spray Containment Sump Suction Valves must be manually opened

Question: 8

The plant is operating at 26% power. CSIP A-SA is under a clearance for maintenance. All necessary Train SB equipment is in service. CSIP B-SB trips.

Which of the following actions should be taken as directed by procedures?

A. Trip the reactor and trip the RCPs

B. Decrease power to less than 10% and trip the RCPs

C. Isolate letdown

D. Bypass the CVCS demineralizers

Question: 9

The plant is at 100% power when a MFW Pump trips. Control Bank 'D' rods are at 215 steps. As rods step inward while responding to the transient, the RO notices that Control Bank 'D' rod K-6 is not inserting. Rod speed has decreased to 8 steps per minute.

Which of the following actions should be taken?

A. Allow rods to continue to insert automatically and realign rod K-6 when the transient is completed

B. Place rods in manual, insert rods to shut the steam dumps, and realign rod K-6 when the transient is completed

C. Place rods in manual to stop all rod insertion

D. Manually trip the reactor

Question: 10

The unit is operating at 20% power with all systems in automatic. Bank 'D' control rods are at 120 steps. Control Bank 'C' rod H6 drops to the bottom of the core. No rod control urgent failure alarms occur.

Where will thermal power and RCS Tavg stabilize in response to the dropped rod without any operator action?

A. Reactor thermal power will be lower than prior to the dropped rod; RCS Tavg will be more than 5°F lower than the temperature prior to the dropped rod.

B. Reactor thermal power will be lower than prior to the dropped rod; RCS Tavg will be within 1°F of the temperature prior to the dropped rod.

C. Reactor thermal power will be the same as prior to the dropped rod; RCS Tavg will be within 1°F of the temperature prior to the dropped rod.

D. Reactor thermal power will be the same as prior to the dropped rod; RCS Tavg will be more than 5°F lower than the temperature prior to the dropped rod.

Question: 11

The plant is operating at full power when 1RC-114, Pressurizer PORV 444 SB, fails open and cannot be closed or isolated.

Assume PRT initial pressure is 5 psig and containment pressure is 5 psig when pressurizer pressure reaches 1000 psig.

As the RCS blows down from operating pressure to 1000 psig, PRZ PORV tail pipe temperature will ...

A. remain constant at 310°F.

B. go from an initial temperature of 310°F to a final temperature of 230°F.

C. go from an initial temperature of 230°F to a final temperature of 310°F.

D. go from an initial temperature of 650 °F to a final temperature of 545°F.

Question: 12

During refueling operations, **NO** spent fuel assembly is attached to the manipulator crane gripper. Refueling personnel discover that they are unable to move the bridge or trolley.

Which of the following is the most likely cause of the inability to move the bridge or trolley?

A. The gripper is not in the FULL UP position inside the mast

B. The gripper is not at least 12 inches up inside the mast

C. The gripper is failed in the ENGAGED position

D. A slack cable condition is sensed by the gripper

Question: 13

Power has been stabilized at 10^{-8} amps to take critical data.

If rods are withdrawn 5 steps at this time, power will ...

A. remain at 10^{-8} amps.

B. increase and stabilize below the Point of Adding Heat.

C. increase and stabilize above the Point of Adding Heat.

D. continue increasing above the Point of Adding Heat.

Question: 14

Following a small break LOCA, the following conditions are observed:

- Core exit thermocouple temperatures are approximately 618°F and stable
- RCS hot legs temperatures are approximately 550°F
- RCS pressure is 1100 psig
- RCS cold leg temperatures are approximately 330°F

What is the status of RCS inventory and core cooling?

A. The core is covered and being cooled by natural circulation

B. The core is partially un-covered and being cooled by natural circulation

C. The core is covered and being cooled by reflux boiling

D. The core is partially un-covered and being cooled by reflux boiling

Question: 15

CCW Pump A-SA is in service. CCW Pump B-SB is in standby.

A large leak out of the CCW system has resulted in the operators tripping the reactor and the RCPs.

To prevent the CCW pumps from automatically starting ...

A. the DC control power knife switches are opened for **BOTH** CCW Pumps prior to stopping CCW Pump A-SA.

B. the DC control power knife switch is opened for **ONLY** CCW Pump B-SB prior to stopping CCW Pump A-SA.

C. the control switches for **BOTH** CCW Pump A-SA and CCW Pump B-SB are held in STOP until CCW system pressure is < 61 psig.

D. the control switch for **ONLY** CCW Pump A-SA is held in STOP until CCW system pressure is < 61 psig.

Question: 16

Why are the Containment Pre-Entry Purge Makeup and Exhaust Isolation valves required to be sealed closed during plant operations?

A. Ensure that the internal pressure of containment remains positive during a low atmospheric pressure condition

B. Ensure that the internal pressure of containment remains within Technical Specification limits, assuming no accident conditions

C. The valve seals are not designed to function with containment pressure at a slightly negative value

D. The valves have not been demonstrated to be capable of closing during a LOCA or steam break inside containment

Question: 17

At 1315, the Reactor Operator must leave the Control Room for a short period of time. All requirements for this short term relief have been conducted and an entry has been made into OMM-002, Attachment 16, "Documentation of Short Term Assumption of Duties."

An entry must also be made in the Control Operators Log Book if the relieved operator does not resume the watch by ...

A. 1330.

B. 1345.

C. 1415.

D. 1515.

Question: 18

Power is at 36% during a power increase following a short maintenance outage. Rod K-6 in Control Bank 'D' is determined to be inoperable due to a power cabinet malfunction. The rod, determined to be at 120 steps, is not capable of being moved, but is considered to be trippable. The crew realigns the remaining rods in Control Bank 'D' with the inoperable rod.

What is the maximum power level that can be achieved under these conditions?

A. 36%

B. 50%

C. 64%

D. 75%

Question: 19

A large leak in the normal letdown line resulted in a Safety Injection actuation. The following actions have been taken:

- Letdown is isolated.
- SI has been terminated.
- Normal charging flow is being controlled to maintain pressurizer level.

The operators encounter a step in EPP-008, SI Termination, which directs them to establish letdown.

Why must the operators wait until seal return is established before establishing **EXCESS LETDOWN?**

A. Ensure adequate backpressure is available to limit excess letdown flow

B. Ensure discharges from the RCS to the PRT are limited

C. Ensure excess letdown does not back up into the RCP seals

D. Ensure adequate capacity is available in the VCT

Question: 20

Which of the following Reactor Protection or Engineered Safety Features Actuation System instruments must be placed in a tripped condition within one (1) hour to allow continued operation?

A. Containment Pressure High-2

B. Pressurizer Water Level High

C. Reactor Coolant Pump Undervoltage

D. Pressurizer Pressure High

Question: 21

The crew has entered FRP-H.2, Response to Steam Generator Overpressure due to a high pressure in 'B' SG. They are directed to cooldown the Reactor Coolant System using the 'A' and 'C' SGs.

Cooling down the RCS to less than 545°F...

A. minimizes primary-to-secondary leakage in the event the overpressure condition is caused by a tube leak.

B. causes the 'B' SG to shrink, resulting in a reduction in SG pressure.

C. ensures that 'B' SG pressure remains below the lift setpoint for the lowest SG safety valve.

D. provides verification that AFW flow capability to the 'A' and 'C' SGs exist.

Question: 22

The plant is being maintained at 1900 psig. RCS temperature is 500°F and stable. Excess letdown and normal letdown are both in service. The following indications are noted:

- Normal letdown is 55 gpm
- Excess letdown is 12 gpm
- RCP 1A seal injection flow is 9 gpm
- RCP 1B seal injection flow is 7 gpm
- RCP 1C seal injection flow is 8 gpm
- RCP 1A seal leakoff flow is 2.5 gpm
- RCP 1B seal leakoff flow is 2.0 gpm
- RCP 1C seal leakoff flow is 2.5 gpm

In order to maintain pressurizer level constant, charging flow should be adjusted to indicate ...

A. 38 gpm.

B. 43 gpm.

C. 50 gpm.

D. 74 gpm.

Question: 23

The plant is at 56% power.

Which of the following will result in an automatic reactor trip?

A. A failed Undervoltage relay on RCP 'A'

B. A failed Underfrequency relay on RCP 'A'

C. A leak on RCS Loop 'A' Flow Detector FT-415 low pressure tap

D. A leak on RCS Loop 'A' Flow Detector FT-414 high pressure tap

Question: 24

The unit is in Mode 6 when permission is requested to perform a gaseous waste release from WGDT 'F'.

Which of the following is the **LOWEST** level of approval required to conduct the release under these conditions?

A. Shift Outage Manager

B. Control Operator

C. Superintendent - Shift Operations

D. Manager - Operations

Question: 25

The unit is operating at 100% power with all systems in automatic. PT-446, Turbine First Stage Pressure, has failed low.

Subsequently, a turbine load rejection to 50% power occurs before any operator action is taken in response to the PT-446 failure.

How will this affect the Steam Dump System?

A. Steam dumps will arm, but will not actuate.

B. Steam dumps will actuate and attempt to control RCS temperature at approximately 557°F.

C. Steam dumps will actuate and attempt to control RCS temperature at approximately 569°F.

D. Steam dumps will have a demand signal, but will not actuate.

Question: 26

An Auxiliary Operator must perform a plant evolution following an accident. Dose rates in the area are determined to be 250 mRem/hour. His total exposure for the year prior to this evolution is 1.75 Rem TEDE.

How long can he work in this area without exceeding his CP&L Annual Administrative Dose Limit without receiving any extensions?

A. 1 hour

B. 5 hours

C. 9 hours

D. 13 hours

Question: 27

Following a large break LOCA, the crew has completed the transfer to Cold Leg Recirculation. Only one (1) CSIP is operating.

When re-aligning for Hot Leg Recirculation, the operating CSIP is aligned to inject through ...

A. SI-1, 2, 3, and 4, BIT Inlet and Outlet Valves.

B. SI-86, High Head SI to Hot Leg, only.

C. SI-107, Alternate High Head SI to Hot Leg, only.

D. both SI-86, High Head SI to Hot Leg, and SI-107, Alternate High Head SI to Hot Leg.

Question: 28

The unit is at 100% power. Troubleshooting is in progress inside Rod Control Power Cabinet 2BD due to an urgent failure. A reactor trip signal occurs during the troubleshooting, but the reactor fails to trip.

Why are the operators **NOT** directed to select Control Bank 'C' and insert rods?

A. Rod insertion will not occur with this failure

B. The reactivity insertion rate will be insufficient to shutdown the reactor

C. No signal will be generated to trip the turbine

D. Unanalyzed flux shapes may be produced

Question: 29

A safety injection has occurred due to 'B' SG being faulted. The operators have completed the actions of EPP-14, Faulted Steam Generator Isolation, and have transitioned to PATH-1, Entry Point C.

The following conditions currently exist:

- Containment pressure is 7 psig and slowly dropping
- Total AFW flow to the intact SGs is 235 KPPH
- 'A' SG level is 26%
- 'C' SG level is 33%
- Primary pressure on SPDS is 1725 psig and rapidly increasing
- All pressurizer level channels indicate 39%
- Core Exit T/Cs on SPDS are 520°F and stable

SI **CANNOT** be terminated under these conditions because ...

A. subcooling is not sufficient.

B. secondary heat sink is not sufficient.

C. RCS pressure is not sufficient.

D. RCS inventory is not sufficient.

Question: 30

Reactor power is 30% when Reactor Coolant Pump 'C' is stopped.

Once the plant stabilizes, what will the RCS Loop ΔTs be indicating?

A. All RCS Loop ΔTs will indicate 30%

B. RCS Loop 'A' and 'B' ΔTs will indicate 30%; RCS Loop 'C' ΔT will indicate 0%

C. RCS Loop 'A' and 'B' ΔTs will indicate 45%; RCS Loop 'C' ΔT will indicate 0%

D. RCS Loop 'A' and 'B' ΔTs will indicate 60%; RCS Loop 'C' ΔT will indicate 0%

Question: 31

The plant is solid in Mode 5 with one (1) RCP in operation. RHR Pump A-SA is providing letdown flow with PK-145.1, LTDN PRESSURE 1CS-38, in MAN. CSIP A-SA is providing RCS makeup and seal injection.

If instrument air is lost to 1CS-38 (PCV-145), the operator should ...

A. trip CSIP A-SA.

B. trip RHR Pump A-SA.

C. control letdown flow using HC-142.1, RHR Letdown 1CS-28.

D. close RHR Letdown 1CS-28 (HCV-142).

Question: 32

During Mode 5 operations, both trains of RHR are aligned for decay heat removal. Emergency Bus B-SB to Aux Bus E Tie Breaker 125 trips open and EDG B-SB fails to start. The alternate power supply is subsequently aligned per procedure to one of the deenergized loop suction valves.

All of the following RHR loop suction valves are still capable of being operated from the MCB **EXCEPT** ...

A. RH-1, RCS Loop 1 to RHR Pump A-SA.

B. RH-2, RCS Loop 1 to RHR Pump A-SA.

C. RH-39, RCS Loop 3 to RHR Pump B-SB.

D. RH-40, RCS Loop 3 to RHR Pump B-SB.

Question: 33

The unit is operating at 630 MWe net with PS-1006, Turbine Impulse Pressure Switch, failed low. Subsequently, Main Feedwater Pump 'A' trips.

How will the Main Turbine respond to these conditions?

A. The turbine will not runback

B. The turbine will runback to approximately 540 Mwe net

C. The turbine will runback to approximately 475 Mwe net

D. The turbine will runback until load is 0 Mwe net

Question: 34

A plant shutdown occurred 80 days ago. The plant is being operated at Mid Loop with fuel in the vessel when a complete loss of RHR occurs. RCS temperature is 100°F.

How much time is available to provide an alternate means of decay heat removal before core uncovery will begin?

A. 60 minutes

B. 92 minutes

C. 310 minutes

D. 850 minutes

Question: 35

A LOCA outside containment has resulted in unsafe radiological conditions in the RAB. The crew has taken all the actions of EPP-013, LOCA Outside Containment, to isolate the break.

Which of the following is the primary indication used in EPP-013 that the actions taken have been successful?

A. RAB temperatures decreasing

B. RAB sump level alarms clearing

C. RHR penetrations and PASS sampling isolated

D. RCS pressure increasing

Question: 36

The plant is at 85% power with a load increase in progress when Chemistry reports that a secondary chemistry parameter is exceeding the Action Level 3 limit.

Which of the following actions should be taken?

A. Shutdown as quickly as safe operation permits.

B. Reduce power and stabilize at less than 30%.

C. Continue monitoring chemistry and if conditions do not improve within 7 days, reduce power and stabilize at less than 30%.

D. Continue monitoring chemistry and if conditions do not improve within 7 days, shutdown at a rate not to exceed 3% per hour.

Question: 37

EPP-012, Loss of Emergency Coolant Recirculation, has been entered following a small break LOCA. The crew is beginning a depressurization of the RCS using a Pressurizer PORV.

The crew is directed to depressurize the RCS to maintain subcooling margin between 10°F and 20°F to ...

A. maximize CSIP injection flow prior to RWST depletion.

B. inject the SI Accumulators.

C. allow the CSIPs to inject while taking a suction off the VCT.

D. minimize RCS break flow.

Question: 38

During SSPS slave relay testing on Train SB, an inadvertant Phase A signal is generated.

Which of the following conditions should be expected?

A. Normal charging is isolated

B. Seal injection flow is isolated

C. Letdown is isolated

D. CSIP suction is aligned to the RWST

Question: 39

If a Containment Ventilation Isolation (CVI) signal occurred, which of the following Containment Ventilation fans would **NOT** trip directly from the CVI signal, but would trip as a result of being interlocked with other fans?

A. Normal Purge Supply fans (AH-82 A & B)

B. Airborne Radioactivity Removal fans (S-1A & B)

C. Pre-Entry Purge Makeup fans (AH-81 A & B)

D. CNMT Pre-entry Purge Exhaust fans (E-5 A & B)

Question: 40

The following conditions exist:

- Safety Injection actuated due to a safety valve failing partially open on SG 'A'.
- SG 'A' pressure is currently 250 psig and decreasing.
- PATH-1 is in progress.
- SI Termination criteria was **NOT** met when first checked in PATH-1.
- Step 65 of PATH-1 is being performed to check for **BOTH** of the following:
  1) "All SG Pressures Stable or Increasing"
  2) "RCS Pressure Stable or Decreasing"

What is the effect of misinterpreting this step and continuing with Step 66, rather than looping back to Entry Point C to wait for SG 'A' to complete depressurizing?

A. SI Termination criteria for subcooling and pressurizer level will be more restrictive **AND** SI Termination will be delayed until after an RCS cooldown is started.

B. SI Termination criteria for subcooling and pressurizer level will be more restrictive **AND** SI Termination will be performed prematurely.

C. SI Termination criteria for subcooling and pressurizer level will be less restrictive **AND** SI Termination will be delayed until after an RCS cooldown is started.

D. SI Termination criteria for subcooling and pressurizer level will be less restrictive **AND** SI Termination will be performed prematurely.

Question: 41

Which of the following actions would be **INAPPROPRIATE** to perform prior to direction in an EOP?

A. Isolating AFW flow to a single faulted SG.

B. Throttling AFW flow to control a ruptured SG level within the required level band.

C. Securing a CSIP to prevent overfilling the pressurizer following an inadvertant SI.

D. Shutting the MSIVs to isolate a steamline break which has not resulted in an SI.

Question: 42

The crew is terminating Safety Injection per EPP-008, SI Termination. The following conditions exist:

- CSIP A-SA is secured.
- BIT Outlet valves 1SI-3 and 1SI-4 are shut.
- Pressurizer level is 10% and decreasing.
- Pressurizer pressure is 1800 psig and decreasing.
- RCS temperature is stable.
- Charging flow is 150 gpm.
- Letdown has not been established.

The crew should ...

A. actuate SI and transition to PATH-1, Entry Point C.

B. re-establish BIT flow and transition to PATH-1, Entry Point C.

C. actuate SI and transition to EPP-009, Post LOCA Cooldown and Depressurization.

D. restart CSIP A-SA and continue in EPP-008.

Question: 43

Which of the following VCT level transmitter failures could possibly result in a loss of CSIP suction source, assuming **NO** operator intervention?

A. LT-112 failed high

B. LT-112 failed low

C. LT-115 failed high

D. LT-115 failed low

Question: 44

A reactor shutdown is being performed. Source Range channel N-31 is known to be failed high due to a detector problem.

Which of the following SR channel N-31 configurations will permit a continued normal shutdown when the Intermediate Range NIs drop below the P-6 reset point?

A.
- Instrument power fuses **REMOVED**
- Control power fuses **INSTALLED**
- Level Trip Switch in **BYPASS**

B.
- Instrument power fuses **INSTALLED**
- Control power fuses **REMOVED**
- Level Trip Switch in **BYPASS**

C.
- Instrument power fuses **REMOVED**
- Control power fuses **INSTALLED**
- Level Trip Switch in **NORMAL**

D.
- Instrument power fuses **INSTALLED**
- Control power fuses **REMOVED**
- Level Trip Switch in **NORMAL**

Question: 45

Following a sequencer actuation, what is the expected configuration of the Fuel Pool Cooling Pumps and Fuel Pool Cooling Pump Room Fans?

A. Pumps **RUNNING**; Fans **RUNNING**

B. Pumps **RUNNING**; Fans **SECURED**

C. Pumps **SECURED**; Fans **RUNNING**

D. Pumps **SECURED**; Fans **SECURED**

Question: 46

With the plant at 100% power, the crew noted indications of a SGTR on 'B' SG, including several secondary system radiation monitor alarms.

The crew has tripped the plant and initiated safety injection. RCS pressure is 1500 psig and slowly decreasing. While performing PATH-1, a step is encountered which states, "SECONDARY RADIATION NORMAL." Upon checking the radiation monitors the crew notes that all secondary radiation monitors have decreased to a value below their alarm setpoints.

Which of the following actions should be taken?

A. Transition to PATH-2 at this point

B. Remain in PATH-1 until 'B' SG level is determined to be increasing uncontrollably

C. Remain in PATH-1 until Chemistry samples confirm activity in 'B' SG

D. Remain in PATH-1 until Chemistry samples confirm boron in 'B' SG

Question: 47

Reactor power is being increased and is at 47% when ALB-008-4-3, RCP 'B' SEAL #1 LEAKOFF HIGH/LOW FLOW, annunciates.

All indications for 'A' and 'C' RCPs are determined to be normal.

Given the following conditions for 'B' RCP:

- #1 seal leakoff flow has stabilized at 7.0 gpm.
- Vibration levels are 6 mils shaft and 2.0 mils frame.
- Upper radial bearing temperature is 172°F and stable.
- Lower radial bearing temperature is 176°F and stable.
- Thrust bearing temperature is 168°F and stable.
- Seal inlet water temperature is 160°F and increasing slowly.
- Pump bearing water temperature is 158°F and increasing slowly.
- Motor winding temperatures are 210°F and stable.

Which of the following actions should be taken?

A. Trip the reactor and trip 'B' RCP within 5 minutes

B. Trip 'B' RCP within 5 minutes and perform a plant shutdown

C. Trip 'B' RCP within 8 hours

D. Continue operating 'B' RCP

Question: 48

A Temporary Change (TC) to a procedure has been written and is in the review process. The first Interim Approver believes the change meets all requirements and is technically adequate, accurate, and safe. The second Interim Approver disagrees.

Which of the following is the correct action to take?

A. Have a third TC Approver make a final determination.

B. Have the Plant Nuclear Safety Committee make a final determination.

C. Have the Initator and the two original TC Approvers determine an acceptable course of action.

D. Discard the Temporary Change and submit a Document Change Form for permanent revision.

Question: 49

During a plant cooldown and depressurization, a decision is made to maintain RCS pressure stable at 2000 psig using the Pressurizer Pressure Master Controller, PK-444A.

The automatic setpoint required to maintain this pressure is ...

A. 17.5%.

B. 37.5%.

C. 62.5%.

D. 80%.

Question: 50

Following a steam break inside containment, the crew is taking actions to regain control of plant equipment. Containment pressure is at 2.5 psig. The following are reset in accordance with EOP-PATH-1:

- Safety Injection
- Phase A
- Phase B
- Containment Spray

Several minutes after securing Containment Spray, containment pressure increases to 11 psig.

Which of the following describes the expected final configuration of the Containment Spray System, assuming no operator intervention?

A. Both pumps running, with discharge valves open

B. Both pumps running, with discharge valves closed

C. Neither pump running, with discharge valves open

D. Neither pump running, with discharge valves closed

Question: 51

During refueling operations, the official fuel assembly status board is required to be maintained in the ...

A. Fuel Handling Building.

B. Containment.

C. Control Room.

D. Work Coordination Center.

Question: 52

Which of the following heat exchanger leaks may result in leakage **INTO** the Component Cooling Water system?

A. Seal Water heat exchanger

B. Fuel Pool Cooling heat exchanger

C. Reactor Coolant Drain Tank heat exchanger

D. Letdown heat exchanger

Question: 53

A reactor trip occurred due to a loss of offsite power. The plant is being cooled down on RHR per EPP-006, Natural Circulation Cooldown with Steam Void in Vessel with RVLIS.

- RCS cold leg temperatures are 190°F.
- Steam generator pressures are 50 psig.
- RVLIS upper range indicates greater than 100%.
- Three CRDM fans have been running during the entire cooldown.

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

A. boron concentration is equalized throughout the RCS.

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

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

D. RCS temperatures do not increase during the required 29 hour vessel soak period.

Question: 54

The compensating voltage on Intermediate Range (IR) channel N-35 is set too low, resulting in N-35 stabilizing at 2×10^{-10} amps during a reactor shutdown.

When IR channel N-36 drops below 5×10^{-11} amps ...

A. both SR NIs will automatically energize.

B. only SR channel N-31 will automatically energize.

C. only SR channel N-32 will automatically energize.

D. neither SR NI will automatically energize.

Question: 55

The plant has experienced a Safety Injection due to improper work in the PIC cabinets. Conditions in the PIC cabinets have been restored to normal.

What action(s), if any, is(are) required to allow another automatic Safety Injection to occur?

A. No additional action is required.

B. Reset SI **ONLY**

C. Reset SI **AND** close the Reactor Trip Breakers

D. Close the Reactor Trip Breakers **ONLY**

Question: 56

The unit is operating at 100% power. The TDAFW Pump is out of service for coupling replacement. The following sequence of events occurs:

- Both Main Feedwater Pumps trip.
- A manual reactor trip is attempted, but is not successful.
- FRP-S.1, Response to Nuclear Power Generation/ATWS, is entered from PATH-1.
- The Reactor Operator is inserting rods manually.
- 1A-SA MDAFW Pumps fails to start.
- 1B-SB MDAFW Pump is supplying maximum design flow.

Which of the following procedure transitions would be expected to be performed?

A. A transition to FRP-H.1, Response to Loss of Secondary Heat Sink, will be required when FRP-S.1 is completed

B. A transition to FRP-H.1, Response to Loss of Secondary Heat Sink, should be made immediately

C. A transition to PATH-1 should be made upon exiting FRP-S.1

D. A transition to FRP-C.1, Response to Loss of Inadequate Core Cooling, will be required when FRP-S.1 is completed

.Question: 57

The following conditions exist:

- The plant is operating at 50% power.
- STM GEN 'A' FW FLOW CONTROL & RECORDER SELECTOR is in the CHAN 477 (Channel III) position
- STM GEN 'A' STM FLOW CONTROL & RECORDER SELECTOR is in the CHAN 474 (Channel III) position
- SG 'A' level begins to increase.
- SG levels 'B' and 'C' are stable at approximately 66%.

Which of the following is the most likely cause of the level increase in SG 'A'?

A. LT-476 CHAN III 'A' LEVEL has failed high

B. PT-475 'A' SG CHAN III STM PRESSURE has failed high

C. FT-474 'A' SG CHAN III STM FLOW has failed low

D. FT-477 'A' SG CHAN III FW FLOW has failed high

Question: 58

The following conditions exist:

- A reactor trip has occurred.
- Rod J3 (Shutdown Bank 'A') indicates fully withdrawn.
- Rod N7 (Shutdown Bank 'A') indicates fully withdrawn.
- Rod B8 (Control Bank 'D') indicates 6 steps.
- RCS boron concentration is 1200 ppm.

The operator should Emergency Borate until RCS boron concentration is at least ...

A. 1490 ppm.

B. 1780 ppm.

C. 2070 ppm.

D. 2300 ppm.

Question: 59

Following a loss of offsite power, SG 'B' was diagnosed with a SGTR.

Power was subsequently restored and the crew is performing EPP-017, Post-SGTR Cooldown Using Backfill. The crew is getting ready to start a RCP. RCS temperature is 400°F

Which pump should be the first RCP started, and why?

A. RCP 'B' to allow for optimal RCS pressure control

B. RCP 'B' to increase the rate of SG backfill

C. RCP 'A' to prevent an inadvertant criticality

D. RCP 'A' to prevent pressurized thermal shock of the reactor vessel

Question: 60

A Specappraisal (S) change that will affect the logic for activating Technical Specification LCOs needs to be implemented.

All of the following personnel are required to approve this S change prior to implementation **EXCEPT** for the ...

A. S Custodian.

B. Superintendent - Work Coordination.

C. Manager – Operations.

D. Manager - Regulatory Affairs.

Question: 61

While operating at 100% at EOL, a control rod system malfunction results in rods inserting in **AUTO**. Annunciator ALB-013-8-3, BANK LOW-LOW INSERTION LIMIT, alarms and the operator immediately places rod in **MANUAL**, stopping all inward rod motion.

If rods are maintained below the rod insertion limit, which of the following Technical Specification limits may be violated?

A. Enthalpy Rise Hot Channel Factor

B. Departure from Nucleate Boiling Parameters

C. Quadrant Power Tilt Ratio

D. Minimum Temperature for Criticality

Question: 62

The operators are responding to a Steam Generator Tube Rupture in accordance with PATH-2. They are performing the procedure steps to isolate the ruptured SG.

Which of the following unexpected conditions, occurring at this time, would require use of the SG PORVs to perform the subsequent cooldown?

A. Containment pressure increasing to 2.2 psig

B. Steam line pressure decreasing to 585 psig

C. Steam line pressure decreasing from 1000 psig to 875 psig over a one-minute time period

D. Trip of 1 of the 3 running Circulating Water Pumps

Question: 63

The plant is at 100% power. 1A-SA CCW Pump is in operation. A large leak has occurred in RCP 'C' thermal barrier heat exchanger.

Which of the following actions will automatically occur?

A. 1CC-252, RCP Thermal Barrier Flow Control, will **CLOSE**

B. 1CC-208, CCW To RCPs, will **CLOSE**

C. 1B-SB CCW Pump will **AUTO START**

D. 1CC-305, CCW To Gross Failed Fuel Detector, will **CLOSE**

Question: 64

A LOCA occurred several hours ago. Only one (1) Containment Spray Pump is running due to actions taken in EPP-012, Loss of Emergency Coolant Recirculation.

A transition has just been made to FRP-J.1, Response to High Containment Pressure. Containment Pressure is 14 psig.

Which of the following actions should be taken?

A. Start the second Containment Spray Pump if Containment pressure does **NOT** decrease below 10 psig before exiting FRP-J.1.

B. Start the second Containment Spray Pump since pressure is above 10 psig.

C. Continue operation with one Containment Spray Pump.

D. Stop the running Containment Spray Pump to conserve RWST inventory.

Question: 65

The crew is implementing FRP-H.1, Response to Loss of Secondary Heat Sink.

Reactor Coolant Pumps are tripped prior to initiating bleed and feed to ...

A. minimize the likelihood of distractions preventing RCP trip when CCW isolates to the RCPs.

B. limit the heat input into the RCS.

C. prevent pumping a two-phase mixture out the open Pzr PORVs.

D. lower RCS pressure to reduce flow out the open Pzr PORVs.

Question: 66

Indicated power on each of the Power Range NIs is as follows:

- N-41 indicates 96%
- N-42 indicates 96.5%
- N-43 indicates 97%
- N-44 indicates 98%

Actual reactor power, as calculated by performing OST-1004, Power Range Heat Balance, is 98.6%.

The gain must be adjusted on Power Range NIs channel(s) ...

A. N-41 only.

B. N-41 and N-42 only.

C. N-41, N-42, and N-43 only.

D. N-41, N-42, N-43, and N-44.

Question: 67

Following a loss of all AC power, how long are the safety-related 125 VDC batteries designed to allow equipment operation?

A. 1 hour

B. 1.5 hours

C. 2 hours

D. 4 hours

Question: 68

The Tank Area Drain Transfer pumps are aligned to discharge to the Storm Drain System. A high radiation alarm condition is received on the Tank Area Drain Transfer Pump Monitor, REM-3530.

Which of the following actions automatically occur?

A. Transfer Pumps **TRIP**

B. 1FD-109, FD Tanks Area Drain Pump Discharge to Storm Drains, **CLOSES**

C. 1FD-110, FD Tank Area Drain Pump Discharge to FD Tank Valve, **OPENS**

D. 1MD-285, Industrial Waste to the Oil Separator, **CLOSES**

Question: 69

What initial power level would result in the **LOWEST** RCS pressure following a SG safety valve failing open, and why?

A. 0% power, due to the greater inventory in the SG

B. 0% power, due to the larger amount of stored energy in the RCS

C. 100% power, due to the greater inventory in the SG

D. 100% power, due to the larger amount of stored energy in the RCS

Question: 70

Following a LOCA, the following containment conditions are noted:

- Containment pressure increases to 4.2 psig and decreases back down to 0.5 psig.
- Containment radiation level increases to $4x10^{3}$ R/hr and decreases back down to $3x10^{-1}$ R/hr.
- Integrated containment radiation exposure has not yet been determined.

While checking the condition of the CORE COOLING Critical Safety Function Status Tree, RCS Subcooling is required to be **greater than 10°F [42°F] - C or greater than 20°F [50°F] – M.**

The STA is calculating subcooling because ERFIS is **NOT** available.

How much subcooling is required to satisfy the CORE COOLING tree?

A. 10°F

B. 20°F

C. 42°F

D. 50°F

Question: 71

During an accident, the Shift Technical Advisor reports that some Incore Thermocouples are "offscale high."

What is the **MAXIMUM** temperature indication for the Incore Thermocouples?

A. 1200°F

B. 2200°F

C. 2500°F

D. 3000°F

Question: 72

You are working in the WCC and are performing the initial OPS review on a WR/JO that is being planned. You have just reached the step to determine the requirements for WCC notification or approval prior to starting work.

WCC notification prior to work release is required **EXCEPT** when ...

A. an Operations Clearance is required to start the work.

B. the initiation of an LCO is required.

C. the equipment out-of-service clock start and stop times are needed.

D. there is a potential impact on safe and reliable plant operation.

Question: 73

The load dispatcher has notified the plant that several transmission lines are down and grid voltage has become unstable.

The following conditions exist:

- CSIP 1A-SA is in operation.
- The Main Generator is **NOT** supplying plant loads.

What actions should be taken regarding the Emergency Diesel Generators?

A. Parallel both EDGs with offsite power and maintain them paralleled.

B. Parallel EDG 1A-SA with offsite power and maintain it paralleled. Maintain EDG 1B-SB in standby.

C. Open EMERGENCY BUS A-SA TO AUX BUS D TIE BREAKER 105 SA and verify EDG 1A-SA starts and energizes 6.9 KV Bus 1A-SA. Maintain EDG 1B-SB in standby.

D. Open EMERGENCY BUS B-SB TO AUX BUS E TIE BREAKER 125 SB and verify EDG 1B-SB starts and energizes 6.9 KV Bus 1B-SB. Then perform the same actions for EMERGENCY BUS A-SA TO AUX BUS D TIE BREAKER 105 SA and EDG 1A-SA.

Question: 74

Which of the following identifies **BOTH** reasons why SI Termination criteria is less restrictive in FRP-P.1, Response to Imminent Pressurized Thermal Shock, than in other procedures?

A.
- To allow subsequent depressurization of the RCS
- To minimize the energy addition to containment

B.
- To reduce the rate of RWST depletion
- To limit the cooldown rate of the RCS

C.
- To limit the cooldown rate of the RCS
- To allow subsequent depressurization of the RCS

D.
- To minimize the energy addition to containment
- To reduce the rate of RWST depletion

Question: 75

A safety injection has just occurred.

How is the operation of the Containment Fan Cooler Unit fans affected?

A. The lead fan in each unit starts in **SLOW** speed and the other fan remains **OFF**.

B. The lead fan in each unit starts in **FAST** speed and the other fan remains **OFF**.

C. Both fans in each unit start in **SLOW** speed.

D. Both fans in each unit start in **FAST** speed.

Question: 76

The unit is in Mode 3. Normal Service Water has been lost to the Instrument Air Compressors and Emergency Service Water is being aligned to all compressors in accordance with OP-139, Service Water System.

How, and why, does this effect the operability of the Emergency Service Water system?

A. Both trains of ESW are inoperable due to being cross-tied.

B. Both trains of ESW are inoperable due to being aligned to non-seismically qualified piping.

C. One train of ESW is inoperable due to being aligned to non-seismically qualified piping.

D. One train of ESW is inoperable due to the additional load resulting in less than design flow to safety-related loads.

Question: 77

Which of the following ventilation systems will **BOTH** respond to a high radiation level on an airborne radiation monitor?

A.
- Operations Support Center
- Technical Support Center

B.
- Joint Information Center
- Emergency Operations Facility

C.
- Operations Support Center
- Joint Information Center

D.
- Technical Support Center
- Emergency Operations Facility

Question: 78

All of the following are symptoms of a partial loss of condenser vacuum **EXCEPT** ...

A. decreasing Condensate Pump discharge temperature.

B. increasing Turbine Exhaust Hood temperature.

C. increasing Turbine vibration.

D. abnormal Gland Seal Steam pressure.

Question: 79

While operating at 90% power, 'B' Main Feed Pump trips. The operators start all AFW pumps, isolate SG blowdown, and begin inserting control rods in MANUAL.

If alarm ALB-013-8-3, BANK LOW-LOW INSERTION LIMIT, is received, the RO should ...

A. stop inserting rods.

B. stop inserting rods and immediately initiate emergency boration.

C. continue inserting rods until the steam dumps close.

D. continue inserting rods until the steam dumps close and immediately initiate emergency boration.

Question: 80

On September 1, at 0600, a plant shutdown was initiated from 100% in preparations for conducting a refueling. The reactor was shutdown at 1800 on the same date. CCW heat exchanger outlet temperature is currently 95°F.

When is the **EARLIEST** that fuel movement in the reactor vessel is allowed to begin?

A. September 8th at 1300

B. September 9th at 0100

C. September 12th at 2000

D. September 13th at 0800

Question: 81

On a Safety Injection signal, the Emergency Service Water (ESW) System is designed to isolate from the Normal Service Water (NSW) System.

How is this isolation established in the event of a single train loss of power?

A. Check valves on the return line to NSW will close due to the difference in pressure between ESW and NSW

B. Air-operated valves on the return line to NSW fail closed on a loss of power

C. Motor-operated individual header return valves to NSW are powered from one train and the common return header valve to NSW is powered from the other train

D. Manual isolation valves on the return line to NSW must be locally closed

Question: 82

While attempting to start Emergency Diesel Generator A-SA from the control room, the engine speed only reaches 390 RPM and then slowly starts decreasing

Why must the DIESEL GENERATOR A-SA control switch be placed in **STOP** following this unsuccessful start attempt?

A. Prevent a possible fire in the Generator Control Panel

B. Restore the Diesel Generator to automatic start status

C. Reset the diesel engine governor to prevent an overspeed trip on the next attempted start

D. Allow the starting air compressors to restore pressure in the starting air receivers

Question: 83

The plant is operating at 100% power.

A loss of both Heater Drain Pumps causes a turbine runback to ...

A. ensure sufficient feedwater capability to maintain SG levels.

B. avoid reaching an OTΔT or OPΔT trip or runback setpoint.

C. minimize extraction steam flow to #4 Feedwater Heaters.

D. prevent reaching runout flow conditions on the Condensate Pumps.

Question: 84

What is the **MAXIMUM** exposure that an emergency worker may receive to repair a piece of equipment vital to protecting valuable company property?

A. 5 Rem TEDE

B. .10 Rem TEDE

C. 25 Rem TEDE

D. >25 Rem TEDE on a voluntary basis

Question: 85

The plant is in Mode 3. Alarm window ALB-30 (7-1), FIRE DETECTION SYSTEM TROUBLE, annunciates. To determine the location of the trouble alarm, reference ...

A. Local Fire Detection Control Panel – 1.

B. the Fire Detection Computer.

C. FPP-002, Fire Emergency.

D. FPP-012, Fire Pre-Plans.

Question: 86

Power is currently at 32% during a plant startup. Instrument Bus IDP-1B-SIV deenergized as a result of a fault in PIC CAB-4. PIC CAB-4 has been isolated from Instrument Bus SIV and will be deenergized for approximately eight (8) hours while repairs are being made.

Which of the following actions must be taken?

A. Place all PIC CAB-4 Reactor Trip instruments in the tripped condition

B. Place all PIC CAB-4 ESF instruments in the tripped condition

C. Place all MFW Regulating Valves in MANUAL

D. Perform a plant shutdown per Technical Specification 3.0.3

Question: 87

The unit is operating at 28% power with two (2) Condensate Pumps, 'A' Condensate Booster Pump, and 'A' Main Feedwater Pump in operation. The 'A' Condensate pump trips.

How does this affect the status of the Condensate Booster Pumps and the Main Feedwater Pumps?

A. The 'A' Condensate Booster Pump and the 'A' Main Feedwater Pump will continue to operate.

B. The 'A' Condensate Booster Pump will continue to operate. The 'A' Main Feedwater Pump will trip and the 'B' Main Feedwater Pump will autostart.

C. The 'A' Condensate Booster Pump will trip and the 'B' Condensate Booster Pump will autostart. The 'A' Main Feedwater Pump will continue to operate.

D. The 'A' Condensate Booster Pump and the 'A' Main Feedwater Pump will trip. The 'B' Condensate Booster Pump and the 'B' Main Feedwater Pump will autostart.

Question: 88

Four (4) maintenance workers will be performing a job several feet away from a "hot spot." The unshielded dose rate where the workers will be standing is 1600 mrem/hr due to gamma radiation.

Which of the following will result in the **LOWEST TOTAL** exposure, including any maintenance personnel and HP personnel exposure?

Assume the total exposure to the HP personnel is unshielded at 1600 mrem/hr for the duration of the shielding installation and do not consider exposure received while removing the shielding.

A. 3 HP technicians spending 30 minutes to install two (2) 2" thick blankets of lead and 4 maintenance workers working for one (1) hour after shielding installed.

B. 2 HP technicians spending 30 minutes to install one (1) 2" thick blanket of lead and 4 maintenance workers working for one (1) hour after shielding installed.

C. 1 HP technician spending 45 minutes to install one (1) 2" thick blanket of lead and 4 maintenance workers working for one (1) hour after shielding installed.

D. 4 maintenance workers working for one (1) hour with NO shielding installed.

Question: 89

SSPS testing is being performed on a Phase B slave relay.

If the output relay is not properly blocked during the testing, which of the following components is most likely to be affected?

A. Containment Spray Pump

B. Charging/SI Pump

C. Reactor Coolant Pump

D. Containment Fan Cooler Unit

Question: 90

A Safety Injection has just occurred.

Which of the following subsystems of the Liquid Waste Processing System (LWPS) is affected?

A. Reactor Auxiliary Building Equipment Drains

B. Containment Building Equipment Drains

C. Waste Processing Building Equipment Drains

D. Fuel Handling Building Equipment Drains

Question: 91

The unit is being operated in Mode 2 with SG levels being maintained using the Motor-Driven Auxiliary Feedwater Pumps with all Flow Control Valves throttled in mid-position. The Turbine Driven Auxiliary Feedwater Pump is in standby with all Flow Control Valves full open. All AFW Isolation Valves are open.

How will the AFW System respond to an AFW Isolation Signal on 'B' SG?

A.
- The MDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The TDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The MDAFW Flow Control Valve for 'B' SG will **REMAIN OPEN.**
- The TDAFW Flow Control Valve for 'B' SG will **REMAIN OPEN.**

B.
- The MDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The TDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The MDAFW Flow Control Valve for 'B' SG will **CLOSE.**
- The TDAFW Flow Control Valve for 'B' SG will **REMAIN OPEN.**

C.
- The MDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The TDAFW Isolation Valve for 'B' SG will **REMAIN OPEN.**
- The MDAFW Flow Control Valve for 'B' SG will **CLOSE.**
- The TDAFW Flow Control Valve for 'B' SG will **REMAIN OPEN.**

D.
- The MDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The TDAFW Isolation Valve for 'B' SG will **CLOSE.**
- The MDAFW Flow Control Valve for 'B' SG will **CLOSE.**
- The TDAFW Flow Control Valve for 'B' SG will **CLOSE.**

Question: 92

SHNPP Technical Specifications limit containment pressure to 1.6 psig during operations to ...

A. maintain accuracy of instruments with detectors inside containment.

B. assure any leakage from containment remains within 10CFR100 limits.

C. assure that peak pressure during an accident will remain within design limits.

D. prevent long term degradation of containment pressure boundary capability.

Question: 93

Which of the following describes the start sequence of the Fire Pumps?

A. The Motor Driven Fire Pump will only start after a 30 second time delay if the Diesel Driven Fire Pump has received a start signal and is not maintaining ≥ 100 psig.

B. The Motor Driven Fire Pump will start at ≤ 93 psig and the Diesel Driven Fire Pump will start at ≤ 83 psig.

C. The Diesel Driven Fire Pump will start at ≤ 93 psig and the Motor Driven Fire Pump will start at ≤ 83 psig.

D. The Diesel Driven Fire Pump will only start after a 30 second time delay if the Motor Driven Fire Pump has received a start signal and is not maintaining ≥ 100 psig.

Question: 94

The unit is operating at 100% power.

If 125 VDC Bus 1A-SA deenergizes due to a fault on the bus ...

A. the reactor will trip due to an undervoltage (UV) trip of Train SA reactor trip breaker.

B. the reactor will trip due to a shunt trip of Train SA reactor trip breaker.

C. Train SA reactor trip breaker will **NOT** be capable of opening due to an undervoltage trip.

D. Train SA reactor trip breaker will **NOT** be capable of opening due to a shunt trip.

Question: 95

AOP-004, Remote Shutdown, requires that pressurizer level be controlled between 25% and 51% while maintaining the plant stable at normal operating temperature.

Why is the pressurizer level control band changed to between 25% and 90% when the decision is made to cooldown?

A. Ensures pressurizer level will remain above the heaters if an RCP is started and a bubble exists in the vessel head

B. Allows for cooldown rates approaching 100°F/hour without uncovering the pressurizer heaters

C. Allows for more charging flow to achieve required RCS boron concentration

D. Ensures a greater amount of flexibility in cooldown rate due to less operator control of AFW flow and steaming rate

Question: 96

While reviewing the MCB annunciators prior to relieving the off-going shift, you note that one annunciator has a **PINK** dot attached to it.

This indicates that the annunciator is in alarm due to ...

A. the associated system being inoperable.

B. the associated system being tested.

C. the alarm window itself being inoperable with a Work Request to repair it written.

D. the associated system being under clearance.

Question: 97

A waste gas release is in progress when the WPB Stack 5 PIG radiation monitor, REM-1WV-3546, exceeds the high alarm setpoint.

How will the release be terminated?

A. Waste Gas Decay Tanks E & F to Plant Vent, 3WG-229, **CLOSES**

B. Running Waste Gas Compressor **TRIPS**

C. Filtered Exhaust Fans, E-46, E-47, E-48, and E-49 **TRIP**

D. Gas Decay Tanks to Plant Vent Isolation Valve, 3WG-230, **CLOSES**

Question: 98

During the implementation of the ERGs, when can a Reactor Coolant Pump be started without having all of its associated support systems available?

A. The pressurizer is empty and a bubble has formed in the vessel head.

B. A RED path on RCS INTEGRITY has been diagnosed.

C. A RED path on CORE COOLING has been diagnosed.

D. A heat sink has been reestablished and feed and bleed has been terminated.

Question: 99

The unit is being operated at 40% power with pressurizer level at program. RCS temperature is within 0.1°F of Tref.

If power is raised from 40% to 60% and all control systems are maintained on program, pressurizer level will increase from approximately ...

A. 35% to approximately 41%.

B. 35% to approximately 46%.

C. 39% to approximately 41%.

D. 39% to approximately 46%.

Question: 100

Both Rod Drive MG sets are in operation when entry is made into FRP-S.1, Response to Nuclear Power Generation/ATWS.

Which of the following local operator actions would result in the control rods dropping into the core most rapidly once the action is performed?

A. Removing the control power fuses for both rod drive MG sets at 480V Buses 1D2 and 1E2

B. Tripping the supply breakers for both 480V Buses 1D2 and 1E2

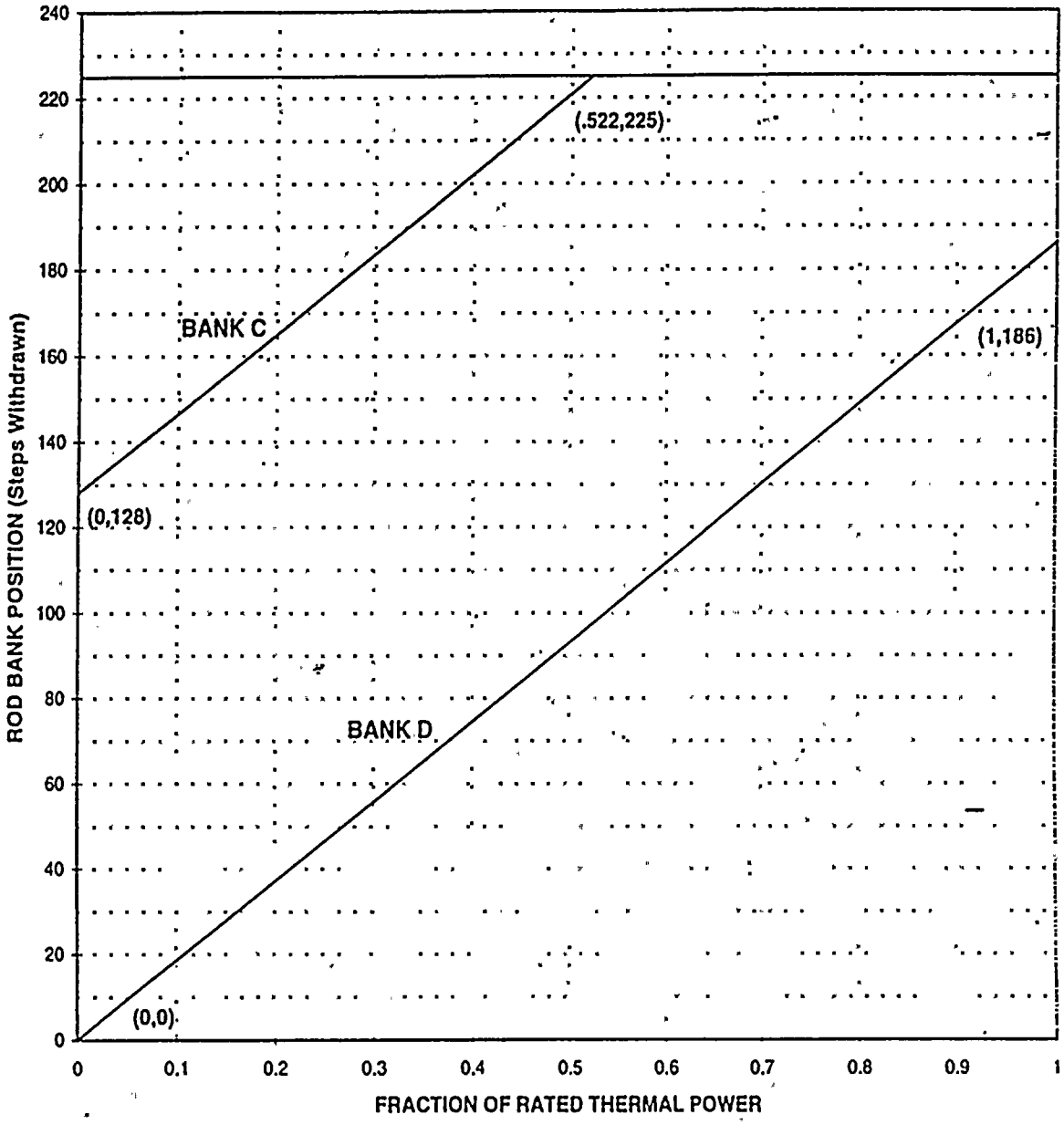
C. Opening both rod drive MG set motor breakers

D. Opening both rod drive MG set generator breakers

Harris Unit 1 Cycle 8
Core Operating Limits Report - Rev. 0

Figure 2

Rod Group Insertion Limits Versus Thermal Power
(Three-Loop Operation)

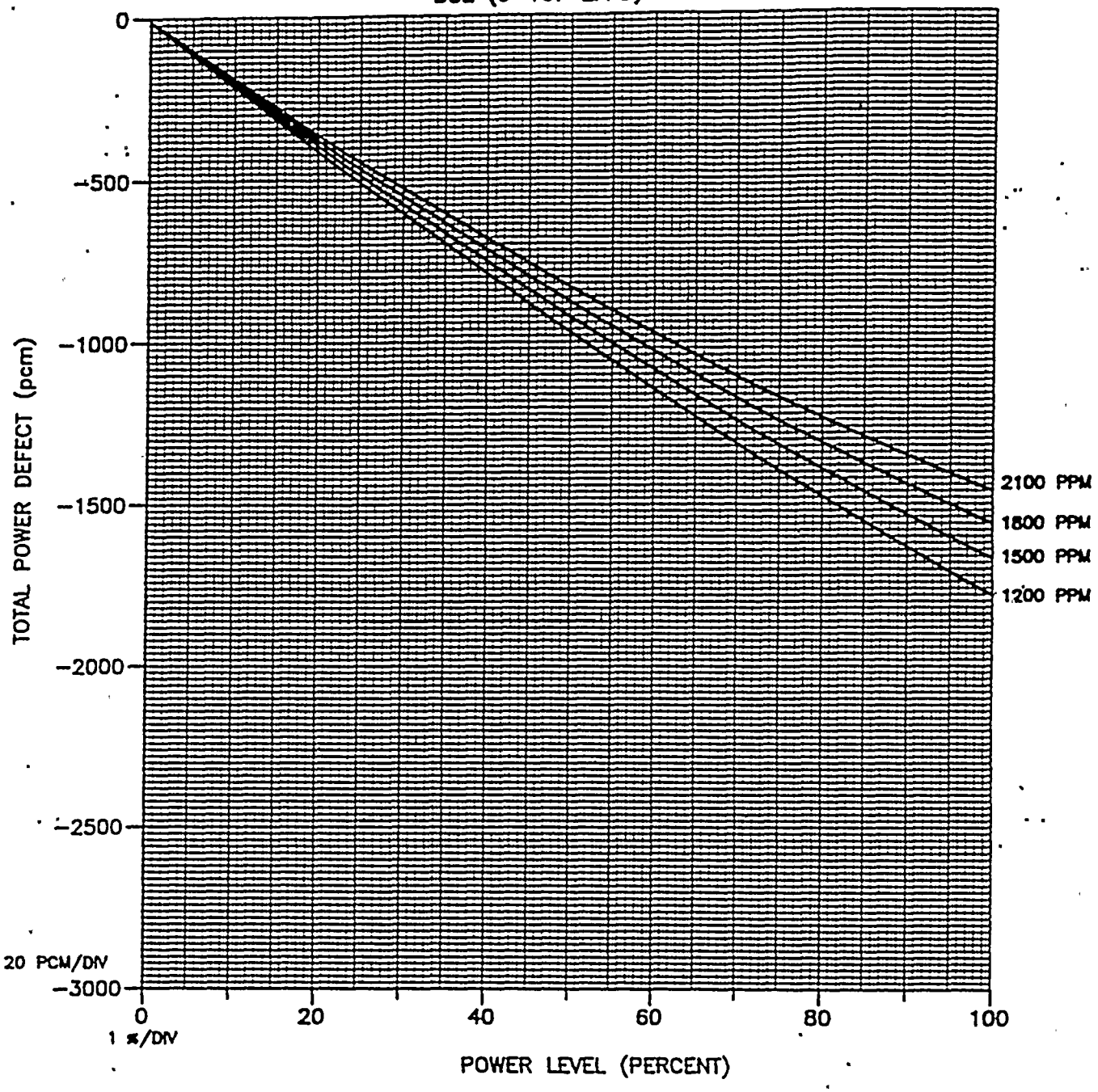


(Fully withdrawn shall be 225 steps)

Note: Control Banks A and B must be withdrawn from the core prior to power operation.

HARRIS UNIT 1 CYCLE 8
POWER DEFECT vs. POWER LEVEL
for VARIOUS BORON CONCENTRATIONS

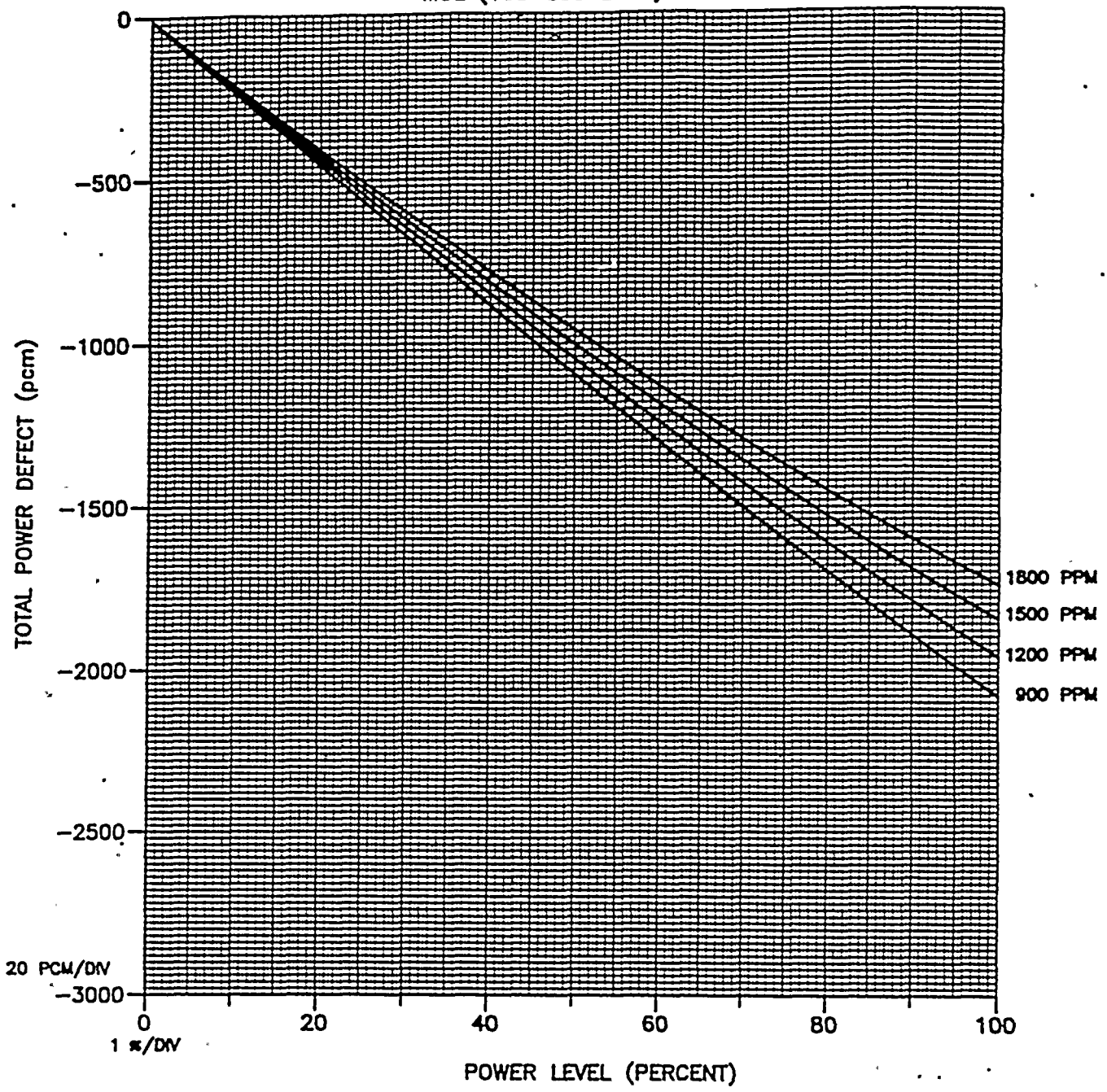
BOL (0-167 EFPD)



CURVE NO.	C-8-1	REV. NO.	0
ORIGINATOR		DATE	5-16-97
SUPERVISOR		DATE	5/19/97
SUPERINTENDENT			
SHIFT OPERATIONS		DATE	5-23-97

HARRIS UNIT 1 CYCLE 8
POWER DEFECT vs. POWER LEVEL
for VARIOUS BORON CONCENTRATIONS

MOL (168–335 EFPD)

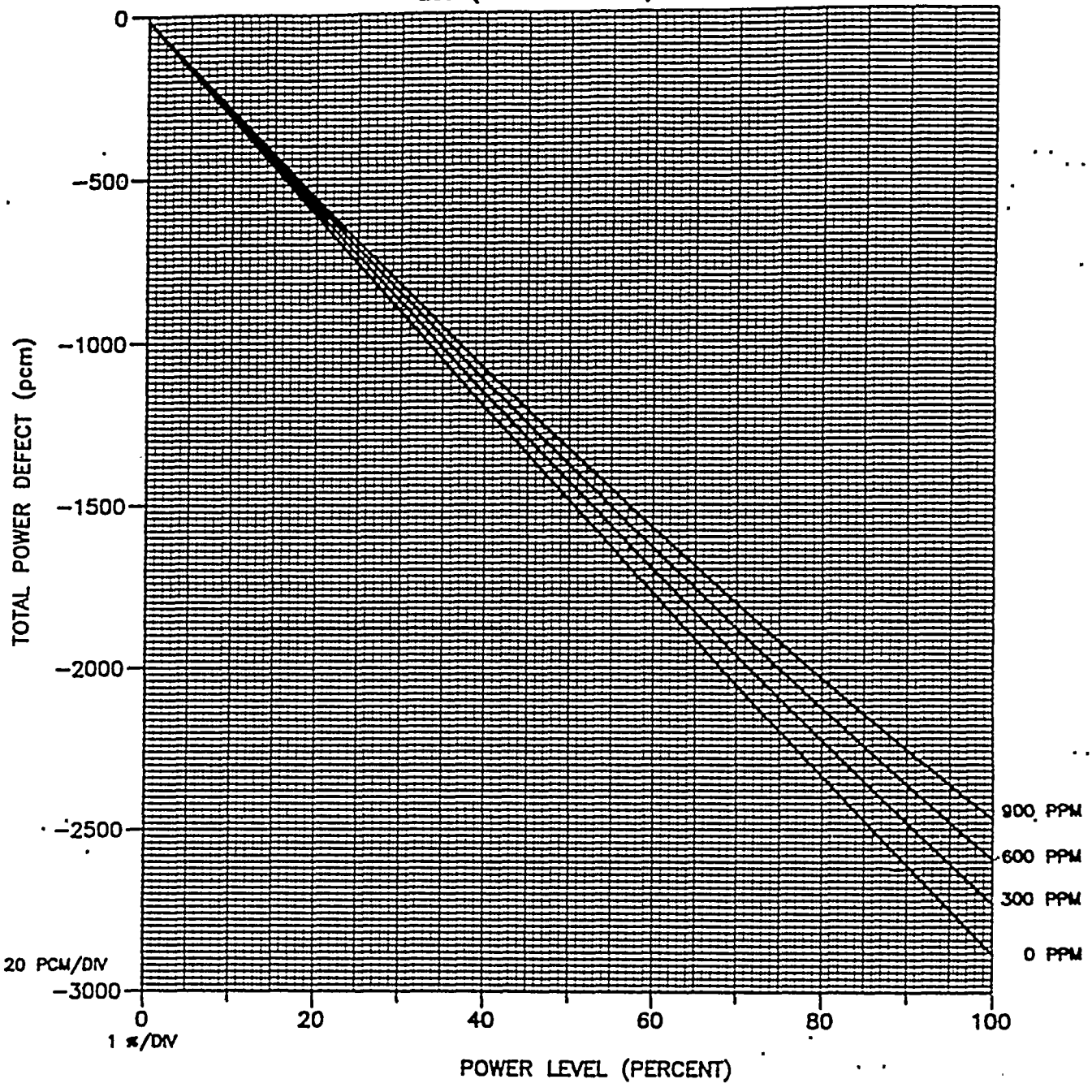


CURVE NO.	C-8-2	REV. NO.	0
ORIGINATOR		DATE	5-16-97
SUPERVISOR		DATE	5/19/97
SUPERINTENDENT	—		
SHIFT OPERATIONS		DATE	5-23-97

C-8-2

HARRIS UNIT 1 CYCLE 8
POWER DEFECT vs. POWER LEVEL
for VARIOUS BORON CONCENTRATIONS

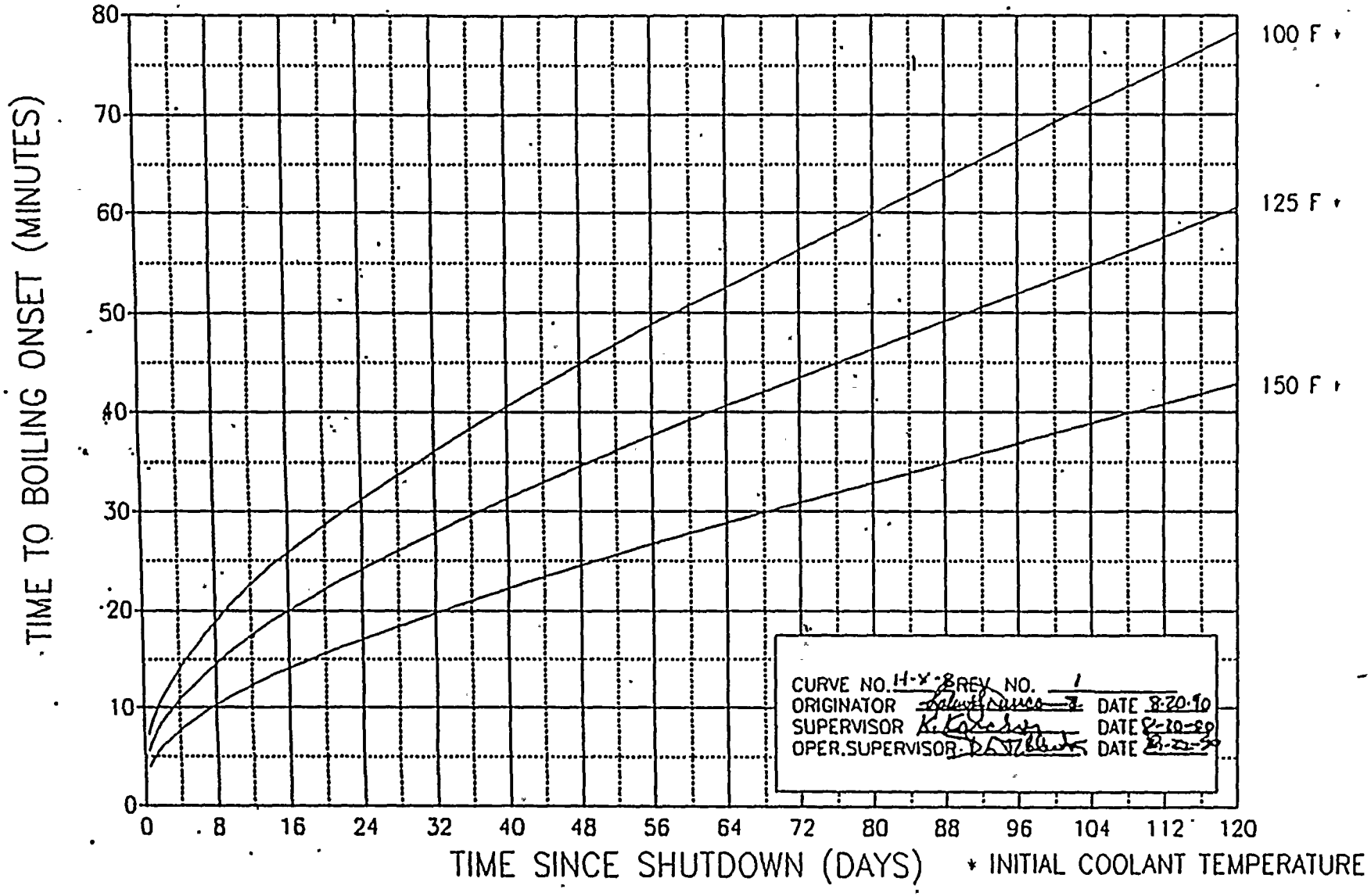
EOL (336-513 EFPD)



CURVE NO.	C-8-3	REV. NO.	0
ORIGINATOR	[signature]	DATE	5-16-97
SUPERVISOR	[signature]	DATE	5/19/97
SUPERINTENDENT	—		
SHIFT OPERATIONS	[signature]	DATE	5-23-97

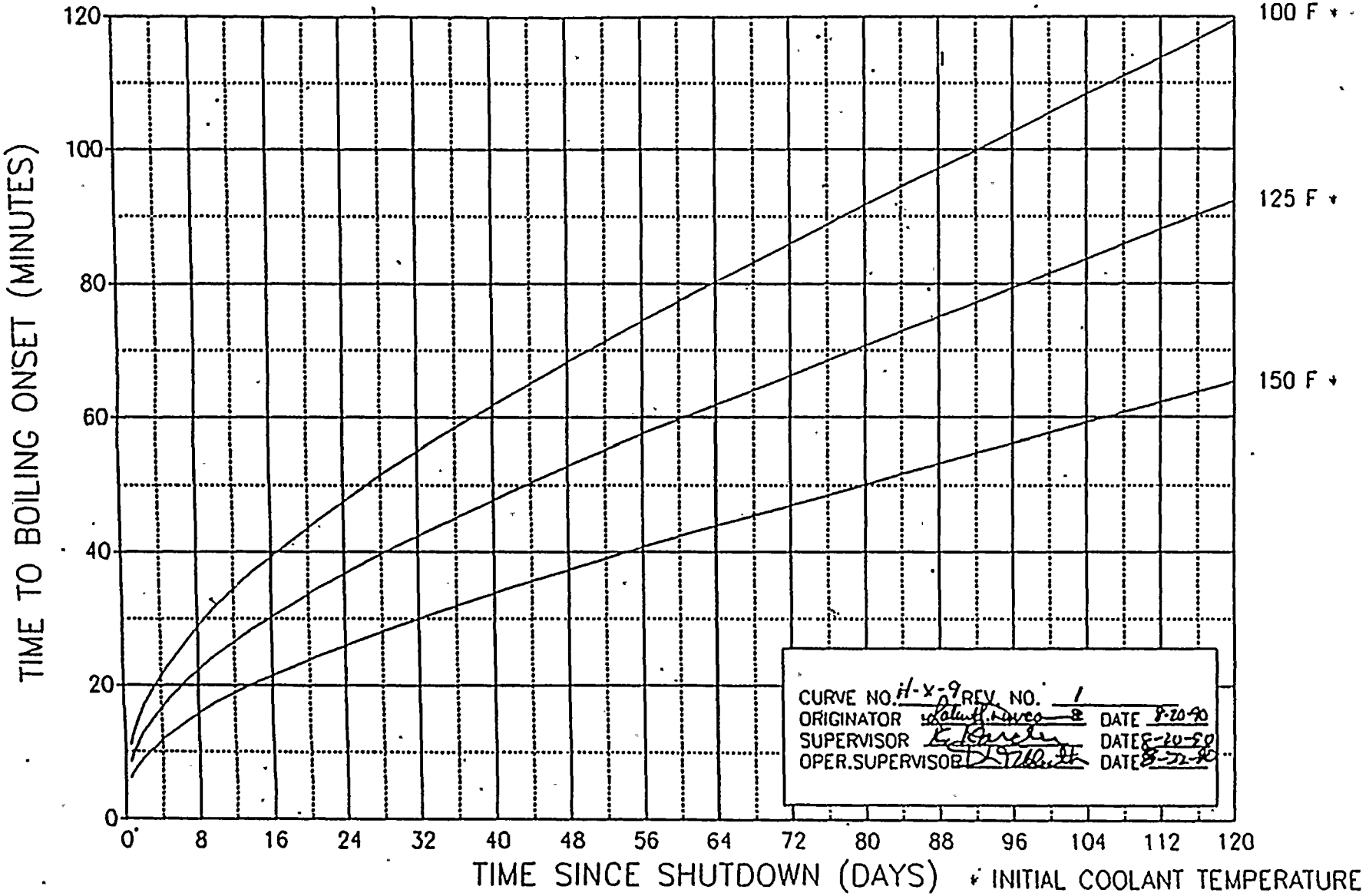
C-8-3

LOSS OF RHR
RCS BOILING CURVES FROM MIDLOOP

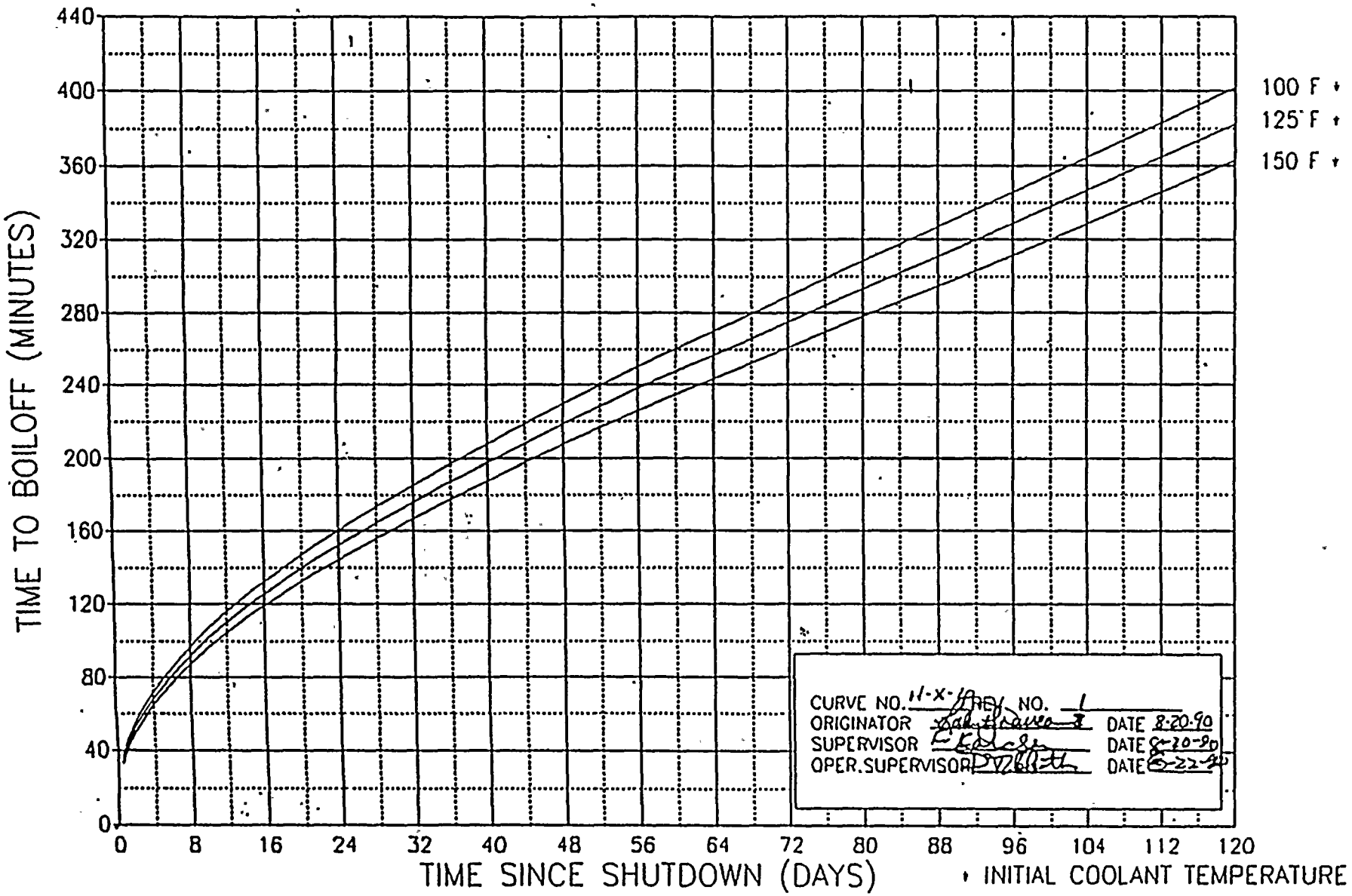


* INITIAL COOLANT TEMPERATURE

LOSS OF RHR
RCS BOILING CURVES AT VESSEL FLANGE



LOSS OF RHR
RCS BOILOFF CURVES FROM MID LOOP TO TOP OF FUEL



LOSS OF RHR
RCS BOILOFF CURVES FROM VESSEL FLANGE TO TOP OF FUEL