OPERATING OUTLINE SUBMITTAL

Facility: Farley Nuclear Plant
Date of Examination: March 8, 2010
Examination Level: **SRO + RO**
Operating Test Number: FA2010301

Administrative Topic (see Note)	Type Code *	Describe activity to be performed
A1.1.A Conduct of Operations **RO portion**	N / R	Verification of Initial Conditions Prior to Core Alterations. Given a set of plant conditions with fuel movement in progress, determine if all Core Alterations initial conditions are satisfied using UOP-4.1. G2.1.40 (2.8/3.9) G2.1.36 (3.0/4.1) G2.1.32 (3.8/4.0)
A1.1.A Conduct of Operations SRO portion	N / R	Verification of Initial Conditions Prior to Core Alterations. Given a set of plant conditions with fuel movement in progress, determine if all Core Alterations initial conditions are satisfied using UOP-4.1, and then list all Tech Spec conditions, REQUIRED ACTIONS and COMPLETION TIMES for LCOs not met. G2.1.40 (2.8/3.9) G2.1.36 (3.0/4.1) G2.2.1.35 (2.2/3.9) G2.1.32 (3.8/4.0)
A1.2.S Conduct of Operations SRO ONLY	D / R	Conduct A Safety Shutdown Assessment and Determine Time to Saturation. G2.1.25 (3.9/4.2)
A2.1.A Equipment Control SRO + RO	D / R	Perform a Shutdown Margin Calculation in modes 1 & 2 for a stuck rod (STP-29.5) 001A4.11 (3.5/4.1) APE005 AK1.05 (3.3/4.1)
A3.1.A Radiation Control SRO + RO	M / R	Calculate the Maximum Permissible Stay Time within Emergency Dose Limits. G2.3.4 (3.2/3.7)
A4.1.A Emergency Plan – SRO + RO	M / S	Monitor the Critical Safety Function Status Trees manually (CSF-0.0) G2.4.14 (3.8/4.5) G2.4.21 (SRO 4.0/4.6)

* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) **[1/2]**
(N)ew or (M)odified from bank (≥ 1) **[3/3]**
(P)revious 2 exams (≤ 1; randomly selected) **[0/0]**

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Examination Level: **SRO + RO**
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Administrative Topic (see Note)	Type Code *	Describe activity to be performed
A1.1.A Conduct of Operations **RO portion**	N / R	Verification of Initial Conditions Prior to Core Alterations. Given a set of plant conditions with fuel movement in progress, determine if refueling operations can continue, and if not, the reason(s) that prohibit refueling from continuing. UOP-4.1 P&Ls and TS and TRM requirements. G2.1.40 (2.8/3.9) G2.1.36 (3.0/4.1) G2.1.32 (3.8/4.0) Perform UOP-4.1 appendix 6 and determine if all core alteration initial conditions are satisfied. This will be done in the classroom and we will use pictures of the NI's and radiation monitors that will show that one NI is not working and the audio count rate selector switch is selected to that NI. Also with fuel movement in the SFP there will be one radiation monitor that is inoperable due to it being in test.
A1.1.A Conduct of Operations **SRO portion**	N / R	Verification of Initial Conditions Prior to Core Alterations. Given a set of plant conditions with fuel movement in progress, determine if all Core Alterations initial conditions are satisfied using UOP-4.1, and then list all Tech Spec conditions, REQUIRED ACTIONS and COMPLETION TIMES for LCOs not met. G2.1.40 (2.8/3.9) G2.1.36 (3.0/4.1) G2.2.1.35 (2.2/3.9) G2.1.32 (3.8/4.0) This is the same JPM as above with the requirement to evaluate Tech Specs and TRM requirements that cover the conditions given and the REQUIRED ACTIONS and COMPLETION TIMES of TS 3.9.2 and TRM 13.3.4.
A1.2.S Conduct of Operations **SRO ONLY**	D / R	Conduct A Safety Shutdown Assessment and Determine Time to Saturation. G2.1.25 (3.9/4.2) This JPM will have the candidate evaluate plant conditions, use a table to determine time to boiling and then fill out UOP-4.0, figure 1a Core Cooling section only. This is only performed by the SRO job function at Farley Nuclear Plant.
A2.1.A Equipment Control **SRO + RO**	D / R	Perform a Shutdown Margin Calculation in modes 1 & 2 for a stuck rod (STP-29.5) 001A4.11 (3.5/4.1) APE005 AK1.05 (3.3/4.1) One Bank D rod is 30 steps below the other seven Bank D rods. Determine the SDM and that an emergency boration is required.

OPERATING OUTLINE SUBMITTAL

A3.1.A Radiation Control SRO + RO	M / R	Calculate the Maximum Permissible Stay Time within Emergency Dose Limits. This JPM has the candidate assess a job where two workers will be assigned a task during an emergency event to save a valuable piece of equipment. There will be three stages to the task in which the dose rate is given and time required to complete the task is given. The year to date dose rates will be given and the task will be to determine if either of the workers will exceed their dose limits of EIP-14. Information required to be known is that EDLs do not take into account current dose, admin limits and NRC limits do not apply and the EIP-14 limits must be applied properly. G2.3.4 (3.2/3.7)
A4.1.A Emergency Plan – SRO + RO	M / S	Monitor the Critical Safety Function Status Trees manually (CSF-0.0) G2.4.14 (3.8/4.5) G2.4.21 (SRO 4.0/4.6) The simulator will be used requiring the candidate to determine the appropriate CSF that applies. We have a snap setup that has N-42 failed high which will cause evaluation of FRP-S, to show a yellow path on FRP-C and H, an Orange path on FRP-P and Z. A manual determination of CSF-0 will be required as to which FRP is applicable based on the setup. The RO will identify all the CSFs that are challenged and the SRO will have to use the procedures to determine which procedure is required due to the plant conditions.
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) **[1/2]** (N)ew or (M)odified from bank (≥ 1) **[3/3]** (P)revious 2 exams (≤ 1; randomly selected) **[0/0]**		

Changes since the draft submittal:

A1.1.A

We could not find procedural guidance for the RHR flow requirement so a radiation monitor for the procedure being used was substituted for the RHR flow. Changed the appropriate Tech Spec to TRM 13.3.4 to adjust for the radiation monitor Inoperable.

A3.1.A

added the KA value to ES-301-1 G2.3.4 (3.2/3.7)

A4.1.A

We could not get the submitted simulator results fo having FRP-P.1 a red path, but we developed one with an Orange path. We also put in a failed NI into the scenario that will have FRP-S evaluated since one NI is >5% power, but failed, so it is not relevant.

A.1.1.A Conduct of Operations ADMIN G2.1.40 – RO & SRO

A.1.1.A
TITLE: Verification of Initial Conditions Prior to Core Alterations.
PROGRAM APPLICABLE: SOT ___ SOCT _____ OLT _X_ LOCT_____
ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS
EVALUATION LOCATION: ____ SIMULATOR ___ CONTROL ROOM _X_ CLASSROOM
PROJECTED TIME: _20 MIN_ SIMULATOR IC NUMBER: _N/A
ALTERNATE PATH ___ TIME CRITICAL ___ PRA_____

JPM DIRECTIONS:

1. This task is to be administered in a group, classroom setting with access to a variety of procedures (UOPs, STPs, SOPs, et al) available via the Exam Reference disk.
2. This task is designed to be performed with evaluation of pictures of the equipment from which operational information will be evaluated.
3. Due to the utilization of pictures, upon request, the status of the lights and switches may be clarified (See standards for the applicable light/switch).
4. Upon completion of elements 1-10, **all candidates** will be evaluated at the RO level.
5. **FOR SRO candidates ONLY:** after evaluation of elements 1-10, they will be provided a second Cue sheet (handout #2) and returned to the classroom to evaluate TS.

TASK STANDARD: Required for successful completion of this JPM:

- Evaluates all steps of UOP-4.1, Appendix 6, Verification Of Initial Conditions Prior To Core Alterations.
- Identifies all inoperable equipment or unsatisfied conditions that prevent completing the attachment, if any.
- **(For SRO ONLY):**
  - Based on the conditions identified List all TS CONDITIONS, REQUIRED ACTIONS and COMPLETION TIMES for LCOs not met.

Examinee:		
Overall JPM Performance:	**Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)		

EXAMINER: _____

Developer	H. Fitzwater	10/26/09
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

CONDITIONS

When I tell you to begin, you are to perform or evaluate all steps FNP-1-UOP-4.1, Appendix 6, Verification of Initial Conditions Prior to Core Alterations. The conditions under which this task is to be performed are:

a. Core Offload was suspended 18 hours ago.
b. RCS temp is 100°F.
c. Time to boil is >2 hours.
d. A Fuel shuffle in the Spent Fuel Pool is ongoing.
e. Communications between the MCR and a System Operator acting as the Cavity Watch have been verified available 10 minutes ago.
f. RCS boron concentration is 2450 ppm following an over boration performed last shift.
g. Rx Makeup water is being used to dilute the Reactor Cavity by chemistry's request.
h. FNP-1-STP-18.4, Containment Midloop and/or Refueling Integrity Verification and Containment Closure, was completed yesterday at 1400.
i. CTMT Main Purge system is in operation.
j. The equipment hatch and all containment air locks are currently closed.
k. Applicable equipment can be assessed using the provided photographs.
l. You have been directed to perform or evaluate all steps of FNP-1-UOP-4.1, Appendix 6.
m. Determine whether or not all Core Alterations initial conditions are satisfied.

INITIATING CUE: "You may begin."

EVALUATION CHECKLIST

ELEMENTS:	**STANDARDS:**	**RESULTS: (CIRCLE)**
_____ START TIME		
1. **(STEP 2.1 & 2.2)** Checks correct version and conducted on appropriate unit.	1) **Determines step 2.1 & 2.2 has been completed.** Utilizes WebTop and verifies unit from initial conditions	S / U
2. **(STEP 3.1)** Communications between MCR and the Reactor Cavity verified within one hour.	2) **Determines step 3.1 has been completed.** Utilizes initial conditions to verify task complete.	S / U

NOTE: • Elements 3 through 5, 7 and 8 are performed by use of pictures. The pictures are sufficient to demonstrate light status and switch position, however **IF** light status or position is questioned, then the cues may be provided (see the standards column for the applicable light or switch).

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
3. **(STEP 3.2.1)** Verify N-31, Source Range NI, detector operable. (reference SOP-39.0 section 4.1) a. Check N-31 Instrument power on AND control power on lights illuminated. b. Check switches aligned: i. Level Trip ii.Operation Selector iii.High Flux at shutdown c. Perform a channel check per STP-1.0 (SR 3.9.2.1).	3) **Determines step 3.2.1 has been satisfied**; Utilizes picture of N-31 and determines that the instrument is operable. a. lights are illuminated b. Switches are in position: i. Normal ii. Normal iii. Normal c. Acceptable per STP-1.0 allowances	S / U
* 4. **(STEP 3.2.2)**Verify N-32, Source Range NI, detector operable. (reference SOP-39.0 section 4.1) a. Check N-32 Instrument power on AND control power on lights illuminated. b. Check switches aligned: i. Level Trip ii.Operation Selector iii.High Flux at shutdown c. Performs a channel check per STP-1.0 (SR 3.9.2.1).	4) **Determines step 3.2.2 can not be satisfied**; Utilizes picture of N-32 and determines that the instrument is **NOT** operable. a. Lights are checked • **Control power light is <u>NOT</u> illuminated.** • **Instrument power is illuminated.** b. Switches are determined; i. Normal ii. Normal iii. Normal c. Acceptable per STP-1.0 allowances.	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
5. **(STEP 3.2.3)**Verify N-48, Gamma-metrics Source Range NI, detector operable. (reference SOP-39.0 section 4.3) a. Checks N-48 in service. b. Performs a channel check per STP-1.0 (SR 3.9.2.1).	**5) Determines step 3.2.3 has been satisfied.** (May identify that the Refueling Coordinator must first be consulted.) a. Aligned and in service as indicated by picture and bulleted items listed on picture. b. Acceptable per STP-1.0 Table 1 allowances.	S / U
6. **(STEP 3.3)** Reactor Coolant system 2000 ppm.	**6) Determines step 3.3 has been satisfied;** Utilizes initial conditions to verify boron concentration.	S / U

NOTE: Element 7 would require either R-5 being in service **OR** required action being taken. The candidate might question whether or not surveys are being performed. Additionally, due to rules of usage may stop the task and attempt to notify the SS.

IF required CUE: "The SS acknowledges the issue you have identified and directs you to continue. No compensatory actions have yet been completed."

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
* 7. **(STEP 3.4.1)** Verifies R-5 operable/operating. (Reference:SOP-45.0 section 4.1.3; TRM 13.3.4) a. Verify Operation Selector switch position. b. Verify Range Selector switch position. c. Verify Drawer indication lights: i. Power ii. Channel Test light iii. High Alarm iv. Low Alarm	7) Identifies R-5 is **NOT** operable/operating; **Determines step 3.4.1 has NOT been satisfied.** (May annotate failure or need to initiate survey). **a. *Level Cal.*** b. WIDE c. Lights are: i. ON **ii. ON** iii. OFF iv. OFF	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
8. **(STEP 3.4.2 through 3.4.4)** Verifies R-24AorB, R-25AorB, and R-35AorB operable using SOP-45.0 section 4.1.5. (uses pictures of LOCAL radiation monitor indications to determine the following conditions) a. Verify local switch for vacuum pump. b. Verify LOCAL switch position. (uses pictures of radiation monitor drawers to determine the following conditions) c. Verify MCR switch: i. Operation selector ii. Pump Power iii. Pump Start d. Verify MCR lights: i. Power light ii. Pump ON light iii. Flow fault light iv. Alert light v. High light vi. Fail/Reset light vii. Power on light	8) Identifies radiation monitors are operable; **Initials step 3.4.2 through 3.4.4.** The following indications are for all steps 3.4.2 through 3.4.4: a. AUTO b. ON (and Fans are running) c. MCR switches are: i. Oper ii. ON iii. Start/Neutral d. MCR lights are: i. ON ii. ON iii. OFF iv. OFF v. OFF vi. ON vii. ON	S / U
9. **(STEP 3.5 through 3.6)** Evaluates Refueling integrity has been verified within 100 hrs, and that step 3.6 is not applicable.	9) Utilizes initial conditions and evaluates that step 3.5 is satisfied and 3.6 in N/A.	S / U

NOTE: REVIEW of completed Appendix 6 to evaluate the above elements.

CUE: Are core alterations initial conditions satisfied?

* 10. Reports/annotates that step 3.2.2 and 3.4.1 are not completed or satisfied and that core Alts should not be started.	10) **Identifies N32 inoperable, R-5 inoperable and that Core alterations should not be permitted since the initial conditions have not been satisfied.**	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)

RO ONLY: Terminate when elements 1-10 of the task have been completed.

SRO ONLY Cue: PROVIDE Handout #2, read and escort back to classroom to allow TS review.
Based on the conditions you identified perform the following:

1) List all TS CONDITIONS, REQUIRED ACTIONS and COMPLETION TIMES for LCOs not met, if any.

*	11. Evaluates TS 3.9.2 Condition C: Inoperable Audio Counts.	11) Identifies the need to **IMMEDIATELY verify** un-borated water sources are isolated.	S / U
*	12. Evaluates TRM 13.3.4 condition B.	12) Identifies the need to **IMMEDIATELY notify HP to perform survey** the SFP area within 24 hours.	S / U

NOTE: • **TS 3.9.2 Condition A is not required to be entered due to Gamma Metrics (as allowed by BASIS) and N-31 are OPERABLE.** CONDITION A may be implemented and does not challenge personnel safety, equipment or license requirements.

However, **IF** CONDITION A is implemented, **THEN** element 13 is critical.

SEE NOTE	13. IF TS 3.9.2 implemented, THEN evaluates TS 3.9.2 CONDITION A: One source range neutron flux monitor inoperable.	13) Identifies the need to **IMMEDIATELY** Suspend CORE ALTERATIONS AND positive reactivity additions (secure Reactor Cavity Makeup).	S / U

SRO ONLY: Terminate when elements 1-13 of the task are complete.

_____ STOP TIME

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) before the element number.

GENERAL REFERENCES:

1. UOP-4.1, VER 51
2. KA: # G2.1.40 2.8 3.9
   G2.1.36 3.0 4.1
   G2.1.32 3.8 4.0

GENERAL TOOLS AND EQUIPMENT:

1. References to be accessed via classroom computer (using exam ID logon) and Exam Reference disk/files only.
2. Provide UOP-4.1, Appendix 6
3. Pen/pencil
4. Pictures of the following components: (11 pages total)
   a. R-24A Local indications
   b. R-24B Local indications
   c. R-25A Local indications
   d. R-25B Local indications
   e. R-35A Local indications
   f. R-35B Local indications
   g. R24A & R25A MCR indications
   h. R-24B & R25B MCR indications
   i. R-35A & R35B MCR indications
   j. N31drawer indications
   k. N32 drawer indications
   l. N31, N32 & N48 Board indications
   m. Audio Count Rate Channel Drawer

Critical ELEMENT justification:

STEP	**Evaluation**

NOTE:	The listed sub-steps to each element (a.b.c…) describe the anticipated actions taken by the candidate. Completion of all substeps is **not required** to make the determination of operability of the components, nor is it intended that these actions be observed. These sub-steps are provided for the examiner as an evaluation tool.

1. NOT critical—this step is for satisfying site procedural protocol and expectations.
2. NOT critical— this step is for satisfying site level expectations or requirements.
3. NOT critical—Although Task objective-component is operable.
4. **Critical Element** —Task objective-evaluate operability of required equipment.
5. NOT critical—Although Task objective-component is operable.
6. NOT critical — this step does not require any evaluation from the candidate.
7. Critical Element —Task objective-evaluate operability of required equipment.
8. NOT critical—Although Task objective-components are operable.
9. **Critical Element**—FINAL Task objective-identifies that initial conditions are not satisfied for Core Alts.
10. NOT critical— this step does not require any evaluation from the candidate.

SRO 11 **Critical Element**—IDENTIFIES and IMPLEMENTS the Actions for License requirement.

SRO 12 **Critical Element**—IDENTIFIES and IMPLEMENTS the Actions for License requirement.

SRO 13 **Conditional Critical Element**—IDENTIFIES and IMPLEMENTS the Actions for License requirement.

- IF the candidate implements this TS condition, then the actions must also be initiated to comply with License requirements.

COMMENTS:

References expected to be utilized:
STP-1.0 Table 1 and Appendix 3, Ver. 97.0; channel check information
M-50 Master list of Surveillance Tests, Ver. 25.0; determine channel check procedure
SOP-39.0, Nuclear Instrumentation System, Ver. 9.0; evaluate switch alignment/operability
SOP-45.0, Radiation Monitoring System, Ver. 35.0; evaluate switch alignment/operability
TRM 13.3.4 and Basis, Ver. 3.0
TS 3.9.2 and Basis, Amendment 146 (U-1), Amendment 137 (U-2)
UOP-4.1, CONTROLLING PROCEDURE FOR REFUELING, Ver. 51.0

TO DISCUSS with the examiner:
Due to procedure rules of usage, a candidate may stop performing the steps upon encountering the first malfunction; therefore the candidate may not have evaluated all components/steps expected.

Possible options:

- Brief all students verbally prior to providing the task or provide the following as part of the initial conditions:

  For the purposes of this task, complete the Appendix in its entirety. Any actions, permissions or notifications required by any identified discrepancies, or procedure step, will be conducted upon completion of all other steps of the Appendix. Annotate any condition identified or the action, the permission, or the notification required for discussion upon completion of the appendix for any, if any, step that can not be completed.
- Facilitate with Cues at the evaluation phase to resolve the expected actions while monitoring the completion of the remaining elements.
- Facilitate with Cues at the evaluation phase then return the candidate to complete the remaining elements.

CONDITIONS

Based on the conditions you identified evaluate TS and TRM requirements and perform the following:

a. List all TS CONDITIONS, REQUIRED ACTIONS and COMPLETION TIMES for LCOs not met, if any.

CONDITIONS

When I tell you to begin, you are to perform or evaluate all steps FNP-1-UOP-4.1, Appendix 6, Verification of Initial Conditions Prior to Core Alterations. The conditions under which this task is to be performed are:

a. Core Offload was suspended 18 hours ago.
b. RCS temp is 100°F.
c. Time to boil is >2 hours.
d. A Fuel shuffle in the Spent Fuel Pool is ongoing.
e. Communications between the MCR and a System Operator acting as the Cavity Watch have been verified available 10 minutes ago.
f. RCS boron concentration is 2450 ppm following an over boration performed last shift.
g. Rx Makeup water is being used to dilute the Reactor Cavity by chemistry's request.
h. FNP-1-STP-18.4, Containment Midloop and/or Refueling Integrity Verification and Containment Closure, was completed yesterday at 1400.
i. CTMT Main Purge system is in operation.
j. The equipment hatch and all containment air locks are currently closed.
k. Applicable equipment can be assessed using the provided photographs.
l. You have been directed to perform or evaluate all steps of FNP-1-UOP-4.1, Appendix 6.
m. Determine whether or not all Core Alterations initial conditions are satisfied.

APPENDIX 6

VERIFICATION OF INITIAL CONDITIONS
PRIOR TO CORE ALTERATIONS

Performed by: _____ Date _____

Reviewed by: _____ Date _____

This appendix consists of 2 pages

APPENDIX 6

VERIFICATION OF INITIAL CONDITIONS
PRIOR TO CORE ALTERATIONS

1.0 Purpose:

Provide separate guidance for specific initial conditions which will be needed to be verified more than once due to core alterations occurring at various time during an outage period.

2.0 Initial Conditions:

____ 2.1 The version of this appendix is the current version. (OR 1-98-498)

____ 2.2 This appendix is correct for the unit for which the task applies. (OR 1-98-498)

3.0 Instructions:

NOTE:	**This appendix should be completed each time core alterations are commenced, including suspensions of core alterations exceeding 12 hours.**

____ 3.1 The direct communications system between the control room and the reactor
__/__ cavity is verified available for use within one hour prior to core alterations.

CAUTION:	**The Gamma-Metrics source range channel may only be used as a back-up to N-31 or N-32 during certain core configurations. The Refueling Coordinator should be consulted if N-31 or N-32 becomes inoperable when the core is not fully loaded.**

3.2 Verify at least two of the required source range neutron flux monitors are operable with continuous visual indication in the Control Room and a channel check performed within 12 hours prior to any core alterations. Trip functions and associated TSLBs are not required for Mode 6 or core alterations.

____ 3.2.1 Source Range Nuclear Instrument, Channel N-31

____ 3.2.2 Source Range Nuclear Instrument, Channel N-32

____ 3.2.3 Gamma-Metrics Neutron Flux Monitor, Channel N-48

____ 3.3 The reactor coolant system boron concentration is $\geq$ 2000 ppm.

3.4 The following radiation monitors are in operation per FNP-1-SOP-45.0, RADIATION MONITORING SYSTEM, or required action is being taken per Tech. Specs 3.3.6, 3.3.7, and 3.3.8, and TR 13.3.4.

____ 3.4.1 R-5 Spent fuel storage or portable monitoring instrumentation used to monitor SFP area at least once per 24 hours (for fuel movement in SFP).

____ 3.4.2. R-25A or B Spent fuel storage – Gaseous (for fuel movement in SFP).

____ 3.4.3 R-24A or B - Containment purge system with main or mini purge in operation.

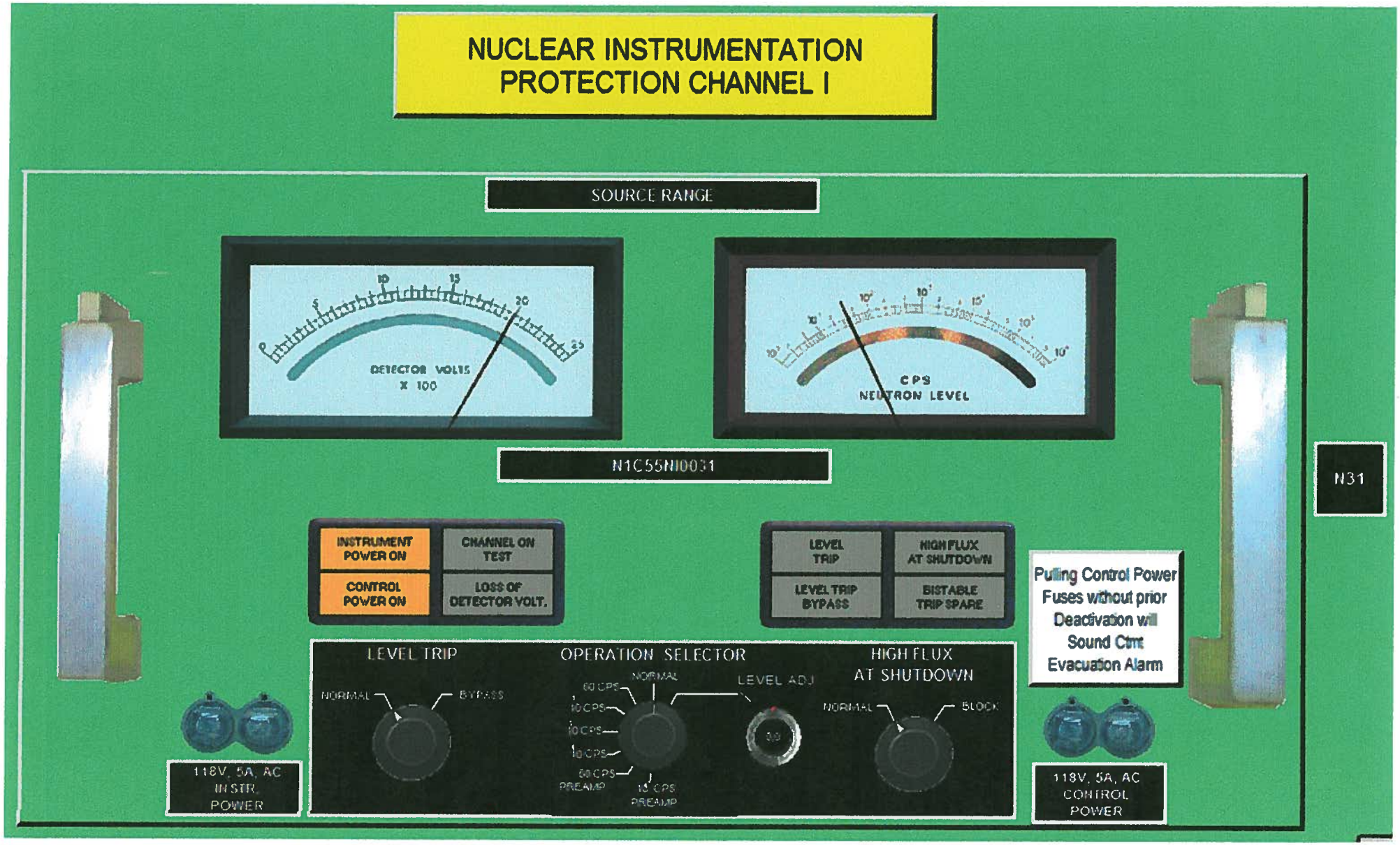
____ 3.4.4 R-35A or B - Control Room HVAC

____ 3.5 Refueling integrity has been verified per FNP-1-STP-18.4, CONTAINMENT
__/__ MIDLOOP AND/OR REFUELING INTEGRITY VERIFICATION AND CONTAINMENT CLOSURE within 100 hours prior to the start of core alterations.

3.6 IF the containment equipment hatch, personnel air lock, or auxiliary air lock is open during core alterations and/or during movement of irradiated fuel assemblies within containment, THEN ensure the following items are complete (TS 3.9.3):

____
__/__ 3.6.1 A designated, trained Maintenance Closure Response Team (MCRT)
MM is available to shut the containment equipment hatch, a door in the personnel air lock, and a door in the auxiliary air lock within two hours after notification and direction from the control room.

____
__/__ 3.6.2 For the equipment hatch, the surveillance is current for SR 3.9.3.3, i.e., FNP-0-STP-610.0 has been completed by Maintenance within the last seven days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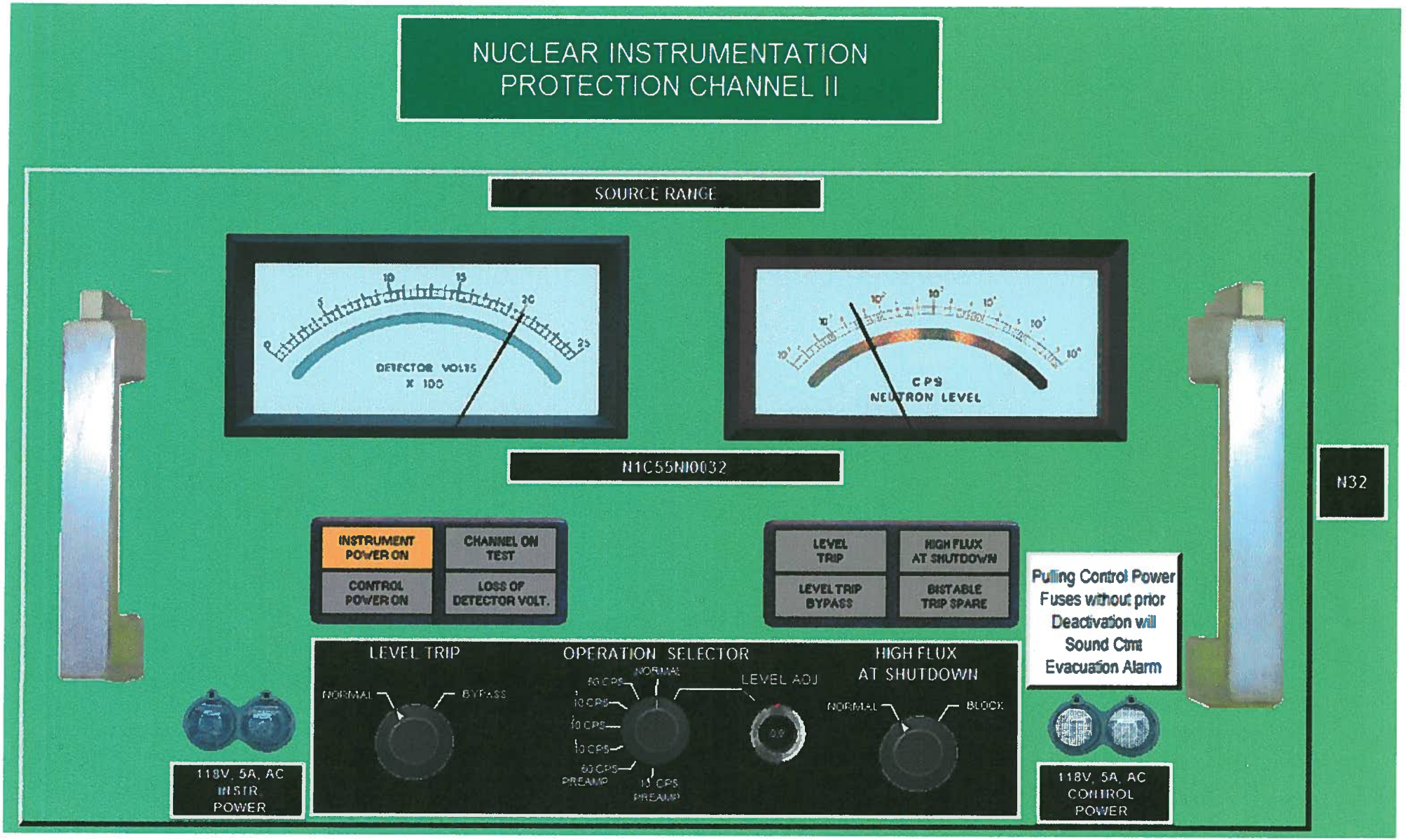
DETECTOR VOLTS
X 100
CPS
NEUTRON LEVEL
N1C55NI0031
N31
INSTRUMENT POWER ON
CHANNEL ON TEST
CONTROL POWER ON
LOSS OF DETECTOR VOLT.
LEVEL TRIP
HIGH FLUX AT SHUTDOWN
LEVEL TRIP BYPASS
BISTABLE TRIP SPARE
Pulling Control Power Fuses without prior Deactivation will Sound Ctmt Evacuation Alarm
LEVEL TRIP
NORMAL
BYPASS
OPERATION SELECTOR
NORMAL
LEVEL ADJ
60 CPS
10 CPS
1 CPS
0.1 CPS
60 CPS PREAMP
10 CPS PREAMP
HIGH FLUX AT SHUTDOWN
NORMAL
BLOCK
118V, 5A, AC INSTR. POWER
118V, 5A, AC CONTROL POWER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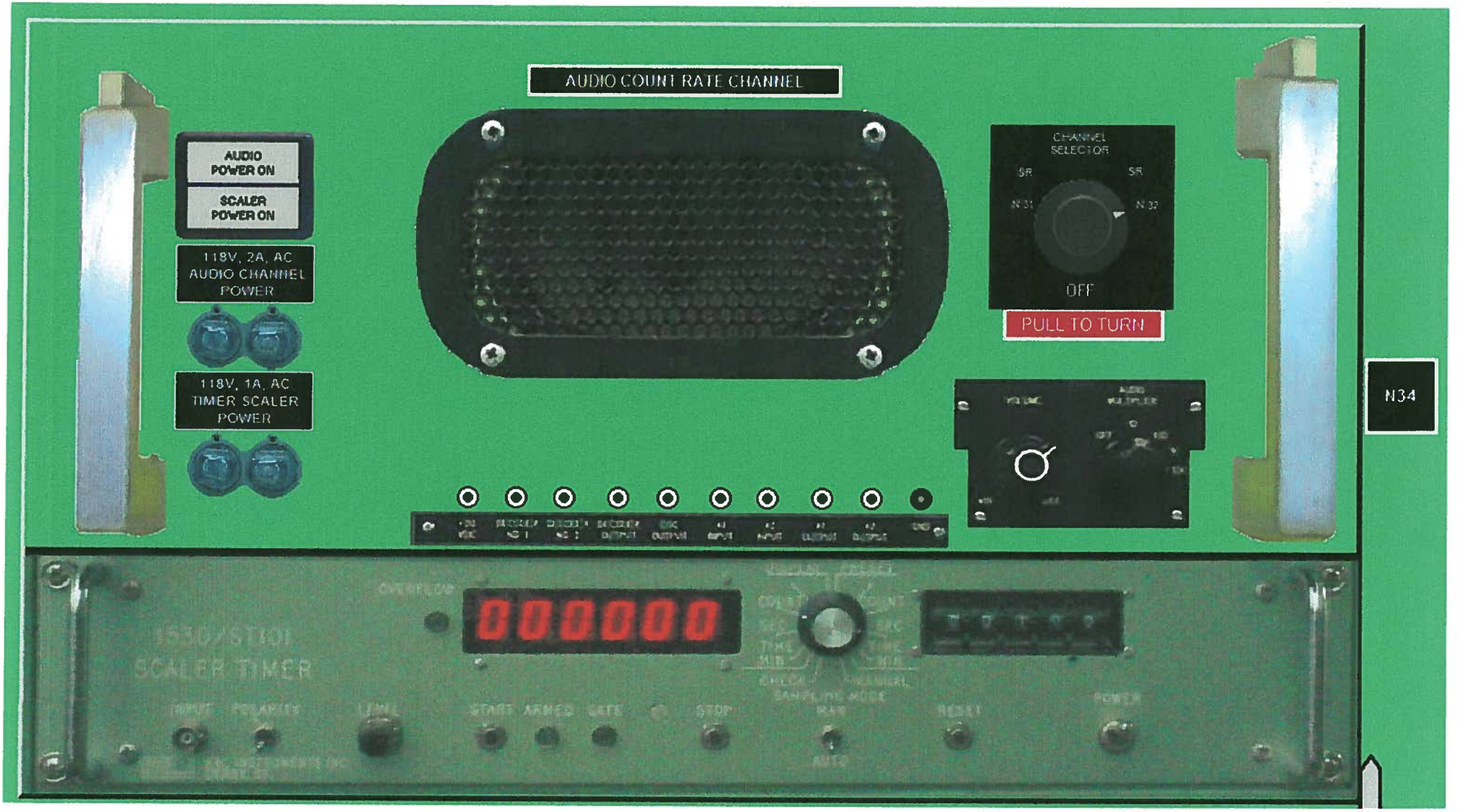
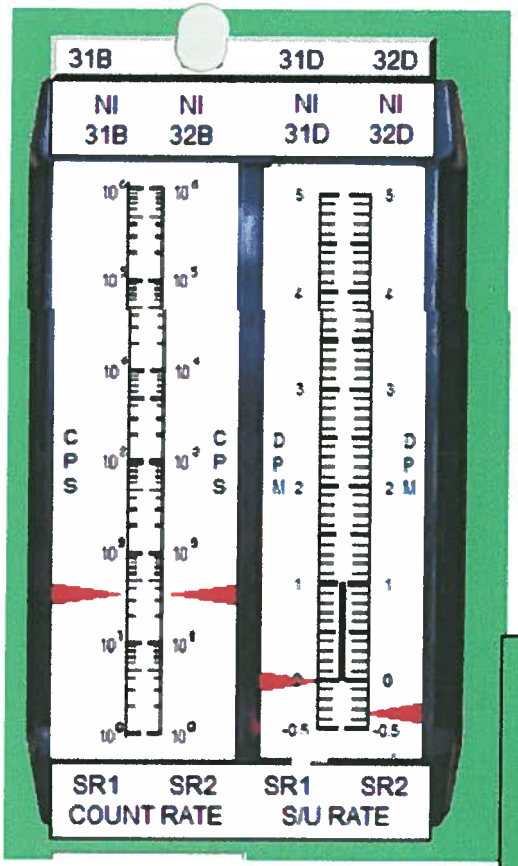
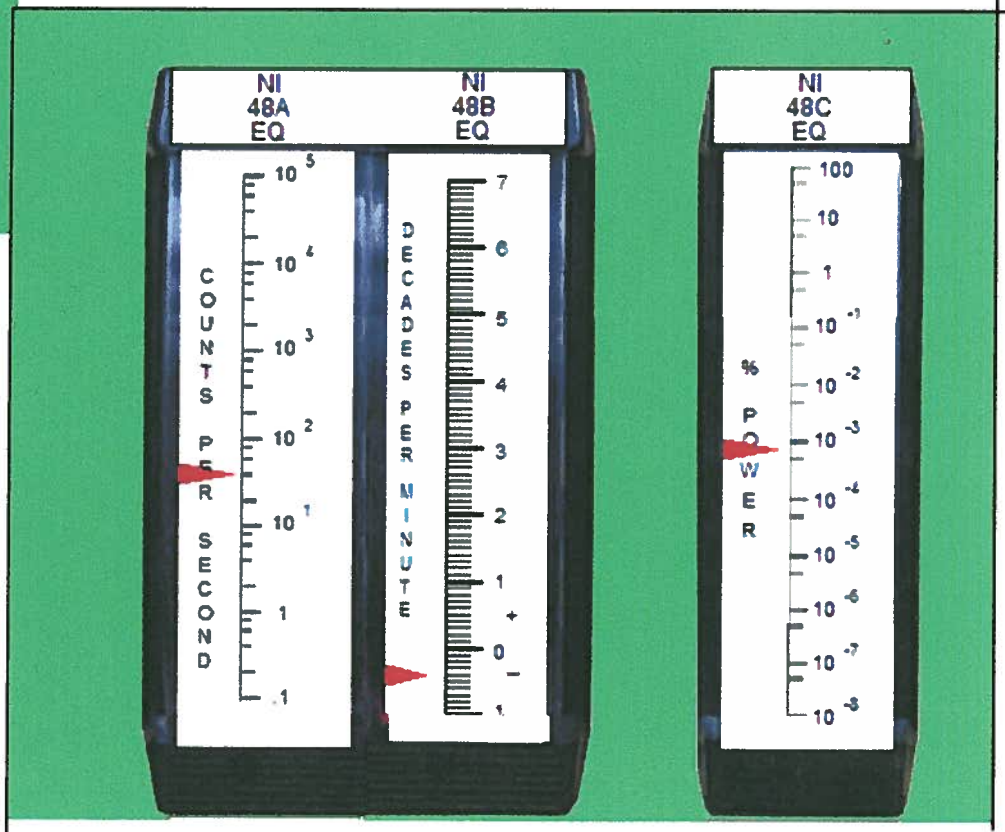
CHANNEL ON TEST
CONTROL POWER ON
LOSS OF DETECTOR VOLT.
LEVEL TRIP
HIGH FLUX AT SHUTDOWN
LEVEL TRIP BYPASS
BISTABLE TRIP SPARE
Pulling Control Power Fuses without prior Deactivation will Sound Ctmt Evacuation Alarm
LEVEL TRIP
NORMAL
BYPASS
OPERATION SELECTOR
NORMAL
LEVEL ADJ
50 CPS
10 CPS
10 CPS
10 CPS
50 CPS PREAMP
10 CPS PREAMP
HIGH FLUX AT SHUTDOWN
NORMAL
BLOCK
118V, 5A, AC INSTR. POWER
118V, 5A, AC CONTROL POWER


AUDIO COUNT RATE CHANNEL
AUDIO POWER ON
SCALER POWER ON
118V, 2A, AC AUDIO CHANNEL POWER
118V, 1A, AC TIMER SCALER POWER
CHANNEL SELECTOR
OFF
PULL TO TURN
N34
000000
SCALER TIMER
START
ARMED
GATE
STOP
RESET
POWER

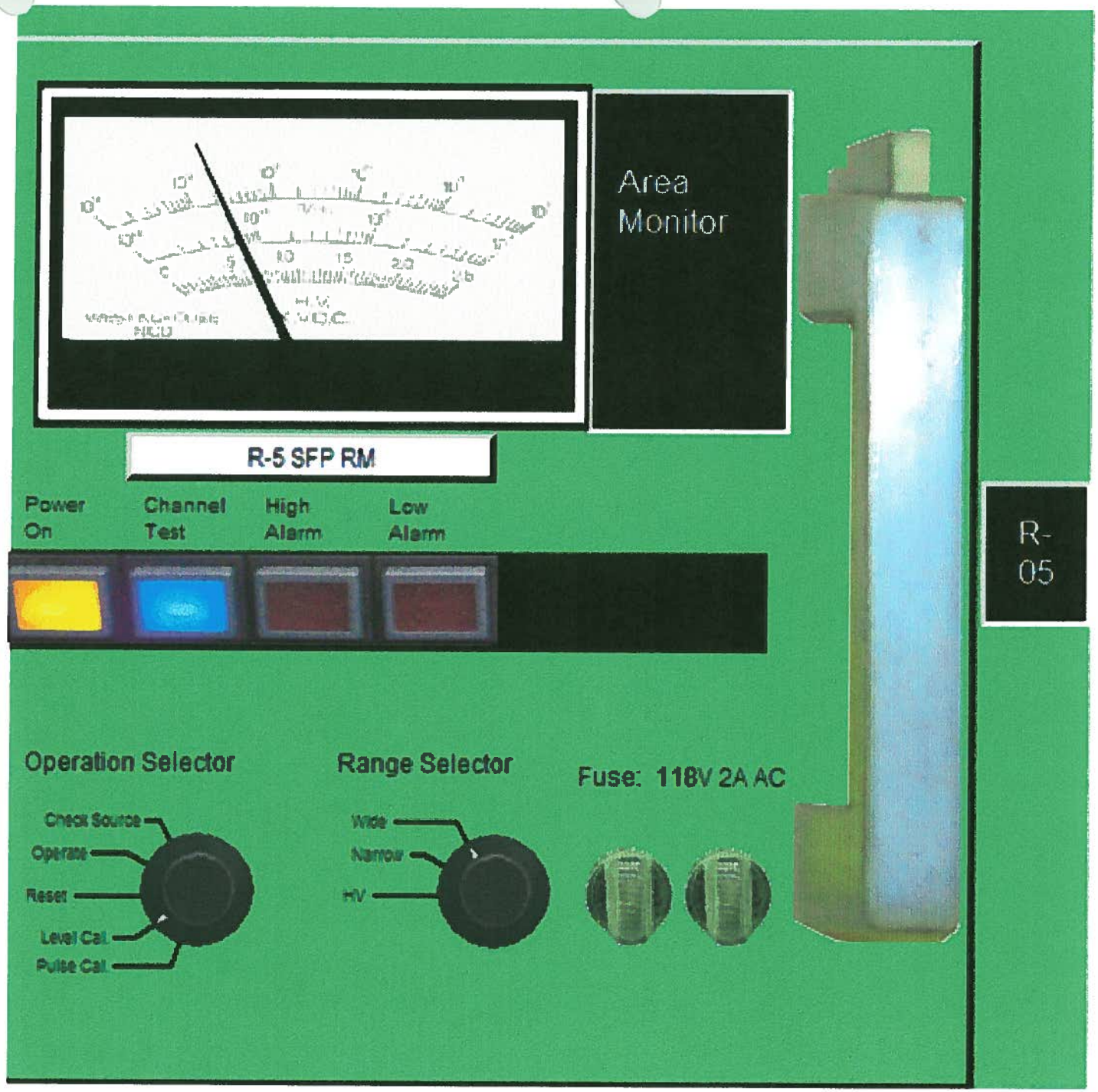
MCB instrumentation



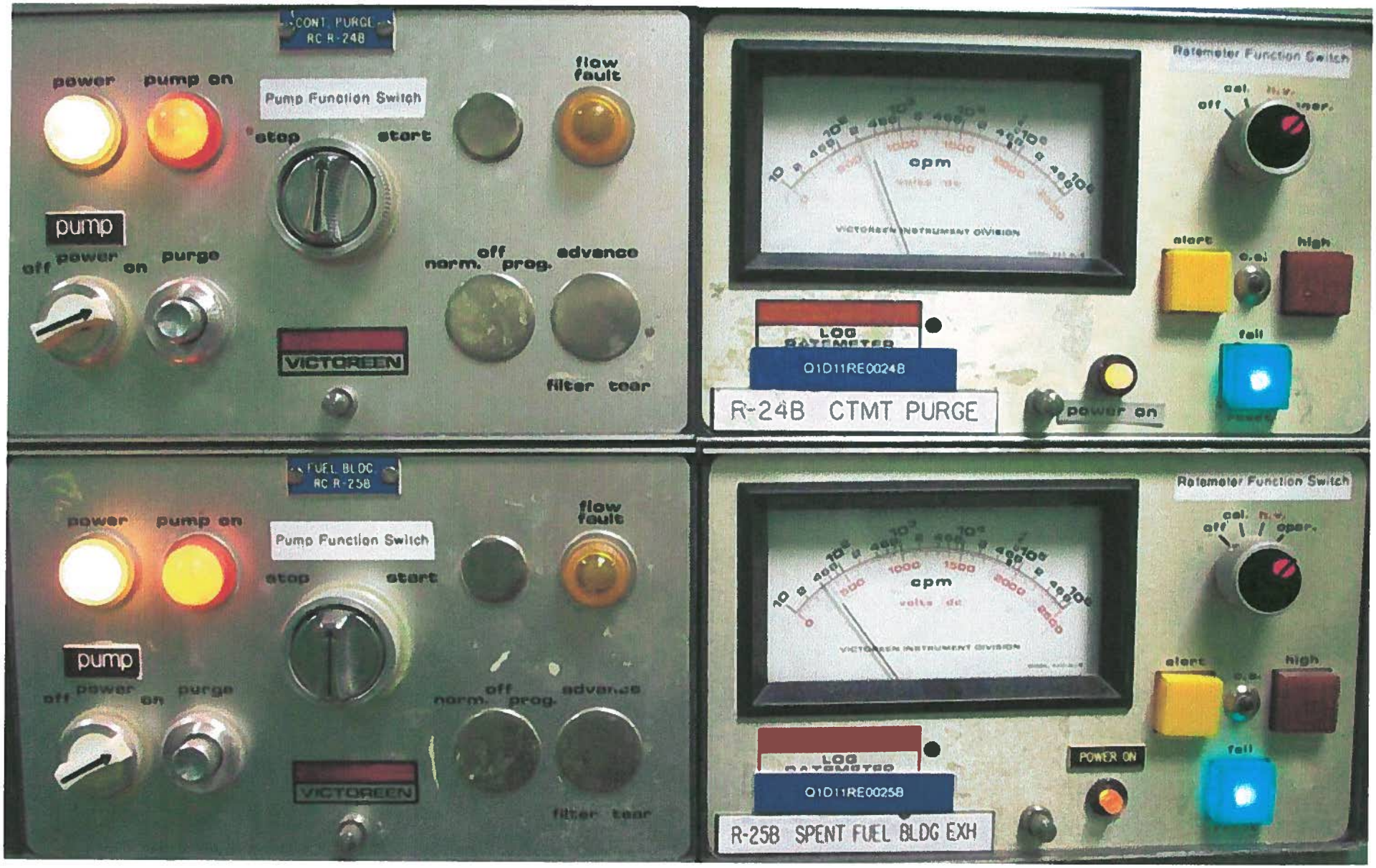


Gamma Metrics Local indications:

- HSDP Excore Neutron Monitor N-48 breaker, Q1R21L005A is closed.
- The nonoperate LED is not illuminated.


Area
Monitor
R-5 SFP RM
Power
On
Channel
Test
High
Alarm
Low
Alarm
R-
05
Operation Selector
Check Source
Operate
Reset
Level Cal
Pulse Cal
Range Selector
Wide
Narrow
HV
Fuse: 118V 2A AC


Ratemeter Function Switch
cal. h.v.
off
oper.
cpm
volts dc
alert
c.s.
high
POWER ON
fail
reset
Q1D11RE0024A
R-24A CTMT PURGE
CONT PURGE
RC R-24A
power
pump on
Pump Function Switch
stop
start
flow fault
pump
off
power
on
purge
norm.
off
prog.
advance
filter tear
VICTOREEN
Ratemeter Function Switch
cal. h.v.
off
oper.
cpm
volts dc
VICTOREEN INSTRUMENT DIVISION
alert
c.s.
high
POWER ON
fail
reset
Q1D11RE0025A
R-25A SPENT FUEL BLDG EXH
FUEL BLDG
RC R-25A
power
pump on
Pump Function Switch
stop
start
flow fault
pump
off
power
on
purge
norm.
off
prog.
advance
filter tear
VICTOREEN

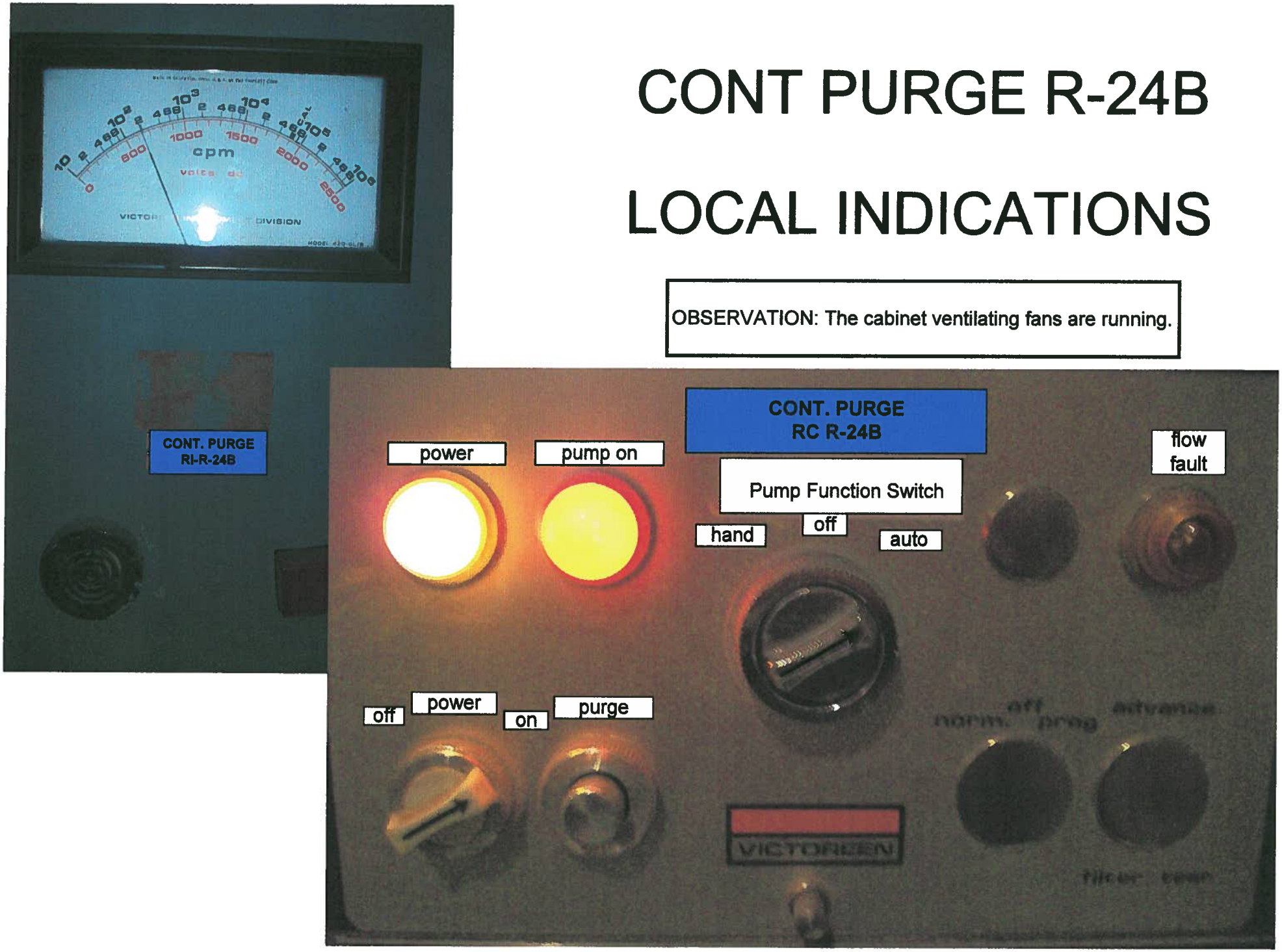

CONT. PURGE
RC R-24B
power
pump on
flow fault
Pump Function Switch
stop
start
pump
off
power
on
purge
norm.
off
prog.
advance
VICTOREEN
filter tear
Rotameter Function Switch
cal.
off
oper.
cpm
VICTOREEN INSTRUMENT DIVISION
alert
high
fail
LOG RATEMETER
Q1D11RE0024B
R-24B CTMT PURGE
power on
FUEL BLDG
RC R-25B
power
pump on
flow fault
Pump Function Switch
stop
start
pump
off
power
on
purge
norm.
off
prog.
advance
VICTOREEN
filter tear
Rotameter Function Switch
cal.
off
oper.
cpm
VICTOREEN INSTRUMENT DIVISION
alert
high
fail
LOG RATEMETER
Q1D11RE0025B
POWER ON
R-25B SPENT FUEL BLDG EXH


Ratemeter Function Switch
cal.
h.v.
off
oper.
cpm
volts dc
VICTOREEN INSTRUMENT DIVISION
alert
c.s.
high
LOG RATEMETER
VICTOREEN
POWER ON
fail
reset
CONT. RM. AIR SUPPLY
RC-R-35A
power
pump on
Pump Function Switch
stop
start
flow fault
pump
off
power
on
purge
norm.
off
prog.
advance
filter
VICTOREEN
CONT. RM. AIR SUPPLY
RC-R-35B
power
pump on
Pump Function Switch
stop
start
flow fault
pump
off
power
on
purge
norm.
off
prog.
advance
filter
tear
VICTOREEN
Ratemeter Function Sw
cpm
VICTOREEN INSTRUMENT DIVISION
alert
high
LOG RATEMETER
VICTOREEN
POWER ON
fail
R-35B CONT RM INLET AIR
QSD11RE0035B
'B' TRAIN CONTROL ROOM
VENTILATION RADIATION MONITOR

CONT PURGE R-24B

LOCAL INDICATIONS

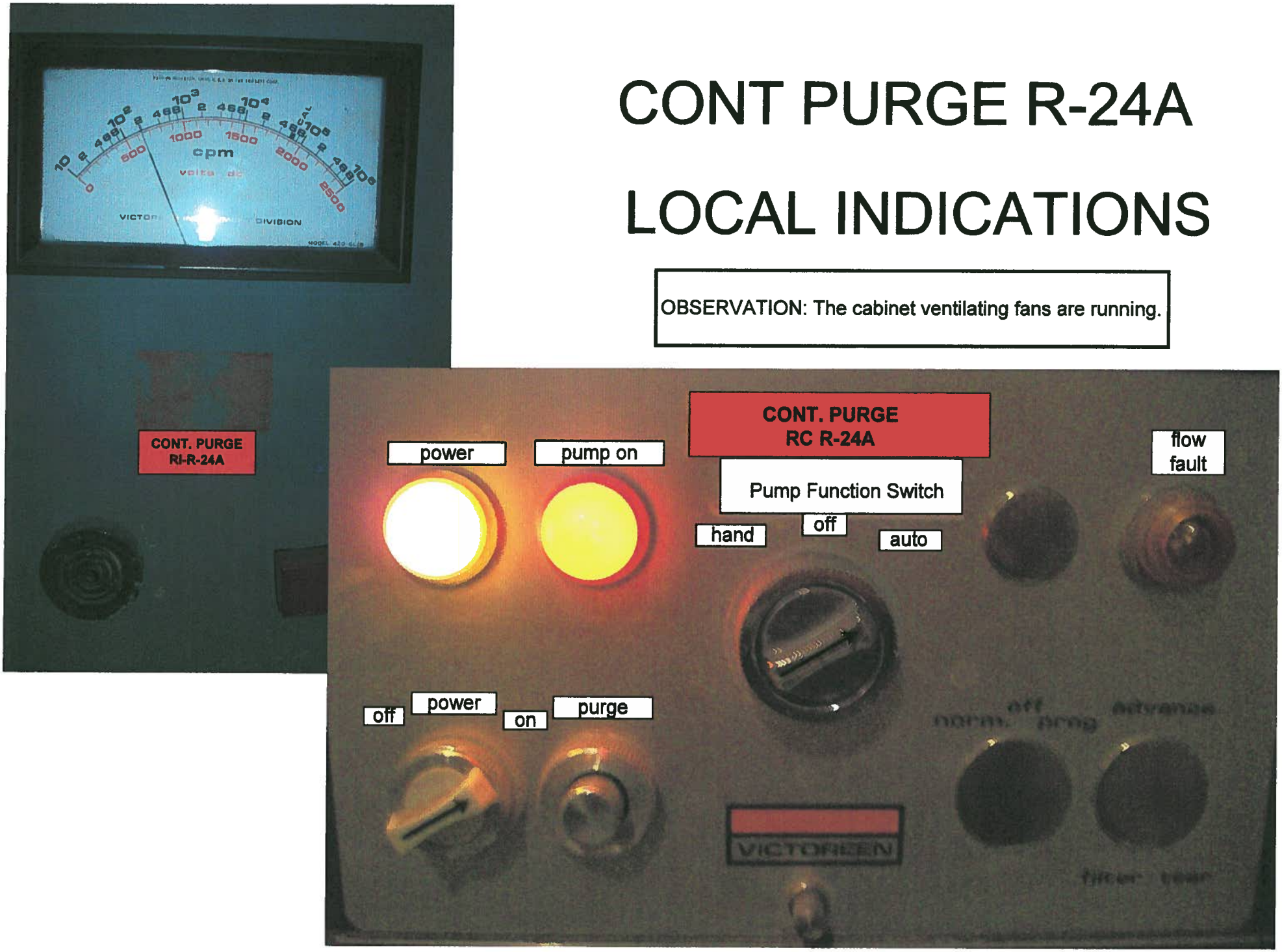
OBSERVATION: The cabinet ventilating fans are running.



CONT PURGE R-24A

LOCAL INDICATIONS

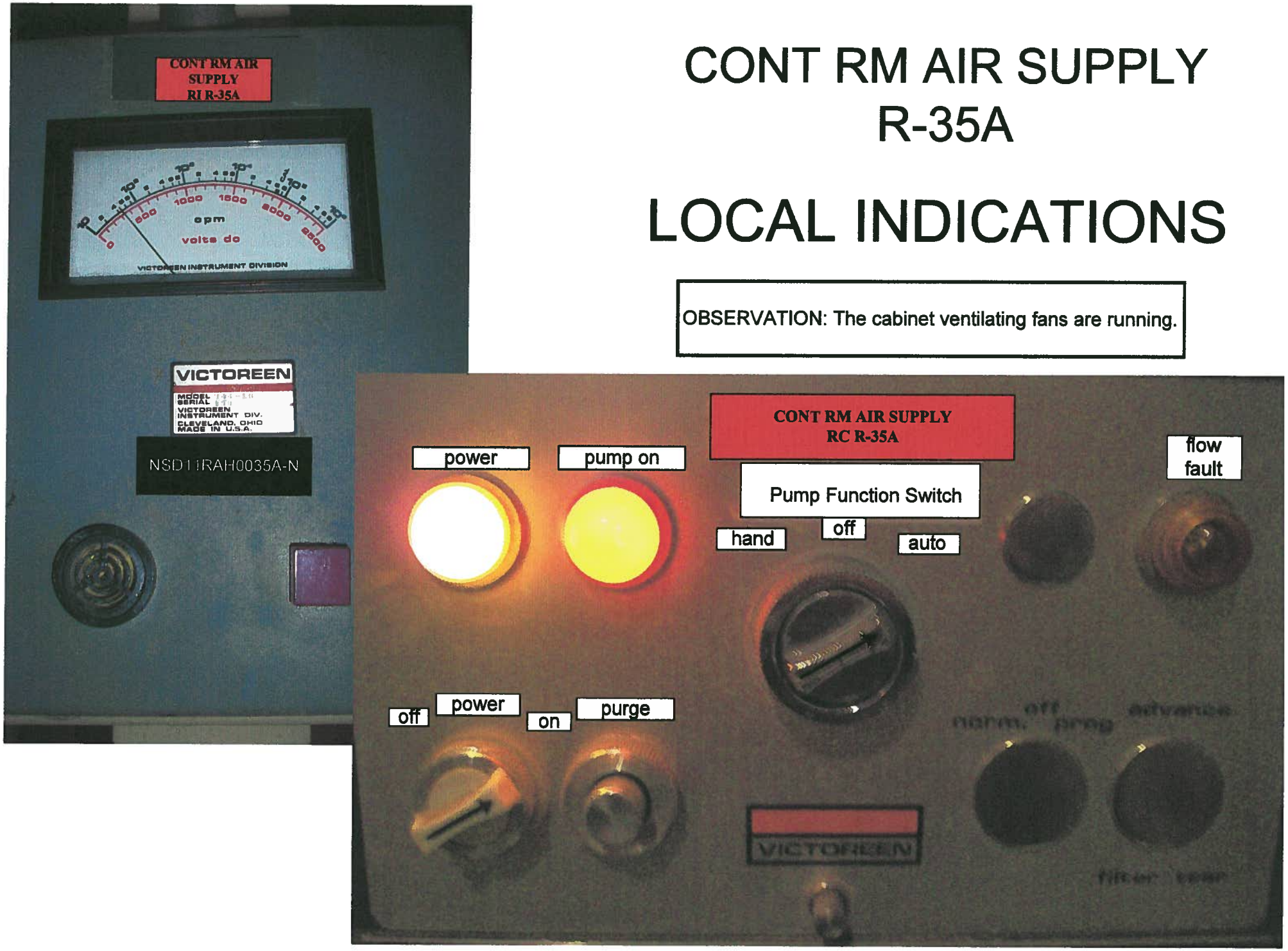
OBSERVATION: The cabinet ventilating fans are running.



CONT RM AIR SUPPLY
R-35A

LOCAL INDICATIONS

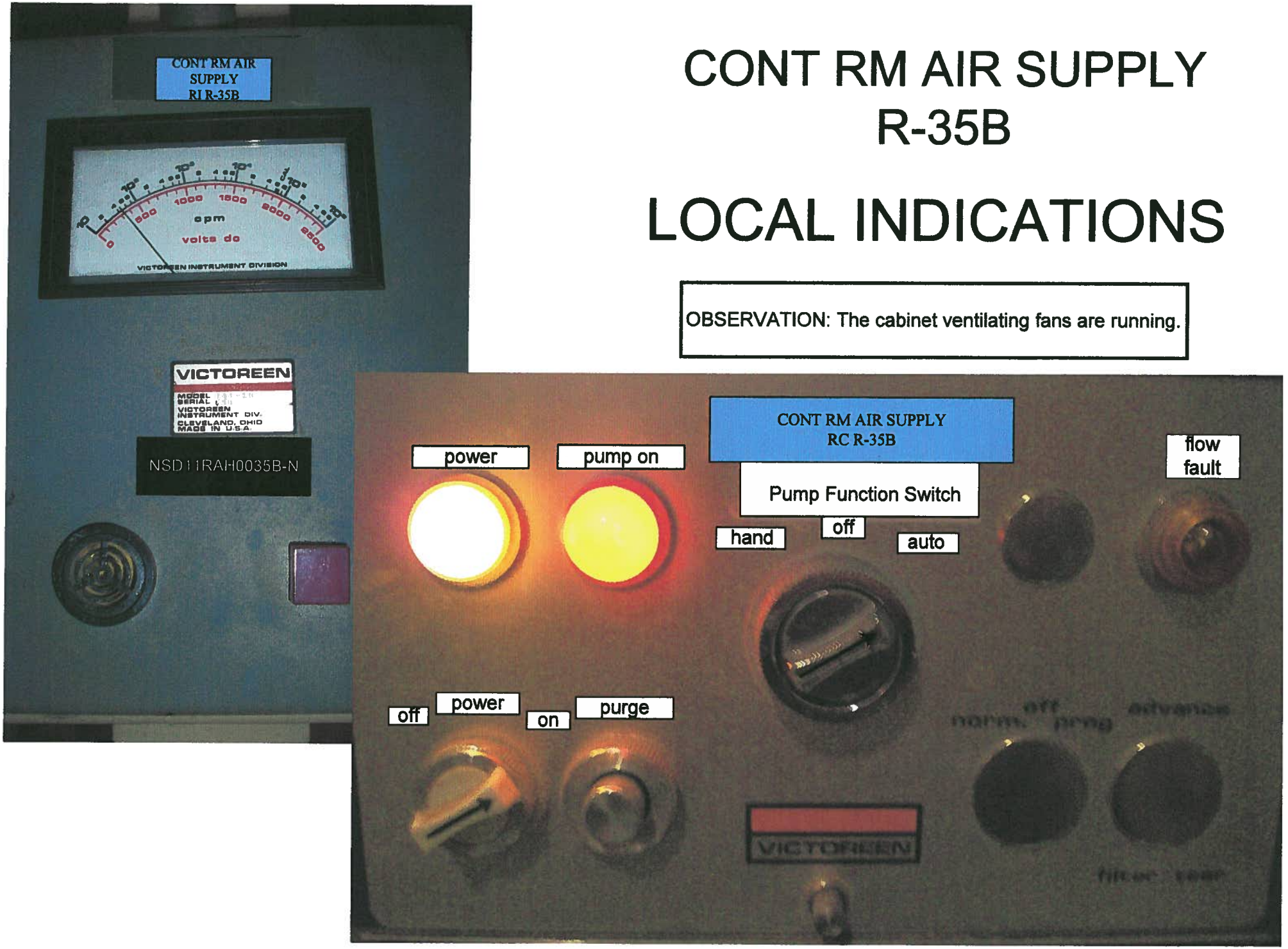
OBSERVATION: The cabinet ventilating fans are running.



CONT RM AIR SUPPLY R-35B

LOCAL INDICATIONS

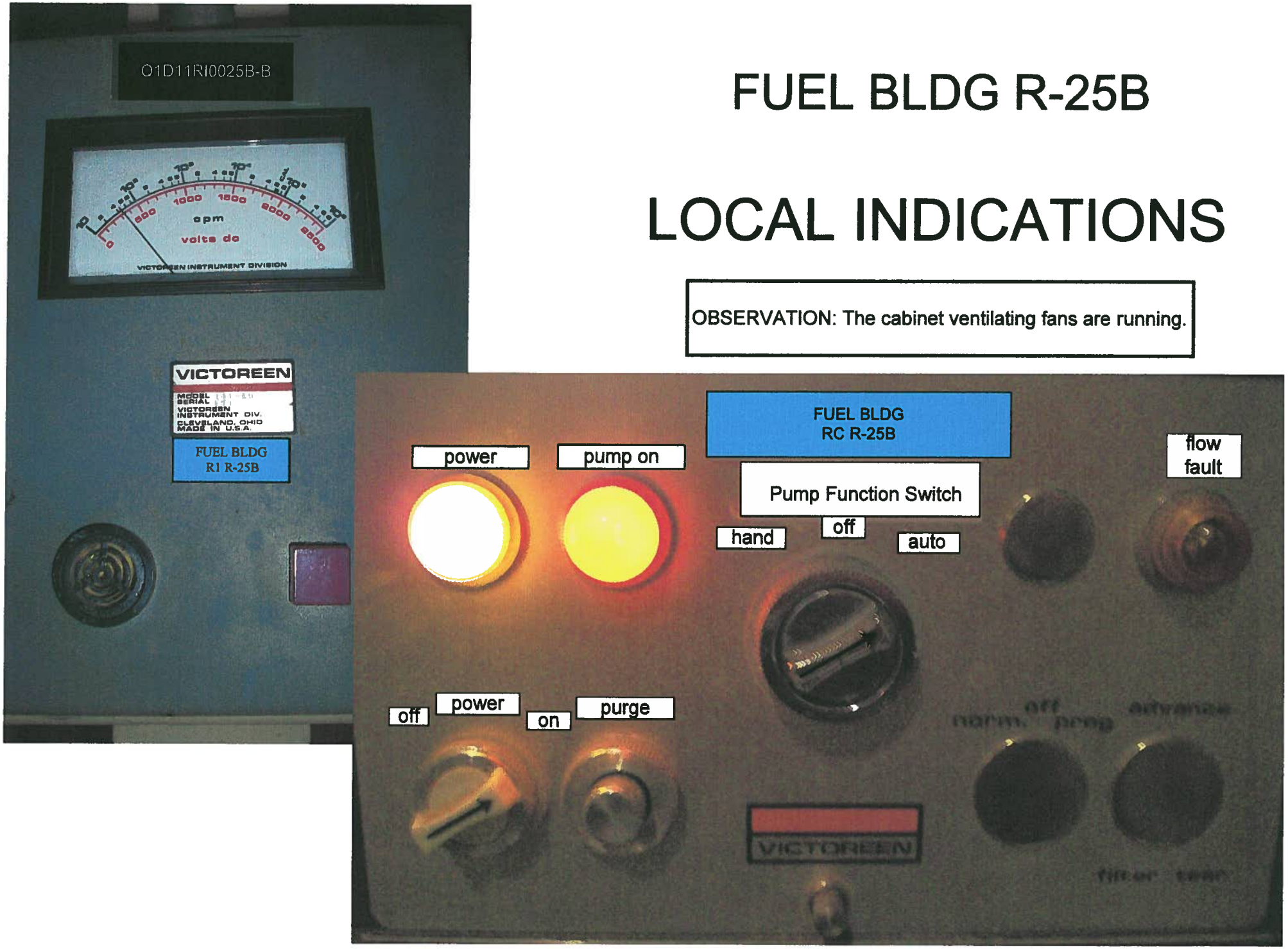
OBSERVATION: The cabinet ventilating fans are running.



FUEL BLDG R-25B

LOCAL INDICATIONS

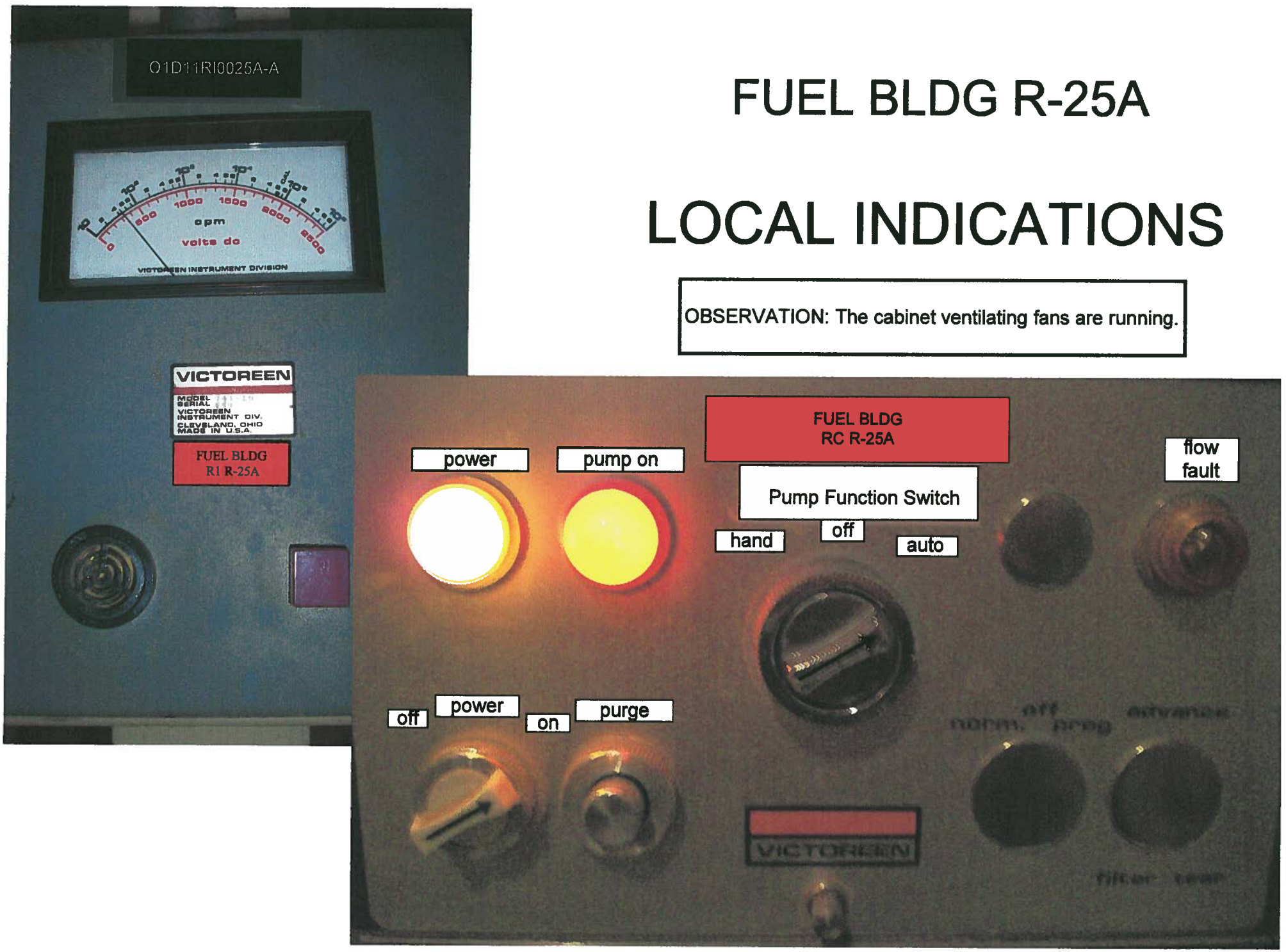
OBSERVATION: The cabinet ventilating fans are running.



FUEL BLDG R-25A

LOCAL INDICATIONS

OBSERVATION: The cabinet ventilating fans are running.



A.1.2.S Conduct of Operations ADMIN G2.1.25 – SRO

HLT33-A1.2.S
TITLE: Conduct A Shutdown Safety Assessment and Determine Time to Saturation.
PROGRAM APPLICABLE: SOT ___ SOCT _____ OLT _X_ LOCT_____
ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS
EVALUATION LOCATION: ____ SIMULATOR ___ CONTROL ROOM _X_ CLASSROOM
PROJECTED TIME: _20 MIN_ SIMULATOR IC NUMBER: _N/A
ALTERNATE PATH ___ TIME CRITICAL ___ PRA_____

JPM DIRECTIONS:

1. Initiation of task may be in group setting; evaluation performed individually upon completion of the task by reviewing the completed form.
2. Provide the examinee with the required materials to perform this JPM.
3. The actions of step 4.2 of the Appendix have been completed and information may be provided to examinee, if requested.

TASK STANDARD: Required for successful completion of this JPM:

- Correctly Assess Time to Saturation using TABLE A of UOP-4.0.
- Complete the Core Cooling section of a Shutdown Safety Assessment using Fig 1A of UOP-4.0.

Examinee:		
Overall JPM Performance:	**Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)		

EXAMINER: _____

Developer	H. Fitzwater	10/26/09
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

CONDITIONS

When I tell you to begin, you are to **determine the time to saturation and prepare the CORE COOLING SECTION ONLY of a shutdown safety assessment on Unit 1 per FNP-0-UOP-4.0, Appendix 1, step 4.3 and step 4.4.** The conditions under which this task is to be performed are:

a. Unit 1 is in a Refueling Outage, and has been shutdown for 120 hours.
b. 1A SG wide range level is 74%; 1B SG wide range level is 75%; 1C SG wide range level is 10%.
c. RCS temperature is 120°F.
d. The RCS is at mid-loop with a FULL core.
e. Both trains of RHR are in operation in the cooldown mode.
f. Mid-loop integrity per STP-18.4 has been verified current.
g. The IPC is not available.
h. Another operator is evaluating the other SHUTDOWN SAFETY FUNCTION/CRITERIAS.
i. You are directed to determine the time to saturation and prepare the CORE COOLING SECTION ONLY of a shutdown safety assessment on Unit 1 per FNP-0-UOP-4.0, Appendix 1, step 4.3 and step 4.4.

INITIATING CUE: "You may begin."

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
_____ START TIME		
NOTE: Since task may be performed as a group classroom task, elements 1 through 8 may be evaluated by reviewing the completed paperwork.		
* 1. **PER STEP 4.3,** determine and document **at bottom of Figure 1A:** Time to saturation IF core cooling were lost: _(a)_ hours _(b)_ minutes	1) Written in bottom line of Figure 1A: (a). **0.0** hours. (b). **9.2** minutes.	S / U
• Select Table using given data • Select applicable page of table. • Select column for given RCS level • Select row for time after Shutdown • Identify time • Identify units for time	○ Table A (Full Core) ○ Select page 2 of 3 (120°F) ○ Select column 2: (MIDLOOP) ○ Select row 6 (120 hours) ○ Identify 9.2 ○ Identify "min" from column header	
NOTE: For Element numbers 2 through 7, the "LINE" number correlates to the Core Cooling Shutdown Safety Function Evaluation, Figure 1A of Appendix 1 of FNP-0-UOP-4.0. Elements 2 through 8 are per step 4.4 of the appendix.		

EVALUATION CHECKLIST

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
*	2. **LINE 1**: ≥ 2 SGs Avail with loops filled (Ref. step 2.7).- evaluate SG availability: • SG tubes filled and vented; considered filled and vented if RCS has remained ≥100 psig since last fill and vent.	2) Zero **(0)** written on the line for item 1. o Midloop ≠ filled and vented and < 100 psig	S / U
*	3. **LINE 2**:Cavity level ≥ 152' 9"	3) Zero **(0)** written on the line for item 2.	S / U
*	4. **LINE 3**:RHR subsystems Available (0,1, or 2)	4) Two **(2)** written on the line for item 3.	S / U
*	5. **LINE 4**:RCS level ≥ 126' 6"	5) Zero **(0)** written on the line for item 4.	S / U
*	6. **LINE 5**:Time to saturation >30 minutes OR RCS press >325 psig with at least one RCP available for operation and at least one SG available	6) Zero **(0)** written on the line for item 5.	S / U
	7. Core Cooling Subtotal	7) Two **(2)** written on line for Core Cooling Subtotal.	S / U

NOTE: Since determination of the Core Cooling function is the critical element, and depending on the format of administering this JPM, the examinee may stop performing the Appendix upon discovering the ORANGE condition and may not complete element 8.

IF no condition circled for element 8 THEN provide the following CUE:
"What condition is Core Cooling in?"

*	8. Evaluates Core Cooling condition	8) **Circle around ORANGE** condition for the Core Cooling Function **OR.**, if cued per NOTE **State the condition is ORANGE**	S / U

Terminate when all elements of the task have been completed.

_____ **STOP TIME**

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) before the element number.

GENERAL REFERENCES:

1. FNP-0-UOP-4.0, VER 36.0
2. KA: G2.1.25 RO 3.9 SRO 4.2

GENERAL TOOLS AND EQUIPMENT:

1. References to be accessed via classroom computer (using exam ID logon) and Exam Reference disk/files only.
2. Provide copy of FNP-0-UOP-4.0 Table A, Table B, Appendix 1
3. Pen/Pencil
4. Calculator (optional-not required to complete this task)

Critical ELEMENT justification:

STEP	Evaluation
1.	Critical - this is first of the two major objectives of the task. Utilization of the plant parameters and selection of the appropriate table are required to properly assess Shutdown Core Cooling function.
2. 3. 4. 5. 6.	Critical - Each line item is critical to evaluate proper assessment of each parameter. The aggregate effect of errors made within each line *could* result in obtaining the correct end point; therefore each sub-step must be evaluated to ensure examinee is correctly assessing the parameters.
7.	This is **NOT** a critical element since documentation of this summation is not procedurally driven nor will failure to complete this element necessarily impact the outcome.
8.	Critical - This is the final objective of the task; proper assessment of this function is required to identify the need of mitigating actions necessary to ensure the health and safety of the public is not jeopardized.

COMMENTS:

References expected to be utilized:

1. FNP-0-UOP-4.0, ver 36.0

10

KEY

Header information is not required for this Task; but if requested use current date and time.

Unit: 1 Prepared By: Name Date: Date Time: HHMM App-1, Fig 2 Evaluated ☐

SHUTDOWN SAFETY FUNCTION/ CRITERIA (No/False=0, Yes/True=1, Use number within range when required)		CONDITION (Circle Condition)		
REACTIVITY		Subtotal	Condition	AOP
1. No Core Alterations in Progress	_____	0-1	RED	41
2. Number of Boration Flow Paths (0, 1, 2) (Ref step 2.13)	_____	2	ORANGE	41
3. RCS Boron: CSD/Refueling Concentration	_____	3-4	YELLOW	41
4. Source Range Instrumentation Available	_____	5	GREEN	
Reactivity Subtotal	_____	(GREEN if Defueled)		
CORE COOLING		Subtotal	Condition	AOP
1. ≥ 2 SGs Avail with loops filled (Ref step 2.7)	0	0-1	RED	42
2. Cavity level ≥ 152'9"	0	2-3	ORANGE	42
3. RHR Subsystems Available (0, 1 or 2)	2	4	YELLOW	42
4. RCS level ≥ 126' 6"	0	≥5	GREEN	
5. Time to saturation > 30 minutes OR RCS press > 325 psig with at least one RCP available for operation and at least one SG available	0	(GREEN if Defueled)		
Core Cooling Subtotal	2			
POWER AVAILABILITY		Subtotal	Condition	
1. 1 "A" Train DG Available	_____	0-2	RED	
2. 1 "B" Train DG Available	_____	3	ORANGE	
3. F 4160 V BUS normal (Aligned to A SUT)	_____	4-5	YELLOW	
4. G 4160 V BUS normal (Aligned to B SUT)	_____	6	GREEN	
5. 2 Feeds available to the HV Switchyard (0, 1 or 2)	_____			
Power Availability Subtotal	_____			
CONTAINMENT		Subtotal	Condition	AOP
1. Refueling Integrity Set	_____	0-1	RED	44
2. CTMT Closure Set	_____	2-4	ORANGE	44
3. No Core Alterations in Progress (2 pts)	_____	5-6	YELLOW	44
4. Equipment Hatch & Air Locks Closed or Capable of Being Closed on Short Notice		7	GREEN	
5. RCS level ≥ 126' 6" (3 pts)	_____	(GREEN if Defueled)		
Containment Subtotal	_____			
INVENTORY		Subtotal	Condition	AOP
1. Refueling Cavity ≥ 23 Feet (142'1") Above Fuel	_____	0	RED	45
2. LHSI Pump/Flowpath Available	_____	1	ORANGE	45
3. HHSI Pump/Flowpath Available	_____	2	YELLOW	45
4. RCS is Intact below the Reactor Vessel Flange	_____	3-4	GREEN	
Inventory Subtotal	_____	(GREEN if Defueled)		
RCS INTEGRITY		Subtotal	Condition	AOP
1. All S/G Manways or Nozzle Dams Installed	_____	0-1	ORANGE	46
2. RCS is Intact below the Reactor Vessel Flange	_____	2	YELLOW	46
3. Pressurizer level < 100%	_____	3	GREEN	
RCS Integrity Subtotal	_____	(GREEN if Defueled)		
SPENT FUEL COOLING		Subtotal	Condition	AOP
1. SFP level ≥ 23 feet (151'6") above fuel (4 pts)	_____	0-4	RED	47
2. A Trn SFP Cooling available	_____	5	ORANGE	47
3. B Trn SFP Cooling available	_____	6	YELLOW	47
4. ≥ 2 SFP Makeup Sources (RWST, DW, RMW to Blender, Boric Acid to Blender, RHT to transfer canal with weir gate removed)	_____	7	GREEN	
SFP Subtotal	_____			
Time to saturation IF core cooling were lost:	0 hours	9.2 minutes		

Min required is to "CIRCLE" the condition "ORANGE"

including the subtotal or the AOP is not required.

CONDITIONS

When I tell you to begin, you are to **determine the time to saturation and prepare the CORE COOLING SECTION ONLY of a shutdown safety assessment on Unit 1 per FNP-0-UOP-4.0, Appendix 1, step 4.3 and step 4.4.** The conditions under which this task is to be performed are:

a. Unit 1 is in a Refueling Outage, and has been shutdown for 120 hours.
b. 1A SG wide range level is 74%; 1B SG wide range level is 75%; 1C SG wide range level is 10%.
c. RCS temperature is 120°F.
d. The RCS is at mid-loop with a FULL core.
e. Both trains of RHR are in operation in the cooldown mode.
f. Mid-loop integrity per STP-18.4 has been verified current.
g. The IPC is not available.
h. Another operator is evaluating the other SHUTDOWN SAFETY FUNCTION/CRITERIAS.
i. You are directed to determine the time to saturation and prepare the CORE COOLING SECTION ONLY of a shutdown safety assessment on Unit 1 per FNP-0-UOP-4.0, Appendix 1, step 4.3 and step 4.4.

TABLE A

Power-Uprated Unit

Time To Saturation: Full Core

Assumed Initial Temperature = 100°F

Time After Shutdown (hours)	Time To Saturation at Midloop (min)	Time To Saturation 3 ft Below Flange (min)	Time To Saturation Full Reactor Cavity (hours)	Time To Saturation RCS Full (hours)
40	7.7	10.5	5.6	1.3
60	8.7	11.9	6.3	1.4
80	9.5	13.0	6.9	1.6
100	10.4	14.2	7.5	1.7
120	11.3	15.4	8.2	1.9
140	11.9	16.3	8.6	2.0
160	12.7	17.4	9.2	2.1
180	13.3	18.2	9.6	2.2
200	13.9	19.0	10.1	2.3
336	17.1	23.4	12.4	2.9
504	20.8	28.5	15.1	3.5

VOLUME REFERENCE TABLE

Midloop Volume (ft3):	945		
Volume: 3 ft Below Flange (ft3)	348	Total =	1293
Volume: Full Reactor Cavity (ft3)	39750	Total =	41043
Volume: RCS Full (including Pzr) (ft3)	9591		

TABLE A

Power-Uprated Unit

Time To Saturation: Full Core

Assumed Initial Temperature = 120°F

Time After Shutdown (hours)	Time To Saturation at Midloop (min)	Time To Saturation 3 ft Below Flange (min)	Time To Saturation Full Reactor Cavity (hours)	Time To Saturation RCS Full (hours)
40	6.3	8.6	4.5	1.1
60	7.1	9.8	5.2	1.2
80	7.8	10.6	5.6	1.3
100	8.5	11.7	6.2	1.4
120	9.2	12.6	6.7	1.6
140	9.8	13.4	7.1	1.7
160	10.4	14.2	7.5	1.8
180	10.9	14.9	7.9	1.8
200	11.4	15.6	8.2	1.9
336	14.0	19.1	10.1	2.4
504	17.0	23.3	12.3	2.9

VOLUME REFERENCE TABLE

Midloop Volume (ft3):	945		
Volume: 3 ft Below Flange (ft3)	348	Total =	1293
Volume: Full Reactor Cavity (ft3)	39750	Total =	41043
Volume: Full RCS (including Pzr) (ft3)	9591		

TABLE A

Power-Uprated Unit

Time To Saturation: Full Core

Assumed Initial Temperature = 140°F

Time After Shutdown (hours)	Time To Saturation at Midloop (min)	Time To Saturation 3 ft Below Flange (min)	Time To Saturation Full Reactor Cavity (hours)	Time To Saturation RCS Full (hours)
40	4.9	6.7	3.5	0.8
60	5.6	7.6	4.0	0.9
80	6.1	8.3	4.4	1.0
100	6.6	9.1	4.8	1.1
120	7.2	9.8	5.2	1.2
140	7.6	10.4	5.5	1.3
160	8.1	11.1	5.9	1.4
180	8.5	11.6	6.1	1.4
200	8.9	12.1	6.4	1.5
336	10.9	14.9	7.9	1.8
504	13.3	18.2	9.6	2.2

VOLUME REFERENCE TABLE

Midloop Volume (ft3):	945		
Volume: 3 ft Below Flange (ft3)	348	Total =	1293
Volume: Full Reactor Cavity (ft3)	39750	Total =	41043
Volume: Full RCS (including Pzr) (ft3)	9591		

TABLE B

Power-Uprated Unit

Time To Saturation: One-Third New Fuel

Assumed Initial Temperature = 100°F

Time After Shutdown (hours)	Time To Saturation at Midloop (min)	Time To Saturation 3 ft Below Flange (min)	Time To Saturation Full Reactor Cavity (hours)	Time To Saturation RCS Full (hours)
100	15.6	21.4	11.3	2.6
200	20.9	28.5	15.1	3.5
300	24.7	33.7	17.8	4.2
400	27.5	37.6	19.9	4.7
500	31.1	42.5	22.5	5.3
600	34.5	47.3	25.0	5.8
700	37.2	51.0	27.0	6.3
800	40.4	55.3	29.2	6.8

VOLUME REFERENCE TABLE

Midloop Volume (ft3):	945		
Volume: 3 ft Below Flange (ft3)	348	Total =	1293
Volume: Full Reactor Cavity (ft3)	39750	Total =	41043
Volume: Full RCS (including Pzr) (ft3)	9591		

TABLE B

Power-Uprated Unit

Time To Saturation: One-Third New Fuel

Assumed Initial Temperature = 120°F

Time After Shutdown (hours)	Time To Saturation at Midloop (min)	Time To Saturation 3 ft Below Flange (min)	Time To Saturation Full Reactor Cavity (hours)	Time To Saturation RCS Full (hours)
100	12.8	17.5	9.2	2.2
200	17.1	23.4	12.4	2.9
300	20.2	27.6	14.6	3.4
400	22.5	30.8	16.3	3.8
500	25.4	34.8	18.4	4.3
600	28.3	38.7	20.5	4.8
700	30.5	41.7	22.1	5.2
800	33.0	45.2	23.9	5.6

VOLUME REFERENCE TABLE

Midloop Volume (ft3):	945		
Volume: 3 ft Below Flange (ft3)	348	Total =	1293
Volume: Full Reactor Cavity (ft3)	39750	Total =	41043
Volume: Full RCS (including Pzr) (ft3)	9591		

TABLE B

Power-Uprated Unit

Time To Saturation: One-Third New Fuel

Assumed Initial Temperature = 140°F

Time After Shutdown (hours)	Time To Saturation at Midloop (min)	Time To Saturation 3 ft Below Flange (min)	Time To Saturation Full Reactor Cavity (hours)	Time To Saturation RCS Full (hours)
100	10.0	13.6	7.2	1.7
200	13.3	18.2	9.6	2.2
300	15.7	21.5	11.4	2.7
400	17.5	24.0	12.7	3.0
500	19.8	27.1	14.3	3.3
600	22.0	30.1	15.9	3.7
700	23.7	32.5	17.2	4.0
800	25.7	35.2	18.6	4.3

VOLUME REFERENCE TABLE

Midloop Volume (ft3):	945		
Volume: 3 ft Below Flange (ft3)	348	Total =	1293
Volume: Full Reactor Cavity (ft3)	39750	Total =	41043
Volume: Full RCS (including Pzr) (ft3)	9591		

FARLEY NUCLEAR PLANT
SHARED
UNIT OPERATING PROCEDURE UOP-4.0
APPENDIX 1

1.0 Purpose

The purpose of the Shutdown Safety Assessment is to provide a means for evaluating the safety condition of the plant when in Modes 4, 5, 6 or de-fueled and to provide appropriate contingency actions. (CR 2004102447)

2.0 Definitions

2.1 Green Condition - The plant is fully capable of performing the associated safety function.

2.2 Yellow Condition - The plant's ability to perform the associated safety function is reduced but is at an acceptable level.

2.3 Orange Condition - The plant's ability to perform the associated safety function has been severely reduced and steps should be taken to minimize the amount of time in this condition.

2.4 Red Condition - The plant's ability to perform the associated safety function is in jeopardy and steps must be taken immediately to correct the cause of the condition.

2.5 Source Range Instrumentation Available - The audible count rate and at least one indication of source range counts (preferably NR-45) are available to indicate a dilution of the RCS.

2.6 RCS Intact Below the Vessel Flange - No opening exist which would result in spillage if the RCS level was raised to the vessel flange.

2.7 One or More SGs Available - A S/G is available to remove heat if the tubes are filled and vented, the wide range level is $\geq$ 75%, a steam flow path to the atmosphere can be made available with minor valve manipulations and a means of adding water to the S/G via the auxiliary feed water system exists. The S/G tubes are considered filled and vented if the RCS has been maintained greater than or equal to 100 psig since the last RCS fill and vent.

2.8 RHR Subsystems Available - The RHR system is capable of removing heat from the RCS.

2.9 One D/G Available - The selected D/G is capable of being started (either manually or automatically) and supplying 4160 V power to its respective bus.

2.10 Equipment Hatch & Airlocks Capable of Being Closed on Short Notice – The equipment hatch meets this definition when the MCRT is established. The personnel and aux airlocks meet this definition when a routine check of the hoses and cables going through the airlocks reveals that at least one door in each airlock can be closed in less than the current time to boil. (AI 2008207932)

2.11 HHSI Pump / Flow Path Available - A charging pump is capable of injecting water into the RCS from the RWST which contains > 50,000 gallons of water. Only minor valve manipulations are required.

2.12 LHSI Pump / Flow Path Available - A RHR pump is capable of injecting water into the RCS from the RWST which contains > 50,000 gallons of water. Only minor valve manipulations are required.

2.13 Based on the unit outage, boration flow paths via charging pumps and ECCS injection lines are determined using the guidance of Table 4 of FNP-1-STP-2.1 OR FNP-2-STP-2.1 , BORON INJECTION FLOW PATH VERIFICATION AND BORIC ACID TRANSFER PUMP OPERABILITY TEST, MODES 5 & 6 AND by a current FNP-1-STP-3.2 OR FNP-2-STP-3.2, BORATED WATER SOURCE OPERABILITY TEST MODE 5, 6.

Additionally, Normal charging can be considered an available boration flow path under the following conditions:

2.13.1 Q1E21MOV8107 and Q1E21MOV8108 are open, OR
Q2E21MOV8107 and Q2E21MOV8108 are open.

2.13.2 With one of the following charging pump requirements met.

- 1A or 2A Charging Pump available
- 1B Charging Pump Available with Q1E21MOV8132A and B open, OR
  2B Charging Pump Available with Q2E21MOV8132A and B open
- 1C Charging pump available with Q1E21MOV8132A and B open, OR
  2C Charging pump available with Q2E21MOV8132A and B open

3.0 Precautions and Limitations

3.1 The Shift Supervisor will evaluate the affect of removing shutdown safety equipment from service. If proposed changes to the schedule appear to reflect a reduction in the key safety functions, refer the proposed changes to the Outage Manager for assessment per FNP-0-AP-94, OUTAGE NUCLEAR SAFETY, prior to implementing the changes.

3.2 The appropriate AOP-40 series procedure will be implemented upon unexpected entry into or discovery of the existence of a Red, Orange or Yellow condition.

3.3 Intentional entry into a red condition must be approved by the Plant Manager and documented per FNP-0-AP-94, OUTAGE NUCLEAR SAFETY. FNP's current position is that the plant will not be intentionally placed in this condition. Review FNP's commitment to NUMARC 91-06.

3.4 Intentional entry into an orange condition must be approved by the Outage Manager or his designee prior to entry into that condition and documented per FNP-0-AP-94.

3.5 Intentional entry into a yellow condition must be approved by the Shift Manager or Operations Superintendent prior to entry into that condition.

3.6 Notify the Outage Manager immediately if a red condition or an unexpected orange condition exists.

4.0 Instructions

NOTE:
- **The Shutdown Safety Assessment form may be a two-side copy.**
- **The Shift Supervisor will ensure that the appropriate Shutdown Safety Assessment Form is completed at about 0200 and 1400 when in Mode 4, Mode 5, Mode 6 or defueled. (CR 2004102447)**

4.1 Obtain a copy of the appropriate Shutdown Safety Assessment form. For modes 5, 6, and defueled use Figure 1A and for mode 4 use Figure 1B.

4.2 Fill in the header information on the form.
- Unit
- Prepared By
- Date
- Time

4.3 IF in mode 5 or 6, THEN determine the time to saturation for existing plant conditions using the IPC (preferred) or FNP-0-UOP-4.0 Table A or B. Enter time on Figure 1A of Appendix 1.

4.4 Evaluate the criteria listed below each Shutdown Safety Function as follows.

NOTE: Refer to Definitions to assist in the evaluation as appropriate.

4.4.1 IF the reactor is defueled, THEN N/A the blanks for all Safety Functions except power availability and spent fuel cooling.

4.4.2 IF the criteria is met, THEN place a 1 in its blank or use the number/range of numbers listed in ( ).

4.4.3 IF the criteria is NOT met, THEN place a 0 in its blank.

4.4.4 For each individual Safety Function add up the numbers in the blanks and circle the condition corresponding to the subtotal.

4.5 IF an unexpected Red, Orange or Yellow condition is determined to exist, THEN implement the appropriate AOP-40 series procedure referenced on the Shutdown Safety Assessment form.

4.6 IF a yellow or orange condition exists that result in a single train available, THEN place a caution sign concerning equipment required for a safe shutdown condition at the applicable locations per the following:

4.6.1 Use Figure 2 to determine posting requirements.

4.6.2 Check the box on Figure 1A or 1B to indicate the review of the Figure 2 posting requirements **{AI 2001203573}.**

4.7 If a red, orange, or yellow condition currently exists for any Safety Function due to an intentional entry, verify

4.7.1 Appropriate approval per FNP-0-AP-94 has been obtained, and

4.7.2 Contingency Actions per Table 1 have been performed for the affected Shutdown Safety Functions.

4.8 Evaluate the activities planned for the next 12 hours to determine if the plant may potentially enter a red, orange, or yellow condition.

4.8.1 IF intentional entry into a red condition is expected THEN entry must be approved by the Nuclear Plant General Manager and documented per FNP-0-AP-94, OUTAGE NUCLEAR SAFETY. FNP's current position is that the plant will not be intentionally placed in this condition. Review FNP's commitment to NUMARC 91-06.

4.8.2 IF intentional entry into an orange condition is expected THEN

A. Entry must be approved by the Outage Manager or his designee prior to entry into that condition and documented per FNP-0-AP-94.

B. Perform the Contingency Actions in Table 2 for the affected Shutdown Safety Function(s).

4.8.3 IF intentional entry into a yellow condition is expected THEN

A. Entry must be approved by the Shift Manager or Operations Superintendent prior to entry into that condition and documented per FNP-0-AP-94.

B. Perform the Contingency Actions in Table 2 for the affected Shutdown Safety Function(s).

4.9 Post the Shutdown Safety Assessment at the following locations.

- Control Room
- Entrance to the PAP
- Entrance to the SAP (only required if SAP opened for protected area access)
- Outage Control Center

5.0 References

4.1 NUMARC 91-06, Guidelines For Industry Actions To Assess Shutdown Management.

4.2 10CFR50.65 (a)(4)

4.3 NUMARC 93-01, Section 11, Assessment of Risk Resulting from Performance of Maintenance Activities, February 2, 2000.

4.4 FNP-0-AP-94, OUTAGE NUCLEAR SAFETY.

Figure 1A

SHUTDOWN SAFETY ASSESSMENT (Modes 5, 6 and Defueled)

Unit:___ Prepared By:_____ Date:_____Time:_____ App-1, Fig 2 Evaluated ☐

SHUTDOWN SAFETY FUNCTION/ CRITERIA (No/False=0, Yes/True=1, Use number within range when required)		CONDITION (Circle Condition)		
REACTIVITY		Subtotal	Condition	AOP
1. No Core Alterations in Progress	_____	0-1	RED	41
2. Number of Boration Flow Paths (0, 1, 2) (Ref step 2.13)	_____	2	ORANGE	41
3. RCS Boron: CSD/Refueling Concentration	_____	3-4	YELLOW	41
4. Source Range Instrumentation Available	_____	5	GREEN	
Reactivity Subtotal	_____	(GREEN if Defueled)		
CORE COOLING		Subtotal	Condition	AOP
1. ≥ 2 SGs Avail with loops filled (Ref step 2.7)	_____	0-1	RED	42
2. Cavity level ≥ 152'9"	_____	2-3	ORANGE	42
3. RHR Subsystems Available (0, 1 or 2)	_____	4	YELLOW	42
4. RCS level ≥ 126' 6"	_____	≥5	GREEN	
5. Time to saturation > 30 minutes OR RCS press > 325 psig with at least one RCP available for operation and at least one SG available	_____	(GREEN if Defueled)		
Core Cooling Subtotal	_____			
POWER AVAILABILITY		Subtotal	Condition	AOP
1. 1 "A" Train DG Available	_____	0-2	RED	43
2. 1 "B" Train DG Available	_____	3	ORANGE	43
3. F 4160 V BUS normal (Aligned to A SUT)	_____	4-5	YELLOW	43
4. G 4160 V BUS normal (Aligned to B SUT)	_____	6	GREEN	
5. 2 Feeds available to the HV Switchyard (0, 1 or 2)	_____			
Power Availability Subtotal	_____			
CONTAINMENT		Subtotal	Condition	AOP
1. Refueling Integrity Set	_____	0-1	RED	44
2. CTMT Closure Set	_____	2-4	ORANGE	44
3. No Core Alterations in Progress (2 pts)	_____	5-6	YELLOW	44
4. Equipment Hatch & Air Locks Closed or Capable of Being Closed on Short Notice		7	GREEN	
5. RCS level ≥ 126' 6" (3 pts)	_____	(GREEN if Defueled)		
Containment Subtotal	_____			
INVENTORY		Subtotal	Condition	AOP
1. Refueling Cavity ≥ 23 Feet (142'1") Above Fuel	_____	0	RED	45
2. LHSI Pump/Flowpath Available	_____	1	ORANGE	45
3. HHSI Pump/Flowpath Available	_____	2	YELLOW	45
4. RCS is Intact below the Reactor Vessel Flange	_____	3-4	GREEN	
Inventory Subtotal	_____	(GREEN if Defueled)		
RCS INTEGRITY		Subtotal	Condition	AOP
1. All S/G Manways or Nozzle Dams Installed	_____	0-1	ORANGE	46
2. RCS is Intact below the Reactor Vessel Flange	_____	2	YELLOW	46
3. Pressurizer level < 100%	_____	3	GREEN	
RCS Integrity Subtotal	_____	(GREEN if Defueled)		
SPENT FUEL COOLING		Subtotal	Condition	AOP
1. SFP level ≥ 23 feet (151'6") above fuel (4 pts)	_____	0-4	RED	47
2. A Trn SFP Cooling available	_____	5	ORANGE	47
3. B Trn SFP Cooling available	_____	6	YELLOW	47
4. ≥ 2 SFP Makeup Sources (RWST, DW, RMW to Blender, Boric Acid to Blender, RHT to transfer canal with weir gate removed)	_____	7	GREEN	
SFP Subtotal	_____			
Time to saturation IF core cooling were lost:	_____ hours	_____ minutes		

FIGURE 1B

SHUTDOWN SAFETY ASSESSMENT (Mode 4)

Unit:____ Prepared By:_____ Date:_____Time:_____ App-1, Fig 2 Evaluated ☐

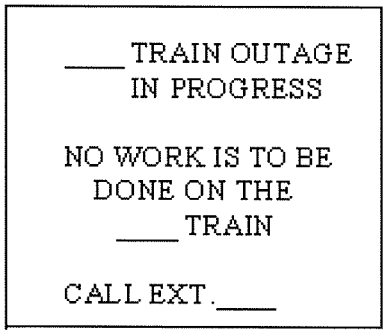
SHUTDOWN SAFETY FUNCTION/ CRITERIA (No/False=0, Yes/True=1, Use number within range when required)		CONDITION (Circle Condition)		
REACTIVITY		Subtotal	Condition	AOP
1. No positive reactivity changes in Progress	_____	0-1	RED	41
2. Number of Boration Flow Paths (0, 1, 2) (Ref step 2.13)	_____	2	ORANGE	41
3. RCS Boron: CSD boron concentration	_____	3-4	YELLOW	41
4. Number of Source Range Instrumentation Available	_____	5	GREEN	
Reactivity Subtotal	_____			
CORE COOLING		Subtotal	Condition	AOP
1. 2 SGs Available (2 pts if ≥ 2 S/G's Available (Ref step 2.7)	_____	0-1	RED	42
2. RHR Subsystems Available (0, 1 or 2)	_____	2-3	ORANGE	42
3. PRZ level within normal operating band	_____	4	YELLOW	42
4. RCS Subcooling Margin > 16° F	_____	≥5	GREEN	
Core Cooling Subtotal	_____			
POWER AVAILABILITY		Subtotal	Condition	AOP
1. 1 "A" Train DG Available	_____	0-2	RED	43
2. 1 "B" Train DG Available	_____	3	ORANGE	43
3. F 4160 V BUS normal (Aligned to A SUT)	_____	4-5	YELLOW	43
4. G 4160 V BUS normal (Aligned to B SUT)	_____	6	GREEN	
5. 2 Feeds available to the HV Switchyard (0, 1 or 2)	_____			
Power Availability Subtotal	_____			
CONTAINMENT		Subtotal	Condition	AOP
1. CTMT Integrity meets tech spec requirements	_____	0-1	RED	44
2. RCS borated to cold shutdown boron concentration (2 pts)	_____	2-4	ORANGE	44
3. CTMT Cooling tech spec are met (3 pts)	_____	5-6	YELLOW	44
Containment Subtotal	_____	6	GREEN	
INVENTORY		Subtotal	Condition	AOP
1. PRZ level within normal operating band	_____	0	RED	45
2. LHSI Pump/Flowpath Available	_____	1	ORANGE	45
3. HHSI Pump/Flowpath Available	_____	2	YELLOW	45
4. Normal make-up capability available	_____	3-4	GREEN	
Inventory Subtotal	_____			
RCS INTEGRITY		Subtotal	Condition	AOP
1. LTOP TECH SPEC MET	_____	0-1	ORANGE	46
2. RCS/PRZ cooldown rate < tech spec allowable	_____	2	YELLOW	46
3. Pressurizer operable per tech specs	_____	3	GREEN	
RCS Integrity Subtotal	_____			
SPENT FUEL COOLING		Subtotal	Condition	
1. SFP level ≥ 23 feet (151'6") above fuel (4 pts)	_____	0-4	RED	47
2. A Trn SFP Cooling	_____	5	ORANGE	47
3. B Trn SFP Cooling	_____	6	YELLOW	47
4 ≥ 2 SFP Makeup Sources (RWST, DW, RMW to Blender, Boric Acid to Blender, RHT to transfer canal with weir gate removed)	_____	7	GREEN	
SFP Subtotal	_____			

Figure 2

Yellow/Orange Condition Signs Required for Single Train Availability

1. IF required by step 4.6, THEN place caution signs at applicable location specified in Table 2 for Unit 1 or Table 3 for Unit 2.

2. Signs should be worded similar to the following:



3. Complete Table 2 or 3 to document the review of posting requirements.

   3.1 Mark as N/A any components which are not required to be posted for the given yellow or orange condition.

   3.2 Post signs at the applicable locations and initial the appropriate block of Table 2 or 3.

   3.3 When the yellow/orange condition no longer exists, ensure the signs have been removed and initial the appropriate block of Table 2 or 3.

TABLE 1
Contingency Actions Required for Voluntary Entry to a Shutdown Safety Assessment **Orange** or **Yellow** condition.

Reactivity **Orange** Condition Contingency Actions for Entry

1. Voluntary entry into a Reactivity **Orange** condition is not anticipated.

Reactivity **Yellow** Condition Contingency Actions for Entry

1. Verify Technical Specification and Technical Requirements Manual requirements are met and will continue to be met for boron concentration, boration flow path, and source range instrumentation.

TABLE 1
Contingency Actions Required for Voluntary Entry to a Shutdown Safety Assessment **Orange** or **Yellow** condition.

Core Cooling **Orange** Condition Contingency Actions for Entry

NOTE:	**Voluntary entry into a core cooling Orange condition is not normally foreseen for evolutions other than Mid Loop Operations or other reduced inventory evolutions (e.g. drain down for reactor vessel head lift). Under certain plant conditions with time to saturation ≤ 30 min., an orange condition may be encountered.**

1. IF Orange condition entry is being made as part of Mid Loop Operations, THEN ensure the requirements of FNP-1-UOP-4.3 OR FNP-2-UOP-4.3, MID LOOP OPERATIONS, have been met, including the Mid-Loop Compensatory measures in Appendix 3 of FNP-1-UOP-4.1 OR FNP-2-UOP-4.1, CONTROLLING PROCEDURE FOR REFUELING.

2. IF orange condition entry is due to certain plant conditions, with time to saturation ≤ 30 minutes, THEN ensure the contingency actions specified in the memo for compensatory measures for RCS level at the reactor vessel flange as required by Appendix 3 of FNP-1-UOP-4.1 OR FNP-2-UOP-4.1, CONTROLLING PROCEDURE FOR REFUELING, have been met. These same contingency actions are applicable for non-refueling outages when RCS level is at the reactor vessel flange in these conditions.

Core Cooling **Yellow** Condition Contingency Actions for Entry

1. Ensure both trains of RHR are operable if in Mode 6 prior to lowering refueling cavity level to < 23 feet (142'1") above the fuel.

TABLE 1
Contingency Actions Required for Voluntary Entry to a Shutdown Safety Assessment
Orange or **Yellow** condition.

Power Availability **Orange** Condition Contingency Actions For Entry

1. Verify RCS level ≥ 126' 6" prior to voluntary **Orange** condition entry.

2. Refer to Technical Specification 3.8.2.

3. Based on the unit outage, as a minimum, ensure the Unit 1 or Unit 2 F OR G 4160V Bus is maintained with:

   - An offsite power feed through its associated startup transformer.
   - Its associated DG(s) operable
   - An operable charging pump in the boration flow path
   - An operable BATP if a BATP is required as part of the boration flow path
   - An operable RWST TO CHG PUMP SUCT MOV if the RWST is part of the boration flow path
   - An operable RHR, CCW, and SW Pump

4. IF the head is on the reactor vessel, THEN at least one PRZR PORV is operable with backup nitrogen available for use in feed and spill cooling in the event that RHR is lost. Notify the Shift Manager, Alabama Control Center (ACC), or outside SO as appropriate to ensure that no work is in progress that could adversely affect the operable train of AC power and to ensure that no such work is started while this **Orange** condition exists.

5. Ensure that no work is in progress in the low voltage switchyard that could adversely affect the operable train of AC power.

6. Notify EM supervisory personnel of AC power conditions and requirements and direct their personnel (including appropriate Williams and EFS personnel) be briefed on these conditions and requirements.

7. Install Caution Tags or place barricades as appropriate to identify components such as ESF bus feeder breaker, DGs, DG output breakers and bus tie breakers, and startup transformer associated with the ESF bus to be maintained operable.

TABLE 1
Contingency Actions Required for Voluntary Entry to a Shutdown Safety Assessment
Orange or **Yellow** condition.

Power Availability **Yellow** Condition Contingency Actions For Entry

1. Verify RCS level ≥ 126' 6" prior to voluntary **Yellow** condition entry.

2. Refer to Technical Specification 3.8.2.

3. Based on the unit outage, as a minimum, ensure the Unit 1 or Unit 2 F OR G 4160V Bus is maintained with:

   - An offsite power feed through its associated startup transformer.
   - Its associated DG(s) operable
   - An operable charging pump in the boration flow path
   - An operable BATP if a BATP is required as part of the boration flow path
   - An operable RWST TO CHG PUMP SUCT MOV if the RWST is part of the boration flow path
   - An operable RHR, CCW, and SW Pump

4. IF the head is on the reactor vessel, THEN at least one PRZR PORV is operable with backup nitrogen available for use in feed and spill cooling in the event that RHR is lost.

5. Ensure that no work is in progress in the low voltage switchyard that could adversely affect the operable train of AC power.

6. Notify EM supervisory personnel of AC power conditions and requirements and direct their personnel (including appropriate Williams and EFS personnel) be briefed on these conditions and requirements.

TABLE 1
Contingency Actions Required for Voluntary Entry to a Shutdown Safety Assessment
Orange or **Yellow** condition.

Containment **Orange** Condition Contingency Actions For Entry

1. Verify no core alterations in progress or planned.

2. IF **Orange** condition entry is being made as part of Mid Loop Operations, THEN base on the unit outage ensure the requirements of FNP-1-UOP-4.3 OR FNP-2-UOP-4.3, MID LOOP OPERATIONS, have been met.

Containment **Yellow** Condition Contingency Actions For Entry

1. Not applicable.

TABLE 1
Contingency Actions Required for Voluntary Entry to a Shutdown Safety Assessment **Orange** or **Yellow** condition.

Inventory **Orange** Condition Contingency Actions For Entry

1. Voluntary entry into an Inventory **Orange** condition is not anticipated.

Inventory **Yellow** Condition Contingency Actions For Entry

1. Ensure both trains of RHR are operable before reducing refueling cavity level to < 23 feet above fuel.

2. IF entry is due to Mid Loop Operations, THEN based on the unit outage, ensure the requirements of FNP-1-UOP-4.3 OR FNP-2-UOP-4.3, have been met.

3. Refer to applicable Technical Specifications before removing RHR or HHSI systems from service.

TABLE 1
Contingency Actions Required for Voluntary Entry to a Shutdown Safety Assessment **Orange** or **Yellow** condition.

RCS Integrity **Orange** Condition Contingency Actions For Entry

1. IF entry is due to Mid Loop Operations, THEN based on the unit outage ensure the requirements of FNP-1-UOP-4.3 OR FNP-2-UOP-4.3, MID LOOP OPERATIONS, have been met.

2. WHEN SG cold leg manways are to be opened OR cold leg nozzle dams are to be removed, THEN verify that at least one hot leg manway, diaphragm, and nozzle dam has been previously removed.

RCS Integrity **Yellow** Condition Contingency Actions For Entry

1. IF entry is due to Mid Loop Operations, THEN based on the unit outage ensure the requirements of FNP-1-UOP-4.3 OR FNP-2-UOP-4.3, MID LOOP OPERATIONS, have been met.

2. WHEN SG cold leg manways are to be opened OR cold leg nozzle dams are to be removed, THEN verify that at least one hot leg manway, diaphragm, and nozzle dam has been previously removed.

TABLE 1
Contingency Actions Required for Voluntary Entry to a Shutdown Safety Assessment
Orange or **Yellow** condition.

Spent Fuel Cooling **Orange** Condition Contingency Actions for Entry

1. Voluntary entry into an **Orange** condition is not anticipated.

Spent Fuel Cooling **Yellow** Condition Contingency Actions for Entry

1. Verify that at least one train of SFP cooling and at least one makeup source are maintained operable.

2. Ensure that operating train SFP HX outlet temperature is being monitored every four hours on Rad Side SO logs.

TABLE 2

Protected Train Postings Unit 1

Components	**Sign Posted Initials**	**Sign Removed Initials**
Charging Pump 1A (B,C)		
RHR Pump 1A (B)		
CCW Pump 1A (B,C)		
BATP 1A (B)		
Diesel Generator 1-2A (1C, 2C, 1B, 2B)		
SFP Cooling 1A TRN (B TRN)		
4160 V Buses F and K (Buses G and L)		
Aux Bldg DC Swgr, A TRN (B TRN)		
Aux Bldg Battery, A TRN (B TRN)		
SW Pumps 1A (B, C, D, E)		
SW Valve Boxes		
Start Up Transformers 1A, or 1B		
Other _____		

TABLE 3

Protected Train Postings Unit 2

Components	**Sign Posted Initials**	**Sign Removed Initials**
Charging Pump 2 (B,C)		
RHR Pump 2 (B)		
CCW Pump 2 (B,C)		
BATP 2 (B)		
Diesel Generator 1-2A (1C, 2C, or 2B)		
SFP Cooling A TRN (B TRN)		
4160 V Buses F and K (Buses G and L)		
Aux Bldg DC Swgr, A TRN (B TRN)		
Aux Bldg Battery, A TRN (B TRN)		
SW Pumps 2A (B, C, D, E)		
SW Valve Boxes		
Start Up Transformers 2A or 2B		
Other _____		

A.2.1.A Equipment Control ADMIN –001A4.11- RO & SRO

HLT33-A.2.1.A

TITLE: Perform A Shutdown Margin Calculation in modes 1 & 2.

PROGRAM APPLICABLE: SOT ___ SOCT _____ OLT _X_ LOCT_____

ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS

EVALUATION LOCATION: ____ SIMULATOR ___ CONTROL ROOM _X_ CLASSROOM

PROJECTED TIME: _30 MIN_ SIMULATOR IC NUMBER: _N/A

ALTERNATE PATH ___ TIME CRITICAL ___ PRA_____

JPM DIRECTIONS:

1. Initiation of task may be in group setting; evaluation performed individually upon completion of the task by reviewing the completed form.
2. Provide the examinee with the required materials to perform this JPM.

TASK STANDARD: Required for successful completion of this JPM:

- Determine if Adequate Shutdown Margin exists while in Mode 1, using STP-29.5.

Examinee:	
Overall JPM Performance:	**Satisfactory** ☐ **Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)	

EXAMINER: _____

Developer	H. Fitzwater	10/28/09
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

CONDITIONS

When I tell you to begin, you are to **Determine if Shutdown Margin is adequate using STP-29.5, SHUTDOWN MARGIN CALCULATION IN MODES 1 AND 2 (TAVG ≥ 547°F),** for Unit 1. The conditions under which this task is to be performed are:

a. Unit 1 is stable at 90% with the ramp on hold
b. Bank D indicates 192 by Group Demand.
c. Seven of the Bank D rods (H2, B8, H14, F6, F10, K10, K6) are at 192 steps by DRPI.
d. Rod P8, in the D bank, has been determined to be stuck.
e. Rod P8 is at 162 steps by DRPI.
f. All other rods are at 229 steps.
g. Core burnup is 9,800 MWD/MTU burnup.
h. FNP-1-STP-29.5, SHUTDOWN MARGIN CALCULATION IN MODES 1 AND 2 (TAVG ≥ 547°F), initial conditions are satisfied.
i. The Shift Supervisor has directed you to complete FNP-1-STP-29.5 starting at step 5.1.

INITIATING CUE: "You may begin."

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
_____ START TIME		
NOTE: Elements 1 through 13 are evaluated by comparing the completed Calculation page to the values and ranges of each element. The acceptable responses are **ALSO** listed on the calculation KEY.		
1. **Step A.1: Document Core Burnup**	1) Value entered: **9,800 MWD**	S / U
2. **Step A.2: Document Power Level**	2) Value entered: **90 % entered**	S / U

	ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
	3. **Step A.3: Determine penalty steps for Banks below RIL.**	3) **Value entered: ZERO (0) (RNG: NONE)**	S / U
	a) Using COLR figure 1 determines RIL for 90% power level.	(a). Determines RIL from COLR • CB D/ RIL = **167 (165-170)** from COLR. • CBC / RIL = **FULL OUT (or 229).**	
	b) Gathers data from Conditions page	(b). Documents given Demand positions • CB D/ Demand **192.** • All others**: Full out (or 229)**	
	c) Determines penalty steps per bank.	(c). Calculates difference • All values: **0 (RNG: NONE)**	
*	4. **Step A.4: Determine number of penalty steps for RODS below RIL**	**4) Value entered: 5 (RNG: 3-8)**	S / U
	a) Determines stuck rod in CBD, Determines CBD RIL.	(a). Determines RIL from COLR • P8 → CB D/ RIL = **167 (Range: 165-170)** from COLR.	
	b) Documents given Data for rod P-8	(b). Documents given data **i.** Rod # → **P8 @ 162**	
	c) Calculates difference	(c). Calculates difference (RIL – DRPI) = **5 (RNG: 3-8)**	
*	5. **Step B.1: Determine Rod Worth for all control and shutdown bands at Zero steps** using given power and burnup: a) Uses Curve 77 pg 1 for 90% power and 10000MWD	5) Value entered: **6268 pcm. (range: NONE)**	S / U
	6. Step B.2: Calculate penalty value of rod banks	6) Value entered of **0** (zero) **pcm**	S / U
*	**7. Step B.3: Calculate penalty value of individual rods**	7) Value entered of **50 pcm (range: 30-80)**	S / U

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
* **8. Step B.4.a; Determine most reactive Rod worth**	8) Value entered of **1406 pcm (range: NONE)** (a). From Curve 77 pg 2 for ≤ 10000MWD.	S / U
* **9. Step B.4.b; Calculate rod worth of stuck/untrippable rod**	9) Value entered of **3515 (RNG: 3515- 3516)** (a). # of stuck: **1 rod** (b). B.4.a: **1406.** (+1 / -0) value for various rounding technique effects)	S / U
* **10. Step B.5; Calculate penalized rod worth**	10) Value entered of: **(-) 2432.7** ***NOTE: NEG (-) SIGN IS IMPORTANT FOR THIS CALCULATION/Evaluation*** **(RNG: (-)2403 to (-) 2451)** Transpose data from other steps: (a). B.1: 6268 (b). B.2: 0 (c). B.3: 50 (d). B.4.b 3515. Calculate using equation.	S / U
* **11. Step B.6; Determine power defect for given conditions**	**11)** Value entered of: **1634 pcm (RNG: NONE)** (a). From Curve 78 for ≤ 10000MWD.	S / U

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
* **12. Step B.8; Calculate available Shutdown Reactivity**	12) Value entered of: **(-) 748.7** **(RNG: -718 to -767)** **NOTE:** ***NEG (-) SIGN IS IMPORTANT FOR THIS CALCULATION/Evaluation*** (a). Transpose data: i. B.5: (-) 2432.7 ii. B.6: 1634 iii. Calculate	S / U
* **13. Step B.9; Calculate Excess Shutdown Margin**	13) Value entered of: **(+) 1021.3** **(RNG: 1003 to 1051)** ***NOTE: POS (+) SIGN IS IMPORTANT FOR THIS CALCULATION/Evaluation*** (a). Transpose data: i. B.8: (-) 748.7 ii. Calculate	S / U

NOTE: Element 15 is not required to be completed but is likely to be performed if initiated as a group/classroom setting, therefore it may be necessary to provide the following cue during review/evaluation of work sheet:
CUE: "Is the SDM adequate?"

* **14. Step B.10: Identifies Need to Emergency Borate** **OR** **Notifies SS that SDM is NOT adequate (does not meet acceptance criteria).**	14) Notifies Shift Supervisor of need to Emergency Borate. OR Reports SDM is **NOT** adequate.	S / U
15. completes task: a) Signs and dates Calculation Sheet b) Initials step 5.1 c) Asks for verification of calculation	15) Completes sign off. (a). Signs and dates form (b). Initials step 5.1 of procedure.	S / U

TERMINATE After calculation of Excess Shutdown Margin AND element 14 completed.

_____ **STOP TIME**

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) before the element number.

GENERAL REFERENCES:

1. FNP-1-STP-29.5, VER 4.0
2. KA: 001A4.11 RO 3.5 SRO 4.1

GENERAL TOOLS AND EQUIPMENT:

1. FNP-1-STP-29.5, ver 4.0
2. PCB-VOL1-CRV77, Cycle 23 rev 8
3. PCB-VOL1-CRV78, Cycle 23 rev 8
4. Unit 1, COLR for FNP Unit1 Cycle 23, Rev 0 Figure 1.
5. Pen/Pencil
6. calculator

Critical ELEMENT justification:

STEP	Evaluation
4-13	CRITICAL - Calculation completion; each step is critical in accurately determining available SDM and Excess SDM.
15	CRITICAL - Task Objective; Identification that Acceptance Criteria NOT met and/or Emergency boration IS required to ensure corrective action is initiated and compliance with T.S. is restored.

COMMENTS:

KEY

A. **PRESENT CONDITIONS**

A.1 Core Burnup [9800] MWD/MTU

A.2 Power Level. [90] %

A.3 Determine number of penalty steps for ROD BANKS below RIL.
(Use COLR or convert the RIL computer reading from % to steps)

A.3.a Record data in table

ROD BANKS	BANK RIL HEIGHT	BANK DEMAND	STEPS BELOW RIL
CBA	FULL OUT	Full Out (229)	0
CBB	FULL OUT	Full Out (229)	0
CBC	Full Out(229) 167 (166-170)	Full Out (229)	0
CBD		192	0
SDA	FULL OUT	Full Out (229)	0
SDB	FULL OUT	Full Out (229)	0

TOTAL STEPS BELOW RIL [0]

RANGE for CBD RIL:
LO: Readability of COLR RIL curve may allow allow as low as 165 steps; although this is < than the curve limit of 166.9, if calculated. The assumptions within the curve development provides for this readability error.

HI: conservatism allowed by P&L 4.1 may be instituted and a value of up to 170 steps may be selected since the specific value between the Y-axis increments may not be calculated.

A.4 Determine number of penalty steps for RODS below RIL which were not counted in A.3
(Rods below RIL on DRPI when the BANK demand is above RIL)
(Use COLR or convert the RIL computer reading from % to steps)

A.4.a Record data in table

ROD NUMBER	RIL POSITION	DRPI POSITION	DIFFERENCE
P8	167 (+3,-2)	162	5 (3-8)

TOTAL STEPS BELOW RIL [5 (RANGE 3-8)]

B. **SHUTDOWN MARGIN**

NOTE: Write the values from Curves 77 & 78 directly into the surveillance test. The correct sign convention has been entered in the STP.

B.1 Rod worth for all control and shutdown banks at zero steps at

Present Burnup (A.1) and Power Level (A.2) . (–) [6268] pcm (Curve 77 Page 1)

B.2 Penalty value of rod banks below insertion limit:

[0] steps (A.3.a) × 75 pcm/step = (+) [0] pcm

B.3 Penalty value of individual rods below RIL which were not counted in A.3
(Rods below RIL on DRPI when the BANK demand is above RIL)

[5 (RANGE 3-8)] steps (A.4.a) × 10 pcm/step = (+) [50 (RNG 30-80)] pcm

KEY

B.4 Stuck / Untrippable Rod penalty:
(B.4.a is N/A and B.4.b is zero if there are no stuck/untrippable rods)

B.4.a Worth of most reactive rod worth at present burnup (A.1) (–) [1406] pcm
from Curve 77 pg. 2

B.4.b Calculate worth of Stuck/untrippable rods

[[1] × (–) [1406] × 1.75] + [(–) [1406] × 0.75] = (–) [3515 range: 3515 to 3516]
(# Stuck/ untripp (B.4.a) (B.4.a)

[-2460.5 to -2461] + [-1054.5 to -1055] = [3515 OR 3516]

B.5 Penalized rod worth considering stuck/untrippable rods, misaligned rods, rods below the insertion limit, and uncertainty:

[(–) [6268] + [0] + [50 (30-80)] (–) [3515 (+1, -0)] × 0.9 = ( ) [(-) 2432.7 range: -2403 to -2451] m
(B.4.b)

[-6268+80+3515]*0.9 = 2405.7
[-6268+80+3517] *0.9 = 2403.9 (Round down to 2403)*LO
[-6268+30+3515]*0.9 = 2450.7 (Round up to 2451) *(hi)
[-6268+30+3517] *0.9= 2448.9

B.6 Reactivity Uncertainty due to Power and Burnup (A.1) (Curve 78). (–) [1634] pcm

B.7 Void Collapse Defect. (+) 50 pcm

B.8 Available Shutdown Reactivity:

( ) [-2432.7] – (–) [1634] + 50 = [(-) 748.7 Range: -719 to -767.0] pcm
(B.5) (B.6) (B.7)

B.9 Shutdown Margin in excess of required Shutdown Margin (B.8 – Required SDM from the COLR):

([-748.7] pcm – (–) 1770 pcm = ( ) [(+) 1021.3 Range: 1003 to 1051] cm
(B.8) Required SDM from the COLR

B.10 If B.9 is positive, THEN emergency borate per FNP-1-AOP-27.0, EMERGENCY BORATION, to establish the required shutdown margin otherwise Shutdown Margin is adequate for the Present plant condition.

Emergency Boration IS required

May also state that a Rx trip may be warranted (P&L 4.3).

DATE-- Element 15-if assumes/states emergency boration completed

Performed by: Signed-- element 15- if assumes/states Emerg Boration completed

Verified by: _____

PCB-1-VOL1-CRV77

UNIT 1 CYCLE 23 CURVE 77

KEY

REV. 8

APPROVED: Vaughn K Kelly For Bryan Grimes 4-15-09

ENGINEERING SUPPORT MANAGER DATE

ARI-1 Rod Worth (pcm) for Shutdown Margin Calculations

Burnup Range (MWD/MTU)	Power Level (%)										
	0	10	20	30	40	50	60	70	80	90	100
≤ 150	4587	4710	4831	5071	5311	5483	5655	5792	5927	6162	6397
> 150 ≤ 1000	4667	4801	4935	5180	5425	5594	5762	5905	6048	6285	6523
> 1000 ≤ 2000	4717	4867	5017	5267	5517	5680	5844	5995	6145	6384	6623
> 2000 ≤ 3000	4755	4909	5063	5320	5578	5740	5902	6052	6201	6442	6683
> 3000 ≤ 4000	4818	4975	5131	5396	5660	5814	5969	6113	6257	6483	6708
> 4000 ≤ 5000	4767	4920	5072	5346	5619	5778	5938	6073	6208	6439	6670
> 5000 ≤ 6000	4717	4865	5013	5296	5579	5743	5906	6033	6159	6395	6631
> 6000 ≤ 7000	4689	4827	4965	5254	5542	5714	5885	6001	6118	6355	6593
> 7000 ≤ 8000	4660	4788	4916	5211	5506	5685	5864	5	Element #6	6316	6555
> 8000 ≤ 9000	4646	4765	4884	5182	5480	5669	5857	5		6292	6531
> 9000 ≤10000	4632	4742	4852	5154	5455	5652	5850	5939	6028	6268	6507
>10000 ≤11000	4622	4725	4828	5129	5431	5641	5850	5933	6016	6253	6490
>11000 ≤12000	4612	4707	4803	5105	5408	5629	5850	5927	6004	6239	6473
>12000 ≤13000	4617	4706	4795	5096	5398	5631	5865	5937	6010	6242	6475
>13000 ≤14000	4621	4704	4787	5087	5387	5633	5879	5947	6015	6245	6476
>14000 ≤15000	4631	4709	4787	5086	5385	5642	5900	5964	6028	6256	6485
>15000 ≤16000	4641	4714	4787	5085	5382	5652	5921	5981	6041	6267	6493
>16000 ≤17000	4662	4731	4800	5096	5391	5669	5947	6004	6062	6286	6510
>17000 ≤18000	4682	4748	4813	5107	5400	5687	5973	6028	6083	6304	6526
>18000 ≤19000	4709	4771	4833	5125	5418	5710	6002	6056	6109	6328	6547
>19000 ≤20000	4735	4794	4852	5144	5435	5734	6032	6083	6135	6351	6568
>20000 ≤20885	4760	4818	4876	5165	5454	5759	6063	6112	6161	6377	6592

Notes:

1. Rod worth data assumes the starting point is rods at the Rod Insertion Limit. If a bank is below the RIL, reduce the table value by 75 pcm for each step below the RIL.
2. The rod worth data represents negative reactivity. However, STP-29.1, STP-29.2 and STP-29.5 have been written to handle the correct sign convention when the above data is entered as a positive number. Enter the above numbers directly into the STP.
3. **ARI-1** is defined as **All Rods In** -- less the most reactive rod. The SDM calculation requires that one rod be assumed stuck. Therefore, use the data directly from the table above when there are not any known stuck rods.

UNIT 1 CYCLE 23 CURVE 77
Control Rod Worth for SDM Calculations

KEY

REV. 8

APPROVED: Vanden K. Fly for Bryan Grimes 4-15-09
ENGINEERING SUPPORT MANAGER DATE

Worth of Most Reactive Rod (pcm) for Shutdown Margin Calculations

Burnup Range (MWD/MTU)	Power Level 0% to 100%
≤ 150	658
> 150 ≤ 1000	676
> 1000 ≤ 2000	732
> 2000 ≤ 3000	781
> 3000 ≤ 4000	889
> 4000 ≤ 5000	1024
> 5000 ≤ 6000	1160
> 6000 ≤ 7000	1232
> 7000 ≤ 8000	1304
> 8000 ≤ 9000	1355
> 9000 ≤10000	1406
>10000 ≤11000	1450
>11000 ≤12000	1494
>12000 ≤13000	1528
>13000 ≤14000	1561
>14000 ≤15000	1592
>15000 ≤16000	1623
>16000 ≤17000	1653
>17000 ≤18000	1684
>18000 ≤19000	1713
>19000 ≤20000	1741
>20000 ≤20885	1767

element #9

Notes:

1. Rod worth data assumes the starting point is rods at the Rod Insertion Limit.
2. The rod worth data represents negative reactivity. However, STP-29.1, STP-29.2 and STP-29.5 have been written to handle the correct sign convention when the above data is entered as a positive number. Enter the above numbers directly into the STP.
3. **ARI-1** is defined as **All Rods In** -- less the most reactive rod.
4. For multiple stuck rods, the ARI-1 value on Page 1 of this curve should be reduced by the following calculation:
   [KUR x WSR x 1.75] + [WSR x 0.75]
   where KUR = Number of **known** untrippable rods (does not include rod **assumed** stuck in ARI-1 table)
   and WSR = Worst stuck rod (i.e. most reactive rod)

PCB-1-VOL1-CRV78

UNIT 1 CYCLE 23 CURVE 78
Total Power Defect for SDM Calculations

KEY

REV. 8

APPROVED: Vanderyck Filly for Bryan Grimes 4-15-09
ENGINEERING SUPPORT MANAGER DATE

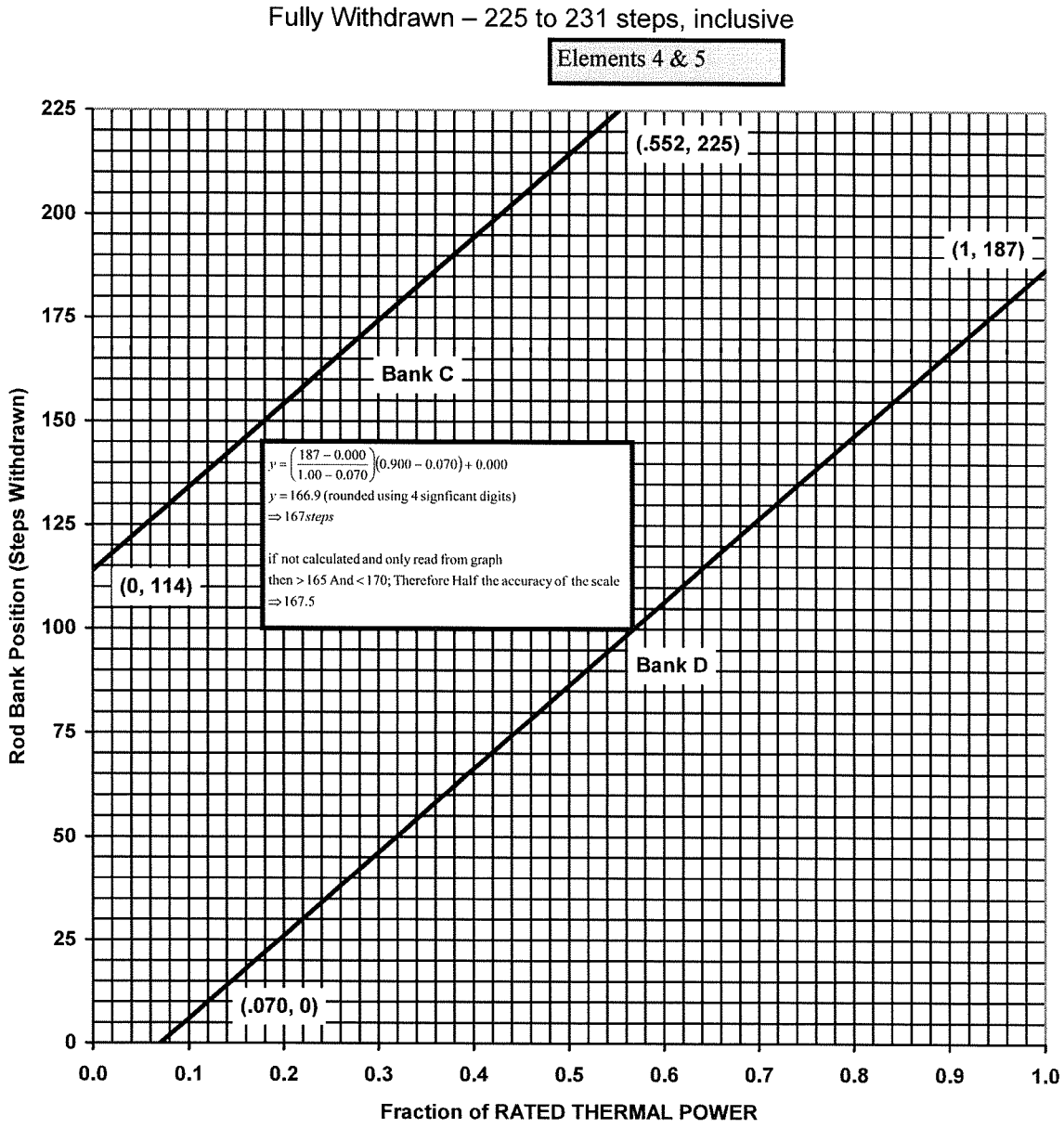
Power Defect (pcm) for Shutdown Margin Calculations

Burnup Range (MWD/MTU)	Power Level (%)										
	0	10	20	30	40	50	60	70	80	90	100
≤ 150	0	361	537	717	898	958	1019	1119	1219	1326	1432
> 150 ≤ 1000	0	351	522	701	879	943	1006	1106	1206	1307	1409
> 1000 ≤ 2000	0	330	495	667	839	903	967	1068	1169	1265	1361
> 2000 ≤ 3000	0	317	476	647	818	879	941	1041	1142	1237	1332
> 3000 ≤ 4000	0	326	489	664	839	901	964	1062	1161	1261	1360
> 4000 ≤ 5000	0	344	514	697	879	942	1004	1103	1202	1306	1410
> 5000 ≤ 6000	0	362	539	729	919	982	1045	1144	1242	1351	1459
> 6000 ≤ 7000	0	388	576	774	972	1037	1103	1202	1301	1416	1531
> 7000 ≤ 8000	0	414	613	818	1024	1092	1160	1260	1360	1481	1603
> 8000 ≤ 9000	0	440	651	863	1074	1147	1220	1	Element #12	1558	1684
> 9000 ≤10000	0	466	690	907	1124	1202	1280	1391	1503	1634	1765
>10000 ≤11000	0	492	728	950	1173	1258	1344	1461	1579	1717	1854
>11000 ≤12000	0	518	766	994	1222	1315	1408	1531	1655	1800	1944
>12000 ≤13000	0	543	804	1035	1267	1369	1471	1603	1734	1884	2034
>13000 ≤14000	0	567	841	1077	1313	1424	1535	1674	1813	1968	2123
>14000 ≤15000	0	589	875	1115	1356	1477	1597	1744	1890	2054	2217
>15000 ≤16000	0	611	908	1153	1399	1529	1660	1813	1967	2139	2310
>16000 ≤17000	0	633	940	1189	1438	1578	1718	1882	2046	2223	2400
>17000 ≤18000	0	654	971	1225	1478	1627	1777	1951	2125	2307	2489
>18000 ≤19000	0	673	1001	1259	1516	1677	1837	2020	2203	2392	2582
>19000 ≤20000	0	692	1031	1293	1554	1726	1897	2089	2280	2477	2674
>20000 ≤20885	0	709	1057	1323	1590	1771	1953	2152	2351	2554	2757

Notes:

1. STP-29.1, STP-29.2 and STP-29.5 have been written to handle the correct sign convention when the above data is entered as a positive number. Enter the above numbers directly into the STP.

Figure 1
Rod Bank Insertion Limits versus Rated Thermal Power



Fully Withdrawn shall be the condition where control rods are at a position within the interval ≥ 225 and ≤ 231 steps withdrawn.

Note: The Rod Bank Insertion Limits are based on the control bank withdrawal sequence A, B, C, D and a control bank tip-to-tip distance of 128 steps.

FARLEY NUCLEAR PLANT

SURVEILLANCE TEST PROCEDURE

FNP-1-STP-29.5

SAFETY RELATED

SHUTDOWN MARGIN CALCULATION IN MODES 1 AND 2 (TAVG ≥ 547°F)

PROCEDURE USAGE REQUIREMENTS PER FNP-0-AP-6	SECTIONS
Continuous Use	ALL
Reference Use	
Information Use	

Approved:

C. D. COLLINS
Operations Manager

Date Issued 4-27-00

FARLEY NUCLEAR PLANT
SURVEILLANCE TEST REVIEW SHEET

SURVEILLANCE TEST NO. FNP-1-STP-29.5	TECHNICAL SPECIFICATION REFERENCE TR 13.1.1; LCO 3.1.4; LCO 3.1.5; LCO 3.1.6
TITLE SHUTDOWN MARGIN CALCULATION IN MODES 1 AND 2 (TAVG ≥ 547°F)	MODE(S) REQUIRING TEST: 1*,2* *See special test exceptions of above specifications

TEST RESULTS (TO BE COMPLETED BY TEST PERFORMER)

PERFORMED BY _____ DATE/TIME_____

COMPONENT OR TRAIN TESTED (if applicable) _____

[ ] ENTIRE STP PERFORMED [ ] FOR SURVEILLANCE CREDIT

[ ] PARTIAL STP PERFORMED: [ ] NOT FOR SURVEILLANCE CREDIT

REASON FOR PARTIAL: _____

TEST COMPLETED: [ ] Satisfactory [ ] Unsatisfactory

[ ] The following deficiencies occurred:

_____

_____

[ ] Corrective action taken or initiated:

_____

_____

_____

_____

SHIFT FOREMAN REVIEW

REVIEWED BY _____ DATE _____

[ ] Procedure properly completed and satisfactory

[ ] Comments: _____

_____

TECHNICAL GROUP-
REACTOR ENG REVIEW REVIEWED BY _____ DATE _____

[ ] Satisfactory and Approved
[ ] Comments: _____

_____

TABLE OF CONTENTS

FARLEY NUCLEAR PLANT
UNIT 1
SURVEILLANCE TEST PROCEDURE STP-29.5

SHUTDOWN MARGIN CALCULATION IN MODES 1 AND 2 (TAVG ≥ 547°F)

1.0 Purpose

1.1 The purpose of this procedure is to verify that the SHUTDOWN MARGIN is greater than the limits of the Technical Requirements Manual TR 13.1.1 as directed by Technical Specifications in Modes 1 or 2:

1.1.1 One or more rod(s) untrippable (LCO 3.1.4),

1.1.2 One or more rod(s) not aligned within 12 steps of their group step counter demand position (LCO 3.1.4),

1.1.3 One or more shutdown banks not within insertion limits specified in the COLR (LCO 3.1.5),

1.1.4 Control bank insertion, sequence, or overlap not within limits specified in the COLR (LCO 3.1.6). (This condition does not affect shutdown margin unless control banks are below insertion limits)

2.0 Acceptance Criteria

2.1 The Shutdown Margin shall be greater than or equal to the value specified in the COLR.

3.0 Initial Conditions

HBF 3.1 The revision of this procedure has been verified to be the current revision and correct unit for the task. (OR 1-98-498)

HBF 3.2 $T_{AVG} \geq 547°F$.

HBF 3.3 $T_{AVG} \pm 1°F$ of programmed value. (Needed for Power Defect to be accurate)

HBF 3.4 The plant is in Mode 1 or 2 with Keff ≥ 1.

HBF 3.5 Technical Specifications required action entered to verify SDM to be within the limits provided in the COLR OR Shift Supervisor desires to perform.

4.0 Precautions and Limitations

4.1 Read all curves as accurately as possible OR most conservatively.

4.2 Observe proper algebraic sign notation throughout the calculation.

4.3 IF necessary to emergency borate due to inadequate shutdown margin, THEN consideration should be given to tripping the reactor and entering FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION concurrent with the emergency boration.

5.0 Instructions

NOTE:
- **For calculating shutdown margin at power, the amount of reactivity by which the reactor would be subcritical from its present condition must be determined. If the reactor were to shutdown instantaneously, the changes in reactivity would be from control rod position and power defect. In the instant that the reactor shut down, reactivity changes from xenon, samarium and boron concentration would be zero.**

____ 5.1 Enter the information required on the attached calculation sheets and calculate the shutdown margin.

NOTE:
- **Verification of shutdown margin calculation by a licensed individual other than the test performer, should take place as soon as practical, and any differences resolved immediately.**
- **A Shift Foreman that serves as verifier of the calculation may also serve as reviewer on the Surveillance Test Review Sheet.**

____ 5.2 Verify shutdown margin calculated in step 5.1.

6.0 References

6.1 Technical Specifications: LCOs 3.1.4, 3.1.5, & 3.1.6.

6.2 Technical Requirement Manual TR 13.1.1

6.3 Core Operating Limits Report (COLR).

SHUTDOWN MARGIN IN MODES 1 AND 2

A. **PRESENT CONDITIONS**

A.1 Core Burnup _____ MWD/MTU

A.2 Power Level. _____ %

A.3 Determine number of penalty steps for ROD BANKS below RIL.
(Use COLR or convert the RIL computer reading from % to steps)

A.3.a Record data in table

ROD BANKS	BANK RIL HEIGHT	BANK DEMAND	STEPS BELOW RIL
CBA	FULL OUT		
CBB	FULL OUT		
CBC			
CBD			
SDA	FULL OUT		
SDB	FULL OUT		

TOTAL STEPS BELOW RIL _____

A.4 Determine number of penalty steps for RODS below RIL which were not counted in A.3
(Rods below RIL on DRPI when the BANK demand is above RIL)
(Use COLR or convert the RIL computer reading from % to steps)

A.4.a Record data in table

ROD NUMBER	RIL POSITION	DRPI POSITION	DIFFERENCE

TOTAL STEPS BELOW RIL _____

B. **SHUTDOWN MARGIN**

NOTE: Write the values from Curves 77 & 78 directly into the surveillance test. The correct sign convention has been entered in the STP.

B.1 Rod worth for all control and shutdown banks at zero steps at

Present Burnup (A.1) and Power Level (A.2) . (–) _____pcm (Curve 77 Page 1)

B.2 Penalty value of rod banks below insertion limit:

_____steps × 75 pcm/step = (+)_____pcm
(A.3.a)

B.3 Penalty value of individual rods below RIL which were not counted in A.3
(Rods below RIL on DRPI when the BANK demand is above RIL)

_____steps × 10 pcm/step = (+)_____pcm
(A.4.a)

B.4 Stuck / Untrippable Rod penalty:
(B.4.a is N/A and B.4.b is zero if there are no stuck/untrippable rods)

B.4.a Worth of most reactive rod worth at present burnup (A.1) (–)_____pcm
from Curve 77 pg. 2

B.4.b Calculate worth of Stuck/untrippable rods

[_____ × (–)_____ × 1.75] + [(–)_____ × 0.75] = (–) _____pcm
(# Stuck/ untrippable rods) (B.4.a) (Most reactive rod worth) (B.4.a) (Most reactive rod worth)

B.5 Penalized rod worth considering stuck/untrippable rods, misaligned rods, rods below the insertion limit, and uncertainty:

[(–)_____ + _____ + _____ – (–)_____] × 0.9 = ( ) _____pcm
(B.1) (B.2) (B.3) (B.4.b)

B.6 Power Defect at Power Level (A.2) and Burnup (A.1) (Curve 78). (–) _____pcm

B.7 Void Collapse Defect. (+) 50 pcm

B.8 Available Shutdown Reactivity:

( )_____ – (–)_____ + 50 = _____ pcm
(B.5) (B.6) (B.7)

B.9 Shutdown Margin in excess of required Shutdown Margin (B.8 – Required SDM from the COLR):

( )_____ pcm – (–) 1770 pcm = ( ) _____pcm
(B.8) Required SDM from the COLR (SDM_{Excess})

B.10 If B.9 is positive, THEN emergency borate per FNP-1-AOP-27.0, EMERGENCY BORATION, to establish the required shutdown margin otherwise Shutdown Margin is adequate for the Present plant condition.

Date:_____ Performed by: _____

Date:_____ Verified by: _____

PCB-1-VOL1-CRV77

UNIT 1 CYCLE 23 CURVE 77
Control Rod Worth for SDM Calculations

REV. 8

APPROVED: Vanessa K. Foley For Bryan Grimes 4-15-09
ENGINEERING SUPPORT MANAGER DATE

ARI-1 Rod Worth (pcm) for Shutdown Margin Calculations

Burnup Range (MWD/MTU)	Power Level (%)										
	0	10	20	30	40	50	60	70	80	90	100
≤ 150	4587	4710	4831	5071	5311	5483	5655	5792	5927	6162	6397
> 150 ≤ 1000	4667	4801	4935	5180	5425	5594	5762	5905	6048	6285	6523
> 1000 ≤ 2000	4717	4867	5017	5267	5517	5680	5844	5995	6145	6384	6623
> 2000 ≤ 3000	4755	4909	5063	5320	5578	5740	5902	6052	6201	6442	6683
> 3000 ≤ 4000	4818	4975	5131	5396	5660	5814	5969	6113	6257	6483	6708
> 4000 ≤ 5000	4767	4920	5072	5346	5619	5778	5938	6073	6208	6439	6670
> 5000 ≤ 6000	4717	4865	5013	5296	5579	5743	5906	6033	6159	6395	6631
> 6000 ≤ 7000	4689	4827	4965	5254	5542	5714	5885	6001	6118	6355	6593
> 7000 ≤ 8000	4660	4788	4916	5211	5506	5685	5864	5970	6076	6316	6555
> 8000 ≤ 9000	4646	4765	4884	5182	5480	5669	5857	5955	6052	6292	6531
> 9000 ≤10000	4632	4742	4852	5154	5455	5652	5850	5939	6028	6268	6507
>10000 ≤11000	4622	4725	4828	5129	5431	5641	5850	5933	6016	6253	6490
>11000 ≤12000	4612	4707	4803	5105	5408	5629	5850	5927	6004	6239	6473
>12000 ≤13000	4617	4706	4795	5096	5398	5631	5865	5937	6010	6242	6475
>13000 ≤14000	4621	4704	4787	5087	5387	5633	5879	5947	6015	6245	6476
>14000 ≤15000	4631	4709	4787	5086	5385	5642	5900	5964	6028	6256	6485
>15000 ≤16000	4641	4714	4787	5085	5382	5652	5921	5981	6041	6267	6493
>16000 ≤17000	4662	4731	4800	5096	5391	5669	5947	6004	6062	6286	6510
>17000 ≤18000	4682	4748	4813	5107	5400	5687	5973	6028	6083	6304	6526
>18000 ≤19000	4709	4771	4833	5125	5418	5710	6002	6056	6109	6328	6547
>19000 ≤20000	4735	4794	4852	5144	5435	5734	6032	6083	6135	6351	6568
>20000 ≤20885	4760	4818	4876	5165	5454	5759	6063	6112	6161	6377	6592

Notes:

1. Rod worth data assumes the starting point is rods at the Rod Insertion Limit. If a bank is below the RIL, reduce the table value by 75 pcm for each step below the RIL.
2. The rod worth data represents negative reactivity. However, STP-29.1, STP-29.2 and STP-29.5 have been written to handle the correct sign convention when the above data is entered as a positive number. Enter the above numbers directly into the STP.
3. **ARI-1** is defined as **All Rods In** -- less the most reactive rod. The SDM calculation requires that one rod be assumed stuck. Therefore, use the data directly from the table above when there are not any known stuck rods.

UNIT 1 CYCLE 23 CURVE 77
Control Rod Worth for SDM Calculations

REV. 8

APPROVED: Vander K. Flip for Bryan Grinaker 4-15-09
ENGINEERING SUPPORT MANAGER DATE

Worth of Most Reactive Rod (pcm) for Shutdown Margin Calculations

Burnup Range (MWD/MTU)	Power Level 0% to 100%
≤ 150	658
> 150 ≤ 1000	676
> 1000 ≤ 2000	732
> 2000 ≤ 3000	781
> 3000 ≤ 4000	889
> 4000 ≤ 5000	1024
> 5000 ≤ 6000	1160
> 6000 ≤ 7000	1232
> 7000 ≤ 8000	1304
> 8000 ≤ 9000	1355
> 9000 ≤10000	1406
>10000 ≤11000	1450
>11000 ≤12000	1494
>12000 ≤13000	1528
>13000 ≤14000	1561
>14000 ≤15000	1592
>15000 ≤16000	1623
>16000 ≤17000	1653
>17000 ≤18000	1684
>18000 ≤19000	1713
>19000 ≤20000	1741
>20000 ≤20885	1767

Notes:

1. Rod worth data assumes the starting point is rods at the Rod Insertion Limit.
2. The rod worth data represents negative reactivity. However, STP-29.1, STP-29.2 and STP-29.5 have been written to handle the correct sign convention when the above data is entered as a positive number. Enter the above numbers directly into the STP.
3. **ARI-1** is defined as **All Rods In** -- less the most reactive rod.
4. For multiple stuck rods, the ARI-1 value on Page 1 of this curve should be reduced by the following calculation:
   [KUR x WSR x 1.75] + [WSR x 0.75]
   where KUR = Number of **known** untrippable rods (does not include rod **assumed** stuck in ARI-1 table)
   and WSR = Worst stuck rod (i.e. most reactive rod)

PCB-1-VOL1-CRV78

UNIT 1 CYCLE 23 CURVE 78
Total Power Defect for SDM Calculations

REV. 8

APPROVED: Vanderpool filling for Bryan Grimes 4-15-09
ENGINEERING SUPPORT MANAGER DATE

Power Defect (pcm) for Shutdown Margin Calculations

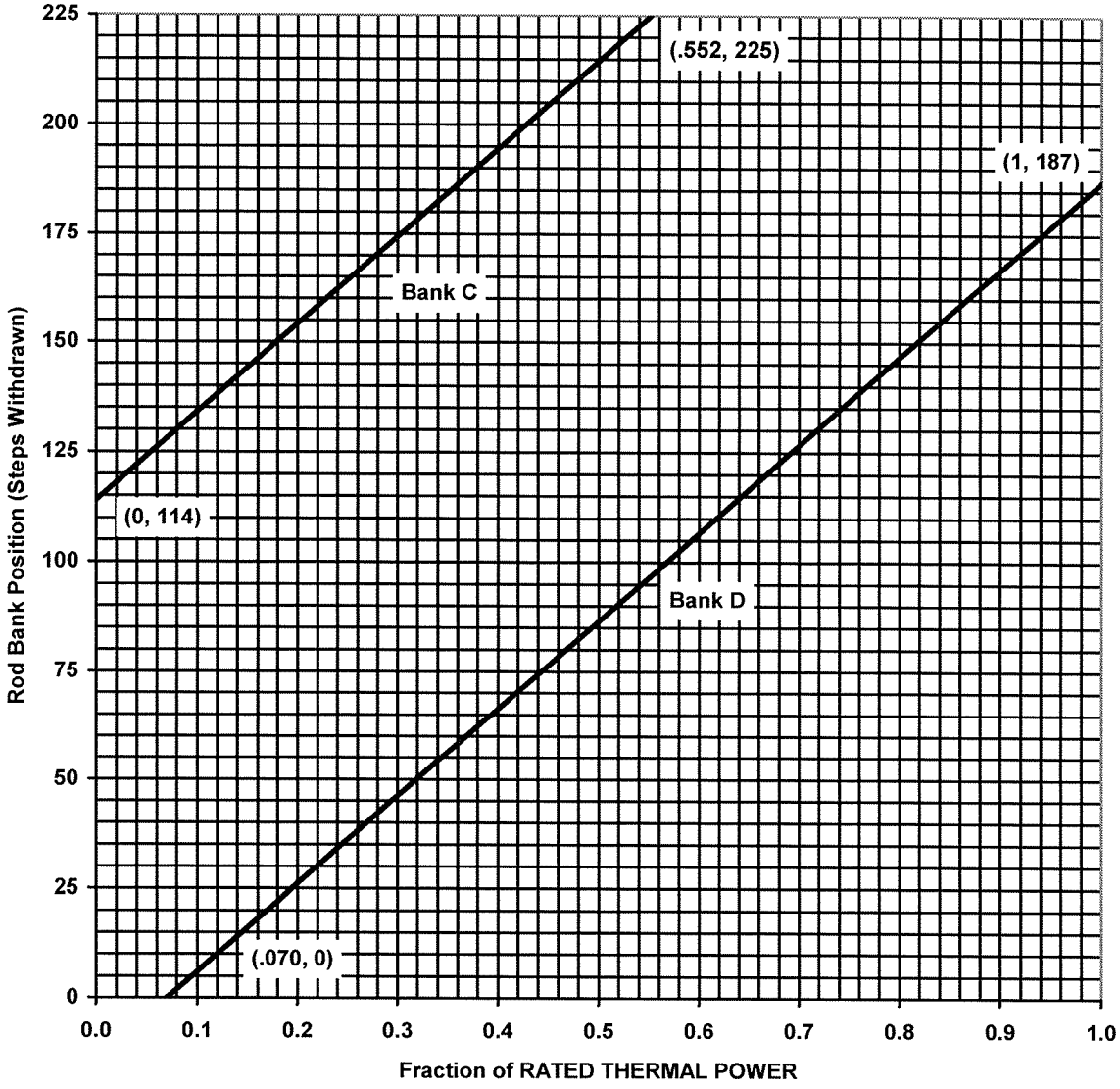
Burnup Range (MWD/MTU)	Power Level (%)										
	0	10	20	30	40	50	60	70	80	90	100
≤ 150	0	361	537	717	898	958	1019	1119	1219	1326	1432
> 150 ≤ 1000	0	351	522	701	879	943	1006	1106	1206	1307	1409
> 1000 ≤ 2000	0	330	495	667	839	903	967	1068	1169	1265	1361
> 2000 ≤ 3000	0	317	476	647	818	879	941	1041	1142	1237	1332
> 3000 ≤ 4000	0	326	489	664	839	901	964	1062	1161	1261	1360
> 4000 ≤ 5000	0	344	514	697	879	942	1004	1103	1202	1306	1410
> 5000 ≤ 6000	0	362	539	729	919	982	1045	1144	1242	1351	1459
> 6000 ≤ 7000	0	388	576	774	972	1037	1103	1202	1301	1416	1531
> 7000 ≤ 8000	0	414	613	818	1024	1092	1160	1260	1360	1481	1603
> 8000 ≤ 9000	0	440	651	863	1074	1147	1220	1326	1431	1558	1684
> 9000 ≤10000	0	466	690	907	1124	1202	1280	1391	1503	1634	1765
>10000 ≤11000	0	492	728	950	1173	1258	1344	1461	1579	1717	1854
>11000 ≤12000	0	518	766	994	1222	1315	1408	1531	1655	1800	1944
>12000 ≤13000	0	543	804	1035	1267	1369	1471	1603	1734	1884	2034
>13000 ≤14000	0	567	841	1077	1313	1424	1535	1674	1813	1968	2123
>14000 ≤15000	0	589	875	1115	1356	1477	1597	1744	1890	2054	2217
>15000 ≤16000	0	611	908	1153	1399	1529	1660	1813	1967	2139	2310
>16000 ≤17000	0	633	940	1189	1438	1578	1718	1882	2046	2223	2400
>17000 ≤18000	0	654	971	1225	1478	1627	1777	1951	2125	2307	2489
>18000 ≤19000	0	673	1001	1259	1516	1677	1837	2020	2203	2392	2582
>19000 ≤20000	0	692	1031	1293	1554	1726	1897	2089	2280	2477	2674
>20000 ≤20885	0	709	1057	1323	1590	1771	1953	2152	2351	2554	2757

Notes:

1. STP-29.1, STP-29.2 and STP-29.5 have been written to handle the correct sign convention when the above data is entered as a positive number. Enter the above numbers directly into the STP.

Figure 1
Rod Bank Insertion Limits versus Rated Thermal Power

Fully Withdrawn – 225 to 231 steps, inclusive



Fully Withdrawn shall be the condition where control rods are at a position within the interval ≥ 225 and ≤ 231 steps withdrawn.

Note: The Rod Bank Insertion Limits are based on the control bank withdrawal sequence A, B, C, D and a control bank tip-to-tip distance of 128 steps.

CONDITIONS

When I tell you to begin, you are to **Determine if Shutdown Margin is adequate using STP-29.5, SHUTDOWN MARGIN CALCULATION IN MODES 1 AND 2 (TAVG ≥ 547°F),** for Unit 1. The conditions under which this task is to be performed are:

a. Unit 1 is stable at 90% with the ramp on hold
b. Bank D indicates 192 by Group Demand.
c. Seven of the Bank D rods (H2, B8, H14, F6, F10, K10, K6) are at 192 steps by DRPI.
d. Rod P8, in the D bank, has been determined to be Stuck.
e. Rod P8 is at 162 steps by DRPI.
f. All other rods are at 229 steps.
g. Core burnup is 9,800 MWD/MTU burnup.
h. FNP-1-STP-29.5, SHUTDOWN MARGIN CALCULATION IN MODES 1 AND 2 (TAVG ≥ 547°F), initial conditions are satisfied.
i. The Shift Supervisor has directed you to complete FNP-1-STP-29.5 starting at step 5.1.

A.3.1.A Radiation Control ADMIN G2.3.9 – RO & SRO

CRO-A.3.1.A
TITLE: Calculate the Maximum Permissible Stay Time within Emergency Dose Limits.
PROGRAM APPLICABLE: SOT ___ SOCT _____ OLT _X_ LOCT_____
ACCEPTABLE EVALUATION METHOD: _X_ PERFORM ___ SIMULATE ___ DISCUSS
EVALUATION LOCATION: ____ SIMULATOR ___ CONTROL ROOM _X_ CLASSROOM
PROJECTED TIME: _20 MIN_ SIMULATOR IC NUMBER: _N/A
ALTERNATE PATH ___ TIME CRITICAL ___ PRA_____

JPM DIRECTIONS:

1. Initiation of task may be in group setting, evaluation performed individually upon completion.
2. The references for this task will be provided as listed or the student may be provided a computer with a generic exam login and access to the EXAM reference disk.
3. Elements 1 through 7 may be evaluated by reviewing the responses on the Handout.

TASK STANDARD: Required for successful completion of this JPM:

- Calculate dose expected for Tasks 1 through 3
- Determine if a Repair team would exceed equipment protection emergency dose limits of EIP-14.0, Personnel Movement, Relocation, Re-Entry and Site Evacuation.
- Calculate the maximum allowable stay time for a task; or determine what tasks can be performed, if any, without exceeding limits.

Examinee:	
Overall JPM Performance: **Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)	

EXAMINER: _____

CONDITIONS

When I tell you to begin, you are to **determine if exposure is within emergency dose limits of EIP-14.0, Personnel Movement, Relocation, Re-Entry and Site Evacuation**. The conditions under which this task is to be performed are:

a. A General Emergency has been declared on Unit 1.
b. 1A RHR pump is air bound and must be vented per AOP-12, Attachment 1, RHR Pump Venting.
c. The TSC has requested that 1B RHR pump motor bearing oil levels be checked and filled as required after restoring 1A RHR and suggests using the same Repair team. The time required to perform this task is unknown, but is estimated to range between 1 to 20 minutes.
d. Ted and Joel have been selected to perform the task, their exposure information is stated below.
e. The Tasks are provided in the table below, and estimated times and doses have been provided.
f. Each task must be completed by both operators, and must be performed in the order listed.
g. Both operators are expected to receive equal dose for each job.
h. The Emergency Director (ED) directs you to perform the following with the information provided:
   - Calculate the expected dose for tasks 1 through 3 and document in the table.
   - Determine the tasks, if any, for which the members of the team could be permitted to perform without exceeding the equipment protection emergency dose limits of EIP-14.0.
     - If any member of the team will NOT exceed limits prior to performing task 4, THEN calculate the maximum allowable stay time to complete task 4, and remain within the dose limits.
     - IF any member of the team WILL exceed limits prior to performing task 4, THEN identify the last tasks (if any) that the team can complete without either member exceeding dose limits.

Task #	Location/Task description	Time allowed/ req'd (minutes)	Dose Rate (R/hr)	Dose
1	83' 1A RHR Pump and HX rooms/ Vent rig installation and venting	30	5.31	
2	100' piping penetration room/ Vent rig installation and venting	15	19.75	
3	121' piping penetration room/ Vent rig installation and venting	20	5.65	
4	Inspect 1B RHR pump motor bearing oil levels and fill as required		7	

Year-to-date DOSE Records (REM TEDE)	
TED	1.26
JOEL	0.4

Can this team perform all of the tasks? (Circle one) YES / NO

IF yes, then state the maximum permitted stay time for task #4. _____

IF no, then state the highest sequential task # that can be performed, if any. _____

INITIATING CUE: "You may begin."

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
_____ START TIME		
1. Determine the dose received for tasks 1 through 3.	1) Calculates (in REM)	
* a. Task #1 $(30\,\text{min}) \times 5.31 R/hr \times \left(\frac{1hr}{60\,\text{min}}\right) = 2.66 REM$	a. 2.66 {Range 2.6 to 2.7}	S / U
* b. Task #2 $(15\,\text{min}) \times 19.75 R/hr \times \left(\frac{1hr}{60\,\text{min}}\right) = 4.938 REM$	b. 4.938 {4.9 to 5.0}	S / U
* c. Task #3 $(20\,\text{min}) \times 5.65 R/hr \times \left(\frac{1hr}{60\,\text{min}}\right) = 1.88 REM$	c. 1.88 {1.8 to 1.9}	S / U

NOTE: • **A Cue may be required to obtain responses for each element if the candidate does not clearly document results. Provide the Cue as stated on the Handout.**

* 2. Evaluates Team exposure within emergency limits of EIP-14.0 for completion of tasks 1 through 3.	2) Circles YES on handout –OR– states that team can perform tasks 1 through 3.	S / U
a. Emergency Dose limit for equipment protection is 10 R and DOES NOT include current exposure.	a. 10 R is limit	
b. Summation of Task 1 through 3 $10 REM - (2.66 + 4.94 + 1.88) REM \geq 0$ $0.52 REM \geq 0$	b. 0.52 R remains available	
c. Determines BOTH team members can complete all tasks.	c. Circles the YES choice	
* 3. Calculates stay time for task #4. $(0.52\,\text{Re}\,m)\left(\frac{hr}{7 REM}\right)\left(\frac{60\,\text{min}}{hr}\right) = 4.493\,\text{min}$ $\{RANGE: 3\,\text{min}\_to\_6\,\text{min}\}$	3) Documents or States: STAY time is 4.5 mins {Range: 3 min to 6 min)	S / U
_____ STOP TIME		

Terminate when all elements of the task have been completed.

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) before the element number.

GENERAL REFERENCES:

1. FNP-0-EIP-14.0, ver 22
2. FNP-0-M-1.0, ver 18.0
3. KA: G2.3.4 RO 3.2 SRO 3.7

GENERAL TOOLS AND EQUIPMENT:

Provide/Acquire:

1. Computer with access to Exam Reference Disk, or EIP 14.0, ver 22.0 and M-1.0, version 18.0.
2. Calculator
3. pens/pencils
4. Scrap paper

Critical ELEMENT justification:

STEP	Evaluation
1.a	CRITICAL - Task Objective
1.b	CRITICAL - Task Objective
1.c	CRITICAL - Task Objective
2	CRITICAL - Task Objective
3	CRITICAL - Task Objective

COMMENTS:

IF Ted's year to date dose is used, the emergency dose limit will be exceeded and the expected response for element 2 is "NO" and highest task that can be completed is Task #3.

IF Joel's year to date dose is used and the Emergency dose is reduced by this value then the stay time will range from 0 mins to 1.1 mins.

IF emergency dose limit of 25 Rem Then Stay time will be excessive.
IF ADMIN dose limit of 2 REM used then NONE of the tasks can be performed, or Legal limit of 5 REM then Task #2 will be the highest.

CONDITIONS

When I tell you to begin, you are to **determine if exposure is within emergency dose limits of EIP-14.0, Personnel Movement, Relocation, Re-Entry and Site Evacuation**. The conditions under which this task is to be performed are:

a. A General Emergency has been declared on Unit 1.
b. 1A RHR pump is air bound and must be vented per AOP-12, Attachment 1, RHR Pump Venting.
c. The TSC has requested that 1B RHR pump motor bearing oil levels be checked and filled as required after restoring 1A RHR and suggests using the same Repair team. The time required to perform this task is unknown, but is estimated to range between 1 to 20 minutes.
d. Ted and Joel have been selected to perform the task, their exposure information is stated below.
e. The Tasks are provided in the table below, and estimated times and doses have been provided.
f. Each task must be completed by both operators, and must be performed in the order listed.
g. Both operators are expected to receive equal dose for each job.
h. The Emergency Director (ED) directs you to perform the following with the information provided:
   - Calculate the expected dose for tasks 1 through 3 and document in the table.
   - Determine the tasks, if any, for which the members of the team could be permitted to perform without exceeding the equipment protection emergency dose limits of EIP-14.0.
     - If any member of the team will NOT exceed limits prior to performing task 4, THEN calculate the maximum allowable stay time to complete task 4, and remain within the dose limits.
     - IF any member of the team WILL exceed limits prior to performing task 4, THEN identify the last tasks (if any) that the team can complete without either member exceeding dose limits.

Task #	Location/Task description	Time allowed/ req'd (minutes)	Dose Rate (R/hr)	Dose
1	83' 1A RHR Pump and HX rooms/ Vent rig installation and venting	30	5.31	
2	100' piping penetration room/ Vent rig installation and venting	15	19.75	
3	121' piping penetration room/ Vent rig installation and venting	20	5.65	
4	Inspect 1B RHR pump motor bearing oil levels and fill as required		7	

Year-to-date DOSE Records (REM TEDE)	
TED	1.26
JOEL	0.4

Can this team perform all of the tasks? (Circle one) YES / NO

IF yes, then state the maximum permitted stay time for task #4. _____

IF no, then state the highest sequential task # that can be performed, if any. _____

A.4.1.A Emergency Plan G2.4.14 – **RO & SRO**

CRO-A.4.1.A
TITLE: Monitor the Critical Safety Function Status Trees.
PROGRAM APPLICABLE: SOT ___ SOCT _____ OLT __X__ LOCT_____
ACCEPTABLE EVALUATION METHOD: __X__ PERFORM ___ SIMULATE ___ DISCUSS
EVALUATION LOCATION: __X__ SIMULATOR
PROJECTED TIME: __20 MIN__ SIMULATOR IC NUMBER: __IC-216
ALTERNATE PATH ___ TIME CRITICAL ___ PRA_____

JPM DIRECTIONS:

1. This task will be conducted on the Simulator.
2. The simulator will remain frozen for the duration to the task, if the candidate attempts to operate any component, no plant response will occur.
3. The plant computer screens will be turned off.
4. ALL will perform elements 1 through 7.
5. **ONLY SRO** will perform elements 8-10.

TASK STANDARD: Required for successful completion of this JPM:

- Identify all applicable Critical Safety functions which are challenged.
- Identify the highest level challenge to the CSFSTs and the required procedure entry, if any.
- **SRO ONLY**: Perform a proper assessment and procedure transition for the given conditions.

Examinee:	
Overall JPM Performance: **Satisfactory** ☐	**Unsatisfactory** ☐
Evaluator Comments (attach additional sheets if necessary)	

EXAMINER: _____

Developer	Howard Fitzwater	11/09/09
NRC Approval	SEE NUREG 1021 FORM ES-301-3	

CONDITIONS

When I tell you to begin, you are to **monitor the Critical Safety Function Status Trees (CSFST).** The conditions under which this task is to be performed are:

a. A Large Break LOCA and loss of Off-site power has occurred on Unit 1 from 100% 10 minutes ago.
b. The team has transitioned to EEP-1.0, Primary or Secondary Loss of Coolant.
c. The Integrated Plant Computer has failed.
d. The STA is en route to the Control Room.
e. You have been directed to manually monitor Critical Safety Functions using CSF-0.0, Critical Safety Function Status Trees and:
    1. Identify all applicable Critical Safety functions which are challenged, if any.
    2. If applicable, identify the highest level challenge to the CSFSTs and the required procedure entry for that condition.

INITIATING CUE: "You may begin."

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
_____ START TIME		
1. Evaluates CSFST at CSF-0.1 Subcriticality. a. Power Rng < 5% b. Both Int RNG SUR zero or neg c. Both SR detectors ARE energized d. IR Range < -0.2 DPM	1) Determines Subcriticality SAT / GREEN. a. YES (N42 is failed high) b. YES c. NO d. YES	S / U
2. Evaluates CSFST at CSF-0.2 Core Cooling. a. CET <1200 °F b. Subcooling > 16°F **{45°}** c. CET <700 °F	2) Determines Core Cooling OFF-NORMAL / YELLOW (C.3). a. YES b. NO c. YES	S / U
3. Evaluates CSFST at CSF-0.3 Heat Sink. a. NR levels > 31{48%} b. Total AFW flow >395 gpm. c. Press in all SG <1129 psig d. NR lvl <82% e. Press <1075 psig f. NR lvl >31 % {48%}	3) Determines Heat Sink is OFF-NORMAL / YELLOW (H.5). a. NO b. YES c. YES d. YES e. YES f. NO	S / U

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)

NOTE: Candidate may inform the SS of the FRP-P.1/ ORANGE path condition upon discovery but should continue to evaluate the remaining CSFSTs. IF CUE required, then provide: "SS Acknowledges."

* 4. Evaluates CSFST at CSF-0.4 INTEGRITY.

4) Determines Integrity is SEVERELY Challanged / ORANGE. (P.1) S / U

a. Temp decr <100 °F last 60 min
b. All Press and CL temps to right of LIMIT A
c. Al l CL temps > 250°F

a. NO
b. YES (LOSP will result in instrument spike < 250F- indication only—should be determined as not valid).
c. NO

NOTE: • The candidate may inform the SS of the FRP- Z.1/ORANGE path condition upon discovery but should continue to evaluate the remaining CSFSTs. IF CUE required, then provide: "SS Acknowledges."

* 5. Evaluates CSFST at CSF-0.5 Containment.

5) Determines containment is in SEVERELY Challenged/ ORANGE (Z.1) S / U

a. CTMT press <54 psig
b. CTMT press <27 psig
c. AT least ONE CTMT Spray pump running with flow >1000 gpm.

a. YES
b. NO (35 psig)
c. NO; recognizes 1B CS pump has no flow path aligned (MOV-8820B closed) and 1A CS pump is not running.

6. Evaluates CSFST at CSF-0.6 INVENTORY.

6) Determines containment is in OFF-NORMAL / YELLOW (I.2). S / U

a. PRZR level < 92%
b. PRZR level > 15%

a. YES
b. NO

EVALUATION CHECKLIST

ELEMENTS:	STANDARDS:	RESULTS: (CIRCLE)
* 7. Reports to the Shift Supervisor identified conditions and FRP-P.1 is highest priority: a. FRP-P.1, ORANGE due to Cooldown >100°F in 60 minutes and < 250°F. b. FRP-Z.1 ORANGE due to failed 1A CTMT Spray pump and 1B CTMT Spray pump discharge valve.	7) SS informed of FRP Z.1 and P.1 ORANGE paths exist and FRP-P.1 entry required.	S / U

RO ONLY: Terminate when Elements 1-7 have been completed.

IF element 7 correctly assessed then:
SRO CUE: "SS acknowledges and directs you to perform FRP-P.1."

8. (FRP-P.1 Step 1) Checks RCS pressure Greater than 435 psig:	8) RCS pressure checked on PI-402B and 403B (50 psig) and determined less than.	S / U
9. (FRP-P.1 step 1 RNO) Checks LHSI flow greater than 1500 gpm.	9) Checks flow on FI-605A and FI-605B. (3250 gpm)	S / U
* 10. **Transitions to procedure step in effect.**	10) Properly assesses Procedure step in effect is FRP-Z.1. **Transitions to FRP-Z.1 or states the FRP-Z.1 is required to be entered.**	S / U

_____ STOP TIME

SRO ONLY: Terminate when all Critical Elements have been completed.

CRITICAL ELEMENTS: Critical Elements are denoted with an asterisk (*) before the element number.

GENERAL REFERENCES:

1. CSF-0.0, ver 17.0
2. FNP-1-FRP-P.1, ver 19
3. KA: G2.4.14 RO 3.8 SRO 4.5

GENERAL TOOLS AND EQUIPMENT:

NONE

Critical ELEMENT justification:

STEP	Evaluation
1	NOT critical—procedure protocol , condition not challenged (GREEN)
2	NOT critical—procedure protocol, conditions Off-Normal (Yellow)
3	NOT critical—procedure protocol, condition Off-Normal (Yellow)
4	CRITICAL - Task Objective, condition CHALLENGED (ORANGE)
5	CRITICAL - Task Objective, condition CHALLENGED (ORANGE)
6	NOT critical—procedure protocol, condition Off-Normal (Yellow)
7	CRITICAL - Task Objective, reports both challenged conditions to SS and identifies highest priority procedure. **(END RO ONLY)**
8	NOT critical—procedure protocol
9	NOT critical—procedure protocol
10	CRITICAL –Task Objective; properly assess next procedure transition for conditions. **(END SRO ONLY)**

COMMENTS:

If the candidate attempts to operate the CTMT Spray pump or discharge valve, and notes that the simulator is frozen, a Cue may be required: "The response is as you see it."

CONDITIONS

When I tell you to begin, you are to **monitor the Critical Safety Function Status Trees (CSFST).** The conditions under which this task is to be performed are:

a. A Large Break LOCA and loss of Off-site power has occurred on Unit 1 from 100% 10 minutes ago.
b. The team has transitioned to EEP-1.0, Primary or Secondary Loss of Coolant.
c. The Integrated Plant Computer has failed.
d. The STA is en route to the Control Room.
e. You have been directed to manually monitor Critical Safety Functions using CSF-0.0, Critical Safety Function Status Trees and:
    1. Identify all applicable Critical Safety functions which are challenged, if any.
    2. If applicable, identify the highest level challenge to the CSFSTs and the required procedure entry for that condition.