North Atlantic

JOB PERFORMANCE MEASURE ADMJPM07 Rev. 00

EVALUATE PLANT CONDITIONS FOR CBA DESIGN MODIFICATION

Student Name: _____ Badge #: _____

Evaluator Name: _____ Badge #: _____

Student Signature: _____ Date: _____
(optional)

Evaluator Signature: _____ Date: _____

Training Coordinator Signature: _____ Date: _____

SAT UNSAT

This JPM was administered for qualification: NO

PREPARED BY: _____ DATE: 1/17/00
INSTRUCTOR

REVIEWED BY: _____ DATE: _____
SUBJECT MATTER EXPERT (OPTIONAL)

APPROVED BY: _____ DATE: 1/18/00
TRAINING SUPERVISOR

JOB PERFORMANCE WORKSHEET

1.0 Task Number and Description:

Position: SM
1190403903 Interpret and ensure compliance with administrative procedures during normal plant operations.

2.0 Conditions:

A. The plant is preparing to begin work on the safety related CBA design change. A pre-job briefing is to be conducted today for entry into the Technical Specification ACTION for CONTROL ROOM SUBSYSTEMS – AIR CONDITIONING.

3.0 Standards:

Determine that the conditions required by Standing Operating Order 99-015 are NOT satisfied for entry into the TS ACTION for CBA.

4.0 Student Materials:

Copy of the Tear-Off Sheet
Technical Specifications
Technical Clarifications
Standing Operating Order 99-015
OS1023.51, CONTROL ROOM VENTILATION AND AIR CONDITIONING SYSTEM OPERATION
MPCS SDS terminal, if possible, for VAS procedures

5.0 Limitations on performance:

Perform all steps. Verbalize all actions to the evaluator.

6.0 References:

Procedures

Technical Specifications
Technical Clarifications
Standing Operating Order 99-015
OS1023.51, CONTROL ROOM VENTILATION AND AIR CONDITIONING SYSTEM OPERATION

Sys	KA	Description	Value SRO
	2.1.12	Ability to apply technical specifications for a system.	4.0

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

7.0 Setting:

Plant / Classroom / Simulator

8.0 Safety Considerations:

IF performed in the plant, ensure both student and evaluator have proper PPE for entry into the plant.

9.0 Approximate Completion Time:

20 minutes

10.0 Directions to the Student:

Evaluator gives Tear-Off sheet to the student
Evaluator reads the following to the student (Optional for multiple JPMs)

Student:

1. Ensures task is done correctly.
2. May be asked follow-up questions to confirm knowledge of task.

A. You are the Shift Manager.

B. The following information is provided to you:

The plant is preparing to begin work on the safety related CBA design change. A pre-job briefing is to be conducted today for entry into the Technical Specification ACTION for CONTROL ROOM SUBSYSTEMS – AIR CONDITIONING.

C. **(NA for NRC Exam)**
The performance must meet the following standard:

Determine that the conditions required by Standing Operating Order 99-015 are NOT satisfied for entry into the TS ACTION for CBA.

D. **(NA for NRC Exam)**
Perform the task utilizing the applicable program manuals.

E. **(NA for NRC Exam)**
To perform the task successfully, you must perform/simulate all critical steps correctly and verbalize all your actions to the evaluator. Practicing STAR techniques and using the station communication standard will safeguard successful completion of the task.

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

F. **(NA for NRC Exam)**
During the course of the walk-through examination, there may be some tasks you will be asked to perform that may require you to implement an alternative method directed by plant procedures in order to complete the assigned task. You are expected to make decisions and take actions based on the facility's procedural guidance and the indications available.

G. **(NA for NRC Exam)**
(Statement optional for multiple JPMs)
Failure to perform or simulate a critical element within the prescribed standard will result in a failure of the task.

H. **(NA for NRC Exam)**
I will inform you when the JPM is complete

I. **(NA for NRC Exam)**
We will begin after the Initiating Cue is read.

J. The evaluator will act as the Assistant Operations Manager (AOM) and provide cues and communications for this JPM. Do you have any questions?

11.0 Initiating Cue:

AOM to SM, **"Verify that the CBA related operating requirements are satisfied for entry into the Technical Specifications ACTION for CONTROL ROOM SUBSYSTEMS – AIR CONDITIONING. The ACTION is to be entered for Train ALPHA CBA."**

~~IAW the Standing Order~~ IAW the appropriate Standing Order

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate	ELEMENT/STEP *denotes a critical step	STANDARD *denotes critical standard	EVALUATION SAT UNSAT	INITIALS/DATE
1. P	Start time_____	Initiating cue read.		_____

NOTE: It is desirable, but not required, that this JPM be administered in a location that has the reference material and a MPCS SDS terminal available. If the location that the JPM is being administered does not have any of the above, provide suitable information to the candidate when asked.

NOTE: The candidate must recognize that Standing Operating Order 99-015 has been issued to establish administrative controls for implementation of the one time basis (per train) extension of AOT for the CBA design change project.

NOTE: The order of steps that the candidate takes to determine whether the required conditions are satisfied is not critical. The scripted **CUES** should be provided, as appropriate, based on the tack taken.

*2.	P	REFER to Standing Operating Order 99-015:	REFERS to Standing Operating Order 99-015:	_____

CUE: IF the candidate checks the status of the non-safety related chill water subsystem with a watchstander: Watchstander to SM: **"The non-safety related chill water subsystem is operating normally".**

NOTE: **There is no specific set of criteria that the operator is required to verify to determine that the non-safety related chill water subsystem is functional. The candidates are NOT expected to verify all of the parameters listed below.**

CUE: If the candidate checks parameters on the MPCS, provide the following information, as applicable:

CBA-FN-14B is running
There are no trouble alarms active for the non-safety related chill water subsystem
Chilled Water Pumps P-432 and P-433 are running
A4813 → P-432/433 discharge pressure ~ 84 psig
A4816 → Chiller outlet (E-226/227) temperature ~51°F
A4817 → E-226/227 outlet pressure ~ 43.5 psig
A4818 → E-229A/B inlet pressure ~ 29 psig
A4819 → E-229A/B inlet temperature ~ 51°F
A4821 → E-229A/B outlet temperature ~ 66°F
A4810 → E-229A/B outlet pressure ~ 29 psig
A4814 → E-229A/B outlet / Bypass mix temperature ~ 52°F
A4811 → P-432/433 suction pressure ~ 30 psig

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

North Atlantic

JOB PERFORMANCE MEASURE L0033I Rev. 00

ECP CALCULATION

Student Name: _____ Badge #: _____

Evaluator Name: _____ Badge #: _____

Student Signature: _____ Date: _____
(optional)

Evaluator Signature: _____ Date: _____

Training Specialist Signature: _____ Date: _____
(optional)

SAT UNSAT

This JPM was administered for qualification: NO

PREPARED BY: _____ DATE: 1/20/00
INSTRUCTOR

REVIEWED BY: _____ DATE: _____
SUBJECT MATTER EXPERT (OPTIONAL)

APPROVED BY: _____ DATE: 1/20/00
TRAINING SUPERVISOR

JOB PERFORMANCE WORKSHEET

1.0 Task Number and Description:

Position: RO

0010100201 Perform Estimated Critical Position (ECP) Calculations

2.0 Conditions:

A. The plant is preparing for a startup following a 2 week outage to repair a 25 kV bus fault.
B. Plant condition/history is as follows:
   1. Shift turnover has been completed and no surveillances are planned or in progress.
   2. MODE 3 with RCS at 557°F and 2235 psig.
   3. RE has given the US an ECP.
   4. The plant has been shutdown for two weeks as of 0000 today. It is now 0200.
   5. Criticality planned for today at 0800, 100 steps, Control Bank D.
   6. Core burnup is 8.0 GWD/MTU.
   7. RCS boron concentration is 1702 ppm. The sample time was 0030 this morning. No boration / dilution has been performed since 1930 yesterday.

3.0 Standards:

A. Independently compute critical boron concentration within ± 30 ppm using RE-1 in the Primary Tech Data Book.
B. Determine max rod insertion limit within ± 10 steps.
C. Determine max rod withdrawal limit consistent with RE-5 or monthly full out position.

4.0 Student Materials:

Copy of the Tear-Off Sheet
Calculator
Copy of RS-1735, Rev. 2, Chg. 2.
Seabrook Primary Tech Data Book
RE-1, Critical Boron Concentration, Rev. 01-07-00.
RE-5, Overlap Integral Rod Worth vs Rod Position, Rev. 01-07-02.
RE-3, Differential Boron Worth, Rev. 01-07-00.
RE-16, Control Bank D Operating Band, Rev. 01-07-00.
RE-20, Monthly RCCA Full Out Position, Rev. 01-07-00.
RE-21, Core Operating Limits Report, Rev. 01-07-00.

5.0 Limitations on performance:

Simulate/Perform all steps. Verbalize all actions to the evaluator.

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

6.0 References:

Procedures:

OS1000.07, Approach to Criticality.
RS-1735, Reactivity Calculations.
Primary Technical Data Book.

Technical Specifications:

3.1.1.4, Minimum Temp for Criticality
3.1.3.6, Control Rod Insertion Limits

Sys	KA	Description	Value RO/SRO
192008	K1.07	Calculate ECP using procedures and given plant procedures.	3.5/3.6

7.0 Setting:

Simulator, Plant or Classroom

A. The Examiner must prepare a completed ECP in advance. Use simulator data curves in Primary Tech Data Book based on 8.0 GWD/MTU. The poison value is 0 (Xenon free startup).
B. The completed ECP worksheet RS1735A can be used to show satisfactory completion of the JPM.
C. The evaluator will act as the US and/or RE Engineer to complete communications with the candidate.

8.0 Safety Considerations:

None

9.0 Approximate Completion Time:

20 Minutes

10.0 Directions to the Student(s):

Evaluator gives Tear-Off sheet to the student
Evaluator reads the following to the student (Optional for multiple JPMs)

JOB PERFORMANCE WORKSHEET

Student:

1. Ensures task is done correctly.
2. May be asked follow-up questions to confirm knowledge of task.

A. You are the Primary Operator. You are going to calculate an ECP.

B. The following information is provided to you:

1. The plant is preparing for a startup following a 2-week outage to repair a 25 kV bus fault.
2. Plant condition/history is as follows:
   a. Shift turnover has been completed and no surveillances are planned or in progress.
   b. MODE 3 with RCS at 557°F and 2235 psig.
   c. RE has given the US an ECP.
   d. The plant has been shutdown for two weeks as of 0000 today. It is now 0200.
   e. Criticality planned for today at 0800, 100 steps, Control Bank D.
   f. Core burnup is 8.0 GWD/MTU.
   g. RCS boron concentration is 1702 ppm. The sample time was 0030 this morning. No boration / dilution has been performed since 1930 yesterday.

C. **(NA for NRC Exam)**
The performance must meet the following standard:

1. Independently compute critical boron concentration.
2. Determine min and max rod withdrawal limits.

D. **(NA for NRC Exam)**
Perform the task using RS-1735, Reactivity Calculations.

E. **(NA for NRC Exam)**
To perform the task successfully, you must perform/simulate all critical steps correctly and verbalize all your actions to the evaluator. Practicing STAR techniques and using the station communication standard will safeguard successful completion of the task.

F. **(NA for NRC Exam)**
During the course of the walkthrough examination, there may be some tasks you will be asked to perform that may require you to implement an alternative method directed by plant procedures in order to complete the assigned task. You are expected to make decisions and take actions based on the facility's procedural guidance and the indications available.

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

G. **(NA for NRC Exam)**
Failure to perform or simulate a critical element within the prescribed standard will result in a failure of the task.

H. **(NA for NRC Exam)**
I will inform you when the JPM is complete.

I. **(NA for NRC Exam)**
We will begin after the Initiating Cue is read.

J. I will act as the US and provide the cues and communications for this JPM. Do you have any questions?

11.0 Initiating Cue:

US to PSO, **"Primary Operator (or student's name), using RS1735, perform a manual Estimated Critical Position (ECP) and verify the results are within control rod insertion limits of TS 3.1.3.6. We will compare your results with the ECP calculation which RE has performed."**

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate	ELEMENT/STEP *denotes a critical step	STANDARD *denotes critical standard	EVALUATION SAT UNSAT	INITIALS/DATE
1. P	Start time _____	Initiating cue read.		_____

NOTE: If the setting is Simulator or Control Room, after the correct procedure is located, give the student a copy of the data sheet. Otherwise, give the student a copy of the procedure. After the student has located the appropriate RE curve, provide the copy included with the JPM (ensures the revision level used by the candidate matches the revision used to generate the answer key).

NOTE: All values should be entered as positive values.

2.	P	Refer to section 4.1.2, of ECP Procedure (ECP Data & Analysis Form RS 1735A):	Performs the following:	_____
		a. ENTER the Estimated Condition for Criticality in Section 1. Include the Date, Time, Burnup and Desired Rod Position for the next criticality.	a. Enters Section 1 conditions: • Criticality date *(Today)* _____ _____ • Criticality time *(0800)* _____ _____ • Core burnup *(8 GWD/MTU)* _____ _____ • Bank D desired rod position *(CBD @ 100)* _____ _____	
		b. RECORD in Section 2 the value of Hot Zero Power, No Xenon, Critical Boron Concentration (C_o), from Seabrook TDB Figure RE-1, for the Burnup listed in Section 1. The value of C_o may be alternately supplied by the Reactor Engineering Department to take advantage of critical boron data measured at the present burnup.	b. Records C_o (Critical Boron Concentration) from TDB Figure RE-1. *(1740 ppm)* _____ _____	

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate	ELEMENT/STEP *denotes a critical step	STANDARD *denotes critical standard	EVALUATION SAT	EVALUATION UNSAT	INITIALS/DATE

CUE: If asked for Net Poison Worth (ρ_I), then respond **"Net Poison Worth is 0 pcm."** (xenon free startup)

c. RECORD in Section 3 the value of the Net Poison Worth at the expected Time of Criticality (ρ_I) as determined by Reactor Engineering or computer prediction.	c. Records ρ_I (Net Poison Worth). *(zero)*	____	____
d. RECORD in Section 4 the value of inserted rod worth (ρ_R), from Seabrook TDB Figure RE-5, for the desired Rod Position listed in Section 1.	d. Records ρ_R (Inserted Rod Worth) from TDB Figure RE-5. *(450 pcm)*	____	____
e. RECORD in Section 5 the Differential Boron Worth (DBW) at HZP, from Seabrook TDB Figure RE-3, for the Burnup listed in Section 1.	e. Records DBW (Differential Boron Worth) from TDB Figure RE-3 for the Burnup listed in Section 1. *(6.76 pcm/ppm)*	____	____
f. COMPLETE the calculation in Section 6 to determine the estimated Critical Boron Concentration (CB) as follows: $C_B = C_O - [(\rho_I + \rho_R)/DBW]$	*f. Calculates C_B (Est. Critical Boron Conc.) within ± 30 ppm of RE ECP. *(1673 ppm)*	____	____

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate	ELEMENT/STEP *denotes a critical step	STANDARD *denotes critical standard	EVALUATION SAT	EVALUATION UNSAT	INITIALS/DATE

CUE: If asked for present Boron Concentration, then respond with " **1702 ,**" the value determined in the Answer Key, Form A, step 7 (C_P). **"The sample time was 0030 this morning. No boration / dilution has been performed since 1930 yesterday."**

h. COMPLETE Section 7 prior to the approach to criticality. RECORD the present boron concentration (C_P) and CALCULATE the present excess in boron concentration to criticality (ΔC) as follows: $\Delta C = C_P - C_B$	g. Completes section 7: • Records present boron concentration. *(1702 ppm)*	_____	_____	
	• Calculates excess boron concentration. *(29 ppm)*	_____	_____	

NOTE: The zero power RIL shall be used as the Min. Rod position if the calculated minimum rod position is less than the zero power Rod Insertion Limit.

h. COMPLETE Section 8 to determine the ± 500 pcm ECP Limits. ADD ± 500 pcm to the value of Inserted Rod Worth recorded in Section 4. From the Minimum and Maximum inserted rod worth (ρ_R Min. and (ρ_R Max.) determine the ADMIN. WITHDRAWAL LIMIT and ADMIN. INSERTION LIMIT respectively using TDB Figure RE-5.	h. Calculates rod limits: • Inserts values for P_R from Section 4 and *(450 pcm)*	_____	_____	
	• Calculates $\rho_{R.\ Min.}$ *(zero)*	_____	_____	
	• Calculates $\rho_{R.\ Max.}$ *(950 pcm)*	_____	_____	

CUE: If student asks about RE-16 limits, **"There are no rod withdrawal limits this cycle."**

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate	ELEMENT/STEP *denotes a critical step	STANDARD *denotes critical standard	EVALUATION SAT UNSAT	INITIALS/DATE

NOTE: Use the March 2000 full out position on RE-20:

- That required by RE-20, Monthly RCCA Full Out Position for the current month.

OR

- A value ≥ 225 steps based on RE-5.

	• Determines Rod Withdrawal Limit (bank/position) from TDB Figure RE-5 – *(221 – 231 steps)*		____ ____	

NOTE: RIL @ HZP is the Tech Spec RIL. TS 3.1.3.6, Control Rod Insertion Limits references the COLR.

	• Determines Rod Insertion Limit from TDB Figure RE-5. *(20 – 40 steps CBD)*		____ ____	

CUE: **"The JPM is complete."**

11.	Stop time _____ Evaluator calculates the time to complete the task.	Start - Stop time is ≤ 20 minutes.		_____

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

PERFORMANCE SUMMARY

Provide comments on unsatisfactory performance of an element/step or for deviation from performance as stated. Record interruptions in performance such as retraining, shift change, and processing of procedure changes. Recommend remedial training, if necessary.

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

TEAR-OFF SHEET FOR JPM L0033I

Directions to the Student:

Evaluator gives Tear-Off sheet to the student
Evaluator reads the following to the student (Optional for multiple JPMs)

Student:

1. Ensures task is done correctly.
2. May be asked follow-up questions to confirm knowledge of task.

A. You are the Primary Operator. You are going to CALCULATE an ECP.

B. The following information is provided to you:

1. The plant is preparing for a startup following a 2 week outage to repair a 25 kV bus fault.
2. Plant condition/history is as follows:
   a. Shift turnover has been completed and no surveillances planned/in progress.
   b. MODE 3 with RCS at 557 °F and 2235 psig.
   c. RE has given the US an ECP.
   d. The plant has been shutdown for two weeks as of 0000 today. It is now 0200.
   e. Criticality planned for today at 0800, 100 steps, Control Bank D.
   f. Core burnup is 8.0 GWD/MTU.
   g. RCS boron concentration is 1702 ppm. The sample time was 0030 this morning. No boration / dilution has been performed since 1930 yesterday.

C. The evaluator will act as the US and provide the cues and communications for this JPM. Do you have any questions?

Initiating Cue:

US to PSO, **"Primary Operator (or student's name), using RS1735, perform a manual Estimated Critical Position (ECP) and verify the results are within control rod insertion limits of TS 3.1.3.6. We will compare your results with the ECP calculation which RE has performed."**

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

Form A: Estimated Critical Position Data & Analysis Form

(Sheet 1 of 2)

Calculated By: _____ Date: _____ Time: _____

Approved By: _____ Date: _____ Time: _____

NOTE: Enter all input data as positive values.

1) Estimated Condition for Criticality

Date: Today Time: 0800 Burnup: 8.0 GWD/MTU

Desired Rod Position: D (Bank) @ 100 (Steps)

2) Critical Boron Concentration @ Current Burnup (HZP, ARO, No Xenon)

C_O = 1740 *ppm* from TDB Figure RE-1

3) Net Poison Worth @ Expected Time of Criticality

ρ_I = 0 *pcm* from computer prediction or Reactor Engineering

4) Inserted Rod Worth @ Criticality

ρ_R = 450 *pcm* from TDB Figure RE-5

5) Differential Boron Worth @ Current Burnup (HZP)

DBW = 6.76 *pcm / ppm* from TDB Figure RE-3

6) Estimated Critical Boron Concentration

$$C_B = C_O - \left[\frac{\rho_I + \rho_R}{DBW}\right]$$

$$C_B = 1740\ ppm - \left[\frac{0\ pcm + 450\ pcm}{6.76\ pcm/ppm}\right]$$

C_B = 1673 *ppm*

Form A: Estimated Critical Position Data & Analysis Form

(Sheet 2 of 2)

7) Present excess in Boron Concentration to Criticality, ΔC

Present RCS Boron Concentration, C_P = 1702 ppm (C_P)

Sample Time & Date Today Hrs. 0030

ΔC = 1702 ppm (C_P) − 1673 ppm (C_B) = 29 ppm (ΔC)

Borate if ΔC is Negative, Dilute if ΔC is Positive.

---

8) Limits on Control Rod Position @ Criticality

ρ_R Min. = 450 pcm (ρ_R) − 500 pcm = 0 pcm (ρ_R Min.)

ρ_R Max. = 450 pcm (ρ_R) + 500 pcm = 950 pcm (ρ_R Max.)

ADMINISTRATIVE WITHDRAWAL LIMIT = D Bank @ 231 Steps

From TDB Figure RE-5 @ (ρ_R Min.), _____ or RE-16 @ HZP

ADMINISTRATIVE INSERTION LIMIT = D Bank @ 30 Steps

From TDB Figure RE-5 @ (ρ_R Max.), or RIL @ HZP

---

9) Reference Data To Be Taken After Criticality @ 10^{-8} Amps IR

Reference Data Time & Date _____ Hrs. _____

Rod Position CBD @ _____ Steps & CBC @ _____ Steps

Net Poison Worth, ρ_I = _____ pcm from MPCS C0036

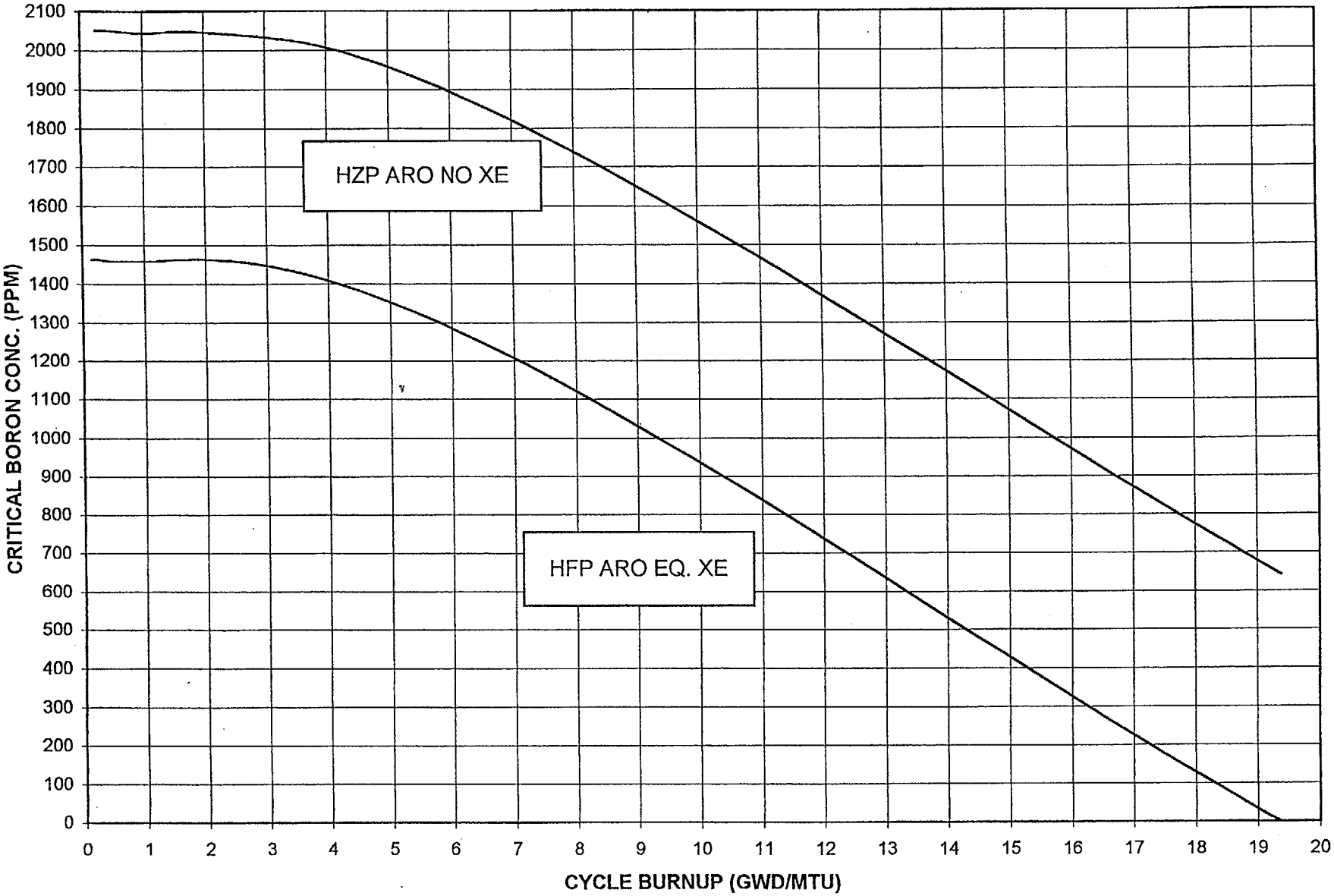
T_{AVG} = _____ °F from MCB

IR Channel N35 = _____ Amps IR Channel N36 = _____ Amps

Measured Critical Boron Concentration, C_M = _____ ppm (C_M)

NOTE: Return this completed form to Reactor Engineering

RE-1 CRITICAL BORON CONCENTRATION VS. BURNUP

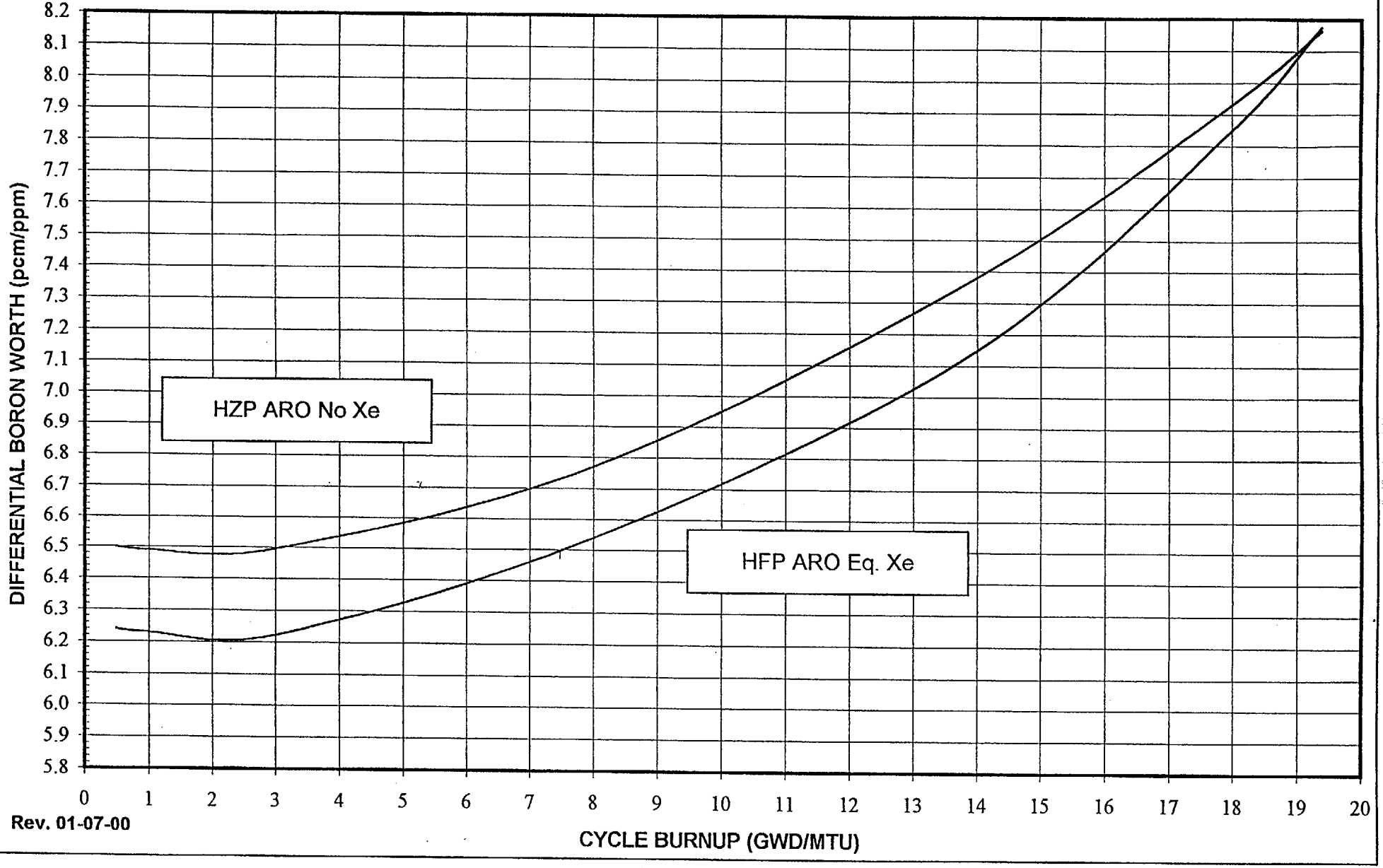


REVISION
01-07-00

RE DEPT SUPERVISOR Paul V. Gruny 5/5/99
SIGNATURE DATE

OPERATIONS MANAGER Jerry Stetson 5/6/99
SIGNATURE DATE

RE-03 DIFFERENTIAL BORON WORTH vs. BURNUP

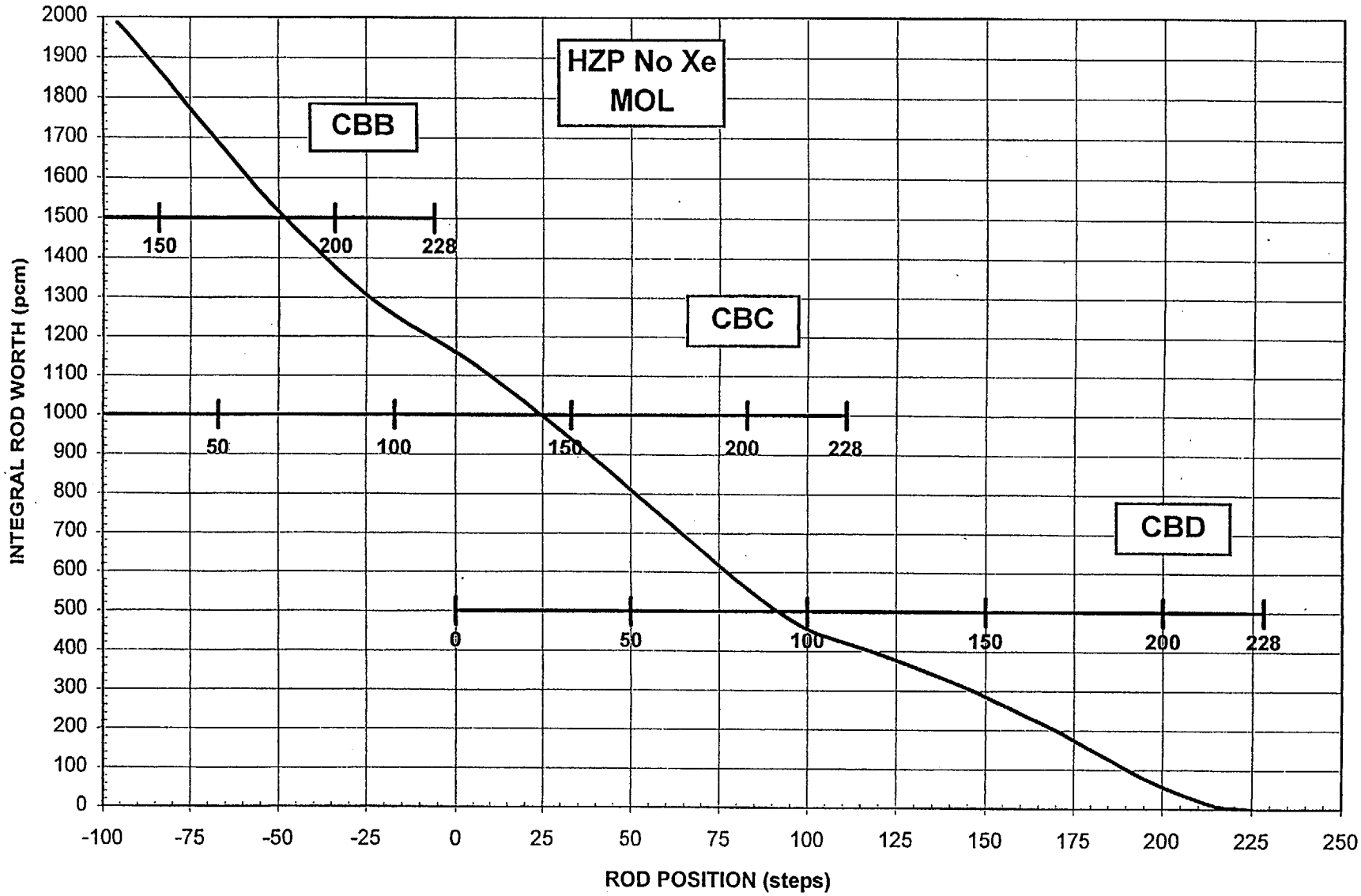


Rev. 01-07-00

RE DEPT SUPERVISOR Paul V. Gruy DATE 5/5/99

OPERATIONS MANAGER Jane St. Pierre DATE 5/6/99

RE-05 OVERLAP INTEGRAL ROD WORTH VS. ROD POSITION



Revision
01-07-02

RE Supervisor _____ Date 1/9/00 Operations Manager _____ Date 1-8-00

RE-16 CONTROL BANK D OPERATING BAND

THIS FIGURE LEFT INTENTIONALLY BLANK

THE NEED FOR ROD WITHDRAWAL LIMITS
FOR CYCLE 07 SHALL BE EVALUATED
DURING LPPT (RS1737)

RE-16 WILL BE RE-ISSUED AT THAT TIME

REVISION
01-07-00

RE DEPT SUPERVISOR Paul V. Gregg 5/9/99
SIGNATURE DATE

OPERATIONS MANAGER [signature] 5/8/99
SIGNATURE DATE

RE-20 MONTHLY RCCA FULL OUT POSITION - CYCLE 7

MONTH #	MONTH	FOP	THUMB WHEEL SWITCH SETTINGS					
			S1	S2	S3	S4	S5	S6
1	May-99	228	117	228	234	345	351	462
2	Jun-99	227	117	227	234	344	351	461
3	Jul-99	226	117	226	234	343	351	460
4	Aug-99	225	117	225	234	342	351	459
5	Sep-99	225	117	225	234	342	351	459
6	Oct-99	226	117	226	234	343	351	460
7	Nov-99	227	117	227	234	344	351	461
8	Dec-99	228	117	228	234	345	351	462
9	Jan-00	230	117	230	234	347	351	464
10	Feb-00	231	117	231	234	348	351	465
11	Mar-00	231	117	231	234	348	351	465
12	Apr-00	230	117	230	234	347	351	464
13	May-00	229	117	229	234	346	351	463
14	Jun-00	228	117	228	234	345	351	462
15	Jul-00	227	117	227	234	344	351	461
16	Aug-00	226	117	226	234	343	351	460
17	Sep-00	225	117	225	234	342	351	459
18	Oct-00	225	117	225	234	342	351	459

RE DEPT SUPERVISOR Paul V. Owen 5/5/99

OPERATIONS MANAGER Thomas A. Green 5/6/99
SIGNATURE DATE

REVISION 01-07-00

SEABROOK STATION

Reactor Engineering Procedure

Reactivity Calculations

RS1735

Rev. 02 Chg. 02

Level of Use
General

Procedure Owner:
A. G. Merrill

Reactivity Calculations

TABLE OF CONTENTS

1. PURPOSE

1.1 Objective

The purpose of this procedure is to provide calculational method and forms necessary for Estimated Critical Positions and boration/dilution reactivity changes.

1.2 Discussion

This procedure exists in two independent parts. The first part, Section 4.1, may be used to calculate the Estimated Critical Position (ECP). Section 4.2 may be used to calculate the volume and flow rate of boric acid or reactor makeup water (RMW) required to execute a given change in RCS boron concentration (C_B), or produce blended makeup without a change in C_B. **Either** Section 4.1 **or** 4.2 may be performed with or without the Main Plant Computer System.

The ECP method, contained in Section 4.1, is based on the Hot Zero Power, Critical Boron vs. Burnup Curve supplied and updated by the RE Department. By using this curve all temperature reactivity defects are accounted for. Therefore, only the reactivity contributions due to control rods and the net worth of Xe, Sm and Pu (referred to as a single value of Net Poison Worth, Ψ_I) need be considered for a specific ECP.

2. PREREQUISITES

None

3. PRECAUTIONS

3.1 The Control Rod Insertion Limits of Technical Specification 3.1.3.6 **shall not** be violated except under the provisions of Technical Specification, Special Test Exceptions 3.10.2 and 3.10.3.

3.2 If criticality is **not** achieved within ± 500 pcm of the calculated ECP or if the 1/M plot indicates criticality will **not** be achieved within ± 500 pcm of the calculated ECP, follow directions provided in Station Operating Procedure OS1000.07, Approach to Criticality.

3.3 On Form A, Estimated Critical Position Data & Analysis Form, enter ALL input data as positive values.

3.4 For an approach to criticality when transient xenon worth is present and a change in the estimated time for criticality occurs, the ECP should be recalculated if the time change results in a change in Net Poison Worth at criticality of greater than 150 pcm.

4. INSTRUCTIONS

4.1 Estimated Critical Condition calculations generated via the ECP program on the Main Plant Computer System (step 4.1.1) may be used in planning the conditions for a critical approach. However, only a manually executed and approved "Estimated Critical Condition & Analysis Form, Form A, (step 4.1.2) shall serve as an authorized ECP as required for reactor startup.

4.1.1 **Computer Generated ECP**

C A U T I O N

The computer ECP program is based on unverified software and may be used for information only.

☐ 4.1.1.1 At any host SDS PC workstation, SELECT the ECP WORKSHEET from the CRITICALITY MENU or use "ECP" Turn-On Code.

4.1.1.2 ENTER the following information for the estimated condition for criticality:

☐ 4.1.1.2.1 Date

☐ 4.1.1.2.2 Time

☐ 4.1.1.2.3 Burnup

☐ 4.1.1.2.4 Control Bank D position in Steps

☐ 4.1.1.3 ENTER the present boron concentration with the date and time the sample was taken.

☐ 4.1.1.4 SELECT GET INITIAL VALUES.

☐ 4.1.1.5 SELECT CALCULATE, and OBTAIN the Form A, Estimated Critical Position Data & Analysis Form, printout.

☐ 4.1.1.6 COMPLETE Section 9 after criticality has been attained and the reactor has been stabilized at 10^{-8} Amps Intermediate Range. RECORD the actual time and date of criticality and RECORD the measured Critical Boron (C_M), Rod Position (TAVG), RCS Pressure, Net Poison Worth (Ψ_I), N35 and N36.

4.1.2 **ECP Procedure (ECP Data & Analysis Form RS 1735A)**

NOTE

Enter ALL input data as positive values.

☐ 4.1.2.1 ENTER the Estimated Condition for Criticality in Section 1. Include the Date, Time, Burnup and Desired Rod Position for the next criticality.

☐ 4.1.2.2 RECORD in Section 2 the value of Hot Zero Power, **No** Xenon, Critical Boron Concentration (C_O), from Seabrook TDB Figure RE-1, for the Burnup listed in Section 1. The value of C_O may be alternately supplied by the Reactor Engineering Department to take advantage of critical boron data measured at the present burnup.

☐ 4.1.2.3 RECORD in Section 3 the value of the Net Poison Worth at the expected Time of Criticality (Ψ_I) as determined by Reactor Engineering or computer prediction.

☐ 4.1.2.4 RECORD in Section 4 the value of inserted rod worth (Ψ_R), from Seabrook TDB Figure RE-5, for the desired Rod Position listed in Section 1.

☐ 4.1.2.5 RECORD in Section 5 the Differential Boron Worth (DBW) at HZP, from Seabrook TDB Figure RE-3, for the Burnup listed in Section 1.

☐ 4.1.2.6 COMPLETE the calculation in Section 6 to determine the estimated Critical Boron Concentration (C_B) as follows:

$$C_B = C_O - [(\rho_I + \rho_R) / DBW]$$

☐ 4.1.2.7 COMPLETE Section 7 prior to the approach to criticality. RECORD the present boron concentration (C_P) and CALCULATE the present excess in boron concentration to criticality (ΔC) as follows:

$$\Delta C = C_P - C_B$$

NOTE

The zero power ROD INSERTION LIMIT (RIL) shall be used as the ADMIN. INSERTION LIMIT if the RIL is more restrictive than the rod position determined from Ψ_R Max.

The ROD WITHDRAWAL LIMIT (RE-16) shall be used as the ADMIN. WITHDRAWAL LIMIT if RE-16 is more restrictive than the rod position determined from Ψ_R Min.

☐ 4.1.2.8 COMPLETE Section 8 to determine the ± 500 pcm ECP Limits. ADD ± 500 pcm to the value of Inserted Rod Worth recorded in Section 4. From the Minimum and Maximum inserted rod worth (Ψ_R Min. and (Ψ_R Max.) determine the ADMIN. WITHDRAWAL LIMIT and ADMIN. INSERTION LIMIT respectively using TDB Figure RE-5.

☐ 4.1.2.9 COMPLETE Section 9 after criticality has been attained and the reactor has been stabilized at 10^{-8} Amps Intermediate Range. RECORD the actual time and date of criticality and RECORD the measured Critical Boron (C_M), Rod Position, TAVG, Net Poison Worth (Ψ_I), N35 and N36.

4.2 Boration/Dilution & Makeup

4.2.1 Manual Boration/Dilution Calculation: (Form B, Boron/Dilution & Blended Makeup Worksheet, Part 1)

NOTE

To be used when the Boration/Dilution Program is unavailable.

☐ 4.2.1.1 Item 1: ENTER the Power and T_{AVG} expected at the time when the concentration change is to be made and the concentration of the BAST to be used if performing a boration.

☐ 4.2.1.2 Item 2: ENTER the present and desired boron concentration and CALCULATE the total change.

☐ 4.2.1.3 Item 3A: OBTAIN the total required volume of boric acid or Reactor Makeup Water (RMW), use TDB Figure RE-14.

NOTE

TDB Figure RE-14 consists of a series of tables, each table covers a range of 100 ppm. Therefore additional lines are provided in Item 3A to accommodate boron changes that span more than one table. Enter the table with the existing RCS boron concentration. (Vertical column on the left labeled Initial Boron Conc.) Find the row in that column for the desired boron concentration and read the total volume required to make the desired change in concentration. (Rows are labeled across the top of the figure as Final Boron Concentration.) Boration volumes are to the left of the diagonal row of zeroes, dilution volumes are to the right.

If the desired change encompasses more than one table, go to the row closest to the desired final concentration, record the volume change in Section 3A of Form RS 1735B, then go to the next table, using the previously used value of final boron concentration as the new value for initial boron concentration. Interpolate as necessary.

☐ 4.2.1.4 Item 3B: Use TDB Figure RE-15 to CORRECT the change in water inventory if T_{AVG} does **not** equal 557°F.

☐ 4.2.1.5 Item 3C: (For Boration Only) ENTER the actual Boric Acid Storage Tank concentration in units of PPM and CALCULATE the Boric Acid Concentration Correction Factor.

☐ 4.2.1.6 Item 3D: CALCULATE the Corrected Total Volume required in units of gallons as the product of Items 3A, 3B and 3C.

☐ 4.2.1.7 Item 4: Prior to initiating boration or dilution, ENTER the totalizer readings (FY-110B and FY-111B) of total flow totalizer and boric acid. When the Boration or Dilution is complete, RECORD totalizer readings again.

☐ 4.2.1.8 Item 5: (Optional) After allowing for RCS equalization, ENTER the final boron concentration.

4.2.2 **Blended Makeup Calculation (Form B, Boron/Dilution & Blended Makeup Worksheet, Part 2)**

☐ 4.2.2.1 Item 1: ENTER the desired makeup boron concentration (C_{MU}).

☐ 4.2.2.2 Item 2: ENTER the desired total makeup flow rate, FK-111, (F_{TOT}).

☐ 4.2.2.3 Item 3: ENTER the actual Boric Acid Storage Tank concentration (C_{BAST}).

☐ 4.2.2.4 Item 4: ENTER the desired total makeup, FK-111 (G_{TOT}).

☐ 4.2.2.5 Item 5: CALCULATE the boric acid flow rate, FK-110 (F_{BA}) as follows:

$$F_{BA} = \frac{C_{MU} \times F_{TOT}}{C_{BAST}}$$

☐ 4.2.2.6 Item 6: CALCULATE the total boric acid, FK-110 (G_{BA}) as follows:

$$G_{BA} = \frac{C_{MU} \times G_{TOT}}{C_{BAST}}$$

5. REFERENCES

5.1 Seabrook Station Technical Data Book (TDB)

5.2 Seabrook Station Technical Specifications

6. SUMMARY OF CHANGES

6.1 Rev. 02: No changes made; converted from WordPerfect to Microsoft Word in the format specified in Rev. 01 of MNPR, PR 3.2. This procedure was converted on April 29, 1998.

6.2 Rev 02 Chg. 01

- Added steps to 4.2.2 and Form B to calculate total boric acid for setting flow controller CS-FK-110.

6.3 Rev 02 Chg. 02

- Changed all psi's (Ψ) to rho's (ρ) throughout the procedure.
- Changed P to ρ's on Form A, sheet 1 of 2, item #6.
- Changed min to max on Form A, sheet 2 of 2, item #8, block labeled ADMINISTRATIVE INSERTION LIMIT.

Form A: Estimated Critical Position Data & Analysis Form

(Sheet 1 of 2)

Calculated By: _____ Date: _____ Time: _____

Approved By: _____ Date: _____ Time: _____

NOTE: Enter all input data as positive values.

1) Estimated Condition for Criticality

Date: _____ Time: _____ Burnup: _____ GWD/MTU

Desired Rod Position: _____ @ _____
Bank Steps

2) Critical Boron Concentration @ Current Burnup (HZP, ARO, No Xenon)

$C_O =$ _____ *ppm* from TDB Figure RE-1

3) Net Poison Worth @ Expected Time of Criticality

$\rho_I =$ _____ *pcm* from computer prediction or Reactor Engineering

4) Inserted Rod Worth @ Criticality

$\rho_R =$ _____ *pcm* from TDB Figure RE-5

5) Differential Boron Worth @ Current Burnup (HZP)

$DBW =$ _____ *pcm / ppm* from TDB Figure RE-3

6) Estimated Critical Boron Concentration

$$C_B = C_O - \left[\frac{\rho_I + \rho_R}{DBW}\right]$$

$$C_B = \text{\_\_\_\_\_}\ ppm - \left[\frac{\text{\_\_\_\_\_}\ pcm + \text{\_\_\_\_\_}\ pcm}{\text{\_\_\_\_\_}\ pcm / ppm}\right]$$

$C_B =$ _____ *ppm*

Form A: Estimated Critical Position Data & Analysis Form

(Sheet 2 of 2)

7) Present excess in Boron Concentration to Criticality, ΔC

Present RCS Boron Concentration, C_P = _____ ppm
(C_P)

Sample Time & Date _____ Hrs. _____

ΔC = _____ ppm − _____ ppm = _____ ppm
(C_P) (C_B) (ΔC)

Borate if ΔC is Negative, Dilute if ΔC is Positive.

---

8) Limits on Control Rod Position @ Criticality

ρ_R Min. = _____ pcm − 500 pcm = _____ pcm
(ρ_R) (ρ_R Min.)

ρ_R Max. = _____ pcm + 500 pcm = _____ pcm
(ρ_R) (ρ_R Max.)

ADMINISTRATIVE WITHDRAWAL LIMIT = _____ (Bank) @ _____ (Steps)

From TDB Figure RE-5 @ (ρ_R Min.), or RE-16 @ HZP

ADMINISTRATIVE INSERTION LIMIT = _____ (Bank) @ _____ (Steps)

From TDB Figure RE-5 @ (ρ_R Max.), or RIL @ HZP

---

9) Reference Data To Be Taken After Criticality @ 10^{-8} Amps IR

Reference Data Time & Date _____ Hrs. _____

Rod Position CBD @ _____ Steps & CBC @ _____ Steps

Net Poison Worth, ρ_I = _____ pcm from MPCS C0036

T_{AVG} = _____ °F from MCB

IR Channel N35 = _____ Amps IR Channel N36 = _____ Amps

Measured Critical Boron Concentration, C_M = _____ ppm
(C_M)

NOTE: Return this completed form to Reactor Engineering

Form B: Boron/Dilution & Blended Makeup Worksheet

(Sheet 2 of 2)

PART 2 BLENDED MAKEUP WORKSHEET

Calculated by:_____ Date:_____

1. Desired Makeup Boron Concentration (C_{MU})_____ppm

2. Desired Total Makeup Flow Rate - FK-111 (F_{TOT})_____gpm

3. Boric Acid Storage Tank Concentration (C_{BAST})_____ppm

4. Desired Total Makeup - FK-111 (G_{TOT})_____gals

5. Boric Acid Flow Rate - FK-110 (F_{BA})

$$F_{BA} = \frac{(C_{MU})(F_{TOT})}{C_{BAST}} = \frac{(\quad)(\quad)}{(\quad)} = \_\_\_\_\_ \text{ gpm}$$

6. Total Boric Acid - FK-110 (G_{BA})

$$G_{BA} = \frac{(C_{MU})(G_{TOT})}{C_{BAST}} = \frac{(\quad)(\quad)}{(\quad)} = \_\_\_\_\_ \text{ gal}$$

Form B: Boron/Dilution & Blended Makeup Worksheet

(Sheet 1 of 2)

PART 1 BORATION/DILUTION WORKSHEET

Calculated by: _____ Date: _____

1. Reactor Power_____% RCS Temp. (TAVG.)_____°F Boric Acid Storage Tank_____ppm

2. Desired Boron Change: From_____ppm To_____ppm Total Change_____ppm

3. Gallons Required

3A. Gallons of 7350 ppm @ 557°F RCS Temp.

					RMW		Boric Acid	
From	_____	ppm	To	_____ ppm	_____	gals.	_____	gals.
From	_____	ppm	To	_____ ppm	_____	gals.	_____	gals.
From	_____	ppm	To	_____ ppm	_____	gals.	_____	gals.
From	_____	ppm	To	_____ ppm	_____	gals.	_____	gals.
From	_____	ppm	To	_____ ppm	_____	gals.	_____	gals.
				Total	a _____	gals.	a _____	gals.

3B. Temp. Correction (for Tavg. not equal to 557°F: Use TDB Figure RE-15 Correction Factor b_____)

3C. Boric Acid Concentration Correction Factor (C = 1.00 For Dilutions)
7350 ppm/(Storage Tank ppm) = 7350 ppm/(_____ppm) = c_____

3D. Corrected Total Gallons Required

(a_____gals.) x (b_____) x (c_____) = _____gals.

☐ RMW

☐ BA

4. Totalizer Readings:

	Initial	Final
Boric Acid (FY-110B)	_____	_____
Makeup (FY-111B)	_____	_____

5. Final Boron Concentration_____ppm

RE-21 CORE OPERATING LIMITS REPORT

CYCLE 7
COLR

RE DEPT SUPERVISOR Paul V. Gurney 4/19/99

OPERATIONS MANAGER Dave Stehm 4/19/99
SIGNATURE DATE

REVISION 01-07-00

1.0 Core Operating Limits Report

This Core Operating Limits Report for Seabrook Station Unit 1, Cycle 7 has been prepared in accordance with the requirements of Technical Specification 6.8.1.6.

The Technical Specifications affected by this report are:

1)	2.2.1	Limiting Safety System Settings
2)	3.1.1.1	Shutdown Margin Limit for MODES 1, 2, 3, 4
3)	3.1.1.2	Shutdown Margin Limit for MODE 5
4)	3.1.1.3	Moderator Temperature Coefficient
5)	3.1.3.5	Shutdown Rod Insertion Limit
6)	3.1.3.6	Control Rod Insertion Limits
7)	3.2.1	Axial Flux Difference
8)	3.2.2	Heat Flux Hot Channel Factor
9)	3.2.3	Nuclear Enthalpy Rise Hot Channel Factor

2.0 Operating Limits

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the following subsections. These limits have been developed using the NRC-approved methodologies specified in Technical Specification 6.8.1.6.

2.1 Limiting Safety System Settings: (Specification 2.2.1)

2.1.1 Cycle Dependent Overtemperature ΔT Trip Setpoint Parameters and Function Modifier:

2.1.1.1 $K_1 = 1.180$

2.1.1.2 $K_2 = 0.024 / °F$

2.1.1.3 $K_3 = 0.0018 / psig$

T = Indicated T_{avg} (°F), and

T' = Indicated T_{avg} at RATED THERMAL POWER (Calibration temperature for ΔT instrumentation, ≤ 588.5°F).

2.1.1.4 Channel Total Allowance (TA) = N.A.

2.1.1.5 Channel Z = N.A.

2.1.1.6 Channel Sensor Error (S) = N.A.

2.1.1.7 Allowable Value – The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 2.6% of ΔT span.

2.1.1.8 $F_1(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power-range neutron ion chambers with gains to be selected based on measured instrument response during plant startup tests. $F_1(\Delta I)$ is specified in Figure 1.1.

2.1.2 Cycle Dependent Overpower ΔT Trip Setpoint Parameters and Function Modifier:

2.1.2.1 $K_4 = 1.087$

2.1.2.2 $K_5 = 0.020$ / °F for increasing average temperature and $K_5 = 0.0$ for decreasing average temperature.

2.1.2.3 $K_6 = 0.00215$ / °F for $T > T''$ and $K_6 = 0.0$ for $T \leq T''$, where:

T = Indicated T_{avg} (°F), and

T'' = Indicated T_{avg} at RATED THERMAL POWER (Calibration temperature for ΔT instrumentation, ≤ 587.5 °F).

2.1.2.4 Channel Total Allowance (TA) = N.A.

2.1.2.5 Channel Z = N.A.

2.1.2.6 Channel Sensor Error (S) = N.A.

2.1.2.7 Allowable Value – The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 2.6% of ΔT span.

2.1.2.8 $F_2(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power-range neutron ion chambers with gains to be selected based on measured instrument response during plant startup tests. $F_2(\Delta I)$ is specified in Figure 1.2.

2.2 Shutdown Margin Limit for MODES 1, 2, 3, and 4: (Specification 3.1.1.1)

A) The Shutdown Margin shall be greater than or equal to 1.3% $\Delta K/K$, in MODES 1, 2, 3.

B) The Shutdown Margin shall be greater than or equal to 2.1% $\Delta K/K$, in MODE 4.

2.3 Shutdown Margin Limit for MODE 5: (Specification 3.1.1.2)

The Shutdown Margin shall be greater than or equal to 2.1% $\Delta K/K$.

2.4 Moderator Temperature Coefficient: (Specification 3.1.1.3)

2.4.1 The Moderator Temperature Coefficient (MTC) shall be less positive than $+1.85 \times 10^{-5}$ $\Delta K/K/°F$ for Beginning of Cycle Life (BOL), All Rods Out (ARO), Hot Zero Thermal Power conditions.

2.4.2 MTC shall be less negative than –4.7 x 10-4 $\Delta K/K/°F$ for End of Cycle Life (EOL), ARO, Rated Thermal Power conditions.

2.4.3 The 300 ppm ARO, Rated Thermal Power MTC shall be less negative than -3.8×10^{-4} $\Delta K/K/°F$ (300 ppm Surveillance Limit).

2.5 Shutdown Rod Insertion Limit: (Specification 3.1.3.5)

2.5.1 The shutdown rods shall be fully withdrawn. The fully withdrawn position is defined as the interval within 225 steps withdrawn to the mechanical fully withdrawn position inclusive.

2.6 Control Rod Insertion Limits: (Specification 3.1.3.6)

2.6.1 The control rod banks shall be limited in physical insertion as specified in Figure 2.

2.7 Axial Flux Difference: (Specification 3.2.1)

2.7.1 For operation with the Fixed Incore Detector Alarm OPERABLE, the indicated AFD must be within the Acceptable Operation Limits specified in Figure 3.1.

2.7.2 For operation with the Fixed Incore Detector Alarm inoperable, the indicated AFD must be within the Acceptable Operation Limits specified in Figure 3.2.

2.8 Heat Flux Hot Channel Factor : (Specification 3.2.2)

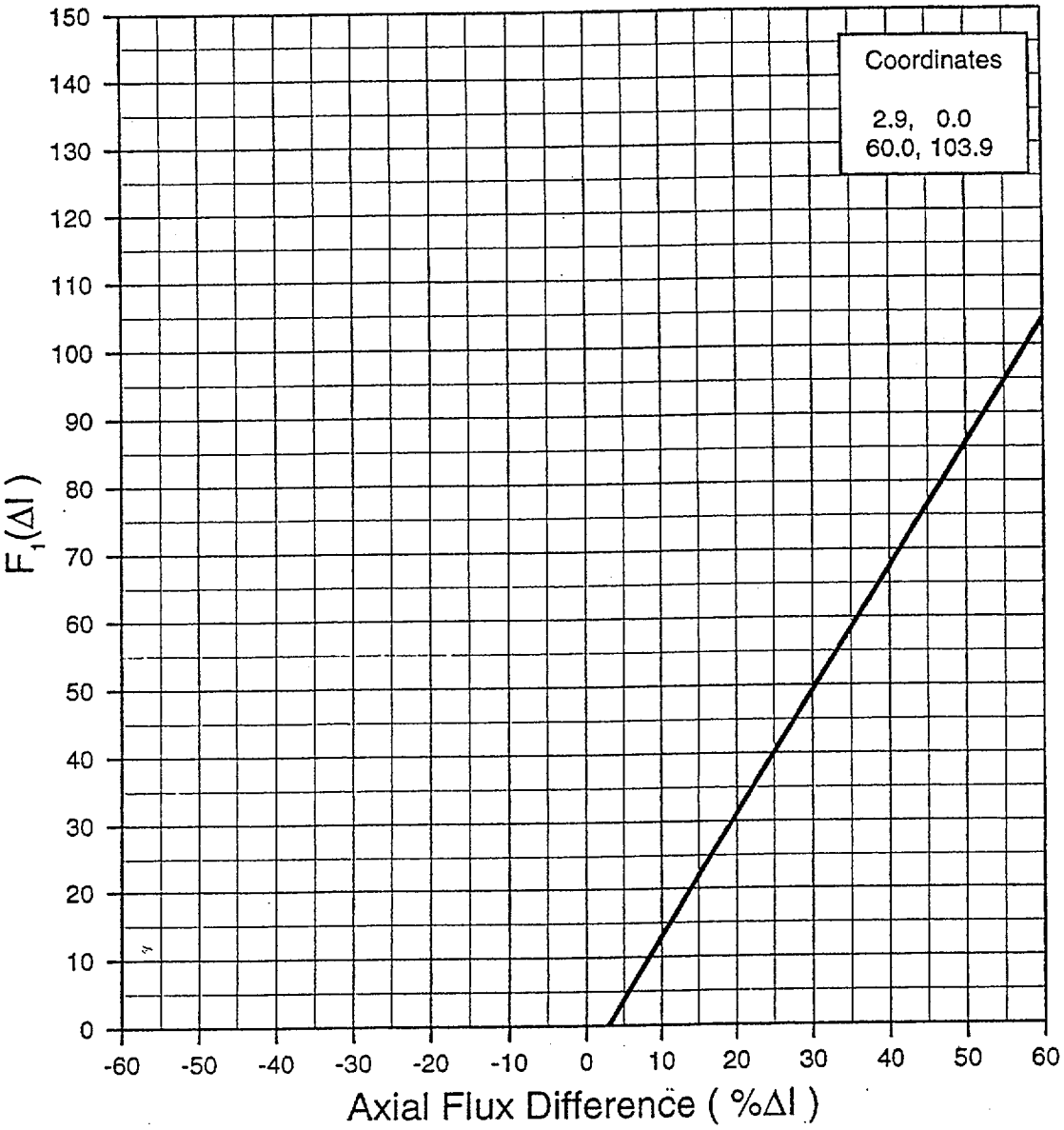
2.8.1 $F^{RTP}_{Q} = 2.50$

2.8.2 For operation with the Fixed Incore Detector Alarm OPERABLE, K(Z) is specified in Figure 4.1.

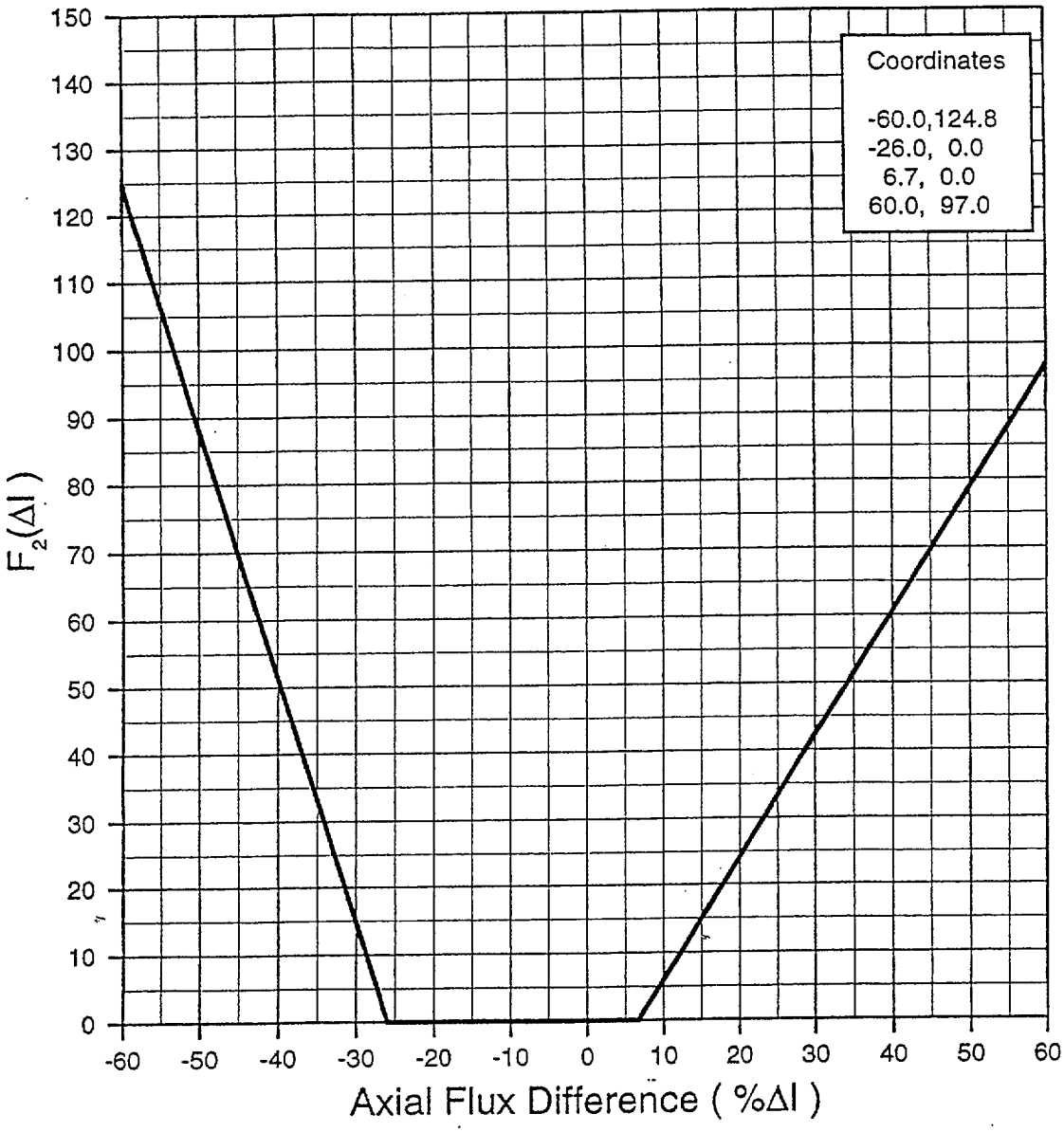
2.8.3 For operation with the Fixed Incore Detector Alarm inoperable, K(Z) is specified in Figures 4.2 to 4.8.

2.9 Nuclear Enthalpy Rise Hot Channel Factor: (Specification 3.2.3)

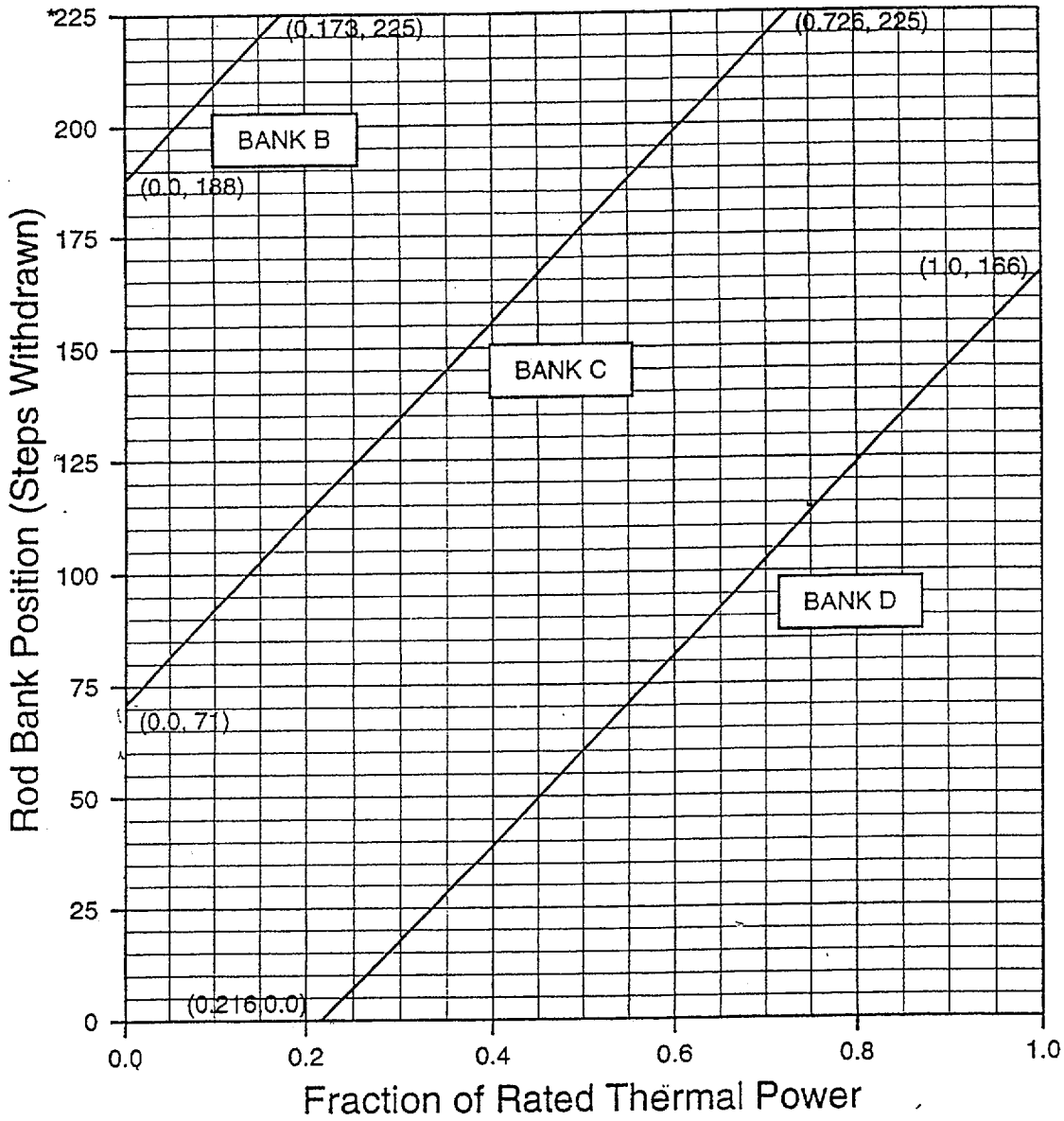
The limits on $F^N_{\Delta H}$ are specified in Figure 5. The limits apply to $F^N_{\Delta H}$ measured using either the fixed or movable incore detectors since a bounding measurement error has been allowed for in determination of the design DNBR limit value.



SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	Overtemperature ΔT Trip $F_1(\Delta I)$ Axial Flux Imbalance Penalty Function FIGURE 1.1



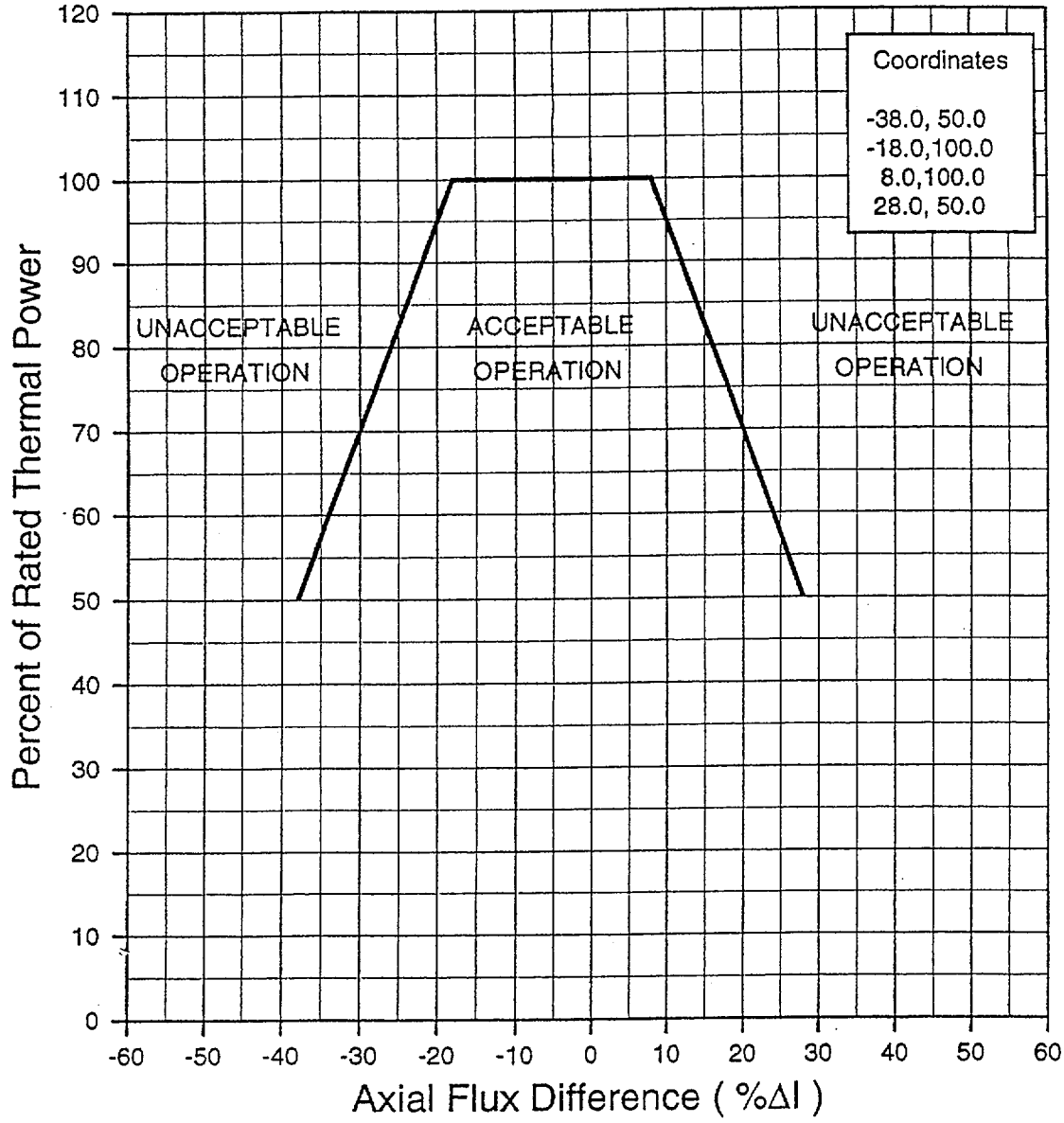
SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	Overpower ΔT Trip $F_2(\Delta I)$ Axial Flux Imbalance Penalty Function FIGURE 1.2



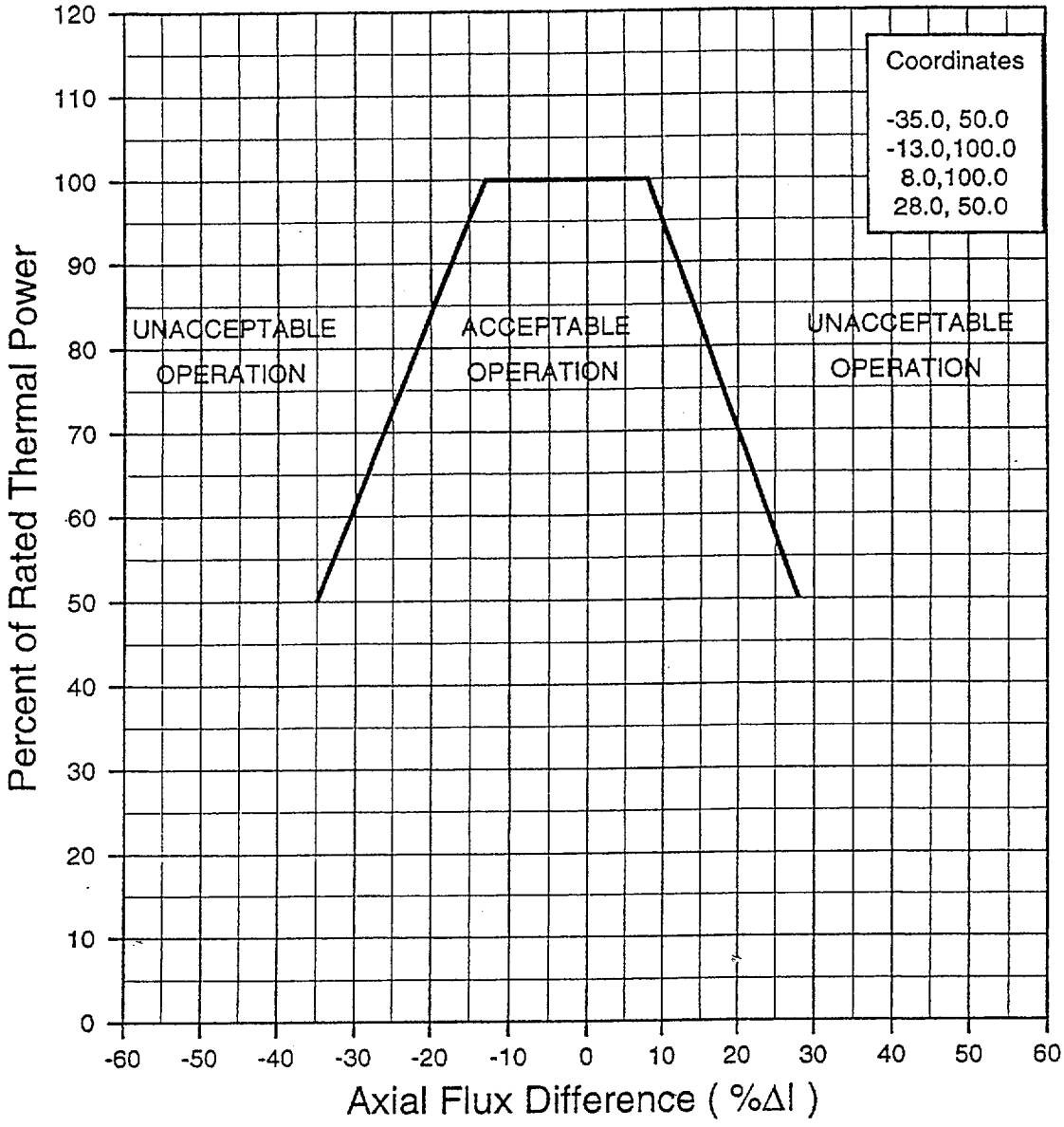
Bank A must be fully withdrawn* prior to power operation.

* Fully Withdrawn is defined as the All-Rods-Out position. The control rod insertion limits have been revised to permit ARO repositioning between 225 and 231 steps withdrawn.

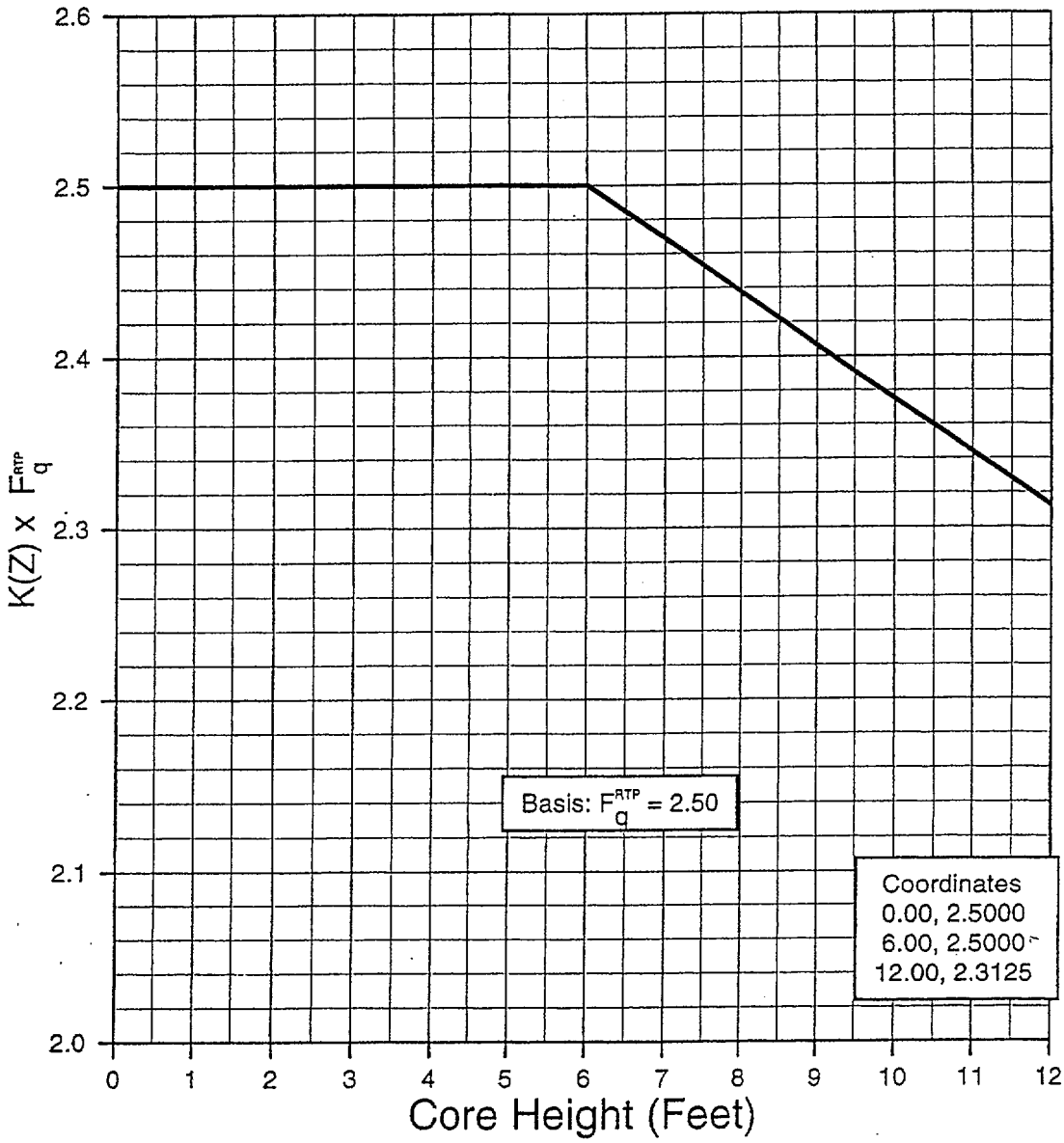
SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	Rod Bank Insertion Limits versus Thermal Power Four-Loop Operation FIGURE 2



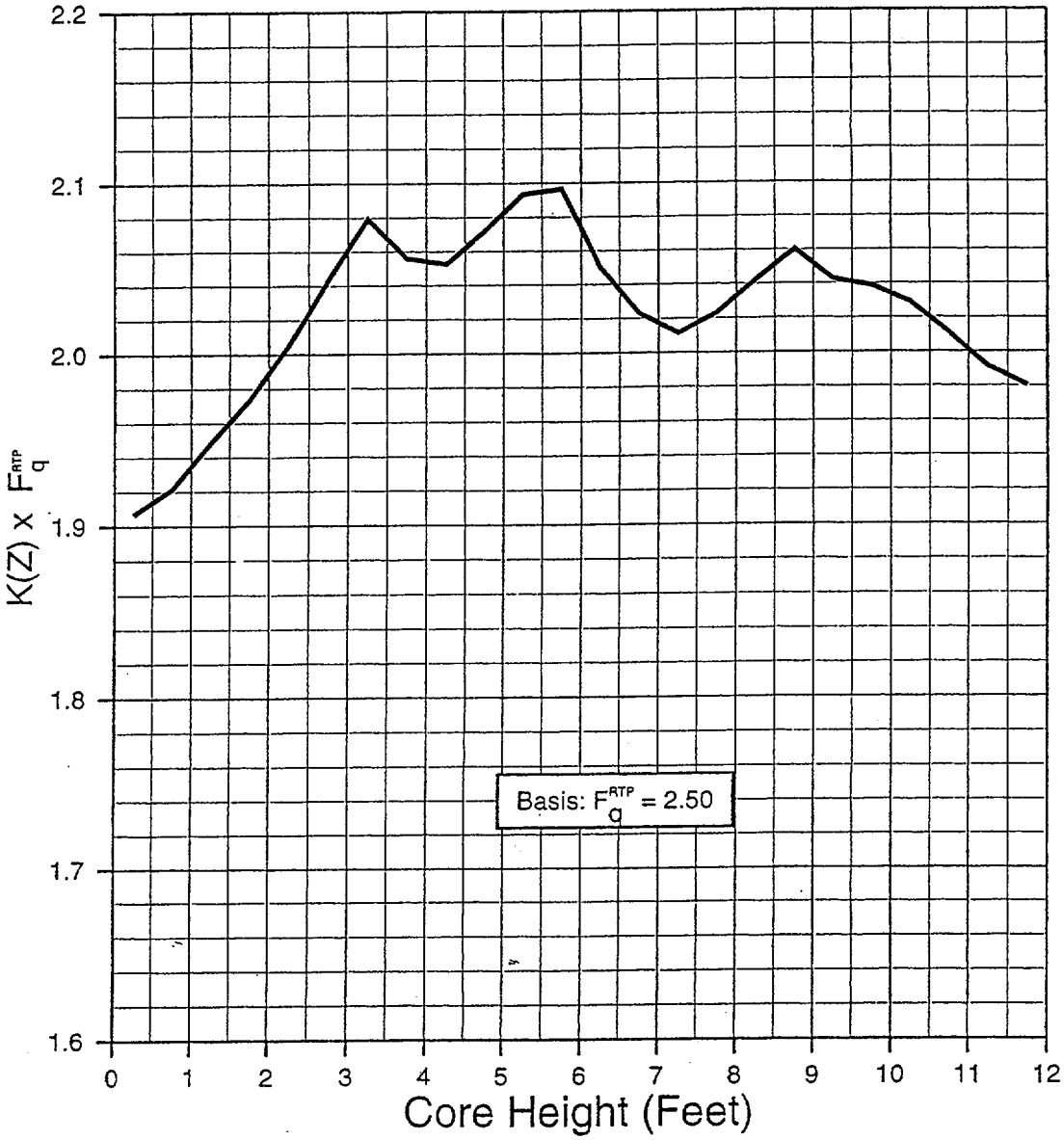
SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	Axial Flux Difference Limits as a Function of Rated Thermal Power for Operation With Fixed Incore Detector System Alarm OPERABLE FIGURE 3.1



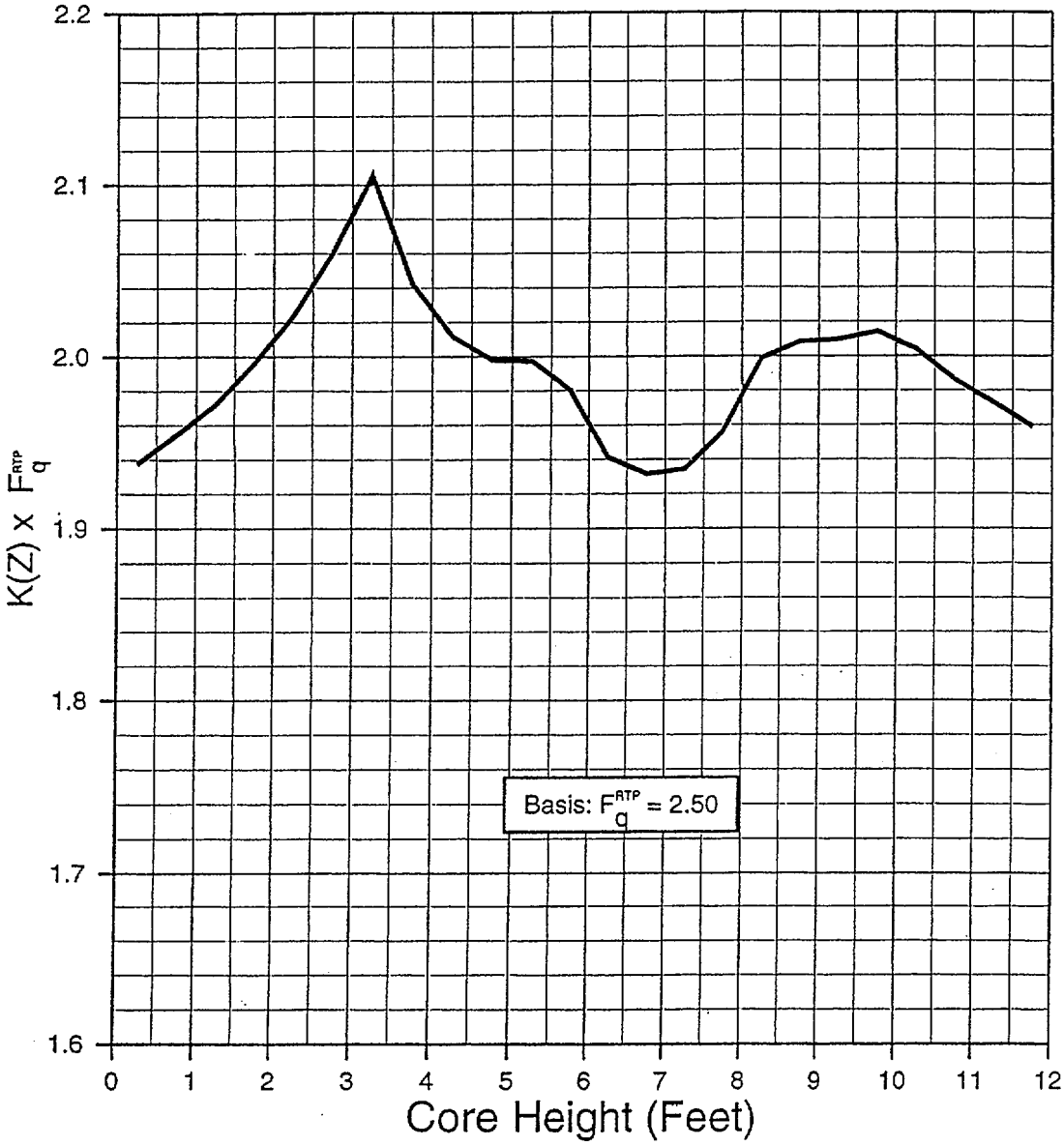
SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	Axial Flux Difference Limits as a Function of Rated Thermal Power for Operation With Fixed Incore Detector System Alarm Inoperable FIGURE 3.2



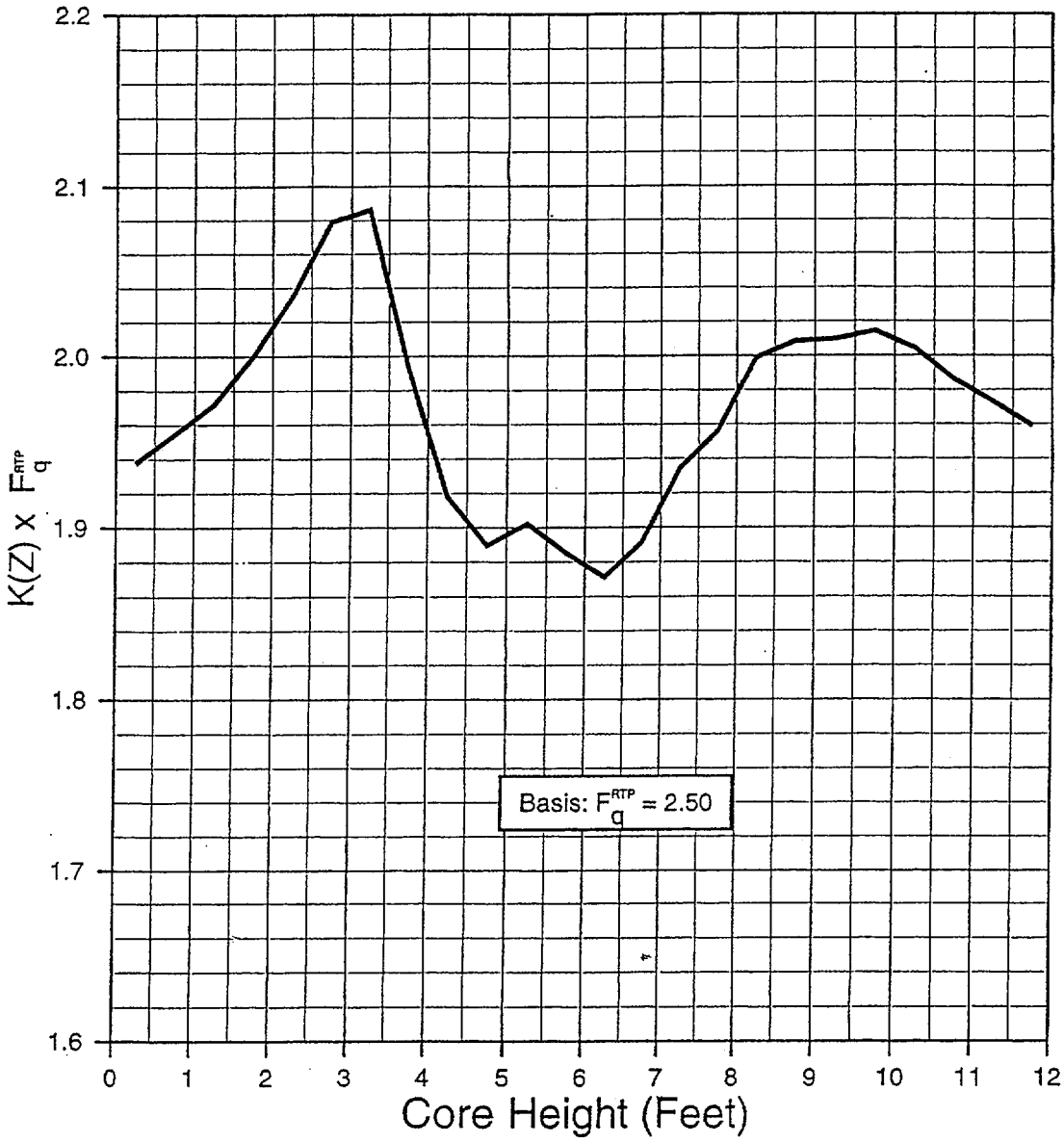
SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	F_q (Z) Limit As A Function of Core Height for Operation with Fixed Incore Detector System Alarm OPERABLE FIGURE 4.1



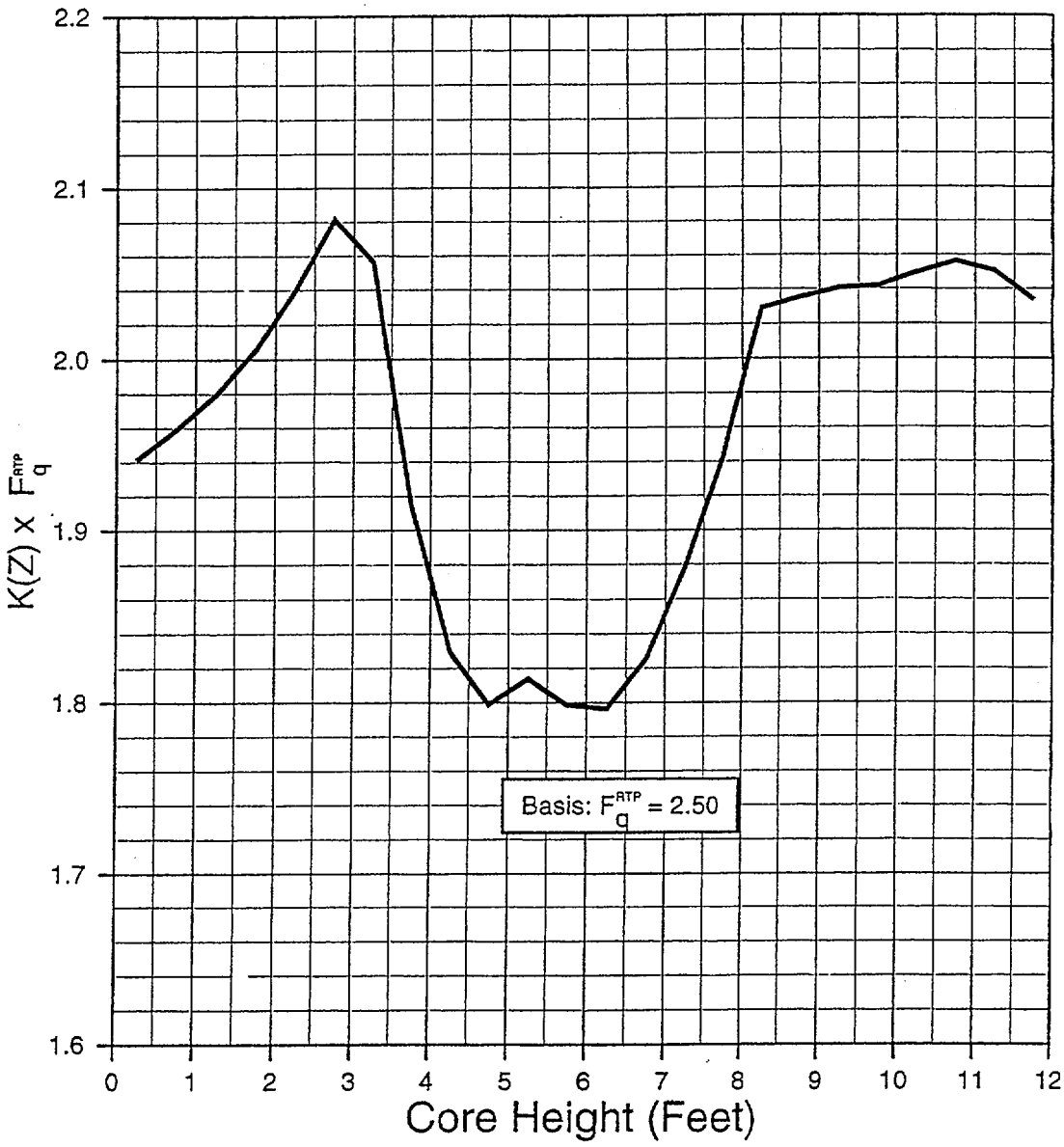
SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	F_q (Z) Limit As A Function of Core Height for Operation with Fixed Incore Detector System Alarm Inoperable and Cycle Average Burnup < 4.0 GWD/Mtu FIGURE 4.2



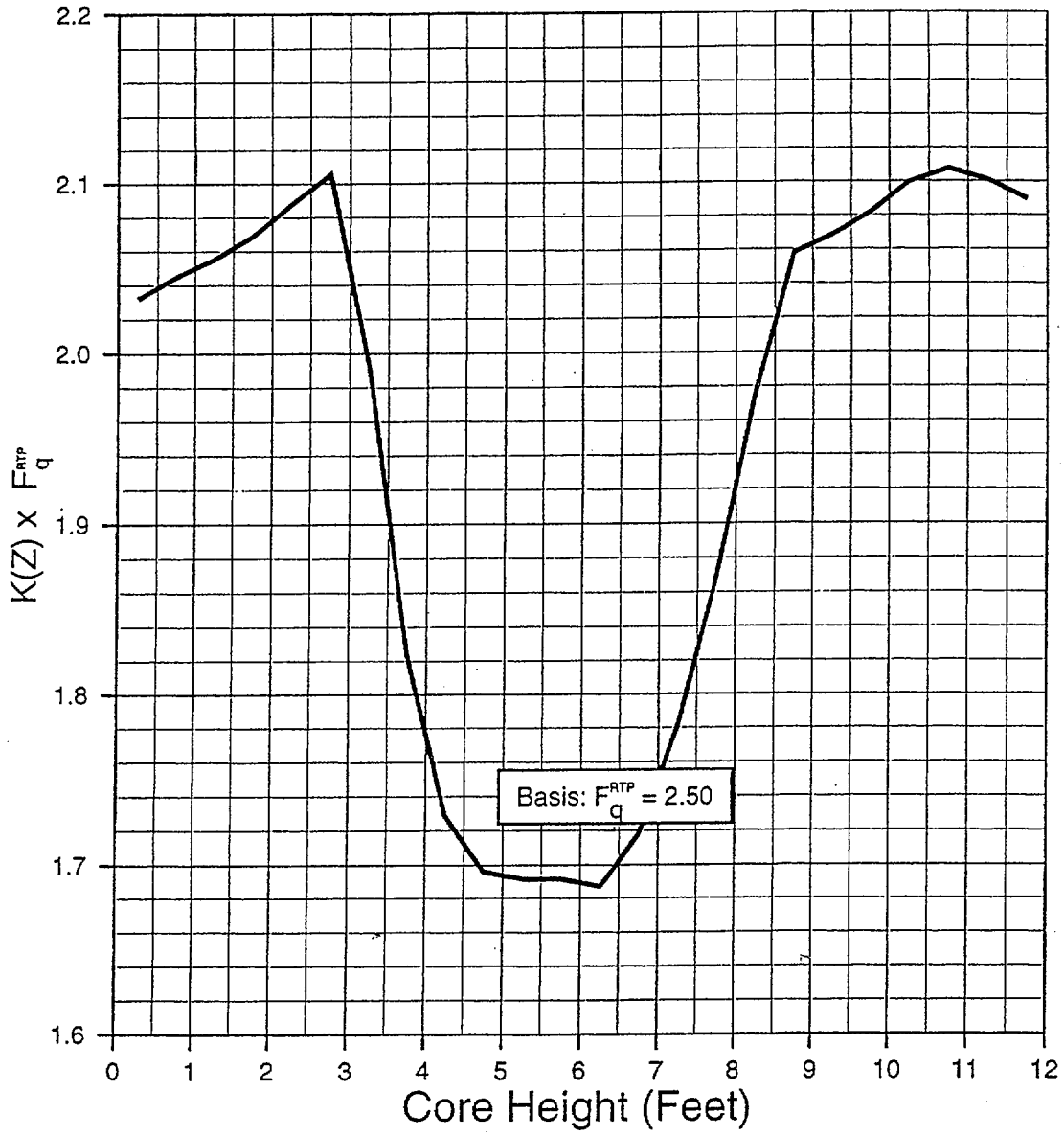
SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	F_q (Z) Limit As A Function of Core Height for Operation with Fixed Incore Detector System Alarm Inoperable and Cycle Average Burnup 4.0 to 8.0 GWD/Mtu FIGURE 4.3



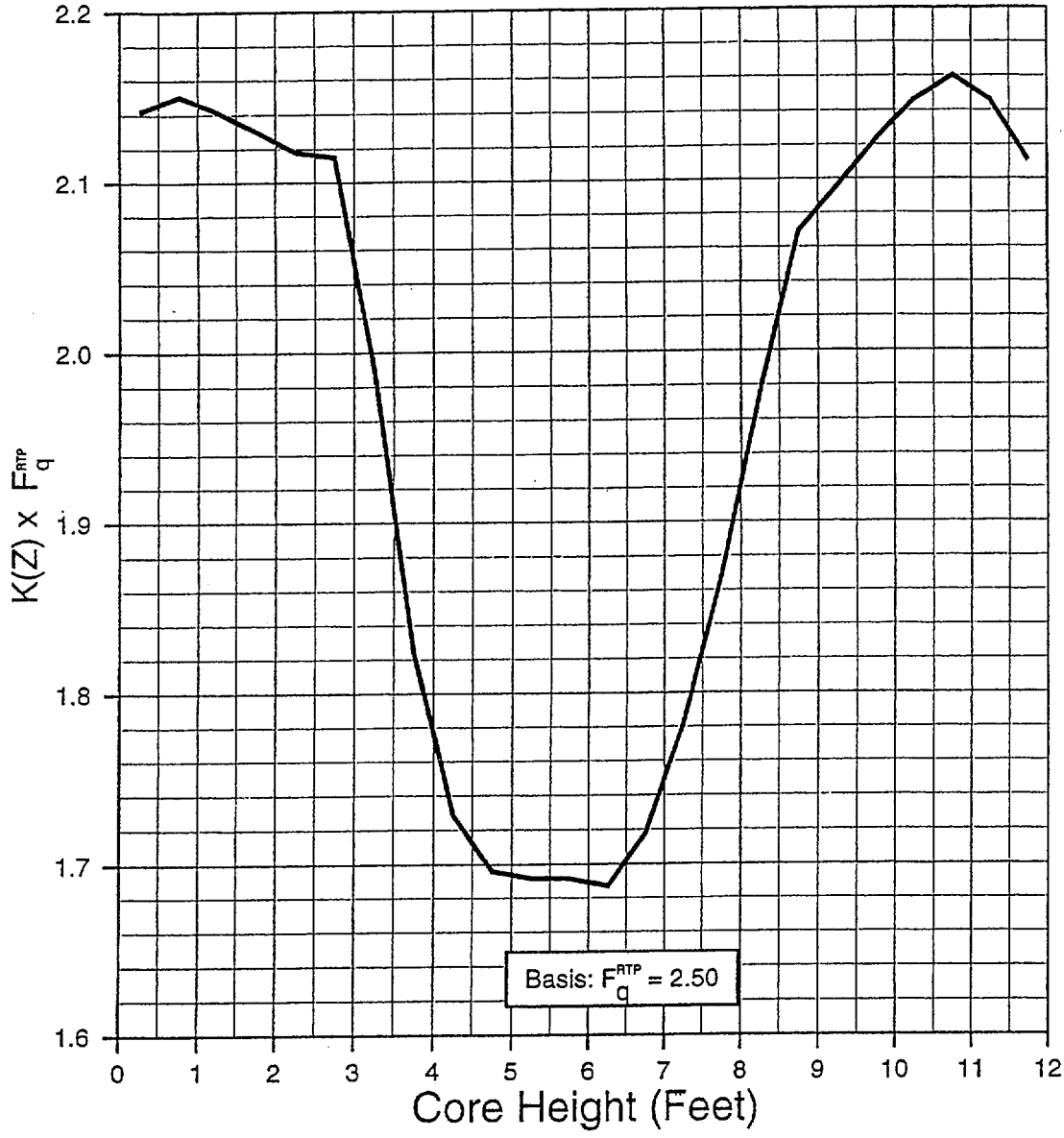
SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	F_q (Z) Limit As A Function of Core Height for Operation with Fixed Incore Detector System Alarm Inoperable and Cycle Average Burnup 8.0 to 11.0 GWD/Mtu FIGURE 4.4



SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	F_q (Z) Limit As A Function of Core Height for Operation with Fixed Incore Detector System Alarm Inoperable and Cycle Average Burnup 11.0 to 14.0 GWD/Mtu FIGURE 4.5



SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	F_q (Z) Limit As A Function of Core Height for Operation with Fixed Incore Detector System Alarm Inoperable and Cycle Average Burnup 14.0 to 18.89 GWD/Mtu FIGURE 4.6



SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	F_q (Z) Limit As A Function of Core Height for Operation with Fixed Incore Detector System Alarm Inoperable and Cycle Average Burnup > 18.89 GWD/Mtu FIGURE 4.7

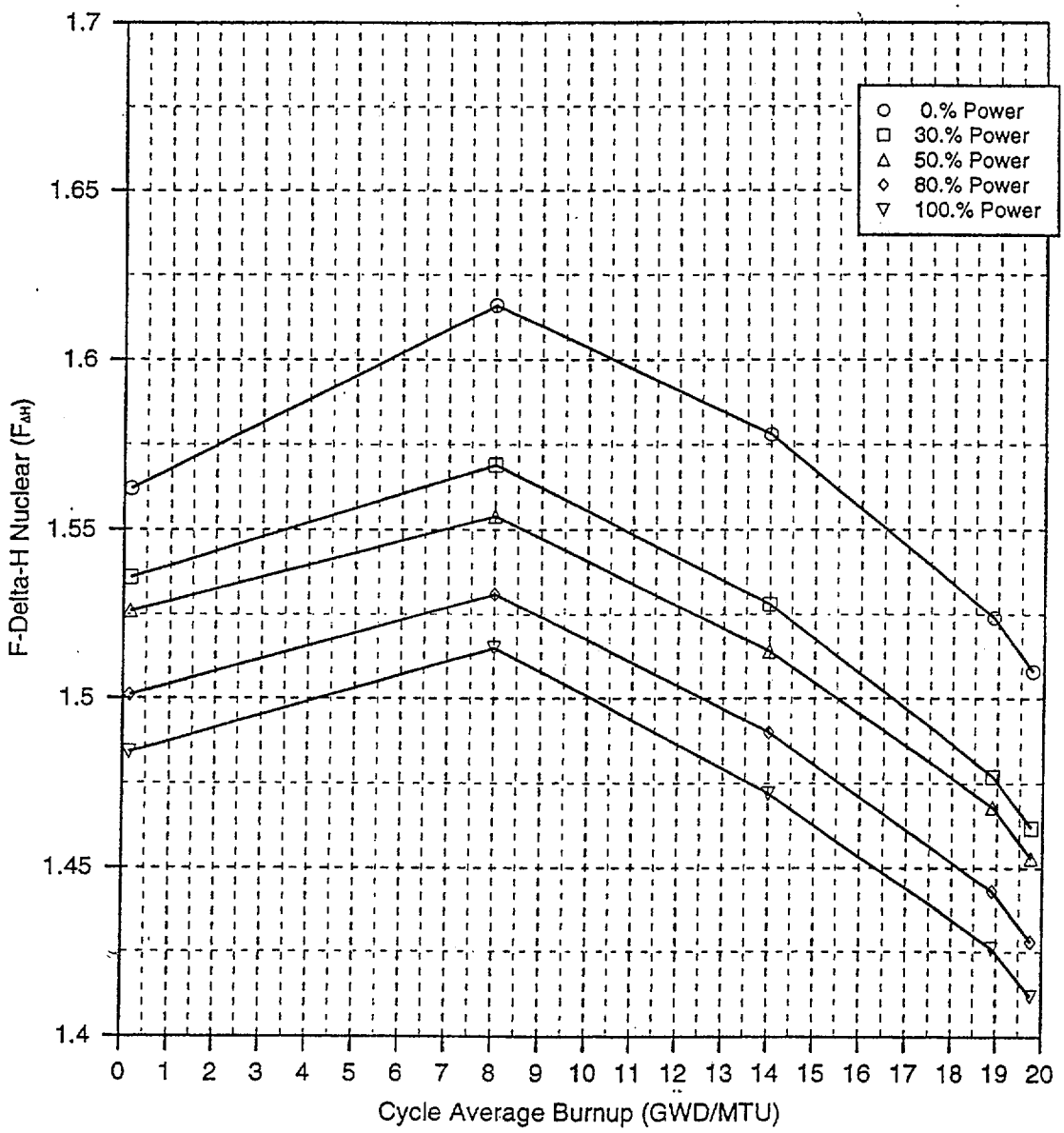
$K(Z) \times F_q^{RTP}$

Cycle Average Exposure Bands in GWd/MTU

Height (feet)	<4	4-8	8-11	11-14	14-18.89	>18.89
11.750	1.980	1.959	1.959	2.034	2.089	2.111
11.250	1.991	1.973	1.973	2.051	2.101	2.146
10.750	2.011	1.986	1.986	2.056	2.107	2.160
10.250	2.029	2.004	2.004	2.050	2.100	2.146
9.750	2.038	2.014	2.014	2.042	2.082	2.123
9.250	2.043	2.010	2.010	2.041	2.068	2.096
8.750	2.060	2.008	2.008	2.035	2.058	2.069
8.250	2.042	1.999	1.999	2.029	1.977	1.977
7.750	2.023	1.956	1.956	1.944	1.869	1.869
7.250	2.011	1.934	1.934	1.878	1.782	1.782
6.750	2.023	1.932	1.891	1.825	1.718	1.718
6.250	2.050	1.941	1.871	1.796	1.687	1.687
5.750	2.097	1.980	1.885	1.799	1.692	1.692
5.250	2.094	1.997	1.902	1.814	1.692	1.692
4.750	2.072	1.998	1.890	1.799	1.696	1.696
4.250	2.053	2.012	1.918	1.830	1.729	1.729
3.750	2.056	2.042	1.992	1.915	1.824	1.824
3.250	2.079	2.105	2.086	2.056	1.991	1.991
2.750	2.043	2.060	2.079	2.081	?	2.115
2.250	2.005	2.024	2.035	2.040		2.118
1.750	1.973	1.996	2.001	2.006		2.130
1.250	1.949	1.972	1.972	1.979		.142
0.750	1.922	1.955	1.955	1.959		150
0.250	1.907	1.938	1.938	1.941		42

Basis: $F_q^{RTP} = 2.50$

SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	Coordinates for F_q (Z) Limit As A Function of Core Height for Operation with Fixed Incore Detector System Alarm Inoperable FIGURE 4.8



SEABROOK STATION CYCLE 7 CORE OPERATING LIMITS REPORT	All-Rods-Out Nuclear Enthalpy Rise Hot Channel Factor Versus Power Level FIGURE 5

QUESTION: 1 **TIME:**

Answer with the aid of reference materials.

For each of the following activities determine whether SRO oversight is **REQUIRED**:

1. Lifting the reactor vessel head from the reactor with fuel in the reactor.
2. Withdrawing the reactor vessel upper internals assembly to begin core off-load.
3. Latching an RCCA extension shaft after core re-load.
4. Transferring a spent fuel assembly from one spent fuel pool storage location to another.
5. Moving an RCCA from one fuel assembly in the spent fuel pool to another fuel assembly in the spent fuel pool.

ANSWER:

Candidate must answer 4 out of 5 correctly

1. No (Technical Clarification TS033 R1 states that lifting the reactor vessel head is not considered a core alteration. The TS 6.2.2.d requirement for an SRO to be present for core alterations does not apply.)
2. Yes (Technical Clarification TS033 R1 states that lifting the reactor vessel upper internals assembly is a core alteration. The TS 6.2.2.d requirement for an SRO to be present for core alterations does apply.)
3. Yes (Technical Clarification TS033 R1 states that since the process of latching the CRDS involves lifting the RCCA out of the fuel assembly, it is considered to be a core alteration.)
4. Yes (OS1015.07, Spent Fuel Bridge Assembly Operation, requires an SRO to be present for fuel handling operations.)
5. Yes (OS1015.12, RCCA Change Tool Operation, requires an SRO to be present to monitor RCCA operations.)

SYS:	KA:	DESCRIPTION:	VALUE:
NA	2.2.29	Knowledge of SRO fuel handling responsibilities (Topic A.2)	SRO 3.8

REFERENCE:

Included with each answer.
New

RESPONSE COMMENTS: **SAT (=70%) UNSAT**

ADMIN QUESTION 1

Answer with the aid of reference materials.

For each of the following activities determine whether SRO oversight is **REQUIRED**:

1. Lifting the reactor vessel head from the reactor with fuel in the reactor.
2. Withdrawing the reactor vessel upper internals assembly to begin core off-load.
3. Latching an RCCA extension shaft after core re-load.
4. Transferring a spent fuel assembly from one spent fuel pool storage location to another.
5. Moving an RCCA from one fuel assembly in the spent fuel pool to another fuel assembly in the spent fuel pool.

QUESTION:2	TIME:

Answer without the aid of reference material.

You are the SRO in charge of fuel handling during core re-load. The initial 18 fuel assemblies, including both source bearing assemblies have been loaded into the core. The Source Range Operational Test procedures have been completed. The initial base count for the Source Range channels has been established.

What condition must you verify with the reactor engineer in the control room, prior to inserting each subsequent fuel assembly into the core?

ANSWER:

The SRO must verify with the Reactor Engineer that a 1/M confirms that the reactor will not reach criticality upon loading another fuel assembly.

SYS:	KA:	DESCRIPTION:	VALUE:
NA	2.2.31	Knowledge of procedures and limitations involved in initial core loading. (Topic A-2)	RO 2.9

REFERENCE:

RS0721, steps 4.1.5.10 and 4.2.2.4
New

RESPONSE COMMENTS: **SAT (=70%) UNSAT**

ADMIN QUESTION 2

Answer without the aid of reference material.

You are the SRO in charge of fuel handling during core re-load. The initial 18 fuel assemblies, including both source bearing assemblies have been loaded into the core. The Source Range Operational Test procedures have been completed. The initial base count for the Source Range channels has been established.

What condition must you verify with the reactor engineer in the control room, prior to inserting each subsequent fuel assembly into the core?

North Atlantic

JOB PERFORMANCE MEASURE ADMJPM06 Rev. 00

LIQUID EFFLUENT WASTE SAMPLE REQUEST

Student Name: _____ Badge #: _____

Evaluator Name: _____ Badge #: _____

Student Signature: _____ Date: _____
(optional)

Evaluator Signature: _____ Date: _____

Training Coordinator Signature: _____ Date: _____
(optional)

SAT UNSAT

This JPM was administered for qualification: NO

PREPARED BY: _____ DATE: 1/17/00
INSTRUCTOR

REVIEWED BY: _____ DATE: _____
~~SUBJECT MATTER EXPERT~~ (OPTIONAL)

APPROVED BY: _____ DATE: 1/18/00
TRAINING SUPERVISOR

JOB PERFORMANCE WORKSHEET

1.0 Task Number and Description:

Position: US

0690301502 Authorize release of liquid waste.

2.0 Conditions:

A. The plant is in MODE 1 with two Service Water and two Circulating Water pumps running with no expected change in configuration.
B. WL-TK-63A `A' WTT has been filled to 18,000 gals.
C. The `A' WTT has to be sampled to prepare a LEWSR for a release to the Transition Structure.
D. The PSO has completed Section I of CP 4.1A, Liquid Effluent Waste Sample Request.

3.0 Standards:

Perform the verification of the completed form.
Time for completion 15 minutes.

4.0 Student Materials:

Copy of the Tear-Off Sheet
Copy of ON1018.07, WASTE TEST TANK RECIRCULATION
Copy of CP 4.1, Effluent Surveillance Program

5.0 Limitations on performance:

Perform all steps. Verbalize all actions to the evaluator.

6.0 References:

Procedures

SSCP, CP 4.1, Effluent Surveillance Program.
ON1018.07, WASTE TEST TANK RECIRCULATION

Sys-Mode	KA	Description	Value RO/SRO
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9 / 3.3

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

7.0 Setting:

In-plant MCR / Simulator / Classroom

8.0 Safety Considerations:

PPE, as appropriate for setting

9.0 Approximate Completion Time:

15 minutes

10.0 Directions to the Student:

Evaluator gives Tear-Off sheet to the student
Evaluator reads the following to the student (Optional for multiple JPMs)

Student:

1. Ensures task is done correctly.
2. May be asked follow-up questions to confirm knowledge of task.

A. You are going to perform the verification of a completed Liquid Effluent Waste Sample Request.

B. The following information is provided to you:

1. The plant is in MODE 1 with two Service Water and two Circulating Water pumps running with no expected change in configuration.
2. WL-TK-63A `A' WTT has been filled to 18,000 gals.
3. The `A' WTT has to be sampled to prepare a LEWSR for a release to the Transition Structure.
4. The PSO has completed Section I of CP 4.1A, Liquid Effluent Waste Sample Request.

C. **(NA for NRC Exam)**
The performance must meet the following standard:

1. Perform the verification of the completed form.
2. Time for completion 15 minutes.

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

D. **(NA for NRC Exam)**
Perform the task utilizing OS1018.07, WASTE TEST TANK RECIRCULATION and CP 4.1 Effluent Surveillance Program.

E. **(NA for NRC Exam)**
To perform the task successfully, you must perform/simulate all critical steps correctly and verbalize all your actions to the evaluator. Practicing STAR techniques and using the station communication standard will safeguard successful completion of the task.

F. **(NA for NRC Exam)**
During the course of the walkthrough examination, there may be some tasks you will be asked to perform that may require you to implement an alternative method directed by plant procedures in order to complete the assigned task. You are expected to make decisions and take actions based on the facility's procedural guidance and the indications available.

G. **(NA for NRC Exam)**
Failure to perform or simulate a critical element within the prescribed standard will result in a failure of the task.

H. **(NA for NRC Exam)**
I will inform you when the JPM is complete

I. **(NA for NRC Exam)**
We will begin after the Initiating Cue is read.

J. The evaluator will act as the PSO and provides cues and communications for this JPM. Do you have any questions?

11.0 Initiating Cue:

PSO to US, **"Unit Supervisor (or student's name) I have completed Section One of Form CP 4.1A. Please perform the verification.**

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate	ELEMENT/STEP *denotes a critical step	STANDARD *denotes critical standard	EVALUATION SAT	EVALUATION UNSAT	INITIALS/DATE
1. P	Start time _____	Initiating cue read. LEWSR given to the candidate.			_____

NOTE: **IF** the setting is the Control Room or the Simulator, give the candidate a working copy of the procedures after he has located the required procedures, **IF** the setting is else where, give the candidate a working copy of the procedures after he has identified the procedures required.

NOTE: It is assumed that the candidate will use CP 4.1 to process through the verification and check ON1018.07 to verify the tank volume and recirculation flow rate. The candidate may choose to verify the tank volume and recirculation rate prior to referring to CP 4.1.

*2.	P	Section I of the LEWSR is completed by Operations and provides the following information:				
		(1) Name of tank, sump, or SG Demineralizer Vessel to be sampled.	*1.	VERIFIES WTT A is entered.	____	____ _____

CUE: If the candidate wants to verify the amount of liquid in the WTT using the MPCS, tell him that the MPCS analog point A1283 indicates 25.71 feet and C6053 indicates 18,000 gallons.

		(2) total tank or sump volume to be discharged or transferred.	2.	Notes 18,000 gallons is consistent with initial conditions and indications, if checked.	____	____ _____

NOTE: The recirculation rate for WTT A is actually 150 gpm. The Waste Holdup Sump (WHUS) is 400 gpm. The student must correct this mistake to ensure adequate tank recirculation prior to sampling.

CUE: **IF** the PSO is challenged on the recirculation rate, respond you must have been thinking about the WHUS recirc rate.

		(3) recirculation starting date, time, and rate.	*3	VERIFIES start time and date entered. CORRECTS the recirc to be 150 gpm and minimum recirc time to 240 minutes.	____	____ _____

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate	ELEMENT/STEP *denotes a critical step	STANDARD *denotes critical standard	EVALUATION SAT	EVALUATION UNSAT	INITIALS/DATE
	(4) sample date and time.	*4 CORRECTS sample time to reflect longer recirc time (1130)	____	____	
	(5) the disposition of the tank.	5 VERIFIES <u>discharge</u> as disposition.	____	____	
	(6) the projected CW & SW pump combination for the discharge.	6 VERIFIES projected combination consistent with initial conditions.	____	____	
	(7) the projected release start date and time (normally 8 hours from the sample time.	*7 CORRECTS projected start time to be 1930.	____	____	
	(8) date, time of request, and initials of originator.	8. VERIFIES time, date and initials are entered.	____	____	_____
	(9) date, time and initials of individual that performed verification of operational data.	*9. ENTERS his initials, date and time.	____	____	_____
CUE:	The JPM is complete.				
	Stop time _____ Evaluator calculates the time to complete the task.	Start - Stop time is ≤ 15 minutes.	____	____	_____

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

PERFORMANCE SUMMARY

Provide comments on unsatisfactory performance of an element/step or for deviation from performance as stated. Record interruptions in performance such as retraining, shift change, and processing of procedure changes. Recommend remedial training, if necessary.

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

TEAR-OFF SHEET FOR JPM ADMJPM06

WTT RECIRCULATION

Directions to the Student:

Evaluator gives Tear-Off sheet to the student
Evaluator reads the following to the student (Optional for multiple JPMs)

Student:

1. Ensures task is done correctly.
2. May be asked follow-up questions to confirm knowledge of task.

A. You are going to perform the verification of a completed Liquid Effluent Waste Sample Request.

B. The following information is provided to you:

1. The plant is in MODE 1 with two Service Water and two Circulating Water pumps running with no expected change in configuration.
2. WL-TK-63A `A' WTT has been filled to 18,000 gals.
3. The `A' WTT has to be sampled to prepare a LEWSR for a release to the Transition Structure.
4. The PSO has completed Section I of CP 4.1A, Liquid Effluent Waste Sample Request.

C. The evaluator will act as the PSO and provides cues and communications for this JPM. Do you have any questions?

11.0 Initiating Cue:

PSO to US, **"Unit Supervisor (or student's name) I have completed Section One of Form CP 4.1A. Please perform the verification.**

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

Liquid Effluent Waste Sample Request

Section I **Operational Data (Completed by Operations Department)**

Tank, Sump, or SG Demin. Vessel: WTT A

Disposition: (Discharge) / Recycle

Tank or Sump Volume: 18,000 gallons

Recirculate Rate: 400 gpm

Minimum Recirc. Time = 2 x Tank Vol. / Recirc. Rate = 90 min.

Recirc. Start Date and Time: 03-10-00 / 0730

Sample Date and Time: 03-10-00 / 0900

NOTE

CW-V-40 position cannot change once this form is submitted to Chemistry.

Project CW and SW pump combination for discharge: CW 2 SW 2

Project Release Start Date and Time: 03-10-00 / 1700

Originator BWK Date 03-10-00 Time 0745

Verified By _____ Date _____ Time _____

Section II **Chemistry Data (Completed by Chemistry Department)**

_____ / _____ _____

Sample Date / Sample Time / Sample Collected by (Initials)

Sample Identification No. _____

LEW Permit Number: _____

Dilution Water Flow Rate: _____ gpm

Volume Discharged: _____ gallons

Composite Volume: _____ mls

Composite Updated by: _____ (Initials)

Figure 1: Limitations and Setpoints

1. Each waste test tank should **not** be filled above 31.0 feet. The tank overflows at 33 feet. Tank volume is 700 gal/ft.

2. To run WL-P-96A, waste test Tank pump A, the following conditions must be present:

   2.1 The normal-cross selector switch must be in NORMAL and waste test tank A level (as indicated locally on WL-LT-1473) must be greater than 5.0 ft.

   or

   2.2 The normal-cross selector switch must be in CROSS and waste test tank B level (as indicated locally on WL-LT-1477) must be greater than 5.0 ft.

3. To run WL-P-96B, waste test tank pump B, the following conditions must be present:

   3.1 The normal-cross selector switch must be in NORMAL and waste test tank B level (as indicated locally on WL-LT-1477) must be greater than 5.0 ft.

   or

   3.2 The normal-cross selector switch must be in CROSS and waste test tank A level (as indicated locally on WL-LT-1473) must be greater than 5.0 ft.

4. The low level trip cutout for WL-P-96A and WL-P-96B is 3.4 feet.

5. The recirculation rate for both waste test tanks is 150 gpm

6. Actual tank volumes can be obtained from the following computer points:

   - C6053 - Waste test tank WL-TK-63A
   - C6054 - Waste test tank WL-TK-63B

SEABROOK STATION

ADMINISTRATIVE PROCEDURE

Effluent Surveillance Program

CP 4.1

Rev. 17 Chg. 02

SORC Review: 99-077 Date: 09/08/99

Effective Date: 9-13-99

Procedure Owner:
D. A. Robinson

1.0 OBJECTIVE

This procedure provides a means for monitoring the various gaseous and liquid effluent release paths for radioactivity.

2.0 PROCEDURAL REFERENCES

1. CP 9.1, NPDES Monitoring
2. CS0908.01, Offsite Dose Assessment
3. CS0917.02, Gaseous Effluent Releases
4. CX0901.37, Regulatory Guide 1.21 Report
5. CX0917.01, Liquid Effluent Releases
6. CX0917.06, Liquid Releases - Effluent Management Software Method
7. CS0917.07, Gaseous Releases - Effluent Management Software Method
8. RAI 460.35
9. Seabrook Station Updated Final Safety Analysis Report
10. Seabrook Station Technical Specification
11. Offsite Dose Calculation Manual (ODCM)
12. U.S. NRC Information Notice 91-40, Contamination of Nonradioactive System and Resulting Possibility for Unmonitored, Uncontrolled Release to the Environment
13. U.S. NRC Regulatory Guide 1.21
14. 90TSEV007, Tritium Unmonitored Release Pathways
15. Technical Specification 6.4.1.6K
16. ACR 98-3557
17. HP Position Number 254, Definition of Unplanned Release, February 18, 1992

4.0 INSTRUCTIONS

4.1 Precautions

The lower limit of detection (LLD) shall be verified to meet the requirements of References 2.8, 2.10 and 2.11 for each type of activity analysis each time counting equipment is efficiency calibrated.

Each LEW/GEW batch release shall be terminated and all requirements of References 2.5 or 2.6 (LEW) and 2.3 or 2.7 (GEW) are completed prior to chemistry issuing a subsequent LEW/GEW batch release permit.

Perform the NPDES analysis per Reference 2.1 for all batch liquid releases.

Accidental, unplanned, or uncontrolled radioactive releases meeting the criteria of §4.2.7 shall be evaluated and reported per Reference 2.15.

4.2 Procedure

4.2.1 Liquid Effluent Waste (LEW) Release, Batch Type

1. When a batch release is to be processed (Waste Test Tank, Recovery Test Tank, and the Waste Holdup pit for the Steam Generator Blowdown) the following steps shall be executed:

   a. The tank is placed on recirculation as per the appropriate Operations procedure.

   b. Section I of the Liquid Effluent Waste Sample Request (LEWSR), CP 4.1A, is completed by Operations and provides the following information:

      (1) name of tank, sump, or SG Demineralizer Vessel to be sampled,

      (2) total tank or sump volume to be discharged or transferred (N/A for SG Demineralizer Vessel),

      (3) recirculation starting date, time, and rate (N/A for SG Demineralizer Vessel),

      (4) sample date and time,

      (5) the disposition of the tank (N/A for SG Demineralizer Vessel),

      (6) the projected CW/SW pump combination for the discharge,

      (7) the projected release start date and time (normally 8 hours from the sample time),

      (8) date, time of request, and initials of originator,

4.2.2 Continuous LEW Releases

NOTE

East/West Feedwater Pipe Chase sump samples are required only if secondary coolant gamma activity sample results exceed the LLD for other than naturally occurring isotopes.

1. Once per week, obtain a sample of the turbine building sump (TBS), oil water separator vault #2 (OW2), east/west feed water pipe chase, and the storm drain system. (Protected: Ref. 2.14)

   Sample the steam generator blowdown flash (SGBF) tank once per week when discharging to the environment. (Protected: Ref. 2.11)

2. The samples shall be used for the analyses as indicated in Figure 5.1.

3. Obtain a discharge permit number from the Release Index Log(CP 4.1C). The permit number consists of two parts: the year and a sequential number (1-9999) e.g., 88-0001. This number could be generated by department software.

4. Using the results from §4.2.2.2, calculate the actual release conditions using References 2.2 and (2.5 or 2.6).

4.2.3 Dissolved Gas Analysis

This analysis is incorporated into each gamma scan. No specific method is required.

4.2.4 LEW Sampling Requirements

Samples are scheduled by a Chemistry supervisor in accordance with Figure 5.1.

4.2.5 Abnormal LEW Sampling and Analysis

1. Monitor Trip and/or High Alarm During a Release

   a. When a monitor indicates a high level alarm and/or trip, the release shall be terminated immediately.

   b. A grab sample shall be taken as soon as possible after the high level alarm and/or monitor trip.

   c. The sample shall be analyzed as soon as possible for gamma activity. This data will be used to determine if the release rates and/or activity concentrations were exceeded.

   d. Inform a Chemistry supervisor of the analysis results. A Chemistry supervisor will advise what actions are necessary.

d. A discharge permit number shall be obtained from the Release Index Log (CP 4.1C). The permit number consists of two parts, the year and a sequential number (0001-9999) (i.e., 88-0001). This number may be generated by department software.

e. Using the noble gas gamma analysis results from §4.2.6.1c calculate the actual release conditions using Reference 2.3 or 2.7.

f. The purge may be interrupted (stopped and restarted) without obtaining new samples or issuing a new permit, provided one of the following conditions is met:

(1) For up to two hours, provided **no** startup, shutdown, or power change greater than 15% in one hour has occurred.

(2) For up to 24 hours, provided the purge is reinitiated within 24 hours of the sample date and time.

(3) At any time after 24 hours from the sample date and time for up to 24 hours, provided **no** startup, shutdown, or power change greater than 15% in one hour has occurred and a two containment volume (5.43 E+06 cubic feet) has been released.

2. GEW Batch Release Completion

When the batch release is terminated, Operations shall return the permit to Chemistry with the appropriate release information entered. Complete the batch release package in accordance with References 2.2 and (2.3 or 2.7).

3. GEW Continuous Release

a. Collect representative samples from the plant, vent RCA/admin. vent, primary lab fume hood vent, condenser air evacuation and turbine gland seal condenser exhaust, in accordance with Reference 2.3 or 2.7. Use form GEW Sample Collection Data (CP 4.1B) to log sample time and data.

b. Analyze the samples as indicated in Figure 5.2.

c. Obtain a discharge permit number from the Release Index Log (CP 4.1C). The Permit number consists of two parts: the year and a sequential number (1-9999) e.g., 88-0001. This number could be generated by department software.

c. Following reactor startup, shutdown and/or a thermal power change exceeding 15% of rated thermal power in a one hour period actions as required by References 2.9 and 2.11 shall be completed in accordance with Chemistry Department procedures.

4.2.7 Accidental, Unplanned, or Uncontrolled Releases

1. An accidental, unplanned, or uncontrolled release is defined as the unintended or unplanned discharge of a volume of liquid or airborne radioactivity (other than naturally occurring) to the environment. The following are examples of accidental, unplanned, or uncontrolled releases:

NOTE

A change in activity level from a release source or the release from a new or different source is not necessarily considered an unplanned release.

a. Any gaseous or liquid release exceeding 10 CFR 20 limits.

b. Any gaseous or liquid release which results in a quantity of release such that a 10 CFR 50.72, Immediate Notification Requirements for Operating Nuclear Reactors, or a 10 CFR 50.73, Licensee Event Report System, report is required. An example of this type of release is a large leak due to unexpected valve or pipe failure.

c. A release that is determined by the Chemistry/Health Physics Manager to have a significantly greater dose than projected.

d. An inadvertent release of the contents of the wrong waste test tank to the circulating water system. An example of this would be the planned discharge of Waste Test Tank 'A' and Waste Test Tank 'B' was actually discharged.

e. A release of radioactivity from a plant system leak (system breach), to the building ventilation system, where the ventilation system was designed to treat normal airborne leakage associated with various pipes and valves. Normal expected leakage is not considered an unplanned release since the ventilation system was designed to treat routine leakage from various pipes and valves.

f. An inadvertent release of the contents of the Containment Building through the plant vent. This release is considered inadvertent as no release was planned.

Figure 5.1
Liquid Effluent Waste Analysis

Sample	Gamma	Tritium	Alpha	Fe-55	Strontium
Waste Test Tanks (4)	Each Batch	Monthly Composite	Monthly Composite	Quarterly Composite	Quarterly Composite
Turbine Bldg. Sump (6)	Weekly Grab	Monthly Composite (3)	Monthly Composite (3)	Quarterly Composite (3) (5) (6)	Quarterly Composite (3) (5) (6)
SGBD Flash Tank (1)	Weekly Grab	Monthly Composite	Monthly Composite (3)	Quarterly Composite (3) (5) (6)	Quarterly Composite (3) (5) (6)
Service Water (2)	Weekly Grab	Monthly Grab	Monthly Grab	Quarterly Grab	Quarterly Grab
PCCW Loops	Weekly Grab	Monthly (3) (5)	Monthly (3) (5)	Quarterly (3) (5)	Quarterly (3) (5)
Waste Holdup Pit (4)	Each Batch	Monthly Composite	Monthly Composite	Quarterly Composite	Quarterly Composite
Recovery Test Tanks (1) (4)	Each Batch	Monthly Composite	Monthly Composite	Quarterly Composite	Quarterly Composite
Storm Drain System	Weekly Grab	Monthly Composite (3) (5) (7)	Monthly Composite (3) (5) (7)	Quarterly Composite (3) (5) (7)	Quarterly Composite (3) (5) (7)

(1) Samples are only required when discharging to the environment.

(2) Gamma analysis shall be done weekly, all other service water analysis requirements shall only be required when a sample taken for gamma analysis contains positive activity, for other than naturally occurring isotopes.

(3) Analysis shall be performed on a combination of the weekly grab samples.

(4) These sample points may have the same composite sample.

(5) This analysis shall only be required when a sample taken for gamma analysis contains positive activity, for other than naturally occurring isotopes.

(6) This discharge point includes secondary plant leakage normally associated with the Turbine Building to circ. water (i.e., condensate discharge to circ. water and Water Treatment Neutralization Tank and Oil Separator Vault No. 2 and East/West Feedwater Pipe Chase sumps discharge to circ. water). Secondary plant leakage discharge points may have the same composite sample. East/West Feedwater Pipe Chase sump samples required only if secondary coolant contains positive gamma activity from other than naturally occurring isotopes.

(7) This analysis required only if the activity cannot be assigned to a particular release point.

Figure 5.3
Summary of Changes

Rev. 17:

Administrative Modification: Converted procedure from WordPerfect to MS Word.

Added Figure 5.3, Summary of Changes, in accordance with the Manuals and Procedures Administrative Manual (MNPR).

Chg. 01:

In §2.0, added Reference 2.15, Reference 2.16, and Reference 2.17.

Added §3.3, Unplanned Release.

In §4.1, added paragraph on evaluation of accidental, unplanned, or uncontrolled radioactive releases.

Added §4.2.7, Accidental, Unplanned, or Uncontrolled Releases.

Modified form CP 4.1B to include duration in minutes.

Chg. 02:

Removed reference to DAW trailer in §4.2.6 (step 3.a), Figure 5.2, and form CP 4.1B. The DAW trailer was removed from site and is no longer a release point.

Liquid Effluent Waste Sample Request

Section I **Operational Data (Completed by Operations Department)**

Tank, Sump, or SG Demin. Vessel: _____ Disposition: _____ Discharge _____ Recycle

Tank or Sump Volume: _____ gallons

Recirculate Rate: _____ gpm

Minimum Recirc. Time = $\frac{2 \times \text{Tank Vol.}}{\text{Recirc. Rate}}$ = _____ min.

Recirc. Start Date and Time: _____ / _____

Sample Date and Time: _____ / _____

NOTE

CW-V-40 position cannot change once this form is submitted to Chemistry.

Project CW and SW pump combination for discharge: CW _____ SW _____

Project Release Start Date and Time: _____ / _____

Originator _____ Date _____ Time _____

Verified By _____ Date _____ Time _____

Section II **Chemistry Data (Completed by Chemistry Department)**

_____ / _____ _____

Sample Date Sample Time Sample Collected by (Initials)

Sample Identification No. _____

LEW Permit Number: _____

Dilution Water Flow Rate: _____ gpm

Volume Discharged: _____ gallons

Composite Volume: _____ mls

Composite Updated by: _____ (Initials)

North Atlantic

JOB PERFORMANCE MEASURE ADMJPM03 Rev. 02

POST SCENARIO EAL DETERMINATION AND EVENT CLASSIFICATION

Student Name: _____ Badge #: _____

Evaluator Name: _____ Badge #: _____

Student Signature: _____ Date: _____
(optional)

Evaluator Signature: _____ Date: _____

Training Coordinator Signature: _____ Date: _____

SAT UNSAT

This JPM was administered for qualification: NO

PREPARED BY: _____ DATE: 1/17/06
INSTRUCTOR

REVIEWED BY: _____ DATE: _____
SUBJECT MATTER EXPERT (OPTIONAL)

APPROVED BY: _____ DATE: 1/18/06
TRAINING SUPERVISOR

JOB PERFORMANCE WORKSHEET

1.0 Task Number and Description:

Position: SRO
3450504203 Classify/reclassify an emergency condition.

2.0 Conditions:

This JPM is designed to be administered after the student has completed any simulator scenario. The intent is for the student to perform the JPM immediately after the scenario is ended while the simulator is in FREEZE. The evaluator will be required to determine the correct responses either prior to the scenario OR after the student has performed the JPM and has left the simulator room.

3.0 Standards:

Identify the applicable Emergency Action Level(s) and classify the event.

4.0 Student Materials:

Copy of the Tear-Off Sheet.

CSF status tree clipboard with the following:

- F-0.0, CSF STATUS TREE WORKSHEET, Rev. 15
- F-0.1, SUBCRITICALITY, Rev. 13
- F-0.2, CORE COOLING, Rev. 12
- F-0.3, HEAT SINK, Rev. 13
- F-0.4, INTEGRITY, Rev. 13
- F-0.5, CONTAINMENT, Rev. 13
- F-0.6, INVENTORY, Rev. 12
- F-0.7, EMERGENCY RECIRCULATION, Rev. 13
- F-0.8, RDMS, Rev.13

ER-1.1, Classification of Emergencies, Rev. 28, chg. 1

5.0 Limitations on performance:

Perform all steps. Verbalize all actions to the evaluator.

6.0 References:

Procedures

- F-0.0, CSF STATUS TREE WORKSHEET
- F-0.1, SUBCRITICALITY
- F-0.2, CORE COOLING

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

- F-0.3, HEAT SINK
- F-0.4, INTEGRITY
- F-0.5, CONTAINMENT
- F-0.6, INVENTORY
- F-0.7, EMERGENCY RECIRCULATION
- F-0.8, RDMS

ER-1.1, CLASSIFICATION OF EMERGENCIES, Rev. 28, chg. 01

Manuals

OPMM, OP 9.2, Control Room Usage of Status Trees.

Sys	KA	Description	Value SRO
	2.2.24	Knowledge of the emergency action level thresholds and classification.	4.1

7.0 Setting:

Simulator

After the completion of any simulator scenario.

8.0 Safety Considerations:

None

9.0 Approximate Completion Time:

20 minutes

10.0 Directions to the Student:

Evaluator gives Tear-Off sheet to the student
Evaluator reads the following to the student (Optional for multiple JPMs)
Student:

1. Ensures task is done correctly.
2. May be asked follow-up questions to confirm knowledge of task.

A. You are the WCS.

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

B. The following information is provided to you:

Using reference material available in the control room and based on present plant conditions, determine whether any Emergency Action Level is being exceeded and whether an Emergency Classification is warranted.

C. **(NA for NRC Exam)**
The performance must meet the following standard:

1. Determine the status of the Critical Safety Function Status Trees then determine the Emergency Action Level and Event Classification.

D. **(NA for NRC Exam)**
Perform the task using the CSF clipboard and ER-1.1.

E. **(NA for NRC Exam)**
To perform the task successfully, you must perform/simulate all critical steps correctly and verbalize all your actions to the evaluator. Practicing STAR techniques and using the station communication standard will safeguard successful completion of the task.

F. **(NA for NRC Exam)**
During the course of the walk-through examination, there may be some tasks you will be asked to perform that may require you to implement an alternative method directed by plant procedures in order to complete the assigned task. You are expected to make decisions and take actions based on the facility's procedural guidance and the indications available.

G. **(NA for NRC Exam)**
Failure to perform or simulate a critical element within the prescribed standard will result in a failure of the task.

H. **(NA for NRC Exam)**
I will inform you when the JPM is complete

I. **(NA for NRC Exam)**
We will begin after the Initiating Cue is read.

J. The evaluator will act as the SM and provide the cues and communications for this JPM. Do you have any questions?

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

11.0 Initiating Cue:

Evaluator to student, **"SM to WCS (or student's name), using ER-1.1, Classification of Emergencies, determine whether an Emergency Classification is warranted. Evaluate EALS 12a, 12b, 12d, and 12e after you have completed your initial classification of events."**

Assume that the CSFST indications on the plant computer are correct

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate	ELEMENT/STEP *denotes a critical step	STANDARD *denotes critical standard	EVALUATION SAT UNSAT	INITIALS/DATE

NOTE: Due to performing this JPM without actions by an operating crew, keep the simulator in FREEZE.

1. P Start time _____ Initiating cue read. _____

NOTE: RDMS can be used whether the simulator is in RUN or FREEZE.

NOTE: Refer to Attachment A of this JPM to ensure reference to appropriate instrumentation for CSF verification.

*2. P DETERMINE the status of the CSFSTs. DETERMINES CSFST status is: _____

a. Determine F-0.1 status	*a. Determines F-0.1 status	____ ____
b. Determine F-0.2 status	*b. Determines F-0.2 status	____ ____
c. Determine F-0.3 status	*c. Determines F-0.3 status	____ ____
d. Determine F-0.4 status	*d. Determines F-0.4 status	____ ____
e. Determine F-0.5 status	*e. Determines F-0.5 status	____ ____
f. Determine F-0.6 status	f. Determines F-0.6 status	____ ____
g. Determine F-0.7 status	g. Determines F-0.7 status	____ ____
h. Determine F-0.8 status	h. Determines F-0.8 status	____ ____

*3. P Review and then circle the miscellaneous emergency conditions and combinations of miscellaneous conditions that correspond to actual station conditions: Reviews and then circles the miscellaneous emergency conditions and combinations of miscellaneous conditions that correspond to actual station conditions: _____

6. Determine *electrical failure* status.	* Determines *electrical failure* status.	____ ____

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate	ELEMENT/STEP *denotes a critical step	STANDARD *denotes critical standard	EVALUATION SAT	EVALUATION UNSAT	INITIALS/DATE
	7. Determine *steam generator tube leakage or rupture* status	* Determines *steam generator tube leakage or rupture* status	____	____	
	8. Determine *fuel failure indication* status	* Determines *fuel failure indication* status	____	____	
	9. Determine *loss of monitoring capability* status	* Determines *loss of monitoring capability* status	____	____	
	10. Determine *loss of all communications capability* status	* Determines *loss of all communications capability* status	____	____	
	11. Determine *shutdown Technical Specification surpassed* status	* Determines *shutdown Technical Specification surpassed* status	____	____	
	12. Determine *high radiation alarm* status	* Determines *high radiation alarm* status	____	____	
	13. Determine *fuel handling accident* status	* Determines *fuel handling accident* status	____	____	
	14. Determine *abnormal reactor trip or safety injection* status	* Determines *abnormal reactor trip or safety injection* status	____	____	
	15. Determine *loss of primary or secondary coolant inside or outside containment* status	* Determines *loss of primary or secondary coolant inside or outside containment* status	____	____	
	16. Determine *fire* status	* Determines *fire* status	____	____	

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

PERFORMANCE CHECKLIST

D=Discuss P=Perform S=Simulate		ELEMENT/STEP *denotes a critical step		STANDARD *denotes critical standard	EVALUATION SAT	EVALUATION UNSAT	INITIALS/DATE
		17. Determine *control room evacuation* status	*	Determines *control room evacuation* status	____	____	
		18. Determine *natural or man-made hazards affecting plant operation* status	*	Determines *natural or man-made hazards affecting plant operation* status	____	____	
		19. Determine *loss of shutdown cooling* status	*	Determine *loss of shutdown cooling* status	____	____	
*4.	P	Circle any combinations of miscellaneous emergency conditions and critical safety functions that corresponds to actual station conditions.	*	Circles any combinations of miscellaneous emergency conditions and critical safety functions that corresponds to actual station conditions	____	____	____
*5.	P	Identify the most severe emergency classification that corresponds to the events circled	*	Identifies the most severe emergency classification that corresponds to the events circled	____	____	____
*6.	P	IF an emergency classification is warranted, immediately implement ER-1.2.	*	Determines the Event Classification.	____	____	____
CUE:		**"The JPM is complete."**					
5.		Stop time _____ Evaluator calculates the time to complete the task.		Start - Stop time is ≤ 20 minutes.	____	____	____

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

ATTACHMENT A - **CSFST HARDWARE VERIFICATION INSTRUMENTATION**

CSFST	Parameter	Train A Powered	Train B Powered
(S)	Neutron Flux	NI-NI-6690-2	NI-NI-6691-2
	IR Rate	NI-NI-6690-1	NI-NI-6691-1
(C)	CETs	RC-TI-9423-A	RC-TI-9423-B
	RCS Subcooling	RC-TI-9424-A	RC-TI-9424-B
	RVLIS Full Range	RC-LI-1311	RC-LI-1321
	RVLIS Dynamic Head	RC-LI-1312	RC-LI-1322
(H)	Containment Pressure	SI-PI(R)-935 or SI-PI-2577	SI-PI(R)-934 or SI-PI-2576
	SG WR Level	FW-LI-501 FW-LI-503	FW-LI-502 FW-LI-504
	EFW Flow	FW-FI-4214-2 (PP-1E) FW-FI-4234-2 (PP-1E)	FW-FI-4224-2 (PP-1F) FW-FI-4244-2 (PP-1F)
	SG Pressure	FW-PI-514-A FW-PI-524-A FW-PI-534-A FW-PI-544-A	FW-PI-515-A FW-PI-525-A FW-PI-535-A FW-PI-545-A
	SG NR Level	FW-LI-529 FW-LI-548	FW-LI-519 FW-LI-537
(P)	RCS Cold Leg Temp.	RC-PR-405 (note 1)	RC-TR-413-B (loop 1,2) RC-TR-433-B (loop 3,4)
	RCS Pressure	RC-PI-405-1 or RC-PI-405-2	RC-PI-403-1 or RC-PI-403-2

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

ATTACHMENT A - **CSFST HARDWARE VERIFICATION INSTRUMENTATION**

CSFST	Parameter	Train A Powered	Train B Powered
(Z)	Containment Pressure	SI-PI(R)-935 or SI-PI-2577	SI-PI(R)-934 or SI-PI-2576
	Phase A & B Penetrations	UL-5	UL-3
	Containment Building Level	CBS-LI-2384	CBS-LI-2385
	Hydrogen Concentration	CGC-A1-5828A	CGC-A1-5828-B
	Post Accident Radiation	RM-RI-6576-A	RM-RI-6576-B
(I)	Containment Pressure	SI-PI(R)-935 or SI-PI-2577	SI-PI(R)-934 or SI-PI-2576
	Pressurizer Level	RC-LI-459A	RC-LI-460A
	RVLIS Full Range	RC-LI-1311	RC-LI-1321
(F)	SI Actuated	UA-50-A1	UA-51-A5
	Containment Building Level	CBS-LI-2384	CBS-LI-2385
	RWST Level	CBS-LI-2380	CBS-LI-2383
	Cont. Recirc Swapover Signal	White Light on MCB-AF	White Light on MCB-BF
	RH-V-32 & 70	UL-4	UL-2
	RHR + SI + CCP Flow	SI-FI-917 (P/S is CP-5) SI-FI-918 (P/S is CP-6) RH-FI-618 (P/S is CP-5)	SI-FI-922 (P/S is CP-7) RH-FI-619 (P/S is CP-8)
(R)	NOTE 2 - USE RAD MONITORS AS LISTED ON F-0.8.		

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

PERFORMANCE SUMMARY

Provide comments on unsatisfactory performance of an element/step or for deviation from performance as stated. Record interruptions in performance such as retraining, shift change, and processing of procedure changes. Recommend remedial training, if necessary.

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).

TEAR-OFF SHEET FOR ADMJPM03

CSFST E-PLAN CLASSIFICATION

Directions to the Student:

Evaluator gives Tear-Off sheet to the student
Evaluator reads the following to the student (Optional for multiple JPMs)
Student:

1. Ensures task is done correctly.
2. May be asked follow-up questions to confirm knowledge of task.

A. You are the WCS.

B. The following information is provided to you:

Using reference material available in the control room and based on present plant conditions, determine whether any Emergency Action Level is being exceeded and whether an Emergency Classification is warranted.

C. The evaluator will act as the SM and provide the cues and communications for this JPM. Do you have any questions?

Initiating Cue:

Evaluator to student, **"SM to WCS (or student's name), using ER-1.1, Classification of Emergencies, determine whether an Emergency Classification is warranted. Evaluate EALS 12a, 12b, 12d, and 12e after you have completed your initial classification of events."**

Note to Evaluator - Obtain Tear-Off Sheets from student following JPM completion (Ops only).