Facility: McGuire		Date of Examination:	8/2/10
Examination Level:	RO	Operating Test Number:	N10-1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed	
Conduct of Operations	M, R	2.1.37 (4.3)	Knowledge of procedures, guidelines or limitations associated with reactivity management
		JPM:	Perform an ECP
Conduct of Operations	D, P, R	2.1.25 (3.9)	Ability to interpret reference materials, such as graphs, curves, tables, etc.
		JPM:	Determine Boric Acid Addition to FWST
Equipment Control	M, R	2.2.12 (3.7)	Knowledge of Surveillance Procedures.
		JPM:	Perform a Manual NC Leakage Calculation
Radiation Control	M, R	2.3.11 (3.8)	Ability to control radiation releases
		JPM:	Perform a Unit Vent Flow Calculation of a Containment Air Release

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

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

RO Admin JPM Summary

A1a This is a modified JPM using Bank JPM-RT-RB:073 as its basis. The operator will be told that Reactor Startup is an hour away, and provided with a set of initial conditions. The operator will be asked to perform an Estimated Critical Position (ECP) in accordance with OP/0/A/6100/06 (Reactivity Balance Calculation), Enclosure 4.2 (Estimated Critical Rod Position). During the course of the ECP, the operator will be given a set of power history conditions, and asked to perform a Shutdown Fission Product Correction calculation in accordance with OP/0/A/6100/06 (Reactivity Balance Calculation), Enclosure 4.8 (Shutdown Fission Product Correction Calculation) in support of the ECP. This is the same JPM as the SRO Exam.

A1b This is a bank JPM, and previously used on the 2009 NRC Operating Test. The operator will be told that a leak, which is now isolated has lowered the FWST level to 440 inches, and that it has been decided to use the Recycle Holdup Tank (RHT) to refill the FWST. The operator will be told that Enclosure 4.4, (FWST Makeup Using the RHT), of OP/1/A/6200/014 (Refueling Water System) is in progress and completed through Step 3.9, and provided with Chemistry Data for the BAT and RHT. The operator will then be directed to determine the amount of Boric Acid needed to raise the FWST level to 480" using the RHT in accordance with Step 3.10 of Enclosure 4.4 of OP/1/A/6200/014 (Refueling Water System). The operator will be expected to calculate the amount of Boric Acid that must be added from the BAT to refill the FWST.

A2 This is a modified JPM using Bank JPMs ADM-NRC-A2-05 and 12 as its basis. The operator will be told that Unit 1 is at 100% power, the Unit 1 OAC point M1L4554 is out of service, and that PT/1/A/4200/040 (Reactor Coolant Leakage Detection) has been completed showing that NCS Leakage is 1.6 gpm. The operator will be given Enclosure 13.2 (NC Leakage Determination Using Manual Calculations) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) with the necessary raw data compiled on a Data Sheet; and directed to complete the calculations within the Enclosure. The operator will be expected to complete all calculations, and identify any Technical Specification Limits that have been exceeded.

A3 This is a modified JPM using Bank JPM ADM-NRC-A3-010 as its basis. The operator will be told that GWR Package # 2010013 for Unit 1 Containment Air Release is currently in use to conduct a series of Containment air releases, and that during the first release, conducted using Enclosure 4.2 (Air Release Mode With VQ Flow Monitor Operable) of OP/1/A/6450/017 (Containment Air Addition and Release), the Unit 1 VQ Monitor became inoperable. The operator will be told that the crew stopped the release and continued the air release using Enclosure 4.3 (Air Release Mode with VQ Flow Monitor Inoperable) of OP/1/A/6450/017 (Containment Air Addition and Release), and that three previous releases have been made; including the one which was made with the Unit 1 VQ Flow Monitor in operation. Finally, the operator will be provided with the pertinent data for the current release, and then be directed to calculate the volume released for the current release and to determine the total volume released from the Containment during all releases. The operator will be expected to calculate the volume of air released from the Containment during the final release, and determine the total volume of air released in the series of four releases.

Facility: McGuire		Date of Examination:	8/2/10
Examination Level:	SRO	Operating Test Number:	N10-1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed	
Conduct of Operations	M, R	2.1.37 (4.6)	Knowledge of procedures, guidelines or limitations associated with reactivity management
		JPM:	Perform an ECP
Conduct of Operations	D, P, R	2.1.25 (4.2)	Ability to interpret reference materials, such as graphs, curves, tables, etc.
		JPM:	Determine Boric Acid Addition to FWST
Equipment Control	M, R	2.2.12 (4.1)	Knowledge of Surveillance Procedures.
		JPM:	Perform/Review a Manual NC leakage Calculation
Radiation Control	M, R	2.3.11 (3.8)	Ability to control radiation releases
		JPM:	Perform a Unit Vent Flow Calculation of a Containment Air Release
Emergency Procedures/Plan	N, R	2.4.44 (4.4)	Knowledge of emergency plan protective action recommendations.
		JPM:	Provide an updated PAR

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

*Type Codes & Criteria:

(C)ontrol room, **(0)** (S)imulator, **(0)** or Class(R)oom **(5)**
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) **(1)**
(N)ew or (M)odified from bank (≥ 1) **(4)**
(P)revious 2 exams (≤ 1; randomly selected) **(1)**

SRO Admin JPM Summary

A1a This is a modified JPM using Bank JPM-RT-RB:073 as its basis. The operator will be told that Reactor Startup is an hour away, and provided with a set of initial conditions. The operator will be asked to perform an Estimated Critical Position (ECP) in accordance with OP/0/A/6100/06 (Reactivity Balance Calculation), Enclosure 4.2 (Estimated Critical Rod Position). During the course of the ECP, the operator will be given a set of power history conditions, and asked to perform a Shutdown Fission Product Correction calculation in accordance with OP/0/A/6100/06 (Reactivity Balance Calculation), Enclosure 4.8 (Shutdown Fission Product Correction Calculation) in support of the ECP. This is the same JPM as the RO Exam.

A1b This is a bank JPM, and previously used on the 2009 Operating Test. The operator will be told that a leak, which is now isolated has lowered the FWST level to 440 inches, below the Technical Specification Limit, and that it has been decided to use the Recycle Holdup Tank (RHT) to refill the FWST. The operator will be told that Enclosure 4.4 (FWST Makeup Using the RHT), of OP/1/A/6200/014 (Refueling Water System) is in progress and completed through Step 3.10, and provided with Chemistry Data for the BAT and RHT. The operator will then be directed to perform the Independent Verification (SRO aspect) of the calculation in Step 3.10 of Enclosure 4.4 to determine the amount of Boric Acid that must be added from the Boric Acid Tank (BAT), in order to raise the FWST Level to 480" using the RHT. The operator will discover two errors within the previous calculation, and determine the correct volume of Boric Acid to add. Following this, the operator will be given a makeup flowrate to the FWST and asked to identify the impact on the Technical Specification ACTION. The operator will be required to identify that ACTION C is applicable after one hour.

A2 This is a modified JPM using Bank JPMs ADM-NRC-A2-05 and 12 as its basis. The operator will be told that Unit 1 is at 100% power, the Unit 1 OAC point M1L4554 is out of service, and that PT/1/A/4200/040 (Reactor Coolant Leakage Detection) has been completed showing that NCS Leakage is 1.6 gpm. The operator will be given Enclosure 13.2 (NC Leakage Determination Using Manual Calculations) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) with the necessary raw data compiled on a Data Sheet; and directed to complete the calculations within the Enclosure. The operator will be expected to complete all calculations in accordance with the provided Key, identify any Technical Specification Limits that have been exceeded, and (SRO aspect) identify with all Technical Specification ACTION.

A3 This is a modified JPM using Bank JPM ADM-NRC-A3-010 as its basis. The operator will be told that GWR Package # 2010013 for Unit 1 Containment Air Release is currently in use to conduct a series of Containment air releases, and that during the first release, conducted using Enclosure 4.2 (Air Release Mode

With VQ Flow Monitor Operable) of OP/1/A/6450/017 (Containment Air Addition and Release), the Unit 1 VQ Monitor became inoperable. The operator will be told that the crew stopped the release and continued the air release using Enclosure 4.3 (Air Release Mode with VQ Flow Monitor Inoperable) of OP/1/A/6450/017 (Containment Air Addition and Release), and that three previous releases have been made; including the one which was made with the Unit 1 VQ Flow Monitor in operation. Finally, the operator will be provided with the pertinent data for the current release, and then be directed to calculate the volume released for the current release and to determine the total volume released from the Containment during all releases. The operator will be expected to calculate the volume of air released from the Containment during the final release, and determine the total volume of air released in the series of four releases. This is the same JPM as the RO Exam.

A4 This is a new JPM. The operator will be placed in a post-accident condition with a Large Break LOCA with a release from the Containment. The operator will be told that a General Emergency has been declared, and provided with the initial Protective Action Recommendation (PAR). The operator will be given a subsequent set of plant conditions and meteorological data, and asked to provide an updated PAR in accordance with Enclosure 4.4 (Offsite Protective Recommendations) of RP/0/B/5700/029 (Notifications to Offsite Agencies from the Control Room). The operator will be expected to determine the Updated PAR for the subsequent conditions.

JPM A1a RO/SRO

Facility:	McGuire	Task No.:	214OP_010
Task Title:	Perform an ECP	JPM No.:	2010 Admin - JPM A1a RO/SRO
K/A Reference:	GK/A 2.1.37 (4.3/4.6)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions: Unit 1 startup in progress per OP/1/A/6100/001 (Controlling Procedure for Unit Startup).

All steps are complete up to determining the desired estimated critical rod height.

The Unit tripped from 30% power, 70 hours ago.

Prior to that the Unit had operated at 2 EFPD since the previous plant trip, which resulted in a shutdown lasting 24 hours.

The following Cycle 21 conditions exist:

- EFPD = 125
- NC Boron = 1577 PPM
- Xenon Worth = 0
- Samarium = 150 PCM greater than equilibrium

It is intended to pull rods to criticality with criticality achieved in approximately 1 hour.

Reactor Engineer Chad Adams has been contacted earlier today and has reported that there have been no unusual trends on ECPs.

The OAC and REACT Program are unavailable.

Task Standard: The Actual Estimated Critical Rod Position Bank for Xenon at time of Criticality agrees with the evaluator calculated ECP $\pm$ 10 steps.

Required Materials:	Calculator
General References:	OP/1/A/6100/001 (Controlling Procedure for Unit Startup) OP/0/A/6100/006 (Reactivity Balance Calculation) OP/1/A/6100/022 (Unit 1 Data Book – Cycle 21) SOMP 01-02 (Reactivity Management)
Handouts:	OP/0/A/6100/006 (Reactivity Balance Calculation) Enclosure 4.2 (Estimated Critical Rod Position (ECP)) OP/0/A/6100/006 (Reactivity Balance Calculation) Enclosure 4.8 (Fission Product Correction Calculation) OP/1/A/6100/022 (Unit 1 Data Book), Enclosure 4.3, Table 6.7, Shutdown Fission Product Correction OP/1/A/6100/022 (Unit 1 Data Book), Enclosure 4.3, Graph 6.1, Critical Boron Concentration HZP, ARO, NO XENON, EQ Sm. OP/1/A/6100/022 (Unit 1 Data Book), Enclosure 4.3, Graph 6.8, Differential Boron Worth, HZP, ARO, NO XENON, EQ Sm. OP/1/A/6100/022 (Unit 1 Data Book), Enclosure 4.3, Table 6.9, Xenon and Samarium Worths. OP/1/A/6100/022 (Unit 1 Data Book), Enclosure 4.3, Table 6.3.A, Integral Rod Worth in Overlap, HZP, NO XENON. OP/1/A/6100/022 (Unit 1 Data Book), Enclosure 4.3, Table 6.3.B, Integral Rod Worth in Overlap, HZP, PEAK XENON. OP/1/A/6100/022 (Unit 1 Data Book), Enclosure 4.3, Graph 1.2, Control Rod Insertion Limit as a Function of Power. OP/1/A/6100/022 (Unit 1 Data Book), Enclosure 4.3, Table 2.8, Rod Withdrawal Limits.
Initiating Cue:	The CRS has directed you to perform an ECP per Enclosure 4.2 (Estimated Critical Rod Position (ECP)) of OP/0/A/6100/006 (Reactivity Balance Calculation).
Time Critical Task:	NO
Validation Time:	40 minutes

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout all documents identified in the Handout section.

START TIME: _____

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Note prior to Step 3.1) All curves/tables used in this procedure are found in OP/1(2)/A/6100/022 (Unit One (Two) Core Data Book). These procedures will be referred to as the "Data Book."	The operator reads the Note and proceeds.		
2	(Step 3.1) Record the following: (Step 3.1.1) Unit_____ Cycle_____	The operator records Unit **1**. The operator records Cycle **21**.		
3	(Step 3.1.2) Recent trends on ECP. Reactor Engineer contacted ____ Date_____	The operator recognizes that Chad Adams has been contacted. The operator records RE name as **Chad Adams** and **today's date**.		
4	(Step 3.1.3) Date/Time of Shutdown.	The operator records **Date/Time** (70 hours ago) from current Date/Time.		
5	(Step 3.1.4) Anticipated Date/Time of Criticality _____/_____	The operator records **today's date** and **1 hour from the time calculation is started** as the time of criticality.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
6	(Step 3.1.5) Burnup: (P1457)	The operator records **125 EFPD**.		
7	(Step 3.1.6) NC System Boron Concentration: (Step 3.1.6.1) If pulling rods to Criticality: (Step 3.1.6.1A) If OAC is unavailable, record the current NC System boron concentration. OR (Step 3.1.6.1B) If OAC is available	The operator recognizes from initial conditions that OAC is unavailable and it is intended to pull rods to criticality. The operator records **1577** in Step 3.1.6.1A. The operator places **NA** in Step 3.1.6.1B.		
8	(Step 3.1.6.2) If dilution to Criticality.....	The operator places **NA** in Step 3.1.6.2.		
9	(Step 3.1.6.3) Record the Effective Boron Concentration: (Step 3.1.6.1A or Step 3.1.6.1B3 or 3.1.6.2)	The operator records **1577** ppm from Step 3.1.6.1A.		
10	(Step 3.1.7) Xenon worth at anticipated time of Criticality (From OAC program Xenon Samarium – XESM or REACT Program).	The operator records **0** from initial conditions.		
11	(Step 3.1.8) If burnup from Step 3.1.5 is > 0 EFPD, record the difference between equilibrium and present samarium worth (P1475, Samarium program on OAC or REACT).	The operator recognizes that burnup is > 0 EFPD and records **150** from initial conditions.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
12	(Step 3.1.9) If burnup from Step 3.1.5 is > 12 EFPD, perform Enclosure 4.8 to determine the fission product correction.	The operator recognizes that burnup is > 12 EFPD and that fission product correction is needed, and proceeds to Enclosure 4.8.		
13	(Enclosure 4.8/Notes prior to Step 3.1) All curves /tables used in this procedure are found in OP/1(2)/A/6100/022 (Unit One (Two) Core Data Book). These procedures will be referred to as the "Data Book." Number of hours shutdown is the difference in time between the time the reactor went subcritical and the expected time of criticality.	The operator reads Notes, and proceeds.		
14	(Step 3.1) Shutdown Fission Product Correction Calculation: (Step 3.1.1) If Unit operated > 3 EFPD from previous shutdown to current shutdown.....	The operator reviews power history and recognizes that the Unit did NOT operate > 3 EFPD from previous shutdown to current shutdown. The operator records an **NA** in Step 3.1.1, and proceeds to Step 3.1.2.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
15	(Step 3.1.2) If Unit operated < 1 EFPD from previous shutdown to current shutdown.....	The operator reviews power history and recognizes that the Unit operated > 1 EFPD from previous shutdown to current shutdown. Operator records an **NA** in Step 3.1.2, and proceeds to Step 3.1.3.		
*16	(Step 3.1.3) If Unit operated between 1 EFPD and 3 EFPD from previous shutdown to current shutdown and current shutdown < 72 hours use Data Book Table 6.7 to determine the shutdown fission product correction based on the following:	The operator reviews power history and recognizes that the Unit operated between 1 EFPD and 3 EFPD from previous shutdown to current shutdown, and the current shutdown is < 72 hours. Operator proceeds to Step 3.1.3.1.		
17	(Step 3.1.3.1) Previous Shutdown: (A) Number of hours during previous shutdown: _____ hrs (B) Shutdown Fission Product Correction: _____ ppm	The operator recognizes from initial conditions that the number of hours during the previous shutdown is 24, and records **24**. The operator addresses Data Book Table 6.7 and determines the Shutdown Fission Product Correction to be 10, and records **10**.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
18	(Step 3.1.3.2) Current Shutdown: (A) Number of hours since current shutdown: _____ hrs (B) Shutdown fission product correction: _____ ppm	The operator recognizes from initial conditions that the number of hours during the current shutdown to the time of the ECP is 71, and records **71**. The operator addresses Data Book Table 6.7 and determines the shutdown fission product correction is 35, and records **34.5**.		
19	(Step 3.1.3.3) Shutdown Fission product Correction: (Step 3.1.3.1B x 0.5) + (Step 3.1.3.2B) = ____ppm	The operator uses value determined in Step 3.1.3.1B and 3.1.3.2 and determines the Shutdown Fission Product Correction is 39.5 ppm. Operator records **39.5 (±0.5)**. (10 x 0.5) + (34.5) = 40 ppm		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
20	(Step 3.1.4) If Unit operated between 1 EFPD and 3 EFPD from previous shutdown to current shutdown and current shutdown > 72:	The operator reviews power history and recognizes that the Unit operated between 1 EFPD and 3 EFPD from previous shutdown to current shutdown, however, the current shutdown is < 72 hours. Operator records an **NA** in Step 3.1.4. Operator reports that the Shutdown Fission Product Correction factor is **39.5 (±0.5).**		
21	(Enclosure 4.2/Step 3.2) If desired, perform automated calculations using REACT…..	The operator recognizes from initial conditions that REACT is NOT available and proceeds to Step 3.3.		
22	(Step 3.3) Manual Calculations: (Step 3.3.1) Boron Concentration: (Step 3.3.1.1) Determine the all rods out (ARO), hot zero power (HZP), no xenon, equilibrium samarium, boron concentration for present burnup from Step 3.1.5 (Data Book Graph 6.1) (Step 3.3.1.2) Record value in Table 4.2.1 Line A.	The operator addresses Data Book Graph 6.1. (NOTE: The operator should use chart at bottom, and NO interpolation is needed). The operator records **1818** in Table 4.2.1 Line A.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
23	(Step 3.3.2) Differential Boron Worth: (Step 3.3.2.1) Determine the ARO differential boron worth for present burnup of step 3.1.5 (Data Book Graph 6.8) (Step 3.3.2.2) Record value in Table 4.2.1 Line B	The operator addresses Data Book Graph 6.8. (NOTE: Operator should use chart at bottom, and NO interpolation is needed). The operator records **-6.35** in Table 4.2.1 Line B.		
24	(Step 3.3.3) Determine the Rod Inserted Worth: Step (3.3.3.1) Record values from Steps 3.1.6 - 3.1.9 in Table 4.2.1.	The operator records values from steps 3.1.6 - 3.1.9 in Table 4.2.1 as follows: C. Present Effective Boron Concentration: **1577** D. Xenon Worth: **0** E. Diff from Eq Sm Worth: **150** F. Fission Product Correction: **39.5 (±0.5)**		
25	(Step 3.3.3.2) Complete Table 4.2.1, recording 0 for any N/A'd Reference Steps.	The operator records remaining values in Table 4.2.1, as follows: G. Reactivity Equivalent of Boron Difference (C - A) x B = **1530**. (1577 - 1818) x - 6.35 = 1530 pcm H. Reactivity Equivalent of Fission Product Correction F x B = **250.83** 39.5 x -6.35 = -250.83 Reactivity of Inserted Rods: (D + E + G) – H = **1931 (±4)** (0 + 150 + 1530) - (-)250.83 = 1931		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
26	(Step 3.3.4) If result from Table 4.2.1 < 0	The operator recognizes result from Table 4.2.1 > 0 and records **NA** in Step 3.3.4.		
27	(Step 3.3.5) Peak xenon worth: (Step 3.3.5.1) Determine the peak xenon worth for present burnup from step 3.1.5 (Data Book Table 6.9) (Step 3.3.5.2) Record value in Table 4.2.2 Line C.	The operator addresses Data Book Table 6.9. The operator records **3913** in Table 4.2.2 Line C.		
28	(Step 3.3.6) Calculate the Estimated Critical Rod Positions: (Step 3.3.6.1) Record values from Step 3.1.7 and Table 4.2.1 in Table 4.2.2.	The operator records values in Table 4.2.2 as follows: A. Xenon Worth: **0** B. Reactivity of inserted rods: **1931** C. Peak Xenon Worth: **3913** D. Lower Band Reactivity Worth: **2681** E. Upper Band Reactivity Worth: **1181**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
29 * * *	(Step 3.3.6.2) Complete Table 4.2.2.	The operator completes Table 4.2.2 as follows: The operator addresses Table 6.3.A of the Data Book and determines: F. No Xenon Rod Position for Reactivity of B - **Bank C @ 35 steps, +2/-3 steps.** G. No Xenon Rod Position for Reactivity of D - **Bank B @ 39 steps, +2/-3 steps.** H. No Xenon Rod Position for Reactivity of E - **Bank D @ 3 steps, +2/-3 steps.** The operator addresses Table 6.3.B of the Data Book and determines: I. Peak Xenon Rod Position for Reactivity of B - **Bank C @ 49 steps, +2/-3 steps.** J. Peak Xenon Rod Position fro Reactivity of D - **Bank B @ 68 steps, +2/-3 steps.** K. Peak Xenon Rod Position for Reactivity of E - **Bank D @ 26 steps, +2/-3 steps.**		
*30	(Table 4.2.2) Estimated Critical Position	The operator records **Bank C @ 35 steps, +2/-3 steps.** [(I - F) x (A ÷ C)] + F.		
*31	(Table 4.2.2) Lower Limit of Band	The operator records **Bank B @ 39 steps, +2/-3 steps.** [(J - G) x (A ÷ C)] + G		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*32	(Table 4.2.2) Upper Limit of Band	The operator records **Bank D @ 3 steps, +2/-3 steps.** [(K - H) x (A ÷ C)] + H		
*33	(Step 3.4) Check the following: (Step 3.4.1) Rod Positions of Table 4.2.2 or REACT output are greater than insertion limits per Data Book Graph 1.2. (Step 3.4.2) Rod positions of Table 4.2.2 or REACT Output are less than rod withdrawal limits per Data Book Table 2.8.	The operator addresses Graph 1.2 and determines rod positions are NOT greater than insertion limits. The operator addresses Table 2.8 and determines no withdrawal limits exist.		
34	(Step 3.5) If Step 3.4 CANNOT be met, contact reactor Engineering.	The operator contacts Reactor Engineering. **Cue:** **Reactor Engineering acknowledges.**		
35	Calculations performed By: _____ (RO) _____ Date	The operator records **Name** and **date**.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2010 Admin - JPM A1a RO/SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

KEY:

Table 4.2.1: Rod Inserted Worth Calculation

Description	Reference	Value
A. ARO, HZP, No Xenon, Eq. Samarium Boron	Step 3.3.1	1818ppm
B. ARO/DBW	Step 3.3.2	-6.35pcm/ppm
C. Present Effective Boron Concentration	Step 3.1.6.3	1577ppm
D. Xenon Worth	Step 3.1.7	0pcm
E. Diff from Eq Sm Worth	Step 3.1.8	150pcm
F. Fission Product Correction	Step 3.1.9	39.5(±0.5)ppm
G. Reactivity Equivalent of Boron Difference	(C-A) x B (1577 - 1818) x -6.35	1530pcm
H. Reactivity Equivalent of Fission Product Correction	F x B 39.5 x -6.35	-250.83pcm (-247.65 – (-) 254)
Reactivity of Inserted Rods	(D + E + G) –H (0 + 150 + 1530) – (-250.83)	1930.83pcm (1927.65 - 1934)

KEY(Cont'd):

Table 4.2.2: Estimated Critical Rod Positions

Description	Reference	Value	
A. Xenon Worth	Step 3.1.7		0pcm
B. Reactivity of inserted rods	Table 4.2.1		1931±4pcm
C. Peak Xenon Worth	Step 3.3.5	-	3913pcm
D. Lower Band Reactivity Worth	B + 750		2681pcm
E. Upper Band Reactivity Worth	B - 750		1181pcm
F. No Xenon Rod Position for Reactivity of B	Data Book Table 6.3.A	BankC	35+2/-3steps w/d
G. No Xenon Rod Position for Reactivity of D	Data Book Table 6.3.A	BankB	39+2/-3steps w/d
H. No Xenon Rod Position for Reactivity of E	Data Book Table 6.3.A	BankD	3+2/-3steps w/d
I. Peak Xenon Rod Position for Reactivity of B	Data Book Table 6.3.B	BankC	48+2/-3steps w/d
J. Peak Xenon Rod Position for Reactivity of D	Data Book Table 6.3.B	BankB	68+2/-3steps w/d
K. Peak Xenon Rod Position for Reactivity of E	Data Book Table 6.3.B	BankD	26+2/-3steps w/d
Estimated Critical Position	[(I - F) x (A/C)] + F [(C48 – C35) x (0/3913)] + C35	BankC	35 +2/-3steps w/d
Lower Limit of Band	[(J - G) x (A/C)] + G [(B68 – B39) x (0/3913)] + B39	BankB	39+2/-3steps w/d
Upper Limit of Band	[(K - H) x (A/C)] + H [(D26 – D3) x (0/3913)] + D3	BankD	3 +2/-3steps w/d

JPM CUE SHEET

Initial Conditions:

Unit 1 startup in progress per OP/1/A/6100/001 (Controlling Procedure for Unit Startup).

All steps are complete up to determining the desired estimated critical rod height.

The Unit tripped from 30% power, 70 hours ago.

Prior to that the Unit had operated at 2 EFPD since the previous plant trip, which resulted in a shutdown lasting 24 hours.

The following Cycle 21 conditions exist:

- EFPD = 125
- NC Boron = 1577 PPM
- Xenon Worth = 0
- Samarium = 150 PCM greater than equilibrium

It is intended to pull rods to criticality with criticality achieved in approximately 1 hour.

Reactor Engineer Chad Adams has been contacted earlier today and has reported that there have been no unusual trends on ECPs.

The OAC and REACT Program are unavailable.

INITIATING CUE:

The CRS has directed you to perform an ECP per Enclosure 4.2 (Estimated Critical Rod Position (ECP)) of OP/0/A/6100/006 (Reactivity Balance Calculation).

1. Limits and Precautions

1.1 The calculation shall be performed twice. A Licensed Reactor Operator performs the calculation. The second, independent calculation shall be performed by a Qualified Reactor Engineer as a separate verification of the original calculation (NSD 304).

1.2 Criticality should not be obtained outside the maximum window (± 750 pcm) of estimated critical control bank position.

1.3 Estimated critical rod position must be recalculated if criticality will not be achieved within ± 2 hours from previously anticipated time of criticality.

1.4 For Dilution to Criticality (Initial Startup for Cycle): The ECP shall be performed using the All Rods Out, HZP, 0 EFPD Critical Boron Concentration provided in the Data Book.

1.5 Rod Worths listed in Data Book Tables 6.3.A, 6.3.B and 6.3.3 do not need to be interpolated over EFPD. The worths are valid over the range given in each column.

1.6 The maximum allowable rod position is ARO and the minimum allowable rod position is 0.

2. Initial Conditions

2.1 None

3. Procedure

NOTE:	All curves/tables used in this procedure are found in OP/1(2)/A/6100/022 (Unit One (Two) Data Book). These procedures will be referred to as the "Data Book."

3.1 Record the following:

☐ 3.1.1 Unit ____ Cycle ____

☐ 3.1.2 Recent trends on ECP
Reactor Engineer contacted: _____ Date _____

☐ 3.1.3 Date/Time of Shutdown: _____/_____

☐ 3.1.4 Anticipated Date/Time of Criticality: _____/_____

☐ 3.1.5 Burnup: (P1457) _____ EFPD

3.1.6 NC System Effective Boron Concentration:

_____ 3.1.6.1 **IF** Pulling Rods to Criticality:

_____ A. **IF** OAC is unavailable, record the current NC Boron Concentration _____ ppm

_____ B. **IF** OAC is available:

☐ 1. Record B-10 Atom Percent, Best Estimate (P5613) _____%

☐ 2. Record the current NC Boron Concentration _____ ppm

☐ 3. Calculate the Effective Boron Concentration (Step 3.1.6.1B.2 x Step 3.1.6.1B.1)÷19.8 =

(_____ x _____) ÷ 19.8 = _____ ppm

_____ 3.1.6.2 **IF** Dilution to Criticality, record All Rods Out, HZP, Critical Boron Concentration for 0 EFPD. (Databook Graph 6.1) _____ ppm

☐ 3.1.6.3 Record the Effective Boron Concentration: (Step 3.1.6.1A or Step 3.1.6.1B.3 or 3.1.6.2) = _____ppm

☐ 3.1.7 Xenon worth at anticipated time of criticality (from OAC program Xenon Samarium - XESM or REACT program). - _____ pcm

_____ 3.1.8 **IF** burnup from step 3.1.5 is > 0 EFPD, record the difference between equilibrium and present samarium worth (P1475, Samarium program on OAC or REACT). {MCEI-0400-150} _____ pcm

_____ 3.1.9 **IF** burnup from step 3.1.5 is > 12 EFPD, perform Enclosure 4.8 to determine the fission product correction. _____ ppmb

_____ 3.2 **IF** desired, perform automated calculations using REACT (Reactivity Balance - ECP module) by performing the following:

☐ 3.2.1 Enter data from Section 3.1 into REACT and calculate, ensuring effective boron concentration from 3.1.6.3 is used as NC System Boron concentration.

☐ 3.2.2 Attach REACT output to this enclosure.

☐ 3.2.3 N/A section 3.3 and go to step 3.4.

_____ 3.3 Manual Calculations:

3.3.1 Boron Concentration:

☐ 3.3.1.1 Determine the all rods out (ARO), hot zero power (HZP), no xenon, equilibrium samarium, boron concentration for present burnup from Step 3.1.5 (Data Book Graph 6.1).

☐ 3.3.1.2 Record value in Table 4.2.1 Line A.

3.3.2 Differential Boron Worth:

☐ 3.3.2.1 Determine the ARO differential boron worth for present burnup of step 3.1.5 (Data Book Graph 6.8)

☐ 3.3.2.2 Record value in Table 4.2.1 Line B.

3.3.3 Determine the Rod Inserted Worth:

☐ 3.3.3.1 Record values from Steps 3.1.6 - 3.1.9 in Table 4.2.1.

☐ 3.3.3.2 Complete Table 4.2.1, recording 0 for any N/A'd Reference Steps.

Table 4.2.1 Rod Inserted Worth Calculation

Description	Reference	Value
A. ARO, HZP, No Xenon, Eq. Samarium Boron	Step 3.3.1	ppm
B. ARO DBW	Step 3.3.2	pcm/ppm
C. Present Effective Boron Concentration	Step 3.1.6.3	ppm
D. Xenon Worth	Step 3.1.7	pcm
E. Diff from Eq Sm Worth	Step 3.1.8	pcm
F. Fission Product Correction	Step 3.1.9	ppm
G. Reactivity Equivalent of Boron Difference	(C - A) x B (_____ - _____) x _____	pcm
H. Reactivity Equivalent of Fission Product Correction.	F x B _____ x _____	pcm
Reactivity of Inserted Rods	(D + E + G) - H (_____ + _____ + _____) - _____	pcm

_____ 3.3.4 **IF** result from Table 4.2.1 < 0 perform the following:

☐ 3.3.4.1 Perform Enclosure 4.1 for an ECB.

☐ 3.3.4.2 Exit this Enclosure.

3.3.5 Peak xenon worth:

☐ 3.3.5.1 Determine the peak xenon worth for present burnup from step 3.1.5 (Data Book Table 6.9).

☐ 3.3.5.2 Record value in Table 4.2.2 Line C.

3.3.6 Calculate the Estimated Critical Rod Positions:

☐ 3.3.6.1 Record values from Step 3.1.7 and Table 4.2.1 in Table 4.2.2.

☐ 3.3.6.2 Complete Table 4.2.2.

Table 4.2.2: Estimated Critical Rod Positions

Description	Reference	Value
A. Xenon Worth	Step 3.1.7	pcm
B. Reactivity of inserted rods	Table 4.2.1	pcm
C. Peak Xenon Worth	Step 3.3.5	- pcm
D. Lower Band Reactivity Worth	B + 750	pcm
E. Upper Band Reactivity Worth	B - 750	pcm
F. No Xenon Rod Position for Reactivity of B	Data Book Table 6.3.A	Bank steps w/d
G. No Xenon Rod Position for Reactivity of D	Data Book Table 6.3.A	Bank steps w/d
H. No Xenon Rod Position for Reactivity of E	Data Book Table 6.3.A	Bank steps w/d
I. Peak Xenon Rod Position for Reactivity of B	Data Book Table 6.3.B	Bank steps w/d
J. Peak Xenon Rod Position for Reactivity of D	Data Book Table 6.3.B	Bank steps w/d
K. Peak Xenon Rod Position for Reactivity of E	Data Book Table 6.3.B	Bank steps w/d
Estimated Critical Position	[(I - F) x (A÷C)] + F [(_____ - _____) x (_____÷_____)] + _____	Bank steps w/d
Lower Limit of Band	[(J - G) x (A÷C)] + G [(_____ - _____) x (_____÷_____)] + _____	Bank steps w/d
Upper Limit of Band	[(K- H) x (A÷C)] + H [(_____ - _____) x (_____÷_____)] + _____	Bank steps w/d

3.4 Check the following:

☐ 3.4.1 Rod Positions of Table 4.2.2 or REACT output are greater than insertion limits per Data Book Graph 1.2.

☐ 3.4.2 Rod Positions of Table 4.2.2 or REACT output are less than rod withdrawal limits per Data Book Table 2.8.

_____ 3.5 **IF** Step 3.4 **CANNOT** be met, contact Reactor Engineering.

_____ _____/_____
Reactor Engineer Contacted Date Time

Calculations Performed By: _____ (RO) Date: _____

Separate Verification By: _____ (QRE) Date: _____

3.6 **WHEN** criticality is achieved, record the following Actual Critical Data (with power leveled off at 10^{-8} amps on I/R):

☐ 3.6.1 Critical Time _____

☐ 3.6.2 T_{avg} at Time of Criticality _____°F

☐ 3.6.3 Critical Rod Position: Bank _____ at _____ steps w/d

☐ 3.6.4 Critical Boron Concentration _____ ppm

☐ 3.7 Request that Primary Chemistry obtain an NC system boron sample for ^{10}B analysis.

_____ 3.8 **IF** criticality is achieved outside the upper or lower band rod position, generate a N coded Reactivity Management PIP.

PIP Number: _____

☐ 3.9 Forward a copy of this Enclosure to Reactor Engineering.

End of Enclosure

1. Limits and Precautions

None

2. Initial Conditions

None

3. Procedure

NOTE: 1. All curves/tables used in this procedure are found in OP/1(2)/A/6100/022 (Unit One (Two) Data Book). These procedures will be referred to as the "Data Book."

2. Number of hours shutdown is the difference in time between the time the reactor went subcritical and the expected time of criticality.

3.1 Shutdown Fission Product Correction Calculation:

_____ 3.1.1 **IF** Unit operated > 3 EFPD from previous shutdown to current shutdown:

☐ 3.1.1.1 Use Data Book Table 6.7 to determine the shutdown fission product correction:

☐ 3.1.1.2 Number of hours shutdown _____ hrs

☐ 3.1.1.3 Shutdown Fission Product Correction: _____ ppm

_____ 3.1.2 **IF** Unit operated < 1 EFPD from previous shutdown to current shutdown:

☐ 3.1.2.1 Use Data Book Table 6.7 to determine the shutdown fission product correction based on the number of hours since the first shutdown:

☐ 3.1.2.2 Number of hours since shutdown _____ hrs

☐ 3.1.2.3 Shutdown Fission Product Correction: _____ ppm

_____ 3.1.3 **IF** Unit operated between 1 EFPD and 3 EFPD from previous shutdown to current shutdown and current shutdown < 72 hours use Data Book Table 6.7 to determine the shutdown fission product correction based on the following:

3.1.3.1 Previous Shutdown:

☐ A. Number of hours during previous shutdown: _____ hrs

☐ B. Shutdown fission product correction: _____ ppm

3.1.3.2 Current Shutdown:

☐ A. Number of hours since current shutdown: _____ hrs

☐ B. Shutdown fission product correction: _____ ppm

☐ 3.1.3.3 Shutdown Fission Product Correction:

(Step 3.1.3.1B x 0.5) + Step 3.1.3.2B =

(_____ x 0.5) + _____ _____ ppm

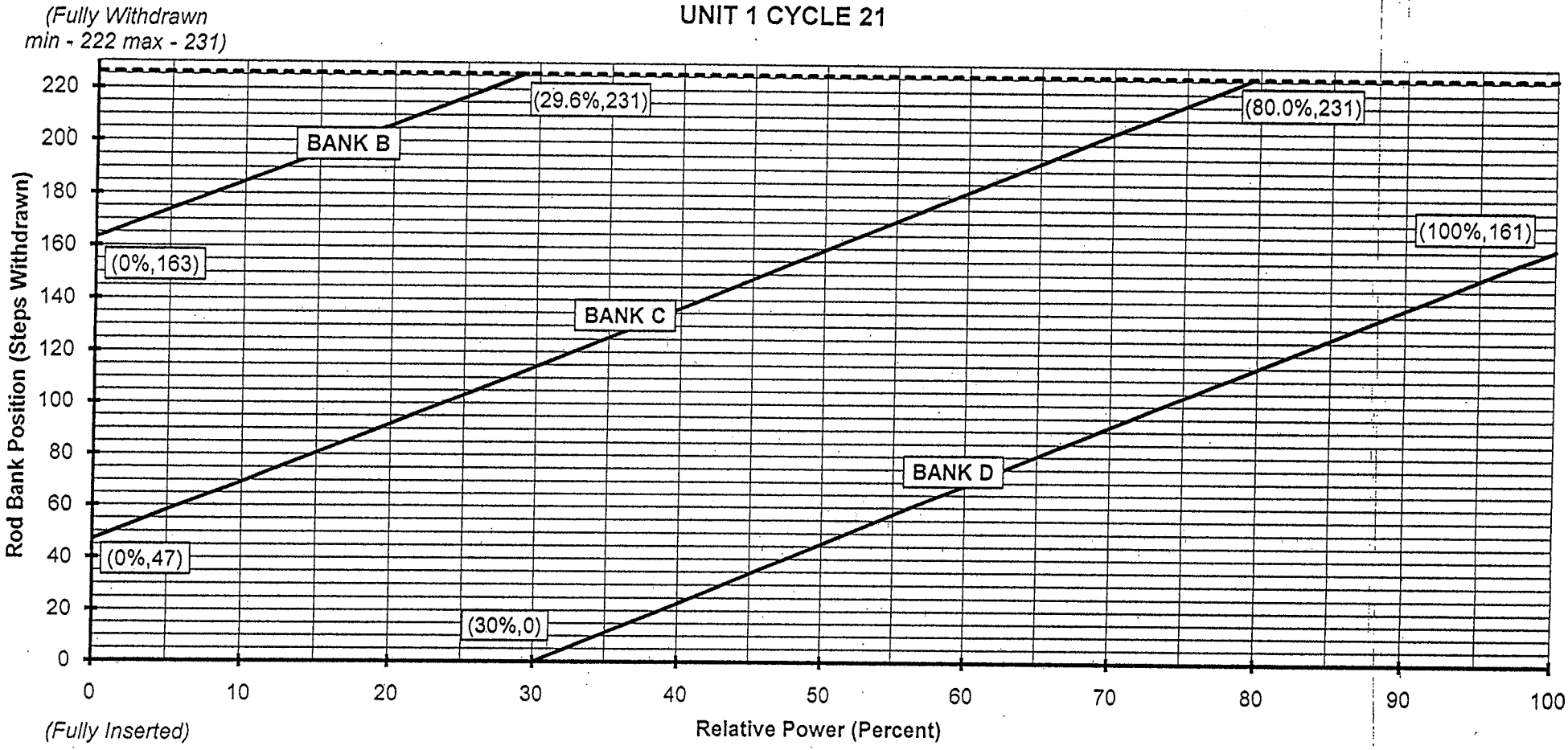
_____ 3.1.4 **IF** Unit operated between 1 EFPD and 3 EFPD from previous shutdown to current shutdown and current shutdown > 72 hours:

☐ 3.1.4.1 Use Data Book Table 6.7 to determine the shutdown fission product correction using the time of the current shutdown only.

☐ 3.1.4.2 Number of hours shutdown _____ hrs

☐ 3.1.4.3 Shutdown Fission Product Correction: _____ ppm

OP/1/A/6100/022
ENCLOSURE 4.3
GRAPH 1.2
CONTROL ROD INSERTION LIMITS AS A FUNCTION OF POWER
UNIT 1 CYCLE 21



Note: (1) Compliance with Tech Spec 3.1.3 may require rod withdrawal limits. Refer to Unit Data Book Table 2.8.

Chg 46

This data is also available on the OAC

Chg 44

UNIT 1

OP/1/A/6100/022
ENCLOSURE 4.3

TABLE 2.8

ROD WITHDRAWAL LIMITS

McGUIRE UNIT 1 CYCLE 21

McGuire Unit 1 is required to operate with a Moderator Temperature Coefficient within the limits of Tech Spec 3.1.3 and as shown in the McGuire Unit 1 Cycle 21 Core Operating Limits Report, MCEI-0400-232, Revision 0.

For McGuire Unit 1 Cycle 21, there are **NO ROD WITHDRAWAL LIMITS.**

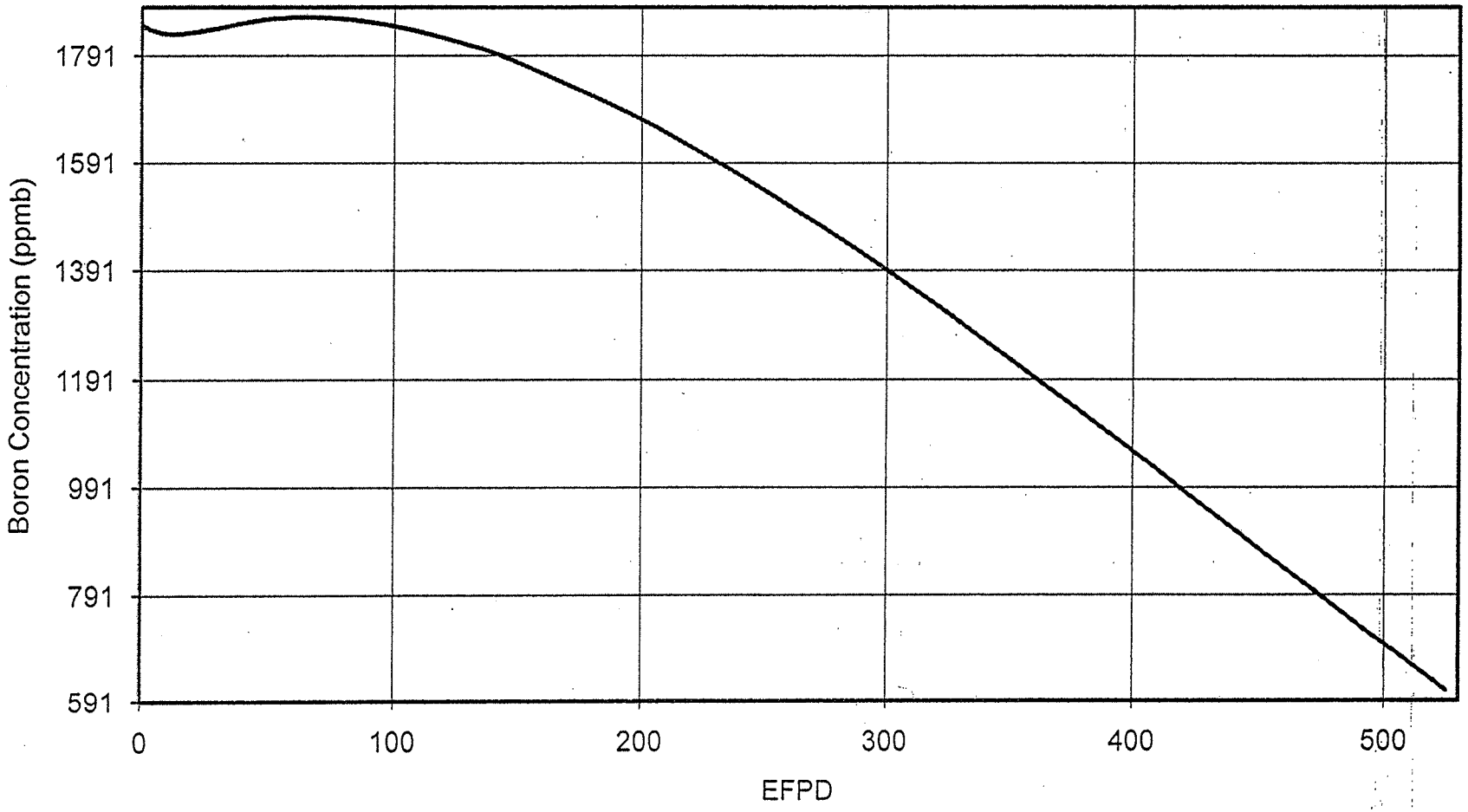
UNIT 1

Enclosure 4.3 - Graph 6.1

CRITICAL BORON CONCENTRATION

HZP, ARO, No Xe, EQ Sm

Unit 1 Cycle 21



EFPD	0	4	12	25	50	75	100	125	150	200	250	300	350	400	450	485	509	524
PPMB	1850	1839	1832	1839	1860	1862	1847	1818	1778	1672	1540	1392	1230	1058	879	753	666	611

Note: Peak Sm at 0 EFPD
This data is available on the OAC

Img 36

Chg 16

Enclosure 4.3 - Table 6.3.A
Integral Rod Worth in Overlap
HZP, No Xenon

Unit 1 Cycle 21

Control Bank Position Steps Withdrawn *				4 EFPD	100 EFPD	200 EFPD	300 EFPD	400 EFPD
				0 - 50 EFPD	51 - 150 EFPD	151 - 250 EFPD	251 - 350 EFPD	351 - EOW
Bk A	Bk B	Bk C	Bk D	IRW (PCM)	IRW (PCM)	IRW (PCM)	IRW (PCM)	IRW (PCM)
226	226	226	226	0	0	0	0	0
226	226	226	225	2	1	2	2	3
226	226	226	220	14	8	9	13	18
226	226	226	215	26	15	17	24	33
226	226	226	210	39	22	25	35	49
226	226	226	205	63	41	47	63	84
226	226	226	200	88	59	68	91	119
226	226	226	195	113	77	90	120	155
226	226	226	190	138	95	111	148	190
226	226	226	185	161	117	136	179	225
226	226	226	180	184	138	161	209	259
226	226	226	175	207	160	186	240	294
226	226	226	170	230	181	211	271	329
226	226	226	165	250	202	235	296	355
226	226	226	160	270	223	258	322	381
226	226	226	155	290	245	281	347	407
226	226	226	150	311	266	305	373	433
226	226	226	145	327	286	325	392	450
226	226	226	140	344	306	345	412	467
226	226	226	135	361	326	366	431	484
226	226	226	130	378	346	386	450	501
226	226	226	125	393	364	404	465	512
226	226	226	120	407	383	421	479	522
226	226	226	116	418	398	435	490	531
226	226	226	110	433	418	454	504	540
226	226	221	105	454	438	473	523	561
226	226	216	100	475	459	492	542	583
226	226	211	95	514	491	527	584	637
226	226	206	90	553	524	562	627	692
226	226	201	85	593	557	596	670	747

NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

Chg AC

Enclosure 4.3 - Table 6.3.A
Integral Rod Worth in Overlap
HZP, No Xenon

Unit 1 Cycle 21

Control Bank Position Steps Withdrawn *				4 EFPD	100 EFPD	200 EFPD	300 EFPD	400 EFPD
				0 - 50 EFPD	51 - 150 EFPD	151 - 250 EFPD	251 - 350 EFPD	351 - EOW
				IRW	IRW	IRW	IRW	IRW
Bk A	Bk B	Bk C	Bk D	(PCM)	(PCM)	(PCM)	(PCM)	(PCM)
226	226	196	80	632	589	631	712	801
226	226	191	75	670	626	672	762	862
226	226	186	70	707	664	713	812	923
226	226	181	65	745	701	754	862	984
226	226	176	60	782	739	795	911	1045
226	226	171	55	819	777	836	957	1097
226	226	166	50	856	816	878	1004	1148
226	226	161	45	893	855	919	1050	1200
226	226	156	40	930	894	961	1096	1251
226	226	151	35	969	934	1002	1138	1295
226	226	146	30	1008	974	1043	1181	1338
226	226	141	25	1047	1014	1084	1224	1381
226	226	136	20	1086	1054	1125	1266	1425
226	226	131	15	1124	1091	1162	1302	1457
226	226	126	10	1161	1129	1199	1338	1489
226	226	121	5	1198	1167	1236	1374	1522
226	226	116	0	1235	1205	1273	1410	1554
226	226	110	0	1269	1246	1312	1446	1583
226	221	105	0	1300	1282	1346	1477	1611
226	216	100	0	1330	1318	1380	1508	1639
226	211	95	0	1367	1360	1420	1547	1682
226	206	90	0	1404	1402	1461	1587	1725
226	201	85	0	1441	1444	1501	1627	1769
226	196	80	0	1477	1486	1541	1666	1812
226	191	75	0	1523	1534	1589	1712	1859
226	186	70	0	1569	1583	1636	1758	1907
226	181	65	0	1614	1632	1683	1804	1954
226	176	60	0	1660	1680	1730	1850	2002
226	171	55	0	1719	1732	1781	1897	2044
226	166	50	0	1778	1784	1831	1944	2087

*NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

UNIT 1

Enclosure 4.3 - Table 6.3.A
Integral Rod Worth in Overlap
HZP, No Xenon

Chg AG

Unit 1 Cycle 21

Control Bank Position Steps Withdrawn *				4 EFPD 0 - 50 EFPD IRW (PCM)	100 EFPD 51 - 150 EFPD IRW (PCM)	200 EFPD 151 - 250 EFPD IRW (PCM)	300 EFPD 251 - 350 EFPD IRW (PCM)	400 EFPD 351 - EOW IRW (PCM)
Bk A	Bk B	Bk C	Bk D					
226	161	45	0	1836	1837	1881	1991	2130
226	156	40	0	1895	1889	1932	2038	2172
226	151	35	0	1954	1933	1974	2076	2203
226	146	30	0	2013	1978	2016	2114	2234
226	141	25	0	2072	2022	2058	2151	2265
226	136	20	0	2131	2066	2100	2189	2295
226	131	15	0	2168	2097	2127	2212	2312
226	126	10	0	2205	2127	2155	2235	2329
226	121	5	0	2241	2158	2183	2257	2346
226	116	0	0	2278	2188	2210	2280	2363
226	110	0	0	2300	2213	2233	2297	2375
221	105	0	0	2323	2236	2255	2317	2396
216	100	0	0	2347	2260	2276	2337	2416
211	95	0	0	2379	2291	2309	2374	2460
[illegible]	90	0	0	2412	2323	2342	2411	2504
[illegible]	85	0	0	2445	2355	2375	2448	2548
[illegible]6	80	0	0	2477	2387	2407	2485	2592
191	75	0	0	2510	2422	2445	2527	2639
186	70	0	0	2542	2457	2483	2569	2686
181	65	0	0	2574	2493	2521	2611	2732
176	60	0	0	2606	2528	2558	2653	2779
171	55	0	0	2640	2565	2596	2691	2816
166	50	0	0	2674	2601	2634	2730	2853
161	45	0	0	2708	2638	2673	2768	2890
156	40	0	0	2742	2675	2711	2806	2928
151	35	0	0	2774	2710	2746	2839	2955
146	30	0	0	2807	2746	2781	2871	2982
141	25	0	0	2839	2782	2816	2903	3008
136	20	0	0	2871	2817	2852	2936	3035
131	15	0	0	2895	2848	2880	2959	3051

*NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

UNIT

UNIT 1

Enclosure 4.3 - Table 6.3.A
Integral Rod Worth in Overlap
HZP, No Xenon

Chg 40

Unit 1 Cycle 21

Control Bank Position Steps Withdrawn *				4 EFPD 0 - 50 EFPD IRW (PCM)	100 EFPD 51 - 150 EFPD IRW (PCM)	200 EFPD 151 - 250 EFPD IRW (PCM)	300 EFPD 251 - 350 EFPD IRW (PCM)	400 EFPD 351 - EOW IRW (PCM)
Bk A	Bk B	Bk C	Bk D					
126	10	0	0	2920	2878	2908	2981	3067
121	5	0	0	2944	2909	2937	3004	3083
116	0	0	0	2969	2939	2965	3027	3098
110	0	0	0	2988	2970	2993	3047	3110
105	0	0	0	3003	2994	3014	3060	3118
100	0	0	0	3018	3018	3035	3074	3126
95	0	0	0	3030	3039	3052	3084	3130
90	0	0	0	3042	3060	3069	3093	3134
85	0	0	0	3054	3081	3087	3103	3139
80	0	0	0	3066	3102	3104	3112	3143
75	0	0	0	3074	3117	3115	3117	3145
70	0	0	0	3082	3131	3126	3123	3147
65	0	0	0	3090	3145	3137	3128	3149
60	0	0	0	3099	3160	3148	3133	3151
	0	0	0	3103	3167	3153	3135	3152
	0	0	0	3108	3174	3159	3138	3153
	0	0	0	3112	3182	3164	3140	3154
40	0	0	0	3117	3189	3170	3143	3155
35	0	0	0	3119	3192	3172	3144	3155
30	0	0	0	3121	3195	3174	3145	3156
25	0	0	0	3124	3198	3176	3146	3156
20	0	0	0	3126	3201	3179	3147	3156
15	0	0	0	3127	3202	3179	3147	3156
10	0	0	0	3128	3203	3180	3147	3157
5	0	0	0	3129	3204	3180	3148	3157
0	0	0	0	3130	3205	3181	3148	3157

*NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

UNIT

UNIT 1

Enclosure 4.3 - Table 6.3.A
Integral Rod Worth in Overlap
HZP, No Xenon

Chg AG

Unit 1 Cycle 21

Control Bank Position	Shutdown Bank Position Steps Withdrawn * SD E	SD D	SD C	SD B	SD A	4 EFPD 0 - 50 EFPD IRW (PCM)	100 EFPD 51 - 150 EFPD IRW (PCM)	200 EFPD 151 - 250 EFPD IRW (PCM)	300 EFPD 251 - 350 EFPD IRW (PCM)	400 EFPD 351 - EOW IRW (PCM)
226	226	226	226	226	226	0	0	0	0	0
0	226	226	226	226	226	3130	3205	3181	3148	3157
0	0	226	226	226	226	3985	4047	3973	3911	3907
0	0	0	226	226	226	4497	4671	4658	4614	4623
0	0	0	0	226	226	5047	5361	5438	5429	5463
0	0	0	0	0	226	6289	6430	6420	6370	6394
0	0	0	0	0	0	6402	6563	6568	6525	6562

*NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

UNIT

UNIT 1

Chg AG

Enclosure 4.3 - Table 6.3.B
Integral Rod Worth in Overlap
HZP, Peak Xenon

Unit 1 Cycle21

Control Bank Position Steps Withdrawn *				4 EFPD	100 EFPD	200 EFPD	300 EFPD	400 EFPD
				0 - 50 EFPD	51 - 150 EFPD	151 - 250 EFPD	251 - 350 EFPD	351 - EOW
				IRW	IRW	IRW	IRW	IRW
Bk A	Bk B	Bk C	Bk D	(PCM)	(PCM)	(PCM)	(PCM)	(PCM)
226	226	226	226	0	0	0	0	0
226	226	226	225	3	2	3	3	4
226	226	226	220	19	15	16	19	23
226	226	226	215	34	27	29	34	42
226	226	226	210	49	39	42	50	61
226	226	226	205	81	69	75	88	103
226	226	226	200	113	99	109	126	145
226	226	226	195	144	129	142	163	187
226	226	226	190	176	159	175	201	229
226	226	226	185	203	188	209	238	267
226	226	226	180	231	218	243	274	305
226	226	226	175	259	248	276	311	343
226	226	226	170	286	278	310	347	381
[illegible]6	226	226	165	308	302	336	374	407
[illegible]3	226	226	160	330	326	362	400	432
226	226	226	155	352	350	389	427	458
226	226	226	150	373	375	415	453	484
226	226	226	145	390	393	434	470	499
226	226	226	140	407	412	452	487	514
226	226	226	135	423	430	471	504	529
226	226	226	130	440	449	489	521	544
226	226	226	125	453	463	502	532	553
226	226	226	120	466	478	515	542	561
226	226	226	116	477	489	525	550	568
226	226	226	110	490	503	536	559	574
226	226	221	105	512	523	556	580	599
226	226	216	100	534	543	575	601	623
226	226	211	95	580	587	625	658	689
226	226	206	90	627	630	674	715	755
226	226	201	85	674	674	723	773	821

*NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

UNIT

Enclosure 4.3 - Table 6.3.B
Integral Rod Worth in Overlap
HZP, Peak Xenon

Chg AG

Unit 1 Cycle21

Control Bank Position Steps Withdrawn *				4 EFPD 0 - 50 EFPD IRW (PCM)	100 EFPD 51 - 150 EFPD IRW (PCM)	200 EFPD 151 - 250 EFPD IRW (PCM)	300 EFPD 251 - 350 EFPD IRW (PCM)	400 EFPD 351 - EOW IRW (PCM)
Bk A	Bk B	Bk C	Bk D					
226	226	196	80	720	718	773	830	887
226	226	191	75	761	763	827	894	958
226	226	186	70	802	808	881	957	1028
226	226	181	65	843	854	935	1021	1099
226	226	176	60	884	899	990	1084	1169
226	226	171	55	923	942	1038	1137	1225
226	226	166	50	961	984	1085	1189	1280
226	226	161	45	1000	1027	1133	1242	1336
226	226	156	40	1039	1070	1181	1295	1392
226	226	151	35	1079	1111	1224	1338	1433
226	226	146	30	1119	1153	1267	1381	1475
226	226	141	25	1159	1194	1310	1424	1516
226	226	136	20	1200	1236	1354	1467	1558
[illegible]	226	131	15	1236	1271	1388	1498	1584
[illegible]	226	126	10	1272	1307	1423	1529	1610
[illegible]26	226	121	5	1308	1342	1457	1561	1636
226	226	116	0	1344	1377	1492	1592	1662
226	226	110	0	1375	1410	1524	1618	1682
226	221	105	0	1403	1439	1553	1645	1709
226	216	100	0	1431	1468	1582	1673	1736
226	211	95	0	1467	1506	1624	1721	1792
226	206	90	0	1502	1544	1666	1769	1847
226	201	85	0	1537	1582	1708	1817	1903
226	196	80	0	1572	1620	1750	1866	1958
226	191	75	0	1616	1666	1799	1918	2015
226	186	70	0	1660	1713	1847	1970	2072
226	181	65	0	1703	1759	1895	2022	2129
226	176	60	0	1747	1806	1944	2074	2186
226	171	55	0	1805	1862	1996	2121	2230
226	166	50	0	1863	1919	2047	2168	2275

*NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

Chg 46

Enclosure 4.3 - Table 6.3.B
Integral Rod Worth in Overlap
HZP, Peak Xenon

Unit 1 Cycle21

Control Bank Position Steps Withdrawn *				4 EFPD	100 EFPD	200 EFPD	300 EFPD	400 EFPD
				0 - 50 EFPD	51 - 150 EFPD	151 - 250 EFPD	251 - 350 EFPD	351 - EOW
				IRW	IRW	IRW	IRW	IRW
Bk A	Bk B	Bk C	Bk D	(PCM)	(PCM)	(PCM)	(PCM)	(PCM)
226	161	45	0	1921	1975	2099	2215	2320
226	156	40	0	1979	2032	2151	2262	2364
226	151	35	0	2043	2085	2195	2298	2395
226	146	30	0	2106	2139	2239	2333	2425
226	141	25	0	2170	2193	2282	2368	2455
226	136	20	0	2233	2246	2326	2404	2485
226	131	15	0	2275	2279	2352	2423	2501
226	126	10	0	2316	2313	2378	2443	2516
226	121	5	0	2357	2346	2404	2463	2532
226	116	0	0	2398	2379	2430	2482	2548
226	110	0	0	2421	2401	2448	2496	2558
221	105	0	0	2445	2424	2469	2516	2579
216	100	0	0	2469	2447	2490	2536	2601
211	95	0	0	2503	2483	2529	2578	2646
[illegible]	90	0	0	2536	2518	2567	2620	2692
[illegible]	85	0	0	2570	2553	2606	2662	2738
96	80	0	0	2603	2588	2644	2704	2783
191	75	0	0	2637	2626	2685	2748	2828
186	70	0	0	2670	2664	2727	2791	2873
181	65	0	0	2704	2702	2768	2835	2917
176	60	0	0	2738	2740	2809	2878	2962
171	55	0	0	2773	2778	2846	2913	2993
166	50	0	0	2808	2816	2882	2947	3025
161	45	0	0	2843	2854	2918	2981	3056
156	40	0	0	2878	2892	2955	3015	3088
151	35	0	0	2908	2923	2983	3038	3107
146	30	0	0	2938	2955	3010	3061	3126
141	25	0	0	2968	2987	3038	3084	3145
136	20	0	0	2998	3019	3066	3107	3164
131	15	0	0	3017	3039	3083	3120	3174

*NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

UNIT 1

Chg AG

Enclosure 4.3 - Table 6.3.B
Integral Rod Worth in Overlap
HZP, Peak Xenon

Unit 1 Cycle21

Control Bank Position Steps Withdrawn *				4 EFPD 0 - 50 EFPD IRW (PCM)	100 EFPD 51 - 150 EFPD IRW (PCM)	200 EFPD 151 - 250 EFPD IRW (PCM)	300 EFPD 251 - 350 EFPD IRW (PCM)	400 EFPD 351 - EOW IRW (PCM)
Bk A	Bk B	Bk C	Bk D					
126	10	0	0	3035	3060	3100	3132	3184
121	5	0	0	3054	3081	3117	3145	3193
116	0	0	0	3072	3101	3134	3158	3203
110	0	0	0	3085	3118	3147	3167	3210
105	0	0	0	3094	3129	3156	3173	3213
100	0	0	0	3103	3140	3165	3179	3217
95	0	0	0	3110	3149	3170	3182	3219
90	0	0	0	3117	3157	3176	3185	3221
85	0	0	0	3123	3165	3181	3189	3224
80	0	0	0	3130	3174	3187	3192	3226
75	0	0	0	3134	3179	3190	3194	3226
70	0	0	0	3138	3183	3193	3195	3227
65	0	0	0	3142	3188	3196	3196	3228
60	0	0	0	3146	3193	3198	3198	3229
[illegible]	0	0	0	3149	3196	3200	3199	3229
[illegible]	0	0	0	3151	3199	3201	3199	3229
[illegible]	0	0	0	3153	3201	3203	3200	3230
40	0	0	0	3156	3204	3204	3201	3230
35	0	0	0	3157	3205	3205	3201	3230
30	0	0	0	3158	3206	3205	3201	3230
25	0	0	0	3160	3208	3206	3201	3230
20	0	0	0	3161	3209	3207	3202	3230
15	0	0	0	3161	3209	3207	3202	3230
10	0	0	0	3162	3210	3207	3202	3230
5	0	0	0	3162	3210	3207	3202	3231
0	0	0	0	3163	3211	3208	3202	3231

NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

UNIT

Enclosure 4.3 - Table 6.3.B
Integral Rod Worth in Overlap
HZP, Peak Xenon

Chg AG

Unit 1 Cycle21

Control Bank Position	Shutdown Bank Position Steps Withdrawn * SD E	SD D	SD C	SD B	SD A	4 EFPD 0 - 50 EFPD IRW (PCM)	100 EFPD 51 - 150 EFPD IRW (PCM)	200 EFPD 151 - 250 EFPD IRW (PCM)	300 EFPD 251 - 350 EFPD IRW (PCM)	400 EFPD 351 - EOW IRW (PCM)
226	226	226	226	226	226	0	0	0	0	0
0	226	226	226	226	226	3163	3211	3208	3202	3231
0	0	226	226	226	226	3925	3955	3916	3890	3906
0	0	0	226	226	226	4506	4639	4652	4643	4674
0	0	0	0	226	226	5152	5424	5515	5539	5598
0	0	0	0	0	226	6427	6542	6544	6523	6567
0	0	0	0	0	0	6612	6749	6762	6749	6813

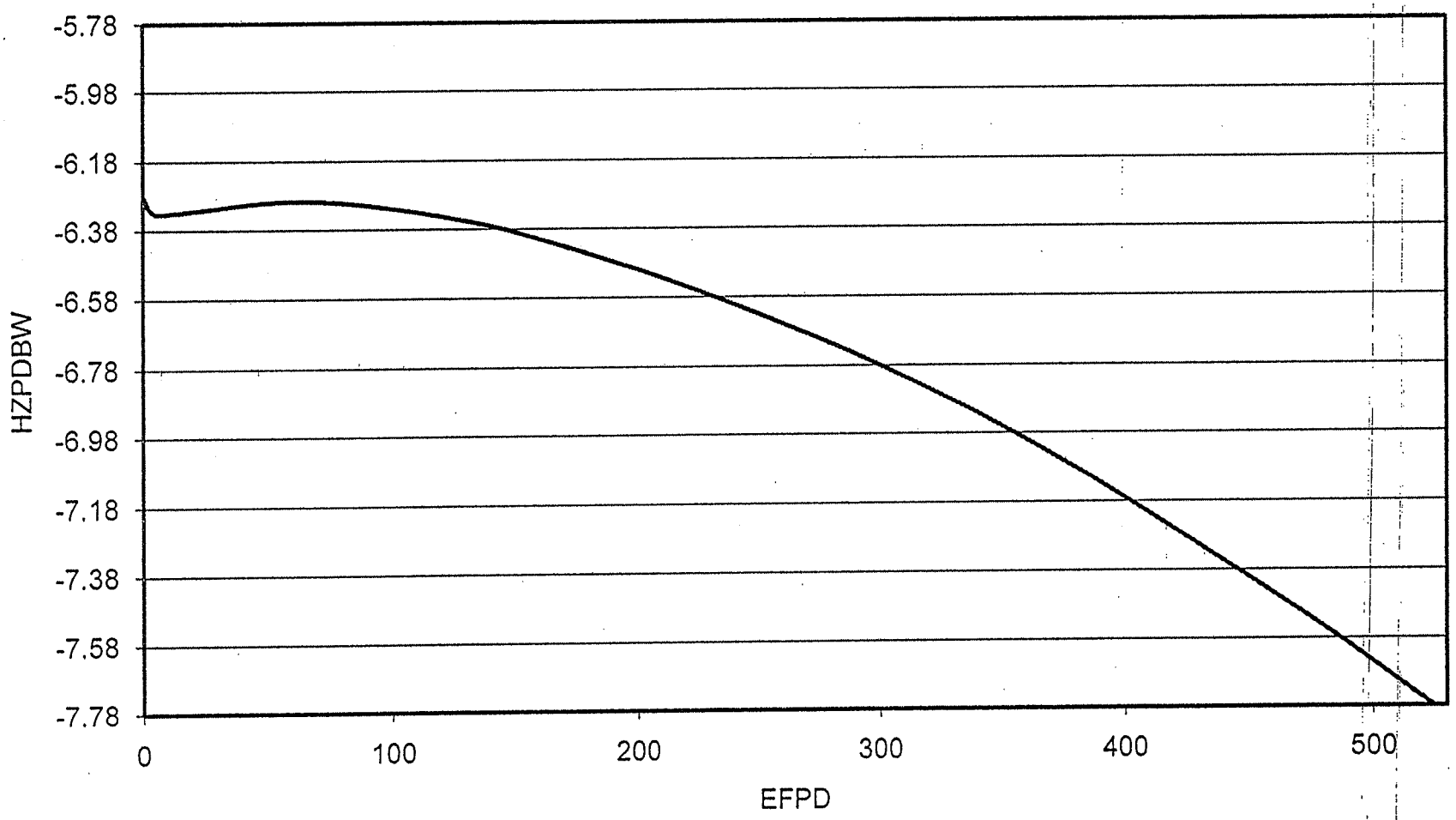
NOTE: For actual ALL Rods out Overlap Data, see Enclosure 4.3, Section 1.13 of the Data Book

Shutdown Fission Product Correction

Time (hours)	Time (days)	Correction (ppm)	Time (hours)	Time (days)	Correction (ppm)	Time (hours)	Time (days)	Correction (ppm)
0	0.0	0	96	4.0	37	192	8.0	46
8	0.3	3	104	4.3	38	200	8.3	47
16	0.7	6	112	4.7	39	208	8.7	47
24	1.0	10	120	5.0	39	216	9.0	48
32	1.3	14	128	5.3	40	224	9.3	49
40	1.7	18	136	5.7	41	232	9.7	49
48	2.0	23	144	6.0	41	240	10.0	50
56	2.3	27	152	6.3	42	480	20.0	53
64	2.7	31	160	6.7	43	720	30.0	56
72	3.0	35	168	7.0	43	960	40.0	56
80	3.3	35	176	7.3	44	1200	50.0	56
88	3.7	36	184	7.7	45			

UNIT 1

OP/1/A/0100/022
Enclosure 4.3 - Graph 6.8
DIFFERENTIAL BORON WORTH
HZP, ARO, No Xe, EQ Sm
Unit 1 Cycle 21



EFPD	0	4	12	25	50	75	100	125	150	200	250	300	350	400	450	485	509	524
DBW	-6.28	-6.33	-6.33	-6.32	-6.30	-6.30	-6.32	-6.35	-6.39	-6.50	-6.63	-6.78	-6.96	-7.17	-7.40	-7.57	-7.70	-7.78

This data is also available on the OAC

UNIT 1

Chg 46

McGuire 1 Cycle 21

Xenon and Samarium Worths

Burnup (EFPD)	HFP Equilibrium Xenon (pcm)	HZP Peak Xenon (pcm)	HFP Equilibrium Samarium (pcm)
0	--	-	748
4	2523	3860	564
12	2519	3850	654
25	2523	3853	753
50	2534	3865	792
75	2548	3880	809
100	2564	3896	825
125	2580	3913	841
150	2597	3932	857
200	2632	3983	887
250	2668	4052	914
300	2706	4144	940
350	2744	4253	963
400	2783	4372	985
450	2822	4499	1006
485	2849	4603	1019
509	2868	4691	1028
524	2879	4738	1033

JPM A1b RO

Facility:	McGuire	Task No.:	217MFW002
Task Title:	Determine Boric Acid Addition to FWST	JPM No.:	2010 Admin - JPM A1b RO
K/A Reference:	GK/A 2.1.25 (3.9/4.2)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- The plant was at 100% power when a leak developed on the FWST.
- FWST Level dropped to 440 inches before leak was isolated.
- Enclosure 4.4, "FWST Makeup Using the RHT," of OP/1/A/6200/014, "Refueling Water System" is in progress and completed through Step 3.9.
- LCO 3.5.4, Refueling Water Storage Tank (RWST), was entered 10 minutes ago.
- Chemistry has provided the following information:
  - BAT Boron Conc. = 7234 ppm
  - RHT Boron Conc.= 1076 ppm
  - FWST Make up Boron Concentration: Use COLR Minimum

Task Standard: The operator will calculate the amount of Boric Acid that must be added from the BAT to refill the FWST is 7,912 gallons +300/-75 gallons.

Required Materials: Calculator

General References: OP/1/A/6200/014, Refueling Water System

McGuire Core Operating Limits Report (Cycle 21)

McGuire U-1 Data Book

OMP 8-2, Component Verification Techniques

Handouts:

Enclosure 4.4 of OP/1/A/6200/014, Refueling Water System, marked up for place-keeping through Step 3.9 as follows:

- Initial Conditions 2.1 -2.3 are initialed.
- Procedure Step 3.1 – Checkbox is checked.
- Procedure Step 3.2 – Left blank (Conditional step).
- Procedure Step 3.3 – initialed, Person Notified: CHEMIST, date/time: present.
- Procedure Step 3.4 – NA, initialed.
- Procedure Step 3.5 – initialed.
- Procedure Step 3.6 – NA, initialed.
- Procedure Step 3.7 – NA, initialed.
- Procedure Step 3.8 – NA, initialed.
- Procedure Step 3.9 – initialed, Person Notified: R.P. TECH, date/time: present.

McGuire 1 Cycle 21 Core Operating Limits Report (Page 26 of 32)

OP/1/A/6100/22, Enclosure 4.3, Curve 7.7, Refueling Water Storage Tank Level (Volume vs. Tank Level)

Initiating Cue: Determine the amount of Boric Acid needed to raise the FWST level to 480" using the RHT in accordance with Step 3.10 of Enclosure 4.4 of OP/1/A/6200/014, "Refueling Water System."

Time Critical Task: NO

Validation Time: 20 minutes

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout all three (3) identified Handout documents, marked up as described.

START TIME: _____

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*1	(Step 3.10) Determine the amount of Boric Acid needed to raise makeup water to the limits specified in the Core Operating Limits Report (COLR).	The operator refers to the COLR, Section 2.13.1 on Page 26 of 32 and determines that the minimum boron concentration to be used in the calculation is 2675 ppm. The operator records **2675** ppm in the first line (Desired Boron Concentration of Addition from COLR) of the Doer Calculation in Step 3.10 of Enclosure 4.4.		
*2	(1st Bullet) Desired Boron Concentration of Addition from COLR + 25 ppmB margin = Desired Boron Concentration	The operator adds an additional 25 ppm and determines Desired Boron Concentration to be 2700 ppm. The operator records **2700** ppm in the 2nd line (Desired Boron Conc) of the Doer Calculation in Step 3.10 of Enclosure 4.4.		
*3	(2nd Bullet) {(Desired Cb) - (RHT Cb)} / (BAT Cb) - (RHT Cb) x {Desired Total Makeup Volume to FWST} = Desired BAT Volume	The operator identifies Desired Cb = **2700** from previous Step and records. The operator recognizes that RHT Cb = **1076** ppm and records (Initial Conditions).		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*3 (CONT'D)		The operator recognizes that BAT Cb = **7234** ppm and records (Initial Conditions). The operator addresses OP/1/A/6100/22, Enclosure 4.3, Curve 7.7, and determines from graph that total makeup volume is 30,000 by comparing 480" volume of 390,000 gallons to the 440" volume of 360,000 gallons. The operator records **30,000 (+1300#)** gallons. The operator calculates the Desired BAT Volume to be added to be **7,912** gallons **+300/-75** gallons. The operator records **7,912** gallons **+300/-75** gallons as the Desired BAT Volume in the Doer Calculation.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2009 Admin - JPM A1b RO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

KEY:

Desired Boron Concentration from COLR + 25 ppmB = Desired Boron Concentration

2675 ppm (From COLR) + 25 ppmB = **2700** ppm

$\frac{\{(\text{Desired Cb}) - (\text{RHT Cb})\}}{(\text{BAT Cb}) - (\text{RHT Cb})} \times \{\text{Desired Total Makeup Volume to FWST}\} = \text{Desired BAT Volume}$

Given:

RHT Cb = **1076** ppm
BAT Cb = **7234** ppm

Desired Total Makeup Volume to FWST = Overflow volume – Present volume
(From Enclosure 4.3, Curve 7.7 of Unit 1 Core Data Book:)
390,000 gallons – 360,000 gallons (440") = **30,000** gallons#

#: If the operator uses develops a "gallons/inch" volume from the information block on Curve 7.7, the operator will determine the makeup volume to be 31,277 gallons.

Volume at 484 inches = 394,089 gallons
Volume at 0 inches = 15,638 gallons

(394,089 gallons – 15,638 gallons)/484 inches = 781.92 gallons/inch

OR

Volume at 455.88 inches = 372,100 gallons
Volume at 0 inches = 15,638 gallons

(372,100 gallons – 15, 638 gallons)/455.88 inches = 781.92 gallons/inch

Therefore, 781.92 gallons/inch x 40 inches = 31,276.80 gallons (This may be used as the makeup volume instead of 30,000 gallons).

If this volume is used, the calculation will result in a Desired BAT Volume below of 8132 gallons

So:

$\frac{\{(\text{Desired Cb})-(\text{RHT Cb})\}}{(\text{BAT Cb})-(\text{RHT Cb})} \times \{\text{Desired Total Makeup Volume to FWST}\} = \text{Desired BAT Volume}$

$\frac{\{(2700)-(1076)\}}{(7234)-(1076)} \times \{30000\} = \text{Desired BAT Volume}$

$\frac{\{1624\}}{6158} \times \{30000\} = \text{Desired BAT Volume}$

.26 x {30000} = Desired BAT Volume or **7,912** gallons **+300/-75** gallons

OR between **7,837** and **8212** gallons

INITIAL CONDITIONS:

- The plant was at 100% power when a leak developed on the FWST.
- FWST Level dropped to 440 inches before leak was isolated.
- Enclosure 4.4, "FWST Makeup Using the RHT," of OP/1/A/6200/014, "Refueling Water System" is in progress and completed through Step 3.9.
- LCO 3.5.4, Refueling Water Storage Tank (RWST), was entered 10 minutes ago.
- Chemistry has provided the following information:
  - BAT Boron Conc. = 7234 ppm
  - RHT Boron Conc.= 1076 ppm
  - FWST Make up Boron Concentration: Use COLR Minimum

INITIATING CUE:

Determine the amount of Boric Acid needed to raise the FWST level to 480" using the RHT in accordance with Step 3.10 of Enclosure 4.4 of OP/1/A/6200/014, "Refueling Water System."

1. Limits and Precautions

✓ 1.1 Maximum FWST Tech Spec temperature limit is 100°F.

✓ 1.2 Minimum FWST Tech Spec temperature limit is 70°F.

✓ 1.3 All electrically operated engineered safeguard valves must be operated electrically after any manual operation.

✓ 1.4 Maximum FWST level is 483 inches unless FWST overflow is required. (Overflows to SFP at 484 inches)

✓ 1.5 NC System sampling during makeup to the FWST is prohibited.

2. Initial Conditions

SLM 2.1 Boron concentration control systems available per OP/1/A/6150/009 (Boron Concentration Control).

SLM 2.2 NB System aligned per OP/0/A/6200/003 (Boron Recycle System).

SLM 2.3 NI check valve test header alignment to FWST secured.

3. Procedure

☑ 3.1 Evaluate all outstanding R&Rs that may impact performance of this procedure.

____ 3.2 **IF** Emergency Boration Flow is needed, secure makeup to FWST.

SLM 3.3 Notify Chemistry to sample RHT.

Kevin Hodges ____/____
Person Notified Date Time

N/A per SLM 3.4 **IF** RHT is unacceptable for use, exit this enclosure.

SLM 3.5 Ensure that a pre-job briefing has been performed that includes discussion of reactivity management concerns with this procedure.
SRO

N/A per SLM 3.6 **IF** FWST in Recirculation per Enclosure 4.1 (FWST Recirculation Using 1A (1B) FWST Recirc Pump), stop the following:

____ • 1A FWST Recirc Pump
____ • 1B FWST Recirc Pump

N/A per SLM 3.7 **IF** FWST in Recirculation with #1 FWST Pump, secure per Enclosure 4.6 (FWST Recirculation Using Unit 1 FWST Pump).

N/A per 3.8 **IF** FWST in Purification, secure per Enclosure 4.5 (FWST Purification).

SLM 3.9 Notify RP of change in FW System alignment. {PIP M97-0680}

Mike Cline _____/_____
Person Notified Date Time

IV ____ 3.10 Determine amount of Boric Acid needed to raise makeup water to limits specified per Core Operating Limits Report (COLR): {PIP 2-M98-0017}

- Desired Boron Concentration of Addition from COLR + 25 ppmB margin = Desired Boron Conc
- $\left(\frac{(\text{Desired Boron Conc})-(\text{RHT Boron Conc})}{(\text{BAT Boron Conc})-(\text{RHT Boron Conc})}\right)\left(\begin{matrix}\text{Desired Total Makeup}\\ \text{Volume To FWST}\end{matrix}\right)$ = Desired BAT Volume

Doer Calculation

(_____ppmB) + 25 ppmB = _____ppmB

$\left(\frac{(\quad\text{ppmB})-(\quad\text{ppmB})}{(\quad\text{ppmB})-(\quad\text{ppmB})}\right)\left(\quad\text{gal}\right)$ = _____gal

IV Calculation

(_____ppmB) + 25 ppmB = _____ppmB

$\left(\frac{(\quad\text{ppmB})-(\quad\text{ppmB})}{(\quad\text{ppmB})-(\quad\text{ppmB})}\right)\left(\quad\text{gal}\right)$ = _____gal

☐ 3.11 Record initial FWST level on Attachment 1.

____ 3.12 **IF** amount of boric acid to be added from Step 3.10 is zero, perform the following:

____ 3.12.1 Ensure NC System Makeup aligned for auto makeup per OP/1/A/6150/009 (Boron Concentration Control).

____ 3.12.2 Go to Step 3.29.

3.13 Add amount of Boric Acid calculated in Step 3.10 to FWST from Blender as follows:

3.13.1 Ensure closed one of the following:

_____ • 1NI-96B (NI Chk Test Hdr C/I Outside)

OR

_____ • 1NI-99 (Unit 1 NI Check Valve Test Hdr To FWST Isol)

3.13.2 Ensure locked closed, either:

_____ 3.13.2.1 1NS-70 (1A & 1B NS HX Outlet To FWST Throttle)

OR

3.13.2.2 Both of the following:

_____ CV _____ • 1NS-8 (1B NS HX Outlet To FWST Isol)

_____ CV _____ • 1NS-25 (1A NS HX Outlet To FWST Isol)

☐ 3.13.3 Ensure closed 1NB-5 (Unit 1 Boric Acid Blender To NB System Isol). (AB 733'+6, KK-51, S End U1 VCT Hallway)

3.13.4 Open:

_____ • 1NV-172 (Unit 1 Boric Acid Blender To NB & FW Isol)
_____ • 1NV-174 (Unit 1 Boric Acid Blender To FWST Isol)

_____ 3.13.5 Select "MANUAL" on "NC Sys M/U Controller".

3.13.6 Ensure in "STOP":

_____ • 1A Rx M/U Water Pump
_____ • 1B Rx M/U Water Pump

_____ 3.13.7 **IF** both BA Trans Pumps off, ensure in "AUTO" one of the following:

_____ • 1A BA Trans Pump

OR

_____ • 1B BA Trans Pump

_____ 3.13.8 **IF** VCT is set up for automatic makeup, record current Setpoint(s) (SP) for the following:

_____ • "Rx M/U Water Flow Control": _____ gpm

_____ • "BA Flow Control": _____ gpm

_____ 3.13.9 Place "Rx M/U Water Flow Control" in manual and close.

NOTE: Total Makeup Flow and Boric Acid Flow Counters must be reset for NC Makeup System to operate.

_____ 3.14 Ensure the following reset to zero:

☐ Total Make Up Flow Counter
☐ Boric Acid Flow Counter

_____ 3.15 Set Total Makeup Flow Counter to desired value.

_____ 3.16 Set Boric Acid Flow Counter to desired value.

NOTE: Valve leakage may occur causing input to the VCT.

☐ 3.17 Monitor the following parameters:

- SM Pressure
- Reactor Power
- Tavg
- Rod Motion

_____ 3.18 **IF** plant parameters indicate other than expected response, notify CRS.

NOTE: FWST level should be maintained less than 481 inches unless FWST overflow is required. (OAC Hi level alarm)

_____ 3.19 Momentarily select "START" on "NC System Make Up".

☐ 3.20 Check lit "NC System Makeup" red light.

_____ 3.21 **IF** in "AUTO", ensure BA Trans Pump starts.

_____ 3.22 Place "BA Flow Control" in manual and adjust to desired flow rate.

_____ 3.23 **HOLD** until desired amount of boric acid added then perform the following:

_____ 3.23.1 **IF** in "AUTO", ensure off:

_____ • 1A BA Trans Pump
_____ • 1B BA Trans Pump

3.23.2 Flush flow path for 5 minutes as follows:

_____ 3.23.2.1 Select "OFF" on "NC Sys M/U Controller".

_____ 3.23.2.2 Close "BA Flow Control".

_____ 3.23.2.3 Open "Rx M/U Water Flow Control".

3.23.2.4 Select "STOP" on the following:

_____ • 1A BA Trans Pump
_____ • 1B BA Trans Pump

3.23.2.5 Select "AUTO" on one of the following:

_____ • 1A Rx M/U Water Pump

OR

_____ • 1B Rx M/U Water Pump

_____ 3.23.2.6 Select "MANUAL" on "NC System M/U Controller".

_____ 3.23.2.7 Momentarily select "START" on "NC System Make Up".

☐ 3.23.2.8 Check lit "NC System Makeup" red light.

_____ 3.23.2.9 Ensure Rx M/U Water Pump starts.

_____ 3.23.2.10 **HOLD** until flush complete then select "OFF" on "NC System Makeup".

3.24 Place in auto:

_____ • "BA Flow Control"
_____ • "Rx M/U Water Flow control"

3.25 Close:

_____ • 1NV-172 (Unit 1 Boric Acid Blender To NB & FW Isol)
_____ • 1NV-174 (Unit 1 Boric Acid Blender To FWST Isol)

_____ 3.26 **IF** BAT to be in recirc, perform the following:

3.26.1 Select "START" on one of the following:

_____ • 1A BA Trans Pump

OR

_____ • 1B BA Trans Pump

☐ 3.26.2 Go to Step 3.28.

3.27 Select "AUTO" on one of the following:

_____ • 1A BA Trans Pump

OR

_____ • 1B BA Trans Pump

3.28 Return the following controllers to values recorded in Step 3.13.8:

_____ • BA Flow Control (+/- 0.2 gpm)
_____ • Rx M/U Water Flow Control (+/- 0.2 gpm)

_____ 3.29 Select "AUTO" on "NC Sys M/U Controller".

_____ 3.30 Momentarily select "START" on "NC System Make Up".

☐ 3.31 Check lit "NC System Makeup" red light.

3.32 Open:

_____ • 1FW-22 (NB To Unit 1 FW Pump Disch Hdr Isol)
_____ • 1FW-24 (Unit 1 FW Pump Disch To FWST Isol)

☐ 3.33 Check closed 1FW-2 (Unit 1 FWST To Refueling Cavity Fill & Drn).

_____ 3.34 Notify Radwaste Chemistry to perform the following:

_____ _____/_____
Person Notified Date Time

3.34.1 Operate the following as required:

☐ 1NB-126 (NB Evap Feed Pumps RHT Contents Transfer Isol)
☐ 1NB-127 (NB Evap Feed Pumps Disch Isol To U1 & U2 FWST)

☐ 3.34.2 Operate both Recycle Evaporator Feed Pumps to complete makeup from RHT.

_____ 3.35 **HOLD** until FWST is at desired level.

_____ 3.36 Notify Radwaste Chemistry to operate Recycle Evaporator Feed Pumps as desired.

_____ _____/_____
Person Notified Date Time

3.37 Close:

_____ • 1FW-22 (NB To Unit 1 FW Pump Disch Hdr Isol)
_____ • 1FW-24 (Unit 1 FW Pump Disch To FWST Isol)

_____ 3.38 Notify Radwaste Chemistry to close:

_____ _____/_____
Person Notified Date Time

☐ 1NB-126 (NB Evap Feed Pumps RHT Contents Transfer Isol)
☐ 1NB-127 (NB Evap Feed Pumps Disch Isol To U1 & U2 FWST)

☐ 3.39 Record final FWST level on Attachment 1.

☐ 3.40 Record in Auto Log final blender contents, either:

☐ Rx Makeup Water

OR

☐ Blend

OR

☐ Boric Acid

☐ 3.41 Place routing stamp in remarks section of cover sheet, check (✓) "Engineering" and fill in "Attachment 1 only".

_____ 3.42 **IF** desired to align for automatic NC System Makeup, align per OP/1/A/6150/009 (Boron Concentration Control).

_____ 3.43 **IF** FWST Recirc Pump stopped in Step 3.6, start one of the following:

_____ • 1A FWST Recirc Pump

OR

_____ • 1B FWST Recirc Pump

_____ 3.44 **IF** FWST Recirculation with #1 FWST Pump is desired, place FWST in Recirculation per Enclosure 4.6 (FWST Recirculation Using Unit 1 FWST Pump).

_____ 3.45 **IF** FWST Purification is desired, place FWST in Purification per Enclosure 4.5 (FWST Purification).

Attachment 1

FWST Makeup Data

Initial FWST Level _____ inches Date _____ Time _____

Final FWST Level _____ inches Date _____ Time _____

Data Collected By _____

End of Enclosure

2.11 RCS Pressure, Temperature and Flow Limits for DNB (TS 3.4.1)

2.11.1 The RCS pressure, temperature and flow limits for DNB are shown in Table 4.

2.12 Accumulators (TS 3.5.1)

2.12.1 Boron concentration limits during MODES 1 and 2, and MODE 3 with RCS pressure >1000 psi:

Parameter	Limit
Accumulator **minimum** boron concentration.	2,475 ppm
Accumulator **maximum** boron concentration.	2,875 ppm

2.13 Refueling Water Storage Tank - RWST (TS 3.5.4)

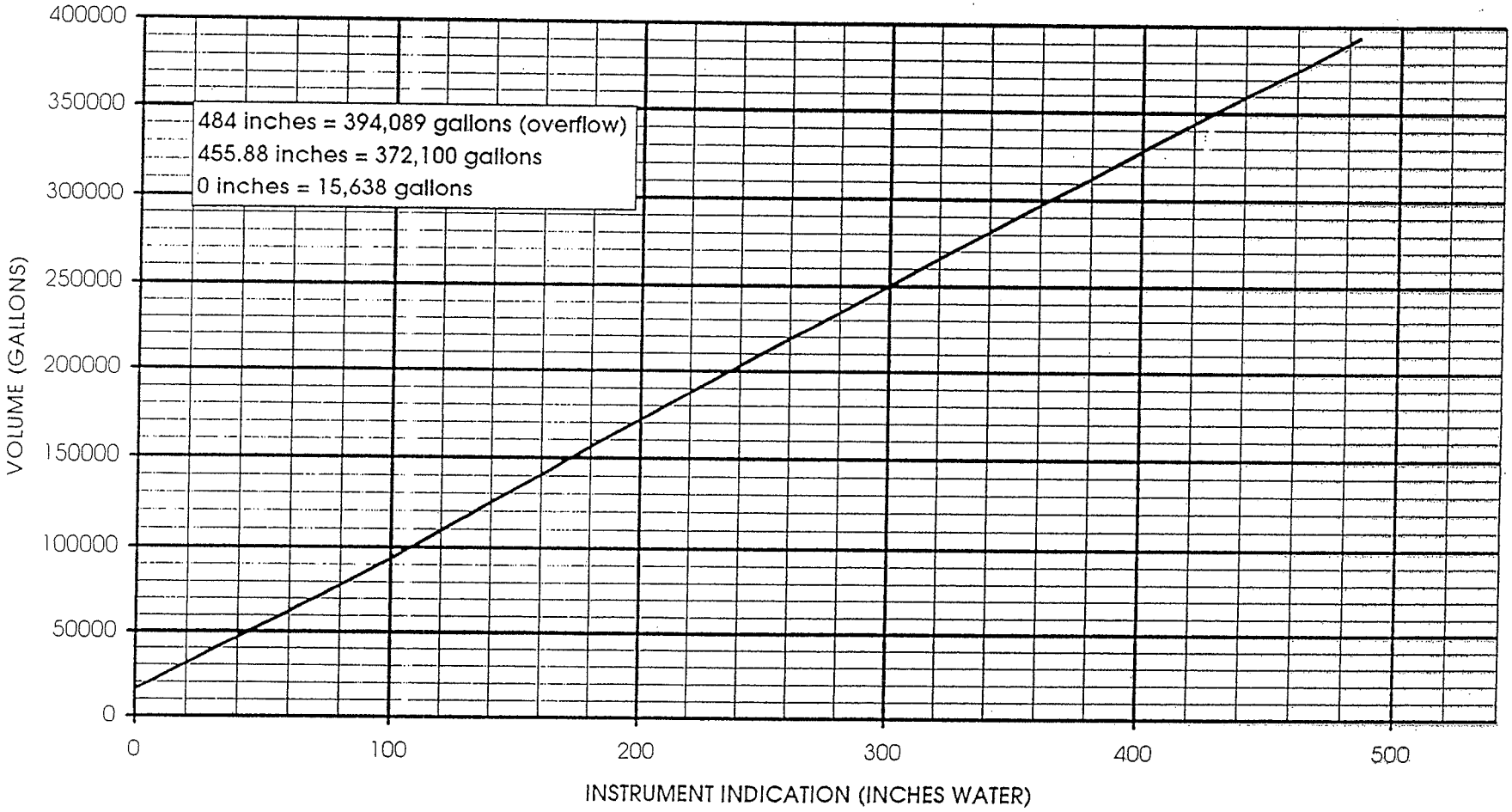
2.13.1 Boron concentration limits during MODES 1, 2, 3, and 4:

Parameter	Limit
RWST minimum boron concentration.	2,675 ppm
RWST maximum boron concentration.	2,875 ppm

CURVE 7.7

REFUELING WATER STORAGE TANK LEVEL

(VOLUME vs. TANK LEVEL)



This data is also available on the OAC.

JPM A1b SRO

Facility:	McGuire	Task No.:	217MFW002
Task Title:	Determine Boric Acid Addition to FWST	JPM No.:	2010 Admin - JPM A1b SRO
K/A Reference:	GK/A 2.1.25 (3.9/4.2)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- The plant was at 100% power when a leak developed on the FWST.
- FWST Level dropped to 440 inches before leak was isolated.
- Enclosure 4.4, "FWST Makeup Using the RHT," of OP/1/A/6200/014, "Refueling Water System" is in progress and completed through Step 3.9.
- LCO 3.5.4, Refueling Water Storage Tank (RWST), was entered 10 minutes ago.
- Chemistry has provided the following information:
  - BAT Boron Conc. = 7234 ppm
  - RHT Boron Conc.= 1076 ppm
  - FWST Make up Boron Concentration: Use COLR Minimum
- The BOP has just completed the Doer Calculation of Step 3.10 of Enclosure 4.4, "FWST Makeup Using the RHT," and has asked you to perform an Independent Verification on the calculation.

Task Standard: The operator will calculate the amount of Boric Acid that must be added from the BAT to refill the FWST is 7,912 gallons +300/-75 gallons, determine that the BOP made two errors in the original calculation, and identify that Technical Specification ACTION C is now applicable.

Required Materials: Calculator

Reference Cart with all identified General References.

General References: OP/1/A/6200/014, Refueling Water System

McGuire Core Operating Limits Report (Cycle 21)

McGuire U-1 Data Book

McGuire Technical Specifications

McGuire Selected Licensee Commitment Manual

OMP 8-2, Component Verification Techniques

Handouts: Enclosure 4.4 of OP/1/A/6200/014, Refueling Water System, marked up for place-keeping and the Doer Calculation of Step 3.10 as follows:

- Initial Conditions 2.1 -2.3 are initialed.
- Procedure Step 3.1 – Box checked.
- Procedure Step 3.2 – Left blank (Conditional step).
- Procedure Step 3.3 – initialed, Person Notified: CHEMIST, date/time: present.
- Procedure Step 3.4 – NA, initialed.
- Procedure Step 3.5 – initialed.
- Procedure Step 3.6 – NA, initialed.
- Procedure Step 3.7 – NA, initialed.
- Procedure Step 3.8 – NA, initialed.
- Procedure Step 3.9 – initialed, Person Notified: R.P. TECH, date/time: present.
- Procedure Step 3.10 – initialed.
- Doer Calculation:

(2875 ppmB + 25 ppmB = 2900 ppmB

$$\{ \frac{(2900\ ppmB) - (1076\ ppmB)}{(7234\ ppmB) - (1076\ ppmB)} \} \{15{,}000\} = 4443\ gal$$

McGuire 1 Cycle 21 Core Operating Limits Report (Page 26 of 32)

McGuire Technical Specifications

OP/1/A/6100/22, Enclosure 4.3, Curve 7.7, Refueling Water Storage Tank Level (Volume vs. Tank Level)

Initiating Cue: Perform the Independent Verification (IV) of the calculation in Step 3.10 of Enclosure 4.4 to confirm the amount of Boric Acid that must be added from the Boric Acid Tank (BAT), in order to raise the FWST Level to 480" using the RHT.

AFTER the calculations have been completed and verified in the FWST make up procedure, an **80 gpm** Makeup is started to the FWST, and continues for **1 hour.**

At the end of this 1 hour period:

What is the status of compliance with LCO 3.5.4?

FWST Temperature = 85 Deg FWST [B] = 2775 ppm

Time Critical Task: NO

Validation Time: 15 minutes

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout all four (4) identified Handout documents, marked up as described.

START TIME: _____

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*1	(Step 3.10) Determine the amount of Boric Acid needed to raise makeup water to the limits specified in the Core Operating Limits Report (COLR).	The operator refers to the COLR, Section 2.13.1 on Page 26 of 32 and determines that the minimum boron concentration to be used in the calculation is 2675 ppm, and **NOT 2875 ppm used by BOP (1st Error) .** The operator records **2675** ppm in the first line (Desired Boron Concentration of Addition from COLR) of the IV calculation in Step 3.10 of Enclosure 4.4.		
*2	(1st Bullet) Desired Boron Concentration of Addition from COLR + 25 ppmB margin = Desired Boron Concentration	The operator adds an additional 25 ppm and determines Desired Boron Concentration to be 2700 ppm. The operator records **2700** ppm in the 2nd line (Desired Boron Conc) of the IV calculation in Step 3.10 of Enclosure 4.4.		
*3	(2nd Bullet) {(Desired Cb) - (RHT Cb)} / (BAT Cb) - (RHT Cb) x {Desired Total Makeup Volume to FWST} = Desired BAT Volume	The operator identifies Desired Cb = **2700** from previous Step and records. The operator recognizes that RHT Cb = **1076** ppm and records Initial Conditions).		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*3 (CONT'D)		The operator recognizes that BAT Cb = **7234** ppm and records (Initial Conditions). The operator addresses OP/1/A/6100/22, Enclosure 4.3, Curve 7.7, and determines from graph that total makeup volume is 30,000 by comparing 480" volume of 390,000 gallons to the 440" volume of 360,000 gallons. The operator records **30,000 (+1300#)** gallons; and **NOT 15,000 gallons used by the BOP (2nd Error).** The operator records **30,000 (+1300#)** gallons in the IV Calculation. The operator calculates the Desired BAT Volume to be added to be **7,912** gallons **+300/-75** gallons. The operator records **7,912** gallons **+300/-75** gallons as the Desired BAT Volume in the IV Calculation.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*4	(Technical Specification LCO 3.5.4) The RWST shall be OPERABLE.	The operator observes TS LCO 3.5.4 and determines that ACTION B was entered at the start of the JPM action was necessary within 1 hour to restore volume. The operator determines that the FWST Volume TS Limit is 372,100 gallons. The operator determines that 12,100 gallons must be added to the FWST to comply with this ACTION Statement, and that in one hour 4800 gallons will be added. The operator identifies that ACTION C is now applicable.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2010 Admin - JPM A1b SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

KEY:

Desired Boron Concentration from COLR + 25 ppmB = Desired Boron Concentration

2675 ppm (From COLR) + 25 ppmB = **2700** ppm

$$\frac{\{(\text{Desired Cb}) - (\text{RHT Cb})\}}{(\text{BAT Cb}) - (\text{RHT Cb})} \times \{\text{Desired Total Makeup Volume to FWST}\} = \text{Desired BAT Volume}$$

Given:

RHT Cb = **1076** ppm
BAT Cb = **7234** ppm

Desired Total Makeup Volume to FWST = Overflow volume – Present volume
(From Enclosure 4.3, Curve 7.7 of Unit 1 Core Data Book:)
390,000 gallons – 360,000 gallons (440") = **30,000** gallons#

#: If the operator uses develops a "gallons/inch" volume from the information block on Curve 7.7, the operator will determine the makeup volume to be 31,277 gallons.

Volume at 484 inches = 394,089 gallons
Volume at 0 inches = 15,638 gallons

(394,089 gallons – 15,638 gallons)/484 inches = 781.92 gallons/inch

OR

Volume at 455.88 inches = 372,100 gallons
Volume at 0 inches = 15,638 gallons

(372,100 gallons – 15, 638 gallons)/455.88 inches = 781.92 gallons/inch

Therefore, 781.92 gallons/inch x 40 inches = 31,276.80 gallons (This may be used as the makeup volume instead of 30,000 gallons).

If this volume is used, the calculation will result in a Desired BAT Volume below of 8132 gallons

So:

$$\frac{\{(\text{Desired Cb})-(\text{RHT Cb})\}}{(\text{BAT Cb})-(\text{RHT Cb})} \times \{\text{Desired Total Makeup Volume to FWST}\} = \text{Desired BAT Volume}$$

$$\frac{\{(2700)-(1076)\}}{(7234)-(1076)} \times \{30000\} = \text{Desired BAT Volume}$$

$$\frac{\{1624\}}{6158} \times \{30000\} = \text{Desired BAT Volume}$$

.26 x {30000} = Desired BAT Volume or **7,912** gallons **+300/-75** gallons

OR between **7,837** and **8212** gallons

JPM CUE SHEET

INITIAL CONDITIONS:

- The plant was at 100% power when a leak developed on the FWST.
- FWST Level dropped to 440 inches before leak was isolated.
- Enclosure 4.4, "FWST Makeup Using the RHT," of OP/1/A/6200/014, "Refueling Water System" is in progress and completed through Step 3.9.
- LCO 3.5.4, Refueling Water Storage Tank (RWST), was entered 10 minutes ago.
- Chemistry has provided the following information:
  - BAT Boron Conc. = 7234 ppm
  - RHT Boron Conc.= 1076 ppm
  - FWST Make up Boron Concentration: Use COLR Minimum
- The BOP has just completed the Doer Calculation of Step 3.10 of Enclosure 4.4, "FWST Makeup Using the RHT," and has asked you to perform an Independent Verification on the calculation.

INITIATING CUE:

Perform the Independent Verification (IV) of the calculation in Step 3.10 of Enclosure 4.4 to confirm the amount of Boric Acid that must be added from the Boric Acid Tank (BAT), in order to raise the FWST Level to 480" using the RHT.

AFTER the calculations have been completed and verified in the FWST make up procedure, an **80 gpm** Makeup is started to the FWST, and continues for **1 hour.**

At the end of this 1 hour period:

What is the status of compliance with LCO 3.5.4?

FWST Temperature = 85 Deg FWST [B] = 2775 ppm

1. Limits and Precautions

✓ 1.1 Maximum FWST Tech Spec temperature limit is 100°F.

✓ 1.2 Minimum FWST Tech Spec temperature limit is 70°F.

✓ 1.3 All electrically operated engineered safeguard valves must be operated electrically after any manual operation.

✓ 1.4 Maximum FWST level is 483 inches unless FWST overflow is required. (Overflows to SFP at 484 inches)

✓ 1.5 NC System sampling during makeup to the FWST is prohibited.

2. Initial Conditions

SLM 2.1 Boron concentration control systems available per OP/1/A/6150/009 (Boron Concentration Control).

SLM 2.2 NB System aligned per OP/0/A/6200/003 (Boron Recycle System).

SLM 2.3 NI check valve test header alignment to FWST secured.

3. Procedure

☑ 3.1 Evaluate all outstanding R&Rs that may impact performance of this procedure.

_____ 3.2 **IF** Emergency Boration Flow is needed, secure makeup to FWST.

SLM 3.3 Notify Chemistry to sample RHT.

Kevin Hodges _____ / _____
Person Notified Date Time

N/A SLM 3.4 **IF** RHT is unacceptable for use, exit this enclosure.

SLM 3.5 Ensure that a pre-job briefing has been performed that includes discussion of reactivity management concerns with this procedure.
SRO

N/A SLM 3.6 **IF** FWST in Recirculation per Enclosure 4.1 (FWST Recirculation Using 1A (1B) FWST Recirc Pump), stop the following:

_____ • 1A FWST Recirc Pump
_____ • 1B FWST Recirc Pump

N/A SLM 3.7 **IF** FWST in Recirculation with #1 FWST Pump, secure per Enclosure 4.6 (FWST Recirculation Using Unit 1 FWST Pump).

N/A SLM 3.8 **IF** FWST in Purification, secure per Enclosure 4.5 (FWST Purification).

SLM 3.9 Notify RP of change in FW System alignment. {PIP M97-0680}

Mike Cline _____/_____
Person Notified Date Time

_____ SLM 3.10 Determine amount of Boric Acid needed to raise makeup water to limits specified per Core Operating Limits Report (COLR): {PIP 2-M98-0017}
IV

- Desired Boron Concentration of Addition from COLR + 25 ppmB margin = Desired Boron Conc
- $\left(\frac{(\text{Desired Boron Conc})-(\text{RHT Boron Conc})}{(\text{BAT Boron Conc})-(\text{RHT Boron Conc})}\right)\left(\begin{matrix}\text{Desired Total Makeup}\\ \text{Volume To FWST}\end{matrix}\right)$ = Desired BAT Volume

Doer Calculation

(2875 ppmB) + 25 ppmB = 2900 ppmB

$\left(\frac{(\ 2900\ \text{ppmB})-(\ 1076\ \text{ppmB})}{(\ 7234\ \text{ppmB})-(\ 1076\ \text{ppmB})}\right)(\ 15{,}000\ \text{gal}) =$ 4443 gal

IV Calculation

(_____ ppmB) + 25 ppmB = _____ ppmB

$\left(\frac{(\quad\ \text{ppmB})-(\quad\ \text{ppmB})}{(\quad\ \text{ppmB})-(\quad\ \text{ppmB})}\right)(\quad\ \text{gal}) =$ _____ gal

☐ 3.11 Record initial FWST level on Attachment 1.

_____ 3.12 **IF** amount of boric acid to be added from Step 3.10 is zero, perform the following:

_____ 3.12.1 Ensure NC System Makeup aligned for auto makeup per OP/1/A/6150/009 (Boron Concentration Control).

_____ 3.12.2 Go to Step 3.29.

3.13 Add amount of Boric Acid calculated in Step 3.10 to FWST from Blender as follows:

3.13.1 Ensure closed one of the following:

_____ • 1NI-96B (NI Chk Test Hdr C/I Outside)

OR

_____ • 1NI-99 (Unit 1 NI Check Valve Test Hdr To FWST Isol)

3.13.2 Ensure locked closed, either:

_____ 3.13.2.1 1NS-70 (1A & 1B NS HX Outlet To FWST Throttle)

OR

3.13.2.2 Both of the following:

_____ CV _____ • 1NS-8 (1B NS HX Outlet To FWST Isol)

_____ CV _____ • 1NS-25 (1A NS HX Outlet To FWST Isol)

☐ 3.13.3 Ensure closed 1NB-5 (Unit 1 Boric Acid Blender To NB System Isol). (AB 733'+6, KK-51, S End U1 VCT Hallway)

3.13.4 Open:

_____ • 1NV-172 (Unit 1 Boric Acid Blender To NB & FW Isol)
_____ • 1NV-174 (Unit 1 Boric Acid Blender To FWST Isol)

_____ 3.13.5 Select "MANUAL" on "NC Sys M/U Controller".

3.13.6 Ensure in "STOP":

_____ • 1A Rx M/U Water Pump
_____ • 1B Rx M/U Water Pump

_____ 3.13.7 **IF** both BA Trans Pumps off, ensure in "AUTO" one of the following:

_____ • 1A BA Trans Pump

OR

_____ • 1B BA Trans Pump

_____ 3.13.8 **IF** VCT is set up for automatic makeup, record current Setpoint(s) (SP) for the following:

_____ • "Rx M/U Water Flow Control": _____ gpm

_____ • "BA Flow Control": _____ gpm

_____ 3.13.9 Place "Rx M/U Water Flow Control" in manual and close.

NOTE: Total Makeup Flow and Boric Acid Flow Counters must be reset for NC Makeup System to operate.

_____ 3.14 Ensure the following reset to zero:

☐ Total Make Up Flow Counter
☐ Boric Acid Flow Counter

_____ 3.15 Set Total Makeup Flow Counter to desired value.

_____ 3.16 Set Boric Acid Flow Counter to desired value.

NOTE: Valve leakage may occur causing input to the VCT.

☐ 3.17 Monitor the following parameters:

- SM Pressure
- Reactor Power
- Tavg
- Rod Motion

_____ 3.18 **IF** plant parameters indicate other than expected response, notify CRS.

NOTE: FWST level should be maintained less than 481 inches unless FWST overflow is required. (OAC Hi level alarm)

_____ 3.19 Momentarily select "START" on "NC System Make Up".

☐ 3.20 Check lit "NC System Makeup" red light.

_____ 3.21 **IF** in "AUTO", ensure BA Trans Pump starts.

_____ 3.22 Place "BA Flow Control" in manual and adjust to desired flow rate.

_____ 3.23 **HOLD** until desired amount of boric acid added then perform the following:

_____ 3.23.1 **IF** in "AUTO", ensure off:

_____ • 1A BA Trans Pump
_____ • 1B BA Trans Pump

3.23.2 Flush flow path for 5 minutes as follows:

_____ 3.23.2.1 Select "OFF" on "NC Sys M/U Controller".

_____ 3.23.2.2 Close "BA Flow Control".

_____ 3.23.2.3 Open "Rx M/U Water Flow Control".

3.23.2.4 Select "STOP" on the following:

_____ • 1A BA Trans Pump
_____ • 1B BA Trans Pump

3.23.2.5 Select "AUTO" on one of the following:

_____ • 1A Rx M/U Water Pump

OR

_____ • 1B Rx M/U Water Pump

_____ 3.23.2.6 Select "MANUAL" on "NC System M/U Controller".

_____ 3.23.2.7 Momentarily select "START" on "NC System Make Up".

☐ 3.23.2.8 Check lit "NC System Makeup" red light.

_____ 3.23.2.9 Ensure Rx M/U Water Pump starts.

_____ 3.23.2.10 **HOLD** until flush complete then select "OFF" on "NC System Makeup".

3.24 Place in auto:

_____ • "BA Flow Control"
_____ • "Rx M/U Water Flow control"

3.25 Close:

_____ • 1NV-172 (Unit 1 Boric Acid Blender To NB & FW Isol)
_____ • 1NV-174 (Unit 1 Boric Acid Blender To FWST Isol)

_____ 3.26 **IF** BAT to be in recirc, perform the following:

3.26.1 Select "START" on one of the following:

_____ • 1A BA Trans Pump

OR

_____ • 1B BA Trans Pump

☐ 3.26.2 Go to Step 3.28.

3.27 Select "AUTO" on one of the following:

_____ • 1A BA Trans Pump

OR

_____ • 1B BA Trans Pump

3.28 Return the following controllers to values recorded in Step 3.13.8:

_____ • BA Flow Control (+/- 0.2 gpm)
_____ • Rx M/U Water Flow Control (+/- 0.2 gpm)

_____ 3.29 Select "AUTO" on "NC Sys M/U Controller".

_____ 3.30 Momentarily select "START" on "NC System Make Up".

☐ 3.31 Check lit "NC System Makeup" red light.

3.32 Open:

_____ • 1FW-22 (NB To Unit 1 FW Pump Disch Hdr Isol)
_____ • 1FW-24 (Unit 1 FW Pump Disch To FWST Isol)

☐ 3.33 Check closed 1FW-2 (Unit 1 FWST To Refueling Cavity Fill & Drn).

_____ 3.34 Notify Radwaste Chemistry to perform the following:

_____ _____/_____
Person Notified Date Time

3.34.1 Operate the following as required:

☐ 1NB-126 (NB Evap Feed Pumps RHT Contents Transfer Isol)
☐ 1NB-127 (NB Evap Feed Pumps Disch Isol To U1 & U2 FWST)

☐ 3.34.2 Operate both Recycle Evaporator Feed Pumps to complete makeup from RHT.

_____ 3.35 **HOLD** until FWST is at desired level.

_____ 3.36 Notify Radwaste Chemistry to operate Recycle Evaporator Feed Pumps as desired.

_____ _____/_____
Person Notified Date Time

3.37 Close:

_____ • 1FW-22 (NB To Unit 1 FW Pump Disch Hdr Isol)
_____ • 1FW-24 (Unit 1 FW Pump Disch To FWST Isol)

_____ 3.38 Notify Radwaste Chemistry to close:

_____ _____/_____
Person Notified Date Time

☐ 1NB-126 (NB Evap Feed Pumps RHT Contents Transfer Isol)
☐ 1NB-127 (NB Evap Feed Pumps Disch Isol To U1 & U2 FWST)

☐ 3.39 Record final FWST level on Attachment 1.

☐ 3.40 Record in Auto Log final blender contents, either:

☐ Rx Makeup Water

OR

☐ Blend

OR

☐ Boric Acid

☐ 3.41 Place routing stamp in remarks section of cover sheet, check (✓) "Engineering" and fill in "Attachment 1 only".

_____ 3.42 **IF** desired to align for automatic NC System Makeup, align per OP/1/A/6150/009 (Boron Concentration Control).

_____ 3.43 **IF** FWST Recirc Pump stopped in Step 3.6, start one of the following:

_____ • 1A FWST Recirc Pump

OR

_____ • 1B FWST Recirc Pump

_____ 3.44 **IF** FWST Recirculation with #1 FWST Pump is desired, place FWST in Recirculation per Enclosure 4.6 (FWST Recirculation Using Unit 1 FWST Pump).

_____ 3.45 **IF** FWST Purification is desired, place FWST in Purification per Enclosure 4.5 (FWST Purification).

Attachment 1

FWST Makeup Data

Initial FWST Level _____ inches Date _____ Time _____

Final FWST Level _____ inches Date _____ Time _____

Data Collected By _____

End of Enclosure

2.11 RCS Pressure, Temperature and Flow Limits for DNB (TS 3.4.1)

2.11.1 The RCS pressure, temperature and flow limits for DNB are shown in Table 4.

2.12 Accumulators (TS 3.5.1)

2.12.1 Boron concentration limits during MODES 1 and 2, and MODE 3 with RCS pressure >1000 psi:

Parameter	Limit
Accumulator **minimum** boron concentration.	2,475 ppm
Accumulator **maximum** boron concentration.	2,875 ppm

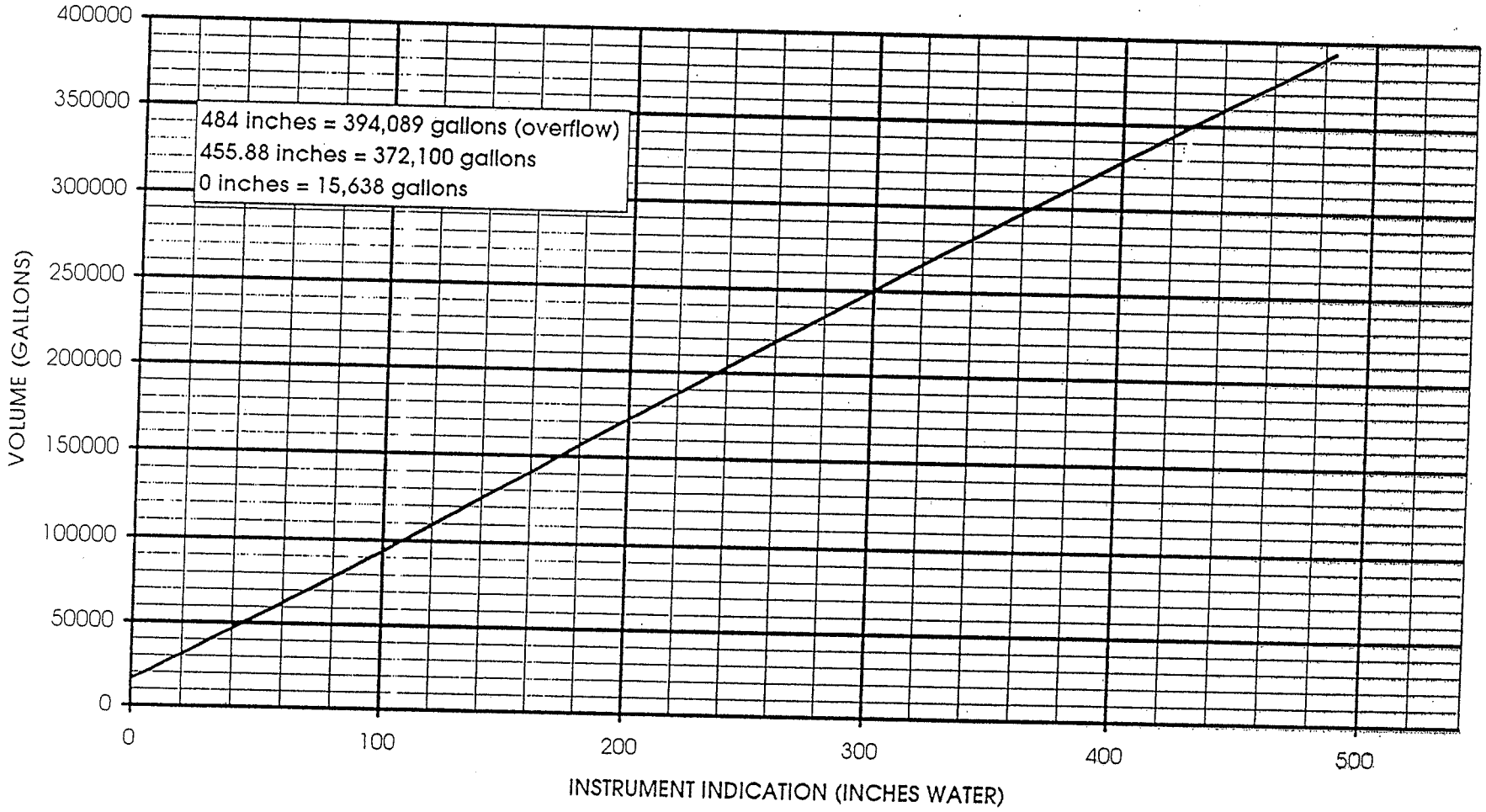
2.13 Refueling Water Storage Tank - RWST (TS 3.5.4)

2.13.1 Boron concentration limits during MODES 1, 2, 3, and 4:

Parameter	Limit
RWST minimum boron concentration.	2,675 ppm
RWST maximum boron concentration.	2,875 ppm

CURVE 7.7

REFUELING WATER STORAGE TANK LEVEL
(VOLUME vs. TANK LEVEL)



This data is also available on the OAC.

JPM A2 RO

Facility:	McGuire	Task No.:	
Task Title:	Perform a Manual NC Leakage Calculation	JPM No.:	2010 Admin - JPM A2 RO
K/A Reference:	GK/A 2.2.12 (3.7)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:
- Unit 1 is at 100% power.
- The Unit 1 OAC point M1L4554 is out of service.
- PT/1/A/4200/040 (Reactor Coolant Leakage Detection) has been completed showing that NCS Leakage is 1.6 gpm.
- A manual NC System leakage calculation is in progress in accordance with PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)
- Enclosure 13.2 (NC Leakage Determination Using Manual Calculations) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) has been completed through Step 1.9.

Task Standard: The operator will complete all calculations in accordance with the attached Key, and identify that the Unidentified RCS Leakage Technical Specification has been exceeded.

Required Materials: None.

General References:
- PT/1/A/4200/040 (Reactor Coolant Leakage Detection)
- PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)
- McGuire Unit 1 Technical Specifications

Handouts:

PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) marked up as follows:

Step 7.1 – Initialed

Steps 8.1 through 8.5 – Initialed.

Step 12.1 Enclosure 13.2 Checkbox is checked.

PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) Enclosure 13.2 (NC Leakage Determinations Using Manual Calculations) marked up as follows:

Step 1.1 – Checkbox is checked/Initialed.

Step 1.2 – Initialed.

Step 1.3 – Initialed.

Determine VCT Purge Status Checkbox is checked.

Secured Checkbox is checked.

NC System leakage calculation is in progress Checkbox is checked.

To refrain from sampling..... Checkbox is checked.

Person Notified Mike Smith Today's Date/Time

Step 1.4 – Initialed.

NC System leakage calculation is in progress Checkbox is checked.

To check that NC sample..... Checkbox is checked.

NC System sampling..... Checkbox is checked.

Person Notified Melvin Smith Today's Date/Time

Step 1.5 – Initialed.

Step 1.6 – All Checkboxes checked/Initialed.

Step 1.7 – Initialed.

Step 1.7.1 – Initialed.

Step 1.7.2 – Initialed.

Step 1.8 – Initialed.

Step 1.9 – Initialed.

Enclosure 13.3 (NCDT Volume) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)

Enclosure 13.4 (PRT Volume) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)

Initiating Cue:

Using Enclosure 13.2 (NC Leakage Determination Using Manual Calculations), AND the attached Datasheet, complete the NC System Leakage Calculation, by performing Steps 1.10 and 1.11.

Indicate whether or not a Technical Specification has been exceeded.

Time Critical Task: NO

Validation Time: 20 minutes

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue, and associated Datasheet (Last two (2) Pages of this JPM); and Handout PT/1/A/4150/001B procedure body marked up as described, Enclosure 13.2 marked up as described, Enclosure 13.3 and Enclosure 13.4.

START TIME: _____

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Enclosure 13.2, Steps 1.10.1 through 13, 22, 26 and 1.11.1) Record raw data.	The operator transposes raw data from the Data Sheet provided.		
2	(Enclosure 13.2, Step 1.10.14) Calculate change in NC System Tave:	The operator calculates the change in NC System Tave to be **0°F**, and records.		
3	(Enclosure 13.2, Step 1.10.15) Calculate VCT Leakage Rate:	The operator calculates the VCT Leakage Rate to be **1.55 gpm**, and records.		
4	(Enclosure 13.2, Step 1.10.16) Calculate PZR Leakage Rate:	The operator calculates the PZR Leakage Rate to be **0.02 gpm**, and records.		
5	(Enclosure 13.2, Step 1.10.17) Calculate Total Leakage:	The operator calculates the Total Leakage to be **1.57 gpm**, and records.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
6	(Enclosure 13.2, Step 1.10.18) Using Enclosure 13.4 (PRT Volume), record the following: Initial PRT Volume Final PRT Volume	The operator uses Enclosure 13.4 and an initial PRT Level of 76.0 %, and determines that initial PRT Volume is **10636.1 gal**, and records. The operator uses Enclosure 13.4 and interpolates a PRT Volume for 76.1% to be **10649.5 gal**, and records.		
7	(Enclosure 13.2, Step 1.10.19) Calculate PRT Leakage Rate:	The operator calculates the PRT Leakage Rate to be **.19 gpm**, and records.		
8	(Enclosure 13.2, Step 1.10. 20) Using Enclosure 13.3 (NCDT Volume), record the following: Initial NCDT Volume Final NCDT Volume	The operator uses Enclosure 13.3 and an initial NCDT Level of **30.0%**, and determines that initial NCDT Volume is **105.9 gal**, and records. The operator uses Enclosure 13.3 and a final NCDT Level of **33.0%**, and determines that final NCDT Volume is **116.2 gal**, and records.		
9	(Enclosure 13.2, Step 1.10.21) Calculate NCDT Leakage Rate:	The operator calculates the NCDT Leakage Rate to be **.14 gpm**, and records.		
10	(Enclosure 13.2, Step 1.10.23) Calculate Total Background Leakage:	The operator calculates the Total Background Leakage to be **0 gpm**, and records.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*11	(Enclosure 13.2, Step 1.10.24) Calculate Identified Leakage:	The operator calculates the Identified Leakage to be **0.33 (±10%) gpm**, and records.		
*12	(Enclosure 13.2, Step 1.10.25) Calculate Unidentified Leakage:	The operator calculates the Unidentified Leakage to be **1.24 (±10%) gpm**, and records.		
*13	(Enclosure 13.2, Step 1.10.26) Determine Total NC Pump #1 Seal Leakoff:	The operator calculates the Total NC Pumps #1 Seal Leakoff to be **12.8 (±10%) gpm**, and records.		
*14	(Enclosure 13.2, Step 1.10.27) Calculate Total Accumulative Leakage:	The operator calculates the Total Accumulative Leakage to be **14.37 (±10%) gpm**, and records.		
15	(Enclosure 13.2) Calculated By/ Date/Time:	The operator places their name in the Calculated by BLOCK, and signs. The operator enters the Date and Time.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*16	Technical Specification LCO 3.4.13: RCS operational LEAKAGE shall be limited to: a. No pressure boundary LEAKAGE; b. 1 gpm unidentified LEAKAGE; c. 10 gpm identified LEAKAGE; d. 389 gallons per day total primary to secondary LEAKAGE through all steam generators (SGs); and e. 135 gallons per day primary to secondary LEAKAGE through any one steam generator (SG). APPLICABILITY: MODES 1, 2, 3, and 4.	The operator returns the completed Enclosure 13.2 and reports that LCO 3.4.13 has been exceeded because there is greater than 1 gpm unidentified LEAKAGE. **Examiner NOTE:** **See KEY on Page 9 of this JPM.**		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2010 Admin - JPM A2 RO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

KEY:

Enclosure 13.2, Step 1.10.14 (JPM Step 2): Change in NC System Tave:
584.8°F – 584.8°F = 0°F

Enclosure 13.2, Step 1.10.15 (JPM Step 3): VCT Leakage Rate:
(53.4% – 47.6%) x19.3 gallons/%/72 minutes = 1.55 gallons per minute (gpm)

Enclosure 13.2, Step 1.10.16 (JPM Step 4): PZR Leakage Rate:
(54.9% – 54.1%) x 132.5 gallons/% x .01613 /72 minutes = 0.02 gallons per minute (gpm)

Enclosure 13.2, Step 1.10.17 (JPM Step 5): Total Leakage:
1.55 gpm + 0.02 gpm = 1.57 gpm

Enclosure 13.2, Step 1.10.18 (JPM Step 6): PRT Final Volume:

(10770.4-10636.1)/10 = 13.43/.1% PRT Level, 10636.1 + 13.43 = 10649.53 (gal)

Enclosure 13.2, Step 1.10.19 (JPM Step 7): Total PRT Leakage:
(10649.5 gallons – 10636.1 gallons)/72 minutes = 0.19 gallons per minute (gpm)

Enclosure 13.2, Step 1.10.21 (JPM Step 9): Total NCDT Leakage:
(116.2 gallons – 105.9 gallons)/72 minutes = 0.14 gallons per minute (gpm)

Enclosure 13.2, Step 1.10.23 (JPM Step 10): Total Background Leakage:
(0 gpm + 0 gpm) = 0 gpm

Enclosure 13.2, Step 1.10.24 (JPM Step 11): Identified Leakage:
(.19 gpm + .14 gpm + 0 gpm) = 0.33 gpm

Enclosure 13.2, Step 1.10.25 (JPM Step 12): Unidentified Leakage:
(1.57 gpm - .33 gpm) = 1.24 gpm

Enclosure 13.2, Step 1.10.26 (JPM Step 13): Total NC Pumps #1 Seal Leakoff:
(2.8 gpm + 3.6 gpm + 3.1 gpm + 3.3 gpm) = 12.8 gpm

Enclosure 13.2, Step 1.10.27 (JPM Step 14): Total Accumulative Leakage:
(.33 gpm + 1.24 gpm + 12.8 gpm) = 14.37 gpm

LCO 3.4.13 (1 gpm unidentified LEAKAGE) has been exceeded.

JPM CUE SHEET

INITIAL CONDITIONS:

Unit 1 is at 100% power.

The Unit 1 OAC point M1L4554 is out of service.

PT/1/A/4200/040 (Reactor Coolant Leakage Detection) has been completed showing that NCS Leakage is 1.6 gpm.

A manual NC System leakage calculation is in progress in accordance with PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)

Enclosure 13.2 (NC Leakage Determination Using Manual Calculations) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) has been completed through Step 1.9.

INITIATING CUE:

Using Enclosure 13.2 (NC Leakage Determination Using Manual Calculations), AND the attached Datasheet, complete the NC System Leakage Calculation, by performing Steps 1.10 and 1.11.

Indicate whether or not a Technical Specification has been exceeded.

Data Sheet

Start Time	**0100**	[redacted]
Stop Time	**0212**	
[redacted]		
	Initial	**Final**
VCT Level	**53.4**	**47.6**
Pzr Level	**54.9**	**54.1**
NC System Tave	**584.8**	**584.8**
PRT Level	**76.0**	**76.1**
NCDT Level	**30**	**33**
[redacted]		
NC Sample Purge Flow value recorded in Autolog		**0**
Any quantified (measured) leakage that has been identified		**0**
[redacted]		
NC Pump 1A #1 Seal Leakoff Flow		**2.8**
NC Pump 1B #1 Seal Leakoff Flow		**3.6**
NC Pump 1C #1 Seal Leakoff Flow		**3.1**
NC Pump 1D #1 Seal Leakoff Flow		**3.3**
[redacted]		
1EMF71 Reading		**1.2**
1EMF72 Reading		**1.7**
1EMF73 Reading		**1.1**
1EMF74 Reading		**1.9**

Duke Energy McGuire Nuclear Station **Reactor Coolant Leakage Calculation**	Procedure No. **PT/1/A/4150/001 B**
	Revision No. **067**
Continuous Use	Electronic Reference No. **MC0047QI**

PERFORMANCE

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(ISSUED) - PDF Format

Revision History (significant issues, limited to one page)	
Rev 067	Changed format of procedure to split out calculation performed by OAC and performed by manual calculation. Combined leakage calculation using the OAC steps with current Enclosure 13.1 and renamed enclosure "NC Leakage Calculation Using OAC". Combined manual leakage calculation steps with Enclosure 13.2 and renamed enclosure "NC Leakage Determination Using Manual Calculation". Changed all references throughout procedure to include these format changes. Encl. 13.5. Added Independent Verification sign offs for calculation of seven day rolling average of Unidentified Leakage. {PIP M-09-1307} Revised current steps for determining if Tier Two or Tier Three Action levels exceeded to reference step numbers associated with determination. Intent is to clarify steps. Reworded steps that state "IF directed" by engineering to "IF advised" by engineering. Definition of "directed" changed with new fatigue rule. Added PIP M-09-1857 as an additional reference to NCP seal leakage basis. Modified steps that begin with "WHEN" to reflect NSD 704 Rev 016 requirements.
Rev 066	Body of procedure. Added a limit and precaution about manipulation of VA System during leakage calculation has an affect on VCT level. Re-worded Step 12.6.17. The leakage calculation is considered valid after 60 minutes but is preferred to run up to 3 hours. The step as written requires the operator to print calculation after 60 minutes when 1 of 3 conditions met. This is procedure use and adherence issue. Re-worded step to give operator flexibility to print calculation summary between 60 minutes and 3 hours. Re-worded Step 12.6.35. If operator performs section 12.6.16 to abort leakage calculation early, enclosure 13.1 is not performed. 12.6.35 directs operator to perform Encl. 13.5, however, this enclosure requires data from enclosure 13.1. Re-worded step to stipulate if unit at 100% RTP AND Encl. 13.1 completed, then perform Encl. 13.5. Procedure use and adherence issue.
Rev 065	• Added step to make operator aware that if leakage calc ran for greater than 30 minutes but less than 60 minutes, the data can still be valid if it meets certain conditions. • Added step to record status of VCT purge at beginning of procedure. • Added steps to take NV-137A "hard" to VCT and back to "AUTO" prior to starting leakage calculation. • Encl. 13.5. Reworded section if any Tier One, Two, or Three Action level is exceeded to make it easier to understand.

Reactor Coolant Leakage Calculation

1. Purpose

/ To determine NC System Leakage using the Operator Aid Computer (OAC) or manual calculations to ensure Tech Spec requirements met.

2. References

✓ 2.1 Tech Spec TS SR 3.4.13.1, 3.4.13.2, TS 3.4.15

✓ 2.2 SLC 16.9.7 Standby Shutdown System

✓ 2.3 MCS-1274.00-00-0016 (License Renewal Basis Spec), Section 4.29

✓ 2.4 UFSAR Chapter 18 (Aging Management Program and Activities), Table 18-1, Reactor Coolant Operational Leakage Monitoring Program

✓ 2.5 SLC 16.7.6 Radiation Monitoring for Plant Operation

✓ 2.6 WCAP-16423-NP (Methodology for calculating Unidentified NC System leakage)

✓ 2.7 WCAP-16465-NP (Action levels and response guidelines for increasing Unidentifed NC System leakage less than Tech Spec limits)

✓ 2.8 MCC-1201.01-00-0053 (MNS Unit 1 & 2 NC Pump Response to Loss of Seal Cooling)

3. Time Required

✓ 3.1 One operator for three hours every 72 hours.

4. Prerequisite Test

/ None

5. Test Equipment

/ None

Unit 1

6. Limits and Precautions

√ 6.1 NC System Tave, Reactor Power, Containment Temperature, and SM Pressure should remain constant during calculation.

√6.2 Positioning valves during calculation which could adversely affect results will invalidate the calculation.

√6.3 Performing Leakage Calculation between 3 am and 8 am on Wednesdays may cause calculation to fail due to OAC weekly backup routine.

√6.4 Performing PT/1/A/4200/019 (ECCS Pump and Piping Vent) during calculation could adversely affect results and will invalidate the calculation.

√6.5 Manipulation of VA System should be avoided while performing Leakage Calculation due to affect on VCT level.

7. Required Unit Status

SLM 7.1 NC System filled and vented with a steam bubble in the Pzr.

8. Prerequisite System Conditions

SLM 8.1 NC System Tave at steady state condition. (± 0.5°F)

SLM 8.2 Reactor Power at steady state condition. (± 0.2%)

SLM 8.3 Main Steam pressure at steady state condition. (± 1%)

SLM 8.4 NCDT and PRT will **NOT** need to be pumped down during calculation.

NOTE:✓ Background leakage consists of known valve stem leakage and NC Sample Purge Flow.

SLM 8.5 **IF** background leakage provided, data meets the following requirements:

- Measured within last 7 days
- Associated system conditions unchanged since calculated

9. Test Method

IF OAC available for leakage calculation, NC System leakage is calculated using a water inventory balance around the NC System based on input data from the OAC. OAC NC System Leakage Calculation will be initiated once per 72 hours and will then run automatically for 3 hours. During the first 15 minutes of calculation, no correlation coefficient will be displayed.

IF elapsed time greater than 60 minutes, program data may be used for leakage calculation when one of the following sets of criteria met:

- "TOTAL LEAKAGE BEST" **NOT** between ±0.15 gpm and "TOTAL LEAKAGE CORRELATION COEFF" greater than 0.6

  OR

- "TOTAL LEAKAGE BEST" less than 0.15 gpm and "IDENTIFIED LEAKAGE BEST" greater than or equal to "BACKGROUND LEAKAGE".

  OR

- "TOTAL LEAKAGE BEST" less than 0.1 gpm

IF plant stability can **NOT** be maintained **AND** elapsed time greater than 30 minutes, leakage calculation data may be used when absolute value for Total Leakage Correlation Coefficient greater than or equal to 0.50 and Identified Leakage Best greater than or equal to Background Leakage.

IF OAC is partially or wholly unavailable, NC System leakage will be calculated manually. Initial data will be recorded followed by final data after 60 - 75 minute wait. Tank volume / gallon conversion and water densities are used in equations to determine NC System leakage.

Individual NC Pump #1 Seal Leakoff flows will be recorded and compared to the maximum allowable limit of 4.0 gpm.

Primary to Secondary Leakage will be recorded from EMF indication(s) or Chemistry sample and compared to a maximum of 135 gpd through any one steam generator or a maximum of 389 gpd through all steam generators.

"TOTAL ACCUMULATIVE LEAKAGE" will be calculated using "IDENTIFIED LEAKAGE BEST", "UNIDENTIFIED LEAKAGE BEST" and "TOTAL NC PUMP SEAL LEAKOFF FLOWS".

10. Data Required

✓10.1 Enclosure 13.1 (NC Leakage Calculation Using OAC) or Enclosure 13.2 (NC Leakage Determination Using Manual Calculations).

✓10.2 **IF** Unit 1 at 100% RTP, Enclosure 13.5 (Evaluation of NC System Unidentified Leakage Results)

✓10.3 Indicate on cover sheet of this procedure under Remarks Section any special system alignments made for this calculation.

11. Acceptance Criteria

✓11.1 NC System Identified Leakage shall be limited to 10 gpm. (Reference TS 3.4.13)

✓11.2 NC System Unidentified Leakage shall be limited to 1 gpm. (Reference TS 3.4.13)

✓11.3 Total NC Pumps #1 Seal Leakoff shall be limited to 16.3 gpm. (Reference SLC 16.9.7) {PIP 04-3317}

✓11.4 Total Accumulative Leakage (sum of Identified Leakage, Unidentified Leakage, and NC Pumps #1 Seal Leakoff) shall be limited to 20 gpm. (Reference SLC 16.9.7) {PIP M99-3926}

✓11.5 Each NC Pump #1 Seal Leakoff flow shall be limited to a sustained value of less than 4.0 gpm. (Reference SLC 16.9.7, MCC-1201.01-00-0053) {PIP 05-779, M-09-1857}

✓11.6 Primary to Secondary Leakage shall be limited to 135 gpd through any one steam generator and 389 gpd through all steam generators. (Reference TS 3.4.13)

12. Procedure

12.1 Perform one of the following:

☐ Enclosure 13.1, NC Leakage Calculation Using OAC

OR

☑ Enclosure 13.2, NC Leakage Determination Using Manual Calculations

Unit 1

13. Enclosures

13.1 NC Leakage Calculation Using OAC

13.2 NC Leakage Determination Using Manual Calculations

13.3 NCDT Volume

13.4 PRT Volume

13.5 Evaluation of NC System Unidentified Leakage Results

End of Body

1. Procedure

☑ 1.1 Evaluate all outstanding R&Rs that may impact performance of this procedure.

NOTE: ✓• **IF** Unit 1 in Mode 3 or 4, this procedure is **NOT** required until 12 hours of steady state operation have elapsed.

✓• The first calculation is considered the first calculation after 18:00 hrs for normal operation.

SLM FOR 1.2 **IF** more than one leakage calculation performed per shift, a brief explanation should be entered on Autolog indicating reason for repeating calculation.

NOTE: ✓A continuous vent is maintained on the PRT and a continuous purge is maintained on the VCT by Radwaste Chemistry.

SLM 1.3 Notify Radwaste Chemistry of the following:

☑ Determine VCT purge status:

☐ Active ☑ Secured

☑ NC System leakage calculation is in progress

☑ To refrain from sampling PRT, NCDT and VCT or changing vent (purge) status of PRT, NCDT and VCT {PIPM-00-0615}

Mike Smith ____/____
Person Notified Date Time

SLM 1.4 Notify Primary Chemistry of the following:

☑ NC System leakage calculation is in progress

☑ To check that NC Sample Purge Flow value is unchanged from the current Autolog entry (Prerequisite System Condition 8.5)

☑ NC System sampling shall only be performed with permission from the Control Room

Melvin Smith ____/____
Person Notified Date Time

SLM 1.5 Ensure adequate VCT level to prevent auto makeup during calculation.

NOTE: √ Leakage Calculation will be invalid if any valve in Step 1.6 or 1.7 is repositioned during calculation.

1.6 Check closed:

- ☑ 1NC-58A (PRT Spray Supply Block)
- ☑ 1NI-9A (NC Cold Leg Inj From NV)
- ☑ 1NI-10B (NC Cold Leg Inj From NV)
- ☑ 1NV-39A (A NC Pump Standpipe Fill)
- ☑ 1NV-55B (B NC Pump Standpipe Fill)
- ☑ 1NV-71A (C NC Pump Standpipe Fill)
- ☑ 1NV-87B (D NC Pump Standpipe Fill)
- ☑ 1NV-171A (BA Blender To VCT Inlet)
- ☑ 1NV-175A (BA Blender To VCT Outlet)
- ☑ 1NV-221A (NV Pumps Suct From FWST)
- ☑ 1NV-222B (NV Pumps Suct From FWST)

SLM 1.7 **IF** 1NV-137A (NC Filters Otlt 3-Way Cntrl) in "AUTO", perform the following:

SLM 1.7.1 Place 1NV-137A to "VCT" position.

SLM 1.7.2 **HOLD** until 1NV-137A indicates "VCT", **THEN** place 1NV-137A to "AUTO".

SLM 1.8 Place "1WL-23 Mode Select" in "MAN".

SLM 1.9 Close 1WL-23 (NCDT Pump Level Control).

☐ 1.10 Perform the following:

NOTE: **IF** available, the OAC should be used to obtain data required for calculation.

☐ 1.10.1 Record Start Time: _____

☐ 1.10.2 Record initial VCT Level (M1P0201): _____ %

☐ 1.10.3 Record initial PZR Level (M1P0200): _____ %

NOTE: **IF** Tave less than 530°F **AND** OAC unavailable, Tave must be calculated using WR T_H and T_C.

☐ 1.10.4 Record initial NC System Tave (M1P1479): _____ °F

☐ 1.10.5 Record initial PRT Level (M1P0202): _____ %

☐ 1.10.6 Record initial NCDT Level (M1P0203): _____ %

_____ 1.10.7 **HOLD** until 60 - 75 minutes elapsed.

☐ 1.10.8 Record Stop Time: _____

☐ 1.10.9 Record final VCT Level (M1P0201): _____ %

☐ 1.10.10 Record final PZR Level (M1P0200): _____ %

NOTE: **IF** Tave less than 530°F **AND** OAC unavailable, Tave must be calculated using WR T_H and T_C.

☐ 1.10.11 Record final NC System Tave (M1P1479): _____ °F

☐ 1.10.12 Record final PRT Level (M1P0202): _____ %

☐ 1.10.13 Record final NCDT Level (M1P0203): _____ %

NOTE: **IF** change in Tave greater than 0.25°F (0.1°F using OAC), calculation is invalid and must be repeated.

☐ 1.10.14 Calculate change in NC System Tave:

_____ - _____ = _____ °F
Initial (Step 1.10.4) Final (Step 1.10.11)

☐ 1.10.15 Calculate VCT Leakage Rate:

[Initial Level (%) - Final Level (%)] x (19.3 Gal/%)
Stop Time - Start Time (Min)

$$\frac{[\ \underset{\text{Initial (Step 1.10.2)}}{\_\_\_\_\_} - \underset{\text{Final (Step 1.10.9)}}{\_\_\_\_\_}\ ] \times 19.3}{\underset{\text{Stop Time (Step 1.10.8)}}{\_\_\_\_\_} - \underset{\text{Start Time (Step 1.10.1)}}{\_\_\_\_\_}} = \_\_\_\_\_ \text{ gpm}$$

☐ 1.10.16 Calculate PZR Leakage Rate:

[Initial Level (%) - Final Level (%)] x (132.5 Gal/%) X (0.01613[1])
Stop Time - Start Time (Min)

$$\frac{[\ \underset{\text{Initial (Step 1.10.3)}}{\_\_\_\_\_} - \underset{\text{Final (Step 1.10.10)}}{\_\_\_\_\_}\ ] \times 132.5 \times 0.01613}{\underset{\text{Stop Time (Step 1.10.8)}}{\_\_\_\_\_} - \underset{\text{Start Time (Step 1.10.1)}}{\_\_\_\_\_}} = \_\_\_\_\_ \text{gpm}$$

☐ 1.10.17 Calculate Total Leakage:

_____ + _____ = _____ gpm
VCT Leakage Rate (Step 1.10.15) PZR Leakage Rate (Step 1.10.16)

☐ 1.10.18 Using Enclosure 13.4 (PRT Volume), record the following:

- Initial PRT Volume: _____ gal (Step 1.10.5)
- Final PRT Volume: _____ gal (Step 1.10.12)

☐ 1.10.19 Calculate PRT Leakage Rate:

$$\frac{\underset{\text{Final Volume (Step 1.10.18)}}{\_\_\_\_\_} - \underset{\text{Initial Volume (Step 1.10.18)}}{\_\_\_\_\_}}{\underset{\text{Stop Time (Step 1.10.8)}}{\_\_\_\_\_} - \underset{\text{Start Time (Step 1.10.1)}}{\_\_\_\_\_}} = \_\_\_\_\_ \text{ gpm}$$

[1] Specific Volume for saturated liquid at PZR temperature.

☐ 1.10.20 Using Enclosure 13.3 (NCDT Volume), record the following:

- Initial NCDT Volume: _____ gal (Step 1.10.6)
- Final NCDT Volume: _____ gal (Step 1.10.13)

☐ 1.10.21 Calculate NCDT Leakage Rate:

$$\frac{\text{Final Volume (Step 1.10.20)} - \text{Initial Volume (Step 1.10.20)}}{\text{Stop Time (Step 1.10.8)} - \text{Start Time (Step 1.10.1)}} = \_\_\_\_\_ \text{ gpm}$$

☐ 1.10.22 Record the following:

- NC Sample Purge Flow value recorded in Autolog: _____ gpm
- Any quantified (measured) leakage that has been identified: _____ gpm

☐ 1.10.23 Calculate Total Background Leakage:

_____ (NC Purge (Step 1.10.22)) + _____ (Quantified (Step 1.10.22)) = _____ gpm

☐ 1.10.24 Calculate Identified Leakage:

_____ (PRT Leakage Rate (Step 1.10.19)) + _____ (NCDT Leakage Rate (Step 1.10.21)) + _____ (Background Leakage (Step 1.10.23)) = _____ gpm[2] (< 10 gpm)

☐ 1.10.25 Calculate Unidentified Leakage:

_____ (Total Leakage (Step 1.10.17)) - _____ (Identified Leakage (Step 1.10.24)) = _____ gpm[2] (< 1 gpm)

☐ 1.10.26 Determine Total NC Pump #1 Seal Leakoff flow:

- NC Pump 1A #1 Seal Leakoff Flow _____ gpm [2](< 4.0 gpm)
- NC Pump 1B #1 Seal Leakoff Flow +_____ gpm [2](< 4.0 gpm)
- NC Pump 1C #1 Seal Leakoff Flow +_____ gpm [2](< 4.0 gpm)
- NC Pump 1D #1 Seal Leakoff Flow +_____ gpm [2](< 4.0 gpm)

Total NC Pumps #1 Seal Leakoff =_____ gpm [2] (< 16.3 gpm)

[2] Acceptance Criteria Value

NOTE:	"0" should be entered below for any negative identified or unidentified value.

☐ 1.10.27 Calculate "Total Accumulative Leakage":

_____ + _____ + _____ = _____ gpm [3] (< 20 gpm)
Identified (Step 1.10.24) Unidentified (Step 1.10.25) Total NC Seal Leakoff (Step 1.10.26) Total Accumulative Leakage

1.11 Determine Primary to Secondary Leakage by performing the following:

_____ 1.11.1 **IF** in Mode 1 **AND** greater than or equal to 40% RTP, record indication on the following:

- 1EMF71: _____ gpd
- 1EMF72: _____ gpd
- 1EMF73: _____ gpd
- 1EMF74: _____ gpd

_____ 1.11.1.1 **IF** any N-16 EMF inoperable, perform the following:

_____ A. Notify Secondary Chemistry to provide Primary to Secondary leakage.

_____ _____/_____
Person Notified Date Time

☐ B. Record Primary to Secondary leakage as determined by Secondary Chemistry: _____ gpd [3]

☐ C. Record date and time Primary to Secondary leakage was determined (provided by Secondary Chemistry):

_____ / _____
Date Time

_____ 1.11.2 **IF** in Mode 1 **AND** less than 40% RTP, perform the following:

_____ 1.11.2.1 Notify Secondary Chemistry to provide Primary to Secondary leakage.

_____ _____/_____
Person Notified Date Time

[3] This value is a total primary to secondary leakage of all four S/Gs. A value of less than or equal to 135 gpd conservatively implies leakage through any one S/G is less than or equal to 135 gpd.

☐ 1.11.2.2 Record Primary to Secondary leakage as determined by Secondary Chemistry: _____ gpd [4]

☐ 1.11.2.3 Record date and time Primary to Secondary leakage was determined (provided by Secondary Chemistry):

_____ / _____
Date Time

_____ 1.11.3 **IF** in Modes 2, 3 or 4, perform the following:

_____ 1.11.3.1 Notify Secondary Chemistry to provide Primary to Secondary leakage via grab sample.

_____ _____/_____
Person Notified Date Time

☐ 1.11.3.2 Record Primary to Secondary leakage as determined by Secondary Chemistry grab sample: _____ gpd [4]

☐ 1.11.3.3 Record date and time Primary to Secondary leakage was determined (provided by Secondary Chemistry):

_____ / _____
Date Time

Calculated By:_____ Date: _____ Time: _____

Checked By: _____ Date: _____ Time: _____

[4] This value is a total primary to secondary leakage of all four S/Gs. A value of less than or equal to 135 gpd conservatively implies leakage through any one S/G is less than or equal to 135 gpd.

☐ 1.12 In Autolog, perform the following:

NOTE:
- Calculations run during power escalation **AND** other than Mode 1 calculations should be identified as such.
- The first calculation is considered the first calculation after 18:00 hrs for normal operation.

1.12.1 Enter the following values with any pertinent comments:

☐ "IDENTIFIED" leakage (Step 1.10.24)
☐ "UNIDENTIFIED" leakage (Step 1.10.25)
☐ "TOTAL NC PUMPS #1 SEAL LEAKOFF" leakage (Step 1.10.26)
☐ "TOTAL" leakage (Step 1.10.27)
☐ "CALCULATION START TIME"
☐ Primary to Secondary leakage

_____ 1.12.2 **IF** other than the first calculation for the day, record reason and any pertinent comments.

NOTE: Unidentified Leakage values are expected to be within ±0.5 gpm for Manual Calculations. Exceeding ±0.5 gpm does **NOT** invalidate leakage calculation.

_____ 1.13 **IF** unidentified leakage **NOT** between ±0.5 gpm, notify Primary System Engineer.

_____ _____/_____
Person Notified Date Time

1.14 Evaluate Acceptance Criteria per one of the following:

☐ 1.14.1 Check Acceptance Criteria specified in Section 11 met.

OR

_____ 1.14.2 **IF** Acceptance Criteria specified in Section 11 **NOT** met, perform the following:

_____ SRO 1.14.2.1 Log applicable Tech Spec or SLC. {PIP M-07-00393}

_____ SRO 1.14.2.2 **IF** Total NC Pumps #1 Seal Leakoff is greater than 16.3 gpm, declare SSF capability degraded.

_____ SRO 1.14.2.3 **IF** Total Accumulative Leakage is greater than 20 gpm **OR** Total NC Pumps #1 Seal Leakoff greater than 16.3 gpm, notify Security of degraded SSF capabilities.

_____ _____/_____
Person Notified Date Time

_____ SRO 1.14.2.4 **IF** any NC Pump #1 Seal Leakoff has a sustained value of greater than **OR** equal to 4.0 gpm, notify SSS Engineer and Security of degraded SSF capability.

_____ _____/_____
Person Notified Date Time

_____ 1.15 **IF** this is the second Leakage Calculation and elevated leakage is indicated, evaluate performing PT/1/A/4150/001 D (Identifying NC System Leakage).

_____ 1.16 Lower NCDT level less than 48%.

_____ 1.17 Close 1WL-23 (NCDT Level Control).

_____ 1.18 Place "1WL-23 Mode Select" to "AUTO".

_____ 1.19 Notify Radwaste Chemistry of the following:

☐ NC System leakage calculation is complete

☐ PRT, NCDT and VCT sampling or venting may be initiated {PIPM-00-0615}

_____ _____/_____
Person Notified Date Time

_____ 1.20 Notify Primary Chemistry of the following:

☐ NC System leakage calculation is complete

☐ NC System sampling may be initiated

_____ _____/_____
Person Notified Date Time

_____ 1.21 **IF** Unit 1 at 100% RTP **AND** OAC is available, perform Enclosure 13.5 (Evaluation of NC System Unidentified Leakage Results).

End of Enclosure

NCDT LEVEL %	NCDT VOLUME (Gal)	NCDT LEVEL %	NCDT VOLUME (Gal)	NCDT LEVEL %	NCDT VOLUME (Gal)
0	19.7	35	123.1	70	247.3
1	21.9	36	126.6	71	250.7
2	24.1	37	130.1	72	254.0
3	26.4	38	133.6	73	257.3
4	28.8	39	137.1	74	260.6
5	31.2	40	140.7	75	263.9
6	33.7	41	144.3	76	267.2
7	36.2	42	147.8	77	270.4
8	38.8	43	151.4	78	273.6
9	41.4	44	155.0	79	276.8
10	44.1	45	158.6	80	279.9
11	46.9	46	162.2	81	283.0
12	49.6	47	165.8	82	286.1
13	52.5	48	169.4	83	289.1
14	55.3	49	173.0	84	292.1
15	58.2	50	176.6	85	295.1
16	61.2	51	180.2	86	298.0
17	64.2	52	183.8	87	300.9
18	67.2	53	187.5	88	303.8
19	70.3	54	191.1	89	306.6
20	73.4	55	194.7	90	309.4
21	76.5	56	198.2	91	312.1
22	79.6	57	201.8	92	314.7
23	82.8	58	205.4	93	317.4
24	86.0	59	209.0	94	319.9
25	89.3	60	212.5	95	322.4
26	92.6	61	216.1	96	324.9
27	95.9	62	219.6	97	327.3
28	99.2	63	223.1	98	329.6
29	102.5	64	226.6	99	331.9
30	105.9	65	230.1	100	334.0
31	109.3	66	233.6		
32	112.7	67	237.0		
33	116.2	68	240.5		
34	119.6	69	243.9		

End of Enclosure

Unit 1

PRT LEVEL %	PRT VOLUME (Gal)	PRT LEVEL %	PRT VOLUME (Gal)	PRT LEVEL %	PRT VOLUME (Gal)
0	303.2	35	4472.0	70	9799.8
1	371.9	36	4621.5	71	9942.5
2	445.6	37	4771.8	72	10084.0
3	523.9	38	4922.8	73	10224.1
4	606.7	39	5074.6	74	10362.9
5	693.6	40	5227.0	75	10500.3
6	784.5	41	5379.9	76	10636.1
7	879.0	42	5533.4	77	10770.4
8	977.0	43	5687.3	78	10903.1
9	1078.3	44	5841.7	79	11034.1
10	1182.7	45	5996.4	80	11163.3
11	1290.0	46	6151.4	81	11290.6
12	1400.2	47	6306.6	82	11416.0
13	1513.0	48	6461.9	83	11539.3
14	1628.4	49	6617.4	84	11660.6
15	1746.2	50	6772.9	85	11779.6
16	1866.2	51	6928.4	86	11896.2
17	1988.5	52	7083.8	87	12010.4
18	2112.9	53	7239.0	88	12122.0
19	2239.2	54	7394.1	89	12231.0
20	2367.5	55	7548.9	90	12337.0
21	2497.6	56	7703.4	91	12440.0
22	2629.4	57	7857.5	92	12539.9
23	2763.0	58	8011.2	93	12636.3
24	2898.1	59	8164.3	94	12729.2
25	3034.8	60	8316.9	95	12818.3
26	3172.9	61	8468.9	96	12903.4
27	3312.4	62	8620.3	97	12984.2
28	3453.3	63	8770.9	98	13060.5
29	3595.5	64	8920.7	99	13132.0
30	3738.9	65	9069.6	100	13198.3
31	3883.4	66	9217.7		
32	4029.1	67	9364.8		
33	4175.7	68	9510.9		
34	4323.4	69	9655.9		

End of Enclosure

Unit 1

JPM A2 SRO

Facility:	McGuire	Task No.:	
Task Title:	Perform/Review a Manual NC Leakage Calculation	JPM No.:	2010 Admin - JPM A2 SRO
K/A Reference:	GK/A 2.2.12 (4.1)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:
- Unit 1 is at 100% power.
- The Unit 1 OAC point M1L4554 is out of service.
- PT/1/A/4200/040 (Reactor Coolant Leakage Detection) has been completed showing that NCS Leakage is 1.6 gpm.
- A manual NC System leakage calculation is in progress in accordance with PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)
- Enclosure 13.2 (NC Leakage Determination Using Manual Calculations) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) has been completed through Step 1.9.

Task Standard: The operator will complete all calculations in accordance with the attached Key, identify that the Unidentified RCS Leakage Technical Specification has been exceeded, and the required ACTION.

Required Materials: None.

General References:
- PT/1/A/4200/040 (Reactor Coolant Leakage Detection)
- PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)
- McGuire Unit 1 Technical Specifications

Handouts:

PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) marked up as follows:

Step 7.1 – Initialed

Steps 8.1 through 8.5 – Initialed.

Step 12.1 Enclosure 13.2 Checkbox is checked.

PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) Enclosure 13.2 (NC Leakage Determinations Using Manual Calculations) marked up as follows:

Step 1.1 – Checkbox is checked/Initialed.

Step 1.2 – Initialed.

Step 1.3 – Initialed.

Determine VCT Purge Status Checkbox is checked.

Secured Checkbox is checked.

NC System leakage calculation is in progress Checkbox is checked.

To refrain from sampling..... Checkbox is checked.

Person Notified Mike Smith Today's Date/Time

Step 1.4 – Initialed.

NC System leakage calculation is in progress Checkbox is checked.

To check that NC sample..... Checkbox is checked.

NC System sampling..... Checkbox is checked.

Person Notified Melvin Smith Today's Date/Time

Step 1.5 – Initialed.

Step 1.6 – All Checkboxes checked/Initialed.

Step 1.7 – Initialed.

Step 1.7.1 – Initialed.

Step 1.7.2 – Initialed.

Step 1.8 – Initialed.

Step 1.9 – Initialed.

Enclosure 13.3 (NCDT Volume) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)

Enclosure 13.4 (PRT Volume) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)

McGuire Technical Specifications

Initiating Cue:

Using Enclosure 13.2 (NC Leakage Determination Using Manual Calculations), AND the attached Datasheet, complete the NC System Leakage Calculation, by performing Steps 1.10 and 1.11, **AND** evaluate the Acceptance Criteria.

Identify any Technical Specifications impacted and any required ACTION.

Time Critical Task: NO

Validation Time: 25 minutes

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue, and associated Datasheet (Last two (2) Pages of this JPM); and Handout PT/1/A/4150/001B procedure body marked up as described, Enclosure 13.2 marked up as described, Enclosure 13.3 and Enclosure 13.4.

START TIME: _____

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Enclosure 13.2, Steps 1.10.1 through 13, 22, 26 and 1.11.1) Record raw data.	The operator transposes raw data from the Data Sheet provided.		
2	(Enclosure 13.2, Step 1.10.14) Calculate change in NC System Tave:	The operator calculates the change in NC System Tave to be **0°F**, and records.		
3	(Enclosure 13.2, Step 1.10.15) Calculate VCT Leakage Rate:	The operator calculates the VCT Leakage Rate to be **1.55 gpm**, and records.		
4	(Enclosure 13.2, Step 1.10.16) Calculate PZR Leakage Rate:	The operator calculates the PZR Leakage Rate to be **0.02 gpm**, and records.		
5	(Enclosure 13.2, Step 1.10.17) Calculate Total Leakage:	The operator calculates the Total Leakage to be **1.57 gpm**, and records.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
6	(Enclosure 13.2, Step 1.10.18) Using Enclosure 13.4 (PRT Volume), record the following: Initial PRT Volume Final PRT Volume	The operator uses Enclosure 13.4 and an initial PRT Level of 76.0 %, and determines that initial PRT Volume is **10636.1 gal**, and records. The operator uses Enclosure 13.4 and interpolates a PRT Volume for 76.1% to be **10649.5 gal**, and records.		
7	(Enclosure 13.2, Step 1.10.19) Calculate PRT Leakage Rate:	The operator calculates the PRT Leakage Rate to be **.19 gpm**, and records.		
8	(Enclosure 13.2, Step 1.10. 20) Using Enclosure 13.3 (NCDT Volume), record the following: Initial NCDT Volume Final NCDT Volume	The operator uses Enclosure 13.3 and an initial NCDT Level of **30.0%**, and determines that initial NCDT Volume is **105.9 gal**, and records. The operator uses Enclosure 13.3 and a final NCDT Level of **33.0%**, and determines that final NCDT Volume is **116.2 gal**, and records.		
9	(Enclosure 13.2, Step 1.10.21) Calculate NCDT Leakage Rate:	The operator calculates the NCDT Leakage Rate to be **.14 gpm**, and records.		
10	(Enclosure 13.2, Step 1.10.23) Calculate Total Background Leakage:	The operator calculates the Total Background Leakage to be **0 gpm**, and records.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*11	(Enclosure 13.2, Step 1.10.24) Calculate Identified Leakage:	The operator calculates the Identified Leakage to be **0.33 (±10%) gpm**, and records.		
*12	(Enclosure 13.2, Step 1.10.25) Calculate Unidentified Leakage:	The operator calculates the Unidentified Leakage to be **1.24 (±10%) gpm**, and records.		
*13	(Enclosure 13.2, Step 1.10.26) Determine Total NC Pump #1 Seal Leakoff:	The operator calculates the Total NC Pumps #1 Seal Leakoff to be **12.8 (±10%) gpm**, and records.		
*14	(Enclosure 13.2, Step 1.10.27) Calculate Total Accumulative Leakage:	The operator calculates the Total Accumulative Leakage to be **14.37 (±10%) gpm**, and records.		
15	(Enclosure 13.2) Calculated By/ Date/Time:	The operator places their name in the Calculated by BLOCK, and signs. The operator enters the Date and Time.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*16	Technical Specification LCO 3.4.13: RCS operational LEAKAGE shall be limited to: a. No pressure boundary LEAKAGE; b. 1 gpm unidentified LEAKAGE; c. 10 gpm identified LEAKAGE; d. 389 gallons per day total primary to secondary LEAKAGE through all steam generators (SGs); and e. 135 gallons per day primary to secondary LEAKAGE through any one steam generator (SG). APPLICABILITY: MODES 1, 2, 3, and 4.	The operator returns the completed Enclosure 13.2 and reports that LCO 3.4.13.b (1 gpm unidentified LEAKAGE) has been exceeded. The operator identifies that CONDITION A is met, RCS Operational LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE or primary to secondary LEAKAGE; AND that the REQUIRED ACTION is to Reduce LEAKAGE to within limits, within 4 hours. **Examiner NOTE:** **See KEY on Page 10 of this JPM.**		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2010 Admin - JPM A2 SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

KEY:

Enclosure 13.2, Step 1.10.14 (JPM Step 2): Change in NC System Tave:
584.8°F – 584.8°F = 0°F

Enclosure 13.2, Step 1.10.15 (JPM Step 3): VCT Leakage Rate:
(53.4% – 47.6%) x19.3 gallons/%/72 minutes = 1.55 gallons per minute (gpm)

Enclosure 13.2, Step 1.10.16 (JPM Step 4): PZR Leakage Rate:
(54.9% – 54.1%) x 132.5 gallons/% x .01613 /72 minutes = 0.02 gallons per minute (gpm)

Enclosure 13.2, Step 1.10.17 (JPM Step 5): Total Leakage:
1.55 gpm + 0.02 gpm = 1.57 gpm

Enclosure 13.2, Step 1.10.18 (JPM Step 6): PRT Final Volume:

(10770.4-10636.1)/10 = 13.43/.1% PRT Level, 10636.1 + 13.43 = 10649.53 (gal)

Enclosure 13.2, Step 1.10.19 (JPM Step 7): Total PRT Leakage:
(10649.5 gallons – 10636.1 gallons)/72 minutes = 0.19 gallons per minute (gpm)

Enclosure 13.2, Step 1.10.21 (JPM Step 9): Total NCDT Leakage:
(116.2 gallons – 105.9 gallons)/72 minutes = 0.14 gallons per minute (gpm)

Enclosure 13.2, Step 1.10.23 (JPM Step 10): Total Background Leakage:
(0 gpm + 0 gpm) = 0 gpm

Enclosure 13.2, Step 1.10.24 (JPM Step 11): Identified Leakage:
(.19 gpm + .14 gpm + 0 gpm) = 0.33 gpm

Enclosure 13.2, Step 1.10.25 (JPM Step 12): Unidentified Leakage:
(1.57 gpm - .33 gpm) = 1.24 gpm

Enclosure 13.2, Step 1.10.26 (JPM Step 13): Total NC Pumps #1 Seal Leakoff:
(2.8 gpm + 3.6 gpm + 3.1 gpm + 3.3 gpm) = 12.8 gpm

Enclosure 13.2, Step 1.10.27 (JPM Step 14): Total Accumulative Leakage:
(.33 gpm + 1.24 gpm + 12.8 gpm) = 14.37 gpm

LCO 3.4.13.b (1 gpm unidentified LEAKAGE) has been exceeded, CONDITION A is met, RCS Operational LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE or primary to secondary LEAKAGE; AND that the REQUIRED ACTION is to Reduce LEAKAGE to within limits, within 4 hours.

INITIAL CONDITIONS:

Unit 1 is at 100% power.

The Unit 1 OAC point M1L4554 is out of service.

PT/1/A/4200/040 (Reactor Coolant Leakage Detection) has been completed showing that NCS Leakage is 1.6 gpm.

A manual NC System leakage calculation is in progress in accordance with PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)

Enclosure 13.2 (NC Leakage Determination Using Manual Calculations) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) has been completed through Step 1.9.

INITIATING CUE:

Using Enclosure 13.2 (NC Leakage Determination Using Manual Calculations), AND the attached Datasheet, complete the NC System Leakage Calculation, by performing Steps 1.10 and 1.11, **AND** evaluate the Acceptance Criteria.

Identify any Technical Specifications impacted and any required ACTION.

Data Sheet

Start Time	**0100**	
Stop Time	**0212**	
	Initial	**Final**
VCT Level	**53.4**	**47.6**
Pzr Level	**54.9**	**54.1**
NC System Tave	**584.8**	**584.8**
PRT Level	**76.0**	**76.1**
NCDT Level	**30**	**33**
NC Sample Purge Flow value recorded in Autolog		**0**
Any quantified (measured) leakage that has been identified		**0**
NC Pump 1A #1 Seal Leakoff Flow		**2.8**
NC Pump 1B #1 Seal Leakoff Flow		**3.6**
NC Pump 1C #1 Seal Leakoff Flow		**3.1**
NC Pump 1D #1 Seal Leakoff Flow		**3.3**
1EMF71 Reading		**1.2**
1EMF72 Reading		**1.7**
1EMF73 Reading		**1.1**
1EMF74 Reading		**1.9**

Duke Energy
McGuire Nuclear Station
Reactor Coolant Leakage Calculation

Procedure No.
PT/1/A/4150/001 B
Revision No.
067
Electronic Reference No.
MC0047QI

Continuous Use

PERFORMANCE

* * * * * * * * * * UNCONTROLLED FOR PRINT * * * * * * * * * *

(ISSUED) - PDF Format

Revision History (significant issues, limited to one page)	
Rev 067	Changed format of procedure to split out calculation performed by OAC and performed by manual calculation. Combined leakage calculation using the OAC steps with current Enclosure 13.1 and renamed enclosure "NC Leakage Calculation Using OAC". Combined manual leakage calculation steps with Enclosure 13.2 and renamed enclosure "NC Leakage Determination Using Manual Calculation". Changed all references throughout procedure to include these format changes. Encl. 13.5. Added Independent Verification sign offs for calculation of seven day rolling average of Unidentified Leakage. {PIP M-09-1307} Revised current steps for determining if Tier Two or Tier Three Action levels exceeded to reference step numbers associated with determination. Intent is to clarify steps. Reworded steps that state "IF directed" by engineering to "IF advised" by engineering. Definition of "directed" changed with new fatigue rule. Added PIP M-09-1857 as an additional reference to NCP seal leakage basis. Modified steps that begin with "WHEN" to reflect NSD 704 Rev 016 requirements.
Rev 066	Body of procedure. Added a limit and precaution about manipulation of VA System during leakage calculation has an affect on VCT level. Re-worded Step 12.6.17. The leakage calculation is considered valid after 60 minutes but is preferred to run up to 3 hours. The step as written requires the operator to print calculation after 60 minutes when 1 of 3 conditions met. This is procedure use and adherence issue. Re-worded step to give operator flexibility to print calculation summary between 60 minutes and 3 hours. Re-worded Step 12.6.35. If operator performs section 12.6.16 to abort leakage calculation early, enclosure 13.1 is not performed. 12.6.35 directs operator to perform Encl. 13.5, however, this enclosure requires data from enclosure 13.1. Re-worded step to stipulate if unit at 100% RTP AND Encl. 13.1 completed, then perform Encl. 13.5. Procedure use and adherence issue.
Rev 065	• Added step to make operator aware that if leakage calc ran for greater than 30 minutes but less than 60 minutes, the data can still be valid if it meets certain conditions. • Added step to record status of VCT purge at beginning of procedure. • Added steps to take NV-137A "hard" to VCT and back to "AUTO" prior to starting leakage calculation. • Encl. 13.5. Reworded section if any Tier One, Two, or Three Action level is exceeded to make it easier to understand.

Reactor Coolant Leakage Calculation

1. Purpose

✓ To determine NC System Leakage using the Operator Aid Computer (OAC) or manual calculations to ensure Tech Spec requirements met.

2. References

✓ 2.1 Tech Spec TS SR 3.4.13.1, 3.4.13.2, TS 3.4.15

✓ 2.2 SLC 16.9.7 Standby Shutdown System

✓ 2.3 MCS-1274.00-00-0016 (License Renewal Basis Spec), Section 4.29

✓ 2.4 UFSAR Chapter 18 (Aging Management Program and Activities), Table 18-1, Reactor Coolant Operational Leakage Monitoring Program

✓ 2.5 SLC 16.7.6 Radiation Monitoring for Plant Operation

✓ 2.6 WCAP-16423-NP (Methodology for calculating Unidentified NC System leakage)

✓ 2.7 WCAP-16465-NP (Action levels and response guidelines for increasing Unidentifed NC System leakage less than Tech Spec limits)

✓ 2.8 MCC-1201.01-00-0053 (MNS Unit 1 & 2 NC Pump Response to Loss of Seal Cooling)

3. Time Required

✓ 3.1 One operator for three hours every 72 hours.

4. Prerequisite Test

✓ None

5. Test Equipment

✓ None

Unit 1

6. Limits and Precautions

√ 6.1 NC System Tave, Reactor Power, Containment Temperature, and SM Pressure should remain constant during calculation.

√6.2 Positioning valves during calculation which could adversely affect results will invalidate the calculation.

√6.3 Performing Leakage Calculation between 3 am and 8 am on Wednesdays may cause calculation to fail due to OAC weekly backup routine.

√6.4 Performing PT/1/A/4200/019 (ECCS Pump and Piping Vent) during calculation could adversely affect results and will invalidate the calculation.

√6.5 Manipulation of VA System should be avoided while performing Leakage Calculation due to affect on VCT level.

7. Required Unit Status

SLM 7.1 NC System filled and vented with a steam bubble in the Pzr.

8. Prerequisite System Conditions

SLM 8.1 NC System Tave at steady state condition. (± 0.5°F)

SLM 8.2 Reactor Power at steady state condition. (± 0.2%)

SLM 8.3 Main Steam pressure at steady state condition. (± 1%)

SLM 8.4 NCDT and PRT will **NOT** need to be pumped down during calculation.

NOTE:✓ Background leakage consists of known valve stem leakage and NC Sample Purge Flow.

SLM 8.5 **IF** background leakage provided, data meets the following requirements:

- Measured within last 7 days
- Associated system conditions unchanged since calculated

9. Test Method

IF OAC available for leakage calculation, NC System leakage is calculated using a water inventory balance around the NC System based on input data from the OAC. OAC NC System Leakage Calculation will be initiated once per 72 hours and will then run automatically for 3 hours. During the first 15 minutes of calculation, no correlation coefficient will be displayed.

IF elapsed time greater than 60 minutes, program data may be used for leakage calculation when one of the following sets of criteria met:

- "TOTAL LEAKAGE BEST" **NOT** between ±0.15 gpm and "TOTAL LEAKAGE CORRELATION COEFF" greater than 0.6

  OR

- "TOTAL LEAKAGE BEST" less than 0.15 gpm and "IDENTIFIED LEAKAGE BEST" greater than or equal to "BACKGROUND LEAKAGE".

  OR

- "TOTAL LEAKAGE BEST" less than 0.1 gpm

IF plant stability can **NOT** be maintained **AND** elapsed time greater than 30 minutes, leakage calculation data may be used when absolute value for Total Leakage Correlation Coefficient greater than or equal to 0.50 and Identified Leakage Best greater than or equal to Background Leakage.

IF OAC is partially or wholly unavailable, NC System leakage will be calculated manually. Initial data will be recorded followed by final data after 60 - 75 minute wait. Tank volume / gallon conversion and water densities are used in equations to determine NC System leakage.

Individual NC Pump #1 Seal Leakoff flows will be recorded and compared to the maximum allowable limit of 4.0 gpm.

Primary to Secondary Leakage will be recorded from EMF indication(s) or Chemistry sample and compared to a maximum of 135 gpd through any one steam generator or a maximum of 389 gpd through all steam generators.

"TOTAL ACCUMULATIVE LEAKAGE" will be calculated using "IDENTIFIED LEAKAGE BEST", "UNIDENTIFIED LEAKAGE BEST" and "TOTAL NC PUMP SEAL LEAKOFF FLOWS".

10. Data Required

✓10.1 Enclosure 13.1 (NC Leakage Calculation Using OAC) or Enclosure 13.2 (NC Leakage Determination Using Manual Calculations).

✓10.2 **IF** Unit 1 at 100% RTP, Enclosure 13.5 (Evaluation of NC System Unidentified Leakage Results)

✓10.3 Indicate on cover sheet of this procedure under Remarks Section any special system alignments made for this calculation.

11. Acceptance Criteria

✓11.1 NC System Identified Leakage shall be limited to 10 gpm. (Reference TS 3.4.13)

✓11.2 NC System Unidentified Leakage shall be limited to 1 gpm. (Reference TS 3.4.13)

✓11.3 Total NC Pumps #1 Seal Leakoff shall be limited to 16.3 gpm. (Reference SLC 16.9.7) {PIP 04-3317}

✓11.4 Total Accumulative Leakage (sum of Identified Leakage, Unidentified Leakage, and NC Pumps #1 Seal Leakoff) shall be limited to 20 gpm. (Reference SLC 16.9.7) {PIP M99-3926}

✓11.5 Each NC Pump #1 Seal Leakoff flow shall be limited to a sustained value of less than 4.0 gpm. (Reference SLC 16.9.7, MCC-1201.01-00-0053) {PIP 05-779, M-09-1857}

✓11.6 Primary to Secondary Leakage shall be limited to 135 gpd through any one steam generator and 389 gpd through all steam generators. (Reference TS 3.4.13)

12. Procedure

12.1 Perform one of the following:

☐ Enclosure 13.1, NC Leakage Calculation Using OAC

OR

☑ Enclosure 13.2, NC Leakage Determination Using Manual Calculations

Unit 1

13. Enclosures

13.1 NC Leakage Calculation Using OAC

13.2 NC Leakage Determination Using Manual Calculations

13.3 NCDT Volume

13.4 PRT Volume

13.5 Evaluation of NC System Unidentified Leakage Results

End of Body

1. Procedure

☑ 1.1 Evaluate all outstanding R&Rs that may impact performance of this procedure.

NOTE: ✓• **IF** Unit 1 in Mode 3 or 4, this procedure is **NOT** required until 12 hours of steady state operation have elapsed.

✓• The first calculation is considered the first calculation after 18:00 hrs for normal operation.

SLM FOR 1.2 **IF** more than one leakage calculation performed per shift, a brief explanation should be entered on Autolog indicating reason for repeating calculation.

NOTE: ✓A continuous vent is maintained on the PRT and a continuous purge is maintained on the VCT by Radwaste Chemistry.

SLM 1.3 Notify Radwaste Chemistry of the following:

☑ Determine VCT purge status:

☐ Active ☑ Secured

☑ NC System leakage calculation is in progress

☑ To refrain from sampling PRT, NCDT and VCT or changing vent (purge) status of PRT, NCDT and VCT {PIPM-00-0615}

Mike Smith ____/____
Person Notified Date Time

SLM 1.4 Notify Primary Chemistry of the following:

☑ NC System leakage calculation is in progress

☑ To check that NC Sample Purge Flow value is unchanged from the current Autolog entry (Prerequisite System Condition 8.5)

☑ NC System sampling shall only be performed with permission from the Control Room

Melvin Smith ____/____
Person Notified Date Time

SLM 1.5 Ensure adequate VCT level to prevent auto makeup during calculation.

NOTE: ✓ Leakage Calculation will be invalid if any valve in Step 1.6 or 1.7 is repositioned during calculation.

1.6 Check closed:

- ☑ 1NC-58A (PRT Spray Supply Block)
- ☑ 1NI-9A (NC Cold Leg Inj From NV)
- ☑ 1NI-10B (NC Cold Leg Inj From NV)
- ☑ 1NV-39A (A NC Pump Standpipe Fill)
- ☑ 1NV-55B (B NC Pump Standpipe Fill)
- ☑ 1NV-71A (C NC Pump Standpipe Fill)
- ☑ 1NV-87B (D NC Pump Standpipe Fill)
- ☑ 1NV-171A (BA Blender To VCT Inlet)
- ☑ 1NV-175A (BA Blender To VCT Outlet)
- ☑ 1NV-221A (NV Pumps Suct From FWST)
- ☑ 1NV-222B (NV Pumps Suct From FWST)

SLM 1.7 **IF** 1NV-137A (NC Filters Otlt 3-Way Cntrl) in "AUTO", perform the following:

SLM 1.7.1 Place 1NV-137A to "VCT" position.

SLM 1.7.2 **HOLD** until 1NV-137A indicates "VCT", **THEN** place 1NV-137A to "AUTO".

SLM 1.8 Place "1WL-23 Mode Select" in "MAN".

SLM 1.9 Close 1WL-23 (NCDT Pump Level Control).

☐ 1.10 Perform the following:

NOTE: **IF** available, the OAC should be used to obtain data required for calculation.

☐ 1.10.1 Record Start Time: _____

☐ 1.10.2 Record initial VCT Level (M1P0201): _____ %

☐ 1.10.3 Record initial PZR Level (M1P0200): _____ %

NOTE: **IF** Tave less than 530°F **AND** OAC unavailable, Tave must be calculated using WR T_H and T_C.

☐ 1.10.4 Record initial NC System Tave (M1P1479): _____ °F

☐ 1.10.5 Record initial PRT Level (M1P0202): _____ %

☐ 1.10.6 Record initial NCDT Level (M1P0203): _____ %

_____ 1.10.7 **HOLD** until 60 - 75 minutes elapsed.

☐ 1.10.8 Record Stop Time: _____

☐ 1.10.9 Record final VCT Level (M1P0201): _____ %

☐ 1.10.10 Record final PZR Level (M1P0200): _____ %

NOTE: **IF** Tave less than 530°F **AND** OAC unavailable, Tave must be calculated using WR T_H and T_C.

☐ 1.10.11 Record final NC System Tave (M1P1479): _____ °F

☐ 1.10.12 Record final PRT Level (M1P0202): _____ %

☐ 1.10.13 Record final NCDT Level (M1P0203): _____ %

NOTE: **IF** change in Tave greater than 0.25°F (0.1°F using OAC), calculation is invalid and must be repeated.

☐ 1.10.14 Calculate change in NC System Tave:

_____ (Initial (Step 1.10.4)) - _____ (Final (Step 1.10.11)) = _____ °F

☐ 1.10.15 Calculate VCT Leakage Rate:

$$\frac{[\text{Initial Level (\%)} - \text{Final Level (\%)}] \times (19.3\ \text{Gal/\%})}{\text{Stop Time - Start Time (Min)}}$$

$$\frac{[\ \text{Initial (Step 1.10.2)} - \text{Final (Step 1.10.9)}\ ] \times 19.3}{\text{Stop Time (Step 1.10.8)} - \text{Start Time (Step 1.10.1)}} = \_\_\_\_\_\ \text{gpm}$$

☐ 1.10.16 Calculate PZR Leakage Rate:

$$\frac{[\text{Initial Level (\%)} - \text{Final Level (\%)}] \times (132.5\ \text{Gal/\%}) \times (0.01613^{1})}{\text{Stop Time - Start Time (Min)}}$$

$$\frac{[\ \text{Initial (Step 1.10.3)} - \text{Final (Step 1.10.10)}\ ] \times 132.5 \times 0.01613}{\text{Stop Time (Step 1.10.8)} - \text{Start Time (Step 1.10.1)}} = \_\_\_\_\_\ \text{gpm}$$

☐ 1.10.17 Calculate Total Leakage:

_____ (VCT Leakage Rate (Step 1.10.15)) + _____ (PZR Leakage Rate (Step 1.10.16)) = _____ gpm

☐ 1.10.18 Using Enclosure 13.4 (PRT Volume), record the following:

- Initial PRT Volume: _____ gal (Step 1.10.5)
- Final PRT Volume: _____ gal (Step 1.10.12)

☐ 1.10.19 Calculate PRT Leakage Rate:

$$\frac{\text{Final Volume (Step 1.10.18)} - \text{Initial Volume (Step 1.10.18)}}{\text{Stop Time (Step 1.10.8)} - \text{Start Time (Step 1.10.1)}} = \_\_\_\_\_\ \text{gpm}$$

[1] Specific Volume for saturated liquid at PZR temperature.

☐ 1.10.20 Using Enclosure 13.3 (NCDT Volume), record the following:

- Initial NCDT Volume: _____ gal (Step 1.10.6)
- Final NCDT Volume: _____ gal (Step 1.10.13)

☐ 1.10.21 Calculate NCDT Leakage Rate:

$$\frac{\text{Final Volume (Step 1.10.20)} - \text{Initial Volume (Step 1.10.20)}}{\text{Stop Time (Step 1.10.8)} - \text{Start Time (Step 1.10.1)}} = \_\_\_\_\_ \text{ gpm}$$

☐ 1.10.22 Record the following:

- NC Sample Purge Flow value recorded in Autolog: _____ gpm
- Any quantified (measured) leakage that has been identified: _____ gpm

☐ 1.10.23 Calculate Total Background Leakage:

$$\underset{\text{NC Purge (Step 1.10.22)}}{\_\_\_\_\_} + \underset{\text{Quantified (Step 1.10.22)}}{\_\_\_\_\_} = \_\_\_\_\_ \text{ gpm}$$

☐ 1.10.24 Calculate Identified Leakage:

$$\underset{\text{PRT Leakage Rate (Step 1.10.19)}}{\_\_\_\_\_} + \underset{\text{NCDT Leakage Rate (Step 1.10.21)}}{\_\_\_\_\_} + \underset{\text{Background Leakage (Step 1.10.23)}}{\_\_\_\_\_} = \_\_\_\_\_ \text{ gpm}^2 \text{ (< 10 gpm)}$$

☐ 1.10.25 Calculate Unidentified Leakage:

$$\underset{\text{Total Leakage (Step 1.10.17)}}{\_\_\_\_\_} - \underset{\text{Identified Leakage (Step 1.10.24)}}{\_\_\_\_\_} = \_\_\_\_\_ \text{ gpm}^2 \text{ (< 1 gpm)}$$

☐ 1.10.26 Determine Total NC Pump #1 Seal Leakoff flow:

- NC Pump 1A #1 Seal Leakoff Flow _____ gpm [2] (< 4.0 gpm)
- NC Pump 1B #1 Seal Leakoff Flow + _____ gpm [2] (< 4.0 gpm)
- NC Pump 1C #1 Seal Leakoff Flow + _____ gpm [2] (< 4.0 gpm)
- NC Pump 1D #1 Seal Leakoff Flow + _____ gpm [2] (< 4.0 gpm)

Total NC Pumps #1 Seal Leakoff = _____ gpm [2] (< 16.3 gpm)

[2] Acceptance Criteria Value

NOTE: "0" should be entered below for any negative identified or unidentified value.

☐ 1.10.27 Calculate "Total Accumulative Leakage":

_____ (Identified (Step 1.10.24)) + _____ (Unidentified (Step 1.10.25)) + _____ (Total NC Seal Leakoff (Step 1.10.26)) = _____ (Total Accumulative Leakage) gpm [3] (< 20 gpm)

1.11 Determine Primary to Secondary Leakage by performing the following:

_____ 1.11.1 **IF** in Mode 1 **AND** greater than or equal to 40% RTP, record indication on the following:

- 1EMF71: _____ gpd
- 1EMF72: _____ gpd
- 1EMF73: _____ gpd
- 1EMF74: _____ gpd

_____ 1.11.1.1 **IF** any N-16 EMF inoperable, perform the following:

_____ A. Notify Secondary Chemistry to provide Primary to Secondary leakage.

_____ (Person Notified) _____/_____ (Date / Time)

☐ B. Record Primary to Secondary leakage as determined by Secondary Chemistry: _____ gpd [3]

☐ C. Record date and time Primary to Secondary leakage was determined (provided by Secondary Chemistry):

_____ (Date) / _____ (Time)

_____ 1.11.2 **IF** in Mode 1 **AND** less than 40% RTP, perform the following:

_____ 1.11.2.1 Notify Secondary Chemistry to provide Primary to Secondary leakage.

_____ (Person Notified) _____/_____ (Date / Time)

[3] This value is a total primary to secondary leakage of all four S/Gs. A value of less than or equal to 135 gpd conservatively implies leakage through any one S/G is less than or equal to 135 gpd.

☐ 1.11.2.2 Record Primary to Secondary leakage as determined by Secondary Chemistry: _____ gpd [4]

☐ 1.11.2.3 Record date and time Primary to Secondary leakage was determined (provided by Secondary Chemistry):

_____ / _____
Date Time

_____ 1.11.3 **IF** in Modes 2, 3 or 4, perform the following:

_____ 1.11.3.1 Notify Secondary Chemistry to provide Primary to Secondary leakage via grab sample.

_____ _____/_____
Person Notified Date Time

☐ 1.11.3.2 Record Primary to Secondary leakage as determined by Secondary Chemistry grab sample: _____ gpd [4]

☐ 1.11.3.3 Record date and time Primary to Secondary leakage was determined (provided by Secondary Chemistry):

_____ / _____
Date Time

Calculated By:_____ Date: _____ Time: _____

Checked By: _____ Date: _____ Time: _____

[4] This value is a total primary to secondary leakage of all four S/Gs. A value of less than or equal to 135 gpd conservatively implies leakage through any one S/G is less than or equal to 135 gpd.

☐ 1.12 In Autolog, perform the following:

NOTE:
- Calculations run during power escalation **AND** other than Mode 1 calculations should be identified as such.
- The first calculation is considered the first calculation after 18:00 hrs for normal operation.

1.12.1 Enter the following values with any pertinent comments:

☐ "IDENTIFIED" leakage (Step 1.10.24)
☐ "UNIDENTIFIED" leakage (Step 1.10.25)
☐ "TOTAL NC PUMPS #1 SEAL LEAKOFF" leakage (Step 1.10.26)
☐ "TOTAL" leakage (Step 1.10.27)
☐ "CALCULATION START TIME"
☐ Primary to Secondary leakage

_____ 1.12.2 **IF** other than the first calculation for the day, record reason and any pertinent comments.

NOTE: Unidentified Leakage values are expected to be within ±0.5 gpm for Manual Calculations. Exceeding ±0.5 gpm does **NOT** invalidate leakage calculation.

_____ 1.13 **IF** unidentified leakage **NOT** between ±0.5 gpm, notify Primary System Engineer.

_____ _____/_____
Person Notified Date Time

1.14 Evaluate Acceptance Criteria per one of the following:

☐ 1.14.1 Check Acceptance Criteria specified in Section 11 met.

OR

_____ 1.14.2 **IF** Acceptance Criteria specified in Section 11 **NOT** met, perform the following:

_____ SRO 1.14.2.1 Log applicable Tech Spec or SLC. {PIP M-07-00393}

_____ SRO 1.14.2.2 **IF** Total NC Pumps #1 Seal Leakoff is greater than 16.3 gpm, declare SSF capability degraded.

_____ SRO 1.14.2.3 **IF** Total Accumulative Leakage is greater than 20 gpm **OR** Total NC Pumps #1 Seal Leakoff greater than 16.3 gpm, notify Security of degraded SSF capabilities.

_____ _____/_____
Person Notified Date Time

_____ SRO 1.14.2.4 **IF** any NC Pump #1 Seal Leakoff has a sustained value of greater than **OR** equal to 4.0 gpm, notify SSS Engineer and Security of degraded SSF capability.

_____ _____/_____
Person Notified Date Time

_____ 1.15 **IF** this is the second Leakage Calculation and elevated leakage is indicated, evaluate performing PT/1/A/4150/001 D (Identifying NC System Leakage).

_____ 1.16 Lower NCDT level less than 48%.

_____ 1.17 Close 1WL-23 (NCDT Level Control).

_____ 1.18 Place "1WL-23 Mode Select" to "AUTO".

_____ 1.19 Notify Radwaste Chemistry of the following:

☐ NC System leakage calculation is complete

☐ PRT, NCDT and VCT sampling or venting may be initiated {PIPM-00-0615}

_____ _____/_____
Person Notified Date Time

_____ 1.20 Notify Primary Chemistry of the following:

☐ NC System leakage calculation is complete

☐ NC System sampling may be initiated

_____ _____/_____
Person Notified Date Time

_____ 1.21 **IF** Unit 1 at 100% RTP **AND** OAC is available, perform Enclosure 13.5 (Evaluation of NC System Unidentified Leakage Results).

End of Enclosure

NCDT LEVEL %	NCDT VOLUME (Gal)	NCDT LEVEL %	NCDT VOLUME (Gal)	NCDT LEVEL %	NCDT VOLUME (Gal)
0	19.7	35	123.1	70	247.3
1	21.9	36	126.6	71	250.7
2	24.1	37	130.1	72	254.0
3	26.4	38	133.6	73	257.3
4	28.8	39	137.1	74	260.6
5	31.2	40	140.7	75	263.9
6	33.7	41	144.3	76	267.2
7	36.2	42	147.8	77	270.4
8	38.8	43	151.4	78	273.6
9	41.4	44	155.0	79	276.8
10	44.1	45	158.6	80	279.9
11	46.9	46	162.2	81	283.0
12	49.6	47	165.8	82	286.1
13	52.5	48	169.4	83	289.1
14	55.3	49	173.0	84	292.1
15	58.2	50	176.6	85	295.1
16	61.2	51	180.2	86	298.0
17	64.2	52	183.8	87	300.9
18	67.2	53	187.5	88	303.8
19	70.3	54	191.1	89	306.6
20	73.4	55	194.7	90	309.4
21	76.5	56	198.2	91	312.1
22	79.6	57	201.8	92	314.7
23	82.8	58	205.4	93	317.4
24	86.0	59	209.0	94	319.9
25	89.3	60	212.5	95	322.4
26	92.6	61	216.1	96	324.9
27	95.9	62	219.6	97	327.3
28	99.2	63	223.1	98	329.6
29	102.5	64	226.6	99	331.9
30	105.9	65	230.1	100	334.0
31	109.3	66	233.6		
32	112.7	67	237.0		
33	116.2	68	240.5		
34	119.6	69	243.9		

End of Enclosure

Unit 1

PRT LEVEL %	PRT VOLUME (Gal)	PRT LEVEL %	PRT VOLUME (Gal)	PRT LEVEL %	PRT VOLUME (Gal)
0	303.2	35	4472.0	70	9799.8
1	371.9	36	4621.5	71	9942.5
2	445.6	37	4771.8	72	10084.0
3	523.9	38	4922.8	73	10224.1
4	606.7	39	5074.6	74	10362.9
5	693.6	40	5227.0	75	10500.3
6	784.5	41	5379.9	76	10636.1
7	879.0	42	5533.4	77	10770.4
8	977.0	43	5687.3	78	10903.1
9	1078.3	44	5841.7	79	11034.1
10	1182.7	45	5996.4	80	11163.3
11	1290.0	46	6151.4	81	11290.6
12	1400.2	47	6306.6	82	11416.0
13	1513.0	48	6461.9	83	11539.3
14	1628.4	49	6617.4	84	11660.6
15	1746.2	50	6772.9	85	11779.6
16	1866.2	51	6928.4	86	11896.2
17	1988.5	52	7083.8	87	12010.4
18	2112.9	53	7239.0	88	12122.0
19	2239.2	54	7394.1	89	12231.0
20	2367.5	55	7548.9	90	12337.0
21	2497.6	56	7703.4	91	12440.0
22	2629.4	57	7857.5	92	12539.9
23	2763.0	58	8011.2	93	12636.3
24	2898.1	59	8164.3	94	12729.2
25	3034.8	60	8316.9	95	12818.3
26	3172.9	61	8468.9	96	12903.4
27	3312.4	62	8620.3	97	12984.2
28	3453.3	63	8770.9	98	13060.5
29	3595.5	64	8920.7	99	13132.0
30	3738.9	65	9069.6	100	13198.3
31	3883.4	66	9217.7		
32	4029.1	67	9364.8		
33	4175.7	68	9510.9		
34	4323.4	69	9655.9		

End of Enclosure

Unit 1

JPM A3 RO/SRO

Facility:	McGuire	Task No.:	
Task Title:	Perform a Unit Vent Flow Calculation of a Containment Air Release	JPM No.:	Exam 2010 Admin - JPM A3 RO/SRO
K/A Reference:	GK/A 2.3.11 (3.8/3.8)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

GWR Package # 2010013 for Unit 1 Containment Air Release is currently in use to conduct a series of Containment air releases.

During the first release, conducted using Enclosure 4.2 (Air Release Mode With VQ Flow Monitor Operable) of OP/1/A/6450/017 (Containment Air Addition and Release), the Unit 1 VQ Monitor became inoperable.

The crew stopped the release and continued the air release using Enclosure 4.3 (Air Release Mode with VQ Flow Monitor Inoperable) of OP/1/A/6450/017 (Containment Air Addition and Release).

Three previous releases have been made; including the one which was made with the Unit 1 VQ Flow Monitor in operation.

At 1743 on 8/4/10, containment pressure was 0.17 PSIG and a VQ release was initiated to reduce pressure to 0.12 PSIG per Step 3.8 of Enclosure 4.3.

This release was secured at 1839 on 8/4/10 and the procedure was completed through step 3.7.1 for this release.

RP has requested that the current GWR paperwork be closed out after the on-going release.

Task Standard:	The operator will calculate the volume of air released from the Containment during the final release, and determine the total volume of air released in the series of four releases in accordance with the provided KEY.
Required Materials:	Calculator
General References:	OP/1/A/6450/017 (Containment Air Addition and Release)

Handouts:

Handout #1 - Enclosure 4.2 (Air Release Mode With VQ Flow Monitor Operable) of OP/1/A/6450/017 (Containment Air Addition and Release) marked up as follows:

Step 2.1 – Initialed.

Step 2.2 – Initialed.

Step 2.3 – Initialed.

Step 2.4 – Initialed, GWR# 2010013 recorded.

Step 3.1 – Checkbox is checked and Initialed.

Step 3.2 – Initialed.

Step 3.2.1 – Initialed and CV initialed.

Step 3.2.2 – Initialed and CV initialed.

Step 3.2.3 – Initialed and **Mike Cline**/Date/Time Recorded consistent with first release Date/Time (8/4/10 0903).

Step 3.3 – Initialed.

Step 3.3.1 – Initialed.

Step 3.3.2 – Checkbox is checked and Initialed.

Step 3.4 – Initialed and CV initialed.

Step 3.5 – Initialed.

Step 3.6 – Initialed.

Step 3.7 – Initialed.

Step 3.7.1 – Checkbox is checked and Initialed.

Step 3.7.2 – Checkbox is checked and Initialed.

Step 3.7.3 – Initialed and CV initialed, VQ Monitor flow is recorded as 1594, and Actual Volume Released is recorded as 15,940.

Step 3.7.4 – Initialed.

Step 3.7.5 – Checkbox is checked and Initialed.

Step 3.8.1 – Checkbox is checked and Initialed.

Step 3.8.2 – Checkbox is checked and Initialed.

Step 3.8.3 – Checkbox is checked and Initialed.

Step 3.8.4 – Checkbox is checked and Initialed.

Step 3.8.5 – Both Checkbox' are checked and Initialed.

Step 3.8.6 – Initialed.

Step 3.9 – Initialed.

Page 5 of 5 (Attachment 1) is marked up as follows: Sheet **1** of **1**

1VQ-2B Open				1VQ-2B Closed		
Doer	**CV**	**VQ Flow Monitor Counting (√)**	**Date/Time**	**Doer**	**CV**	**Date/Time**
Initial	Initial	√	8/4/10 0903	Initial	Initial	8/4/10 1016

Handout #2 - Enclosure 4.3 (Air Release Mode With VQ Flow Monitor Inoperable) of OP/1/A/6450/017 (Containment Air Addition and Release) marked up as follows:

Step 2.1 – Initialed.

Step 2.2 – Initialed.

Step 2.3 – Initialed.

Step 2.4 – Initialed, GWR# 2010013 recorded.

Step 3.1 – Checkbox is checked and Initialed.

Step 3.2 – Initialed.

Step 3.2.1 – Initialed and CV initialed.

Step 3.2.2 – Initialed and CV initialed.

Step 3.2.3 – Initialed and Person Notified/Date/Time Recorded consistent with **first** release Date/Time on Page 6 of 6.

Step 3.3 – Initialed.

Step 3.4 – Initialed and CV initialed.

Step 3.5.1 – Checkbox is checked and Initialed.

Step 3.5.2 – Checkbox is checked and Initialed.

Step 3.5.3 – Checkbox is checked and Initialed.

Step 3.5.4 – Both Checkbox' are checked and Initialed.

Step 3.5.5 – Checkbox is checked and Initialed.

Step 3.5.6 – Initialed.

Step 3.6 – NA and Initialed.

Step 3.7 – Initialed.

Step 3.7.1 - Checkbox is triple-checked and Initialed.

Step 3.7.2-3 - Checkbox is double-checked and Initialed.

Step 3.8 – Initialed.

Step 3.9.1 through 3.9.3 – Initialed.

Page 6 of 6 (Attachment 1) is marked as follows: Sheet **1** of **1**

1VQ-2B Open				1VQ-2B Closed					
Doer	CV	Date/Time	Start Pressure (psig)	Doer	CV	Date/Time	Stop Pressure (psig)	Ft^3 Released	Total Ft^3 Released
Initial	Initial	8/4/10 1117	0.21	Initial	Initial	8/4/10 1258	0.12	21,469.28	21,469.28
Initial	Initial	8/4/10 1432	0.19	Initial	Initial	8/4/10 1547	0.12	15,534.63	37,003.91
Initial	Initial	8/4/10 1743	0.17	Initial	Initial		0.12		

Initiating Cue: You have been directed to calculate the volume released for this release and complete all required paperwork starting with Step 3.7.2, **AND**, since this is the last release perform Steps 3.9.4 through 3.9.8 of Enclosure 4.3 to determine the total volume released from the Containment.

The CRS notified RP (Mike Cline) at 1840 on 8/4/10 that the release has been terminated.

Complete all required paperwork.

Time Critical Task: NO

Validation Time: 15 minutes

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handouts #1 and #2.

START TIME: _____

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Enclosure 4.3, Step 3.7.2) Record stop date/time on Attachment 1	The operator records **8/4/10 1839** in the 1VQ-2B Closed Date/Time Block of Attachment 1.		
2 *	(Step 3.7.3) Calculate volume released using the following and record on Attachment 1. Cu. Ft. Released = X + (YxZ) Where: X and Y are from Table 1 Z is actual release duration in minutes from Attachment 1.	The operator uses Table 1 of Enclosure 4.3 and determines X to be **10.51** (Start Pressure of 0.17). The operator uses Table 1 of Enclosure 4.3 and determines Y to be **201.1** (Start Pressure of 0.17). The operator uses Attachment 1 of Enclosure 4.3 and determines Z to be **56** (Stop Time of 1839 - Start Time of 1743). The operator calculates volume released as follows: 10.51 + (201.1 x 56) = **11,272.11±1% (See KEY),** and records this value in the 1VQ-2B Closed Cubic Ft Released Block of Attachment 1.		
3	(Step 3.9.4) Ensure release stop date/time recorded on Attachment 1.	The operator ensures **8/4/10 1839** recorded in the 1VQ-2B Closed Date/Time Block of Attachment 1.		
4	(Step 3.9.5) Notify RP that release has been terminated ……	The operator recognizes from the initial conditions that RP has been notified.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
5 *	(Step 3.9.6) Determine Total Cu. Ft Released on Attachment 1.	The operator adds the volume of this most recent release (**11,272.11**) to the total previously released on Attachment 1 (**37,003.91**) and determines that the total volume released is **<u>48,276.02 ft^3 ±1% (See KEY)</u>**. The operator records this value in the 1VQ-2B Closed Total Cubic Ft Released Block of Attachment 1.		
6	(Step 3.9.7) Record Total Cu. Ft Released from Attachment 1:________ft^3	The operator records **<u>48,276.02</u>** in the 1VQ-2B Closed Cubic Ft Released Block of Attachment 1.		
7 *	(Step 3.9.8) IF Enclosure 4.2 (Air Release Mode With VQ Flow Monitor Operable) was used during this release, perform the following: (Step 3.9.8.1) Record Actual Volume Released from Enclosure 4.2, Step 3.7.3. ________ft^3 (Step 3.9.8.2) Calculate Total Volume Released as follows: ____ ft^3 + ____ ft^3 = ____ ft^3 Step 3.10.7 Step 3.10.8.1 Total Vol Rel	The operator observes Step 3.7.3 of Enclosure 4.2 and determines that **<u>15,940</u>** ft^3 had been released when the VQ Monitor was operable, and records this value on Enclosure 4.3, Step 3.9.8.1. The operator adds the total volume released recorded in Step 3.9.7 (**<u>48,276.02</u>**) and the total volume released recorded in Step 3.9.8.1 (**<u>15,940</u>**), and determines the Total Volume Released for this series of Containment Air Releases is **<u>64,216.02 ft^3 ±1% (See KEY)</u>**.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ____________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2010 Admin - JPM A3 RO/SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

KEY:

Enclosure 4.3, Attachment 1:

RED = filled in at start of JPM.
GREEN = filled in during JPM performance

1VQ-2B Open				1VQ-2B Closed					
Doer	CV	Date/Time	Start Pressure (psig)	Doer	CV	Date/Time	Stop Pressure (psig)	Ft^3 Released	Total Ft^3 Released
Initial	Initial	8/4/10 1117	0.21	Initial	Initial	8/4/10 1258	0.12	21,469.28	21,469.28
Initial	Initial	8/4/10 1432	0.19	Initial	Initial	8/4/10 1547	0.12	15,534.63	37,003.91
Initial	Initial	8/4/10 1743	0.17	Initial	Initial	8/4/10 1839	0.12	11,272.11	48,276.02

Enclosure 4.3, Step 3.7.3 (JPM Step 2): Volume released, current release:
10.51 ft^3 + (201.1 ft^3/min x 56 min) = 11,272.11 ft^3

Enclosure 4.3, Step 3.9.7 (JPM Step 3): Total Volume released, during performance of Enclosure 4.3:
11,272.11 ft^3 + 37,003.91 ft^3 = 48,276.02 ±1% ft^3 (47,793.26 – 48758.78)

Enclosure 4.3, Step 3.9.8.2 (JPM Step 5): Total Volume released, during performance of GW Permit:
48,276.02 ft^3 + 15940 ft^3 = 64,216.02 ±1% ft^3 (63,573.86 - 64,858.18)

JPM CUE SHEET

INITIAL CONDITIONS:

GWR Package # 2010013 for Unit 1 Containment Air Release is currently in use to conduct a series of Containment air releases.

During the first release, conducted using Enclosure 4.2 (Air Release Mode With VQ Flow Monitor Operable) of OP/1/A/6450/017 (Containment Air Addition and Release), the Unit 1 VQ Monitor became inoperable.

The crew stopped the release and continued the air release using Enclosure 4.3 (Air Release Mode with VQ Flow Monitor Inoperable) of OP/1/A/6450/017 (Containment Air Addition and Release).

Three previous releases have been made; including the one which was made with the Unit 1 VQ Flow Monitor in operation.

At 1743 on 8/4/10, containment pressure was 0.17 PSIG and a VQ release was initiated to reduce pressure to 0.12 PSIG per Step 3.8 of Enclosure 4.3.

This release was secured at 1839 on 8/4/10 and the procedure was completed through step 3.7.1 for this release.

RP has requested that the current GWR paperwork be closed out after the on-going release.

INITIATING CUE:

You have been directed to calculate the volume released for this release and complete all required paperwork starting with Step 3.7.2, **AND**, since this is the last release perform Steps 3.9.4 through 3.9.8 of Enclosure 4.3 to determine the total volume released from the Containment.

The CRS notified RP (Mike Cline) at 1840 on 8/4/10 that the release has been terminated.

Complete all required paperwork.

1. Limits and Precautions

√ 1.1 Containment Pressure Tech Spec limit is ±0.3 psig.

√ 1.2 All Engineered Safeguards Valves shall be cycled electrically after any manual operation.

2. Initial Conditions

SLM 2.1 Per Tech Spec 3.9.4, movement of recently irradiated fuel assemblies within Containment, is **NOT** in progress. {PIP M-05-1608, PIP M-07-0033, CAPR}

SLM 2.2 VQ Flow Monitor is operable.

SLM 2.3 Containment pressure requires an air release.

SLM 2.4 GWR # 2010013 has been issued.

3. Procedure

☑ 3.1 Evaluate all outstanding R&Rs that may impact performance of this procedure.

SLM 3.2 **IF** 1EMF-39L monitoring release, perform the following:

FBK CV SLM 3.2.1 Ensure 1EMF-39L Trip 1 setpoint set per GWR.

FBK CV SLM 3.2.2 Ensure 1EMF-39L Trip 2 setpoint set per GWR.

SLM 3.2.3 Notify RP to update 1EMF-39L setpoints in EMF Setpoint Log.

Mike Cline 8/4/10 / 0903
Person Notified Date Time

SLM 3.3 **IF** this is initial release **OR** directed to this enclosure from Enclosure 4.3, (Air Release Mode With VQ Flow Monitor Inoperable), perform the following:

SLM 3.3.1 Reset VQ Flow Monitor.

☑ 3.3.2 Record Release start date and time on GWR paperwork.

FBK CV SLM 3.4 Throttle 1VQ-4 (VQ To Unit Vent Control) 15% open.

SLM 3.5 Ensure 1VQ-2B (Cont Air Rel Outside Isol) closed.

SLM 3.6 Open 1VQ-1A (Cont Air Rel Inside Isol).

SLM 3.7 **IF AT ANY TIME** VQ Flow Monitor stops counting **OR** becomes inoperable, perform the following:

☑ 3.7.1 Ensure 1VQ-2B (Cont Air Rel Outside Isol) closed per Attachment 1.

☑ 3.7.2 Ensure release stop date / time recorded on Attachment 1.

FBK CV SLM 3.7.3 Record VQ Flow Monitor actual volume released as follows: {PIP 05-5685}

1594 x 10 = 15,940 ft^3

VQ Flow Monitor Actual Volume Released

SLM 3.7.4 Reset VQ Flow Monitor.

☑ 3.7.5 Exit this enclosure and go to Enclosure 4.3 (Air Release Mode With VQ Flow Monitor Inoperable).

3.8 Start initial VQ release as follows:

☑ 3.8.1 Open 1VQ-2B (Cont Air Rel Outside Isol) per Attachment 1.

☑ 3.8.2 Maintain a release rate less than 300 cfm by throttling 1VQ-4 (VQ To Unit Vent Control).

☑ 3.8.3 Record that VQ Flow Monitor is counting on Attachment 1.

☑ 3.8.4 Record start date / time on Attachment 1.

3.8.5 Record the following in Auto Log:

☑ Release number
☑ Start time

SLM 3.8.6 Ensure "Release Initiation" on GWR is completed.

SLM 3.9 To secure release, close 1VQ-2B (Cont Air Rel Outside Isol) per Attachment 1.

____ 3.10 **IF AT ANY TIME** it is desired to throttle 1VQ-4 (VQ To Unit Vent Control) in subsequent releases, maintain release rate less than 300 cfm.

____ 3.11 **IF** subsequent releases with existing GWR are required, maintain containment pressure less than 0.20 psig per Attachment 1.

_____ 3.12 **IF** desired to close out existing GWR, perform the following:

_____ 3.12.1 Close 1VQ-1A (Cont Air Rel Inside Isol).

_____ / _____ 3.12.2 Close 1VQ-4 (VQ To Unit Vent Control).
CV

_____ 3.12.3 Ensure 1VQ-2B (Cont Air Rel Outside Isol) closed per Attachment 1.

_____ 3.12.4 Ensure release stop date / time recorded on Attachment 1.

_____ 3.12.5 Notify RP that VQ release has been terminated and 1EMF-38, 1EMF-39, and 1EMF-40 setpoints need to be evaluated. {PIP 1-M97-1925}

_____ _____/_____
Person Notified Date Time

_____ / _____ 3.12.6 Record VQ Flow Monitor total volume released as follows: {PIP 05-5685}
CV

_____ x 10 = _____ ft^3
VQ Flow Monitor Total Volume Released

_____ 3.12.7 **IF** Enclosure 4.3 (Air Release Mode With VQ Flow Monitor Inoperable) was used during this release, perform the following:

☐ 3.12.7.1 Record "Total Cu Ft Released" from Enclosure 4.3, Attachment 1:

_____ ft^3

☐ 3.12.7.2 Calculate Total Volume Released as follows:

_____ ft^3 + _____ ft^3 = _____ ft^3
Step 3.12.6 Step 3.12.7.1 Total Vol Rel

3.12.8 Record the following in Auto Log:

- ☐ Release number
- ☐ Stop time
- ☐ Volume released

☐ 3.12.9 Record release stop date / time on GWR.

☐ 3.12.10 Record and CV "Total Vol. Rel." on GWR. (Step 3.12.6 or Step 3.12.7.2) {PIP 05-5685}

_____ 3.12.11 Ensure "Release Completion" on GWR is completed.

☐ 3.12.12 Route GWR to SRO.

_____ 3.12.13 Reset VQ Flow Monitor.

Enclosure 4.2

Air Release Mode With VQ Flow Monitor Operable

Attachment 1

Sheet 1 of 1

1VQ-2B Open				1VQ-2B Closed		
Doer	**CV**	**VQ Flow Monitor Counting (✓)**	**Date/Time**	**Doer**	**CV**	**Date/Time**
SLM	FBK	✓	8/4/10 / 0903	FBK	SLM	8/4/10 / 1016

End of Enclosure

Unit 1

Enclosure 4.3

Air Release Mode With VQ Flow Monitor Inoperable

1. Limits and Precautions

√1.1 Containment Pressure Tech Spec limit is ±0.3 psig.

√1.2 All Engineered Safeguards Valves shall be cycled electrically after any manual operation.

2. Initial Conditions

SLM 2.1 Per Tech Spec 3.9.4, movement of recently irradiated fuel assemblies within Containment, is **NOT** in progress. {PIP M-05-1608, PIP M-07-0033, CAPR}

SLM 2.2 VQ Flow Monitor is inoperable.

SLM 2.3 Containment pressure requires an air release.

SLM 2.4 GWR # 2010013 has been issued.

3. Procedure

☑ 3.1 Evaluate all outstanding R&Rs that may impact performance of this procedure.

SLM 3.2 **IF** 1EMF-39L monitoring release, perform the following:

FBK CV SLM 3.2.1 Ensure 1EMF-39L Trip 1 setpoint set per GWR.

FBK CV SLM 3.2.2 Ensure 1EMF-39L Trip 2 setpoint set per GWR.

SLM 3.2.3 Notify RP to update 1EMF-39L setpoints in EMF Setpoint Log.

Mike Cline — Person Notified
8/4/10 / 1115 — Date Time

SLM 3.3 Open 1VQ-1A (Cont Air Rel Inside Isol).

> **NOTE:** ✓ 1VQ-4 (VQ To Unit Vent Control) is required to be in full open position for air releases with VQ Flow Monitor inoperable.

FBK CV SLM 3.4 Fully open 1VQ-4 (VQ To Unit Vent Control).

3.5 Start initial VQ release as follows:

☑ 3.5.1 Open 1VQ-2B (Cont Air Rel Outside Isol) per Attachment 1.

☑ 3.5.2 Record start date / time on Attachment 1.

☑ 3.5.3 Record start pressure on Attachment 1.

3.5.4 Record the following in Auto Log:

☑ Release number
☑ Start time

☑ 3.5.5 Record release start date / time on GWR.

SLM 3.5.6 Ensure "Release Initiation" on GWR is completed.

N/A 3.6 **IF AT ANY TIME** VQ Flow Monitor becomes operable, perform the following:

_____ 3.6.1 Ensure 1VQ-2B (Cont Air Rel Outside Isol) closed per Attachment 1.

_____ 3.6.2 Ensure release stop date / time recorded on Attachment 1.

_____ _____ 3.6.3 Record Total Cu. Ft. Released on Attachment 1. {PIP 05-5685}
CV

☐ 3.6.4 Exit this enclosure and go to Enclosure 4.2 (Air Release Mode With VQ Flow Monitor Operable).

SLM 3.7 **HOLD** until containment pressure reaches 0.12 psig, **THEN** secure VQ release as follows:

☑ 3.7.1 Close 1VQ-2B (Cont Air Rel Outside Isol) per Attachment 1.

☑ 3.7.2 Record stop date / time on Attachment 1.

☑ 3.7.3 Calculate volume released using the following and record on Attachment 1: (Documentation of calculation **NOT** required)

Cu. Ft. Released = X + (Y x Z)

Where: **X** and **Y** are from Table 1
Z is actual release duration in minutes from Attachment 1

_____ ft^3 + (_____ ft^3/min X _____ min) = _____ ft^3
X (Table) Y (Table) Z (Release Duration)

Table 1

Start Pressure (psig)	Stop Pressure (Always 0.12) (psig)	X (ft^3)	Y (ft^3/min)
0.12	0.12	0	0
0.13	0.12	0	188.29
0.14	0.12	0.64	191.71
0.15	0.12	2.39	194.98
0.16	0.12	5.60	198.10
0.17	0.12	10.51	201.10
0.18	0.12	17.31	203.99
0.19	0.12	26.13	206.78
0.20	0.12	37.07	209.47
0.21	0.12	50.21	212.07
0.22	0.12	65.57	214.60
0.23	0.12	83.20	217.06
0.24	0.12	103.09	219.44

SLM 3.8 **IF** subsequent releases required, maintain containment pressure less than 0.20 psig per Attachment 1.

____ 3.9 **IF** it is desired to close out existing GWR, perform the following:

SLM 3.9.1 Close 1VQ-1A (Cont Air Rel Inside Isol).

FBK CV SLM 3.9.2 Close 1VQ-4 (VQ To Unit Vent Control).

SLM 3.9.3 Ensure 1VQ-2B (Cont Air Rel Outside Isol) closed per Attachment 1.

____ 3.9.4 Ensure release stop date / time recorded on Attachment 1.

____ 3.9.5 Notify RP that VQ release has been terminated and 1EMF-38, 1EMF-39, and 1EMF-40 setpoints need to be evaluated. {PIP 1-M97-1925}

_____ ____/____
Person Notified Date Time

☐ 3.9.6 Determine Total Cu. Ft Released on Attachment 1.

☐ 3.9.7 Record Total Cu. Ft Released from Attachment 1: _____ ft^3

____ 3.9.8 **IF** Enclosure 4.2 (Air Release Mode With VQ Flow Monitor Operable) was used during this release, perform the following:

☐ 3.9.8.1 Record Actual Volume Released from Enclosure 4.2, Step 3.7.3:

_____ ft^3

☐ 3.9.8.2 Calculate Total Volume Released as follows:

_____ ft^3 + _____ ft^3 = _____ ft^3
Step 3.9.7 Step 3.9.8.1 Total Vol Rel

3.9.9 Record the following in Auto Log:

- ☐ Release number
- ☐ Stop time
- ☐ Volume released

☐ 3.9.10 Record release stop date / time on GWR.

☐ 3.9.11 Record and CV "Total Vol. Rel." on GWR. (Step 3.9.7 or Step 3.9.8.2) {PIP 05-5685}

_____ 3.9.12 Ensure "Release Completion" on GWR is completed.

☐ 3.9.13 Route GWR to SRO.

Attachment 1 Sheet 1 of 1

1VQ-2B Open				1VQ-2B Closed					
Doer	CV	Date/Time	Start Pressure (psig)	Doer	CV	Date/Time	Stop Pressure (psig)	Cubic Ft Released per Step 3.7.3	Total Cubic Ft Released
SLM	FBK	8/4/10 / 1117	0.21	FBK	SLM	8/4/10 / 1358	0.12	21,469.28	21,469.28
SLM	FBK	8/4/10 / 1432	0.19	FBK	SLM	8/4/10 / 1547	0.12	15,534.63	37,003.91
SLM	FBK	8/4/10 / 1743	0.17	FBK	SLM		0.12		
							0.12		
							0.12		
							0.12		
							0.12		
							0.12		
							0.12		
							0.12		
							0.12		
							0.12		
							0.12		
							0.12		
								Total Cu. Ft Released	

End of Enclosure

Unit 1

JPM A4 SRO

Facility: McGuire Task No.:

Task Title: Provide an Updated PAR JPM No.: 2010 Admin - JPM A4 SRO

K/A Reference: GK/A 2.4.44 (4.4)

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

A LOCA inside containment has occurred on Unit 1.

The crew implemented EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirc) due to multiple ECCS component failures.

A Containment Red Path and a Core Cooling Red Path have occurred.

The Emergency Coordinator declared a General Emergency per RP/0/A/5700/000, Enclosure 4.1, EAL # 4.1.G.2 (Loss of Any two Barriers AND Potential loss of the third).

An Emergency Notification Form, along with the initial PAR was sent at the appropriate time.

The following conditions exist 1 hour after the start of the event:

- The radioactive release is still on-going.
- The wind speed is 9 mph.
- The wind direction is 158.9°.
- EMF51 A and B reading is 800 R/hr.

A Radioactive Release is still in progress above normal limits.

The OAC is NOT available.

Task Standard:	The operator will determine the PAR for the current conditions to be as reflected on the provided KEY.
Required Materials:	None
General References:	RP/0/A/5700/000 (Classification of Emergency) RP/0/B/5700/029 (Notifications to Offsite Agencies from the Control Room)
Handouts:	Initial Emergency Notification Form Copy of Enclosure 4.4 (Offsite Protective Action Recommendation) of RP/0/B/5700/029 (Notifications to Offsite Agencies from the Control Room) marked up to step 2.
Initiating Cue:	Based on the present conditions, the OSM directs you to update the PAR by completing steps 2 through 12 of Enclosure 4.4 (Offsite Protective Action Recommendation) of RP/0/B/5700/029 (Notifications to Offsite Agencies from the Control Room). Complete the Sections below as appropriate.
Time Critical Task:	NO
Validation Time:	10 minutes

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM) and Handout the Initial Emergency Notification Form and Enclosure 4.4 of RP/0/B/5700/029 marked up to step 2.

START TIME: _____

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Enclosure 4.4, Step 1) If a General Emergency is declared, determine initial Protective Action Recommendation…..	The operator recognizes per the initial conditions this step is already complete.		
*2	(Step 2) If Wind Speed is less than or equal to…..	The operator recognizes that Wind Speed is greater than 5 mph, and proceeds to Step 3.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*3	(Step 3) If Wind Speed is greater than 5 mph, evacuate and shelter zones as shown in the table below based on wind direction Caution 1: Once a zone is selected for evacuation, it should not be removed. Caution 2: A short term release is any release that can be projected to be 3 hours or less in duration. An example would be a "puff release." A controlled release is one that can be started or stopped at the licensee's discretion, such as the venting of Containment for pressure control. If a release is short term and controlled, then sheltering in lieu of evacuation should be considered.	The operator uses the Table and determines that the applicable Wind Direction range is 157.6-180.0°. The operator observes that Sectors A, B, C, L, M, and N are recommended to be evacuated for a 2 mile radius, and 5 miles downwind. The operator observes that Sectors D, E, F, G, H, I, J, K, O, P, Q, R and S are recommended to be sheltered. The operator applies Caution 1, and recognizes that Sectors D, O and R have previously been evacuated, and although the Table recommends that they be sheltered, they must remain evacuated. The operator recognizes that Caution 2 does NOT apply. The operator recommends that Sectors A, B, C, D, L, M, N, O and R remain evacuated for a 2 mile radius, and 5 miles downwind; and that Sectors E, F, G, H, I, J, K, P, Q, and S are remain sheltered.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
4	(Step 4) If notified by RP Dose Assessment that dose projections or field measurements indicate that thyroid dose will be greater than 5 Rem.....	The operator recognizes that no RP Dose Assessments have been made, and proceeds to Step 5.		
5	(Step 5) For any other Protective Action Recommendation, Check E (Other), and record information.....	The operator recognizes that there are no other PARs, and proceeds to Step 6.		
*6	(Step 6) After the initial PARS are transmitted to offsite agencies, check for large fission product inventory in Containment as follows: (Step 6.1) If the OAC is available.... (Step 6.2) If the OAC is unavailable, use the following EMFs: 1EMF51A, 1EMF51B (Step 6.3) Check if Containment radiation level exceeds the following limits based on time after shutdown:	 The operator recognizes that the OAC is NOT available and proceeds. The operator recognizes that 1EMF51 A and B readings must be used. The operator uses the table in the Time after Shutdown column of 0-2 hours, and compares the 1EMF51A and B readings of 800 R/hr to the established limit of 864 R/hr determining that the Large Fission Product Inventory in Containment has NOT been met.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*7	(Step 7) If Containment radiation level exceeds limits in Step 6.3.....	The operator recognizes that the radiation levels are NOT exceeded, and proceeds to Step 8.		
8	(Step 8) A McGuire EPZ Map is located on Page 8 of 8, if it is desired to visually see zones evacuated or sheltered.	The operator acknowledges and proceeds to Step 9.		
9	(Step 9) If notified by RP Dose Assessment that dose projections or field measurements indicate that thyroid dose will be greater than 5 Rem.....	The operator recognizes that no RP Dose Assessments have been made, and proceeds to Step 10.		
10	(Step 10) On a continuing basis, evaluate specific plant conditions including: large fission product inventory in Containment, EMF 51 A/B readings, offsite dose projections, wind speed and wind direction, field monitoring team data, and assess the need to update Protective Action Recommendations made to the states and counties in the previous notification.	The operator acknowledges and proceeds to Step 11.		
11	(Step 11) Review dose projections with the on-shift dose assessor (if available) to determine if Protective Action Recommendations are required beyond the 10-mile radius.	The operator recognizes that no Dose Assessments have been made, and proceeds to Step 12.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*12	(Step 12) If Protective Action Recommendations are required beyond 10 miles....	The operator recognizes that no RP Dose Assessments have been made, and returns the completed PAR marked up as established on the KEY.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2010 Admin - JPM A4 SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

KEY:

PROTECTIVE ACTION RECOMMENDATIONS:		**A** None
B	Evacuate: A, B, C, D, L, M, N, O and R remain evacuated for a 2 mile radius, and 5 miles downwind	
C	Shelter: E, F, G, H, I, J, K, P, Q, and S	
D	Consider the Use of KI (Potassium Iodide) in accordance with State Plans and Policy: **NA**	
E	Other: **NA**	

JPM CUE SHEET

Initial Conditions:

A LOCA inside containment has occurred on Unit 1.

The crew implemented EP/1/A/5000/ECA-1.1 (Loss of Emergency Coolant Recirc) due to multiple ECCS component failures.

A Containment Red Path and a Core Cooling Red Path have occurred.

The Emergency Coordinator declared a General Emergency per RP/0/A/5700/000, Enclosure 4.1, EAL # 4.1.G.2 (Loss of Any two Barriers AND Potential loss of the third).

An Emergency Notification Form, along with the initial PAR was sent at the appropriate time.

The following conditions exist 1 hour after the start of the event:

- The radioactive release is still on-going.
- The wind speed is 9 mph.
- The wind direction is 158.9°.
- EMF51 A and B reading is 800 R/hr.

A Radioactive Release is still in progress above normal limits.

The OAC is NOT available.

INITIATING CUE:

Based on the present conditions, the OSM directs you to update the PAR by completing steps 2 through 12 of Enclosure 4.4 (Offsite Protective Action Recommendation) of RP/0/B/5700/029 (Notifications to Offsite Agencies from the Control Room).

Complete the Sections below as appropriate.

PROTECTIVE ACTION RECOMMENDATIONS:		[A] **None**
[B]	**Evacuate:**	
[C]	**Shelter:**	
[D]	**Consider the Use of KI (Potassium Iodide) in accordance with State Plans and Policy:**	
[E]	**Other:**	

ENF Handout

NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM

1. [A] DRILL [B] ACTUAL EVENT — MESSAGE # 1

2. [A] INITIAL [B] FOLLOW-UP NOTIFICATION: TIME _____ DATE ____ / ____ / ____ AUTHENTICATION # _____

3. SITE: McGuire Nuclear Site — Confirmation Phone # (704) 875-6044

4. **EMERGENCY CLASSIFICATION:** [A] UNUSUAL EVENT [B] ALERT [C] SITE AREA EMERGENCY [D] GENERAL EMERGENCY

   BASED ON EAL# 4.1.G.2 EAL DESCRIPTION: Loss of Any Two Fission Product Barriers and Potential Loss of the Third

5. **PROTECTIVE ACTION RECOMMENDATIONS:** [A] NONE

   [B] EVACUATE A, B, C, D, L, M, N, O and R

   [C] SHELTER E, F, G, H, I, J, K, P, Q, and S

   [D] CONSIDER THE USE OF KI (POTASSIUM IODIDE) IN ACCORDANCE WITH STATE PLANS AND POLICY. NA

   [E] OTHER NA

6. **EMERGENCY RELEASE:** [A] None [B] Is Occurring [C] Has Occurred

7. RELEASE SIGNIFICANCE: [A] Not applicable [B] Within normal operating limits [C] Above normal operating limits [D] Under Evaluation

8. EVENT PROGNOSIS: [A] Improving [B] Stable [C] Degrading

9. METEOROLOGICAL DATA: Wind Direction* from 132.5 degrees Wind Speed* 4 mph

   (* May not be available for Initial Notifications) Precipitation* None Stability Class* [A] [B] [C] [D] [E] [F] [G]

10. [A] DECLARATION [B] TERMINATION Time Event Start Time Date Today / Today / Today

11. AFFECTED UNIT(S): [1] [2] [3] [All]

12. Unit Status: (Unaffected Unit(s) Status Not Required for Initial Notifications)

    [A] U1 0 % Power Shutdown at: Time T minus 10 Date TODAY / TODAY / TODAY

    [B] U2 100 % Power Shutdown at: Time _____ Date ____ / ____ / ____

    [C] U3 ____ % Power Shutdown at: Time _____ Date ____ / ____ / ____

13. REMARKS: _____

FOLLOW-UP INFORMATION (Lines 14 through 16 Not Required for Initial Notifications)

EMERGENCY RELEASE DATA. NOT REQUIRED IF LINE 6A IS SELECTED.

14. RELEASE CHARACTERIZATION: TYPE: [A] Elevated [B] Mixed [C] Ground UNITS: [A] Ci [B] Ci/sec [C] µCi/sec

    MAGNITUDE: Noble Gases: _____ Iodines: _____ Particulates: _____ Other: _____

    FORM: [A] Airborne Start Time: _____ Date: ____ / ____ / ____ Stop Time _____ Date ____ / ____ / ____

    [B] Liquid Start Time: _____ Date: ____ / ____ / ____ Stop Time _____ Date ____ / ____ / ____

15. PROJECTION PARAMETERS: Projection Period: _____ Hours Estimated Release Duration: _____ Hours

    Projection performed: Time _____ Date ____ / ____ / ____

16. PROJECTED DOSE:

DISTANCE	TEDE (mrem)	Adult Thyroid CDE (mrem)
Site boundary		
2 Miles		
5 Miles		
10 Miles		

17. APPROVED BY _____ Title: Emergency Coordinator Time: Time Date TODAY / TODAY / TODAY

    NOTIFIED BY: _____ RECEIVED BY: _____ Time: _____ Date ____ / ____ / ____

NOTE: 1. Protective Action Recommendations (PARs) for the public apply during a General Emergency, and include sheltering, evacuation and consideration of KI use. PARs are based on plant conditions independent of projected dose, and can also be based on projected dose. Protective Action Guides (PAGs) are levels of radiation dose at which prompt protective actions should be initiated and are based on EPA-400-R-92-001, Manual of protective Action Guides and Protective Actions for Nuclear Incidents. The projected dose PARs specified in this enclosure are based on the PAGs listed below. The PAG for KI is taken from Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies, FDA Guidance, November 2001 and Guidance for Industry, KI in Radiation Emergencies, Questions and Answers, FDA, December 2002. {23}

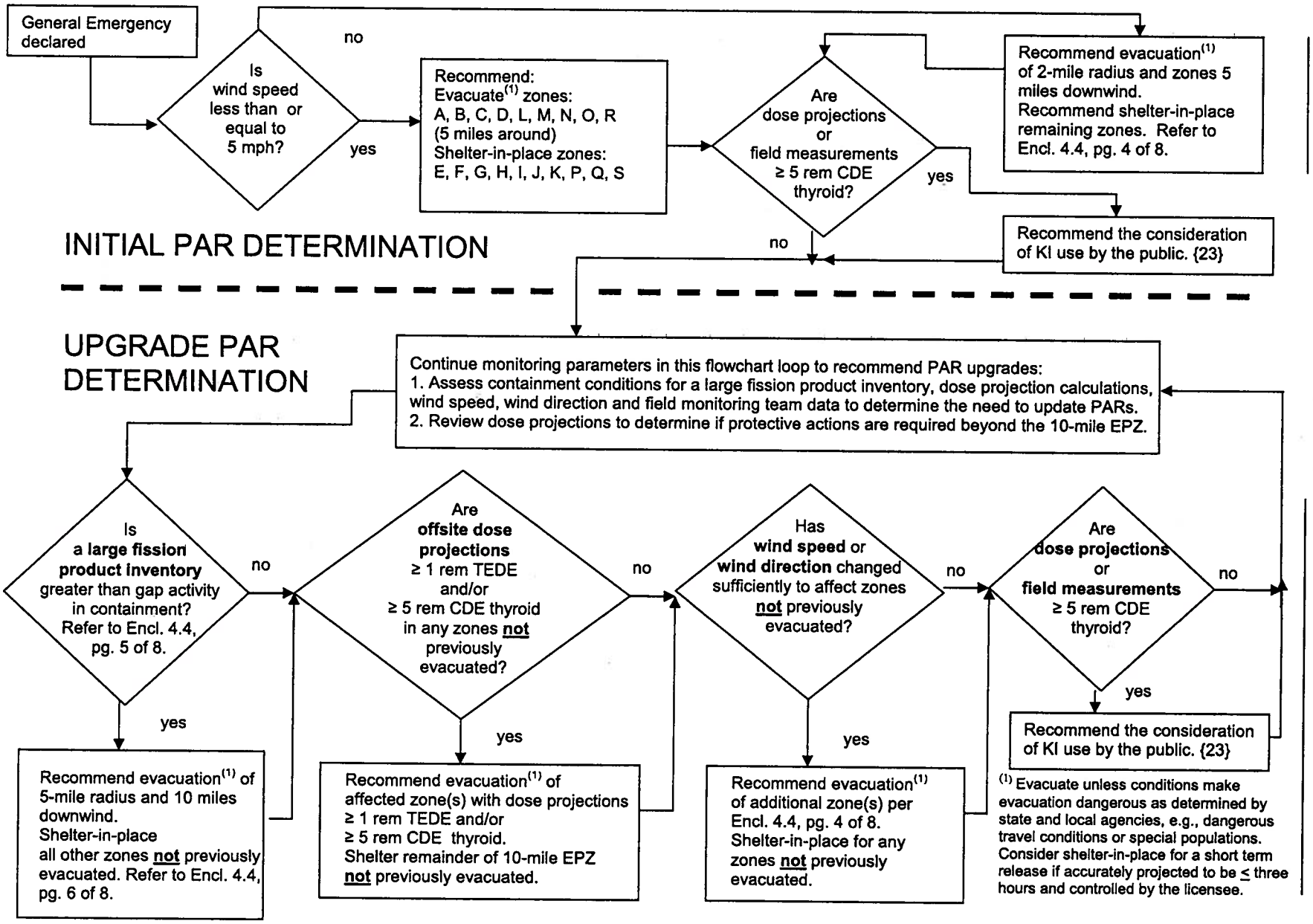
PROTECTIVE ACTION GUIDES (PAGs)

Projected Dose

Total Effective Dose Equivalent (TEDE)	Committed Dose Equivalent (CDE) Thyroid	Recommendation
< 1 rem	< 5 rem	No Protective Action is required based on projected dose.
≥ 1 rem	≥ 5 rem	Evacuate affected zones and shelter the remainder of the 10-mile EPZ not evacuated.
N/A	≥ 5 rem	Consider the use of KI (potassium iodide) in accordance with State Plans and Policy.

2. **IF** desired, you may refer to the flow chart of page 2 of this enclosure. {PIP M-06-5137, C.A.3}

Offsite Protective Action Recommendations



SUM 1. **IF** a General Emergency is declared, determine Initial Protective Action Recommendations as follows (PIP-M-02-6163):

☑ 1.1 Obtain the wind speed and direction, use chart recorder 1EEBCR9100, point #5 (Average Lower Wind Speed) and point #8 (Average Upper Wind Direction).

Wind Direction (Point 8): 158.9°

Wind Speed (Point 5): 9 mph

N/A SUM 1.2 **IF** Chart Recorder unavailable, obtain wind direction from one of the following sources, preferred sequence:

☐ A. Unit 1 OAC:

- Average Upper Wind Direction - M1P0847
- Average Lower Wind Speed - M1P0848.

☐ B. DPC Meteorologist (9-704-382-0139 or 9-704-373-7896).

☐ C. National Weather Service in Greer, S.C. (9-864-879-1085 or 9-800-268-7785).

____ 2. **IF** wind speed less than or equal to 5 MPH, recommend the following:

CAUTION:
1. Once a zone is selected for evacuation, it should not be removed. {PIP-M-03-3483}
2. A short term release is any release that can be projected to be 3 hours or less in duration. An example would be a "puff release". A controlled release is one that can be started and stopped at the licensee's discretion, such as the venting of Containment for pressure control. **IF** a release is short term and controlled, **THEN** sheltering in lieu of evacuation should be considered. {PIP-M-05-3631}

☐ 2.1 Evacuate zones A, B, C, D, L, M, N, O, R. (See Caution 2 above)

☐ 2.2 Shelter zones E, F, G, H, I, J, K, P, Q, S.

_____ 3. **IF** wind speed is greater than 5 MPH, evacuate and shelter zones as shown in the table below based on wind direction:

CAUTION:
1. Once a zone is selected for evacuation, it should not be removed. {PIP-M-03-3483}
2. A short term release is any release that can be projected to be 3 hours or less in duration. An example would be a "puff release". A controlled release is one that can be started and stopped at the licensee's discretion, such as the venting of Containment for pressure control. **IF** a release is short term and controlled, **THEN** sheltering in lieu of evacuation should be considered. {PIP-M-05-3631}

Protective Action Zones Determination

Wind Speed Greater than 5 Miles per Hour		
Wind Direction (deg from N) Chart Recorder 1EEBCR9100 Point # 8 Average Upper Wind Direction	**Evacuate*** 2 Mile Radius-5 Mile Downwind	**Shelter** Remaining Sectors
0.1 - 22.5	B,C,D,L,M,O,R	A,E,F,G,H,I,J,K,N,P,Q,S
22.6 – 45.0	B,C,D,L,M,O,R	A,E,F,G,H,I,J,K,N,P,Q,S
45.1 – 67.5	B,C,D,L,M,O,R	A,E,F,G,H,I,J,K,N,P,Q,S
67.6 – 90.0	B,C,D,L,M,N,O,R	A,E,F,G,H,I,J,K,P,Q,S
90.1 – 112.5	B,C,L,M,N,O,R	A,D,E,F,G,H,I,J,K,P,Q,S
112.6 – 135.0	A,B,C,L,M,N,O,R	D,E,F,G,H,I,J,K,P,Q,S
135.1 – 157.5	A,B,C,L,M,N,O	D,E,F,G,H,I,J,K,P,Q,R,S
157.6 – 180.0	A,B,C,L,M,N	D,E,F,G,H,I,J,K,O,P,Q,R,S
180.1 – 202.5	A,B,C,L,M,N	D,E,F,G,H,I,J,K,O,P,Q,R,S
202.6 – 225.0	A,B,C,D,L,M,N	E,F,G,H,I,J,K,O,P,Q,R,S
225.1 – 247.5	A,B,C,D,L,M	E,F,G,H,I,J,K,N,O,P,Q,R,S
247.6 – 270.0	A,B,C,D,L,M	E,F,G,H,I,J,K,N,O,P,Q,R,S
270.1 – 292.5	A,B,C,D,L,M	E,F,G,H,I,J,K,N,O,P,Q,R,S
292.6 – 315.0	A,B,C,D,L,M	E,F,G,H,I,J,K,N,O,P,Q,R,S
315.1 – 337.5	B,C,D,L,M,R	A,E,F,G,H,I,J,K,N,O,P,Q,S
337.6 – 360.0	B,C,D,L,M,R	A,E,F,G,H,I,J,K,N,O,P,Q,S

* See Cautions 1 and 2 above.

_____ 4. **IF** notified by RP Dose Assessment that dose projections or field measurements indicate that Thyroid dose will be ≥ 5 Rem, KI use by the General Public must be recommended in accordance with State Plans and Policy. {PIP-G-03-606}

_____ 5. For any other Protective Action Recommendation, check E (Other) and record informtion.

6. After the Initial PARS are transmitted to offsite agencies, check for large fission product inventory in containment as follows:

_____ 6.1 **IF** the OAC is available, call up the following computer points based on need:

Unit 1 OAC	Unit 2 OAC
M1A0829	M2A0829
M1A0835	M2A0835.

_____ 6.2 **IF** the OAC is unavailable, use the following EMF's:

Unit 1	Unit 2
1EMF51A	2EMF51A
1EMF51B	2EMF51B.

☐ 6.3 Check if containment radiation level exceeds the following limits based on time after shutdown:

TIME AFTER SHUTDOWN (hours)	EMF51A(B) reading(R/HR)
>0-2	864
>2-4	624
>4-8	450
>8	265

_____ 7. **IF** containment radiation level exceeds limits in Step 6.3, perform the following:

☐ 7.1 Evacuate and shelter zones in the table below based on wind direction:

CAUTION: 1. Once a zone is selected for evacuation, it should not be removed. {PIP-M-03-3483}

2. A short term release is any release that can be projected to be 3 hours or less in duration. An example would be a "puff release". A controlled release is one that can be started and stopped at the licensee's discretion, such as the venting of Containment for pressure control. **IF** a release is short term and controlled, **THEN** sheltering in lieu of evacuation should be considered. {PIP-M-05-3631}

Protective Action Zones Determination

For Containment Radiation Levels Exceeding GAP Activity		
Wind Direction (deg from N) Chart Recorder 1EEBCR9100 Point # 8 Average Upper Wind Direction	**Evacuate*** 5 Mile Radius-10 Mile Downwind	**Shelter** Remaining Sectors
0.1 - 22.5	A,B,C,D,E,F,L,M,N,O,R,S	G,H,I,J,K,P,Q
22.6 – 45.0	A,B,C,D,E,L,M,N,O,Q,R,S	F,G,H,I,J,K,P
45.1 – 67.5	A,B,C,D,E,L,M,N,O,Q,R,S	F,G,H,I,J,K,P
67.6 – 90.0	A,B,C,D,L,M,N,O,P,Q,R,S	E,F,G,H,I,J,K
90.1 – 112.5	A,B,C,D,K,L,M,N,O,P,Q,R,S	E,F,G,H,I,J
112.6 – 135.0	A,B,C,D,I,K,L,M,N,O,P,Q,R,S	E,F,G,H,J
135.1 – 157.5	A,B,C,D,I,K,L,M,N,O,P,Q,R	E,F,G,H,J,S
157.6 – 180.0	A,B,C,D,I,J,K,L,M,N,O,P,R	E,F,G,H,Q,S
180.1 – 202.5	A,B,C,D,G,H,I,J,K,L,M,N,O,P,R	E,F,Q,S
202.6 – 225.0	A,B,C,D,G,H,I,J,K,L,M,N,O,P,R	E,F,Q,S
225.1 – 247.5	A,B,C,D,F,G,H,I,J,L,M,N,O,R	E,K,P,Q,S
247.6 – 270.0	A,B,C,D,F,G,H,I,J,L,M,N,O,R	E,K,P,Q,S
270.1 – 292.5	A,B,C,D,E,F,G,H,J,L,M,N,O,R	I,K,P,Q,S
292.6 – 315.0	A,B,C,D,E,F,G,L,M,N,O,R	H,I,J,K,P,Q,S
315.1 – 337.5	A,B,C,D,E,F,G,L,M,N,O,R	H,I,J,K,P,Q,S
337.6 – 360.0	A,B,C,D,E,F,L,M,N,O,R,S	G,H,I,J,K,P,Q

* See Cautions 1 and 2 above.

☐ 8. A McGuire EPZ map is located on page 8 of 8, if it is desired to visually see zones evacuated or sheltered.

_____ 9. **IF** notified by RP Dose Assessment that dose projections or field measurements indicate that Thyroid dose will be ≥ 5 Rem, KI use by the General Public must be recommended in accordance with State Plans and Policy. {PIP-G-03-606}

_____ 10. On a continuing basis, evaluate specific plant conditions including: large fission product inventory in containment, EMF 51 A/B readings, offsite dose projections, wind speed and wind direction, field monitoring team data, and assess the need to update Protective Action Recommendations made to the states and counties in the previous notification.

_____ 11. Review dose projections with the on-shift dose assessor (if available) to determine if Protective Action Recommendations are required beyond the 10-mile EPZ.

_____ 12. **IF** Protective Action Recommendations are required beyond 10 miles, notify the states and counties and request that they consider sheltering/evacuating the general populations located beyond the affected 10-mile EPZ.

McGUIRE PROTECTIVE ACTION ZONES

(2 and 5 mile radius, inner circles)

10-MILE EPZ