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U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Emergency Plan Implementing Procedures Manual
Volume B, Revision 2002-09

Please find attached for your use and review copies of the revision to the Oconee Nuclear Station Emergency Plan:

Volume B Revision 2002-09 October 2002

This revision is being submitted in accordance with 10 CFR 50-54(q) and does not decrease the effectiveness of the Emergency Plan or the Emergency Plan Implementing Procedures.

Any questions or concerns pertaining to this revision please call Rodney Brown, Emergency Planning Manager at 864-885-3301.

By copy of this letter, two copies of this revision are being provided to the NRC, Region II, Atlanta, Georgia.

Very truly yours,

FOR

W. R. McCollum, Jr.
VP, Oconee Nuclear Site

xc: (w/2 copies of attachments)
Mr. Luis Reyes,
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w/copy of attachments
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(w/o Attachments, Oconee Nuclear Station)
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M. D. Thorne, Manager, Emergency Planning

A045

Ocotber14, 2002

OCONEE NUCLEAR SITE

SUBJECT: Emergency Plan Implementing Procedures
Volume B, Revision 2002-09

Please make the following changes to the Emergency Plan, Volume B by following these instructions.

REMOVE	ADD
Cover Sheet Rev. 2002-08	Cover Sheet Rev. 2002-09
Table of Contents page 2	Table of Contents page 2
Chemistry Manual 5.2 - 07/29/02	Chemistry Manual 5.2 - 09/25/02

DUKE POWER

EMERGENCY PLAN
IMPLEMENTING PROCEDURES
VOLUME B

APPROVED:

W. W. Foster, Manager
Safety Assurance

10/14/2002
Date Approved

10/14/2002
Effective Date

VOLUME B
REVISION 2002-09
OCTOBER 2002

VOLUME B

TABLE OF CONTENTS

CHEMISTRY MANUAL 5.2
POST ACCIDENT PROCEDURE USE GUIDELINES

INFORMATION ONLY

REVISION NUMBER	ISSUE DATE
Original	07/15/82
1	10/25/95
2	01/20/97
3	04/07/97
4	11/20/97
5	08/17/98
6	03/16/99
7	12/28/99
8	09/18/00
9	04/11/02
10	07/29/02
11	09/25/02

Prepared by: D. P. Rochester Date: 9/24/02

10CFR50.59 required: Yes ✓ No X RW 9/25/02

Approval: Bryan J. [illegible] Date: 9/25/02

Control Copies delivered to Emergency Planning: Pam Motley

Date: 9/26/02

Post Accident Procedure Use Guidelines

1. Purpose

> **NOTE:** 1. NSD 228 Applicability Determination and a 50.59 screening is required to make major changes to this section. Minor changes per NSD 703 can be made without a Applicability Determination.
>
> 2. Seven Control copies and one Information Only copy of this CSM shall be routed to the Emergency Preparedness Team within three (3) working days following any approved changes/modifications.

This section provides guidelines on the administration and use of chemistry post accident procedures and the precautions that should be observed during the use of these procedures. Special attention is given to limits and precautions associated with the execution of a procedure during a projected accident. Personnel requirements and procedure work locations will be given for personnel exposure consideration. Also, a listing of RIAs of interest to Chemistry for planning and assessment activities is included in Enclosures 6.1 and 6.2. This information is intended only as guidelines with the knowledge that an actual accident situation may deviate greatly from a projected scenario.

2. Guidelines

2.1 Limits and Precautions

> **NOTE:** These Limits and Precautions do not apply to the task for Addition of Caustic to the LPI (RCS) System. This task is a "time critical task" and therefore is not subject to the below Limits and Precautions.

2.1.1 Valve alignments should <u>NOT</u> be made and samples should <u>NOT</u> be taken without prior authorization from the TSC/OSC.

2.1.2 Do <u>NOT</u> attempt any phase of sampling or analysis without Radiation Protection coverage.

2.1.3 ALL personnel will need prior authorization from the OSC to exceed any exposure limit.

2.1.4 Radiation levels of the sampling and analysis area should be measured continuously during all phases of sampling, sample preparation, and analysis.

2.1.4.1 Air activity should be determined by use of installed air monitors or through the use of portable air sampling equipment.

2.1.4.2 Area dose rates should be established by the use of installed radiation monitors or by portable radiation survey instruments.

2.1.4.3 Portable shielding, remote handling equipment, video equipment, etc., should be used where practical during sample preparation and sample analysis.

2.1.4.4 All personnel working in the lab area and transporting samples shall monitor their personal dosimetry frequently to avoid exceeding maximum dose limits.

2.1.5 The post accident analysis should be done in a fume hood and/or other precautions should be taken to avoid the release of gaseous activity.

2.1.6 Radiation exposure to an individual during all phases of sampling should be limited so as not to exceed an annual accumulative exposure of 2 rem whole body; 50 rem skin of whole body; 50 rem extremities; or 15 rem eye respectively. All personnel will need prior authorization from the TSC/OSC to knowingly exceed any exposure limit. The exposure received may require an occupational exposure penalty and/or a medical decision as to whether an individual can continue in radiation work.

2.2 Waste Disposal

2.2.1 Determine by detailed planning meeting, the exact course of action to be taken. Under no condition should liquid or solid wastes be disposed of without prior specific RP directions.

2.2.2 Designate a sealable carboy as the "Post Accident Lab Waste" container. This container should be shielded and used as an interim liquid waste disposal container for all liquid analytical waste.

2.2.3 Request RP to designate an area where the "RCS Flush" bottle(s), "RCS Sample" bottle(s) and "Post Accident Lab Waste" container may be stored until final disposal.

2.2.4 In the event an area is grossly contaminated and cannot be decontaminated, evaluate the need for shielding or protective covering to prevent the spread of airborne activity.

2.3 Procedures

2.3.1 CP/1,2,3/A/2002/001 - Unit One, Two, or Three Primary Sampling System

Description - Defines the steps necessary to sample tanks, systems, etc., associated with the primary system to determine various chemical concentrations and radioactive isotopes.

Personnel - One (1) Chemistry technician - to sample
One (1) RP technician

Precautions - Personnel should expect high dose rates and possible airborne activity. Use applicable RIA's listed in Enc. 6.1 and 6.2. Some sample points will be at system pressure.

CAUTION: If the hydrogen purge unit is in service on Unit 2 or 3 the ventilation flow path for the Primary and waste sample hoods has been isolated. The hydrogen purge unit will typically not be placed into service for about 7 days after a LOCA and then only if the hydrogen recombiner is out of service. The hydrogen purge unit must be secured prior to sampling.

Use - This procedure should be used to obtain reactor coolant samples when possible. Other primary systems and tanks such as LPI, BWST, SFP, etc. can be sampled using these procedures.

Location - Third floor Aux building - Primary sample hoods; First floor Aux building - Waste sample hoods

2.3.2 CP/1,2,3/A/2002/004 C - Operating Procedure for the Post Accident Liquid Sampling System (PALSS)

Description - Outlines method to sample primary coolant using the remotely operated PALSS sampling system. System can sample from RCS "J-Leg", LPI Pump Discharge, and HPI Letdown.

Personnel - One (1) Chemistry technician - panel operation
One (1) person to communicate with control room for LP-65 (if required)
One (1) Radiation Protection technician.

Precautions - Because of location of sample panels, personnel may be in high radiation area with airborne activity. Evaluate shuttle of personnel to and from lower dose areas. Use the readings from applicable RIAs listed in Enc. 6.1 and 6.2 to plan sampling activities.

Use - This procedure should be used to sample primary coolant when significant fuel damage is expected. System is designed to limit personnel exposure during sampling. Sample point for RCS "J-Leg" needs flow through that loop to ensure representative sample. If significant loss of coolant has occurred, need to also sample LPI Pump Discharge.

Location - First floor auxiliary building Near 1 & 2 Waste Disposal Hood - Units 1 & 2; Near 3 Waste Disposal Hood - Unit 3

2.3.3 CP/1,2,3/A/2002/004E - Unit One, Two or Three Reactor Coolant Sampling During an Appendix "R" Accident

Description - This procedure provides instruction on sampling the RCS via an ice cooled sampler installed on the discharge side of valve 1, 2, 3 RC-179 of the affected unit during an Appendix "R" accident situation.

Personnel - Two (2) Chemistry Technicians
One (1) Radiation Protection Technician
Two (2) I&E Technicians

Precautions - Personnel should expect normal dose rates and a high probability of airborne activity due to fission gas release during sample flush to floor drain. Sample temperature & pressure will be very high & if not cooled properly will flash to steam.

Use - This procedure should only be used during an Appendix "R" fire when all power is lost. It should be considered the last alternative for Reactor coolant sampling.

Location - Unit 1, 2, 3 LPI Pump rooms

2.3.4 CP/1&2,3/A/2002/005 - Post Accident Caustic Injection Into the Low Pressure Injection System

> **NOTE:** This is a "time critical task" and must be initiated immediately when recirculation mode off the RBES has been established.

Description - Outlines the method used to raise the pH of the primary coolant to ≈ 7.0 - 8.0 following a LOCA. Caustic additions will improve the iodine liquid partition factor and inhibit hydrogen gas formation. Use Enc. 6.3 to calculate quantity of caustic required for addition.

Personnel - Two (2) Chemistry technicians (desirable, but not required)
One (1) Radiation Protection tech (desirable, but not required)
Two (2) additional OSC personnel to move Caustic (desirable, but not required)

Precautions - High radiation areas and airborne activity may be a concern. Use readings from applicable RIAs listed in Enc. 6.1 and 6.2 to plan addition. Establish Low Dose Waiting Areas as needed. Heat Stress conditions may also be a concern.

Use - This procedure should be used when a significant loss of coolant to the Reactor Building has occurred and there is concern about an Iodine release and/or hydrogen gas formation. The LPI System MUST be in service and taking suction from the emergency sump.

Location - Units 1&2 - 2nd floor of the Aux. Bldg, Chemical Addition Area
Unit 3 - 1st floor of the Aux Bldg, Chemical Addition Area

2.3.5 LM/O/P003C - Determination of Boron by Manual Colorimetric Titration Using Phenolphthaline Indicator

Description - Outlines the use of manual potentiometric titrations to determine boron concentration. The range for this analysis is between 100 and 2500 ppm. Samples with concentrations greater than 1000 ppm must be diluted for dose and time considerations.

Personnel - One (1) Chemistry technician
One (1) Radiation Protection technician

Precautions - Personnel should expect high dose rates and possible airborne activity. Use the readings from applicable RIAs listed in Enc. 6.1 and 6.2 to determine if the Primary Lab is available for use.

Use - This procedure should be used to analyze for boron whenever conditions have resulted in the loss of the normal analytical instrumentation, such as an Appendix "R" Accident.

Location - Rooms 329 and 330.

2.3.6 LM/O/P919 - Boron Analysis By Mettler DL-58 Titration

Description - This method covers the precise determination of boron concentration in the 0.2 – 10,000 ppm range in high purity water (RCS) using the Mettler DL-58 Titration System.

Personnel - One (1) Chemistry technician
One (1) Radiation Protection technician

Precautions - Personnel should expect high dose rates and possible airborne activity. Use the readings from applicable RIAs listed in Enc. 6.1 and 6.2 to determine if the Primary Lab is available for use.

Use - This procedure should be used as the primary method for determining boron concentration.

Location - Rooms 329 and 330.

2.3.7 LM/O/P914 - Ion Analysis - DX-500 IC

Description - Outlines the use of ion chromatograph in determination of chloride concentration in primary coolant when fuel failure is expected.

Personnel - One (1) Chemistry technician
One (1) Radiation Protection technician

Precautions - Personnel should expect high dose rates and possible airborne activity. If too much dilution is required based on dose consideration, then this procedure could not be utilized. Use the readings from applicable RIAs listed in Enc. 6.1 and 6.2 to determine if the Dionex Lab is available for use.

Use - This procedure should be used when dose consideration allows a reasonable expectancy of being able to detect chloride at the dilution required.

Location - Room 330.

2.3.8 LM/O/P008 - The Determination of Hydrogen Using the Carle or SRI Gas Chromatographs

Description - This procedure covers the use of the Carle Series and the SRI Series Analytical Gas Chromatographs to determine the concentration of hydrogen in gas samples.

Personnel - One (1) Chemistry technician
One (1) Radiation Protection technician

Precautions - Personnel should expect high dose rates and possible airborne activity. Use the readings from applicable RIAs listed in Enc. 6.1 and 6.2 to determine if the Primary Lab is available for use.

Use - This procedure should be used in an accident situation to analyze for hydrogen concentration.

Location - Rooms 329 and 330.

2.3.9 LM/O/G004 - Determination of Gamma Isotopic Activity

Description - Outline of method used to prepare sample for gamma isotopic analysis.

Personnel - One (1) Chemistry technician
One (1) Radiation Protection technician

Precautions - Personnel should expect high dose rates and possible airborne activity. Utilize remote handling when possible. Use the readings from applicable RIAs listed in Enc. 6.1 and 6.2 to determine if the Primary Lab and Count Room are available for use.

Use - This procedure should be used when a gamma isotopic analysis is required.

Location - Rooms 329 and 330.

3. Additional Information

3.1 Tank volumes:

Quench Tank	5,834 gallons
BWST	388,000 gallons
CBAST	22,440 gallons
BAMT	2,500 gallons
BHUT	82,000 gallons
LDST	4,488 gallons (31.26 gal/in)
CFT	10,470 gallons (total)
SFP (1&2)	546,000 gallons
SFP (3)	374,000 gallons
LiOH	30 gallons
NaOH	100 gallons
MWT	20,200 gallons
HAWT	2,000 gallons
LAWT	3,000 gallons
CTP 1	1,300,000 gallons
CTP 2	1,100,000 gallons
CTP 3	3,000,000 gallons
CTP 3 (weir down)	4,900,000 gallons

3.2 System Volumes:

RCS (cold/hot)	88,000/60,000 gallons
Reactor Building	1,910,000 ft^3 free volume
CST	30,000 gallons
Waste Gas	23.800 ft^3
Hotwell	150,000 gallons
OTSG (Secondary Side)	28,000 gallons

3.3 Cooler Supplies:

Quench Tank	-	CC
Decay Heat	-	LPSW
Letdown	-	CC
Seal Return	-	RCW
RBCU	-	LPSW
CC	-	LPSW
RCW	-	CCW
Pri Sample	-	RCW
PALSS	-	RCW

4. Suggested Actions

4.1 Normal Operating Conditions:

Observation: Loose part or mechanical failure has caused suspected loss of some fuel integrity.

Actions:

- Do not over react, close coordination with OPS and RP will be necessary to understand where and how to sample coolant.
- First find out exact status of unit (subcritical, pressure, temperature, # of RCP on, letdown flow rate, area monitor readings?)
- If the unit is shutdown, then remember that samples will show normal coolant fission product spiking - must compare to earlier unit trip results.
- Have RP survey letdown piping (if in service) and compare to normal values before deciding which method to use in sampling.

- For truly mechanical damage, gap activity isotope should increase (xenons, kryptons, iodines) with much smaller increases in (strontium, barium, cesium, less mobile isotopes).

- With gap activity release, degassing of coolant fission gases will be much more pronounced. Appropriate respiratory protection should be considered while sampling.

4.2 Overheat Condition Without Fuel Melt

Observation: RB pressure and temperature increase. Suspect loss of coolant to Reactor Building.

Actions:

- If ES actuation occurs, then letdown will be automatically secured thus rendering normal sample point useless (Ops may manually override)

- Make immediate plans to move necessary equipment to RW facility or Environmental lab for chemical analysis of boron and pH. Dose rates may render Primary lab useless.

- Before deciding which sample location to use, a careful evaluation of all data should be performed.

  1. Boron concentration can be calculated based on injection volumes and known concentrations.

  2. RIA readings from RIA 57, 58 can closely estimate failed fuel percentage without need for sampling.

  3. If recirculation of water through vessel is not available, the PALS J-leg sample will not be representative.

  4. Core exit thermocouple readings and mapping can aid in estimating area and extent of core damage.

- If electrical system load shed has occurred, then many of the normal power supplies to the Chemistry group may be unavailable without Operations assistance.

4.3 Fuel Melt

Actions:

- All of Section 4.2 action items are applicable.
- Expect higher levels of barium, strontium and praseodyium from fuel matrix loss.
- Expect high suspended solids in any sampling attempted.
- Both hydrogen percentage and RIA 57, 58 readings can and should be used in lieu of sampling, at least until dose levels have significantly dropped.
- Boron as a criticality concern should be minimal - weighing the small benefit of a sample versus the extreme risk to an individual(s) should be considered.

5. References

5.1 ONS Post Accident Procedures

5.2 ONS OFD Drawings

5.3 ONS UFSAR

5.4 ONS ITS

5.5 BWNS Water Chemistry Manual for 177 F.A. Plants, BAW-1385, Revision 6. 1/27/93

5.6 Calculation OSC-7337, "Post-Accident Reactor Building Sump pH Analysis", Revision 0, October 1999

5.7 OP/0/A/1108/001, "Curves and General Information"

6. Enclosures

6.1 RIAs of Interest to Chemistry

6.2 Location of Sample Points for Multipoint RIAs

6.3 Caustic Addition Calculations

6.4 E, A and R Values for 1% Failed Fuel and DBA

6.5 Caustic Addition Calculations

6.6 Quarterly Inspection of Post Accident Equipment

Enclosure 6.1
RIAs of Interest to Chemistry

RIA #	RANGE	LOCATION	INFORMATION USED FOR
1RIA-4 2RIA-4 3RIA-4	0.1 - 10e7 mR/hr	Reactor Building Entrance/ Personnel Hatch	Indicates a LOCA with moderate to severe fuel damage; 2RIA-4 is located near the Primary Lab and Count Room - Readings used to assess the need to prepare alternate labs
RIA-8	0.1 - 10e7 mR/hr	Primary Chemistry Lab	Used to assess the need to prepare the alternate Primary Lab and/or Count Room
1RIA-10 2RIA-10 3RIA-10	0.1 - 10e7 mR/hr	Unit 1 Primary Sample Hood Unit 2 Primary Sample Hood Unit 3 Primary Sample Hood	Used for planning sampling. Readings will be high once sampling is started if significant fuel damage has occurred
1RIA-12 3RIA-12	0.1 - 10e7 mR/hr	Unit 1&2 Boric Acid Mix Tank Unit 3 Boric Acid Mix Tank	Readings used for planning chemical additions (ie: Caustic Additions)
1RIA-13 3RIA-13	0.1 - 10e7 mR/hr	Unit 1&2 Waste Sample Hood Unit 3 Waste Sample Hood	Used for planning sampling activities from the PALS. Readings may be high if significant fuel damage has occurred
1RIA-15 3RIA-15	0.1 - 10e7 mR/hr	Unit 1&2 HPI Pump Room Unit 3 HPI Pump Room	Provide preliminary indications of significant fuel damage
1RIA-16,17 2RIA-16,17 3RIA-16,17	0.01 - 10e3 mR/hr	Unit 1 'A & B' Main Steam Lines Unit 2 'A & B' Main Steam Lines Unit 3 'A & B' Main Steam Lines	Readings > background from these RIAs are indications of primary/secondary steam generator tube leaks
3RIA-19	0.1 - 10e7 mR/hr	Laundry and Hot Shower Tank Room	Used for planning Unit 3 caustic; readings may be high if significant fuel damage has occurred due to being near LDST
1RIA-31 3RIA-31	10 - 10e6 CPM	Behind air compressors in Turbine Building Basement, west of Unit 2 Powdex North of sewage ejectors at Unit 3, west wall of Turbine Building	Multipoint RIA that monitors LPSW effluents from LPI Cooler, and CC Cooler. Readings > background indicate a primary coolant leak into the LPSW System. See Enc. 6.2 for sample point locations.
1RIA-32 3RIA-32	10 - 10e6 CPM	Monitor on first floor of Aux Building; sample points are located in various room/areas throughout the Aux Building	Multipoint RIA that measures airborne activity levels in various locations (up to 24) through the Aux Building. Used to plan sampling and chemical addition activities. See Enc. 6.2 for sample point locations.

Enclosure 6.1
RIAs of Interest to Chemistry

RIA #	RANGE	LOCATION	INFORMATION USED FOR
1RIA-35 2RIA-35 3RIA-35	10 - 10e6 CPM	Behind air compressors in Turbine Building Basement, west of Unit 2 Powdex Same location as 3RIA-31	Monitors LPSW discharge from the Building. Readings > background are indicators of primary coolant leak into the LPSW System; RIA-31 readings will increase also.
1RIA-40 2RIA-40 3RIA-40	10 - 10e6 CPM	Unit 1 CSAE Off Gas Discharge Unit 2 CSAE Off Gas Discharge Unit 3 CSAE Off Gas Discharge	Monitors CSAE Off Gas effluent to each unit vent. Indicates steam generator tube leaks.
1,2,3 RIA-57&58	1 - 10e7 R/hr	Unit 1 Reactor Building Unit 2 Reactor Building Unit 3 Reactor Building	Measures activity in the Rx building during a LOCA. Readings from these RIAs can be related to % failed fuel.

1RIA-31 SAMPLE POINTS

1RIA-31-1	LPI/Decay Heat Cooler 1A Outlet
1RIA-31-2	LPI/Decay Heat Cooler 1B Outlet
1RIA-31-3	RB Component Cooler 1A Outlet
1RIA-31-4	RB Ventilation (Cooling) Unit 1A Outlet
1RIA-31-5	RB Ventilation (Cooling) Unit 1B Outlet
1RIA-31-6	RB Ventilation (Cooling) Unit 1C Outlet
1RIA-31-7	LPI/Decay Heat Cooler 2A Outlet
1RIA-31-8	LPI/Decay Heat Cooler 2B Outlet
1RIA-31-9	RB Component Cooler 2B Outlet
1RIA-31-10	RB Ventilation (Cooling) Unit 2A Outlet
1RIA-31-11	RB Ventilation (Cooling) Unit 2B Outlet
1RIA-31-12	RB Ventilation (Cooling) Unit 2C Outlet

3RIA-31 SAMPLE POINTS

3RIA-31-1	LPI/Decay Heat Cooler 3A Outlet
3RIA-31-2	LPI/Decay Heat Cooler 3B Outlet
3RIA-31-3	RB Component Cooler 3B Outlet
3RIA-31-4	RB Ventilation (Cooling) Unit 3B Outlet
3RIA-31-5	RB Ventilation (Cooling) Unit 3A Outlet
3RIA-31-6	RB Ventilation (Cooling) Unit 3C Outlet

1RIA-32 SAMPLE POINTS

1RIA-32-1	Unit 1 Pipe Rooms; Elevation 758 and 771
1RIA-32-2	Unit 2 Pipe Rooms; Elevation 758 and 771
1RIA-32-3	Spent Resin Storage Tanks, Condensate Test Tanks, Unit 1 Letdown Storage Tank, Boric Acid Mix Tank
1RIA-32-4	RC Bleed Evaporator Room, Unit 1&2 Miscellaneous Waste Holdup Tank, Unit 2 Letdown Storage Tank
1RIA-32-5	Waste Drumming Area
1RIA-32-6	Miscellaneous Waste Evaporator Room
1RIA-32-7	Unit 1 RC Bleed Transfer Pump, Unit 1 RC Bleed Holdup Tanks, Unit 1 Concentrated Boric Acid Storage Tank
1RIA-32-8	Unit 2 RC Bleed Transfer Pump, Unit 2 RC Bleed Holdup Tanks, Unit 2 Concentrated Boric Acid Storage Tank
1RIA-32-10	Waste Gas Compressor, RC Bleed Evaporator Feed Tank
1RIA-32-11	Unit 1 Pipe Rooms; Elevations 783-796
1RIA-32-12	Unit 2 Pipe Rooms; Elevations 783-796

3RIA-32 SAMPLE POINTS

3RIA-32-1	Unit 3 Pipe Rooms; Elevation 758 and 771
3RIA-32-2	Unit 3 Pipe Rooms; Elevations 783-796
3RIA-32-3	RB Component Coolers, Letdown Filters, Hatches, Waste Gas Compressor Room, Waste Gas Decay Tanks
3RIA-32-4	Unit 3 RC Bleed Holdup Tanks, Unit 3 Concentrated Boric Acid Storage Tank, Unit 3 Miscellaneous Waste Holdup Tank Area
3RIA-32-5	High Activity Spent Resin Storage Tank, Boric Acid Mix Tank and Pumps, Spent Resin Storage Tank Area

1. Initial Conditions for Injection

1.1 An emergency is in effect due to a LOCA.

1.2 The Low Pressure Injection (LPI) system is in operation with the LPI pumps taking suction from the BWST.

1.3 The Reactor Building Emergency Spray system may or may not be in operation from the BWST through the spray headers.

1.4 The addition of caustic SHALL begin WITHIN thirty (30) minutes AFTER switchover to the recirculation mode of core cooling. The recirculation mode is in effect whenever the suction for the LPI pumps' is aligned to the Reactor Bldg. Emergency Sump.

1.5 The addition of caustic will be made upon authorization of the TSC/OSC, or upon notification by Operations when the TSC/OSC has not yet been activated.

2. Bases for Caustic Addition Calculations

2.1 Calculations for the amount of caustic required for neutralization of the borated water are dependent on:

2.1.1 An reasonable estimate of the volume of borated water being used as the core flooding coolant;

2.1.2 The boron concentration of the sources of water prior to addition.

2.2 If the total volumes of the CFTs and BWST are used, then the maximum amount of caustic required for neutralization of the borated water to a pH of 7.5 is 500 gallons. This amount has been calculated with the following considerations:

2.2.1 Both CFTs and the BWST have a total volume of 403,000 gallons with a boron concentration of 2300 ppm;

2.2.2 The RCS has a volume of 88,000 gallons with a boron concentration of 1000 ppm.

3. Determination of the amount of Caustic for pH 7.0 to 8.0 based on calculated Boron Concentration

Date __________ Time __________ Unit __________ By ____________________

CFT 'A' Boron, ppm __________ CFT 'B' Boron __________

RCS Boron __________ BWST Boron __________

NOTE:	Volume of BWST is 7608 gallons/ft.

BWST volume added to RCS, gallons __________ (obtain estimate from Operations)

3.1 Calculate the average boron concentration in the recirculating coolant to be neutralized.

$$\text{Average Boron, ppm} = \frac{\left(\frac{\text{'A'CFT boron, ppm} + \text{'B'CFT boron, ppm}}{2}\right)(15{,}000\text{ gal}) + (\text{RCS boron, ppm})(88{,}000\text{ gal}) + (\text{BWST boron, ppm})(\text{Volume, gal})}{(15{,}000\text{ gal} + 88{,}000\text{ gal} + \text{BWST volume, gal})} = \_\_\_\_\_\_\_\_$$

3.2 From Enclosure 6.5, using the average boron concentration, determine the B/Na ratio for the target pH.

NOTE:	Target pH is typically 7.5.

Target pH __________ B/Na Ratio __________

3.3 Calculate the Na concentration required for neutralization:

$$\text{Na, ppm} = \left(\frac{\text{Average Boron, ppm}}{\text{B/Na Ratio}}\right) = \_\_\_\_\_\_\_\_$$

3.4 Calculate the amount of 35% NaOH to be added to achieve the target Na concentration:

$$\text{NaOH, gal} = \frac{(\text{Na, ppm})(1.74)(\text{Coolant Volume, gal})}{483{,}000\text{ ppm NaOH}} = \_\_\_\_\_\_\_\_$$

where:

- 1.74 is the gravimetric conversion factor for Na to NaOH ($\left[\frac{40,\text{ FW NaOH}}{23,\text{ FW Na}}\right]$) and;
- 35% wt. NaOH contains 483 gm/l or 483,000 ppm NaOH.

Enclosure 6.4
E, A and R Values for
1% Failed Fuel and DBA

1% Failed Fuel:

$\bar{E}$ ~ 0.34 MeV/dis.

A ~ 0.293 mCi/ml

R = 0.18 mR/hr-mCi at lm for $\bar{E}$ ~ 0.34 MeV

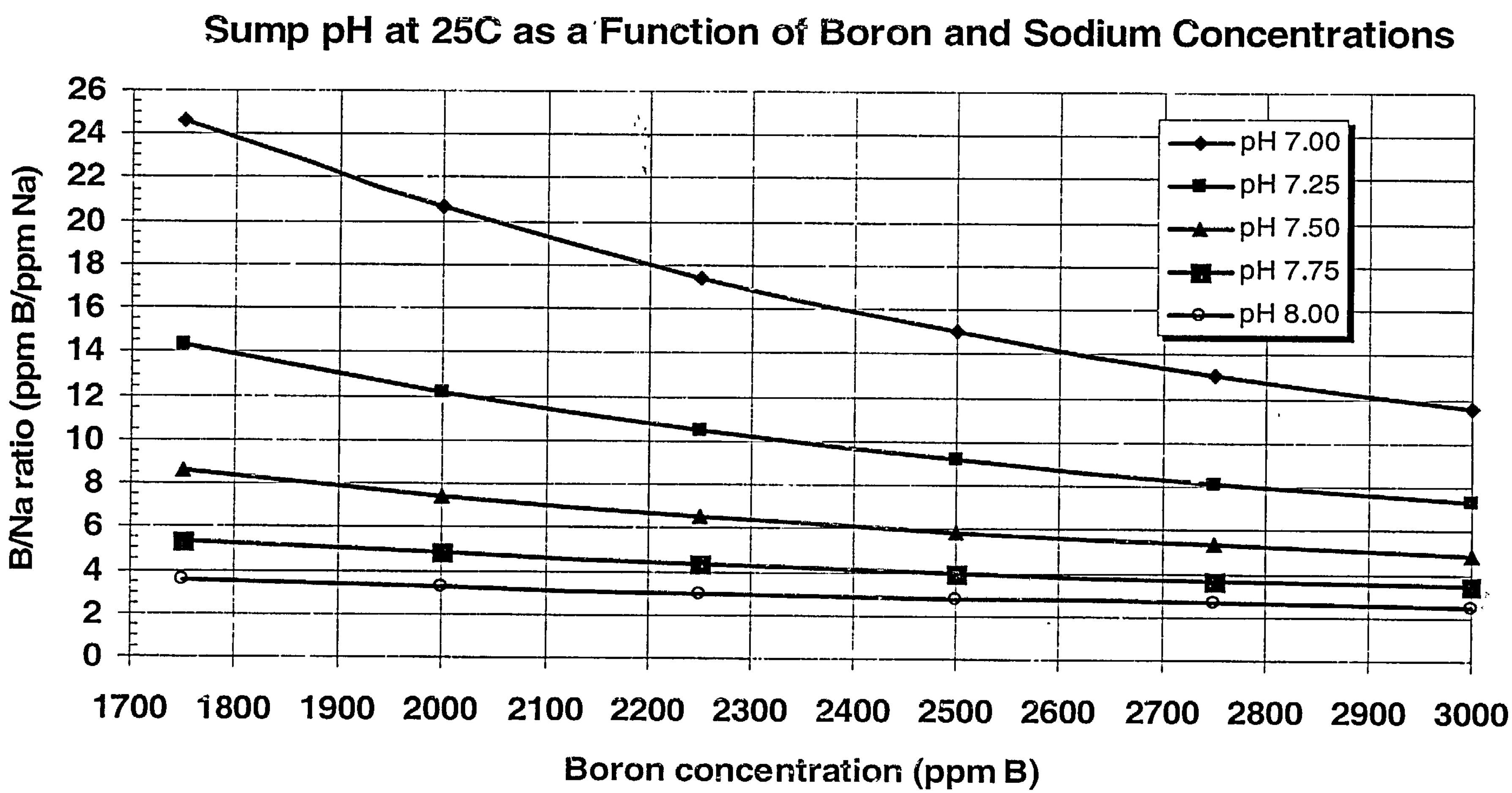
100% Failed Fuel or Design Basis Accident (DBA):

$\bar{E}$ ~ 1.14 MeV/dis.

A ~ 1.324 x 10^5 uCi/mL

R = 0.58 R/hr-Ci at lm for $\bar{E}$ ~ 1.14 MeV

A direct proportion should exist between $\bar{E}$ and R for any failed fuel value > 1% and < 100%.


Sump pH at 25C as a Function of Boron and Sodium Concentrations
B/Na ratio (ppm B/ppm Na)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
Boron concentration (ppm B)
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
pH 7.00
pH 7.25
pH 7.50
pH 7.75
pH 8.00

Enclosure 6.6
Quarterly Inspection of
Post Accident Equipment

1. **Caustic addition equipment stored in the brown cabinet in AB, 2nd floor ~10 ft North of 1 & 2 Chemical Addition Area:**

Goggles
Corrosive suit
Boots
Tank to valve adapter
Face shield
Gloves
Stainless steel flex hose
Tape measure
Bung Wrench
Flashlight

2. **Appendix 'R' sampling apparatus stationed in each units respective LPI room:**

	UNITS		
	1 (RM-61)	**2 (RM-63)**	**3 (RM-82)**
Sample cooler	______	______	______
Ice container (30 gal. drum)	______	______	______
Glass thermometer	______	______	______
Plastic liter bottles (3)	______	______	______
Tygon tubing for cooler (1 3/4", 2 1/4")	______	______	______
Adjustable wrench	______	______	______
250 mL disposable beaker	______	______	______
Hose isolation clamp	______	______	______