

September 25, 2003

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 2003-06

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

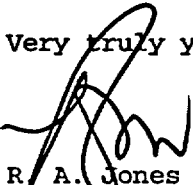
Volume B Revision 2003-06 September 2003

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,



R. A. Jones  
VP, Oconee Nuclear Site

xc: (w/2 copies of attachments)  
Mr. Luis Reyes,  
Regional Administrator, Region II  
U. S. Nuclear Regulatory Commission  
61 Forsyth St., SW, Suite 24T23  
Atlanta, Georgia 30303

w/copy of attachments  
Mr. James R. Hall  
Rockville, Maryland

(w/o Attachments, Oconee Nuclear Station)  
NRC Resident Inspector  
M. D. Thorne, Manager, Emergency Planning

A045

September 25, 2003

OCONEE NUCLEAR SITE

SUBJECT: Emergency Plan Implementing Procedures  
Volume B, Revision 2003-06

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

REMOVE

Cover Sheet Rev. 2003-05

Table of Contents, page 1 & 2

CP/1&2/A/2002/005 - 07/24/02

CP/3/A/2002/005 - 07/24/02

INSERT

Cover Sheet Rev. 2003-06

Table of Contents page 1 & 2

CP/1&2/A/2002/005 - 09/10/03

CP/3/A/2002/005 - 09/10/03

**DUKE POWER**

**EMERGENCY PLAN**  
**IMPLEMENTING PROCEDURES**  
**VOLUME B**



**APPROVED:**



**W. W. Foster, Manager**  
**Safety Assurance**

09/29/03

**Date Approved**

09/29/03

**Effective Date**

**VOLUME B**  
**REVISION 2003-06**  
**SEPTEMBER 2003**

**VOLUME B**  
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CP/1&2/A/2002/005	Post Accident Caustic Injection Into The Low Pressure Injection System	09/10/03
CP/2/A/2002/004C	Operating Procedure For The Post Accident Liquid Sampling System (PALSS)	01/10/03
CP/3/A/2002/004C	Operation Procedure For The Post-Accident Liquid Sampling System (PALSS)	01/10/03
CP/3/A/2002/005	Post Accident Caustic Injection Into The Low Pressure Injection System	09/10/03
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HP/0/B/1009/012	Distribution Of Potassium Iodide Tablets In The Event Of A Radioiodine Release	01/09/01
HP/0/B/1009/015	Procedure For Sampling And Quantifying High Level Gaseous Radioiodine And Particulate Radioactivity	07/23/01
HP/0/B/1009/016	Procedure For Emergency Decontamination Of Personnel And Vehicles On-Site And From Off-Site Remote Assembly Area	12/29/97
HP/1/A/1009/017	Operating Procedure For Post-Accident Containment Air Sampling System	09/13/00
HP/2/A/1009/017	Operating Procedure For Post-Accident Containment Air Sampling System	09/13/00
HP/3/A/1009/017	Operating Procedure For Post-Accident Containment Air Sampling System	09/13/00
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Safety Services Procedure 2.1	Safety Services Emergency Response Procedure 2.1	03/14/00

Duke Power Company  
**PROCEDURE PROCESS RECORD**  
**INFORMATION ONLY**

(1) ID No. CP1&2/A/2002/005Revision No. 18**Continuous Use****REPARATION**(2) Station Oconee Nuclear Station(3) Procedure Title Post Accident Caustic Injection Into the Low Pressure Injection System(4) Prepared By *[Signature]* F Clark Date 5/29/03

(5) Requires NSD 228 Applicability Determination?

☒ Yes (New procedure or revision with major changes)☐ No (Revision with minor changes)☐ No (To incorporate previously approved changes)(6) Reviewed By *[Signature]* (QR) Date 8/11/03Cross-Disciplinary Review By *[Signature]* (QR) NA Date 08/26/03Reactivity Mgmt. Review By \_\_\_\_\_ (QR) NA *[Signature]* Date \_\_\_\_\_Mgmt. Involvement Review By \_\_\_\_\_ (Ops. Supt.) NA *[Signature]* Date \_\_\_\_\_

(7) Additional Reviews

QA Review By \_\_\_\_\_ Date \_\_\_\_\_

Reviewed By \_\_\_\_\_ Date \_\_\_\_\_

Reviewed By \_\_\_\_\_ Date \_\_\_\_\_

Temporary Approval (if necessary)

By \_\_\_\_\_ (OSM/QR) Date \_\_\_\_\_

By \_\_\_\_\_ (QR) Date \_\_\_\_\_

(9) Approved By *[Signature]* Bryan J. [Signature] Date 9/10/03**PERFORMANCE** (Compare with control copy every 14 calendar days while work is being performed.)

(10) Compared with Control Copy \_\_\_\_\_ Date \_\_\_\_\_

Compared with Control Copy \_\_\_\_\_ Date \_\_\_\_\_

Compared with Control Copy \_\_\_\_\_ Date \_\_\_\_\_

(11) Date(s) Performed \_\_\_\_\_

Work Order Number (WO#) \_\_\_\_\_

**COMPLETION**

(12) Procedure Completion Verification

☐ Yes ☐ NA Check lists and/or blanks initialed, signed, dated, or filled in NA, as appropriate?☐ Yes ☐ NA Required enclosures attached?☐ Yes ☐ NA Data sheets attached, completed, dated, and signed?☐ Yes ☐ NA Charts, graphs, etc. attached, dated, identified, and marked?☐ Yes ☐ NA Procedure requirements met?

Verified By \_\_\_\_\_ Date \_\_\_\_\_

Procedure Completion Approved \_\_\_\_\_ Date \_\_\_\_\_

(14) Remarks (Attach additional pages, if necessary)

## Post Accident Caustic Injection into the Low Pressure Injection System

- NOTE:**
1. This entire procedure supports an AP or EOP action. The procedure will require AP/EOP validation per NSD 705.
  2. A control copy of this procedure shall be routed to the Emergency Preparedness Team within 3 working days after any approved changes.

### 1. Purpose

- 1.1 This procedure is to provide instruction for determining the amount and method of caustic addition into the LPI System during a LOCA.

1.2 Principle

Caustic is injected into the LPI System during a LOCA to neutralize the borated water used in the Reactor Building Emergency Spray System to pH 7.0 - 8.0.

The neutralization will inhibit the generation of hydrogen gas and promote a higher partition factor for iodine.

### 2. Limits and Precautions

- ☐ 2.1 The following safety equipment shall be worn when connecting/disconnecting caustic tote bins:
- 2.1.1 Chemical goggles
  - 2.1.2 Face shield
  - 2.1.3 Corrosive resistant suit, neoprene or chemrel
  - 2.1.4 Corrosive resistant boots, neoprene or PVC
  - 2.1.5 Corrosive resistant gloves, neoprene or PVC
- ☐ 2.2 Chemical hazards shall be known prior to use. For additional information refer to the MSDS sheets shall be referenced.
- ☐ 2.3 Under accident conditions, valve alignments shall **NOT** be made and injection shall **NOT** begin without prior authorization from the Operations Emergency Coordinator **OR** the Technical Support Center (TSC)/Operational Support Center (OSC)!

**NOTE:** An initial caustic add of 15 inches will neutralize an RCS inventory of 80,000 gallons with a boron concentration of 1800 ppm. This is a conservative initial add to allow immediate response to a large break LOCA.

- ☐ 2.4 An initial caustic add of 15 inches can be made without performing CSM 5.2, Enclosure 6.3 (Caustic Addition Calculations).
- ☐ 2.5 In the event of a caustic spill, extension 4911 shall be called to report spill.
- ☐ 2.6 ITS 5.4.1.a and SLC 16.13.7 require that pH be measured AND that the addition of caustic to Reactor Coolant commence within 30 minutes AFTER switchover to Recirculation Mode of Core Cooling to adjust the pH to a range of 7.0 to 8.0 WITHIN 24 hours.  
  
During recirculation mode, long-term core cooling is provided by injection of water from the Reactor Building Emergency Sump to the core by the Low Pressure Injection (LPI) pumps (1 LP-19 & 20 or 2 LP-19 & 20 are open). Switchover to recirculation mode is accomplished with minimal level in the BWST.
- ☐ 2.7 Safety and caustic addition equipment is stored in the brown storage container located in the Auxiliary Building, Unit 1 & 2 Chemical Addition Area.
- ☐ 2.8 Keys to the brown storage container are stored with the caustic addition procedures in the OSC Chemistry Emergency Procedure Files and in the filing cabinet located in the Primary Chemistry lab office. All personnel in Primary Chemistry and Radwaste have also been issued individual keys.
- ☐ 2.9 Power to the caustic addition pump is provided through 1XL located near the LPI hatch area. (Power supply diagram, Enclosure 5.6.)
- ☐ 2.10 Protective clothing shall be worn prior to connecting/disconnecting chemical line on tote bin.

### 3. Procedure

- 3.1 Upon notification from Operations Emergency Coordinator OR TSC / OSC take the following actions to align the caustic addition system to the appropriate unit:

**NOTE:** The following steps may be performed simultaneously to conserve time.

- ☐ Verify eyewash station and safety shower operable.

\_\_\_\_\_ • Verify label of tote bin to be used for addition as caustic soda and/or sodium hydroxide (NaOH).



- ☐ Mark the current liquid level directly on the translucent tote bin container.
- ☐ Measure down from the liquid level mark 15 inches.
  - Mark this level directly on the tote bin.
- ☐ IF necessary, move the tote bin into position.
- ☐ Remove dust cover from swagelock fitting on tote bin.
- ☐ Remove dust cover from swagelock fitting at CA-36 (Caustic Pump Suction Tell Tale). (Bottom of 1&2 Caustic Mix Tank downstream of CA-35, Elev 783)

**NOTE:** Protective clothing shall be worn prior to Step 3.1.1.

- ☐ 3.1.1 Connect stainless steel flex hose to the Swagelock quick-connect fitting upstream of CA-36 (Caustic Pump Suction Tell Tale) (Bottom of 1&2 Caustic Mix Tank downstream of CA-35, Elev. 783).
- ☐ 3.1.2 Connect stainless steel flex hose to the Swagelock fitting on tote-bin.
- 3.1.3 For Unit 1, notify Operations for permission to operate 1CA-62 AND 1LP-51 per procedure.  
Person contacted \_\_\_\_\_
- 3.1.4 For Unit 2, notify Operations for permission to operate 2CA-63 AND 2LP-51 per procedure.  
Person contacted \_\_\_\_\_
- ☐ 3.1.5 For Unit 1, ensure valve alignments per Enclosure 5.1.
- ☐ 3.1.6 For Unit 2, ensure valve alignments per Enclosure 5.2.
- ☐ 3.1.7 Vent the caustic tote bin by removing the tote bin fill cap.
- ☐ 3.1.8 Open the caustic tote bin outlet valve.
- ☐ 3.1.9 Notify Operations OR the OSC (if activated) that valve alignments for caustic injection are complete and ready to be initiated.  
Person contacted \_\_\_\_\_ Date/Time \_\_\_\_\_ / \_\_\_\_\_

**NOTE:** Low dose waiting area shall be used as possible during addition.

The caustic pump switch is located on the Chemical Addition Control Panel. The maximum pump capacity is approximately 2 gallons per minute.

3.1.10 WHEN notified by Operations, perform the following:

☐ 3.1.10.1 Open CA-36 (Caustic Pump Suction Tell Tale). (bottom of 1&2 Caustic Mix Tank downstream of CA-35, Elev. 783)

☐ 3.1.10.2 Start Caustic Addition Pump.

3.1.11 Check pressure gauge (above CA-112) to ensure pump working.

☐ 3.1.12 Notify Operations OR the OSC (if activated) that caustic injection has begun.

Person contacted \_\_\_\_\_ Date/Time \_\_\_\_\_ / \_\_\_\_\_

**NOTE:** The caustic pump has an average pump rate of 1.2 gallons per minute. To pump the initial setting of 15 inches will require 1.5 hours.

☐ 3.1.13 Calculate the total amount of caustic (in gallons) to be added for the neutralization of the borated water added to the system by using CSM 5.2 (Enclosure 6.3).

☐ 3.1.14 Convert gallons from Step 3.1.13 to inches (in the 350 gallon tote bin) by dividing the number of gallons to be added by 8.1.

Gallons to be added \_\_\_\_\_ Inches to be added from the tote bin \_\_\_\_\_

☐ 3.1.15 Mark the calculated liquid level directly on the tote bin by measuring down from the original "current liquid level" mark made in Step 3.1.

☐ 3.1.16 WHEN the caustic tote bin level reaches the desired level (as marked in Step 3.1) OR WHEN the caustic tote bin is empty, STOP caustic addition pump using the switch located on the Chemical Addition Control Panel.

☐ 3.1.17 Close tote bin outlet valve.

☐ 3.1.18 Close CA-36 (Caustic Pump Suction Tell Tale) (Bottom of 1&2 Caustic Mix Tank downstream of CA-35, Elev 783).

☐ 3.1.19 Record time and volume added on Enclosure 5.5.

- ☐ 3.1.20 **IF** necessary, replace the caustic tote bin as follows:
- ☐ 3.1.20.1 Replace tote bin fill cap.
  - ☐ 3.1.20.2 Disconnect empty tote bin from swagelock fitting on stainless flex hose.
  - ☐ 3.1.20.3 **IF** necessary, perform the following:
    - Move tote bins.
    - Remove dust cover from swagelock fitting on new tote bin.
  - ☐ 3.1.20.4 Connect stainless flex hose to the new tote bin.
  - ☐ 3.1.20.5 **IF** pumping is to continue, mark the tote bin per Section 3.1 for the amount to be added from the new tote bin.
    - A. Proceed to Step 3.1.7.
- ☐ 3.1.21 Notify OSC that caustic addition to the LPI is complete and no further additions are in progress at this time.
- Person contacted \_\_\_\_\_ Date/Time \_\_\_\_\_ / \_\_\_\_\_
- ☐ 3.1.22 Allow LPI to recirc  $\approx$  2 hours for mixing.
- ☐ 3.1.23 **WHEN** authorized by the TSC/OSC, collect sample (per appropriate procedure) to determine the resultant pH of the reactor coolant.
- ☐ 3.1.24 **IF** pH is  $< 7.0$ ,
- Calculate (refer to CSM 5.2, Enclosure 6.3) the amount of caustic (in gallons) to be added.
  - Convert this number to inches (in the 350 gallon tote bin) by dividing the number of gallons to be added by 8.1 gallons/inch.
  - Record the values below:  
Gallons to be added: \_\_\_\_\_ Inches to be added from tote bin: \_\_\_\_\_
- ☐ 3.1.25 **IF** pH is  $> 7.0$ , go to Step 3.1.29.
- ☐ 3.1.26 Mark the current liquid level directly on the translucent tote bin container.

- ☐ 3.1.27 Measure down from this mark the number of inches calculated in Step 3.1.24 above.
- Mark this level directly on the tote bin.
- ☐ 3.1.28 Repeat Steps 3.1.1 through 3.1.25 until all necessary caustic (as determined by TSC/OSC) has been added.
- ☐ 3.1.29 **WHEN** all necessary caustic has been added and upon authorization from the TSC/OSC, return the system to normal as follows:
- ☐ 3.1.29.1 Replace tote bin fill cap.
  - ☐ 3.1.29.2 Disconnect empty tote bin from swagelock fitting on stainless flex hose.
  - 3.1.29.3 For Unit 1, notify Operations for permission to operate 1CA-62 **AND** 1LP-51 per procedure.  
Person contacted \_\_\_\_\_
  - 3.1.29.4 For Unit 2, notify Operations for permission to operate 2CA-63 **AND** 2LP-51 per procedure.  
Person contacted \_\_\_\_\_
  - ☐ 3.1.29.5 For Unit 1, perform alignments per Enclosure 5.3 to return valves to normal position.
  - ☐ 3.1.29.6 For Unit 2, perform alignments per Enclosure 5.4 to return valves to normal position.

#### 4. References

- 4.1 Dwg. No. OFD-110A-1.8 Chemical Addition System (Primary Side Chemical Addition)
- 4.2 Dwg. No. OFD-102A-1.1 and OFD-102A-2.1 Low Pressure Injection System, Borated Water Supply and LPI Pump Suction.
- 4.3 CSM 5.2
- 4.4 ITS 5.4.1.a
- 4.5 SLC 16.13.7

**5. Enclosures**

- 5.1 Valve Alignment for Caustic Injection on Unit 1**
- 5.2 Valve Alignment for Caustic Injection on Unit 2**
- 5.3 Normal Valve Alignment for Caustic Injection System on Unit 1**
- 5.4 Normal Valve Alignment for Caustic Injection System on Unit 2**
- 5.5 Caustic Mixing and Injection Record**
- 5.6 Unit 1&2 Caustic Pump Power Supplies**

**Enclosure 5.1**  
**Valve Alignment for**  
**Caustic Injection on Unit 1**

**CP/1&2/A/2002/005**  
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**NOTE:** This enclosure is AP/EOP related.

Date \_\_\_\_\_

<i><b>DV</b></i>	<i><b>Init</b></i>	<i><b>Position</b></i>	<i><b>Valve No.</b></i>	<i><b>Valve Name</b></i>	<i><b>Location</b></i>
		Closed	2CA-98	Caustic to Unit #2 LPI Block (Chm)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-74
		Closed	1CA-58	Caustic to U1 LPI Suct Tell Tale (Chm)	Unit 1&2 LPI Hatch Area, AB, Elev 771, Col. T-72
		Open	1CA-39	Caustic to Unit #1 LPI Block (Chm)	Unit 1&2 LPI Hatch Area, AB Rm 118, Elev 771, Col. T-72
		Open	1CA-62	Caustic to Unit #1 LPI Block (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-72
		Open	1LP-51	LPI Sample Recirc Isolation (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 061, Elev 771, Col. T-71
		Open	CA-103	Caustic Recirc Line and Press Gauge Block	Downstream of 1&2 Caustic Pump and CA-37, Elev 783, Col. Q-67
		Closed	CA-96	Caustic Recirc Block	Recirc Line tapping off between CA-103 & CA-112 returning to Caustic Mix Tank, Elev 783
		Closed	CA-97	Caustic Recirc Block	Downstream of CA-96 and upstream of DW-120 or Caustic Mix Tank recirc line, Elev. 783
		Closed	CA-35	Caustic Pump Suction	Next valve after CA-34 Tank and upstream of Caustic Pump, Elev 783
		Closed	CA-37	Caustic Header to Waste Evap. Feed Tank Block	AB Hallway, Elev 783, near Col. P-74, 6 ft. overhead
		Open	CA-112	Caustic Pump Press Gauge Isol	First valve downstream of PG-27 (Pressure Gauge) behind Caustic Mix Tank on West Wall, Elev 783

**Enclosure 5.2**  
**Valve Alignment for**  
**Caustic Injection System on Unit 2**

**CP/1&2/A/2002/005**

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**NOTE:** This enclosure is AP/EOP related.

Date \_\_\_\_\_

<i><b>DV</b></i>	<i><b>Init</b></i>	<i><b>Position</b></i>	<i><b>Valve No.</b></i>	<i><b>Valve Name</b></i>	<i><b>Location</b></i>
		Closed	1CA-39	Caustic to Unit #1 LPI Block (Chm)	Unit 1&2 LPI Hatch Area, AB Rm 118, Elev 771, Col. T-72
		Closed	2CA-58	Caustic to #2 LPI Pump Suct Tell Tale (Chm)	Unit 1&2 LPI Hatch Area, AB Rm 119, Elev 771, Col. T-74
		Open	2CA-98	Caustic to Unit #2 LPI Block (Chm)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-74
		Open	2CA-63	Caustic to Unit #2 LPI Block (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-74
		Open	2LP-51	LPI Sample Recirc Isolation (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 063, Elev 771, Col. T-71
		Open	CA-103	Caustic Recirc Line and Press Gauge Block	Downstream of 1&2 Caustic Pump and CA-37, Elev 783, Col. Q-67
		Closed	CA-96	Caustic Recirc Block	Recirc Line tapping off between, CA-103 & CA-112 returning to Caustic Mix Tank, Elev 783
		Closed	CA-97	Caustic Recirc Block	Downstream of CA-96 and upstream of DW-120 or Caustic Mix Tank recirc line, Elev. 783
		Closed	CA-35	Caustic Pump Suction	Next valve after CA-34 Tank and upstream of Caustic Pump, Elev 783
		Closed	CA-37	Caustic Header to Waste Evap. Feed Tank Block	AB Hallway, Elev 783, near Col. P-74, 6 ft. overhead
		Open	CA-112	Caustic Pump Press Gauge Isol	First valve downstream of PG-27 (Pressure Gauge) behind Caustic Mix Tank on West Wall, Elev 783

# Enclosure 5.3

## Normal Valve Alignment for Caustic Injection System on Unit 1

CP/1&2/A/2002/005

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**NOTE:** This enclosure is AP/EOP related.

Date \_\_\_\_\_

<i>DV</i>	<i>Init</i>	<i>Position</i>	<i>Valve No.</i>	<i>Valve Name</i>	<i>Location</i>
		Closed	2CA-98	Caustic to Unit #2 LPI Block (Chm)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-74
		Closed	2CA-63	Caustic to Unit #2 LPI Block (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-74
		Closed	1CA-58	Caustic to UI LPI Suct Tell Tale (Chm)	Unit 1&2 LPI Hatch Area, AB, Elev 771, Col. T-72
		Closed	1CA-39	Caustic to Unit #1 LPI Block (Chm)	Unit 1&2 LPI Hatch Area, AB Rm 118, Elev 771, Col. T-72
		Closed	1CA-62	Caustic to Unit #1 LPI Block (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-72
		Closed	1LP-51	LPI Sample Recirc Isolation (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 061, Elev 771, Col. T-71
		Open	CA-103	Caustic Recirc Line and Press Gauge Block	Downstream of 1&2 Caustic Pump and CA-37, Elev 783, Col. Q-67
		Closed	CA-97	Caustic Recirc Block	Downstream of CA-96 and upstream of DW-120 on Caustic Mix Tank Recirc Line, Elev 783
		Closed	CA-96	Caustic Recirc Block	Recirc Line tapping off between CA-103 & CA-112 returning to Caustic Mix Tank, Elev 783
		Closed	LWD-267	Caustic Tank Outlet Drain	Base of Caustic Mix Tank West Side, Elev 783
		Closed	CA-34	Caustic Mix Tank Outlet	First valve from bottom of Caustic Mix Tank and upstream of Caustic Pump, Elev 783 Col. Q-68
		Closed	CA-35	Caustic Pump Suction	Next valve after CA-34 Tank and upstream of Caustic Pump, Elev 783
		Closed	CA-37	Caustic Header to Waste Evap. Feed Tank Block	AB Hallway, Elev 783, near Col. P-74, 6 ft. overhead
		Open	CA-112	Caustic Pump Press Gauge Isol	First valve downstream of PG-27 (Pressure Gauge) behind Caustic Mix Tank on West Wall, Elev 783
		Closed	CA-36	Caustic Pump Suction Tell Tale	Bottom of 1&2 Caustic Mix Tank downstream of CA-35, Elev 783



# Enclosure 5.4

## Normal Valve Alignment for Caustic Injection System on Unit 2

CP/1&2/A/2002/005

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**NOTE:** This enclosure is AP/EOP related.

Date \_\_\_\_\_

<i>DV</i>	<i>Init</i>	<i>Position</i>	<i>Valve No.</i>	<i>Valve Name</i>	<i>Location</i>
		Closed	1CA-39	Caustic to Unit #1 LPI Block (Chm)	Unit 1&2 LPI Hatch Area, AB Rm 118, Elev 771, Col. T-72
		Closed	1CA-62	Caustic to Unit #1 LPI Block (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-72
		Closed	2CA-58	Caustic to #2 LPI Pump Suct Tell Tale (Chm)	Unit 1&2 LPI Hatch Area, AB Rm 119, Elev 771, Col. T-74
		Closed	2CA-98	Caustic to Unit #2 LPI Block (Chm)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-74
		Closed	2CA-63	Caustic to Unit #2 LPI Block (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 119, Elev 771, Col. T-74
		Closed	2LP-51	LPI Sample Recirc Isolation (Ops)	Unit 1&2 LPI Hatch Area, AB Rm. 063, Elev 771, Col. T-71
		Open	CA-103	Caustic Recirc Line and Press Gauge Block	Downstream of 1&2 Caustic Pump and CA-37, Elev 783, Col. Q-67
		Closed	CA-97	Caustic Recirc Block	Downstream of CA-96 and upstream of DW-120 on Caustic Mix Tank Recirc Line, Elev 783
		Closed	CA-96	Caustic Recirc Block	Recirc Line tapping off between CA-103 & CA-112 returning to Caustic Mix Tank, Elev 783
		Closed	LWD-267	Caustic Tank Outlet Drain	Base of Caustic Mix Tank West Side, Elev 783
		Closed	CA-34	Caustic Mix Tank Outlet	First valve from bottom of Caustic Mix Tank and upstream of Caustic Pump, Elev 783 Col. Q-68
		Closed	CA-35	Caustic Pump Suction	Next valve after CA-34 Tank and upstream of Caustic Pump, Elev 783
		Closed	CA-37	Caustic Header to Waste Evap. Feed Tank Block	AB Hallway, Elev 783, near Col. P-74, 6 ft. overhead
		Open	CA-112	Caustic Pump Press Gauge Isol	First valve downstream of PG-27 (Pressure Gauge) behind Caustic Mix Tank on West Wall, Elev 783
		Closed	CA-36	Caustic Pump Suction Tell Tale	Bottom of 1&2 Caustic Mix Tank downstream of CA-35, Elev 783

**Enclosure 5.5**  
**Caustic Mixing and Injection Record**

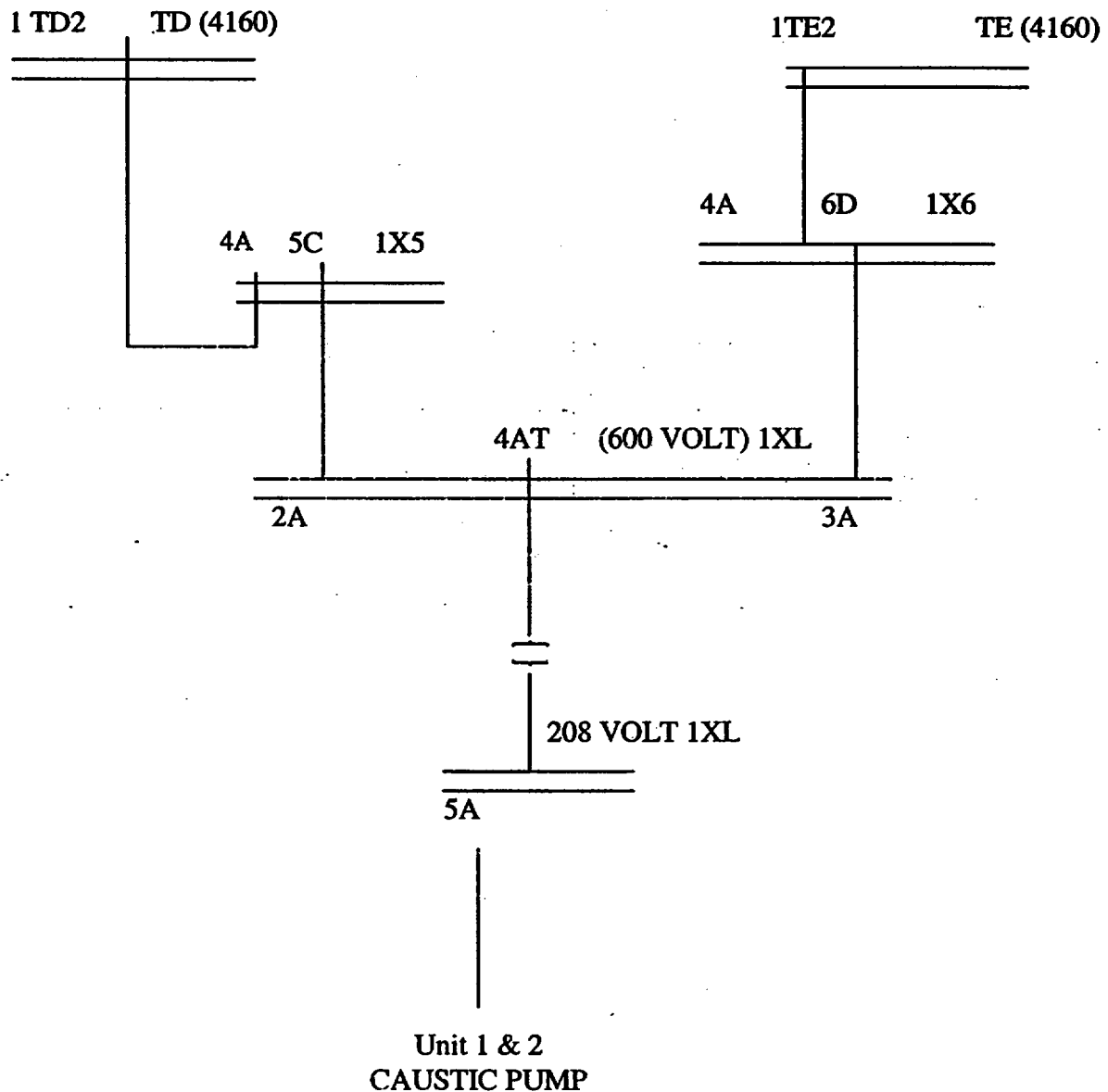
**CP/1&2/A/2002/005**  
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**NOTE:** This enclosure is AP/EOP related.

**Date/Time of Injection**

**Gal NaOH**

- NOTE:**
1. This enclosure is AP/EOP related.
  2. Operations alternates the power logic as outlined. Verification will be required to establish which alignment is in use at the time of question.



**Duke Power Company**  
**PROCEDURE PROCESS RECORD**

(1) ID No. CP/3/A/2002/005Revision No. 16**Continuous Use****INFORMATION ONLY****PREPARATION**(2) Station Oconee Nuclear Station(3) Procedure Title Post Accident Caustic Injection Into the Low Pressure Injection System(4) Prepared By For Clark Date 8/11/03

(5) Requires NSD 228 Applicability Determination?

☒ Yes (New procedure or revision with major changes)☐ No (Revision with minor changes)☐ No (To incorporate previously approved changes)(6) Reviewed By Richards (QR) Date 8/11/03Cross-Disciplinary Review By Forner (QR) NA Date 08/26/03Reactivity Mgmt. Review By \_\_\_\_\_ (QR) NA For Date \_\_\_\_\_Mgmt. Involvement Review By \_\_\_\_\_ (Ops. Supt.) NA For Date \_\_\_\_\_

(7) Additional Reviews

QA Review By \_\_\_\_\_ Date \_\_\_\_\_

Reviewed By \_\_\_\_\_ Date \_\_\_\_\_

Reviewed By \_\_\_\_\_ Date \_\_\_\_\_

(8) Temporary Approval (if necessary)

By \_\_\_\_\_ (OSM/QR) Date \_\_\_\_\_

By \_\_\_\_\_ (QR) Date \_\_\_\_\_

(9) Approved By Bryant J. Jones Date 9/10/03**PERFORMANCE** (Compare with control copy every 14 calendar days while work is being performed.)

(10) Compared with Control Copy \_\_\_\_\_ Date \_\_\_\_\_

Compared with Control Copy \_\_\_\_\_ Date \_\_\_\_\_

Compared with Control Copy \_\_\_\_\_ Date \_\_\_\_\_

(11) Date(s) Performed \_\_\_\_\_

Work Order Number (WO#) \_\_\_\_\_

**COMPLETION**

(12) Procedure Completion Verification

☐ Yes ☐ NA Check lists and/or blanks initialed, signed, dated, or filled in NA, as appropriate?☐ Yes ☐ NA Required enclosures attached?☐ Yes ☐ NA Data sheets attached, completed, dated, and signed?☐ Yes ☐ NA Charts, graphs, etc. attached, dated, identified, and marked?☐ Yes ☐ NA Procedure requirements met?

Verified By \_\_\_\_\_ Date \_\_\_\_\_

(13) Procedure Completion Approved \_\_\_\_\_ Date \_\_\_\_\_

(14) Remarks (Attach additional pages, if necessary)

## Post Accident Caustic Injection into the Low Pressure Injection System

- NOTE:**
1. This entire procedure supports an AP or EOP action. The procedure will require AP/EOP validation per NSD 705.
  2. A control copy of this procedure shall be routed to the Emergency Preparedness Team within 3 working days after any approved changes.

### 1. Purpose

- 1.1 This procedure is to provide instruction for caustic addition into the LPI System during a Loss of Coolant Accident. (LOCA)

1.2 Principle

Caustic is injected into the LPI System during a LOCA to neutralize the borated water used in the Reactor Building Emergency Spray System to pH 7.0 - 8.0.

The neutralization will inhibit the generation of hydrogen gas and promote a higher partition factor for iodine.

### 2. Limits and Precautions

- ☐ 2.1 The following safety equipment shall be worn when connecting/disconnecting caustic tote bins:
- 2.1.1 Chemical goggles
  - 2.1.2 Face shield
  - 2.1.3 Corrosive resistant suit, neoprene or chemrel
  - 2.1.4 Corrosive resistant boots, neoprene or PVC
  - 2.1.5 Corrosive resistant gloves, neoprene or PVC
- ☐ 2.2 Chemical hazards shall be known prior to use. For additional information, MSDS sheets shall be referenced.
- ☐ 2.3 Under accident conditions, valve alignments shall NOT be made and injection shall NOT begin without prior authorization from the Operations Emergency Coordinator OR the Technical Support Center (TSC) / Operational Support Center (OSC)!

**NOTE:** An initial caustic add of 15 inches will neutralize an RCS inventory of 80,000 gallons with a boron concentration of 1800 ppm. This is a conservative initial add to allow immediate response to a large break LOCA.

- ☐ 2.4 An initial caustic add of 15 inches can be made without performing CSM 5.2, Enclosure 6.3 (Caustic Addition Calculations).
- ☐ 2.5 In the event of caustic spill, extension 4911 shall be called to report spill.
- ☐ 2.6 ITS 5.4.1.a and SLC 16.13.7 require that pH be measured AND that the addition of caustic to Reactor Coolant commence within 30 minutes AFTER switchover to recirculation mode of core cooling to adjust pH to a range of 7.0 to 8.0 WITHIN 24 hours.

During recirculation mode, long-term core cooling is provided by injection of water from the Reactor Building Emergency Sump to the core by the Low Pressure Injection (LPI) pumps (3 LP-19 and 3 LP-20 are open). Switchover to recirculation mode is accomplished with minimal level in the BWST.

- ☐ 2.7 Safety and caustic addition equipment is stored in the brown storage container located in the Auxiliary Building, Unit 1 & 2 Chemical Addition Area. The following equipment should be retrieved for Caustic Addition:

Chemical Goggles	Tape Measure
Face Shield	Marking Pen (to mark level on Tote Bin)
Corrosive resistant suit	Bung Wrench
Corrosive resistant gloves	Leather Gloves

- ☐ 2.8 Keys to the brown storage container are stored with the caustic addition procedure in the OSC Chemistry Emergency Procedure Files and in the filing cabinet located in the Primary Chemistry lab office. All personnel in Primary Chemistry and Radwaste have also been issued individual keys.
- ☐ 2.9 Power to the caustic addition pump is provided through 3XL located near the LPI Hatch Area (Power supply diagram, Enclosure 5.4).
- ☐ 2.10 Protective clothing shall be worn prior to connecting/disconnecting chemical line or tote bin.

### 3. Procedure

- 3.1 Upon notification from Operations Emergency Coordinator OR TSC / OSC, take the following actions to align the caustic addition system to the appropriate unit:

**NOTE:** The following steps may be performed simultaneously to conserve time.

- ☐ Verify eyewash and safety shower operable.
- \_\_\_\_ • Verify label of tote bin to be used for addition as caustic soda AND/OR sodium hydroxide (NaOH).
- ☐ Mark the current liquid level directly on the translucent tote bin container.
- ☐ Measure down from the liquid level mark 15 inches.
  - Mark this level directly on the tote bin.
- ☐ IF necessary, move the tote bin into position.
  - ☐ Remove dust cover from Swagelock fitting on tote bin.
  - ☐ Remove dust cover from Swagelock fitting at 3CA-36 (Caustic Pump Suction Tell Tale). (AB Elev 771 at base of Unit 3 NaOH pump)

**NOTE:** Protective clothing shall be worn prior to Step 3.1.1.

- ☐ 3.1.1 Connect stainless steel flex hose to the Swagelock quick-connect fitting upstream of 3CA-36 (Caustic Pump Suction Tell Tale). (AB 771 at base of Unit 3 NaOH pump)
- ☐ 3.1.2 Connect stainless steel flex hose to the Swagelock fitting on the tote bin.
- 3.1.3 Notify Operations for permission to operate 3CA-62 AND 3LP-51 per procedure.  
Person contacted \_\_\_\_\_
- ☐ 3.1.4 Ensure valve alignments per Enclosure 5.1 to allow caustic injection into the Low Pressure Injection (LPI) pump suction on Unit 3.
- ☐ 3.1.5 Vent the caustic tote bin by removing the tote bin fill cap.
- ☐ 3.1.6 Open the caustic tote bin outlet valve.

- ☐ 3.1.7 Notify Operations OR the OSC (if activated) that valve alignments for caustic injection are complete and ready to be initiated.

Person contacted \_\_\_\_\_ Date/Time \_\_\_\_\_ / \_\_\_\_\_

**NOTE:** The caustic pump switch is located on the Chemical Addition Control Panel. The maximum pump capacity is approximately 2 gallons per minute.

- ☐ 3.1.8 WHEN notified by Operations perform the following:

3.1.8.1 Open 3CA-36 (Caustic Pump Suction Tell Tale). (AB Elev. 771 at base of U3 NaOH Pump).

3.1.8.2 Start caustic addition pump.

- 3.1.9 Check pressure gauge 3PG-262 (upstream 3CA-112, AB Elev. 771 adjacent to but west of Unit 3 NaOH mix tank) to verify the pump is working.

**NOTE:** Low dose waiting area as possible during addition

- ☐ 3.1.10 Notify Operations OR the OSC (if activated) that caustic injection has begun.

Person contacted \_\_\_\_\_ Date/Time \_\_\_\_\_ / \_\_\_\_\_

**NOTE:** The caustic pump has an average pump rate of 1.2 gallons per minute. To pump the initial setting of 15 inches will require 1.5 hours.

- ☐ 3.1.11 Calculate the total amount of caustic (in gallons) to be added for the neutralization of the borated water added to the system by using CSM 5.2 (Enclosure 6.3).

- ☐ 3.1.12 Convert gallons from Step 3.1.10 to inches (in the 350 gallon tote bin) by dividing the number of gallons to be added by 8.1. Record the values below:

Gallons to be added \_\_\_\_\_ Inches to be added from the tote bin \_\_\_\_\_

- ☐ 3.1.13 Mark the calculated liquid level directly on the tote bin by measuring down from the original "current liquid level" mark made in Step 3.1.

- ☐ 3.1.14 WHEN the caustic tote bin level reaches the desired level (as marked in Step 3.1) OR WHEN the caustic tote bin is empty, stop caustic addition pump using the switch located on the Chemical Addition Control Panel.

- ☐ 3.1.15 Close tote bin outlet valve.



- ☐ 3.1.16 Close 3CA-36 (Caustic Pump Suction Tell Tale) (AB Elev. 771 at base of Unit 3 NaOH pump).
- ☐ 3.1.17 Record time and volume added on Enclosure 5.3.
- ☐ 3.1.18 IF necessary, replace the caustic tote bin as follows:
- ☐ 3.1.18.1 Replace tote bin fill cap.
  - ☐ 3.1.18.2 Disconnect empty tote bin from Swagelock fitting on stainless flex hose.
  - ☐ 3.1.18.3 IF necessary, move tote bins and remove dust cover from Swagelock fitting on new tote bin.
  - ☐ 3.1.18.4 Connect stainless flex hose to the new tote bin.
  - ☐ 3.1.18.5 IF pumping is to continue,
    - A. Mark the tote bin per Section 3.1 for the amount to be added from the new tote bin
    - B. Proceed to Step 3.1.5.
- ☐ 3.1.19 Notify OSC caustic addition to U-3 LPI is complete and no further additions are in progress.
- Person contacted \_\_\_\_\_ Date/Time \_\_\_\_\_ / \_\_\_\_\_
- ☐ 3.1.20 Allow LPI to recirc for 2 hours for mixing.
- ☐ 3.1.21 WHEN authorized by the TSC/OSC, collect sample (per appropriate procedure) to determine the resultant pH of the reactor coolant.
- ☐ 3.1.22 IF pH is < 7.0:
- Calculate (refer to CSM 5.2, Enclosure 6.3) the amount of caustic (in gallons) to be added to complete the neutralization of the borated water added to the system.
  - Convert this number to inches (in the 350 gallon tote bin) by dividing the number of gallons to be added by 8.1 gallons/inch.
  - Record the values below:
- Gallons to be added: \_\_\_\_\_ Inches to be added from tote bin: \_\_\_\_\_

- ☐ 3.1.23 **IF** pH is > 7.0, go to Step 3.1.27.
- ☐ 3.1.24 Mark the current liquid level directly on the translucent tote bin container.
- ☐ 3.1.25 Measure down from this mark the number of inches calculated in Step 3.1.22 above.
  - Mark this level directly on the tote bin.
- ☐ 3.1.26 Repeat Steps 3.1.1 through 3.1.23 until all necessary caustic (as determined by TSC/OSC) has been added.
- ☐ 3.1.27 **WHEN** all necessary caustic has been added and upon authorization from the TSC/OSC, return the system to normal as follows:
  - ☐ 3.1.27.1 Replace tote bin fill cap.
  - ☐ 3.1.27.2 Disconnect empty tote bin from Swagelock fitting on stainless flex hose.
  - 3.1.27.3 Notify Operations for permission to operate 3CA-62 **AND** 3LP-51 per procedure.  
Person contacted \_\_\_\_\_
  - ☐ 3.1.27.4 Ensure alignments per Enclosure 5.2 to return valves to normal position.

#### 4. References

- 4.1 Dwg. No. OFD-110A-3.8 Chemical Addition System (Primary Side Chemical Addition)
- 4.2 Dwg. No. OFD-102A-3.1, Low Pressure Injection System, Borated Water Supply and LPI Pump Suction.
- 4.3 CSM 5.2
- 4.4 ITS 5.4.1.a
- 4.5 SLC 16.13.7

## **5. Enclosures**

- 5.1 Valve Alignment for Caustic Injection on Unit 3**
- 5.2 Normal Valve Alignment for Caustic Injection System on Unit 3**
- 5.3 Caustic Mixing and Injection Record**
- 5.4 Unit 3 Caustic Pump Power Supplies**

**Enclosure 5.1**  
**Valve Alignment for**  
**Caustic Injection on Unit 3**

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**NOTE:** This enclosure is AP/EOP related.

Date \_\_\_\_\_

<i>DV</i>	<i>Init</i>	<i>Position</i>	<i>Valve No.</i>	<i>Valve Name</i>	<i>Location</i>
		Open	3CA-103	Caustic Recirc Line & Press Gauge Block	AB Rm. 150, at Caustic Mix Tank north side downstream of PG27 & upstream of 3CA-103
		Closed	3CA-96	Caustic Recirc Block	AB Elev 771 at Unit 3 NaOH Pump Discharge
		Closed	3CA-97	Caustic Recirc Block	AB Elev 771 at Unit 3 NaOH Pump Discharge
		Closed	3CA-35	Caustic Pump Suction	AB Elev 771 at base of Unit 3 NaOH pump
		Open	3CA-112	Caustic Pump Pressure Gauge Isolation	AB Elev 771 adjacent to but west of Unit 3 NaOH mix tank
		Closed	3CA-58	Caustic to #3 LP Pump Suction Tell Tale	AB Elev 783 Col. Q-91, near CC Cooler Room
		Open	3CA-39	Caustic to Unit #3 LP Block (Chm)	AB Hall, Elev 783 Col. Q-91, near CC Cooler Room
		Open	3CA-62	Caustic to Unit #3 LPI Block (OPS)	AB Elev 783 Col. Q-91, near CC Cooler Room
		Open	3LP-51	LPI Sample Recirc. Isolation Valve (Ops)	AB Elev 783 Col. R-90 near CC Cooler Room

## Enclosure 5.2

### Normal Valve Alignment for Caustic Injection System on Unit 3

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**NOTE:** This enclosure is AP/EOP related.

Date \_\_\_\_\_

<i>DV</i>	<i>Init</i>	<i>Position</i>	<i>Valve No.</i>	<i>Valve Name</i>	<i>Location</i>
		Open	3CA-103	Caustic Recirc Line & Press Gauge Block	AB Rm. 150, at Caustic Mix Tank north side downstream of PG27 & upstream of 3CA-103
		Closed	3CA-97	Caustic Recirc Block	AB Elev 771 overhead at Unit 3 NaOH mix tank
		Closed	3CA-96	Caustic Recirc Block	AB Elev 771 at Unit 3 NaOH Pump Discharge
		Closed	3LWD-267	Caustic Tank Outlet Drain	AB Elev 771 at tank drain pipe of Unit 3 NaOH pump
		Closed	3CA-34	Caustic Mix Tank Outlet	AB Elev 771 at base of Unit 3 NaOH pump
		Closed	3CA-35	Caustic Pump Suction	AB Elev 771 at base of Unit 3 NaOH pump
		Closed	3CA-36	Caustic Pump Suction Tell Tale	AB Elev 771 at base of Unit 3 NaOH pump
		Open	3CA-112	Caustic Pump Pressure Gauge Isolation	AB Elev 771 adjacent to but west of Unit 3 NaOH mix tank
		Closed	3CA-58	Caustic to #3 LPI Pump Suct Tell Tale	AB Elev 783 Col. Q-91, near CC Cooler Room
		Closed	3CA-39	Caustic to Unit #3 LPI Block (Chm)	AB Hall, Elev 783 Col. Q-91, near CC Cooler Room
		Closed	3CA-62	Caustic to Unit #3 LPI Block (OPS)	AB Elev 783 Col. Q-91, near CC Cooler Room
		Closed	3LP-51	LPI Sample Recirc. Isolation Valve (Ops)	AB Elev 783 Col. R-90 near CC Cooler Room



**Enclosure 5.4**  
**Unit 3 Caustic Pump Power Supplies**

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- NOTE:**
1. This enclosure is AP/EOP related.
  2. Operations alternates the power logic as outlined. Verification will be required to establish which alignment is in use at the time of question.

