

# PILGRIM NUCLEAR POWER STATION

Procedure No. 2.2.95

CHLORINATION SYSTEM



Stop  
Think  
Act  
Review

MSTP RELATED

CONTINUOUS USE

## REVISION LOG

**REVISION    52                      Date Originated    6/05**

Pages Affected

Description

3,21,27

Add Sections 7.1.2 and 7.1.4 to provide direction for priming the CW Hypo Pump(s) P-113A (B). (CR-PNP-2005-0406)

**REVISION    51                      Date Originated    7/04**

Pages Affected

Description

36

To reflect field conditions, revise step to ensure that the Dechlorination Pump vent tubing is connected.

58

Add lines to record names/initials of checklist performers.

**REVISION    50                      Date Originated    2/04**

Pages Affected

Description

6

Add PNPS 7.8.1 to References.

15,17,19,22,24,60

Change CWS TRC targets to reference PNPS 7.8.1.

26,29,31,33,35

Change SSW TRC targets to reference PNPS 7.8.1

43-53,57,58

Revise checklists to conform with eSOMS.

## TABLE OF CONTENTS

	<u>Page</u>
1.0 PURPOSE AND SCOPE.....	5
2.0 REFERENCES.....	5
2.1 DEVELOPMENTAL.....	5
2.2 IMPLEMENTING.....	6
3.0 DEFINITIONS.....	7
4.0 DISCUSSION.....	7
4.1 GENERAL.....	7
4.2 CIRCULATING WATER SYSTEM CHLORINATION.....	8
4.2.1 CW Hypochlorite Injection - Description.....	8
4.2.2 CW Hypochlorite Injection - Function.....	8
4.2.3 CWS Residual Chlorine Monitoring.....	9
4.3 SALT SERVICE WATER SYSTEM CHLORINATION.....	10
4.3.1 SSW Hypochlorite Injection - Description.....	10
4.3.2 SSW Hypochlorite Injection - Function.....	10
4.3.3 SSWS Residual Chlorine Monitoring.....	11
4.4 SCREENWASH WATER DECHLORINATION.....	11
5.0 PRECAUTIONS AND LIMITATIONS.....	12
5.1 PRECAUTIONS.....	12
5.2 LIMITATIONS.....	13
6.0 PREREQUISITES.....	13
7.0 PROCEDURE.....	14
7.1 CHLORINATION OF THE CWS (CONDENSER) USING THE CW HYPO PUMPS.....	15
7.1.1 Operation Of CW Hypo Pump P-113A.....	16
7.1.2 Priming Of CW Hypo Pump P-113A.....	21
7.1.3 Operation Of CW Hypo Pump P-113B.....	22
7.1.4 Priming Of CW Hypo Pump P-113B.....	27

## TABLE OF CONTENTS (Continued)

	<u>Page</u>
7.2 CHLORINATION OF THE SSWS.....	28
7.2.1 SSW Chlorination Using Hypo Pump P-161A.....	29
7.2.2 SSW Chlorination Using Hypo Pump P-161B.....	32
7.2.3 SSW Chlorination Using The Spare (Swing) Hypo Pump P-161C.....	34
7.3 DECHLORINATION OF THE SCREENWASH WATER.....	38
7.3.1 Setup of Dechlorination System for Automatic Operation.....	38
7.3.2 Long-Term Operation of Dechlorination System.....	39
7.4 SODIUM HYCHLORITE SPILLS.....	40
8.0 ATTACHMENTS.....	41
ATTACHMENT 1 - PREREQUISITE CHECKLIST.....	42
ATTACHMENT 2 - VALVE CHECKLIST.....	44
ATTACHMENT 3 - BREAKER CHECKLIST.....	56
ATTACHMENT 4 - INSTRUMENTATION CHECKLIST.....	59
ATTACHMENT 5 - TECHNICAL DATA FOR CW HYPO PUMPS P-113A AND P-113B.....	61
ATTACHMENT 6 - CWS HYPOCHLORITE INJECTION MONITORING (OPER-36).....	62
ATTACHMENT 7 - SALT SERVICE WATER CHLORINATION SYSTEM ISOMETRIC DIAGRAM.....	66

## 1.0 PURPOSE AND SCOPE

This Procedure provides the information necessary for Station personnel to perform the following:

- [1] Chlorination of the Circulating Water System (CWS)
- [2] Chlorination of the Salt Service Water System (SSWS)
- [3] Dechlorination of Screenwash Water

This Procedure focuses on hypochlorite injection rather than chlorine monitoring, which is dealt with more thoroughly in Chemistry Procedures.

## 2.0 REFERENCES

### 2.1 DEVELOPMENTAL

- [1] National Pollutant Discharge Elimination System (NPDES) Permit (No. MA0003557 Federal, No. 359 State), including modifications issued after 4/29/91
- [2] PNPS Drawings
  - (a) E158 Residual Chlorine Sampling Systems
  - (b) E309, Residual Chlorine Monitoring Systems
  - (c) P&ID M211, Circulating Water System
  - (d) P&ID M212, Salt Service Water, Screenwash, and Hypochlorination Systems
- [3] PNPS Plant Design Changes (PDCs/FRNs/ERs)
  - (a) 81-09, Salt Service Water Chlorination System Refurbishment
  - (b) 85-28, SSW Residual Chlorine Monitoring System Upgrade
  - (c) 85-28-25, Removal of the Residual Chlorine Monitoring System
  - (d) 86-123, Screenwash Dechlorination System Modifications
  - (e) 90-42, CW & SSW Hypo Injection System Upgrade
  - (f) 96-04-44, Replace Rotameters For Circulating Water Hypo Pumps
  - (g) 99-01-100, Hypochlorination of SSW and Circ Water Systems
  - (h) 00-01-127, Replace Stainless Steel Hypochlorite Injection Piping with Teflon Lined Piping

- (i) 01-01-110, Revise Hypochlorination Discharge Pipe in the SSW Pump Bay
- (j) 01-01-117, Install Flexi-Liner in Sodium Hypochlorite Tank (T-147)

[4] Problem Reports (PRs)

- (a) 94.0354, Hypo Pump Flow Indicators FI-3922A/B Have Been Found To Be Jammed On Numerous Occasions
- (b) 95.0523, Relief Valves in the Circulating Water and Service Water Hypochlorination Systems Contain Isolation Valves
- (c) 95.0524, Hypochlorination Pump Suction Piping Located Outside The Hypochlorination Tank Leakage Containment Berm

[5] Vendor Manual V-0558, Hypochlorination System

2.2 IMPLEMENTING

[1] P&ID M212: Service Water, Screenwash and Hypochlorination Systems

[2] PDC90-42, SSW & CW Hypochlorite Injection Systems Upgrade

[3] Procedures

- (a) PNPS 1.12.1, *"Receiving, Recording, and Monitoring of Consumable Deliveries"*
- (b) PNPS 2.2.32, *"Salt Service Water System (SSW)"*
- (c) PNPS 2.2.94, *"Seawater System"*
- (d) PNPS 5.5.4, *"Response to Hazardous Material Incidents"*
- (e) PNPS 7.2.40, *"Intake Canal, Discharge Canal, and Screen House Sampling and TRC Analysis"*
- (f) PNPS 7.3.41, *"Salt Service Water Discharge Headers Sampling and Analysis"*
- (g) PNPS 7.8.1, *"Chemistry Sample and Analysis Program"*

[4] Vendor Manual V-0558, Hypochlorination System

### 3.0 DEFINITIONS

- [1] Chlorination or hypochlorination - Injection of liquid sodium hypochlorite solution into raw cooling water to prevent or control marine growth, both microfouling and macrofouling.
- [2] Total Residual Chlorine (TRC) - The concentration of all oxidants in a solution of chlorinated seawater which, at pH 4, cause added iodide to be converted to iodine. Amperometric titration with phenylarsine oxide is the analytical method approved by US EPA, with the results converted to mg/liter (= ppm) of chlorine; equivalent to total residual oxidant (TRO).

### 4.0 DISCUSSION

#### 4.1 GENERAL

- [1] The purpose of the chlorination system is to prevent or control marine growth (biofouling) within those cooling systems (CWS and SSWS) which use seawater as a heat sink. Excessive biofouling can reduce heat transfer efficiency, restrict cooling water flow, and accelerate corrosion/erosion of affected components. There are two basic aspects of chlorination: hypochlorite injection and residual chlorine monitoring.

Chlorination is achieved by adding a solution of sodium hypochlorite separately to the CWS and SSWS. The hypochlorite injection apparatus for each is located in the Screenhouse and Intake Structure. A lined-steel hypochlorite storage tank (T-147) common to both CW and SSW chlorination subsystems has a capacity of 14,000 gallons and reads out in inches of water.

Tank level is monitored daily by Operations in accordance with PNPS 2.1.16, "Nuclear Power Plant Operator Tour". When T-147 level drops to 50 inches as indicated on 28-LI-3990, Operations will notify and schedule vendor delivery and refill of sodium hypochlorite in accordance with PNPS 1.12.1, "Receiving, Recording, and Monitoring of Consumable Deliveries".

Monitoring of discharged chlorine concentration, measured as total residual chlorine (TRC), is conducted by Chemistry.

- [2] The Screenwash Dechlorination System is intended to comply with the US EPA requirement that the screenwash water contain no residual chlorine. The water used to spray the traveling screens comes from the SSWS (which normally is continuously chlorinated); therefore, the screenwash water usually must be dechlorinated when either/both screenwash pump(s) is operated.

## 4.2 CIRCULATING WATER SYSTEM CHLORINATION

### 4.2.1 CW Hypochlorite Injection - Description

- [1] Target: Microfouling (slime or biofilm) accumulation in the Main Condenser. Not intended to control biofouling in the Intake Structure.
- [2] Frequency: Condenser chlorination is governed by the MSTP and varies according to the time of year. CW hypo is usually done 5 to 7 days per week (for 2 hours/day) during the spring, summer, and fall. The frequency is usually reduced in the winter to reflect the decrease in microbial growth.

### 4.2.2 CW Hypochlorite Injection - Function

- [1] Operation: Chlorine is introduced into the CWS by pumping hypochlorite into diffusers located underwater, upstream of each of the four traveling screens. Two hypo pumps (P-113A and P-113B) draw filtered hypochlorite from the storage tank (T-147) and inject it into separate dilution lines supplied with screenwash water, which discharge into the four CW hypo diffusers. Chlorinated intake water is then dispersed into the CW pump bays and delivered to the condenser by the CW pumps.
- [2] Control: Each CW hypo pump is operated by a control switch on Panel C38 and a handwheel to adjust the pump stroke. The two control switches have four positions: "CONTINUOUS", "MANUAL", "AUTO", and "OFF"; however, only the "CONTINUOUS" mode is used to activate P-113A/P-113B. The "MANUAL" and "AUTO" modes are not normally used and their function is not addressed in this Procedure.

Hypo injection rate (pump output) for P-113A/P-113B is controlled by the adjustment handwheel which changes the length of the pump piston stroke; the frequency is fixed at 140 strokes/minute. An "odometer style" scale, which ranges from 0000 - 0400, indicates the relative stroke length up to a maximum rated capacity of 5 gallons/minute. Actual hypo injection rate is determined by reading the in-line flow meters downstream of each hypo pump.



- [3] Electrical Isolation: It is strongly suggested that both CW and SSW hypo injection subsystems not be isolated at the same time. Whenever possible, avoid developing a tagout which isolates the common breaker (14L-12). The following guidance should be referred to when it is necessary to isolate the CW hypo subsystem.

CW hypo injection equipment receives electricity from 120V AC and 480V AC power sources. Breaker #12 in Lighting Panel 14L supplies 120V AC control power to both CW hypo (Panel C38) and SSW hypo (Panel C37). It is desirable to avoid de-energizing Panel C37 (SSW hypo injection) when isolation of only C38 is needed.

To de-energize the CW hypo control panel independently of C37, use the toggle switch/breaker located within Panel C38. This switch/breaker has two positions (ON/OFF) and is labeled C38-CB1. Use the CW hypo pump (P-113A/P-113B) control switches on C38 and/or the 480V AC power supply to isolate the CW hypo pumps.

Breaker 13/15/17 in Panel 13L supplies 480V AC (3-phase) power to P-113A and P-113B. The circuit is arranged so that this triple pole breaker feeds two panels: B26A (to pump P-113A) and B26B (to pump P-113B).

#### 4.2.3 CWS Residual Chlorine Monitoring

Measurement of the concentration of total residual chlorine (TRC) in the CWS is required by NPDES (National Pollutant Discharge Elimination System) stipulations. The unit of measurement identified in the NPDES permit (mg/liter total residual oxidant or mg/L TRO) is equivalent to parts per million (ppm) total residual chlorine (TRC). Monitoring instrumentation consists of a sample pump at the discharge canal footbridge and an amperometric titrator to determine the TRC concentration in samples drawn from the effluent stream. PNPS 7.2.40 addresses this issue completely; however, Chemistry should be notified of any CWS change that has the potential to impact system performance and/or the concentration of TRC discharged.

#### 4.3 SALT SERVICE WATER SYSTEM CHLORINATION

##### 4.3.1 SSW Hypochlorite Injection - Description

- [1] Target: Macrofouling (especially mussels) in the SSW pump bays, piping, and RBCCW/TBCCW heat exchangers. Microfouling in the SSWS is also controlled as a consequence of chlorination.
- [2] Frequency: Normally continuous, every day, year-round.

##### 4.3.2 SSW Hypochlorite Injection - Function

- [1] Operation: The SSWS is chlorinated by injecting hypochlorite into diffusers submerged in the SSW pump bays. Three hypo pumps (P-161A, P-161B, and P-161C) draw filtered hypochlorite from the storage tank (T-147) and inject it into separate dilution lines supplied with city water, which discharge into hypo diffusers adjacent to the SSW sluice gate openings. The chlorinated service water is then dispersed into the SSW pump bays and delivered to the SSWS by the SSW pumps.
- [2] Control: The SSW hypo pumps (P-161A, P-161B, and P-161C) are activated by control switches on Panel C37 and adjusted by a pair of knobs on each pump which regulate stroke length and frequency. The control switches for P-161A and P-161B have four positions: "CONTINUOUS", "MANUAL", "AUTO", and "OFF"; however, only the "CONTINUOUS" mode is used to activate P-161A/P-161B. The "MANUAL" and "AUTO" modes are not normally used and their function is not addressed in this Procedure. The control switch for the "swing" SSW hypo pump (P-161C) is located in the center of Panel C37 and only has two positions: "STOP" and "RUN". P-161C is usually only operated as a backup when one of the other two pumps is unavailable.

Hypo injection rate (pump output) for P-161A, P-161B, and P161C is controlled by turning either the "percent stroke" (length) and/or "stroke rate" (frequency) adjustment knobs. The pump manufacturer recommends maintaining the maximum possible stroke length for a given combination of stroke length and stroke frequency (i.e., increase "percent stroke" first when raising the injection rate). The sightglasses downstream of the SSW hypo pumps only offer a visual (qualitative) indication of hypo flow. Adjustment of the SSW hypo pumps is based on measurement of total residual chlorine (TRC) concentration in the SSWS, conducted by Chemistry.

- [3] Electrical Isolation: Because of the need to continuously chlorinate the SSWS to prevent mussel infestation, isolations for the SSW hypo subsystem should be carefully selected to minimize impact on component availability.

Breaker #12 in Lighting Panel 14L supplies 120V AC power to both SSW hypo (Panel C37) and CW hypo (Panel C38). It is desirable to avoid de-energizing Panel C38 (CW hypo injection) when isolation of only C37 is needed.

To de-energize the SSW hypo control panel independently of C38, use the toggle switch/breaker located within Panel C37. This switch/breaker has two positions (ON/OFF) and is labeled C37-CB1. Use the SSW hypo pump (P-161A/P-161B/P-161C) control switches on C37 and/or unplug the 120V AC power supply to isolate individual SSW hypo pumps.

#### 4.3.3 SSWS Residual Chlorine Monitoring

Data on TRC levels in each loop of the SSWS are obtained from daily grab sampling and analysis (by amperometric titration) performed during chlorination.

Chemistry should be notified of any SSWS change that has the potential to impact system performance and/or the concentration of total residual chlorine (TRC) discharged.

#### 4.4 SCREENWASH WATER DECHLORINATION

The screenwash water is dechlorinated by injection of saturated sodium thiosulfate solution into the suctions of each screenwash pump. Whenever the screenwash pumps are operated, the dechlorination pumps start automatically, drawing a suction from the respective sodium thiosulfate drums. System flow is monitored at each pump discharge by a bubble type flow indicator. Pump stroke length and stroke rate are each controlled by rotary dials (0-100%).

Dechlorination pump operation secures automatically upon stopping the associated screenwash pump and may be manually secured by placing the pump control switch to "STOP". The Dechlorination System should be aligned for automatic operation by leaving the control switch for P-175A and P-175B in the "START" position, unless the CW and SSW Chlorination systems are secured for an extended period.

An event recorder documents the operation of the four traveling screens, the screenwash pumps, and the dechlorination pumps as part of the marine biota impingement monitoring program required by the NPDES permit.

If chlorination is performed while a screenwash pump is operating, then dechlorination of the screenwash water is required. If thorough dechlorination is not possible (as determined by Chemistry), then both CW and SSW hypo injection systems shall be secured while there is water flowing through the sluiceway (i.e., when either screenwash pump is operating).

## 5.0 PRECAUTIONS AND LIMITATIONS

### 5.1 PRECAUTIONS

- [1] Sodium hypochlorite is corrosive and causes chemical burns when touched. Avoid physical contact with skin, eyes, and clothing. Appropriate personal protective safety equipment shall be utilized whenever activities are in progress that have the potential to expose an individual to sodium hypochlorite. (PR99.9027) Refer to the MSDS (Material Safety Data Sheet) for guidance when handling this substance.
  - (a) When traversing the hypochlorite pump room, normal PPE (hard hat, safety glasses, leather shoes) is sufficient.
  - (b) When operating equipment for hypochlorite (valving, stroke adjustments, starting/stopping equipment, draining, or connecting/disconnecting flex hose or any activity which has the potential for a spill), personnel shall utilize full PPE:
    - Face shield
    - Rubber gloves
    - Disposable smock (apron), rubber apron, or equivalent
- [2] In case of a significant leak, secure the hypo injection pump(s) and isolate the hypo storage tank as well as the source of the leak(s). Provide adequate ventilation and contain the leaking hypochlorite as soon as possible.
- [3] When detagging and returning hypo injection pump(s) into service, sequence removal of tags such that the valve closest to the hypo storage tank is the last to be removed. (PR99.9027)
- [4] Adequate chlorination of both the CWS and the SSWS is important in order to maintain satisfactory component operability and overall system cleanliness. In an effort to minimize chlorination system downtime, refer to Steps 4.2.2[3] and 4.3.2[3] when it is necessary to isolate either hypo injection subsystem.
- [5] Operation of the hypo injection pumps for both the CWS (P-113A and P-113B) and the SSWS (P-161A, P-161B, and P-161C) is controlled by using Control Panels C38 and C37. Only the "CONTINUOUS" and "OFF" modes on the control switches for these panels are normally used. The "MANUAL" and "AUTO" modes are not normally used and their function is not addressed in this Procedure.
- [6] During periods of extended screenwashes (greater than 4 hours duration), monitor the dechlorination pumps and piping for proper operation to ensure NPDES permit compliance. (PR99.0273)
- [7] Chemistry should be notified of any system change that has the potential to impact system performance and/or total residual chlorine (TRC) discharged.
- [8] If a spill or leak of sodium hypochlorite were to occur, then implement the actions of PNPS 5.5.4, "Response to Hazardous Material Incidents".

## 5.2 LIMITATIONS

CHLORINE DISCHARGE LIMITS - National Pollutant Discharge Elimination System (NPDES) Permit (No. MA0003557 Federal, No. 359 State)

- [1] Circulation Water System (CWS) - Total residual chlorine (TRC) may not be discharged into Cape Cod Bay from CWS for more than 2 hours per day. The quantity of TRC discharged from the CWS shall not exceed 0.10 mg/L (0.10 ppm).

If the CWS limit for TRC is exceeded, immediately terminate hypo injection and notify the Shift Manager (SM)/CRS as soon as possible. Do not resume hypo injection until the cause(s) of the problem has been identified, reported to Operations and Chemistry Supervision, and satisfactorily resolved.

- [2] Salt Service Water System (SSWS) - Continuous chlorination of the SSWS may be used as long as at least one CW pump is operating. The quantity of TRC discharged from the SSWS (both loops combined) shall not exceed an instantaneous maximum daily concentration of 1.0 mg/L (1.0 ppm) nor exceed a monthly average concentration of 0.50 mg/L (0.50 ppm). Refer to Section 7.2.

When no CW pumps are operating or during a condenser backwash, SSW chlorination shall be secured.

- [3] Dechlorination - The screenwash water shall be dechlorinated when hypo injection (either CW and/or SSW) is ongoing AND a screenwash pump(s) is operating.

## 6.0 PREREQUISITES

- [1] Perform the Prerequisite Checklist (Attachment 1) ensuring proper signoff in accordance with PNPS 1.3.34.
- [2] The Prerequisite Checklist is to be performed when the system is lined up for service following an outage or when the system lineup is performed for other reasons. It is not necessary to repeat the system Prerequisites each time a system operation described in, or referenced from, an approved Procedure is performed.
- [3] Personnel performing the Valve Checklist shall note whether the valve identification tag is in place. If the identification tag is not in place, the person(s) performing the Valve Checklist will forward a copy of pages where tags are missing to the OA. The copies will be marked "Valve ID Tags Needing Replacement".

[4] Dilution Water:

- (a) At least one CW (seawater) pump must be operating when SSW hypochlorination is in service.
  - (b) Both CW (seawater) pumps should be operating prior to and during CW hypo injection. If either CW pump stops operating during hypochlorination, then immediately secure CW hypo injection.
  - (c) When only one CW pump is in operation, there is an increased risk of overchlorination. Do not perform CW hypochlorination with only one CW pump running unless:
    - Permission is obtained from both the Shift Manager and the Chemistry Superintendent.
- AND
- Sea conditions near the mouth of the discharge canal are less than 2 feet (no storm surges). This can be determined by the Chemistry Technician.

7.0 PROCEDURE

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NOTES

1. Chlorination (hypochlorite injection) of both CWS and SSWS is covered in this Procedure as follows:
    - Section 7.1 for CW Chlorination,
    - Section 7.2 for SSW Chlorination,
    - Section 7.3 for Screenwash Dechlorination (also addressed in PNPS 2.2.94).
  2. Chlorination of the SSWS should be continuous (24 hours/day) to control mussel growth (macrofouling) in the SSW pump bays, heat exchangers, and piping. Instantaneous TRC limit in the SSWS is 1.00 ppm, measured before mixing with the CWS flow.
  3. CW chlorination is done for 2 hours every day (or twice/week in winter) to prevent microfouling (slime buildup) from affecting condenser performance. Instantaneous limit for total residual chlorine (TRC) is 0.10 ppm measured in discharge canal. Refer to Section 5.2 for more information on limitations.
  4. If thorough dechlorination of the screenwash water is not possible (as determined by Chemistry), then both CW and SSW hypo injection systems shall be secured when either screenwash pump (P-213A/B) is operating.
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## 7.1 CHLORINATION OF THE CWS (CONDENSER) USING THE CW HYPO PUMPS

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### NOTES

1. Chlorination of CW pump bays may be done in any order (i.e., Section 7.1.3 may be done before Section 7.1.1). Alternate which bay is done first as much as possible (try not to start with the same bay every day). It is not permissible to chlorinate both CW pump bays simultaneously.
  2. Hypo injection is normally done for 1 hour per CW pump bay (2 hours/day). It may be less than this but not more than 2 hours total duration per day (e.g., a single CW pump may be chlorinated for up to 2 hours at a time).
  3. Both seawater (CW) pumps should be operating prior to and during CW hypo injection. If either CW pump is secured during hypochlorination, then immediately secure hypo injection as well.
  4. When only one CW pump is in operation, there is an increased risk of overchlorination. Do not perform hypochlorination with only one CW pump running unless:
    - a. Permission is obtained from both the SM and the Chemistry Superintendent.
    - b. Sea conditions near the mouth of the discharge canal must be less than 2 feet (no storm surges).
  5. The Operator shall control hypo injection so that the discharge limit of 0.10 ppm TRC (total residual chlorine) is not exceeded. Once hypochlorination is underway, upon receiving feedback from the Chemistry Technician, the injection rate may be increased in gradual steps provided that the following conditions are met:
    - a. An achievable limit concentration has been established in PNPS 7.8.1, *"Chemistry Sample and Analysis Program"*, to avoid overchlorination. This target value may be exceeded, but only with the approval of the SM/CRS and Chemistry Supervision.
    - b. Start hypochlorination based on the initial hypo injection rate specified by the Chemistry Technician. A waiting period of at least 20 minutes shall be observed prior to any increase in the hypo injection rate when two CW pumps are operating. If only one CW pump is in service, then a waiting period of at least 40 minutes applies prior to increasing the hypo injection rate.
  6. It is very important that two-way communication can be established throughout the entire injection process. In case of a problem, the only way the Operator knows to reduce or secure hypo injection is by feedback from the Chemistry Technician. In case of loss of communication, secure hypo injection or use the Gaitronics private line until normal communication is restored.
  7. When the level in the hypo storage tank (T-147) goes below 50 inches (using LI-3990), then more sodium hypochlorite should be ordered. Contact the Control Room Annex to reorder hypo and fill in accordance with PNPS 1.12.1, *"Receiving, Recording, and Monitoring of Consumable Deliveries"*.
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### 7.1.1 Operation Of CW Hypo Pump P-113A

- [1] **CHECK** the oil level in P-113A **AND ENSURE** it is within the acceptable range indicated on the dipstick.
- [2] **VERIFY** that the CW (seawater) pump is operating in the bay to be chlorinated.
- [3] **ESTABLISH** two-way communication between Operator (in Screenhouse) and Chemistry Technician (at discharge canal). **VERIFY** that the sample pump in the discharge canal is operating properly and that all personnel are ready to proceed.

#### **CAUTION**

Do not adjust the handwheel (stroke setting) on CW Hypo Pump P-113A unless it is operating. The pump could be damaged if the handwheel is turned when the pump is idle.

- [4] **CONTACT** Chemistry Technician for initial hypo injection flow rate (in gal/min) and/or P-113A hypo pump setting. The correlation between P-113 stroke setting and the CW hypo pump's output is given in Attachment 5.
- [5] **VERIFY** that the screenwash system is not dead-headed (at least one screenwash block valve is OPEN) **AND ACTIVATE** either screenwash pump P-213A and/or P-213B in accordance with PNPS 2.2.94.

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#### **NOTE**

The "A" CW hypo pump (P-113A) can be used to inject hypo into either the "A" CW pump (east half of Intake Structure, "C" and "D" screens) or, using the cross-tie, to the "B" CW pump (west).

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- [6] To prepare for chlorination using P-113A, CW Hypo Pump A, **PERFORM** the following valve lineup:
  - (a) **OPEN** 5-HO-33A, Circ Water Hypo Ejector J-38 Inlet Block Valve.
  - (b) **VERIFY OPEN** 5-HO-J27, Circ Water Hypo Ejector J-38 Outlet Block Valve.
  - (c) **OPEN** 5-HO-J25, Circ Water Hypo Ejector J-38 Screenwash Inlet Block Valve.
  - (d) **OPEN** 5-HO-113, Circ Water Hypo Storage Tank Outlet Valve.
  - (e) **IF** chlorinating CW Pump A (P-105A), **PERFORM** Steps [7] through [10].
  - (f) **IF** chlorinating CW Pump B (P-105B), **PERFORM** Steps [11] through [14].



[7] To prepare for chlorination of the "A" CW Pump (P-105A), **PERFORM** the following valve lineup to establish a flow path to the CW hypo diffusers upstream of the "C" and "D" screens:

- (a) **VERIFY CLOSED** 5-HO-J28, Circ Water Hypo Ejectors J-38 and J-39 Outlet X-tie Valve.
- (b) **OPEN** 5-HO-J8, Circ Water Hypo to Traveling Screen X-108C Block Valve.
- (c) **OPEN** 5-HO-J7, Circ Water Hypo to Traveling Screen X-108D Block Valve.
- (d) **CLOSE/VERIFY CLOSED** 5-HO-J10, Circ Water Hypo to Traveling Screen X-108A Block Valve.
- (e) **CLOSE/VERIFY CLOSED** 5-HO-J9, Circ Water Hypo to Traveling Screen X-108B Block Valve.
- (f) **OPEN** 5-HO-33A, Circ Water Hypo Ejector J-38 Inlet Block Valve.

**CAUTION**

Coordinate with Chemistry Technician to ensure that the chlorine discharge limit of 0.10 ppm TRC is not exceeded. There may be a 40-minute delay between an increase in the hypo injection rate and the measurable TRC change in the discharge canal.

Terminate hypo injection if the discharge limit of 0.10 ppm TRC is exceeded and notify the SM/CRS at once. Reduce the hypo flow rate immediately if TRC level approaches the PNPS 7.8.1 achievable limit (unless prior approval was obtained from Supervision).

[8] **BEGIN** chlorination by doing the following:

- (a) **ACTIVATE** CW hypo pump P-113A by turning the control switch on Panel C38 to the "CONTINUOUS" position.
- (b) **VERIFY** P-113A is pumping by observing pump and by using FI-39022A for visual indication of hypo flow (float should move). **VERIFY** P-113A is set at the desired stroke setting to deliver the initial hypo injection flow rate obtained from Chemistry.

---

NOTE

Hypo injection flow rate, pump stroke setting, and other parameters shall be recorded on Attachment 6 while chlorination is in progress.

---

- [9] **NOTIFY** Chemistry that P-113A has been started **AND RECORD** time the pump was started (in Attachment 6). Chemistry personnel will periodically perform total residual chlorine (TRC) analysis to determine effluent concentration in the discharge canal. **ADJUST** pump stroke setting as necessary. **RECORD** injection rate every 10 minutes on Attachment 6.
- [10] **WHEN** chlorination of the "A" CW pump is completed, **THEN**:
- (a) **IF** P-113A is NOT to be used again today, **THEN PROCEED TO** Step 7.1.1[15]. **IF** the "B" CW pump bay will be chlorinated using P-113A, **THEN GO TO** Step 7.1.1[11].
- [11] **IF** it is necessary to chlorinate the "B" CW pump using P-113A (via the cross-tie), **THEN PERFORM** the following valve lineup to establish a flow path to the hypo diffusers upstream of the "A" and "B" screens:
- (a) **OPEN** 5-HO-J10, Circ Water Hypo to Traveling Screen X-108A Block Valve.
- (b) **OPEN** 5-HO-J9, Circ Water Hypo to Traveling Screen X-108B Block Valve.
- (c) **OPEN** 5-HO-J28, Circ Water Hypo Ejectors J-38 and J-39 Outlet X-tie Valve.
- (d) **CLOSE/VERIFY CLOSED** 5-HO-J8, Circ Water Hypo to Traveling Screen X-108C Block Valve.
- (e) **CLOSE/VERIFY CLOSED** 5-HO-J7, Circ Water Hypo to Traveling Screen X-108D Block Valve.

### CAUTION

Coordinate with Chemistry Technician to ensure that the chlorine discharge limit of 0.10 ppm TRC is not exceeded. There may be a 40-minute delay between an increase in the hypo injection rate and the measurable TRC change in the discharge canal.

Terminate hypo injection if the discharge limit of 0.10 ppm TRC is exceeded and notify the SM/CRS at once. Reduce the hypo flow rate immediately if TRC level approaches the PNPS 7.8.1 achievable limit (unless prior approval was obtained from Supervision).

[12] **CONTINUE** chlorination by doing the following:

- (a) **ACTIVATE** CW Hypo Pump P-113A by placing/verifying placed the control switch on Panel C38 to the "CONTINUOUS" position.
- (b) **INFORM** Chemistry Technician that hypo injection to the "B" CW pump bay is now in progress.
- (c) **VERIFY** P-113A is pumping by observing pump and by using FI-39022A for visual indication of hypo flow (float should move). **VERIFY** P-113A is set at the desired stroke setting to deliver the initial hypo injection flow rate obtained from Chemistry.

---

### NOTE

Hypo injection flow rate, pump stroke setting, and other parameters shall be recorded on Attachment 6 while chlorination is in progress.

---

[13] **NOTIFY** Chemistry that P-113A has been started **AND RECORD** time the pump was started (in Attachment 6). Chemistry personnel will periodically perform total residual chlorine (TRC) analysis to determine effluent concentration in the discharge canal. **ADJUST** pump stroke setting as necessary. **RECORD** injection rate every 10 minutes on Attachment 6.

[14] **WHEN** chlorination of the "B" CW pump is completed, **THEN**:

- (a) **IF** P-113A is NOT to be used again today, **THEN PROCEED TO** Step 7.1.1[15]. **IF** the "A" CW pump bay will be chlorinated using P-113A, **THEN GO TO** Step 7.1.1[7].

---

NOTE

Resume here if not using P-113A to chlorinate both CW pump bays.

---

[15] **SECURE** chlorination as follows:

- (a) **DIAL DOWN** the stroke setting of the pump **AND SECURE** P-113A by turning the control switch on Panel C38 to the "OFF" position.
- (b) **CLOSE** 5-HO-J25, Circ Water Hypo Ejector J-38 Screenwash Inlet Block Valve.
- (c) **CLOSE** 5-HO-33A, Circ Water Hypo Ejector J-38 Inlet Block Valve.
- (d) **CLOSE/VERIFY CLOSED** 5-HO-J28, Circ Water Hypo Ejectors J-38 and J-39 Outlet X-tie Valve.
- (e) **CLOSE/VERIFY CLOSED** 5-HO-J8, Circ Water Hypo to Traveling Screen X-108C Block Valve.
- (f) **CLOSE/VERIFY CLOSED** 5-HO-J7, Circ Water Hypo to Traveling Screen X-108D Block Valve.
- (g) **CLOSE/VERIFY CLOSED** 5-HO-J10, Circ Water Hypo to Traveling Screen X-108A Block Valve.
- (h) **CLOSE/VERIFY CLOSED** 5-HO-J9, Circ Water Hypo to Traveling Screen X-108B Block Valve.
- (i) **CLOSE** 5-HO-113, Circ Water Hypo Storage Tank Outlet Valve.

[16] **IF** there is no further need for screenwash flow (for this or other activities), **THEN SECURE** screenwash pump(s) P-213A/P-213B in accordance with PNPS 2.2.94.

[17] **IF** Section 7.1.3 has already been done or is not to be performed, **THEN**:

- (a) **INFORM** Chemistry Technician that hypo injection has been completed for today.
- (b) **VERIFY** Attachment 6 (data sheet) has been filled out and brought to Control Room Annex.

### 7.1.2 Priming Of CW Hypo Pump P-113A

#### CAUTIONS

1. Only move the micrometer with the CW Hypo Pump running.
2. To prevent exceeding the NPDES hypochlorite discharge limit, initially prime the CW Hypo Pump with city water at a stroke setting of 1/2 maximum (200), then prime the CW Hypo Pump using the hypochlorite solution and immediately dial the micrometer to the normal stroke setting.

- [1] **HOLD** a Pre-Evolution Briefing in accordance with PNPS 1.3.34 with Maintenance, Chemistry, and Operations representatives present.
- [2] **CLOSE** 5-HO-J11, Circ Water Hypo Pump P-113A Suction Block Valve.
- [3] **OPEN** 5-HO-3A, Circ Water Hypo Pump P-113A Suction Flush Valve, to admit city water to the CW Hypo Pump P-113A suction.
- [4] **START** CW Hypo Pump P-113A AND **ADJUST** the micrometer setting to 200.
- [5] **WHEN** flow is observed in the flow instrument FI-39022A, Circ Water Hypo Pump P-113A Flow Meter, THEN SLOWLY THROTTLE 5-HO-33A, Circ Water Hypo A Ejector J-38 Inlet Block Valve, to 25% open to aid in air removal.
- [6] **WHEN** the air appears to be removed from CW Hypo Pump P-113A, THEN SECURE CW Hypo Pump P-113A.
- [7] **CLOSE** 5-HO-3A, Circ Water Hypo Pump P-113A Suction Flush Valve.
- [8] **OPEN** 5-HO-J11, Circ Water Hypo Pump P-113A Suction Block Valve.

---

#### NOTE

Ensure Chemistry is available to sample the discharge, and as soon as it is evident that the CW Hypo Pump is functioning, be prepared to adjust the micrometer to the normal stroke setting.

---

- [9] **START** CW Hypo Pump P-113A.
- [10] **WHEN** CW Hypo Pump P-113A is primed on hypochlorite, THEN RETURN the micrometer to the normal stroke setting as specified by Chemistry.
- [11] **RETURN** 5-HO-33A, Circ Water Hypo A Ejector J-38 Inlet Block Valve, to the **FULL OPEN** position.

### 7.1.3 Operation Of CW Hypo Pump P-113B

- [1] **CHECK** the oil level in P-113B **AND ENSURE** it is within the acceptable range indicated on the dipstick.
- [2] **VERIFY** that the CW (seawater) pump is operating in the bay to be chlorinated.
- [3] **ESTABLISH** two-way communication between Operator (in Screenhouse) and Chemistry Technician (at discharge canal). **VERIFY** that the sample pump in the discharge canal is operating properly and that all personnel are ready to proceed.

#### CAUTION

Do not adjust the handwheel (stroke setting) on CW Hypo Pump P-113B unless it is operating. The pump could be damaged if the handwheel is turned when the pump is idle.

- [4] **CONTACT** Chemistry Technician for initial hypo injection flow rate (in gal/min) and/or P-113B Hypo Pump setting. The correlation between P-113 stroke setting and the CW hypo pump's output is given in Attachment 5.
- [5] **VERIFY** that the screenwash system is not dead-headed (at least one screenwash block valve is OPEN) **AND ACTIVATE** either screenwash pump P-213A and/or P-213B in accordance with PNPS 2.2.94.

---

#### NOTE

The "B" CW hypo pump (P-113B) can be used to inject hypo into either the "B" CW pump (west half of Intake Structure, "A" and "B" screens) or, using the cross-tie, to the "A" CW pump (east).

---

- [6] To prepare for chlorination using P-113B, CW Hypo Pump B, **PERFORM** the following valve lineup to establish a flow path to the CW hypo diffusers upstream of the "A" and "B" screens:
  - (a) **OPEN** 5-HO-33B, Circ Water Hypo Ejector J-39 Inlet Block Valve.
  - (b) **VERIFY OPEN** 5-HO-J29, Circ Water Hypo Ejector J-39 Outlet Valve.
  - (c) **OPEN** 5-HO-J26, Circ Water Hypo Ejector J-39 Screenwash Inlet Block Valve.
  - (d) **OPEN** 5-HO-113, Circ Water Hypo Storage Tank Outlet Valve.
  - (e) **IF** chlorinating CW Pump B (P-105B), **PERFORM** Steps [7] through [10].
  - (f) **IF** chlorinating CW Pump A (P-105A), **PERFORM** Steps [11] through [14].

[7] To prepare for chlorination of the "B" CW Pump (P-105B), **PERFORM** the following valve lineup to establish a flow path to the CW hypo diffusers upstream of the "A" and "B" screens:

- (a) **VERIFY CLOSED** 5-HO-J28, Circ Water Hypo Ejectors J-38 and J-39 Outlet X-tie Valve.
- (b) **OPEN** 5-HO-J9, Circ Water Hypo to Traveling Screen X-108B Block Valve.
- (c) **OPEN** 5-HO-J10, Circ Water Hypo to Traveling Screen X-108A Block Valve.
- (d) **CLOSE/VERIFY CLOSED** 5-HO-J8, Circ Water Hypo to Traveling Screen X-108C Block Valve.
- (e) **CLOSE/VERIFY CLOSED** 5-HO-J7, Circ Water Hypo to Traveling Screen X-108D Block Valve.
- (f) **OPEN** 5-HO-33B, Circ Water Hypo Ejector J-39 Inlet Block Valve.

**CAUTION**

Coordinate with Chemistry Technician to ensure that the chlorine discharge limit of 0.10 ppm TRC is not exceeded. There may be a 40-minute delay between an increase in the hypo injection rate and the measurable TRC change in the discharge canal.

Terminate hypo injection if the discharge limit of 0.10 ppm TRC is exceeded and notify the SM/CRS at once. Reduce the hypo flow rate immediately if TRC level approaches the PNPS 7.8.1 achievable limit (unless prior approval was obtained from Supervision).

[8] **BEGIN** chlorination by doing the following:

- (a) **ACTIVATE** CW Hypo Pump P-113B by turning the control switch on Panel C38 to the "CONTINUOUS" position.
- (b) **VERIFY** P-113B is pumping by observing pump and by using FI-39022B for visual indication of hypo flow (float should move). **VERIFY** P-113B is set at the desired stroke setting to deliver the initial hypo injection flow rate obtained from Chemistry.

---

NOTE

Hypo injection flow rate, pump stroke setting, and other parameters shall be recorded on Attachment 6 while chlorination is in progress.

---

- [9] **NOTIFY** Chemistry that P-113B has been started **AND RECORD** time the pump was started (in Attachment 6). Chemistry personnel will periodically perform total residual chlorine (TRC) analysis to determine effluent concentration in the discharge canal. **ADJUST** pump stroke setting as necessary. **RECORD** injection rate every 10 minutes on Attachment 6.
- [10] **WHEN** chlorination of the "B" CW pump is completed, **THEN**:
- (a) **IF** P-113B is NOT to be used again today, **THEN PROCEED TO** Step 7.1.3[15]. **IF** the "A" CW pump bay will be chlorinated using P-113B, **THEN GO TO** Step 7.1.3[11].
- [11] **IF** it is necessary to chlorinate the "A" CW pump using P-113B (via the cross-tie), **THEN PERFORM** the following valve lineup to establish a flow path to the hypo diffusers upstream of the "C" and "D" screens:
- (a) **OPEN** 5-HO-J7, Circ Water Hypo to Traveling Screen X-108D Block Valve.
  - (b) **OPEN** 5-HO-J8, Circ Water Hypo to Traveling Screen X-108C Block Valve.
  - (c) **OPEN** 5-HO-J28 Circ Water Hypo Ejectors J-38 and J-39 Outlet X-tie Valve.
  - (d) **CLOSE/VERIFY CLOSED** 5-HO-J10, Circ Water Hypo to Traveling Screen X-108A Block Valve.
  - (e) **CLOSE/VERIFY CLOSED** 5-HO-J9, Circ Water Hypo to Traveling Screen X-108B Block Valve.



### CAUTION

Coordinate with Chemistry Technician to ensure that the chlorine discharge limit of 0.10 ppm TRC is not exceeded. There may be a 40-minute delay between an increase in the hypo injection rate and the measurable TRC change in the discharge canal.

Terminate hypo injection if the discharge limit of 0.10 ppm TRC is exceeded and notify the SM/CRS at once. Reduce the hypo flow rate immediately if TRC level approaches the PNPS 7.8.1 achievable limit (unless prior approval was obtained from Supervision).

[12] **CONTINUE** chlorination by doing the following:

- (a) **ACTIVATE** CW Hypo Pump P-113B by placing/verifying placed the control switch on Panel C38 to the "CONTINUOUS" position.
- (b) **INFORM** Chemistry Technician that hypo injection to the "A" CW pump bay is now in progress.
- (c) **VERIFY** P-113B is pumping by observing pump and by using FI-39022B for visual indication of hypo flow (float should move). **VERIFY** P-113B is set at the desired stroke setting to deliver the initial hypo injection flow rate obtained from Chemistry.

---

### NOTE

Hypo injection flow rate, pump stroke setting, and other parameters shall be recorded on Attachment 6 while chlorination is in progress.

---

[13] **NOTIFY** Chemistry that P-113B has been started **AND RECORD** time the pump was started (in Attachment 6). Chemistry personnel will periodically perform total residual chlorine (TRC) analysis to determine effluent concentration in the discharge canal. **ADJUST** pump stroke setting as necessary. **RECORD** injection rate every 10 minutes on Attachment 6.

[14] **WHEN** chlorination of the "A" CW pump is completed, **THEN**:

- (a) **IF** P-113B is NOT to be used again today, **THEN PROCEED TO** Step 7.1.1[15]. **IF** the "B" CW pump bay will be chlorinated using P-113B, **THEN GO TO** Step 7.1.3[7].

---

NOTE

Resume here if not using P-113B to chlorinate both CW pump bays.

---

[15] **SECURE** chlorination as follows:

- (a) **DIAL DOWN** the stroke setting of the pump **AND SECURE** P-113B by turning the control switch on Panel C38 to the "OFF" position.
- (b) **CLOSE** 5-HO-J26, Circ Water Hypo Ejector J-39 Screenwash Inlet Block Valve.
- (c) **CLOSE** 5-HO-33B, Circ Water Hypo Ejector J-38 Inlet Block Valve.
- (e) **CLOSE/VERIFY CLOSED** 5-HO-J28, Circ Water Hypo Ejectors J-38 and J-39 Outlet X-tie Valve.
- (e) **CLOSE/VERIFY CLOSED** 5-HO-J8, Circ Water Hypo to Traveling Screen X-108C Block Valve.
- (f) **CLOSE/VERIFY CLOSED** 5-HO-J7, Circ Water Hypo to Traveling Screen X-108D Block Valve.
- (g) **CLOSE/VERIFY CLOSED** 5-HO-J10, Circ Water Hypo to Traveling Screen X-108A Block Valve.
- (h) **CLOSE/VERIFY CLOSED** 5-HO-J9, Circ Water Hypo to Traveling Screen X-108B Block Valve.
- (i) **CLOSE** 5-HO-113, Circ Water Hypo Storage Tank Outlet Valve.

[16] **IF** there is no further need for screenwash flow (for this or other activities), **THEN SECURE** screenwash pump(s) P-213A/P-213B in accordance with PNPS 2.2.94.

[17] **IF** Section 7.1.1 has already been done or is not to be performed, **THEN**:

- (a) **INFORM** Chemistry Technician that hypo injection has been completed for today.
- (b) **VERIFY** Attachment 6 (data sheet) has been filled out and brought to Control Room Annex.

#### 7.1.4 Priming Of CW Hypo Pump P-113B

##### CAUTIONS

1. Only move the micrometer with the CW Hypo Pump running.
2. To prevent exceeding the NPDES hypochlorite discharge limit, initially prime the CW Hypo Pump with city water at a stroke setting of 1/2 maximum (200), then prime the CW Hypo Pump using the hypochlorite solution and immediately dial the micrometer to the normal stroke setting.

- [1] **HOLD** a Pre-Evolution Briefing in accordance with PNPS 1.3.34 with Maintenance, Chemistry, and Operations representatives present.
- [2] **CLOSE** 5-HO-J12, Circ Water Hypo Pump P-113B Suction Block Valve.
- [3] **OPEN** 5-HO-3B, Circ Water Hypo Pump P-113B Suction Flush Valve, to admit city water to the CW Hypo Pump P-113B suction.
- [4] **START** CW Hypo Pump P-113B AND **ADJUST** the micrometer setting to 200.
- [5] **WHEN** flow is observed in the flow instrument FI-39022B, Circ Water Hypo Pump P-113B Flow Meter, **THEN SLOWLY THROTTLE** 5-HO-33B, Circ Water Hypo B Ejector J-39 Inlet Block Valve, to 25% open to aid in air removal.
- [6] **WHEN** the air appears to be removed from CW Hypo Pump P-113B, **THEN SECURE** CW Hypo Pump P-113B.
- [7] **CLOSE** 5-HO-3B, Circ Water Hypo Pump P-113B Suction Flush Valve.
- [8] **OPEN** 5-HO-J12, Circ Water Hypo Pump P-113B Suction Block Valve.

---

##### NOTE

Ensure Chemistry is available to sample the discharge, and as soon as it is evident that the CW Hypo Pump is functioning, be prepared to adjust the micrometer to the normal stroke setting.

---

- [9] **START** CW Hypo Pump P-113B.
- [10] **WHEN** CW Hypo Pump P-113B is primed on hypochlorite, **THEN RETURN** the micrometer to the normal stroke setting as specified by Chemistry.
- [11] **RETURN** 5-HO-33B, Circ Water Hypo B Ejector J-39 Inlet Block Valve, to the FULL OPEN position.

## 7.2 CHLORINATION OF THE SSWS

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### NOTES

1. SSW hypochlorination should be maintained within the achievable limits of PNPS 7.8.1.
  2. Normally, hypochlorite is continuously injected into the SSWS. However, there are certain situations which require that the SSWS hypochlorite injection system be secured:
    - Inability to sample/measure the residual chlorine level in the SSWS prior to mixing with any other stream.
    - Inability to completely dechlorinate the screenwash water when a screenwash pump must be operated.
    - No CWS flow in discharge canal (for dilution), usually because there is a Main Condenser backwash or because no CW (seawater) pumps are operating.
    - Dive operation underway in SSW pump bay.

There may be other reasons for terminating SSWS chlorination, but these are the most common causes.
  3. Operation and control of the SSW hypo injection subsystem is dependent on several variables including SSWS configuration, dechlorination system status, and TRC level in the SSW System. In order to avoid excessive chlorination (and NPDES Permit violations), it is essential to maintain timely communication between Operations and Chemistry personnel.
  4. The following sections may be performed in any order deemed acceptable by the SM/CRS.
-

### CAUTIONS

1. Be careful not to overchlorinate. The EPA limit for maximum SSW chlorine level is 1.00 ppm TRC (total residual chlorine) for both SSW loops averaged together.

However, the TRC in one of the loops can exceed 1.00 ppm as long as the average for both is not greater than 1.00 ppm. For example, if the chlorine level in the "A" SSW loop = 1.70 ppm and the level in the "B" loop = 0.25 ppm, then this is not over the EPA (NPDES) permit limit because  $(A + B)/2$  does not exceed 1.00 ppm.

2. When priming the SSW hypo pump(s), always wear protective gloves and safety glasses.

#### 7.2.1 SSW Chlorination Using Hypo Pump P-161A

### NOTE

This pump is normally used to inject hypo into the west (A, B, C) SSW pump bay, which supplies the "A" SSW loop. However, unless the two SSW loops are isolated (with MOV-3808 and/or MOV-3813), chlorinated seawater from the west SSW pump bay can flow to the "B" SSW loop (some crossover can occur).

#### 7.2.1.1 Starting SSW Hypo Pump "A" (P-161A)

[1] **VERIFY** valve lineup for P-161A.

- (a) **OPEN/VERIFY OPEN** 5-HO-103A, Salt Service Water Hypo Pump P-161A Suction Block Valve.
- (b) **OPEN/VERIFY OPEN** 5-HO-105A, Salt Service Water Hypo Pump P-161A Discharge Block Valve.
- (c) **OPEN/VERIFY OPEN** 5-HO-109A, SSW Hypo Injection Line to SSW Bay A Block Valve.
- (d) **CLOSE/VERIFY CLOSED** 5-HO-20A, SSW Hypo Pump P-161C Discharge to Injection Line A Block Valve.

### CAUTION

Chemistry should be notified of any SSWS change that has the potential to impact system performance and/or the concentration of total residual chlorine (TRC) discharged.

- [2] **VERIFY** that Operations and Chemistry personnel involved have established a communication channel and are ready to proceed. **CONTACT** Chemistry for initial hypo pump settings.
- [3] **ACTIVATE** SSW Hypo Pump P-161A by turning the control switch on Panel C37 to the "CONTINUOUS" position.

---

### NOTE

When adjusting the settings (stroke and frequency) for the SSW hypo pumps, the larger knob (for percent stroke) can only be turned during a pump stroke. Do not try to reset the hypo pump's stroke unless it is operating.

- 
- [4] **VERIFY** Hypo Pump P-161A is adjusted to the settings (stroke and frequency) obtained from Chemistry. The larger knob (for percent stroke) can only be turned during a pump stroke.
  - [5] **VERIFY** P-161A is pumping by using discharge tubing for visual indication of hypo flow.
  - [6] **NOTIFY** Chemistry that P-161A has been started **AND RECORD** time the pump was started (in CRS log). Chemistry personnel will periodically perform total residual chlorine (TRC) analysis using the appropriate Procedure to determine TRC concentration in the SSWS. **PROCEED TO** Section 7.2.1.2.

### 7.2.1.2 Long-Term Operation of SSW Hypo Pump "A"

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#### NOTE

It is desirable to continuously chlorinate the west SSW pump bay whenever this bay is active (P-208A, P-208B, or P-208C operating). However, P-161A may also be operated intermittently, depending upon plant conditions. The CRS should be notified of major changes in the operating status of the SSW hypo injection system.

---

- [1] At least once each day a cursory inspection of the system should be conducted. This should include checking for flow at the discharge tubing, visual examination of the hypo pumps, looking for any leaks, and otherwise verifying normal operation.

#### CAUTION

Chemistry should be notified of any SSW change that has the potential to impact system performance and/or the concentration of total residual chlorine (TRC) discharged.

- [2] Upon request from Chemistry personnel, **ADJUST** the percent stroke (length) and/or stroke rate (frequency) controls on P-161A to maintain a total residual chlorine (TRC) concentration within the achievable limit of PNPS 7.8.1. This may require communication with the person monitoring the SSW chlorine level.

### 7.2.1.3 Securing SSW Hypo Pump "A" (P-161A)

- [1] **VERIFY** with the CRS that SSW hypo pump P-161A is to be secured.
- [2] **ADJUST** SSW hypo pump P-161A settings (stroke and frequency) to minimum.
- [3] **SECURE** SSW hypo pump P-161A using the control switch on Panel C37.
- [4] **CLOSE** 5-HO-105A, Salt Service Water Hypo Pump P-161A Discharge Block Valve.
- [5] **NOTIFY** Chemistry that P-161A has been secured **AND RECORD** time the pump was shut off (in CRS log).

### 7.2.2 SSW Chlorination Using Hypo Pump P-161B

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#### NOTE

This pump is normally used to inject hypo into the east (D and E) SSW pump bay, which supplies the "B" SSW loop. However, unless the two SSW loops are isolated (with MOV-3808 and/or MOV-3813), chlorinated seawater from the east SSW pump bay can flow to the "A" SSW loop (some crossover can occur).

---

#### 7.2.2.1 Starting SSW Hypo Pump "B" (P-161B)

#### CAUTION

Chemistry should be notified of any SSWS change that has the potential to impact system performance and/or the concentration of total residual chlorine (TRC) discharged.

- [1] **VERIFY** valve lineup for P-161B.
    - (a) **OPEN/VERIFY OPEN** 5-HO-103B, Salt Service Water Hypo Pump P-161B Suction Block Valve.
    - (b) **OPEN/VERIFY OPEN** 5-HO-105B, Salt Service Water Hypo Pump P-161B Discharge Block Valve.
    - (c) **OPEN/VERIFY OPEN** 5-HO-109B, SSW Hypo Injection Line to SSW Bay B Block Valve.
    - (d) **CLOSE/VERIFY CLOSED** 5-HO-20B, SSW Hypo Pump P-161C Discharge to Injection Line B Block Valve.
  - [2] **VERIFY** that Operations and Chemistry personnel involved have established a communication channel and are ready to proceed. **CONTACT** Chemistry for initial hypo pump settings.
  - [3] **ACTIVATE** SSW hypo pump P-161B by turning the control switch on Panel C37 to the "CONTINUOUS" position.
- 

#### NOTE

When adjusting the settings (stroke and frequency) for the SSW hypo pumps, the larger knob (for percent stroke) can only be turned during a pump stroke. Do not try to reset the hypo pump's stroke unless it is operating.

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- [4] **VERIFY** Hypo Pump P-161B is adjusted to the settings (stroke and frequency) obtained from Chemistry. The larger knob (for percent stroke) can only be turned during a pump stroke.



- [5] **VERIFY** P-161B is pumping by using sightglass FG-39019B for visual indication of hypo flow.
- [6] **NOTIFY** Chemistry that P-161B has been started **AND RECORD** time the pump was started (in CRS log). Chemistry personnel will periodically perform total residual chlorine (TRC) analysis using the appropriate Procedure to determine TRC concentration in the SSWS. **PROCEED TO** Section 7.2.2.2.

#### 7.2.2.2 Long-Term Operation of SSW Hypo Pump "B"

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##### NOTE

It is desirable to continuously chlorinate the east SSW pump bay whenever this bay is active (P-208D or P-208E operating). However, P-161B may also be operated intermittently, depending upon plant conditions. The CRS should be notified of major changes in the operating status of the SSW hypo injection system.

---

##### CAUTION

Chemistry should be notified of any SSWS change that has the potential to impact system performance and/or the concentration of total residual chlorine (TRC) discharged.

- [1] At least once each day a cursory inspection of the system should be conducted. This should include checking for flow at the sightglasses (FG-39019A and FG-39019B), visual examination of the hypo pumps, looking for any leaks, and otherwise verifying normal operation.
- [2] Upon request from Chemistry personnel, **ADJUST** the percent stroke (length) and/or stroke rate (frequency) controls on P-161B to maintain a total residual chlorine (TRC) concentration within the achievable limit of PNPS 7.8.1. This may require communication with the person monitoring the SSW chlorine level.

#### 7.2.2.3 Securing SSW Hypo Pump "B" (P-161B)

- [1] **VERIFY** with the CRS that SSW hypo pump P-161B is to be secured.
- [2] **ADJUST** SSW hypo pump P-161B settings (stroke and frequency) to minimum.
- [3] **SECURE** SSW hypo pump P-161B using the control switch on Panel C37...
- [4] **CLOSE** 5-HO-105B, Salt Service Water Hypo Pump P-161B Discharge Block Valve.
- [5] **NOTIFY** Chemistry that P-161B has been secured **AND RECORD** time the pump was shut off (in CRS log).

### 7.2.3 SSW Chlorination Using The Spare (Swing) Hypo Pump P-161C

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#### NOTE

The SSW hypochlorite injection system includes three hypo pumps, although only two (P-161A and P-161B) are normally used. Use of the third, "swing" hypo pump (P-161C) is usually required when one of the other hypo pumps is not available. However, SSW Hypo Pump "C" (P-161C) also may be used for other reasons.

When desired, P-161C is operated in place of P-161A or P-161B. No more than two SSW hypo pumps should be operated at the same time.

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#### 7.2.3.1 Substitution of SSW Hypo Pump "C" for P-161A

#### CAUTION

Chemistry should be notified of any SSWS change that has the potential to impact system performance and/or the concentration of total residual chlorine (TRC) discharged.

- [1] **VERIFY** correct valve lineup.
  - (a) **OPEN** 5-HO-103C, Salt Service Water Hypo Pump P-161C Suction Block Valve.
  - (b) **OPEN** 5-HO-105C, Salt Service Water Hypo Pump P-161C Discharge Block Valve.
  - (c) **OPEN/VERIFY OPEN** 5-HO-109A, SSW Hypo Injection Line to SSW Bay A Block Valve.
  - (d) **OPEN** 5-HO-20A, SSW Hypo Pump P-161C Discharge to Injection Line A Block Valve.
- [2] **VERIFY** that P-161A is properly secured.
- [3] **VERIFY** that Operations and Chemistry personnel involved have established a communication channel and are ready to proceed. **CONTACT** Chemistry for initial hypo pump settings.
- [4] **ACTIVATE** SSW Hypo Pump P-161C by turning the control switch on Panel C37 to the "RUN" position.
- [5] **VERIFY** Hypo Pump P-161C is adjusted to the settings (stroke and frequency) obtained from Chemistry. The larger knob (for percent stroke) can only be turned during a pump stroke.

- [6] **VERIFY** P-161C is pumping by using discharge tubing for visual indication of hypo flow.
- [7] **NOTIFY** Chemistry that P-161C has been started **AND RECORD** time the pump was started (in CRS log). Chemistry personnel will periodically perform total residual chlorine (TRC) analysis using the appropriate Procedure to determine TRC concentration in the SSWS. **PROCEED TO** Section 7.2.3.2.

#### 7.2.3.2 Long-Term Operation of SSW Hypo Pump "C" (For P-161A)

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#### NOTE

It is desirable to continuously chlorinate the west SSW pump bay whenever this bay is active (P-208A, P-208B, or P-208C operating). However, P-161C may also be operated intermittently, depending upon plant conditions. The CRS should be notified of major changes in the operating status of the SSW hypo injection system.

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#### CAUTION

Chemistry should be notified of any SSWS change that has the potential to impact system performance and/or the concentration of total residual chlorine (TRC) discharged.

- [1] At least once each day a cursory inspection of the system should be conducted. This should include checking for flow at the discharge tubing, visual examination of the hypo pumps, looking for any leaks, and otherwise verifying normal operation.
- [2] Upon request from Chemistry personnel, **ADJUST** the percent stroke (length) and/or stroke rate (frequency) controls on P-161C to maintain a total residual chlorine (TRC) concentration within the achievable limit of PNPS 7.8.1. This may require communication with the person monitoring the SSW chlorine level.

### 7.2.3.3 Substitution of SSW Hypo Pump "C" For P-161B

- [1] **VERIFY** correct valve lineup.
  - (a) **OPEN** 5-HO-103C, Salt Service Water Hypo Pump P-161C Suction Block Valve.
  - (b) **OPEN** 5-HO-105C, Salt Service Water Hypo Pump P-161C Discharge Block Valve.
  - (c) **OPEN/VERIFY OPEN** 5-HO-109B, SSW Hypo Injection Line to SSW Bay B Block Valve.
  - (d) **OPEN** 5-HO-20B, SSW Hypo Pump P-161C Discharge to Injection Line B Block Valve.
- [2] **VERIFY** that P-161B is properly secured.

#### CAUTION

Chemistry should be notified of any SSWS change that has the potential to impact system performance and/or the concentration of total residual chlorine (TRC) discharged.

- [3] **VERIFY** that Operations and Chemistry personnel involved have established a communication channel and are ready to proceed. **CONTACT** Chemistry for initial hypo pump settings.
- [4] **ACTIVATE** SSW Hypo Pump P-161C by turning the control switch on Panel C37 to the "RUN" position.
- [5] **VERIFY** Hypo Pump P-161C is adjusted to the settings (stroke and frequency) obtained from Chemistry. The larger knob (for percent stroke) can only be turned during a pump stroke.
- [6] **VERIFY** P-161C is pumping by using discharge tubing for visual indication of hypo flow.
- [7] **NOTIFY** Chemistry that P-161C has been started **AND RECORD** time the pump was started (in CRS log). Chemistry personnel will periodically perform total residual chlorine (TRC) analysis using the appropriate Procedure to determine TRC concentration in the SSWS. **PROCEED TO** Section 7.2.3.4.

#### 7.2.3.4 Long-Term Operation of SSW Hypo Pump "C" (For P-161B)

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##### NOTE

It is desirable to continuously chlorinate the east SSW pump bay whenever this bay is active (P-208D or P-208E operating). However, P-161C may also be operated intermittently, depending upon plant conditions. The CRS should be notified of major changes in the operating status of the SSW hypo injection system.

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- [1] At least once each day a cursory inspection of the system should be conducted. This should include checking for flow at the discharge tubing, visual examination of the hypo pumps, looking for any leaks, and otherwise verifying normal operation.

##### CAUTION

Chemistry should be notified of any SSWS change that has the potential to impact system performance and/or the concentration of total residual chlorine (TRC) discharged.

- [2] Upon request from Chemistry personnel, **ADJUST** the percent stroke (length) and/or stroke rate (frequency) controls on P-161C to maintain a total residual chlorine (TRC) concentration within the achievable limit of PNPS 7.8.1. This may require communication with the person monitoring the SSW chlorine level.

#### 7.2.3.5 Securing SSW Hypo Pump "C" (P-161C)

- [1] **VERIFY** with the CRS that SSW Hypo Pump P-161C is to be secured.
- [2] **ADJUST** SSW Hypo Pump P-161C settings (stroke and frequency) to minimum.
- [3] **SECURE** SSW Hypo Pump P-161C using control switch on Panel C37.
- [4] **NOTIFY** Chemistry that P-161C has been secured **AND RECORD** time the pump was shut off (in CRS log).
- [5] **CLOSE** 5-HO-103C, Salt Service Water Hypo Pump P-161C Suction Block Valve.
- [6] **CLOSE** 5-HO-105C, Salt Service Water Hypo Pump P-161C Discharge Block Valve.
- [7] **CLOSE/VERIFY CLOSED** 5-HO-20A, SSW Hypo Pump P-161C Discharge to Injection Line A Block Valve.
- [8] **CLOSE/VERIFY CLOSED** 5-HO-20B, SSW Hypo Pump P-161C Discharge to Injection Line B Block Valve.

### 7.3 DECHLORINATION OF THE SCREENWASH WATER

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#### NOTE

If thorough dechlorination of the screenwash water is not possible (as determined by Chemistry), then both CW and SSW hypo injection systems shall be secured when either screenwash pump (P-213A/B) is operating.

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#### 7.3.1 Setup of Dechlorination System for Automatic Operation

#### CAUTION

Sodium thiosulfate powder is hazardous if ingested. Gloves and a face mask are to be used when handling the dry chemical.

- [1] **VERIFY** there is sufficient level in the sodium thiosulfate drum being used. **IF** level is less than one-quarter full by visual inspection, **THEN CONTACT** the Chemistry Lab.
  - [2] **OPEN/VERIFY OPEN** 29-HO-3935A **AND** 29-HO-3935B, Dechlorination Pumps P-175A, P-175B Disch Block Vlvs.
  - [3] **VERIFY** Dechlorination Pump (P-175A/P-175B) Vent Valve (29-HO-3936A/29-HO-3936B) tubing is connected from the vent valve to the basket strainer drain line.
  - [4] **OPEN** 29-HO-3936A/29-HO-3936B, Dechlorination Pump P-175A/P-175B Discharge Vent Valve.
- 

#### NOTE

The dechlorination pumps will not operate unless the respective screenwash pumps are in operation **AND** the dechlorination pump control switch is in the "START" position.

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- [5] **PLACE** the dechlorination pump control switch in "START". The switch should remain in the "START" position to ensure automatic activation of the dechlorination pump when the corresponding screenwash pump is operated.
- [6] **ADJUST** stroke rate between 80 to 100%. **SET** stroke length to 100%.
- [7] **AFTER** little or no air bubbles are visible in the liquid stream flow through the vent tubing, **CLOSE** the vent valve (29-HO-3936A/29-HO-3936B).

- [8] **ENSURE** there is output from the dechlorination pump (P-175A/P-175B) by observing the float in the flow indicator (FI-3947A/FI-3947B) just downstream or by observing the discharge tubing for indication of flow.
- [9] Once pump is primed, **ADJUST** injection rate(s) to maintain dechlorination of screenwash water (dependent on SSWS TRC level).

### 7.3.2 Long-Term Operation of Dechlorination System

- [1] **IF** screenwash operation duration is greater than 4 hours, **THEN MONITOR** the dechlorination operation at least every 4 hours for the following:
- **CHECK** FI-3947A/FI-3947B for flow indication (ball float is deflecting).
  - Visual examination of Dechlorination Pumps P-175A/P-175B, piping and tubing. **LOOK** for signs of system leakage (i.e., compression fittings) **AND OTHERWISE VERIFY** normal operation.
  - Greater than one-quarter level in the sodium thiosulfate drum being used.
  - **CHECK** PI-3986/PI-3987 to ensure adequate pump discharge pressure.
  - Visual examination of dechlorination tubing; **LOOK** for any leaks (i.e., compression fittings and valves).
- [2] **IF** the level in the sodium thiosulfate drum is less than one-quarter by visual inspection, **THEN CONTACT** the Chemistry Lab **AND COORDINATE** drum replacement by performing the following:
- (a) **SECURE** the affected dechlorination pump.
  - (b) **CAREFULLY REMOVE** the suction flexible tubing from the used sodium thiosulfate drum.
  - (c) **POSITION** the suction flexible tubing to a full sodium thiosulfate drum.
  - (d) **INSTALL** the suction flexible tubing inside the new drum.
  - (e) **START** the affected pump **AND, IF** required, **PRIME** in accordance with applicable steps of Section 7.3.1.

## 7.4 SODIUM HYPOCHLORITE SPILLS

### 7.4.1 Sodium Hypochlorite Spills of the SSW Continuous Injection System

- [1] **IF** a leak or spill of sodium hypochlorite occurs in the SSW Continuous Hypo Injection System, **PERFORM** the following:
- (a) **SECURE** the in-service SSW Continuous Hypo Injection Pump P-161A, P-161B, OR P-161C.
  - (b) **IF** it appears safe to perform, **CLOSE** 5-H0-J16, Salt Service Water Hypo Pumps P-161A/B/C Inlet Block Valve.
  - (c) **NOTIFY** the Control Room.
  - (d) **IMPLEMENT** the actions of PNPS 5.5.4, *"Response to Hazardous Material Incidents"*.

### 7.4.2 Sodium Hypochlorite Spills of the Circ Water Intermittent Injection System

- [1] **IF** a leak or spill of sodium hypochlorite occurs in the Circ Water Intermittent Hypo Injection System, **PERFORM** the following:
- (a) **SECURE** the in-service Circ Water Hypo Injection Pump, P-113A or P-113B.
  - (b) **IF** it appears safe to perform, **CLOSE** 5-H0-32, Circ Water Hypo Supply Strainer Inlet Block Valve.
  - (c) **NOTIFY** the Control Room.
  - (d) **IMPLEMENT** the actions of PNPS 5.5.4, *"Response to Hazardous Material Incidents"*.

### 7.4.3 Sodium Hypochlorite Spills from the Storage Tank T-147

- [1] **IF** a leak or spill of sodium hypochlorite occurs in the Storage Tank, **PERFORM** the following:
- (a) **SECURE** the in-service Injection Pumps.
    - P-113A, Circ Water Hypo Injection Pump "A"
    - P-113B, Circ Water Hypo Injection Pump "B"
    - P-161A, SSW Continuous Hypo Injection Pump "A"
    - P-161B, SSW Continuous Hypo Injection Pump "B"
    - P-161C, SSW Continuous Hypo Injection Pump "C"



- (b) IF it appears safe to perform, **CLOSE/VERIFY CLOSED** the following valves:
- 5-HO-113, Circ Water Hypo Storage Tank Outlet Valve
  - 5-HO-111, Salt Service Water Hypo Supply Block Valve
- (c) **NOTIFY** the Control Room.
- (d) **IMPLEMENT** the actions of PNPS 5.5.4, *"Response to Hazardous Material Incidents"*.

## 8.0 ATTACHMENTS

ATTACHMENT 1 - PREREQUISITE CHECKLIST

ATTACHMENT 2 - VALVE CHECKLIST

ATTACHMENT 3 - BREAKER CHECKLIST

ATTACHMENT 4 - INSTRUMENTATION CHECKLIST

ATTACHMENT 5 - TECHNICAL DATA FOR CW HYPO PUMPS P-113A AND P-113B

ATTACHMENT 6 - CWS HYPOCHLORITE INJECTION MONITORING (OPER-36)

ATTACHMENT 7 - SALT SERVICE WATER CHLORINATION SYSTEM ISOMETRIC DIAGRAM

## PREREQUISITE CHECKLIST

### 1.0 PREREQUISITES

Personnel performing steps in Sections 1.1, 1.2, and 1.3 of this Attachment shall print their name and sign their initials below:

Name (print)	Initials	Name (print)	Initials
Name (print)	Initials	Name (print)	Initials
Name (print)	Initials	Name (print)	Initials

#### 1.1 FOR CIRCULATING WATER CHLORINATION SYSTEM

	<u>Initials</u>
[1] CWS flow to discharge canal for dilution and circulation of injected hypochlorite	_____
[2] One screenwash pump P-213A/P-213B operable	_____
[3] Dechlorination capability (if screens are to be operated)	_____
[4] Sufficient hypo in Storage Tank (T-147)	_____

#### 1.2 FOR SALT SERVICE WATER CHLORINATION SYSTEM

[1] SSWS flow for dilution and circulation of injected hypochlorite	_____
[2] City water source (dilution water for diffusers)	_____
[3] Dechlorination capability (if screens are to be operated)	_____
[4] Sufficient hypo in Storage Tank (T-147)	_____

Initials

1.3 FOR SCREENWASH WATER DECHLORINATION SYSTEM

- [1] One screenwash pump P-213A/P-213B operable
- [2] One dechlorination pump P-175A/P-175B operable
- [3] At least 10 gallons (1/4 full) of sodium thiosulfate in one storage drum

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Completed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Name (print) Initials

Prerequisites as listed are met or discrepancies have been evaluated as acceptable.

SM \_\_\_\_\_ Date \_\_\_\_\_

2.0 SYSTEM OPERATIONAL ACCEPTANCE

- [1] Valve Checklist complete in accordance with Attachment 2.
- [2] Breaker Checklist complete in accordance with Attachment 3.
- [3] Instrumentation Checklist complete in accordance with Attachment 4.
- [4] Outstanding MRs are cleared or evaluated as acceptable for operation.

\_\_\_\_\_  
SRO

\_\_\_\_\_  
SRO

\_\_\_\_\_  
SRO

List MRs \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
SRO

3.0 FINAL REVIEW

All items listed in Section 2.0 are acceptable; the system can be considered operable.

SM \_\_\_\_\_ Date \_\_\_\_\_

VALVE CHECKLIST

All Operators involved with the Checklist shall print their name, sign, and initial below.

NAME (print)	SIGNATURE	INITIALS	NAME (print)	SIGNATURE	INITIALS

Personnel performing the Valve Checklist shall note whether the valve identification tag is in place. If the identification tag is not in place, the person(s) performing the Valve Checklist will forward a copy of pages where tags are missing to the OA. The copies will be marked "Valve ID Tags Needing Replacement".

VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
34-HO-126	CITY WATER TO HYPO STORAGE TANK AREA WASHDOWN VALVE	SCREENHOUSE	M212 3 F2	CLOSED	/		
34-HO-127	CITY WATER TO HYPO STORAGE TANK AREA VALVE	SCREENHOUSE	M212 3 F2	CLOSED	/		
5-HO-101A	CIRC WATER HYPO PUMP P-113A DISCHARGE FLUSH CONNECTION VLV	SCREENHOUSE HYPO AREA	M212 3 E8	CLOSED & CAPPED	/		
5-HO-101B	CIRC WATER HYPO PUMP P-113B DISCHARGE FLUSH CONNECTION VLV	SCREENHOUSE	M212 3 E8	CLOSED & CAPPED	/		

VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
5-HO-103A	SALT SERVICE WATER HYPO PUMP P-161A SUCTION BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 C4	OPEN	/		
5-HO-103B	SALT SERVICE WATER HYPO PUMP P-161B SUCTION BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 B4	OPEN	/		
5-HO-103C	SALT SERVICE WATER HYPO PUMP P-161C SUCTION BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 D4	*	/		
5-HO-105A	SALT SERVICE WATER HYPO PUMP P-161A DISCHARGE BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 C5	OPEN	/		
5-HO-105B	SALT SERVICE WATER HYPO PUMP P-161B DISCHARGE BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 B5	OPEN	/		
5-HO-105C	SALT SERVICE P-161C DISCHARGE BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 D5	*	/		

\* Dependent upon plant/system status

VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
5-HO-109A	SSW HYPO INJECTION LINE TO SSW BAY A BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 C6	OPEN	/		
5-HO-109B	SSW HYPO INJECTION LINE TO SSW BAY B BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 B6	OPEN	/		
5-HO-34A	SSW HYPO INJ. LINE A DIFFUSER BLOCK VALVE	SCREENHOUSE WEST SSW BAY	M212 3 C8	OPEN	/		
5-HO-34C	SSW HYPO INJ. LINE A NORTH DIFFUSER BLOCK VALVE	SCREENHOUSE WEST SSW BAY	M212 3 B8	OPEN	/		
5-HO-110 [S-5-3]	HYPOCHLORITE STORAGE TANK LEAK DETECTION DRAIN VALVE	SCREENHOUSE	M212 3 E2	CLOSED	/		
5-HO-111	SALT SERVICE WATER HYPO SUPPLY OUTLET BLOCK VALVE	SCREENHOUSE	M212 3 D2	OPEN	/		

\* Dependent upon plant/system status

### VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
5-HO-112	CHLORINATION SYSTEM HYPO STORAGE TANK FILL VALVE	SCREENHOUSE	M212 3 E2	CLOSED & CAPPED	/		
34-HO-274	DILUTION WATER TO SSW HYPO SYSTEM BLOCK VALVE	SCREENHOUSE	M218 3 G8	OPEN	/		
5-HO-112A	SSW HYPO INJECTION LINE A DILUTION WATER BLOCK VALVE	SCREENHOUSE	M212 3 C7	OPEN	/		
5-HO-112B	SSW HYPO INJECTION LINE B DILUTION WATER BLOCK VALVE	SCREENHOUSE	M212 3 A7	OPEN	/		
5-HO-113 [S-5-1]	CIRC WATER HYPO STORAGE TANK OUTLET VALVE	SCREENHOUSE	M212 3 E2	OPEN*	/		
5-HO-114	CIRC WATER HYPO SUPPLY LINE AND STORAGE TANK DRAIN VALVE	SCREENHOUSE	M212 3 E3	CLOSED	/		
5-HO-115	SALT SERVICE WATER HYPO SUPPLY FILTER X-104 BYPASS VALVE	SCREENHOUSE	M212 3 C2	CLOSED	/		

\* Valve will be closed when Circ Water hypo is not in service.



VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
5-HO-116	SALT SERVICE WATER HYPO SUPPLY FILTER X-104 OUTLET BLOCK VLV	SCREENHOUSE	M212 3 D3	OPEN	/		
5-HO-117	SALT SERVICE WATER HYPO SUPPLY FILTER X-104 OUTLET BLOCK VALVE	SCREENHOUSE	M212 3 D3	OPEN	/		
5-HO-118	SSW HYPO PUMP P-161A, B, C INLET HEADER DRAIN VALVE	SCREENHOUSE	M212 3 B4	CLOSED & CAPPED	/		
5-HO-20A	P-161C DISCHARGE TO INJECTION LINE A BLOCK VALVE	SCREENHOUSE	M212 3 C5	*	/		
5-HO-20B	P-161C DISCHARGE TO INJECTION LINE B BLOCK VALVE	SCREENHOUSE	M212 3 B5	*	/		

\* Dependent upon plant/system status

### VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
5-HO-24	CIRC WATER HYPO PUMPS P-113A & P-113B INLET BLOCK VALVE	SCREENHOUSE	M212 3 E5	OPEN	/		
5-HO-2A	CIRC WATER HYPO P113A SUCTION DRAIN VALVE	SCREENHOUSE	M212 3 D7	CLOSED & CAPPED	/		
5-HO-2B	CIRC WATER HYPO P113B SUCTION DRAIN VALVE	SCREENHOUSE	M212 3 E7	CLOSED & CAPPED	/		
5-HO-32	CIRC WATER HYPO SUPPLY STRAINER INLET BLOCK VALVE	SCREENHOUSE	M212 3 E5	OPEN	/		
5-HO-33A	CIRC WATER HYPO A EJECTOR J-38 INLET BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 G6	OPEN*	/		
5-HO-33B	CIRC WATER HYPO B EJECTOR J-39 INLET BLOCK VALVE	SCREENHOUSE	M212 3 G6	OPEN*	/		
5-HO-3A	CIRC WATER HYPO PUMP P-113A SUCTION FLUSH VALVE	SCREENHOUSE HYPO AREA	M212 3 D6	CLOSED	/		

\* Valve will be closed when Circ Water hypo is not in service.

VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
5-HO-3B	CIRC WATER HYPO PUMP P-113B SUCTION FLUSH VALVE	SCREENHOUSE	M212 3 E6	CLOSED	/		
34-HO-273	FLUSH WATER TO CIRC WATER HYPO SYSTEM BLOCK VALVE	SCREENHOUSE	M218 3 G8	OPEN	/		
5-HO-4A	CIRC WATER HYPO PUMP P-113A PRESS RELIEF RETURN BLOCK VLV	SCREENHOUSE HYPO AREA	M212 3 D6	LOCKED OPEN	/		
5-HO-4B	CIRC WATER HYPO PUMP P-113B PRESS RELIEF RETURN BLOCK VLV	SCREENHOUSE	M212 3 E6	LOCKED OPEN	/		
5-HO-6A	CIRC WATER HYPO PUMP P-113A SUCTION TEST CONNECTION VALVE	SCREENHOUSE HYPO AREA	M212 3 D7	CLOSED	/		

VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
5-HO-6B	CIRC WATER HYPO PUMP P-113B SUCTION TEST CONNECTION VALVE	SCREENHOUSE HYPO AREA	M212 3 E7	CLOSED	/		
5-HO-J11	CIRC WATER HYPO PUMP P-113A SUCTION BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 D6	OPEN	/		
5-HO-J12	CIRC WATER HYPO PUMP P-113B SUCTION BLOCK VALVE	SCREENHOUSE	M212 3 E6	OPEN	/		
5-HO-J16	SALT SERVICE WATER HYPO PUMPS P-161A/B/C INLET BLOCK VALVE	SCREENHOUSE HYPO AREA	M212 3 C3	OPEN	/		
5-HO-J25	CIRC WATER HYPO EJECTOR J-38 SCREENWASH INLET BLOCK VALVE	SCREENHOUSE	M212 3 G7	CLOSED	/		
5-HO-J26	CIRC WATER HYPO EJECTOR J-39 SCREENWASH INLET BLOCK VALVE	SCREENHOUSE	M212 3 G7	CLOSED	/		

### VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIAL	REASON FOR ABNORMAL POSITION
5-HO-J27	CIRC WATER HYPO EJECTOR J-38 OUTLET BLOCK VALVE	SCREENHOUSE	M212 3 G6	OPEN	/		
5-HO-J28	CIRC WATER HYPO EJECTORS J-38 & J-39 OUTLET CROSS-TIE VALVE	SCREENHOUSE	M212 3 G6	*	/		
5-HO-J29	CIRC WATER HYPO EJECTOR J-39 OUTLET BLOCK VALVE	SCREENHOUSE	M212 3 G6	OPEN	/		
5-HO-J7	CIRC WATER HYPO TO TRAVELING SCREEN X-108D BLOCK VALVE	SCREENHOUSE	M212 3 H5	CLOSED	/		
5-HO-J8	CIRC WATER HYPO TO TRAVELING SCREEN X-108C BLOCK VALVE	SCREENHOUSE	M212 3 H5	CLOSED	/		
5-HO-J9	CIRC WATER HYPO TO TRAVELING SCREEN X-108B BLOCK VALVE	SCREENHOUSE	M212 3 G5	CLOSED	/		

\* Dependent upon plant/system status

### VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
5-HO-J10	CIRC WATER HYPO TO TRAVELING SCREEN X-108A BLOCK VALVE	SCREENHOUSE	M212 3 F5	CLOSED	/		
PCV-39025A	CIRC WATER HYPO EJECTOR J-38 INLET PRESSURE CONTROL VALVE	SCREENHOUSE HYPO AREA	M212 3 G7	AUTOMATIC OPERATION	/		
PCV-39025B	CIRC WATER HYPO EJECTOR J-39 INLET PRESSURE CONTROL VALVE	SCREENHOUSE HYPO AREA	M212 3 G7	AUTOMATIC OPERATION	/		
PSV-3932A	SSW HYPO INJECTION LINE A TO T-147 RELIEF VALVE	SCREENHOUSE HYPO AREA	M212 3 C6	AUTOMATIC OPERATION	/		
PSV-3932B	SSW HYPO INJECTION LINE B TO T-147 RELIEF VALVE	SCREENHOUSE HYPO AREA	M212 3 B6	AUTOMATIC OPERATION	/		
S-5-1	REACH ROD FOR HYPO TANK CIRC WTR HYPO OUTLET VLV 5-HO-113	SCREENHOUSE	M212 3 E2	OPEN*	/		

\* Valve will be closed when Circ Water hypo is not in service.

VALVE CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	PRINT LOCATION	NORMAL POSITION	ID TAG IN PLACE YES/NO	INITIALS	REASON FOR ABNORMAL POSITION
S-5-3	REACH ROD FOR HYPO TANK T-147 LEAK DETECTION DRAIN VALVE 5-HO-110	SCREENHOUSE	M212 3 E2	CLOSED	/		
S-5-4	REACH ROD FOR CIRC WATER HYPO OUTLET DRAIN VALVE 5-HO-114	SCREENHOUSE	M212 3 E2	DISCONNECTED	/		
29-HO-3935A	DECHLORINATION PUMP P-175A DISCHARGE VALVE	SCREENWASH PUMP A	M212 2 G7	OPEN	/		
29-HO-3935B	DECHLORINATION PUMP P-175B DISCHARGE VALVE	SCREENWASH PUMP B	M212 2 D7	OPEN	/		
29-HO-3936A	DECHLORINATION PUMP P-175A DISCHARGE VENT VALVE	SCREENHOUSE HYPO AREA	M212 2 G7	CLOSED	/		
29-HO-3936B	DECHLORINATION PUMP P-175B DISCHARGE VENT VALVE	SCREENHOUSE HYPO AREA	M212 2 D7	CLOSED	/		

Reviewed By:

SM signature

Date

BREAKER CHECKLIST

All Operators involved with the Checklist shall print their name, sign, and initial below.

NAME (print)

SIGNATURE

INITIALS




BREAKER CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	BREAKER STATUS	DISCREPANCIES	PERFORMER INITIALS
B2613A	LIGHTING PANEL 13L INTAKE STRUCTURE 277V	SCREENHOUSE	ON		
B2613B	LIGHTING PANEL 14L INTAKE STRUCTURE 120V	SCREENHOUSE	ON		
B2626A	RECREATION AREA	SCREENHOUSE	ON		
13L BKR 13/15/17	CIRC WTR HYPO PUMPS P-113A AND P-113B	SCREENHOUSE	ON		
B26A	HYPO INJ PUMP P-113A 480V AC	SCREENHOUSE	ON		
B26B	HYPO INJ PUMP P-113B 480V AC	SCREENHOUSE	ON		
14L-12	C37 AND C38 CHLORINATION SYSTEM	INTAKE STRUCTURE	ON		
14L-21	DECLORINATION PUMPS P-175A AND P-175B	INTAKE STRUCTURE	ON		
14L-41	EVENT RECORDER ER-3905 PNL C73 VIA J2208	INTAKE STRUCTURE	ON		

BREAKER CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	BREAKER STATUS	DISCREPANCIES	PERFORMER INITIALS
C37-CB1	SSW HYPO INJ. PUMPS P-161A, B, C, 120V AC	CONTROL PANEL C37 - SCREENHOUSE	ON		
C38-CB1	CW HYPO INJ. SYSTEM CONTROL POWER	CONTROL PANEL C38 - SCREENHOUSE	ON		

Breaker Checklist verification reviewed by \_\_\_\_\_ Date \_\_\_\_\_  
SM

INSTRUMENTATION CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	*STATUS			REMARKS	PERFORMER INITIALS
			O	I	OK		
LI-3990	Hypo Storage Tank T-147 Level Indicator	Screenhouse Hypo Pump Room					
FI-3990	Bubbler Air Flow Meter for LI-3990 Hypo Storage Tank	Screenhouse Hypo Pump Room					
FI-39022A	CW Hypo Pump P-113A Flow Meter	Screenhouse Hypo Pump Room					
FI-39022B	CW Hypo Pump P-113B Flow Meter	Screenhouse Hypo Pump Room					
PI-3949A	CW Hypo Pump P-113A Disc Pressure Gauge	Screenhouse Hypo Pump Room					
PI-3949B	CW Hypo Pump P-113B Disc Pressure Gauge	Screenhouse Hypo Pump Room					
PI-39020A	CW Hypo Inj. Dampener X-185A Pressure Gauge	Screenhouse Hypo Pump Room					
PI-39020B	CW Hypo Inj. Dampener X-185B Pressure Gauge	Screenhouse Hypo Pump Room					
PI-3927	Screenwash Pressure Chlorination System	Screenhouse Hypo Pump Room					
FG-39019A	SSW Hypo Inj. Line to SSW Bay "A" Sightglass	Screenhouse Hypo Pump Room					
FG-39019B	SSW Hypo Inj. Line to SSW Bay "B" Sightglass	Screenhouse Hypo Pump Room					
FG-39043	Hypo Storage Tank T-147 Leak Detection Sightglass	Screenhouse Hypo Tank Room					

\* See Note on Sheet 2

INSTRUMENTATION CHECKLIST

EQUIPMENT OPERATOR ID	EQUIPMENT DESCRIPTION	EQUIPMENT LOCATION	*STATUS			REMARKS	PERFORMER INITIALS
			O	I	OK		
FI-3947A	Dechlorination Pump P-175A Flow Meter	Screenhouse Hypo Pump Room					
FI-3947B	Dechlorination Pump P-175B Flow Meter	Screenhouse Hypo Pump Room					

\*Note: Status Code:  
 O = Operable  
 I = Inoperable  
 OK = Not known to be inoperable

Performed by: \_\_\_\_\_  
 Name (print) Initials

Performed by: \_\_\_\_\_  
 Name (print) Initials

Sufficient instrumentation available to support system operation \_\_\_\_\_ Date \_\_\_\_\_  
 SM

TECHNICAL DATA FOR CW HYPO PUMPS P-113A AND P-113B

PulsaFeeder Diaphragm Pump - "HydraTube" Model 7440-S-E  
Maximum operating: pressure = 100 psi; flow = 5 GPM  
Use only "PulsaLube" oil (get from Tool Depot)

CW Hypo Pump		Expected Flow	
Stroke	Capacity	(GPM)	Gal/Hr
0	0%	0.00	0
10		0.16	10
20		0.32	19
30		0.48	29
40	10%	0.64	39
50		0.81	48
60		0.97	58
70		1.13	68
80	20%	1.29	77
90		1.45	87
100		1.61	97
110		1.77	106
120	30%	1.93	116
130		2.10	126
140		2.26	135
150		2.42	145
160	40%	2.58	155
170		2.74	164
180		2.90	174
190		3.06	184
200	50%	3.22	193
210		3.39	203
220		3.55	213
230		3.71	223
240	60%	3.87	232
250		4.03	242
260		4.19	252
270		4.35	261
280	70%	4.51	271
290		4.68	281
300		4.84	290
310		5.00	300
320	80%	5.16	310

NOTE: Do not try to adjust the stroke setting (handwheel) on either CW hypo injection pump unless it is operating. The pump's "stroke adjustment gear assembly" can be damaged if the handwheel is turned without the motor operating.

CWS HYPOCHLORITE INJECTION MONITORING

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NOTES

1. Chlorination of CW pump bays may be done in any order (i.e., base document Section 7.1.3 may be done before Section 7.1.1). Alternate which bay is done first as much as possible (try not to start with the same bay every day). It is not permissible to chlorinate both CW pump bays simultaneously.
  2. Hypo injection is normally done for 1 hour per CW pump bay (2 hours/day). It may be less than this but not more than 2 hours total duration per day (e.g., a single CW pump may be chlorinated for up to 2 hours at a time).
  3. Both seawater (CW) pumps should be operating prior to and during CW hypo injection. If either CW pump is secured during hypochlorination, then immediately secure hypo injection as well.
  4. When only one CW pump is in operation, there is an increased risk of overchlorination. Do not perform hypochlorination with only one CW pump running unless:
    - a. Permission is obtained from both the SM and the Chemistry Superintendent.
    - b. Sea conditions near the mouth of the discharge canal must be less than 2 feet (no storm surges).
  5. The Operator shall control hypo injection so that the discharge limit of 0.10 ppm TRC (total residual chlorine) is not exceeded. Once hypochlorination is underway, upon receiving feedback from the Chemistry Technician, the injection rate may be increased in gradual steps provided that the following conditions are met:
    - a. An achievable limit concentration has been established PNPS 7.8.1, "*Chemistry Sample and Analysis Program*", to avoid overchlorination. This target value may be exceeded, but only with the approval of the SM/CRS and Chemistry Supervision.
    - b. Start hypochlorination based on the initial hypo injection rate specified by the Chemistry Technician. A waiting period of at least 20 minutes shall be observed prior to any increase in the hypo injection rate when two CW pumps are operating. If only one CW pump is in service, then wait at least 40 minutes prior to increasing the hypo injection rate.
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NOTES (Continued)

6. It is very important that two-way communication can be established throughout the entire injection process. In case of a problem, the only way the Operator knows to reduce or secure hypo injection is by feedback from the Chemistry Technician. In case of loss of communication, secure hypo injection or use the Gaitronics private line until normal communication is restored.
  7. When the level in the hypo storage tank (T-147) goes below 50 inches (using LI-3990), then more sodium hypochlorite should be ordered. Contact the Control Room Annex to reorder hypo and fill in accordance with PNPS 1.12.1, *"Receiving, Recording, and Monitoring of Consumable Deliveries"*.
  8. Check FG-39043 hypo storage tank T-147 leak detection sightglass, located below the hypo storage tank, to verify no liner leakage exists.
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OPER-36  
CWS HYPOCHLORITE INJECTION MONITORING

INTAKE WATER TEMPERATURE CW Pump A \_\_\_\_\_ °F CW Pump B \_\_\_\_\_ °F

Note: Record CW hypo pump settings and flow rate (GPM) every 10 minutes. Circle which hypo pump used (P-113A or P-113B) below. Maintain communication with Chemistry Technician and record TRC readings. If chlorine discharge level is exceeded, terminate hypo injection and notify the CRS/SM immediately. Review base document Precaution Step 5.1[1] for PPE requirements.

NOTE

In attempt to equalize run times and prevent sodium hypochlorite from coming out of solution and causing flow indicator fouling, use P-113A to inject hypo into the "A" CW Pump (if available). Use P-113B to inject hypo into the "B" CW Pump (if available). If either CW hypo pump is not available, use the cross-tie to inject into the opposite CW pump. (PR94.0354.03)

"A" CIRC WATER PUMP (P-105A)				"B" CIRC WATER PUMP (P-105B)			
Time	Stroke Setting	Flow (GPM)	TRC (ppm)	Time	Stroke Setting	Flow (GPM)	TRC (ppm)

Time

- CW Pump "A" chlorination started at \_\_\_\_\_ using P-113A/P-113B  
CW Pump "A" chlorination finished at \_\_\_\_\_ using P-113A/P-113B
- CW Pump "B" chlorination started at \_\_\_\_\_ using P-113A/P-113B  
CW Pump "B" chlorination finished at \_\_\_\_\_ using P-113A/P-113B

- T-147 Tank Level Start \_\_\_\_\_ Finish \_\_\_\_\_

Reorder at 50" level

Reorder required Yes ☐ No ☐

- FG-39043 Hypo Storage Tank T-147 leak detection sightglass empty. Y/N \_\_\_\_\_

- Comments/Discrepancies: \_\_\_\_\_



OPER-36  
CWS HYPOCHLORITE INJECTION MONITORING

ACCEPTANCE CRITERIA

The CWS was chlorinated for 2 hours (or less) and discharge chlorine levels did not exceed 0.10 mg/L (ppm) TRC.

Injection done by \_\_\_\_\_ Total Time \_\_\_\_\_ Date \_\_\_\_\_

Acceptance Criteria Met: On-Shift SRO \_\_\_\_\_ Date \_\_\_\_\_

Appropriate MSTP Rep Task updated. OA \_\_\_\_\_ Date \_\_\_\_\_

Sunday S001450

Monday S001449

Tuesday S001451

Wednesday S001452

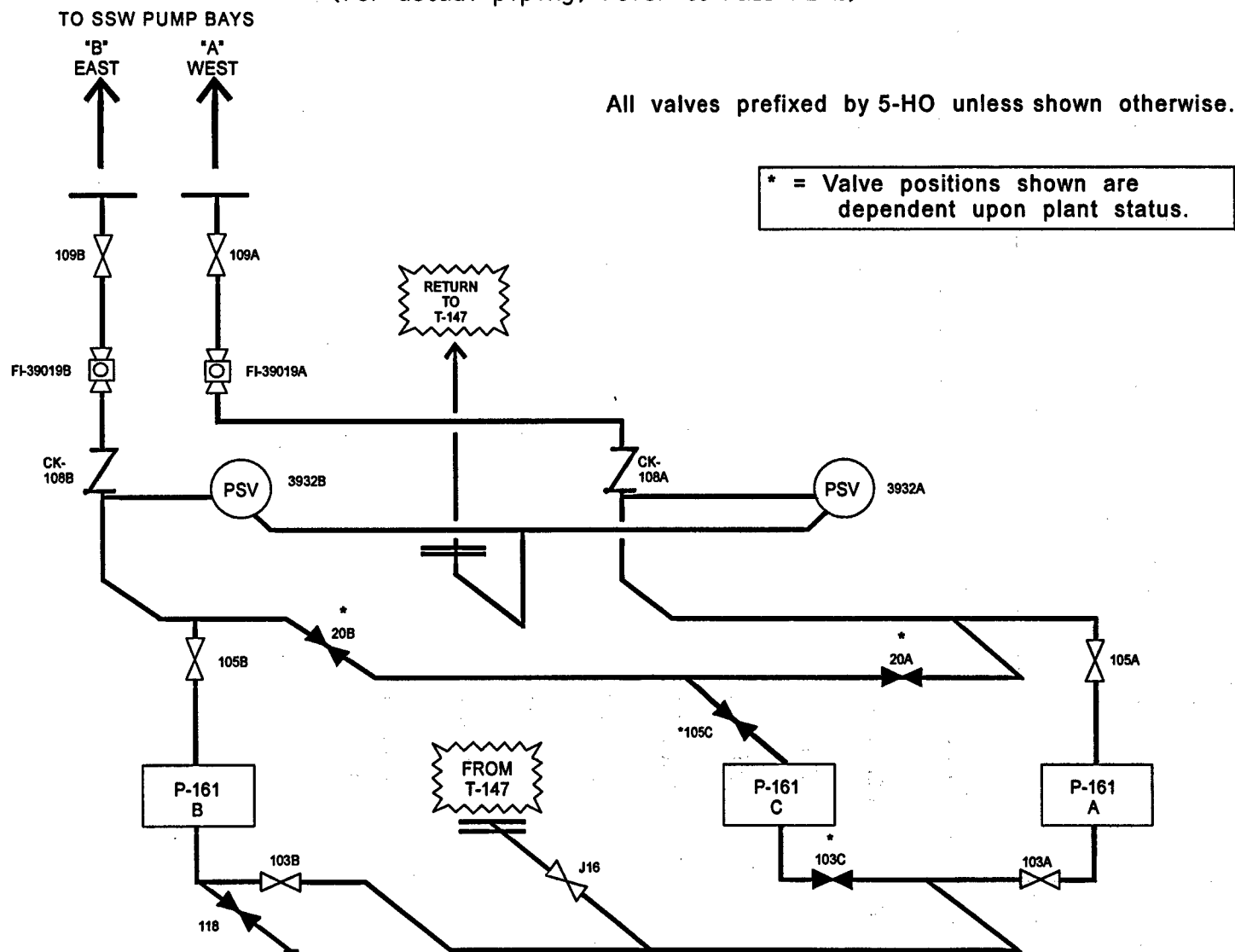
Thursday S001453

Friday S001461

Saturday S001454

# SALT SERVICE WATER CHLORINATIN SYSTEM ISOMETRIC DIAGRAM

(For actual piping, refer to P&ID M212)



2.2.95Z01