



Date: August 31, 2023  
To: All Vendors  
Subject: Addendum #3

**REFERENCE: P060-23 Annual Supply of Scale Inhibitor and Clean in Place Chemicals**

This Addendum forms part of the contract and clarifies, corrects or modifies original proposal document.

**Question 1:** Provide the current antiscalant and membrane cleaning products being used.

**Answer 1:** The antiscalant used is MegaFLUX AF. The cleaning products are AWC-C234 and AWC-C237.

**Question 2:** What dose in PPM for the current antiscalant?

**Answer 2:** The current antiscalant dosage rate is 2.1 ppm.

**Question 3:** Do you currently clean each stage separately using a new CIP batch for each stage, or do you clean them both at the same time using the same CIP batch?

**Answer 3:** Each stage is cleaned at the same time using the same CIP batch.

**Question 4:** Can you share your current low and high pH cleaning procedures?

**Answer 4:** Low and high cleaning procedures are attached.

The signature of the company agent, for the acknowledgement of this addendum, shall be required.  
**Complete information below and return via e-mail to: [dsolitaire@brownsville-pub.com](mailto:dsolitaire@brownsville-pub.com).**

I hereby acknowledge receipt of this addendum.

**Company:** \_\_\_\_\_

**Agent Name:** \_\_\_\_\_

**Agent Signature:** \_\_\_\_\_


**Address:** \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone Number: \_\_\_\_\_ E-mail address: \_\_\_\_\_

If you have any further questions about the Proposal, call 956-983-6366.

BY: *Diane Solitaire*  
Purchasing

	SRWA - RO Clean-In-Place (6 hour wash) Work Instructions	Department	3190
		Number	SRW-1006-WI
		Effective Date	4/10/2023
		Revision Number	1
		Final Approver	

### 1.0 Purpose

The purpose of these work instructions is to guide operators in washing the reverse osmosis trains A, B, C, D, E, F, G and H.

### 2.0 Scope

These instructions apply to BPUB Surface Water Licensed A, B, C, and D Water Operators, Lead Operators, and Chief Operators.

### 3.0 Definitions

- 3.1 pH – Scale to measure acidity and alkalinity.
- 3.2 R.O – Reverse Osmosis
- 3.3 CIP – Clean in Place
- 3.4 CF Vessel – Cartridge Filter Vessel
- 3.5 NaOH – Caustic Soda
- 3.6 HCl – Hydrochloric acid, commonly known as muriatic acid
- 3.7 PPE – Personal Protective Equipment
- 3.8 ERT- Energy Recovery Turbine
- 3.9 AWC- American Water Chemicals
- 3.10 GPM – Gallons Per Minute

### 4.0 Roles and Responsibilities

- 4.1 The manager ensures compliance to these instructions.

- 4.2 The Chief Operator ensures training is provided to all employees using the department instructions manual.
- 4.3 Lead Operator and Operators will:
  - 4.3.1 Review normalized data to determine schedule for cleaning RO membrane trains.
  - 4.3.2 Properly and safely wash selected train.

## **5.0 Instructions**

- 5.1 Begin with the R.O. membrane train preparation.
  - 5.1.1 Review Work Instruction SRW - 1008 on CIP R.O. Preparation.
- 5.2 High pH wash first, Low pH begins in 6.28
- 5.3 Begin filling CIP tank to 2500 gallon mark.
  - 5.3.1 Mark with permeate water, by opening valve label V-419. (by site glass)
  - 5.3.2 Turn on heater element at CIP control panel to heat water in CIP tank to 95°F. (High temperature needed to help with high pH wash to kill bacteria).
  - 5.3.3 Ensure CIP tank drain valve behind tank is closed.
  - 5.3.4 Close 1<sup>st</sup> and 2<sup>nd</sup> stage feed line valves labeled V-415 and V-416 and CF vessel drain valves labeled V-409 and V-410.
- 5.4 Isolate 1<sup>st</sup> stage from 2<sup>nd</sup> stage by closing valves going into the E.R.T.
  - 5.4.1 Close the valve going into the E.R.T.'s feed pump impeller from the 1<sup>st</sup> stage concentrate line (blue wheel valve).
  - 5.4.2 Close the valve going into the E.R.T.'s brine turbine impeller from 2<sup>nd</sup> stage concentrate line (long blue lever valve).
- 5.5 Finish filling CIP tank and release air from recirculation lines.
  - 5.5.1 Open valves labeled V-407 & V-408 (top of C.F. vessel at the CIP area).

- 5.5.2 **VERIFY** all feed valves are **CLOSED**. Valves labeled V-415 and V-416
- 5.5.3 CIP tank recirculation valve labeled V-405 is **OPEN**.
- 5.5.4 **Close** 2<sup>nd</sup> stage return valve labeled V-418 at CIP tank
- 5.6 At C.I.P control panel, start CIP pump by pressing green button.
- 5.7 Locate 55 gal drum of high pH detergent (AWC-237) in drum storage by CIP tank (wear proper PPE, including apron, full face shield or full facemask, elbow length gloves)
- 5.8 Install the drum pump to pump (AWC-237) detergent into CIP tank.
- 5.9 Plug in pump's electric cord and open valve to the feed line.
- 5.10 **Two people are needed for this step.** The person by the high pH (11.0) detergent drum needs to wear proper P.P.E. (apron, full face shield or full facemask, elbow length nitrile gloves).
  - 5.10.1 A strong flashlight is needed to measure drawdown from the drum.
  - 5.10.2 A 2.0% solution in 2500 gal of water will be mixed in CIP tank by adding 55 gal of AWC-237, and adding NaOH to raise pH to 12.0 if needed.
- 5.11 Second person at CIP control panel, locate the high pH button and press button, when person at drum is ready to start measuring drawdown, then stop, when drum person signals to stop.
- 5.12 Allow solution to mix for (5) minutes.
- 5.13 At R.O. unit, close red 2<sup>nd</sup> stage wash/return valve (V-504). Close valves at the end of wash lines under grating, when no more water is coming out.
  - 5.13.1 Verify 1<sup>st</sup> stage feed wash valves (V-501 & V-502) are open
  - 5.13.2 Verify (V-503) 1<sup>st</sup> stage return wash valve is open. Also, close 2<sup>nd</sup> stage return valve (V-418) at CIP tank.
  - 5.13.3 Verify 1<sup>st</sup> stage return valve is open.
- 5.14 With temperature at up to (95°), **slowly** open (slow enough to push any trapped air safely thru the membranes) V-415 (1<sup>st</sup> stage feed valve) to ¼ mark, (check pressure at R.O. gauges)

- 5.14.1 **Slowly** close recirculation valve V-405 (pipe above C.F. vessel at the CIP tank). 1<sup>st</sup> and 2<sup>nd</sup> stage gauges on CF vessel should be reading approximately 70 psi.
- 5.14.2 Introduce the cleaning solution at low flow rate, between 15-20 gpm per pressure vessel.
- 5.14.3 This is to prevent membrane telescoping caused by high differential pressure across the membrane during cleaning.
- 5.14.4 Gradually increase the flow rate of cleaning solution up to 48 gpm per pressure vessel or 1050 gpm, but **maintain the cleaning pressure below 60 psi.**
- 5.15 Allow solution to circulate thru R.O. membranes for 5 minutes and then obtain a sample from the hose, on top of C.F. vessel.
- 5.16 Run a pH test on sample to make sure pH is kept in the **10.0 – 12.0** pH range.
  - 5.16.1 If pH is not at proper range add more AWC-237 or NAOH (caustic soda) in 1/2 gallon increments until pH meets a minimum of 11.0 pH.
- 5.17 Check pH reading of cleaning solution, the pH should be maintained at 11.0 – 12.0 for effective removal of bio deposits and disinfection.
- 5.18 Circulate the solution for 1 hour and soak for 60 minutes and repeat this circulation and soak process 3 times.
- 5.19 To soak or box-in, use the following steps:
  - 5.19.1 Open (V-405) CIP tank recirculation valve.
  - 5.19.2 Slow flow, by slightly closing (V-415) 1<sup>st</sup> stage feed valve.
  - 5.19.3 Slowly close (V-503) 1<sup>st</sup> stage return valve at R.O. unit.
  - 5.19.4 Slowly close (V-501 & V-502). 1<sup>st</sup> stage feed valves at R.O. unit.
  - 5.19.5 Turn off CIP pump at the C.I.P control panel.
  - 5.19.6 Then, **SLOWLY** open 1<sup>st</sup> and 2<sup>nd</sup> stage return valves at the CIP tank. (V-417, V-418) to release pressure on feed and return lines.

- 5.20 After 60 minute soak (box-in);
- 5.20.1 **CLOSE** 1<sup>st</sup> and 2<sup>nd</sup> stage feed and 2<sup>nd</sup> stage return valves (V-415, V-416) at CIP tank.
  - 5.20.2 At R.O. unit, **OPEN** 1<sup>st</sup> stage feed valves (V-501, V-502) and 1<sup>st</sup> stage return valve (V-503).
  - 5.20.3 **VERIFY** recirculation valve at CIP tank (V-405) is open.
  - 5.20.4 Start C.I.P pump at control panel.
- 5.21 Recirculation after box-in; **slowly** open 1<sup>st</sup> stage feed valve (V-415) and **slowly** close CIP tank recirculation valve (V-405).
- 5.22 Check **pH** reading of sample, the pH should be above **11.0**. If the pH drops below **11.0**, add more cleaning chemical.
- 5.23 If the pH of the water is stable, continue with the recirculation.
- 5.24 Prepare to neutralize solution (Refer to neutralization work instructions for instructions.)
- 5.25 Rinse with permeate water. High flow and good pressure is necessary to remove all traces of cleaning solution.
- 5.26 After CIP tank is empty, rinse tank with small amount of permeate water, before filling to rinse R.O. vessels.
- 5.27 Close CIP tank drain valve (V-402) and begin to fill tank with permeate water. Close C.F. vessel drain valves (V-409, V410).
- 5.28 When CIP tank level reaches 6 to 7 foot height, open 1<sup>st</sup> and 2<sup>nd</sup> stage feed valves (V-415, V416) to flush out to the end of wash lines located under grating any cleaning solution left in wash lines.
- 5.28.1 Close valves at end of wash lines when clear permeate water starts flushing out.
  - 5.28.2 Verify 1<sup>st</sup> stage feed valves are open on R.O. vessels (V-501 and V-502).
  - 5.28.3 Verify 2<sup>nd</sup> stage feed and return valves at R.O. vessel (V-503 and V-504) are closed.
  - 5.28.4 Close 1<sup>st</sup> and 2<sup>nd</sup> stage feed valves (V-415, V-416) at CIP tank.

- 5.28.5 Close 2<sup>nd</sup> stage return valve (labeled V-418) at CIP tank.
- 5.29 Allow CIP tank to fill, and purge air through valves on top of C.F. vessel (V-407 and V408). Turn on CIP pump.
- 5.30 Slowly open 1<sup>st</sup> stage feed valve labeled (V-415) at CIP tank to start flowing rinse water to R.O. vessels.
- 5.31 Close CIP tank self-circulate valve (labeled V-405).
- 5.32 Allow circulation 10 to 15 minutes, then obtain sample from hose at top of C.F. vessel, and test pH. If pH is **below 9.0** and **above 5.0**, you are done.
- 5.33 Record pH reading and time on CIP form. Open CIP circulation valve labeled (V-405) and close 1<sup>st</sup> stage feed valve labeled (V415), now you can turn off power to CIP pump.
- 5.34 You are ready to drain the solution from the tank and all pipes including membrane vessels.
- 5.35 Open all valves at CIP tank, drain valve labeled (V-402), C.F. vessel drain valve labeled (V-409& V-410) & C.F. vessel top valve labeled (V-407 and V-408), 1<sup>st</sup> and 2<sup>nd</sup> stage feed and return valve labeled (V415, V-416, V-417 and V-418),
- 5.35.1 At the R.O. train, open feed and return valve labeled (V-503, V-504) leave 1<sup>st</sup> stage feed valve labeled (V-501 & V-502), and open valves at the end of wash lines, under grating.
- 5.35.2 Allow for all liquid to completely drain from tank, wash lines and R.O. vessels.
- 5.36 Verify CIP tank drain valve labeled (V-402) is closed, fill CIP tank with permeate water.
- 5.36.1 When CIP tank level reaches 6' to 7' height, open 1<sup>st</sup> and 2<sup>nd</sup> stage feed valve labeled (V-415, V416) to flush out, to end of wash lines under grating, any cleaning solution left in wash lines.
- 5.36.2 Close 1<sup>st</sup> and 2<sup>nd</sup> stage feed valve labeled (V-415, V416) at CIP tank when clear permeate water starts flushing out at the end of wash lines, under grating.



- 5.36.3 Leave end valves, under grating and CIP tank return valve labeled (V-417, V418) open, to allow water to drain from wash lines.
- 5.37 Finish filling CIP tank & release air from recirculation lines, by opening valve labeled V-407 & V-408 (top of C.F. vessel at CIP).
- 5.37.1 **VERIFY** all feed valves are **CLOSED** (V-415 and V-416), and CIP tank recirculation valve (V-405) is **OPEN**.
- 5.38 At C.I.P control panel, start CIP pump by pressing green button.
- 5.39 Locate 55 gal drum of Low pH detergent (AWC-234) in drum storage by CIP tank (wear proper P.P.E., apron, full face shield or full facemask, elbow length gloves), and install the drum pump, to pump (AWC-234) detergent into CIP tank. Plug in pump's electric cord and open valve to the feed line.
- 5.40 **Two people are needed for this step.** The person by the Low pH (2.0) detergent drum needs to wear proper P.P.E. (apron, full face shield or full facemask, elbow length, rubber gloves).
- 5.40.1 A strong flashlight is needed to measure drawdown from the drum.
- 5.40.2 A 2.0% solution in 2500gallon of water will be mixed in CIP tank by adding 55 gal of AWC-234.
- 5.41 Second person at CIP control panel, locate the low pH button, and press when person at drum is ready to start measuring draw-down, then stop, when drum person signals to stop.
- 5.42 Allow solution to mix for (5) minutes.
- 5.43 At R.O. unit, open red, 1<sup>st</sup> stage, feed valve labeled V-501 & V-502.
- 5.43.1 Verify 2<sup>nd</sup> stage feed wash valve labeled (V-503) is closed; verify (V-504) 1<sup>st</sup> stage return wash valve is open.
- 5.43.2 Close valves at the end of wash lines under grating, when no more water is coming out.
- 5.43.3 **Close** 2<sup>nd</sup> stage return valve (V-418) at CIP tank.
- 5.43.4 Verify 1<sup>st</sup> stage return valve is open (V-417).

- 5.44 **Slowly** open (slow enough to push any trapped air safely through the membranes) V-415 (1<sup>st</sup> stage feed valve) to ¼ mark, (check pressure at R.O. gauges)
- 5.44.1 **Slowly** close recirculation valve labeled V-405 (pipe above C.F. Vessel at CIP tank).
- 5.44.2 The pressure gauges on the 1<sup>st</sup> and 2<sup>nd</sup> stage CF vessel should be reading approx. **70** psi.
- 5.44.3 Introduce the cleaning solution at low flow rate, between 15-20 gpm per pressure vessel.
- 5.44.3.1 This is to prevent membrane telescoping caused by high differential pressure across the membrane during cleaning.
- 5.44.4 Gradually increase the flow rate of cleaning solution up to 50 gpm per pressure vessel or 1100 gpm, but **maintain the cleaning pressure below 60 psi.**
- 5.45 Allow solution to circulate thru R.O. membranes for 5 minutes and then obtain a sample from the hose, on top of C.F. vessel.
- 5.45.1 Run a pH test on sample to make sure pH is kept in the **2.0 – 3.0** range.
- 5.45.2 If pH is not at proper range, stop circulation and add (HCL) in 1 gallon increments.
- 5.46 Circulate the solution for 1 hour; obtain four samples verify pH range.
- 5.46.1 Then soak for 60 minutes to soak or box-in; require the following steps:
- 5.46.2 Open V-405 CIP tank recirculation valve
- 5.46.3 Slow flow, by slightly closing (V-415) 1<sup>st</sup> stage feed valve.
- 5.46.4 Slowly close V-503 1<sup>st</sup> stage return valve at R.O. unit.
- 5.46.5 Slowly close V-501 & V-502 1<sup>st</sup> stage feed valves at R.O. unit.
- 5.46.6 At CIP tank, slowly close 1<sup>st</sup> stage feed valve labeled V-415.
- 5.46.7 Turn-off CIP Pump at C.I.P control panel.

5.46.7.1 Then, **SLOWLY** open 1<sup>st</sup> and 2<sup>nd</sup> stage return valves at the CIP tank, (V-417, V-418) to release pressure on feed and return lines.

5.47 After 60 minute soak (box-in)

5.47.1 **CLOSE** 1<sup>st</sup> and 2<sup>nd</sup> stage feed and 2<sup>nd</sup> stage return valve labeled (V-415, V-416, and V-418) at CIP tank.

5.47.2 At R.O. unit, **OPEN** 1<sup>st</sup> stage feed valve labeled (V-501 & V-502) and 1<sup>st</sup> stage return valve labeled (V-503).

5.47.3 **VERIFY** recirculation valve at CIP tank (V-405) is open

5.47.4 Start C.I.P pump at control panel.

5.48 Repeat the recirculation and soak process three more times; **slowly** open 1<sup>st</sup> stage feed valve labeled (V-415) and **slowly** close CIP tank recirculation valve labeled (V-405).

5.49 Allow solution to circulate for (5) minutes and then grab a sample from sample hose on top of C.F. vessel.

5.50 Check **pH** reading of sample, the pH should be 3.0 or below.

5.50.1 Then terminate the recirculation and **low pH** cleaning of 1<sup>st</sup> stage pressure vessels.

5.50.2 Open CIP tank recirculation valve labeled (V-405) and close 2<sup>nd</sup> stage feed valve labeled (V-416). Leave CIP pump running.

5.51 Prepare to neutralize solution. Refer to neutralization SOP for these instructions.

5.52 After CIP tank is empty, rinse tank with small amount of permeate water, before filling to rinse R.O. vessels.

5.53 Close CIP tank drain valve labeled (V-402) and begin to fill tank with permeate water.

5.54 Close C.F. vessel drain valve labeled (V-409, V410).

5.55 When CIP tank level reaches 6' to 7' height

5.55.1 open 1<sup>st</sup> and 2<sup>nd</sup> stage feed valve labeled (V-415, V416) to flush out

- 5.55.2 To end of wash lines under grating, any cleaning solution left in wash lines.
- 5.55.3 Close valves at end of wash lines when clear permeate water starts flushing out.
- 5.55.4 Verify 1<sup>st</sup> stage feed valves are closed on R.O. vessels (V-501 & V-502).
- 5.56 Verify 2<sup>nd</sup> stage feed and return valves at R.O. vessel (V-503 & V-504) are open.
- 5.57 Close 1<sup>st</sup> and 2<sup>nd</sup> stage feed valve labeled (V-415, V-416) at CIP tank.
  - 5.57.1 And close 2<sup>nd</sup> stage return valve labeled (V-418) also at CIP tank.
- 5.58 Allow CIP tank to fill, and purge air through valves on top of C.F. vessel (V-407 and V408).
  - 5.58.1 Then turn on CIP pump.
- 5.59 Slowly open 1<sup>st</sup> stage feed valve labeled (V-415) at CIP tank to start flowing, rinse water to R.O. vessels.
  - 5.59.1 Then close CIP tank self-circulate valve labeled (V-405).
- 5.60 Allow circulation 10 to 15 minutes:
  - 5.60.1 Obtain sample from hose atop C.F. vessel, and test pH. If pH is **below 9.0** and **above 5.0**, you are done.
  - 5.60.2 Record pH reading and time on CIP form.
  - 5.60.3 Open CIP circulation valve labeled (V-405) and close 1<sup>st</sup> stage feed valve labeled (V415)
  - 5.60.4 Now you can turn off power to CIP pump.
  - 5.60.5 You are ready to drain the solution from the tank and all pipes including membrane vessels.
- 5.61 Open all valves at CIP tank, drain valve labeled (V-402), C.F. vessel drain valve labeled (V-409& V-410) & C.F. vessel top valve labeled (V-407 and V-408)

- 5.61.1 1<sup>st</sup> and 2<sup>nd</sup> stage feed and return valve labeled (V415, V-416,V-417 and V-418),
- 5.61.2 at R.O. open feed and return valve labeled (V-503, V-504) and 1<sup>st</sup> stage feed valve labeled (V-501 &V-502) too,
- 5.61.3 Open valves at the end of wash lines, under grating.
- 5.61.4 Allow for all liquid to completely drain from tank, wash lines and R.O. vessels.

**7 Instructions Approvals**

<b>Role</b>	<b>Name of Approver</b>	<b>Approval Signature</b>	<b>Date Approved</b>
Work Instruction Writer	Jacob Galvan, W/WW Operator Chief		
Middle Management	Jose A. Garza, Water Treatment Manager		

**8 Revision History**

<b>Effective Date</b>	<b>Revision Number</b>	<b>Final Approver</b>	<b>Description of Change</b>

**9.0 Appendix**