Evaporator System Short-Term Flush and Layup Operation

Tank Farm Plant Operating Procedure

Effluent Treatment Facility

USQ Not Required – ETF is a < Hazard Category 3 Radiological Facility

Table of Contents

1.0 PURPOSE AND SCOPE ........................................................................................................... 3
  1.1 Purpose.................................................................................................................................. 3
  1.2 Scope..................................................................................................................................... 3

2.0 INFORMATION .......................................................................................................................... 3
  2.1 Terms and Definitions............................................................................................................. 3
  2.2 General Information.............................................................................................................. 3

3.0 PRECAUTIONS AND LIMITATIONS .................................................................................. 4
  3.1 Personnel Safety.................................................................................................................... 4
  3.2 Equipment Safety.................................................................................................................. 4
  3.3 Radiation and Contamination Control ............................................................................... 4
  3.4 Environmental Compliance ............................................................................................... 4

4.0 PREREQUISITES ..................................................................................................................... 5
  4.1 Special Tools, Equipment, and Supplies.............................................................................. 5
  4.2 Performance Documents......................................................................................................... 5

5.0 PROCEDURE ............................................................................................................................ 6
5.1 Valve Lineup Determination ................................................................. 6
5.2 Pump Evaporator Concentrate to Concentrate Tanks .......................... 6
5.3 Flush and Layup of Density Meter Instrumentation Line ........................ 9
5.4 Drain Remaining Vapor Body Concentrate to SWRTs via Sump 1 or TOTES ........................................... 11
5.5 Purge Feed Line from SWRTs ............................................................. 12
5.6 Flush Vapor Body, Concentrate Transfer Line, and Instruments ............. 14
5.7 Place Boiler in Wet Layup ................................................................ 20
5.8 EDTA Addition to Evaporator Vapor Body via Feed Line ...................... 21
5.9 Records .......................................................................................... 27

Table 1 – CT Level (%) to Volume (gal) Conversion ...................................... 28
Table 2 – SWRT Level (%) to Volume (gal) Conversion .................................. 29
Table 3 – Evaporator Vapor Body Level (%) to Volume (Gal) Conversion ........ 30
Data Sheet 1– Manual Valve Drain Alignment ............................................ 31
Attachment 1- Total CT and SWRT Available Volume Calculations .................. 32
1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for evaporator short-term flush and layup.

1.2 Scope

This procedure applies to short-term flush and layup that are performed for a shutdown of less than six months.

2.0 INFORMATION

2.1 Terms and Definitions
- CT - Concentrate Tank
- EDTA - Ethylenediaminetetraacetic Acid
- SWRT - Secondary Waste Receiving Tank.

2.2 General Information

2.2.1 When switching from MANUAL to AUTO, control valve setpoints will take on the current process value (i.e., equal to output value) of the controller while the system is in MANUAL. After returning the controller to AUTO, it is necessary to re-enter the normal operating setpoint for AUTO operation.

2.2.2 Dash placement in valve numbers is not consistent and may differ dependent on whether the user is looking at the valve in the field or on the MCS. See approved deviations in TFC-ENG-STD-12, Tank Farm Equipment Identification Numbering and Labeling Standard.
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

**WARNING** Tetra Sodium EDTA may cause eye, skin, and respiratory tract irritation.

3.2 Equipment Safety

**CAUTION** - Thermo stress damage can occur to the evaporator if the evaporator cool-down rate limit exceeds 15°F/hour.

3.3 Radiation and Contamination Control

3.3.1 When this procedure is worked in radiological areas, an approved radiological work permit (RWP) is required. If radiological conditions or work performed falls outside the scope of the RWP, all work activities must be discontinued until a new or revised RWP has been issued in accordance with TFC-ESHQ-RP_RWP-C-03.

3.3.2 When disconnecting, breaching or opening systems or system components that currently contain or previously contained radioactive material, the following actions apply:

- HPT coverage is required
- Pre-job and post-job HPT surveys are required
- Contamination controls shall be implemented in accordance with ETF-02-001, until radiological verifications have been performed.

3.4 Environmental Compliance

3.4.1 In the event of a spill/leak/release, notify the SOM/FWS and respond per ETF-ERP-85B-003, Emergency Spill or Release at ETF.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:

- Hose, 1-inch, with male quick-connect, and union with female NPT connector, 50 feet (minimum)
- Tetra Sodium EDTA (MSDS/SDS #060663)
- Face shield
- Rubber gloves
- Tight-fitting chemical goggles
- Chemical protective apron
- Laboratory coat
- Rubber overshoes.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- ETF-60I-003, Evaporator Systems Operation
- ETF-20B-001, Sump Tank/Pump System Operation
- ETF-95B-001, Seal Water Operation
- ETF-95C-001, Cooling Water System Operation
- TFC-OPS-OPER-C-17, Operating Logbooks.
5.0 PROCEDURE

Special Instructions

Steps may be performed concurrently, in any logical order and repeated.

SOM determines component lineup requirements.

The use of ( ), [ ] represents (SWRT A), [SWRT B].

5.1 Valve Lineup Determination

5.1.1 (SOM) DETERMINE which component lineup Checklists/Data sheets need to be performed.

5.1.2 (SOM) IF components are known to be in the required position and do not require verification, INITIAL/DATE AND DOCUMENT reason in the comments section of the Checklist/Data Sheet.

5.1.3 (SOM) IF components are not in the required position because of an existing process (i.e., LOTO, Caution Tag, Work Package, Administrative Lock, Facility Tag or Status Seals), MARK N/A on the Checklist/Data Sheet AND INITIAL/DATE AND DOCUMENT reason in the comments section of the Checklist/Data Sheet.

5.2 Pump Evaporator Concentrate to Concentrate Tanks

5.2.1 On graphic Evap, ENSURE evaporator SHUTDOWN.

NOTE - Boiler can be left in RUN if evaporator system is expected to be restarted in short time. SOM will make determination on boiler status.

5.2.2 On Attachment 1, CALCULATE total available CT volume as follows:

5.2.2.1 On graphic Conc, OBTAIN (LT60J001A, CT A) [LT60J001B, CT B] current liquid level.

5.2.2.2 CONVERT, per Table 1, CT A and CT B Levels from (%) to gallons AND RECORD as CT current volume.

5.2.2.3 PERFORM individual and total available CT volume calculations.

5.2.3 REFER to Table 3 for vapor body level (%) conversion to volume (gal).
Evaporator System Short-Term Flush and Layup Operation

5.2 Pump Evaporator Concentrate to Concentrate Tanks (Cont.)

5.2.4 IF total CT available volume is less than 3,500 gallons, REQUEST approval from SOM to transfer vapor body contents to CTs.

5.2.5 On graphic Conc, ENSURE one CT (60J-TK-1A) or [60J-TK-1B] in RECEIVING and the other in READY or SHUTDOWN.

5.2.6 PLACE PCV109 (PIC-60I109A) in MANUAL at 100% OPEN.

5.2.7 ENSURE seal water and cooling water systems are in OPERATION.

5.2.8 ENSURE seal water and cooling water are aligned AND VALVED for 60I-P-2 and 60I-P-4:

<table>
<thead>
<tr>
<th>60I-P-2</th>
<th>95B-040</th>
<th>95B-042</th>
<th>95B-056</th>
<th>60I-264</th>
<th>FIC-60I-805: Throttle to 140-160 gph</th>
</tr>
</thead>
<tbody>
<tr>
<td>60I-P-4</td>
<td>95B-081</td>
<td>95B-084 50% Open</td>
<td>95B-112</td>
<td>60I-277</td>
<td>60I-278</td>
</tr>
</tbody>
</table>

5.2.9 ENSURE seal water pressure in in range, P1-95B-004 (10 - 25 psig) / P1-95B-015 (21 - 35 psig).

NOTE - Evaporator concentrate pumping is typically performed with 60I-P-2 and 60I-P-4; however, some circumstances, such as leaking evaporator heat exchanger, would require running only 60I-P-4.

5.2.10 PLACE P2 (60I-P-2), recirculation pump, in MANUAL/START, unless otherwise directed by Engineering/SOM.

5.2.11 ENSURE P-4 (60I-P-4) is valved per ETF-60I-003.

5.2.12 PLACE P4 (60I-P-4), concentrate transfer pump, in MANUAL/START.

5.2.13 PLACE V108 (AOV60I108), concentrate dump valve, in MANUAL/OPEN.

5.2.14 LOCALLY CLOSE 60I-179, concentrate transfer recirculation line block valve.

5.2.15 CHECK LIC-60I107, vapor body level, lowering.

5.2.16 On graphic Conc, CHECK RECEIVING CT (LT60J001A) [LT60J001B], level rising.
5.2 Pump Evaporator Concentrate to Concentrate Tanks (Cont.)

5.2.17 **ENSURE** the following conditions during this operation:
- Concentrate tank temperature does not exceed 176°F.
- Evaporator body temperature does not cool at a rate greater than 15°F/hr.

5.2.18 **IF** concentrate tank temperature exceeds 125°F, **ISOLATE** tank area with yellow caution tape until temperature drops below 125°F.

5.2.19 **MONITOR** TT-60I111, vapor body temperature for evaporator cool down rate.

5.2.20 **OPEN** valve 60I-179 prior to closing V108 AOV-60I108.

5.2.21 **CYCLE** V108 (AOV60I108), concentrate dump valve, CLOSED/OPEN, and valve 60I-179 OPEN/CLOSED to keep cool down rate less than or equal to 15°F/hr.

**NOTE** - Pump cavitation is detected by noisy operation (clanging or gravel sounds in pump).

5.2.22 **IF** 60I-P-2 is operated and pump cavitates, **PLACE** P2 (60I-P-2) to STOP.

5.2.23 **WHEN** LIC-60I107 indicates 10%, **LOCALLY CHECK** 60I-P-2 shuts down, if previously running.

5.2.24 **IF** 60I-P-4 pump cavitates, **PLACE** P2 (60I-P-2) to STOP.

5.2.25 **WHEN** PAL 60I123, recirc pump discharge pressure annunciates, **ENSURE** P4 (60I-P-4), concentrate transfer pump, OFF.

5.2.26 **LOCALLY OPEN** 60I-179.

5.2.27 **CLOSE** V108 (AOV60I108), concentrate dump valve.
5.3 Flush and Layup of Density Meter Instrumentation Line

NOTE - Density meter loop flushing should be performed soon after the evaporator shutdown while the contents of distillate flash tank are still warm for more effective flushing.

5.3.1 ENSURE distillate flash tank level LIC-601108 is at 40% or more.

5.3.2 CONFIRM the following valves are CLOSED:
- V494 (AOV-60I-194)
- V105 (AOV-60I-105)
- V106 (AOV-60I-106)
- V161 (AOV-60I-161)
- V162 (AOV-60I-162)
- V163 (AOV-60I-163)
- V164 (AOV-60I-164).

5.3.3 CONFIRM the following valves are CLOSED:
- 60I-181
- 60I-343.

5.3.4 ENSURE the following valves are OPEN:
- 60I-178
- 60I-338
- 60I-342.

5.3.5 PLACE P3 (60I-P-3) in MANUAL/START.

5.3.6 OPEN 60I-339 for one minute AND CONFIRM PI-60I-314 reads 18 to 24 psig.

5.3.7 CLOSE 60I-178.

5.3.8 OPEN 60I-181 for one minute.

5.3.9 CLOSE 60I-181.

5.3.10 CLOSE 60I-339.

5.3.11 PLACE P3 (60I-P-3) to STOP.
5.3 Flush and Layup of Density Meter Instrumentation Line (Cont.)

5.3.12 IF density meter line is to be drained, PERFORM the following:

5.3.12.1 ENSURE the following valves CLOSED:
- 60I-329
- 60I-183
- 60I-178
- 60I-181
- 60I-339.

5.3.12.2 REMOVE vent camlock cap on 60I-344.

5.3.12.3 OPEN the following valves:
- 60I-343
- 60I-328
- 60I-341
- 60I-344
- 60I-342.

5.3.12.4 WHEN draining is complete, CLOSE the following valves:
- 60I-341
- 60I-342
- 60I-343
- 60I-344
- 60I-328.

5.3.12.5 PLACE vent camlock cap back on 60I-344.
5.4 Drain Remaining Vapor Body Concentrate to SWRTs via Sump 1 or TOTES

5.4.1 On graphic SWRT, ENSURE one SWRT (60I-TK-1A) or [60I-TK-1B] is in RECEIVING and the other is in READY or SHUTDOWN.

5.4.2 On graphic Sump, ENSURE V042 (AOV20B042), Sump 1 transfer valve to SWRT, OPEN.

5.4.3 ENSURE V041 (AOV20B041), Sump 1 transfer valve to surge tank, CLOSED.

5.4.4 IF pumping Sump 1 to TOTES, MONITOR Sump 1 Level (LT20B001) AND SECURE draining as needed at step 5.4.6.

5.4.5 LOCALLY OPEN evaporator system drain valves to Sump 1 as follows:
- 60I-183
- 60I-328
- 60I-301
- 60I-302
- 60I-182.

NOTE - A stable Sump 1 level indicates the evaporator drainage is complete.

5.4.6 WHEN Sump 1 level stabilizes as indicated on LT20B001, CLOSE the following valves:
- 60I-183
- 60I-328
- 60I-301
- 60I-302
- 60I-182.

5.4.7 FLUSH evaporator drain line per ETF-60I-004, if directed by SOM.

5.4.8 FLUSH concentrate transfer line drain per ETF-60I-004, if directed by SOM.

5.4.9 REPEAT Steps 5.4.5 through 5.4.6, if directed by SOM.
5.5 Purge Feed Line from SWRTs

5.5.1 On graphic SWRT, **CONFIRM** both SWRTs (60I-TK-1A and 60I-TK-B) are in SHUTDOWN.

5.5.2 **LOCALLY ENSURE** 60I-076 CLOSED.

**NOTE** - 95D-007 is at west end of wall between SWRT and evaporator.
- Hose connection will be determined by SOM and Engineering concurrence.

5.5.3 **CONNECT** hose between 95D-007, raw water source valve, and pipe stub at 60I-076.

5.5.4 **PLACE** LCV107 (LIC60I107) in MANUAL 100% OPEN.

5.5.5 On graphic SWRT, **PLACE** V017 (AOV60I017), SWRT “A” evap feed valve, in MANUAL/OPEN.

5.5.6 **LOCALLY OPEN** 95D-007.

5.5.7 **LOCALLY OPEN** 60I-076 AND

**WAIT** two minutes.
5.5 Purge Feed Line from SWRTs (Cont.)

5.5.8 **LOCALLY CLOSE 60I-157 AND**

**WAIT** two minutes.

5.5.9 **OPEN 60I-157.**

5.5.10 On graphic SWRT, **PLACE** V017 (AOV60I017), SWRT “A” evap feed valve, in AUTO.

5.5.11 On graphic SWRT, **CONFIRM** V017 (AOV60I017) CLOSED.

5.5.12 On graphic SWRT, **PLACE** V016 (AOV60I016), SWRT “B” evap feed valve, in MANUAL/OPEN.

5.5.13 **LOCALLY CLOSE 60I-157 AND**

**WAIT** two minutes.

5.5.14 **OPEN 60I-157.**

5.5.15 **PLACE** LCV107 LIC-60I107 in AUTO/CLOSED.

5.5.16 **LOCALLY CLOSE 95D-007.**

5.5.17 **LOCALLY CLOSE 60I-076.**

5.5.18 On graphic SWRT, **PLACE** V016 (AOV60I016), SWRT “B” evap feed valve, in AUTO.

5.5.19 On graphic SWRT, **ENSURE** V016 (AOV60I016) CLOSED.

5.5.20 **DISCONNECT** hose at pipe stub near valve 60I-076.
5.6 Flush Vapor Body, Concentrate Transfer Line, and Instruments

NOTE - Flush uses verification water to flush the vapor body, which then drains to Sump 1, and is pumped to the SWRTs.

5.6.1 On Attachment 1, CALCULATE the following:

5.6.1.1 On graphic SWRT, OBTAIN (LT60I001A, SWRT A) [LT60I001B, SWRT B] liquid level.

5.6.1.2 CONVERT per Table 2 AND RECORD as SWRT CURRENT VOL.

5.6.1.3 PERFORM individual and total available SWRT volume calculations.

5.6.2 IF total SWRT available volume is less than 5000 gallons, INFORM SOM flush cannot be continued until adequate space is provided in SWRTs.

5.6.3 On graphic Evap, MONITOR TT60I111, vapor body temperature.
5.6 Flush Vapor Body, Concentrate Transfer Line, and Instruments (Cont.)

NOTE - Step 5.6.4 or 5.6.7 may be used at direction of the SOM to monitor temperature.

- Low Temperature Method or High Temperature Method may be used at direction of the SOM.
- Evaporator vapor body will be filled to 90% (pump P-2 ON) with verification water.

5.6.4 IF directed by SOM, USE Low Temperature Method as follows:

5.6.4.1 WAIT until TT60I111 indication is less than or equal to 100°F AND LOCALLY OPEN 60I-173, verification water to vapor body.

5.6.4.2 WHEN LIC60I107 indicates 78% (77 to 79), LOCALLY CLOSE 60I-173.

5.6.5 ENSURE seal water and cooling water systems are in OPERATION.

5.6.6 ENSURE seal water and cooling water are aligned AND VALVED for 60I-P-2 and 60I-P-4:

<table>
<thead>
<tr>
<th>60I-P-2</th>
<th>95B-040</th>
<th>95B-042</th>
<th>95B-056</th>
<th>60I-264</th>
<th>FIC-60I-805: Throttle to 140-160 gph</th>
</tr>
</thead>
<tbody>
<tr>
<td>60I-P-4</td>
<td>95B-081</td>
<td>95B-084 50% Open</td>
<td>95B-112</td>
<td>60I-277</td>
<td>60I-278</td>
</tr>
</tbody>
</table>

5.6.6.1 PLACE 60I-P-2, recirculation pump, to START.

5.6.6.2 ENSURE the following valves OPEN:
- 60I-182
- 60I-177
- 60I-178.

5.6.6.3 PLACE (60I-P-4), concentrate transfer pump, to START.
5.6 Flush Vapor Body, Concentrate Transfer Line, and Instruments (Cont.)

NOTE - Evaporator body will be filled to 100% (pump P-2 ON) with verification water.

5.6.7 IF directed by SOM, USE High Temperature Method as follows:

5.6.7.1 PLACE PCV109 (PIC60I109A) in MANUAL at 100% OPEN.

5.6.7.2 WHEN vapor body temperature TT-60I111 is less than or equal to 150°F, OPEN 60I-173, verification water valve.

5.6.7.3 WHEN PT-60I123 reaches 3 psig, CLOSE valve 60I-173.

5.6.7.4 WAIT one hour.

5.6.7.5 OPEN valve 60I-173.

5.6.7.6 ENSURE seal water service ON AND VALVED per ETF-95B-001 for pumps 60I-P-2 and 60I-P-4.

5.6.7.7 ENSURE cooling water ON AND VALVED per ETF-95C-001 for P4 (60I-P-4).

5.6.7.8 WHEN LT-60I107, vapor body liquid level, reaches 50%, PLACE 60I-P-2 and 60I-P-4 pumps ON.

5.6.7.9 WHEN LIC60I107 indicates 100% (99 to 100), CLOSE 60I-173, verification water valve.

5.6.8 RECORD SOM direction for method used in ETF Control Room Logbook

5.6.9 WAIT one hour.

5.6.10 OPEN V108 (AOV60I108), concentrate dump valve, AND WAIT one minute.

5.6.11 CLOSE V108 (AOV60I108).

5.6.12 OPEN instrument isolation diaphragm flush valves, one-at-a-time, for one minute each, THEN

CLOSE the following valves:

- 60I-252
- 60I-260
- 60I-256
5.6 Flush Vapor Body, Concentrate Transfer Line, and Instruments (Cont.)

5.6.13 PLACE the following pumps to STOP:
- 60I-P-2
- 60I-P-4.

5.6.14 OPEN V108 (AOV60I108).

5.6.15 WHEN CT level increase stops, WAIT ten minutes AND
CLOSE V108 (AOV60I108).

NOTE - With 60I-183 fully OPEN, the volume of water from evaporator drain could overcome Sump 1 if only one sump pump is running.

5.6.16 DRAIN evaporator system to Sump 1:

5.6.16.1 LOCALLY OPEN drain valves:
- 60I-328
- 60I-301
- 60I-302.

5.6.16.2 THROTTLE open 60I-183.

5.6.16.3 MONITOR Sump 1 level increase.

5.6.16.4 On graphic Sump, PLACE P1A (20BP1A) and P1B (20BP1B) in MANUAL AND
START one or both pumps to control level rise in Sump 1.

5.6.16.5 ADJUST 60I-183 opening to get desired flow to Sump 1.
5.6 Flush Vapor Body, Concentrate Transfer Line, and Instruments (Cont.)

5.6.17 On graphic Evap, SELECT the following valves to MANUAL/OPEN:

<table>
<thead>
<tr>
<th>MCS Graphic</th>
<th>AOV #</th>
<th>DESCRIPTION/LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>V262</td>
<td>AOV60I262</td>
<td>Silencer Drain to Entrain Separator</td>
</tr>
<tr>
<td>V210</td>
<td>AOV60I210</td>
<td>Outlet Silencer Drain</td>
</tr>
<tr>
<td>V194</td>
<td>AOV60I194</td>
<td>Distillate to Vapor Compressor</td>
</tr>
<tr>
<td>V106</td>
<td>AOV60I106</td>
<td>Distillate to SWRTs</td>
</tr>
<tr>
<td>V105</td>
<td>AOV60I105</td>
<td>Distillate to Surge Tank</td>
</tr>
<tr>
<td>V161</td>
<td>AOV60I161</td>
<td>Entrain Separator Mesh Pad Flush</td>
</tr>
<tr>
<td>V162</td>
<td>AOV60I162</td>
<td>Entrain Separator Mesh Pad Flush</td>
</tr>
<tr>
<td>V163</td>
<td>AOV60I163</td>
<td>Entrain Separator Chevron Upper Flush</td>
</tr>
<tr>
<td>V164</td>
<td>AOV60I164</td>
<td>Entrain Separator Chevron Lower Flush</td>
</tr>
</tbody>
</table>

5.6.18 On graphic Evap, SELECT controllers to MANUAL AND SET output to 100%:
- LIC60I108, LCV 108 Distillate Flash Tank Liquid Level
- LIC60I132, LCV 132 Level Control Tank Liquid Level.

5.6.19 CONNECT hose to pipe stub at valve 60I-324 (near P-3 suction) for 60I-TK-02 drainage to Sump 1.

5.6.20 OPEN valves 60I-146 and 60I-324.

5.6.21 WAIT ten minutes or until 60I-TK-02 has drained, On graphic Evap, PLACE the following AOVs in AUTO:

<table>
<thead>
<tr>
<th>MCS Graphic</th>
<th>AOV #</th>
<th>DESCRIPTION/LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>V262</td>
<td>AOV60I262</td>
<td>Silencer Drain to Entrain Separator</td>
</tr>
<tr>
<td>V210</td>
<td>AOV60I210</td>
<td>Outlet Silencer Drain</td>
</tr>
<tr>
<td>V194</td>
<td>AOV60I194</td>
<td>Distillate to Vapor Compressor</td>
</tr>
<tr>
<td>V106</td>
<td>AOV60I106</td>
<td>Distillate to SWRTs</td>
</tr>
<tr>
<td>V105</td>
<td>AOV60I105</td>
<td>Distillate to Surge Tank</td>
</tr>
<tr>
<td>V161</td>
<td>AOV60I161</td>
<td>Entrain Separator Mesh Pad Flush</td>
</tr>
<tr>
<td>V162</td>
<td>AOV60I162</td>
<td>Entrain Separator Mesh Pad Flush</td>
</tr>
<tr>
<td>V163</td>
<td>AOV60I163</td>
<td>Entrain Separator Chevron Upper Flush</td>
</tr>
<tr>
<td>V164</td>
<td>AOV60I164</td>
<td>Entrain Separator Chevron Lower Flush</td>
</tr>
</tbody>
</table>
5.6 Flush Vapor Body, Concentrate Transfer Line, and Instruments (Cont.)

5.6.22 On graphic Evap, PLACE controllers in AUTO:
- LCV108 (LIC60I108), Distillate Flash Tank Liquid Level with setpoint 15
- LCV132 (LIC60I132), Level Control Tank Liquid Level with setpoint 13
- PCV109 (PIC60I109A), Vapor Body High Pressure Controller with setpoint 60.

5.6.23 CLOSE the following drain valves:
- 60I-146
- 60I-324.

5.6.24 CONFIRM manual drain valves per Data Sheet 1– Manual Valve Drain Alignment.

5.6.25 SECURE seal water to the following pumps:
- 60I-P-2
- 60I-P-4
- 60I-P-6.
5.7 Place Boiler in Wet Layup

Special Instructions

SOEs and ITs perform the following steps as indicated.

5.7.1 CLOSE 60I-214, steam isolation valve.

5.7.2 OPEN V-PI60I152-B, boiler ventcock.

NOTE - MOV-60I-261 can be opened/closed using a wrench.

5.7.3 OPEN MOV-60I-261, boiler feed water valve, OPEN.

5.7.4 CLOSE V-PI60I152-B ventcock.

5.7.5 OPEN 60I-214, boiler steam isolation valve.

NOTE - MOV-60I-261 can be opened/closed using a wrench.

5.7.6 WHEN water flows out boiler ventcock V-PI60I152-B, CLOSE MOV-60I-261.
5.8 EDTA Addition to Evaporator Vapor Body via Feed Line

NOTE - Sodium EDTA is added to evaporator vapor body for cleaning of the evaporator system to reduce accumulated solids.

- Control valve PCV60I109 at 100% OPEN provides a vent path for air escape during evaporator system fill.

5.8.1 CONFIRM evaporator is in SHUTDOWN.

5.8.2 SET PCV109 (PIC60I109A) output to MANUAL/100% OPEN.

5.8.3 On TT60I111, IF vapor body temperature is greater than 100°F, THEN On trend EVAP 1, TREND vapor body temperature.

5.8.4 ENSURE evaporator vapor body has been drained to the level requested by process memo.

5.8.5 ENSURE density meter DT-60I-106 is valved in per ETF 60I-003, Data Sheet 3.

5.8.6 PLACE LCV107 (LIC60I107) in MANUAL at 0% CLOSED.

5.8.7 OPEN 60I-173 to add verification water to vapor body until LT-60I107 indicates approximately 27%, or as specified in process memo.

5.8.8 On trend EVAP 1, MONITOR, evaporator vapor body cool-down rate.

CAUTION

Thermo stress damage can occur to the evaporator if the evaporator cool-down rate limit exceeds 15°F/hour.

5.8.9 IF cool-down will exceed 15°F in one hour, THROTTLE 60I-173 to lower cool-down rate.

5.8.10 PLACE PCV109 (PIC60I109A) in AUTO with setpoint of 15.
5.8 EDTA Addition to Evaporator Vapor Body via Feed Line (Cont.)

5.8.11 On graphic SWRT, **ENSURE** P1B (60I-P-1B) pump is OFF.

5.8.12 **ENSURE** P1A (60I-P-1A) is OFF.

5.8.13 **ENSURE** the following valves are OPEN:
- 60I-011, SWRT Feed Pump Discharge Isolation
- 60I-034, SWRT Discharge to Evaporator
- 60I-022, PT-60I-011B Isolation
- 60I-156, Distillate/Feed Heat Exchanger Bypass.

5.8.14 **ENSURE** the following valves are CLOSED:
- 60I-009, SWRT Feed Pump Inlet Isolation
- 60I-041, SWRT-B Pump Flush Connection Isolation
- 60I-021, Chem Add Connection to SWRT-B Pump Discharge
- 60I-067, SWRT Pump Discharge to Sample Sink
- 60I-012, SWRT-B Recirculation Line Isolation
- 60I-006, SWRT to CT Transfer Isolation
- 60I-005, SWRT A and B Discharge Cross Connection.

5.8.15 **PLACE** V016 (AOV60I016), SWRT-B transfer valve, in MANUAL and OPEN.

5.8.16 **PLACE** V017 (AOV60I017), SWRT-A transfer valve, in MANUAL and CLOSED.

5.8.17 On graphic EVAP, **PLACE** LCV107 (LCV60I107) in MANUAL and 100% OPEN.

5.8.18 **STAGE** the following near SWRT:
- Chemical addition tank
- Transfer pump
- Hoses.
5.8 EDTA Addition to Evaporator Vapor Body via Feed Line (Cont.)

NOTE - An HPT needs to be present for Steps 5.8.19 and 5.8.20 to perform contamination survey.

5.8.19 ATTACH transfer hose on the camlock fitting above valve 60I-021 and to one side of the waste transfer pump.

5.8.19.1 (HPT) PERFORM contamination survey.

5.8.20 ATTACH transfer hose to the camlock fitting on the chemical addition tank discharge and to the other side of the waste transfer pump.

5.8.20.1 (HPT) PERFORM contamination survey.

5.8.21 CONFIRM waste transfer pump switch is in the “0” position.

5.8.22 CONFIRM switch on pump electrical outlet is OFF.

NOTE - Pump power plugs are twist-lock plugs. 100-foot extension is available for use if pump cord is too short to reach outlet.

5.8.23 CONNECT power cord of the waste transfer pump to the electrical outlet.

5.8.24 CONNECT power cord of chemical addition tank agitator to closest available 120-volt power outlet.

5.8.25 ADD sanitary water to chemical addition tank until level is about one foot below top of tank.

5.8.26 START chemical addition tank electric agitator.

WARNING
Tetra Sodium EDTA may cause eye, skin, and respiratory tract irritation.

5.8.27 DON the following PPE:
- Rubber gloves
- Tight-fitting chemical goggles
- Chemical protective apron.
5.8 EDTA Addition to Evaporator Vapor Body via Feed Line (Cont.)

5.8.28 ADD 1000-lb Tetra-Sodium EDTA to chemical addition tank, or amount specified by process memo or SOM.

5.8.29 AGITATE chemical addition tank contents for ten minutes or until all solids have dissolved.

5.8.30 OPEN valve V-1 on discharge of chemical tank.

5.8.31 OPEN valve 60I-021.

5.8.32 STOP chemical addition tank electric agitator.

5.8.33 OPEN bypass valve on waste transfer pump head until fluid is seen entering the pump from the waste transfer line.

5.8.34 WHEN fluid is seen at the pump in the hose, CLOSE pump bypass valve on waste transfer pump head.

Special Instructions

Occasionally, the pump will not start when the switch on the outlet is turned ON. This will occur when the flexible impeller becomes bound up in the pump head. Usually the flexible impeller can be freed by reversing the flow direction and “bumping” the pump (i.e., quickly turning the pump on then off).

5.8.35 TURN switch on outlet to ON.

5.8.36 IF pump does not start, TURN switch on outlet to OFF AND PERFORM the following:

5.8.36.1 PLACE waste transfer pump to opposite direction setting to reverse flow.

5.8.36.2 QUICKLY TURN pump ON and OFF (bumping).

5.8.36.3 RETURN to Step 5.8.34.

5.8.37 PLACE waste transfer pump to either “1” or “2” depending on which direction pump is to pump.

5.8.38 WHEN chemical tank is empty, PLACE waste transfer switch to “0.”
5.8 EDTA Addition to Evaporator Vapor Body via Feed Line (Cont.)

5.8.39 CLOSE valve 60I-021.

5.8.40 ADD sanitary water to chemical tank until level is about one foot below top of tank or as directed by SOM.

5.8.41 OPEN 60I-021.

Special Instructions

Occasionally, the pump will not start when the switch on the outlet is turned ON. This will occur when the flexible impeller becomes bound up in the pump head. Usually the flexible impeller can be freed by reversing the flow direction and “bumping” the pump (i.e., quickly turning the pump on then off).

5.8.42 TURN switch on outlet to ON.

5.8.43 IF pump does NOT start, TURN switch on outlet to OFF AND PERFORM the following:

5.8.43.1 PLACE waste transfer pump to opposite direction setting to reverse flow.

5.8.43.2 QUICKLY TURN pump ON and OFF (bumping).

5.8.43.3 RETURN to Step 5.8.41.

5.8.44 PLACE waste transfer pump to either “1” or “2” depending on which direction pump is to pump.

5.8.45 ROTATE pump bypass valve several times from OPEN to CLOSE while flushing pump system to flush bypass line.

5.8.46 LEAVE bypass valve CLOSED.

5.8.47 WHEN chemical tank is empty, PLACE waste transfer switch to “0.”

5.8.48 TURN switch on outlet to OFF.

5.8.49 CLOSE 60I-021.

5.8.50 CLOSE valve V-1 on chemical addition tank discharge line.
5.8 EDTA Addition to Evaporator Vapor Body via Feed Line (Cont.)

5.8.51 **TURN** switch on outlet to OFF.

5.8.52 **DISCONNECT** drum waste pump from electrical outlet.

5.8.53 **DISCONNECT** power cord of chemical addition tank agitator from 120-volt electrical outlet.

**NOTE** - An HPT needs to be present for Steps 5.8.54 through 5.8.57 to perform contamination survey.

5.8.54 **DISCONNECT** hose from camlock connection near valve 60I-021 AND **DRAIN** residual liquid into catch container.

5.8.54.1 (HPT) **PERFORM** contamination survey.

5.8.55 **DISCONNECT** hoses from the waste drum pump, and the chemical tank.

5.8.55.1 (HPT) **PERFORM** contamination survey.

5.8.56 **DRAIN** hoses into a catch container.

5.8.56.1 (HPT) **PERFORM** contamination survey.

5.8.57 **DISPOSE** of residual liquid in Sump 1.

5.8.58 **PLACE** camlock caps on outlet from valve 60I-021, on both inlet and outlet of waste drum pump, and on outlet of chemical addition tank.

5.8.59 **STORE** hose in RMA.

5.8.60 **CLOSE** valve 60I-156.

5.8.61 **OPEN** valves 60I-009 and 60I-012.
5.9 Records

5.9.1 PERFORM the following for records identified within this procedure.

5.9.1.1 RECORD the number of times the record was generated in applicable column

OR

PLACE a check mark (✓) in the N/A column.

5.9.1.2 SUBMIT the package for verification of completed records.

<table>
<thead>
<tr>
<th>Records Submittal Checklist</th>
<th>Number of times completed</th>
<th>N/A (✓)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Sheets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Sheet 1– Manual Valve Drain Alignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FWS/OE/Shift Manager SEND the completed records to the Central Shift Office for records retention.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signature</td>
<td>Print (First &amp; Last)</td>
<td>Date</td>
</tr>
</tbody>
</table>

The record custodian identified in the company-level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.
### Table 1 – CT Level (%) to Volume (gal) Conversion

Tank Contents (gallons) = (LL% x 57.00) + 906

- Ref: Calculation C-1223-003, Rev. 5, p. 19

<table>
<thead>
<tr>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>906</td>
<td>1</td>
<td>963</td>
<td>2</td>
<td>1020</td>
<td>3</td>
<td>1077</td>
</tr>
<tr>
<td>25</td>
<td>2331</td>
<td>26</td>
<td>2388</td>
<td>27</td>
<td>2445</td>
<td>28</td>
<td>2502</td>
</tr>
<tr>
<td>50</td>
<td>3756</td>
<td>51</td>
<td>3813</td>
<td>52</td>
<td>3870</td>
<td>53</td>
<td>3927</td>
</tr>
<tr>
<td>75</td>
<td>5181</td>
<td>76</td>
<td>5238</td>
<td>77</td>
<td>5295</td>
<td>78</td>
<td>5352</td>
</tr>
<tr>
<td>1020</td>
<td>5352</td>
<td>29</td>
<td>2559</td>
<td>54</td>
<td>3984</td>
<td>79</td>
<td>5409</td>
</tr>
<tr>
<td>2331</td>
<td>5466</td>
<td>30</td>
<td>2616</td>
<td>55</td>
<td>4041</td>
<td>80</td>
<td>5523</td>
</tr>
<tr>
<td>3756</td>
<td>5580</td>
<td>31</td>
<td>2673</td>
<td>56</td>
<td>4098</td>
<td>81</td>
<td>5637</td>
</tr>
<tr>
<td>5181</td>
<td>5694</td>
<td>32</td>
<td>2730</td>
<td>57</td>
<td>4155</td>
<td>82</td>
<td>5751</td>
</tr>
<tr>
<td>5580</td>
<td>5751</td>
<td>33</td>
<td>2787</td>
<td>58</td>
<td>4212</td>
<td>83</td>
<td>5808</td>
</tr>
<tr>
<td>5694</td>
<td>5808</td>
<td>34</td>
<td>2844</td>
<td>59</td>
<td>4269</td>
<td>84</td>
<td>5865</td>
</tr>
<tr>
<td>5751</td>
<td>5865</td>
<td>35</td>
<td>2901</td>
<td>60</td>
<td>4326</td>
<td>85</td>
<td>5922</td>
</tr>
<tr>
<td>5808</td>
<td>5922</td>
<td>36</td>
<td>2958</td>
<td>61</td>
<td>4383</td>
<td>86</td>
<td>5979</td>
</tr>
<tr>
<td>5865</td>
<td>5979</td>
<td>37</td>
<td>3015</td>
<td>62</td>
<td>4440</td>
<td>87</td>
<td>6036</td>
</tr>
<tr>
<td>5922</td>
<td>6036</td>
<td>38</td>
<td>3072</td>
<td>63</td>
<td>4497</td>
<td>88</td>
<td>6093</td>
</tr>
<tr>
<td>5979</td>
<td>6093</td>
<td>39</td>
<td>3129</td>
<td>64</td>
<td>4554</td>
<td>89</td>
<td>6150</td>
</tr>
<tr>
<td>6036</td>
<td>6150</td>
<td>40</td>
<td>3186</td>
<td>65</td>
<td>4611</td>
<td>90</td>
<td>6207</td>
</tr>
<tr>
<td>6093</td>
<td>6207</td>
<td>41</td>
<td>3243</td>
<td>66</td>
<td>4668</td>
<td>91</td>
<td>6264</td>
</tr>
<tr>
<td>6150</td>
<td>6264</td>
<td>42</td>
<td>3300</td>
<td>67</td>
<td>4725</td>
<td>92</td>
<td>6321</td>
</tr>
<tr>
<td>6207</td>
<td>6321</td>
<td>43</td>
<td>3357</td>
<td>68</td>
<td>4782</td>
<td>93</td>
<td>6378</td>
</tr>
<tr>
<td>6264</td>
<td>6378</td>
<td>44</td>
<td>3414</td>
<td>69</td>
<td>4839</td>
<td>94</td>
<td>6435</td>
</tr>
<tr>
<td>6321</td>
<td>6435</td>
<td>45</td>
<td>3471</td>
<td>70</td>
<td>4896</td>
<td>95</td>
<td>6492</td>
</tr>
<tr>
<td>6378</td>
<td>6492</td>
<td>46</td>
<td>3528</td>
<td>71</td>
<td>4953</td>
<td>96</td>
<td>6549</td>
</tr>
<tr>
<td>6435</td>
<td>6549</td>
<td>47</td>
<td>3585</td>
<td>72</td>
<td>5010</td>
<td>97</td>
<td>6606</td>
</tr>
<tr>
<td>6492</td>
<td>6606</td>
<td>48</td>
<td>3642</td>
<td>73</td>
<td>5067</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>6549</td>
<td></td>
<td>49</td>
<td>3699</td>
<td>74</td>
<td>5124</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0% level = 3.375" above tangent line at top of tank bottom dish.
100% level = overflow level.
Evaporator System Short-Term Flush and Layup Operation

Table 2 – SWRT Level (%) to Volume (gal) Conversion

Tank Contents (gallons) = (LL% x 174.69) + 2033
Ref: Calculation C-1223-003, Rev. 5, p. 17

<table>
<thead>
<tr>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2,033</td>
<td>25</td>
<td>6,400</td>
<td>50</td>
<td>10,768</td>
<td>75</td>
<td>15,135</td>
</tr>
<tr>
<td>1</td>
<td>2,208</td>
<td>26</td>
<td>6,575</td>
<td>51</td>
<td>10,942</td>
<td>76</td>
<td>15,309</td>
</tr>
<tr>
<td>2</td>
<td>2,382</td>
<td>27</td>
<td>6,750</td>
<td>52</td>
<td>11,117</td>
<td>77</td>
<td>15,484</td>
</tr>
<tr>
<td>3</td>
<td>2,557</td>
<td>28</td>
<td>6,924</td>
<td>53</td>
<td>11,292</td>
<td>78</td>
<td>15,659</td>
</tr>
<tr>
<td>4</td>
<td>2,732</td>
<td>29</td>
<td>7,099</td>
<td>54</td>
<td>11,466</td>
<td>79</td>
<td>15,834</td>
</tr>
<tr>
<td>5</td>
<td>2,906</td>
<td>30</td>
<td>7,274</td>
<td>55</td>
<td>11,641</td>
<td>80</td>
<td>16,008</td>
</tr>
<tr>
<td>6</td>
<td>3,081</td>
<td>31</td>
<td>7,448</td>
<td>56</td>
<td>11,816</td>
<td>81</td>
<td>16,183</td>
</tr>
<tr>
<td>7</td>
<td>3,256</td>
<td>32</td>
<td>7,623</td>
<td>57</td>
<td>11,990</td>
<td>82</td>
<td>16,358</td>
</tr>
<tr>
<td>8</td>
<td>3,431</td>
<td>33</td>
<td>7,798</td>
<td>58</td>
<td>12,165</td>
<td>83</td>
<td>16,532</td>
</tr>
<tr>
<td>9</td>
<td>3,605</td>
<td>34</td>
<td>7,972</td>
<td>59</td>
<td>12,340</td>
<td>84</td>
<td>16,707</td>
</tr>
<tr>
<td>10</td>
<td>3,780</td>
<td>35</td>
<td>8,147</td>
<td>60</td>
<td>12,514</td>
<td>85</td>
<td>16,882</td>
</tr>
<tr>
<td>11</td>
<td>3,955</td>
<td>36</td>
<td>8,322</td>
<td>61</td>
<td>12,689</td>
<td>86</td>
<td>17,056</td>
</tr>
<tr>
<td>12</td>
<td>4,129</td>
<td>37</td>
<td>8,497</td>
<td>62</td>
<td>12,864</td>
<td>87</td>
<td>17,231</td>
</tr>
<tr>
<td>13</td>
<td>4,304</td>
<td>38</td>
<td>8,671</td>
<td>63</td>
<td>13,038</td>
<td>88</td>
<td>17,406</td>
</tr>
<tr>
<td>14</td>
<td>4,479</td>
<td>39</td>
<td>8,846</td>
<td>64</td>
<td>13,213</td>
<td>89</td>
<td>17,580</td>
</tr>
<tr>
<td>15</td>
<td>4,653</td>
<td>40</td>
<td>9,021</td>
<td>65</td>
<td>13,388</td>
<td>90</td>
<td>17,755</td>
</tr>
<tr>
<td>16</td>
<td>4,828</td>
<td>41</td>
<td>9,195</td>
<td>66</td>
<td>13,563</td>
<td>91</td>
<td>17,930</td>
</tr>
<tr>
<td>17</td>
<td>5,003</td>
<td>42</td>
<td>9,370</td>
<td>67</td>
<td>13,737</td>
<td>92</td>
<td>18,104</td>
</tr>
<tr>
<td>18</td>
<td>5,177</td>
<td>43</td>
<td>9,545</td>
<td>68</td>
<td>13,912</td>
<td>93</td>
<td>18,279</td>
</tr>
<tr>
<td>19</td>
<td>5,352</td>
<td>44</td>
<td>9,719</td>
<td>69</td>
<td>14,087</td>
<td>94</td>
<td>18,454</td>
</tr>
<tr>
<td>20</td>
<td>5,527</td>
<td>45</td>
<td>9,894</td>
<td>70</td>
<td>14,261</td>
<td>95</td>
<td>18,629</td>
</tr>
<tr>
<td>21</td>
<td>5,701</td>
<td>46</td>
<td>10,069</td>
<td>71</td>
<td>14,136</td>
<td>96</td>
<td>18,803</td>
</tr>
<tr>
<td>22</td>
<td>5,876</td>
<td>47</td>
<td>10,243</td>
<td>72</td>
<td>14,611</td>
<td>97</td>
<td>18,978</td>
</tr>
<tr>
<td>23</td>
<td>6,051</td>
<td>48</td>
<td>10,418</td>
<td>73</td>
<td>14,785</td>
<td>98</td>
<td>19,153</td>
</tr>
<tr>
<td>24</td>
<td>6,226</td>
<td>49</td>
<td>10,593</td>
<td>74</td>
<td>14,960</td>
<td>99</td>
<td>19,327</td>
</tr>
</tbody>
</table>

0% level = tangent line at top of tank bottom dish
100% level = overflow level
Tank contents are reported as rounded to whole numbers
Table 3 – Evaporator Vapor Body Level (%) to Volume (Gal) Conversion

<table>
<thead>
<tr>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
<th>Liquid Level (%)</th>
<th>Volume (Gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2601</td>
<td>25</td>
<td>3297</td>
<td>50</td>
<td>3969</td>
<td>75</td>
<td>4620</td>
</tr>
<tr>
<td>1</td>
<td>2629</td>
<td>26</td>
<td>3325</td>
<td>51</td>
<td>3995</td>
<td>76</td>
<td>4646</td>
</tr>
<tr>
<td>2</td>
<td>2657</td>
<td>27</td>
<td>3353</td>
<td>52</td>
<td>4021</td>
<td>77</td>
<td>4672</td>
</tr>
<tr>
<td>3</td>
<td>2684</td>
<td>28</td>
<td>3381</td>
<td>53</td>
<td>4047</td>
<td>78</td>
<td>4698</td>
</tr>
<tr>
<td>4</td>
<td>2712</td>
<td>29</td>
<td>3409</td>
<td>54</td>
<td>4073</td>
<td>79</td>
<td>4724</td>
</tr>
<tr>
<td>5</td>
<td>2740</td>
<td>30</td>
<td>3437</td>
<td>55</td>
<td>4099</td>
<td>80</td>
<td>4750</td>
</tr>
<tr>
<td>6</td>
<td>2768</td>
<td>31</td>
<td>3465</td>
<td>56</td>
<td>4125</td>
<td>81</td>
<td>4776</td>
</tr>
<tr>
<td>7</td>
<td>2796</td>
<td>32</td>
<td>3492</td>
<td>57</td>
<td>4151</td>
<td>82</td>
<td>4802</td>
</tr>
<tr>
<td>8</td>
<td>2824</td>
<td>33</td>
<td>3520</td>
<td>58</td>
<td>4177</td>
<td>83</td>
<td>4828</td>
</tr>
<tr>
<td>9</td>
<td>2852</td>
<td>34</td>
<td>3548</td>
<td>59</td>
<td>4203</td>
<td>84</td>
<td>4854</td>
</tr>
<tr>
<td>10</td>
<td>2880</td>
<td>35</td>
<td>3576</td>
<td>60</td>
<td>4229</td>
<td>85</td>
<td>4880</td>
</tr>
<tr>
<td>11</td>
<td>2907</td>
<td>36</td>
<td>3604</td>
<td>61</td>
<td>4255</td>
<td>86</td>
<td>4907</td>
</tr>
<tr>
<td>12</td>
<td>2935</td>
<td>37</td>
<td>3630</td>
<td>62</td>
<td>4281</td>
<td>87</td>
<td>4933</td>
</tr>
<tr>
<td>13</td>
<td>2963</td>
<td>38</td>
<td>3656</td>
<td>63</td>
<td>4307</td>
<td>88</td>
<td>4959</td>
</tr>
<tr>
<td>14</td>
<td>2991</td>
<td>39</td>
<td>3682</td>
<td>64</td>
<td>4333</td>
<td>89</td>
<td>4985</td>
</tr>
<tr>
<td>15</td>
<td>3019</td>
<td>40</td>
<td>3708</td>
<td>65</td>
<td>4359</td>
<td>90</td>
<td>5011</td>
</tr>
<tr>
<td>16</td>
<td>3047</td>
<td>41</td>
<td>3734</td>
<td>66</td>
<td>4386</td>
<td>91</td>
<td>5037</td>
</tr>
<tr>
<td>17</td>
<td>3075</td>
<td>42</td>
<td>3760</td>
<td>67</td>
<td>4412</td>
<td>92</td>
<td>5063</td>
</tr>
<tr>
<td>18</td>
<td>3102</td>
<td>43</td>
<td>3786</td>
<td>68</td>
<td>4438</td>
<td>93</td>
<td>5089</td>
</tr>
<tr>
<td>19</td>
<td>3130</td>
<td>44</td>
<td>3812</td>
<td>69</td>
<td>4464</td>
<td>94</td>
<td>5115</td>
</tr>
<tr>
<td>20</td>
<td>3158</td>
<td>45</td>
<td>3838</td>
<td>70</td>
<td>4490</td>
<td>95</td>
<td>5141</td>
</tr>
<tr>
<td>21</td>
<td>3186</td>
<td>46</td>
<td>3865</td>
<td>71</td>
<td>4516</td>
<td>96</td>
<td>5167</td>
</tr>
<tr>
<td>22</td>
<td>3214</td>
<td>47</td>
<td>3891</td>
<td>72</td>
<td>4542</td>
<td>97</td>
<td>5193</td>
</tr>
<tr>
<td>23</td>
<td>3242</td>
<td>48</td>
<td>3917</td>
<td>73</td>
<td>4568</td>
<td>98</td>
<td>5219</td>
</tr>
<tr>
<td>24</td>
<td>3270</td>
<td>49</td>
<td>3943</td>
<td>74</td>
<td>4594</td>
<td>99</td>
<td>5245</td>
</tr>
</tbody>
</table>

Note:
Volume includes brine holdup in heater 601-E-01 (383 gal) and recirculation piping (408 gal).
## Data Sheet 1– Manual Valve Drain Alignment

<table>
<thead>
<tr>
<th>Valve Number</th>
<th>Valve Name &amp; Location</th>
<th>Required Position</th>
<th>Initials</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>60I-183</td>
<td>Vapor Body &amp; Piping Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-328</td>
<td>Vapor Body &amp; Piping Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-301</td>
<td>Vapor Body &amp; Piping Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-302</td>
<td>RC Pmp Disch Crosstie to Conc Pmp Suction</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-143</td>
<td>Heater Tube Side Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-142</td>
<td>Heater Shell Side Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-189</td>
<td>Entrain Separator Flush Header Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-285</td>
<td>Instrument Flush Hdr Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-150</td>
<td>Instrument Flush Hdr Supply Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-282</td>
<td>Feed/Distillate Heat Exchange (HX)</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-151</td>
<td>Feed/Distillate HX Tube Side Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-281</td>
<td>Feed/Distillate HX Shell Side Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-283</td>
<td>Feed/Distillate HX Shell Side Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-284</td>
<td>Feed/Distillate HX Shell Side Effluent Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-156</td>
<td>Feed/Distillate HX B/P Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-202</td>
<td>Vapor Compressor Low Point Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60I-317</td>
<td>Vapor Compressor Endplates Drain</td>
<td>OPEN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

____________________ / ______________________ / ______________ / ____________
Signature          Print (First & Last)                   Initials       Date
NCO

____________________ / ______________________ / ______________ / ____________
Signature          Print (First & Last)                   Initials       Date
NCO

____________________ / ______________________ / ______________ / ____________
Print (First & Last) Signature                  Initials       Date
SOM
### Total CT Available Volume Calculations

**Formula:** 6171 gal - Current Volume = Available Volume

\[
\text{CT A current vol} \quad \text{CT A available vol} \\
\text{6171 gal} - \frac{\text{CT A current vol}}{\text{CT A available vol}} = \frac{\text{CT A available vol}}{\text{CT A available vol}} \quad (\text{carry to formula below})
\]

\[
\text{CT B current vol} \quad \text{CT B available vol} \\
\text{6171 gal} - \frac{\text{CT B current vol}}{\text{CT B available vol}} = \frac{\text{CT B available vol}}{\text{CT B available vol}} \quad (\text{carry to formula below})
\]

**Formula:** CT A Available Vol + CT B Available Vol = Total CT Available Volume

\[
\frac{\text{CT A available vol}}{\text{CT B available vol}} + \frac{\text{CT B available vol}}{\text{CT B available vol}} = \frac{\text{Total CT available vol}}{\text{Total CT available vol}}
\]

Where: 6171 = Total volume (gallons) of each CT tank below alarm setpoint
(CT A) [CT B] Current Vol = volume (gallons) presently in each CT tank
Total CT Available Vol = Total volume (gallons) available in both CT Tanks

### Total Available SWRT Volume Calculations

**Formula:** 18279 gal - Current Volume = Available Volume

\[
\text{SWRT A current vol} \quad \text{SWRT A available vol} \\
\text{18279 gal} - \frac{\text{SWRT A current vol}}{\text{SWRT A available vol}} = \frac{\text{SWRT A available vol}}{\text{SWRT A available vol}} \quad (\text{carry to formula below})
\]

\[
\text{SWRT B current vol} \quad \text{SWRT B available vol} \\
\text{18279 gal} - \frac{\text{SWRT B current vol}}{\text{SWRT B available vol}} = \frac{\text{SWRT B available vol}}{\text{SWRT B available vol}} \quad (\text{carry to formula below})
\]

**Formula:** SWRT A Available Vol + SWRT B Available Vol = Total SWRT Available Volume

\[
\frac{\text{SWRT A available vol}}{\text{SWRT B available vol}} + \frac{\text{SWRT B available vol}}{\text{SWRT B available vol}} = \frac{\text{Total SWRT available vol}}{\text{Total SWRT available vol}}
\]