Changes “Other Than Inconsequential” Require These Additional Reviews:

### Radiological Controls

**USQ # EV-18-1428-D, Rev. 0**

<table>
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<tr>
<th>Rev-Mod</th>
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<tr>
<td>H-6</td>
<td>09/10/2018</td>
<td>Changes found in Periodic Review Process</td>
<td>Updated Duty card - Page 8 – The note that reads “If seal water is not restored to P-B1 CA1 vessel…” should read “If seal water is not restored to P-B-1, C-A-1 vessel” Page 8 – In the bold square box that reads “PLACE HV-CA1-10 in CF-PC” the word “in” is obscured by the box line.</td>
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<td>H-5</td>
<td>02/13/2018</td>
<td>Inconsequential Change</td>
<td>Inconsequential change to title of TFC-OPS-OPER-C-24 to “Occurrence Reporting” (Step 3.4.2).</td>
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<td>H-4</td>
<td>01/22/2018</td>
<td>Operations Request</td>
<td>Modified NOTE in Section 3.1 in AOP/ERP to one consistent statement. “Steps in this procedure may be performed simultaneously or in any logical order, depending on situational needs.”</td>
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<tr>
<td>H-3</td>
<td>12/11/2017</td>
<td>Operations Request</td>
<td>Added Step 3.2.1 and 3.2.8 to address recording step completion. Deleted Steps 4.1.1 through 4.1.2.</td>
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<td>H-2</td>
<td>10/10/2017</td>
<td>Operations Request</td>
<td>Added &quot;NOTE – Abnormal Operating Procedures are not designed for, nor intended to be applied to, “expected” alarms generated by approved work activities or procedures.”</td>
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Type: REFERENCE  
Document No.: TF-AOP-EVAP-003  
Rev/Mod: H-6  
Release Date: 09/10/2018  
Page: 1 of 9
1.0 AFFECTED PERSONNEL, FACILITIES, EQUIPMENT, OR AREAS

This procedure applies to WRPS personnel operating the 242-A Evaporator raw water system and components.

NOTE - Abnormal Operating Procedures are not designed for, nor intended to be applied to, "expected" alarms generated by approved work activities or procedures.

2.0 ENTRY CONDITIONS

2.1.1 Initial indication for low raw water pressure upstream and downstream of raw water strainers is activation of the following alarms:
- PI-RW-2 - F-RW-1/2 FILTER UPSTREAM PRESSURE LO {WHITE ALARM}
- PI-RW-1 - F-RW-1/2 FILTER DNSTREAM PRESSURE LO.

2.1.2 During Evaporator operations, the following additional "out of limit parameter alarms" may be activated depending on plant configuration:
- FI-CA1-1 - P-B-1 Seal Water Flow Low
- PI-CA1-9 - P-B-1 Seal Water Pressure Low
- FI-CA1-2 - P-B-2 Seal Water Flow Low
- PI-CA1-10 - P-B-2 Seal Water Pressure Low
- ZS-EA1-1 - Reboiler 10lb Steam Valve Closed
- PSH-CA1-11 - Evap Vacuum 0-30 In Hg
- PI-CA1-11 - Evap Torr 200-0.

2.1.3 A loss of the raw water for the Evaporator can occur due to:
- Loss of 200 Area powerhouse raw water system
- Rupture of raw water supply line
- Inadvertent closure of raw water block and/or control valves (operating error).

2.1.4 A loss of raw water can be initiated by the following events:
- Loss of electrical power, affecting raw water supply pumps at the powerhouse
- Ruptures and failure of raw water valves
- Inadvertent isolation of raw water lines (valve closures)
- Natural emergencies: seismic events, high winds, tornado, etc.
- Vehicle accidents (damaging raw water lines).
3.0 ACTIONS

NOTE - This is a guide to assist the operator and Shift Manager in placing the facility in a safe configuration.

- Steps in this procedure may be performed simultaneously or in any logical order, depending on situational needs.

- The attached Duty Card is to be completed by the A-1 operator. The Shift Manager has the responsibility to follow and complete all procedural steps. Not all procedural step are included in the duty card.

3.1 Automatic Actions

NOTE - If the source of seal water to P-B-1 and P-B-2 pumps is process condensate, then the operation of these pumps may not be immediately affected. If the source of seal water to P-B-1 and P-B-2 pumps is the filtered raw water supply, these pumps will probably shut down. If C-A-1 vessel is full and seal water cannot be maintained to P-B-1, then the vessel should be dumped as soon as it is safe to do so.

- Low raw water pressure and equipment failure alarms are followed almost immediately by numerous process related "out of limit" parameter alarms (e.g., levels, temperature, flow, pressure). The majority of these alarms activate simultaneously, indicating an Evaporator process shutdown, and possibly a process upset.

- When raw water pressure decreases to 60 psig alarms PI-RW-1 and PI-RW-2 activate.

NOTE - If seal water flow/pressure to recirculation pump P-B-1 decreases to a preset value alarms FI-CA1-1 and PI-CA1-9 activate on Graphic Screen 12.

3.1.1 If seal water pumps P-C-105 and/or P-C-105A are in use and receiving low pressure and/or low flow alarms, seal water pumps P-C-105 and P-C-105A shut down after a 4 minute timer times out.

NOTE - Loss of P-B-1 activates the following shutdown interlocks:
- Reboiler steam supply valve FV-EA1-1 CLOSES
- Reboiler steam chest air supply valve HV-EA1-3 OPENS to supply 18 psig process air to reboiler steam chest
- Eight minute timer KY-PB1-1 activates. If allowed to time out, interlocks initiate vessel dump and flush process. However, without raw water, there is no flushing. Thus, flushing shall be performed per a recovery plan.

3.1.2 If utilizing filtered raw water (FRW), recirculation pump P-B-1 shuts down.
3.1 Automatic Actions (Cont.)

NOTE - No raw water flushing will occur, when valves HV-CA1-7 and HV-CA1-9 open but if draining the vessel is necessary a controlled dump should be performed to prevent over pressurization of 241-AW-102.

- Draining activates the following alarms on Graphic Screen 10:
  - LIC-CA1-1 and LIC-CA1-2 activates when vessel level decreases to 23,500 gallons (LO LEVEL), YELLOW ALARM
  - LIC-CA1-1 and LIC-CA1-2 activates when vessel level decreases to 23,000 gallons (LO, LO LEVEL), RED ALARM.

3.1.3 If allowed to time out timer KY-PB1-1 activates the following actions eight minutes after recirculation pump P-B-1 shuts down.
  - Vacuum breaker HV-EC1-1 OPENS
  - Vessel drain valves HV-CA1-7 and HV-CA1-9 OPEN allowing vessel to drain back to 241-AW-102
  - Approximately 255 seconds after timer KY-PB1-1 opens vacuum breaker HV-EC1-1, steam ejector steam supply valve HV-EC2/3-1 will CLOSE.

NOTE - If seal water flow/pressure to slurry pump P-B-2 decreases to a preset value alarms FI-CA1-2 and PI-CA1-10 activate on Graphic Screen 15.

- Loss of P-B-2 may activate an eight minute flush timer KY-CA1-2, if the “SLURRY LO FLOW” alarm is received.

3.1.4 If utilizing filtered raw water (FRW), slurry pump P-B-2 shuts down.

3.1.5 Low raw water flow through the primary, inter and after condenser results in a loss of evaporator vessel vacuum and produces the following alarms on Graphic Screen 10:
  - PI-CA1-11 activates when evaporator vessel vacuum [G10] decreases to 20.0 inches Hg.
  - PIC-CA1-7 (Yellow) activates when evaporator vessel torr increases to 100 torr.
  - PSH-CA1-11 activates when evaporator pressure reaches 18.0 inches Hg.
  - PIC-CA1-7 (Red) activates when evaporator vessel torr increases to 170 torr.

3.1.6 Evaporator feed from 241-AW Farm is isolated by an interlock that CLOSES valve HV-CA1-1 if the P-B-1 interlock is allowed to timeout.
3.1 Automatic Actions (Cont.)

3.1.7 Other equipment and systems affected by loss of raw water are:

- Steam condensate sample cooler loses raw water, thus sampling can be affected.

3.2 Initial Actions

NOTE - This plan provides guidance for personnel protective actions, notifications, 242-A process operations shutdown, and recovery actions.

- Response actions in this procedure are provided on a laminated duty card (Attachment 1 – Loss of Raw Water Duty Card) located in 242-A Control Room. The duty card summarizes response actions as a checklist to aid operators in ensuring all actions are performed to place facility in a safe shutdown condition.

242-A Shift Manager

3.2.1 WHEN performing Step 3.2.2, WRITE time of step completion on the laminated Duty Card AND RECORD time of step completion in the A-1 or Shift Manager logbook.

3.2.2 ENSURE Control Room operator performs required actions per Attachment 1 – Loss of Raw Water Duty Card.

3.2.3 DIRECT non-essential personnel to leave (not evacuate) the facility.

3.2.4 RESTRICT entry into facility.

NOTE - Temperature differential between 241-AW-102 waste and slurry being dumped from evaporator may result in over pressurization of 241-AW-102 and, possibly a radioactive material release to atmosphere.

3.2.5 NOTIFY Tank Farms Shift Manager.

3.2.6 IF raw water system failed upstream of Water Service Building, and TROUBLE ALARM is activated on Fire System, INITIATE an hourly fire watch for the facility.
3.2 Initial Actions

3.2.7 NOTIFY Effluent Treatment Facility (ETF) Control Room (373-9000) of status changes in any of the following:
- Steam condensate system (stop/restart)
- Steam condensate monitoring
- Used cooling water
- Process condensate.

Control Room Operator

3.2.8 WHEN performing Step 3.2.9, WRITE time of step completion on the laminated Duty Card AND RECORD time of step completion in the A-1 or Shift Manager logbook.

3.2.9 PERFORM actions per Attachment 1 – Loss of Raw Water Duty Card.

3.3 Follow-on Actions

3.3.1 ENSURE process air is being supplied to reboiler at 28 to 35 psia, via pressure indicator PI-EA1-1 [G13].

NOTE - Once condensate drain valve HV-EA1-4 is closed, it takes approximately 15 to 20 minutes for air pressure in reboiler to reach approximately 15 psig per Pressure Indicator PI-EA1-11 [G13].

3.3.2 IF reboiler pressure is not approximately 15 psig after 15 to 20 minutes ENSURE FV-EA1-1 [G13] has “STM OFF” status indication via MCS and HV-EA1-4 (G14/9, F30/0) Steam Condensate Block Valve is CLOSED.

NOTE - PI-EA1-7 is located next to condensate tank TK-C-100.

3.3.3 IF PI-EA1-11 [G13] pressure indication on MCS is less than 15 psig, DIRECT an operator to locally check air pressure indication on PI-EA1-7 is at least 15 psig.

3.3.3.1 IF PI-EA1-7 local indication is less than 15 psig, OBTAIN Maintenance and Operations Management assistance.

3.3.4 ENSURE PC recycle is on for seal water.

3.3.4.1 IF C-A-1 vessel is full AND IF seal water cannot be maintained to P-B-1, DUMP the vessel as soon as it is safe to do so.
3.3 Follow-on Actions

3.3.5 IF C-A-1 vessel is full, ENSURE P-B-1 is running.

3.3.6 IF process system is in operation, ENSURE proper shutdown configuration per TO-600-060.

3.4 Administrative Actions

NOTE - Actual steps taken for restoration are dependent on specific situation and facility configuration at the time of event. The following steps are general guidance and may be performed concurrently, in any order or omitted at discretion of Shift Manager to fit situation.

3.4.1 ENSURE that the CSM is notified of AOP entry AND REQUEST CSM to make notifications per TFC-OPS-OPER-C-57.

3.4.2 EVALUATE conditions per TFC-OPS-OPER-C-24, Occurrence Reporting.

3.4.3 REQUEST Shift Manager to evaluate the need to notify Environmental per TF-REC-001 and TFC-ESHQ-ENV_FS-C-01.

3.4.4 INITIATE repairs or work requests to systems that may have caused unexpected condition.

4.0 EXIT CRITERIA

4.1 Termination/Exit Criteria

Raw water system returned to normal operation.

4.1.1 RETURN raw water system to normal shutdown operation per TO-600-130, “Operate 242-A-81 Raw Water Strainer System.”

4.1.2 ENSURE process system is in proper shutdown configuration per TO-600-060.

4.1.3 IF fire system raw water supply was lost and is returned, SUSPEND hourly fire watch per direction of Shift Manager once Hanford Fire Department has certified sprinkler system is operational.

5.0 RECORDS

No records are generated during the performance of this procedure.
Response to 242-A Evaporator Loss of Raw Water System

Attachment 1 – Loss of Raw Water Duty Card

ALARMS
PI-RW-1 LO PRESS
PI-RW-2 LO PRESS

TROUBLESHOOT raw water supply in Service building AND IF possible correct problem.

Unable to correct problem?

Terminate use of this procedure.

IF necessary, CONTACT Export Water Services AND REQUEST additional raw water pump started.

Perform Personnel Protective actions

DIRECT non-essential personnel to leave the evaporator.

RESTRICT entry into facility.

NOTIFY 242-A and Tank Farms Shift Managers of event.

- NOTE -
Heavy line weight box indicates compressed air required to perform action.

- NOTE -
If seal water is not restored to P-B-1, CA1 vessel will have to be dumped.

ENSURE pump P-C-106 is running.

PLACE HV-CA1-10 in CF-PC.

ENSURE Pumps PC-105 and PC-105A are SHUT DOWN.

G-12
HV-CA1-10 in CF-PC

Yes

No

A

B

No

Yes

HV-CA1-10 in CF-PC

H-VCA1-10 in CF-PC

Yes

No