Response to 242-A Evaporator Loss of Electrical Power

Changes “Other Than Inconsequential” Require These Additional Reviews:

| Designated IH Program Manager | Radiological Controls Lee Livesey’s Organization |

USQ # EV-19-0107-S, Rev. 0

<table>
<thead>
<tr>
<th>CHANGE HISTORY (≤ LAST 5 REV-MODS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rev-Mod</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>G-10</td>
</tr>
<tr>
<td>G-9</td>
</tr>
<tr>
<td>G-8</td>
</tr>
<tr>
<td>G-7</td>
</tr>
<tr>
<td>G-6</td>
</tr>
</tbody>
</table>

Table of Contents

| 1.0 | Affected Personnel, Facilities, Equipment, or Areas | 2 |
| 2.0 | Entry Conditions | 2 |
| 3.0 | Actions | 3 |
| 3.1 | Automatic Actions | 4 |
| 3.2 | Immediate Actions | 6 |
| 3.3 | Follow-on Actions | 7 |
| 3.4 | Administrative Actions | 8 |
| 4.0 | EXIT CRITERIA | 8 |
| 4.1 | Exit Actions/Criteria | 8 |
| 5.0 | Records | 9 |
| Attachment 1 – Loss of Electrical System Duty Card | 10 |
1.0 AFFECTED PERSONNEL, FACILITIES, EQUIPMENT, OR AREAS

This procedure applies to WRPS personnel operating the 242-A Evaporator.

2.0 ENTRY CONDITIONS

**Special Instructions** – Performing the actions of this AOP will place personnel and the facility in a safe condition. Entry into additional evaporator AOP’s for systems’ that are affected by the loss of power is not required, unless directed by the evaporator Shift Manager.

2.1.1 Unplanned loss of normal electrical power to 242-A Evaporator as indicated by any or all of the following:

**Indication for a loss of BPA power**
- Loss of normal building lighting
- Loss of normal building ventilation systems
- Activation of backup emergency lighting
- Activation of numerous operating alarms, due to failure of electrical components.
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.

- Per DOE-0359, an Electrical Risk Assessment (ERA) is not required for DC circuits; single-phase circuits; or three phase circuits rated less than 240 volts and supplied by transformers (or equivalent), or generator, rated at less than 125 kVA. The electrical components used in this procedure have been evaluated and fall within this exception.
3.1 Automatic Actions

3.1.1 The following equipment starts up automatically:

- Emergency lights (battery powered).

3.1.2 The following equipment shuts down (stops) due to loss of power:

NOTE - Seal water supply to P-B-1 is reduced due to loss of seal water pumps P-C-105, P-C-105A, or P-C-106.

- P-B-1 recirculation pump

NOTE - Seal water supply to P-B-2 is reduced due to loss of seal water pumps P-C-105, P-C-105A, or P-C-106.

- P-B-2 slurry pump
- 241-AW-P-102-1 feed and blend pump (AW Farm)
- Vessel Ventilation Exhauster EX-C-1
- K1 supply fan K1-5-1 and exhaust fan K1-5-3
- K2 supply fan K2-5-1 and exhaust fans K2-5-2 and K2-5-3
- ACU-2
- P-C-100 condensate pump
- Anti-foam pumps and agitators
- Raw water strainer motors
- Building heating system

NOTE - Reduction of seal water may produce the following alarms (Raw water line pressure to P-B-1 may be enough to prevent a low flow or low pressure condition):

- Low seal water flow FI-CA1-1 on Graphic Screen 12 for P-B-1 pump
- Low seal water pressure PI-CA1-9 on Graphic Screen 12 for P-B-1 pump
- Low seal water flow FI-CA1-2 on Graphic Screen 15 for P-B-2 pump
- Low seal water pressure PI-CA1-10 on Graphic Screen 15 for P-B-2 pump.
- Line pressure from FRW is available until P-C-105 and P-C-105A are valved in, and power restored.

- Seal water pumps P-C-105, P-C-105A and P-C-106.
3.1 Automatic Actions (Cont.)

3.1.3 The following valves fail in the positions described as follows:

NOTE - Closure of valve FV-EA1-1 will result in the following alarms:
- ZS-EA1-1 (FV-EA1-1 in closed position)
- PSL-EA1-1 (reboiler 10-lb steam pressure low)
- FIC-EA1-1 (reboiler steam flow low).
- Valve FV-EA1-1 fails CLOSED isolating 10-pound steam supply to reboiler
- Valve HV-EA1-5, 10 lb. Steam Isolation Valve fails CLOSED.

NOTE - Feed control valve HV-CA1-1 is interlocked to close whenever Feed Pump is off.
- Feed control valve HV-CA1-1 fails OPEN due to loss of pneumatic control

NOTE - Vessel dump activates low level alarms on LIC-CA1-1 or LIC-CA1-2 on Graphic Screen 10.
- Dump valves HV-CA1-7 and HV-CA1-9 fail OPEN, allowing vessel to drain to 241-AW-102 feed tank
- Slurry outlet valves HV-CA1-2 and HV-CA1-2A fail in the "Farm Flush Positions," allowing raw water to enter the line
- Raw water supply valve HV-CA1-8, fails CLOSED (for flushing vessel and recirculation lines)
- Valve HV-CA1-10 will divert to CF-FRW
- Seal water pumps P-C-105 and P-C-105A are valved out (or fail as-is)

NOTE - Failure of the Evaporator vessel vacuum system produces alarm PIC-CA1-7 (Yellow) when torr reaches 100 torr
  PIC-CA1-7 (Red) when torr reaches 170 torr
  PI-CA1-11 when vacuum decreases to 20 inches Hg, and
  PSH-CA111 when vessel pressure reaches 18 inches Hg.
- Valve HV-EC2/3-1 fails CLOSED isolating 1st and 2nd stage steam ejectors
- Vacuum breaker HV-EC1-1 fails OPEN
- Vacuum breaker HV-EC5-1 fails OPEN.
3.2 Immediate Actions

**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 listed on Attachment 1 – Loss of Electrical System Duty Card.

3.2.3 **ENSURE** all personnel secure and leave radiological areas and adjacent areas (HVAC, Survey Room, AMU Room).

3.2.4 **ENSURE** all doors to contaminated areas are shut.

3.2.5 **ENSURE** Central Shift Manager and if applicable 241-AW Farm operator are notified of 242-A loss-of-electrical status so they can prepare for an uncontrolled vessel dump to 241-AW-102 which may result in over pressurization of the tank.

3.2.6 **ENSURE** the EV Area Dayshift Manager or the Central Shift Manager is notified that due to loss of air to AW Farm, the AW Farm pressurization alarm out is of service.
3.3 Follow-on Actions

3.3.1 INITIATE a fire watch for 242-A Evaporator.

3.3.2 IF fire sprinkler wet pipe system was isolated, INITIATE an hourly fire watch for the facility.

3.3.3 WHEN normal electrical power is returned to service, PERFORM the following:

3.3.3.1 RETURN K-1 and K-2 ventilation systems to normal operations, in accordance with TO-620-020.

a. REMOVE tape from radiological area doors/entrances.

3.3.3.2 RESTART raw water strainers per TO-600-130.
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 logical 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 PRIOR to suspending fire watch duties, REQUEST Hanford Fire Department test fire alarm system.

4.0 EXIT CRITERIA

NOTE - Steps in this section are for general guidance and may be performed concurrently, in any logical order, or omitted at the discretion of Shift Manager to fit the situation.

4.1 Exit Actions/Criteria

4.1.1 Normal BPA power is restored.
5.0 RECORDS

The performance of this procedure generates no records.
Response to 242-A Evaporator Loss of Electrical Power

Attachment 1 – Loss of Electrical System Duty Card

**Time Line**

- Loss of normal lighting.
- Activation of emergency lighting.
- Numerous operating alarms.

**PERFORM** the following Personnel Protective actions:

- **DIRECT** all personnel to evacuate radiation areas
- **NOTIFY** 242-A Shift Manager
- **NOTIFY** Tank Farm Shift Manager to prepare for a potential dump and possible pressurization of 241-AW-102

**Direct Operator to CLOSE** valve 5-60.

**Proced** to follow-on actions in TF-AOP-EVAP-002.

- **NOTE** -
  - Closing valve 5-60 isolates water to valve 5-59 (Dump Line Flush) and valve 5-47 (HV-CA1-2 Flush).

- **NOTE** -
  - Heavy line weight boxes indicate electrical power and compressed air are required to perform action.