

**WASTE TREATMENT AND IMMOBILIZATION PLANT  
CHAPTER 4G  
DIRECT-FEED LOW-ACTIVITY WASTE (EFFLUENT MANAGEMENT FACILITY)  
CHANGE CONTROL LOG**

Change Control Logs ensure that changes to this unit are performed in a methodical, controlled, coordinated, and transparent manner. Each unit addendum will have its own change control log with a modification history table. The “**Modification Number**” represents Ecology’s method for tracking the different versions of the permit. This log will serve as an up to date record of modifications and version history of the unit.

Modification History Table

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**CHAPTER 4G**  
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2 **CHAPTER 4G**  
3 **DIRECT FEED LOW-ACTIVITY WASTE (EFFLUENT MANAGEMENT FACILITY)**  
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## 1 **4G DIRECT FEED LOW-ACTIVITY WASTE (EFFLUENT MANAGEMENT FACILITY)**

2 The Direct Feed Low-Activity Waste (DFLAW) configuration allows for the operation of the  
3 Low-Activity Waste (LAW) Vitrification Facility and Analytical Laboratory (Lab) prior to operation of  
4 the Pretreatment (PT) Facility. In this configuration, pretreated LAW is fed directly from the Hanford  
5 Tank Farms to the LAW Vitrification Facility. The Effluent Management Facility (EMF) is in place to  
6 manage and treat the liquid effluent from the LAW Vitrification Facility Radioactive Liquid Waste  
7 Disposal (RLD) System and the Lab RLD System, and manage the effluent from the LAW Secondary  
8 Offgas/Vessel Vent Process (LVP) System. Waste received at the LAW Vitrification Facility from the  
9 Tank Operations Contractor (TOC) will not be characterized as ignitable (D001) or reactive (D003);  
10 therefore, tanks/vessels associated with the DFLAW configuration are not required to be designed to  
11 manage reactive or ignitable wastes.

12 Permitted processes involved with the DFLAW configuration include the Direct Feed LAW EMF Process  
13 (DEP) System, the Direct Feed LAW EMF Vessel Vent Process (DVP) System, and the underground  
14 waste transfer lines.

### 15 Process Flow

16 The primary function of the EMF is to house the DEP and DVP systems and their supporting utility  
17 systems, which allow for the treatment of radioactive, dangerous liquid effluent derived from secondary  
18 waste streams resulting from glass production in the LAW Facility. The sources of the secondary  
19 effluents that are sent to the EMF for treatment are the LAW and Lab RLD systems, the LAW LVP  
20 system, and the transfer line flushes and drains associated with the feed and secondary effluent transfers.  
21 The EMF will operate up to and during the commissioning of the PT and High-Level Waste (HLW)  
22 Facilities. Once the HLW Facility and the PT Facility begin hot commissioning, the EMF will be placed  
23 into lay-up and maintained in the event that the PT Facility is unavailable.

24 The effluents from LAW Facility and Lab operations are collected in the EMF and blended together for  
25 evaporation, with the exception of the caustic scrubber effluent received from the LVP system. The EMF  
26 concentrates the blended effluent to reduce the total volume to be returned to the LAW Concentrate  
27 Receipt Process (LCP) system. The caustic scrubber effluent is combined with the evaporator condensate  
28 and is sent to the Liquid Effluent Retention Facility or Effluent Treatment Facility (LERF/ETF) for  
29 disposal.

30 The DEP system includes the equipment necessary to concentrate the liquid effluent from the  
31 LAW Facility and Lab, as well as transfer line drains and flushes, via evaporation. Recycling some  
32 concentrated effluent causes build-up in the evaporator recycle loop until steady state conditions are  
33 achieved. This approach is consistent with the baseline design, in which LAW Facility effluent is recycled  
34 to the PT Facility through the Treated LAW Evaporation System (TLP).

35 Internal areas of the EMF are provided with conditioned air and ventilation capability by the EMF  
36 Heating, Ventilation, and Air Conditioning (HVAC) systems. The EMF Active Confinement Ventilation  
37 System (ACV) serves the process and utility areas of the EMF, while the C1V system serves the C1 areas  
38 that do not interface with the ACV system. The ACV system uses a cascading ventilation system that  
39 maintains airflow from areas of less potential for contamination to areas of greater potential for  
40 contamination to provide confinement of contamination at or near the source. Exhaust from the ACV  
41 system is monitored to ensure compliance with permit requirements.

42 Figure 4G-1, Effluent Management Facility Process Flow, presents a simplified process flow diagram of  
43 the EMF Process.

## 1 Direct Feed Low-Activity Waste Effluent Management Facility Process System

2 The DEP System allows the EMF to collect, process, recycle, and dispose of the liquid effluent from the  
3 Lab, LAW Vitrification Facility, and underground waste transfer line flushes. The DEP System performs  
4 the following functions:

- 5 • Receipt of liquid effluent.
- 6 • Liquid effluent volume reduction.
- 7 • Process stream sampling.
- 8 • Waste conditioning.

9 The DEP System includes the following major components:

- 10 • An evaporator system consisting of an evaporator separator vessel (DEP-EVAP-00001),  
11 evaporator reboiler (DEP-RBLR-00001), evaporator condensers (DEP-COND-0001/2/3),  
12 recirculation pump, and steam ejectors.
- 13 • Low-Point Drain Vessel (DEP-VSL-00001).
- 14 • Evaporator Feed Vessel (DEP-VSL-00002).
- 15 • Evaporator Concentrate Vessels (DEP-VSL-00003A/B/C).
- 16 • Overhead Sampling Vessels (DEP-VSL-00004A/B).
- 17 • Process Condensate Lag Storage Vessels (DEP-VSL-00005A/B).
- 18 • Other equipment, including pumps, filters, and associated piping and valves.

19 The DEP System evaporator loop functions to reduce the volume of liquid effluent sent to the LERF/ETF,  
20 reduce the amount of the effluent recycled, and concentrate the recycles by separating the effluents into a  
21 recycle stream and a waste stream. The design also supports the transfer of the concentrate to the Hanford  
22 Tank Farms and to the tanker truck load out area. Condensate from the DEP System process can be  
23 treated at the LERF/ETF or used to flush the underground waste transfer lines back to the Hanford Tank  
24 Farms (Tank AP-106).

25 Table 4G-5, Effluent Management Facility Tank System Process and Leak Detection System  
26 Instruments and Parameters and Table 4G-6, Effluent Management Facility Miscellaneous Unit Process  
27 and Leak Detection System Instruments and Parameters, summarize the instruments and parameters for  
28 the DEP system.

## 29 Direct Feed Low-Activity Waste Effluent Management Facility Vessel Vent Process System

30 The DVP System is comprised of two main parts; air inlet, and exhaust. The DVP System provides vessel  
31 ventilation for the DEP System vessels. The purpose of the DVP System is to direct vessel vent gases to  
32 emission control systems, and purge hydrogen to maintain the vessel hydrogen concentration below  
33 dangerous levels.

34 The DVP System includes the following major components:

- 35 • Process Ventilation Preheaters (DVP-HTR-00001A/B).
- 36 • Process Ventilation Primary High Efficiency Particulate Air (HEPA) Filters (DVP-HEPA-  
37 00003A/B).
- 38 • Process Ventilation Secondary HEPA Filters (DVP-HEPA-00004A/B).
- 39 • Process Ventilation Exhausters (DVP-EXHR-00001A/B).

1 The DVP system treats contaminated gaseous exhaust from DFLAW. Instrumentation for the  
2 DVP system that is in contact with contaminated exhaust are identified on design documents for  
3 inspection in accordance with the Dangerous Waste Permit. There will be no liquid releases capable  
4 during operation of this air-filtering system. Monitoring of air-filtering systems are addressed in the air  
5 permit for DEP/DVP, where Best Available Radionuclides Control Technology indicating devices are  
6 identified. Information on DWP equipment for the DVP system can be found in the associated Piping and  
7 Instrumentation Diagrams, 24590-BOF-M6-DVP-00001001, as well as in the EMF Design Description  
8 and System Design Descriptions, 24590-BOF-3ZD-25-00001.

#### 9 Underground Waste Transfer Lines

10 The underground waste transfer lines installed to support the DFLAW configuration are coaxial lines that  
11 are constructed of stainless steel primary pipe, with a carbon steel encasement pipe that is coated with  
12 Fusion Bonded Epoxy (FBE). Cathodic protection is not needed for the underground waste transfer lines  
13 installed to support the DFLAW configuration as the pipe system is made of corrosion resistant materials,  
14 providing water resistant construction to isolate the underground waste transfer lines from the soil and  
15 moisture.

16 The underground waste transfer lines transfer waste from various areas to support the DFLAW  
17 configuration. Underground waste transfer lines support the receipt of the treated LAW to the LAW  
18 Vitrification Facility, as well as effluent transfers from LAW Vitrification Facility and Lab to EMF and  
19 from the EMF to LERF/ETF. Evaporator concentrate from EMF is sent back to the LAW Vitrification  
20 Facility through the underground waste transfer line. In addition, liquid effluent can be transferred  
21 underground from the DEP Evaporator Feed Vessel, DEP-VSL-00002, and the DEP Evaporator  
22 Concentrate Vessels, DEP-VSL-00003A/B/C, to the Hanford Tank Farms (Tank AP-102). During  
23 DFLAW operations, flushing of the Hanford Tank Farms waste transfer line will occur at a minimum  
24 whenever there is a planned or unplanned system outage of 14 calendar days or more. EMF process  
25 condensate will be used to flush the waste transfer line back to the Hanford Tank Farms (AP-106).  
26 Residual flushing media in the line will drain to the EMF low-point drain vessel (DEP-VSL-00001).  
27 Between feed delivery transfers, the line will remain full of treated feed. In addition to these flushing  
28 cycles, during each feed transfer the motive force to deliver LAW feed will provide flushing of the line to  
29 the LAW Concentrate Receipt Vessels (CRV).

#### 30 Effluent Management Facility Buildings

31 The EMF, located north of the Lab, is comprised of four buildings; The following is a list of the  
32 EMF Buildings:

- 33 • Building 25 – LAW Effluent Process Building.
- 34 • Building 25A – LAW Effluent Drain Tank Building.
- 35 • Building 26 – LAW Effluent Utility Building.
- 36 • Building 27 – LAW Effluent Electrical Building.

#### 37 **4G.1 Containers**

38 The dangerous and mixed waste generated at the EMF is managed in 90-day accumulation areas and  
39 satellite accumulation areas pursuant to the requirements in Washington Administrative Code  
40 (WAC) 173-303-200, generating dangerous waste on-site. All waste anticipated to be dangerous or mixed  
41 waste is managed in accordance with WAC 173-303-170, *Requirements for generators of dangerous*  
42 *waste*, through WAC 173-303-230, *Special conditions*. The dangerous and mixed waste is labeled and  
43 characterized in accordance with requirements in WAC 173-303-070, *Designation of dangerous waste*.

1 The following are examples of secondary dangerous and mixed waste generated at the EMF:

- 2 • Spent or failed equipment.
- 3 • Offgas HEPA filters.
- 4 • Personal Protective Equipment.
- 5 • Spent maintenance materials.

## 6 **4G.2 Tank Systems**

7 Permitted tank systems are designed to comply with bounding design criteria, such as pH, temperature,  
8 and pressure conditions.

9 Vessel overflow is prevented by continuous level monitoring in conjunction with inventory controls.  
10 Automatic and operator alarm responses are designed to shut down feed to the vessel when the high-level  
11 settings are exceeded.

12 A list of all EMF tank systems can be found in Table 4G-1, Effluent Management Facility Tank Systems.  
13 Table 4G-5 summarizes the instruments and parameters for tank process and leak detection systems in the  
14 EMF Facility.

### 15 **4G.2.1 Low-Point Drain Vessel (DEP-VSL-00001)**

16 The low-point drain vessel (DEP-VSL-00001) is located below grade, within an enclosed room  
17 (ED-B001), in the LAW Effluent Drain Tank Building. The lower elevation of Room ED-B001 is  
18 designated as a routinely non-accessible area. The low-point drain vessel collects effluent from flushes of  
19 the underground waste transfer lines.

20 The low-point drain vessel also collects effluent from the west process area sumps (DEP-SUMP-  
21 00002A/B), feed vessel area sumps (DEP-SUMP-00004A/B), and tanker truck loadout sump  
22 (DEP-SUMP-00008). In addition, the low-point drain vessel collects overflow from several DEP System  
23 process vessels, including the evaporator feed vessel (DEP-VSL-00002), evaporator concentrate vessels  
24 (DEP-VSL-00003A/B/C), overhead sampling vessels (DEP-VSL-00004A/B), and process condensate lag  
25 storage vessels (DEP-VSL-00005A/B), as well as effluent from the evaporator drain line, fume hood  
26 drain line, and off-specification evaporator concentrate drain line.

27 The vessel drain line, overflow pipe, and the low-point drain sump (DEP-SUMP-00001) are  
28 decontaminated with demineralized water. The demineralized water used for decontamination is ultimately  
29 sent to LERF/ETF.

30 The low-point drain vessel is equipped with a vessel agitator (DEP-AGT-00001) to help prevent buildup of  
31 settled solids in the waste. The agitator operates when transferring or sampling liquid.

### 32 **4G.2.2 Evaporator Feed Vessel (DEP-VSL-00002)**

33 The evaporator feed vessel (DEP-VSL-00002) receives filtered effluent from multiple sources and caustic  
34 solution from the caustic tank (SHR-TK-00013) for pH adjustment in off-normal conditions. Effluent is  
35 received in the evaporator feed vessel (DEP-VSL-00002) from the following systems:

- 36 • LAW plant wash vessel (RLD-VSL-00003).
- 37 • RLD submerged bed scrubber condensate collection vessel (RLD-VSL-00005).
- 38 • Lab RLD vessel (RLD-VSL-00164).
- 39 • Low-point drain vessel (DEP-VSL-00001).
- 40 • Overhead sampling vessels (DEP-VSL-00004A/B).
- 41 • Low-point drain sump (DEP-SUMP-00001).
- 42 • Off-specification concentrate (DEP-VSL-00003A/B/C).

- 1 • Contaminated steam condensate (DEP-VSL-00008).
- 2 • Evaporator Feed Prefilter (DEP-FILT-00003).

3 The evaporator feed vessel recirculation pumps (DEP-PMP-00012A/B/C) are used to recirculate the  
4 evaporator feed vessel contents to a sample connection, where samples are collected, and fluid is returned  
5 to the evaporator feed vessel through the eductors. After passing through the evaporator feed prefilter  
6 (DEP-FILT-00003), effluent from the evaporator feed vessel (DEP-VSL-00002) is transferred to the  
7 evaporator separator vessel (DEP-EVAP-00001).

8 In the event of an off-normal condition within the EMF, the evaporator feed vessel recirculation pumps  
9 can bypass the evaporator separator vessel and transfer effluent to the Hanford Tank Farms after passing  
10 through the evaporator concentrate/feed vessels LAW effluent cooler (DEP-HX-00001). The evaporator  
11 feed vessel (DEP-VSL-00002) is located in Room E-0105 which has been designated as a routinely  
12 non-accessible tank system room. The evaporator feed prefilter (DEP-FILT-00003) is used to keep any  
13 solids larger than 5 microns from entering the evaporator process.

#### 14 **4G.2.3 Evaporator Concentrate Vessels (DEP-VSL-00003A/B/C)**

15 The evaporator concentrate vessels (DEP-VSL-00003A/B/C) are used to accumulate concentrated  
16 effluent from the evaporator separator vessel (DEP-EVAP-00001). In addition, the evaporator concentrate  
17 vessels may receive filter backflush from the evaporator feed prefilter (DEP-FILT-00003) and caustic  
18 solution from the caustic tank (SHR-TK-00013). The concentrate effluent can either be recycled back to  
19 the LAW LCP vessels (LCP-VSL-00001/2), to the Hanford Tank Farms, or to the tanker truck load out  
20 area. In the event of an overflow, the liquid flows by gravity into the low-point drain vessel (DEP-VSL-  
21 00001). Each batch is sampled and characterized before it is sent to the LAW Vitrification Facility or the  
22 Hanford Tank Farms. The evaporator concentrate vessels (DEP-VSL-00003A/B/C) are located in Room  
23 E-0105 which is designated as a routinely non-accessible tank system room.

24 The evaporator concentrate transfer pumps (DEP-PMP-00003A/B) are used to circulate fluid from the  
25 evaporator concentrate vessels via eductors. The evaporator concentrate pumps also transfer the evaporator  
26 concentrate vessels' contents to LAW LCP vessels, the Hanford Tank Farms, or the tanker truck load out  
27 area.

28 When transferring concentrate to the Hanford Tank Farms, the effluent stream must comply with the  
29 Tank Farms Waste Transfer Compatibility Program. The evaporator concentrate transfer pumps transfer  
30 the effluent through the evaporator feed prefilter (DEP-FILT-00003) to remove solids, the filtered effluent  
31 is mixed with process condensate and sodium nitrite, as necessary, and then the effluent is sent through  
32 the evaporator concentrate/feed vessel LAW effluent cooler (DEP-HX-00001) before being sent to the  
33 Hanford Tank Farms.

#### 34 **4G.2.4 Overhead Sampling Vessels (DEP-VSL-00004A/B)**

35 The overhead sampling vessels (DEP-VSL-00004A/B) receive condensate from:

- 36 • Evaporator primary condenser (DEP-COND-00001).
- 37 • Inter-condenser (DEP-COND-00002).
- 38 • After-condenser (DEP-COND-00003).
- 39 • Caustic scrubber fluids from the LVP system (LVP-TK-00001).
- 40 • Process condensate lag storage vessels (DEP-VSL-00005A/B).
- 41 • West process area sumps (DEP-SUMP-00002A/B).
- 42 • Feed vessel area sumps (DEP-SUMP-00004A/B).
- 43 • Non-radioactive liquid waste disposal system (NLD) sumps (NLD-SUMP-00031/32).

1 Samples are collected from the concentrate vessels in DEP-HOOD-0001 and characterized before being  
2 sent to the LAW Facility or being returned to the Hanford tank farms. Similarly, each batch is sampled in  
3 the overhead sampling vessels and characterized before transfer to the process condensate lag storage  
4 vessels (DEP-VSL-00005A/B). If the waste does not meet LERF/ETF requirements  
5 (i.e., off-specification), it can be blended in the other overhead sampling vessel in attempt to meet the  
6 LERF/ETF requirements.

7 The overhead sampling vessel transfer/recirculation pumps (DEP-PMP-00004A/B/C) are used to  
8 recirculate the overhead sampling vessels contents to a sample connection, where samples are collected  
9 and fluid is returned to the overhead sampling vessels through the eductors. After the content quality has  
10 been verified through laboratory testing, pumps are used to transfer the contents to the process condensate  
11 lag storage vessels. If the waste does not meet LERF/ETF requirements (i.e., off-specification), it can be  
12 blended with the other overhead sampling vessel in attempt to meet the LERF/ETF requirements. If  
13 required, the liquid effluent can be transferred to the evaporator feed vessel (DEP-VSL-00002) for  
14 reprocessing, if necessary.

#### 15 **4G.2.5 Process Condensate Lag Storage Vessels (DEP-VSL-00005A/B)**

16 The process condensate lag storage vessels (DEP-VSL-00005A/B) receive batches of process condensate  
17 from:

- 18 • Overhead sampling vessels (DEP-VSL-00004A/B).
- 19 • Secondary steam blowdown (SCW-VSL-00054).
- 20 • Effluent from the east process area sumps (DEP-SUMP-00003A/B).
- 21 • Process condensate vessel area sumps (DEP-SUMP-00005A/B).

22 The vessels allow for lag storage before sending the process condensate to the LERF/ETF. In the event of  
23 an overflow, the liquid will flow by gravity into the low-point drain vessel (DEP-VSL-00001). While  
24 sampling normally occurs in the overhead sampling vessels, periodic sampling of the process condensate  
25 vessel area sumps is out-sourced for permit compliance and LERF/ETF acceptance.

26 The process condensate may be used to flush the transfer line from the Hanford Tank Farms, flush the  
27 transfer line from the low-point drain vessel to the evaporator feed prefilter (DEP-FILT-00003), flush the  
28 transfer line from the evaporator concentrate vessels to LCP-VSL-00001/2, as well as dilute evaporator  
29 concentrate prior to transfer back to the Hanford Tank Farms to meet the acceptance criteria.

#### 30 **4G.2.6 Effluent Management Facility Effluent Transfer to Hanford Tank Farms**

31 A dedicated pipeline (DEP-ZS-00069-W31A-03/AP020-WT-WTL-SN-700) is used to transfer the  
32 DFLAW conditioned liquid effluent generated by the Waste Treatment and Immobilization Plant (WTP)  
33 from the EMF to Hanford Tank Farm tank AP-102. Prior to each transfer, WTP samples and analyzes the  
34 EMF effluent and adjusts the chemistry, if needed, to meet corrosion control criteria. Upon approval by  
35 Hanford Tank Farms of the WTP request to transfer effluent, each facility verifies ready to transfer/receive  
36 status, and WTP provides notification of start of transfer. During the transfer, the WTP performs inline  
37 process monitoring and will stop the process in a fail-safe condition such as detection of a leak, removal of  
38 a permissive signal, or interlock. WTP leak detection instrumentation (Leak Detection Box [LDB]  
39 DEP-LDB-00001) information for the transfer line is included in Table 4G-5.

40 WTP initiates shutdown of the EMF effluent transfer pump when the target transfer volume is reached or  
41 a transfer/receipt permissive is removed. Following completion of the transfer, WTP will evaluate the  
42 anticipated schedule for the next effluent batch transfer. If no transfer is scheduled within the next  
43 14 calendar days, WTP will flush the transfer line to AP-102 with an appropriate flushing media  
44 (e.g., EMF process condensate, deionized water, raw water). Residual flushing media in the line will be  
45 permitted to drain into the EMF Low Point Drain Vessel, after which the WTP and Hanford Tank Farms

1 transfer/receipt systems are subsequently isolated until the next transfer. If the next transfer will be  
2 performed within 14 days, transfer line flushing is not required.

### 3 **4G.3 Miscellaneous Units**

4 The following miscellaneous units are part of the DEP System and are managed under this permit as tanks  
5 and tank systems. Table 4G-2 Effluent Management Facility Miscellaneous Units (Systems and  
6 Sub-Systems) summarizes the miscellaneous units within the EMF. Table 4G-6 summarizes the  
7 instruments and parameters for all miscellaneous unit process and leak detection systems in the EMF  
8 Facility.

#### 9 **4G.3.1 Evaporator Separator Vessel (DEP-EVAP-00001)**

10 The evaporator separator vessel (DEP-EVAP-00001) receives feed from the evaporator feed vessel  
11 (DEP-VSL-00002 via DEP-PMP-00002A/B). Feed from DEP-VSL-00002 is combined with evaporator  
12 concentrate recycles, heated in the reboiler, and introduced into the lowest portion on the evaporator.  
13 Additionally, evaporator concentrates can be recycled without going through the reboiler.

14 The evaporator circulation pump (DEP-PMP-00017) is used to provide a continuous flow of recirculated  
15 concentrate effluent to the evaporator reboiler (DEP-RBLR-00001). Multiple transfer options are  
16 considered depending on the density, flow, and radiation levels of the concentrate; and the effluent may  
17 be discharged to the evaporator concentrate vessels (DEP-VSL-00003A/B/C), recirculated back to the  
18 evaporator separator vessel, or if off-specification, transferred to the evaporator feed vessel (DEP-VSL-  
19 00002). In addition, a drain line is provided from the evaporator separator vessel to the low-point drain  
20 vessel (DEP-VSL-00001) to drain the evaporator during maintenance.

21 The evaporator separator vessel (DEP-EVAP-00001) is fitted with level, temperature, pressure, and  
22 differential pressure instrumentation that interfaces with the Process Control System (PCJ) for remote  
23 monitoring of evaporator separator vessel conditions. Anti-foam reagent is added to the evaporator  
24 separator vessel that is supplied by the anti-foam metering pumps (AFR-PMP-00014A/B) to reduce foam  
25 generation and minimize entrainment of aerosols with overhead vapor during the evaporation process.

#### 26 **4G.3.2 Evaporator Primary Condenser (DEP-COND-00001)**

27 The vapors from the evaporator separator vessel enter the primary condenser (DEP-COND-00001). The  
28 vapor is cooled, allowing liquids to condense out and collect in the boot of DEP-COND-00001. The liquids  
29 from DEP-COND-00002 and DEP-COND-00003 also collect in the boot of DEP-COND-00001. The  
30 condensate is pumped to the overhead sampling vessels (DEP-VSL-00004A/B) by evaporator condensate  
31 pumps (DEP-PMP-00006A/B), or sent back to the evaporator separator vessel (DEP-EVAP-00001) for  
32 reprocessing. A portion of the condensate is also filtered via the condensate duplex cartridge filters  
33 (DEP-FILT-00004A/B) and used to spray the demister pads and for intermittent wash down of the  
34 evaporator separator vessel.

35 The vacuum for the evaporator separator vessel is established and maintained through condensing the  
36 vapor into liquid in the evaporator primary condenser. The first stage ejector (DEP-EJCTR-00001A/B) is  
37 used for additional pressure control in the evaporator separator vessel.

38 DEP-COND-00001 is contained in a pressure boundary, with no known leak paths in the completely sealed  
39 system. All elements are either flanged with gaskets or welded, mitigating the potential for leaks. In an  
40 unusual scenario where a leak occurs, such will be detected in DEP-SUMP-00003B.

#### 41 **4G.3.3 Evaporator Inter-Condenser (DEP-COND-00002)**

42 Non-condensable overhead vapor is moved from the evaporator separator vessel (DEP-EVAP-00001) and  
43 evaporator primary condenser (DEP-COND-00001) via the first stage ejector and discharged to the  
44 evaporator inter-condenser (DEP-COND-00002). The evaporator inter-condenser and evaporator  
45 after-condenser (DEP-COND-00003) work with the steam ejectors to create a vacuum in the evaporator

1 separator vessel (DEP-EVAP-00001). The first stage ejector (DEP-EJCTR-00001A/B) is used to draw  
2 vapor from the evaporator primary condenser (DEP-COND-00001).

3 DEP-COND-00002 is contained in a pressure boundary, with no known leak paths in the completely sealed  
4 system. All elements are either flanged with gaskets or welded, mitigating the potential for leaks. In an  
5 unusual scenario where a leak occurs, such will be detected in DEP-SUMP-00003B.

#### 6 **4G.3.4 Evaporator After-Condenser (DEP-COND-00003)**

7 The second stage ejector (DEP-EJCTR-00002) pulls vapor from evaporator inter-condenser (DEP-COND-  
8 00002) and discharges into the evaporator after-condenser (DEP-COND-00003), where the steam is  
9 condensed and the remaining vapor is drawn into the vessel vent header. The condensate is pumped by  
10 evaporator condensate pumps (DEP-PMP-00006A/B) to the overhead sampling vessels (DEP-VSL-  
11 00004A/B), and/or back to the evaporator separator vessel (DEP-EVAP-00001).

12 DEP-COND-00003 is contained in a pressure boundary, with no known leak paths in the completely sealed  
13 system. All elements are either flanged with gaskets or welded, mitigating the potential for leaks. In an  
14 unusual scenario where a leak occurs, such will be detected in DEP-SUMP-00003B.

#### 15 **4G.3.5 Process Condensate Filter (DEP-FILT-00002)**

16 Prior to transfer to LERF/ETF, effluent is filtered through a 5-micron process condensate filter  
17 (DEP-FILT-00002) downstream of the process condensate lag storage transfer pumps (DEP-PMP-  
18 00005A/B).

#### 19 **4G.3.6 Evaporator Feed Prefilter (DEP-FILT-00003)**

20 The evaporator feed prefilter (DEP-FILT-00003) is used to remove solids from the effluent entering the  
21 evaporator feed vessel (DEP-VSL-00002). It filters all effluent except for off-specification recycled  
22 condensate from overhead sampling vessels (DEP-VSL-00004A/B), contaminated secondary condensate  
23 (off normal condition in closed-loop system) from reboiler condensate collection vessel (DEP-VSL-  
24 00008), and off-specification concentrate from evaporator separator vessel (DEP-EVAP-00001). Filtered  
25 solids do not enter the evaporator feed vessel and are flushed to the evaporator concentrate vessels  
26 (DEP-VSL-00003A/B/C), where the solids are mixed with the evaporator concentrate for transfer back to  
27 the LAW Vitrification Facility.

#### 28 **4G.3.7 Condensate Duplex Cartridge Filters (DEP-FILT-00004A/B)**

29 A portion of the condensate from the evaporator primary condenser (DEP-COND-00001) is also filtered  
30 via the condensate duplex cartridge filters (DEP-FILT-00004A/B) and used to spray off the demister pads  
31 or for intermittent wash down of the evaporator separator vessel (DEP-EVAP-00001).

#### 32 **4G.3.8 Evaporator Concentrate/Feed Vessels Low-Activity Waste Effluent Cooler** 33 **(DEP-HX-00001)**

34 The evaporator concentrate/feed vessels LAW effluent cooler (DEP-HX-00001) uses plant cooling water  
35 to cool the effluent stream prior to return to Hanford Tank Farms per the Tank Farms Waste Transfer  
36 Compatibility Program. The effluent stream may be mixed with sodium nitrite and/or process condensate,  
37 as necessary.

#### 38 **4G.3.9 Evaporator Reboiler (DEP-RBLR-00001)**

39 The evaporator reboiler (DEP-RBLR-00001) reheats the recirculating concentrate and the feed before it  
40 enters into the evaporator separator vessel (DEP-EVAP-00001). The process fluid is on the tube side, with  
41 saturated steam on the shell side. The evaporator circulation pump (DEP-PMP-00017) is used to circulate  
42 evaporator separator vessel concentrate through the evaporator reboiler and back to the evaporator  
43 separator vessel. The evaporator reboiler has temperature and level sensing capabilities on the utility outlet  
44 piping, which interfaces with the PCJ to remotely monitor temperature and level on the process fluid side.

1 The reboiler condensate collection vessel (DEP-VSL-00008) manages clean steam condensate as part of a  
2 closed loop system, and any contaminated steam condensate is transferred to DEP-VSL-00002 and  
3 processed through the evaporator.

4 DEP-RBLR-00001 is contained in a pressure boundary, with no known leak paths in the completely sealed  
5 system. All elements are either flanged with gaskets or welded, mitigating the potential for leaks. In an  
6 unusual scenario where a leak occurs, such will be detected in DEP-SUMP-00002B.

#### 7 **4G.4 Secondary Containment and Release Detection for Effluent Management Facility**

8 The EMF is constructed of steel reinforced concrete. The design ensures that the containment units have  
9 sufficient structural strength to prevent collapse or failure. The primary barriers of the EMF containment  
10 units are designed to withstand loads from the movement of personnel, wastes, and equipment handling.  
11 Stainless steel liners are provided on the interior floors, and a portion of the walls, for the areas containing  
12 the low-point drain vessel (DEP-VSL-00001), the evaporator feed vessel (DEP-VSL-00002), and the  
13 evaporator concentrate vessels (DEP-VSL-00003A/B/C). The remaining containment areas are provided  
14 with special protective coatings that are constructed with chemical-resistant water stops and compatible  
15 with the stored waste.

16 The specifications for the preparation, design, and construction of the secondary containment systems are  
17 documented in Operating Unit Group 10, Appendix 13.7. Construction of tank systems to required  
18 specifications ensures that foundations are capable of supporting tank and secondary containment systems  
19 and that uneven settling and failures from pressure gradients will not occur.

20 Table 4G-3, Effluent Management Facility Secondary Containment Rooms/Areas and Table 4G-4,  
21 Effluent Management Facility Sumps, LDBs, Drain Lines and Floor Drains, summarizes the EMF  
22 secondary containment systems. Instrumentation associated with secondary containment and leak  
23 detection can be found in Table 4G-5 and Table 4G-6.

##### 24 **4G.4.1 Low-Point Drain Sump (DEP-SUMP-00001)**

25 The low-point drain sump (DEP-SUMP-00001) is used to capture overflow effluent from the low-point  
26 drain vessel (DEP-VSL-00001). In addition, underground waste transfer line LDB drain headers  
27 discharge to the low-point drain sump. The low-point drain sump discharges to the evaporator feed vessel  
28 (DEP-VSL-00002) via DEP-FILT-00003. The liquid level in the low-point drain sump is monitored with  
29 transmitters that communicate with the PCJ and provide control room alarm indication.

##### 30 **4G.4.2 Pipeline Containment and Leak Detection**

31 The DEP System has LDBs on the headers of the coaxial underground waste transfer piping. LDBs are  
32 provided for the underground transfer lines to LAW Vitrification Facility. LDBs are also provided on  
33 underground transfer lines between EMF, LAW, Lab, and Hanford Treatment, Storage, and/or Disposal  
34 (TSD). The WTP underground transfer lines are equipped with LDBs to detect a leak within the annular  
35 space of the coaxial piping. The liquid level in the sumps is monitored with transmitters that communicate  
36 with the PCJ and provide control room alarm indication.

37 Within EMF, the pipelines associated with the tank systems/miscellaneous units are primarily  
38 single-walled. Secondary containment is provided for piping within the plant through the use of special  
39 protective coatings and waterstops or stainless liners in process areas and process rooms. The leak  
40 detection equipment located within the process areas and process rooms sumps alert operators of a piping  
41 leak through the use of level detection instrument alarms. The west process area and the low-point drain  
42 area are connected by a pipe chase with coaxial piping that drains to the low-point drain sump  
43 (DEP-SUMP-00001).

1 For all secondary containment area sumps, residual liquids may be present after the sump has been  
2 flushed and pumped using the large transfer pump. When residual liquid is detected in sumps, excluding  
3 the low point drain sump (DEP-SUMP-00001) and the feed vessel area sumps (DEP-SUMP-00004A/B),  
4 an entry will occur to remove the residual liquid using a portable sump pump or absorbent device. The  
5 feed vessel area sumps (DEP-SUMP-00004A/B) in room E-0105 include designated sample pumps  
6 (DEP-PMP-00042A/B). Samples are collected in the EMF Sampling Fume Hood (DEP-HOOD-00001).  
7 The pumps are designed to support sampling of the sumps as well as the removal of small volumes of  
8 precipitation or residual liquids after the large transfer pump has completed the transfer.

9 The leak detection instrumentation for all secondary containment area sumps include a Level  
10 Computation Relay (LKY) function. The LKY function indicates an increase in fluid levels in the sump,  
11 even when residual liquid is present.

#### 12 **4G.4.3 Evaporator Secondary Containment System**

13 The secondary containment system and associated ancillary equipment for the evaporator separator vessel  
14 (DEP-EVAP-00001) is located in the west process area, located in the LAW Effluent Process Building.  
15 The west process area sumps (DEP-SUMP-00002A/B) are located in Room E-0103. The west process  
16 area sumps and level detection instruments detect leakage from the evaporator separator vessel,  
17 evaporator feed prefilter (DEP-FILT-00003), and the additional ancillary equipment associated with the  
18 evaporator separator vessel. The west process area is sloped to the room sumps and is provided with a  
19 special protective coating and waterstops as part of secondary containment.

20 Fluid contained in the west process area sumps is transferred to the overhead sampling vessels  
21 (DEP-VSL-00004A/B) or the low-point drain vessel (DEP-VSL-00001) by sump pumps (DEP-PMP-  
22 00032A/B). The liquid level in the west process area sumps is monitored with transmitters that  
23 communicate with the PCJ and provide control room alarm indication.

#### 24 **4G.4.4 Evaporator Condenser Secondary Containment System**

25 The secondary containment system for the evaporator condensers (DEP-COND-00001/2/3) and associated  
26 ancillary equipment is located in the east process area. The east process area sumps (DEP-SUMP-00003A/B)  
27 are located in Room E-0102. The east process area sumps and level detection instruments detect leakage from  
28 the evaporator condensers, the evaporator reboiler (DEP-RBLR-00001), the evaporator concentrate/feed  
29 vessels LAW effluent cooler (DEP-HX-00001), and the ancillary equipment associated with the evaporator  
30 condensers and evaporator reboiler. The east process area is sloped to the sumps and is provided with a  
31 special protective coating and waterstops as part of secondary containment.

32 Fluid contained in the east process area sumps is transferred to the process condensate lag storage vessels  
33 (DEP-VSL-00005A/B) by sump pumps (DEP-PMP-00033A/B). The liquid level in sumps is monitored  
34 with transmitters that communicate with the PCJ and provide control room alarm indication.

#### 35 **4G.4.5 Process Condensate Vessel Area Sumps (DEP-SUMP-00005A/B)**

36 The process condensate vessel area sumps (DEP-SUMP-00005A/B) are located in Room E-0106. The  
37 process condensate vessel area sumps are equipped with level detection instruments to detect  
38 precipitation or leakage from the overhead sampling vessels (DEP-VSL-00004A/B) and the process  
39 condensate lag storage vessels (DEP-VSL-00005A/B). The process condensate vessel area sumps also  
40 collect leakage from ancillary equipment located in this room. Room E-0106 is sloped to the sumps and  
41 is provided with a special protective coating and waterstops as part of secondary containment.

42 Fluid contained in the process condensate vessel area sumps is transferred to the process condensate lag  
43 storage vessels (DEP-VSL-00005A/B) by sump pumps (DEP-PMP-00035A/B). Sump liquid will be  
44 transferred to the lag storage vessels after an operator verifies that the source of the sump effluent did not  
45 originate in either of the lag storage vessels.

1 Any accumulation of precipitation can be transferred to a container and managed as non-dangerous waste.  
2 Large volumes can be transferred to the process condensate lag storage vessels (DEP-VSL-00005A/B).

3 A small volume of residual liquids may be present after the sump has been flushed and pumped using the  
4 large transfer pump. When residual liquid is detected in Room E-0106 sumps, an entry will occur to  
5 remove the residual liquid using a portable pump or absorbent spill devices.

6 The liquid level in the sump is monitored and the sump is equipped with level transmitters that  
7 communicate with the PCJ and provide a control room alarm indication. The leak detection  
8 instrumentation for all secondary containment area sumps include a LKY function. The LKY function  
9 indicates an increase in fluid levels in the sump, even when residual liquid is present.

#### 10 **4G.4.6 Feed Vessel Area Sumps (DEP-SUMP-00004A/B)**

11 The feed vessel area sumps (DEP-SUMP-00004A/B) are located in Room E-0105 and provide leak  
12 detection for the evaporator feed vessel (DEP-VSL-00002) and the evaporator concentrate vessels  
13 (DEP-VSL-00003A/B/C). The sumps also collect leakage from ancillary equipment or precipitation  
14 collected in Room E-0105. The room is sloped to the feed vessel area sumps. The secondary containment  
15 area located in the room is provided with a stainless steel liner. The liquid level in the feed vessel area  
16 sumps is monitored with transmitters that communicate with the PCJ and provide control room alarm  
17 indication. Due to radiation dose rates there is limited access to Room E-0105.

18 Any accumulation of precipitation can be transferred to a container and managed as non-dangerous waste.  
19 Large volumes can be transferred to the process condensate lag storage vessels (DEP-VSL-00005A/B).

20 A small volume of residual liquids may be present after the sump has been flushed and pumped using the  
21 large transfer pump. When residual liquid is detected the sample pumps (DEP-PMP-00042A/B) can be  
22 used to remove the residual liquids after the large transfer pump has completed the transfer.

23 The LKY function indicates an increase in fluid levels in the sump, even when residual liquid is present.  
24 The feed vessel area sumps are equipped with pumps that transfer the liquid to the appropriate vessel; the  
25 liquid is transferred after sampling occurs to characterize the liquid. Precipitation collected in the feed  
26 vessel area sumps can be transferred by sump pumps (DEP-PMP-00034A/B) to the overhead sampling  
27 vessels (DEP-VSL-00004A/B). Effluent from a spill is transferred to the low-point drain vessel  
28 (DEP-VSL-00001) by sump pumps (DEP-PMP-00034A/B) and recycled back into the process.

#### 29 **4G.5 Air Emission Control**

##### 30 **4G.5.1 Direct Feed Low-Activity Waste Effluent Management Facility Vessel Vent** 31 **Process System**

32 The DVP System is comprised of two main parts, air intake and exhaust. The DVP is designed to remove  
33 mixed waste particulates that may be present in the gases that fill the headspace of select DEP System  
34 process vessels. The DEP System process vessels and condenser that directly interface with the DVP are  
35 the low-point drain vessel (DEP-VSL-00001), evaporator feed vessel (DEP-VSL-00002), evaporator  
36 concentrate vessels (DEP-VSL-00003A/B/C), overhead sampling vessels (DEP-VSL-00004A/B), process  
37 condensate lag storage vessels (DEP-VSL-00005A/B) and the evaporator after condenser (DEP-COND-  
38 00003). The headspace in the evaporator separator vessel (DEP-EVAP-00001) is exhausted by the DVP  
39 through the evaporator condensers (DEP-COND-00001/2/3). The inlet air is taken from lower  
40 contamination areas throughout the building to provide purged air for maintaining the DEP System process  
41 vessels.

42 In the LAW Effluent Process Building, the exhaust air is sent through a preheater (DVP-HTR-00001A/B),  
43 two-stages of HEPA filters (DVP-HEPA-00004A/B) and (DVP-HEPA-00003A/B), and an exhaust fan  
44 (DVP-EXHR-00001A/B). The exhaust fan is downstream of the DEP System process vessels, preheater  
45 and HEPA filters, to ensure that the DEP System vessel headspaces are at negative pressure.

1 Downstream of the EMF ACV HEPA filters and exhaust fans, the treated DVP offgas ties into the LAW  
2 Effluent Utility Building exhaust duct, where it is discharged through the EMF stack.

### 3 **4G.6 Effluent Management Facility Process Sampling**

4 Sampling station (DEP-HOOD-00001) consists of a standard fume hood, the low-point drain vessel  
5 (DEP-VSL-00001) process pipelines, manual sampling collection points, utilities systems and a drain  
6 system. The EMF process sample streams include:

- 7 • DEP-VSL-00001.
- 8 • DEP-VSL-00002.
- 9 • DEP-VSL-00003A/B/C.
- 10 • DEP-VSL-00004 A/B.
- 11 • DEP-VSL-00005A/B.
- 12 • DEP-EVAP-00001.
- 13 • DEP-HX-00001.

14 Process pipelines bring the process fluids to the sampling station, recirculate the stream before the sample  
15 is collected to ensure the sample is representative for the batch, and provide the means to collect the  
16 sample into a sampling bottle. A system of valves on the pipelines are used to control the flow during  
17 sampling.

18 The utility systems are provided in the sampling station to allow for flushing and cleanup of the lines at  
19 completion of the sampling campaign, and cleanup of the sampling station work area. The drain system  
20 collects the liquid waste resulting from the line flushing process and from the hood cleanup. The drain  
21 system connects the liquid sampling station and drains to the low-point drain vessel (DEP-VSL-00001).

22

**Table 4G-1 Effluent Management Facility Tank Systems**

No.	System	Vessel Number/Location	Description	Material	Approximate Total Volume (U.S. Gallons)	Approximate Dimensions (Inside Diameter × Height or Length in feet) (tangent line/ tangent line)
1	DEP	DEP-VSL-00001 ED-B001	Low-point drain vessel	Stainless Steel	18,000	14 ft x 12.75 ft
2	DEP	DEP-VSL-00002 E-0105	Evaporator feed vessel	6% Mo	42,300	14 ft x 32 ft
3	DEP	DEP-VSL-00003A E-0105	Evaporator concentrate vessel	6% Mo	14,900	12 ft x 13.5 ft
4	DEP	DEP-VSL-00003B E-0105	Evaporator concentrate vessel	6% Mo	14,900	12 ft x 13.5 ft
5	DEP	DEP-VSL-00003C E-0105	Evaporator concentrate vessel	6% Mo	14,900	12 ft x 13.5 ft
6	DEP	DEP-VSL-00004A E-0106	Overhead sampling vessel	Stainless Steel	40,800	14 ft x 30.75 ft

**Table 4G-1 Effluent Management Facility Tank Systems**

No.	System	Vessel Number/Location	Description	Material	Approximate Total Volume (U.S. Gallons)	Approximate Dimensions (Inside Diameter × Height or Length in feet) (tangent line/tangent line)
7	DEP	DEP-VSL-00004B E-0106	Overhead sampling vessel	Stainless Steel	40,800	14 ft x 30.75 ft
8	DEP	DEP-VSL-00005A E-0106	Process condensate lag storage vessel	Stainless Steel	127,260	25 ft x 29.5 ft
9	DEP	DEP-VSL-00005B E-0106	Process condensate lag storage vessel	Stainless Steel	127,260	25 ft x 29.5 ft

1

**Table 4G-2 Effluent Management Facility Miscellaneous Units (Systems and Sub-Systems)**

No.	System/Subsystem	Component Number/Location	Description	Material	Total Volume (US gallons)
<b>Effluent Management Facility</b>					
1	DEP	DEP-COND-00001 E-0102	DEP Evaporator Primary Condenser	Stainless Steel	NA
2	DEP	DEP-COND-00002 E-0102	DEP Evaporator Inter-Condenser	Stainless Steel	NA
3	DEP	DEP-COND-00003 E-0102	DEP Evaporator After-Condenser	Stainless Steel	NA
4	DEP	DEP-EVAP-00001 E-0103	DEP Evaporator Separator Vessel	Hastelloy	NA
5	DVP	DVP-HTR-00001A E-0102	Process Ventilation Preheater	Stainless Steel	NA
6	DVP	DVP-HTR-00001B E-0102	Process Ventilation Preheater	Stainless Steel	NA
7	DVP	DVP-HEPA-00003A E-0102A	Process Ventilation Primary HEPA Filter Housing	Stainless Steel	NA
8	DVP	DVP-HEPA-00003B E-0102A	Process Ventilation Primary HEPA Filter Housing	Stainless Steel	NA
9	DVP	DVP-HEPA-00004A E-0102A	Process Ventilation Secondary HEPA Filter Housing	Stainless Steel	NA
10	DVP	DVP-HEPA-00004B E-0102A	Process Ventilation Secondary HEPA Filter Housing	Stainless Steel	NA
11	DEP	DEP-HX-00001 E-0103	Evaporator Concentrate/Feed Vessels LAW Effluent Cooler	Stainless Steel	NA
12	DEP	DEP-RBLR-00001 E-0103	DEP Evaporator Reboiler	Hastelloy	NA

**Table 4G-2 Effluent Management Facility Miscellaneous Units  
(Systems and Sub-Systems)**

No.	System/ Subsystem	Component Number/Location	Description	Material	Total Volume (US gallons)
13	DVP	DVP-EXHR-00001A E-0102	Process Ventilation Exhausters	Stainless Steel	NA
14	DVP	DVP-EXHR-00001B E-0102	Process Ventilation Exhausters	Stainless Steel	NA
15	DEP	DEP-FILT-00002 E-0103	DEP Process Condensate Filter	6% Mo	NA
16	DEP	DEP-FILT-00003 E-0103	DEP Evaporator Feed Prefilter	6% Mo	NA
17	DEP	DEP-FILT-00004A E-0102	DEP Condensate Duplex Cartridge Filter	6% Mo	NA
18	DEP	DEP-FILT-00004B E-0102	DEP Condensate Duplex Cartridge Filter	6% Mo	NA

1

**Table 4G-3 Effluent Management Facility Secondary Containment Rooms/Areas**

Room/Area	Approximate Room/Area Dimensions (LxW, in feet)	Miscellaneous Treatment Units or Tanks in Room/Area (Largest Plant Item)	Volume of Largest Plant Item in Room/Area (US Gallons)	Minimum Secondary Containment Height (feet)
E-0102 east evaporator process area	62 ft x 94 ft 6 in.	Process condensate lag storage vessel	127,260	4 ft 6 in.
E-0103 west evaporator process area	62 ft x 56 ft 6 in.	Evaporator feed vessel	42,300	3 ft 5 in.
ED-B001 low-point drain vessel area	28 ft x 33 ft	Low-point drain vessel	18,000	4 ft 2 in.
E-0105 evaporator feed vessel area	45 ft 6 in. x 39 ft	Evaporator feed vessel	42,300	5 ft 2 in.
E-0106 process condensate lag storage vessel area	45 ft 6 in. x 84 ft 4 in.	Process condensate lag storage vessel	127,260	6 ft 10 in.

2

**Table 4G-4 Effluent Management Facility Sumps, Leak Detection Boxes, Drain Lines/Floor Drains**

Sump/Leak Detection Box, or Floor Drain/Line I.D. # and Room #	Maximum Sump/Leak Detection Box Capacity (gallons)	Sump/Leak Detection Box Level Detection Type	Sump, Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
<b>Effluent Management Facility</b>				
<b>Sumps</b>				
DEP-SUMP-00001 ED-B001	~58	Radio Frequency (RF) Capacitance	24 in. Dia. x 30 in. Length 304L SS	<b>24590-BOF</b> -M6-DEP-00001002
DEP-SUMP-00002A E-0103	~58	RF Capacitance	24 in. Dia. x 30 in. Length 304L SS	<b>24590-BOF</b> -M6-DEP-00009001
DEP-SUMP-00002B E-0103	~58	RF Capacitance	24 in. Dia. x 30 in. Length 304L SS	<b>24590-BOF</b> -M6-DEP-00009001
DEP-SUMP-00003A E-0102	~58	RF Capacitance	24 in. Dia. x 30 in. Length 304L SS	<b>24590-BOF</b> -M6-DEP-00009004
DEP-SUMP-00003B E-0102	~58	RF Capacitance	24 in. Dia. x 30 in. Length 304L SS	<b>24590-BOF</b> -M6-DEP-00009004
DEP-SUMP-00004A E-0105	~58	RF Capacitance	24 in. Dia. x 30 in. Length 304L SS	<b>24590-BOF</b> -M6-DEP-00009002
DEP-SUMP-00004B E-0105	~58	RF Capacitance	24 in. Dia. x 30 in. Length 304L SS	<b>24590-BOF</b> -M6-DEP-00009002
DEP-SUMP-00005A E-0106	~58	RF Capacitance	24 in. Dia. x 30 in. Length 304L SS	<b>24590-BOF</b> -M6-DEP-00009005
DEP-SUMP-00005B E-0106	~58	RF Capacitance	24 in. Dia. x 30 in. Length 304L SS	<b>24590-BOF</b> -M6-DEP-00009005
<b>Leak Detection Boxes</b>				
DEP-LDB-00001 ED-B001	~7	Conductivity Switch	8 in. Dia. x 41 in. Length 316L SS	<b>24590-BOF</b> -M6-DEP-00011001
DEP-LDB-00002 ED-B001	~7	Conductivity Switch	8 in. Dia. x 41 in. Length 316L SS	<b>24590-BOF</b> -M6-DEP-00011001
DEP-LDB-00003 ED-B001	~7	Conductivity Switch	8 in. Dia. x 41 in. Length 316L SS	<b>24590-BOF</b> -M6-DEP-00011001
DEP-LDB-00004 ED-B001	~7	Conductivity Switch	8 in. Dia. x 41 in. Length 316L SS	<b>24590-BOF</b> -M6-DEP-00011001
DEP-LDB-00005 ED-B001	~7	Conductivity Switch	8 in. Dia. x 41 in. Length 316L SS	<b>24590-BOF</b> -M6-DEP-00011001
DEP-LDB-00006 ED-B001	~7	Conductivity Switch	8 in. Dia. x 41 in. Length 316L SS	<b>24590-BOF</b> -M6-DEP-00011001

**Table 4G-4 Effluent Management Facility Sumps, Leak Detection Boxes, Drain Lines/Floor Drains**

Sump/Leak Detection Box, or Floor Drain/Line I.D. # and Room #	Maximum Sump/Leak Detection Box Capacity (gallons)	Sump/Leak Detection Box Level Detection Type	Sump, Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction		Piping and Instrumentation Diagram Number
<b>Drain Lines</b>					
BOF-DEP-ZS-20282-W11A-011/02-01 ED-CH01	NA	NA	4 in. Dia. 316L SS	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001001
			1 ½ in. Dia. AL6XN	Process pipe	
BOF-DEP-ZS-20236-W31A-02-01 ED-CH01	NA	NA	4 in. Dia. Carbon Steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001001
			2 in. Dia. 316L SS	Process pipe	
BOF-DEP-ZS-20245-W11A-04-01 ED-CH01	NA	NA	6 in. Dia. 316 SS	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001001
			4 in. Dia. AL6XN	Process pipe	
BOF-DEP-ZS-20231-W31A-03-01 ED-CH01	NA	NA	6 in. Dia. Carbon Steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001001
			3 in. Dia. 316L SS	Process pipe	
BOF-DEP-ZS-20242-W31A-10-01 ED-CH01	NA	NA	14 in. Dia. Carbon Steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001001
			10 in. Dia. 316L SS	Process pipe	
BOF-DEP-ZS-20249-W31A-03-01 ED-CH01	NA	NA	6 in. Dia. Carbon Steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001001
			3 in. Dia. 316L SS	Process pipe	
BOF-DEP-ZS-20225-W31A-02-01 ED-CH01	NA	NA	4 in. Dia. Carbon steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001002
			2 in. Dia. 316L SS	Process pipe	
BOF-DEP-ZS-20219-W31A-02-01 ED-CH01	NA	NA	4 in. Dia. Carbon steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001002
			2 in. Dia. 316L SS	Process pipe	

**Table 4G-4 Effluent Management Facility Sumps, Leak Detection Boxes, Drain Lines/Floor Drains**

Sump/Leak Detection Box, or Floor Drain/Line I.D. # and Room #	Maximum Sump/Leak Detection Box Capacity (gallons)	Sump/Leak Detection Box Level Detection Type	Sump, Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction		Piping and Instrumentation Diagram Number
BOF-DEP-ZS-20222-W31A-02-01 ED-CH01	NA	NA	4 in. Dia. Carbon Steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001002
			2 in. Dia. 316L SS	Process pipe	
BOF-DEP-ZS-20252-W11A-03-01 ED-CH01	NA	NA	6 in. Dia. 316L SS	Containment pipe	<b>24590-BOF</b> -M6-DEP-00010001
			3 in. Dia. AL6XN	Process pipe	
BOF-DEP-ZS-20265-W31A-03-01 ED-CH01	NA	NA	6 in. Dia. Carbon Steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00002006
			3 in. Dia. 316L SS	Process pipe	
BOF-DEP-ZY-00181-W31A-03-01 ED-CH01	NA	NA	6 in. Dia. Carbon Steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001001
			3 in. Dia. 316L SS	Process pipe	
BOF-DEP-WU-00008-W31A-03-01 ED-CH01	NA	NA	6 in. Dia. Carbon steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001001
			3 in. Dia. 316L SS	Process pipe	
BOF-DVP-GV-00026-W31A-03-01 ED-CH01	NA	NA	6 in. Dia. Carbon steel	Containment pipe	<b>24590-BOF</b> -M6-DEP-00001001
			3 in. Dia. 316L SS	Process pipe	

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**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>Low Point Drain Vessel (DEP-VSL-00001) in ED-B001 (see 24590-BOF-M6-DEP-00001001/00001002)</b>								
DEP-LT-8109; DEP-LI-8109; DEP-LSHH- 8109	RF level transmitter – Room ED-0102; graphic display liquid level indicator (control room); level interlock (software)	Liquid level in DEP-VSL-00001	2,456-10,537 gallons	13,900 gallons <sup>3</sup>	+/- 0.25 % span	DEP-LSHH-8109 12,423 gallons	Overfill protection; measures and transmits liquid level to PCJ Level Switch High High (LSHH) activates the high-high alarm in control room LSHH closes the following valves to prevent overflow: DEP-YV-8409 DEP-YV-8628 DEP-YV-8631 DEP-YV-8285 DEP-YV-8101 DEP-YV-8102 DEP-YV-8103 DEP-YV-8687 DEP-YV-8682 LSHH stops the following pumps to prevent overflow: DEP-PMP-00034A DEP-PMP-00034B DEP-PMP-00038	Not Calibratable <sup>4</sup>

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>Low Point Drain Vessel Sump (DEP-SUMP-00001) in ED-B001C (see 24590-BOF-M6-DEP-00001002)</b>								
DEP-LT-8112; DEP-LI-8112A; DEP-LKY- 8112A	RF level transmitter – Room ED-0102; Graphic display liquid level and leak rate indicator (control room)	Liquid level in DEP-SUMP- 00001	0 gallons, sump normally dry	58.7 gallons	±0.25 % span	DEP-LI-8112A High: 1 gal High-high: 58.7 gallons DEP-LKY-8112A: High: 0.1 gal/hr	Leak detection; measure and transmits liquid level to PCJ Level Indicator (LI) alarms high level and high-high level and activates the LKY function  LKY High alarms high leak rate in the control room	Not Calibratable <sup>4</sup>
<b>Effluent Transfer Leak Detection Box (DEP-LDB-00001) in Room ED-B001 (see 24590-BOF-M6-DEP-00011001)</b>								
DEP-LSH-8701 DEP-LAH-8701	RF level switch/ ED-B001B Graphic alarm display/Control room	Liquid level in DEP-LDB- 00001  Presence or absence of liquid	0 gallons, LDB normally dry	9 gallons	N/A	DEP-LAH-8701 is driven by DEP-LSH-8701  Activates when in contact with liquid, set at 0.08 gallon	Detect liquid in LDB: presence or absence of liquid  Level Alarm High (LAH) alarms detection of liquid in control room  Level Switch High (LSH) stops transfer in co-axial pipe by shutting off: DEP-PMP-12A DEP-PMP-12B DEP-PMP-12C DEP-PMP-3A DEP-PMP-3B	Functional Test Annually  Not Calibratable

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
							DEP-PMP-15A DEP-PMP-15B DEP-PMP-15C SNR-PMP-00022 LSH closes DEP-YV-8405 DEP-UI-8170 notifies TOC transfer has been stopped	
<b>LAWPS Transfer Leak Detection Box (DEP-LDB-00002) in Room ED-B001 (see 24590-BOF-M6-DEP-00011001)</b>								
DEP-LSH-8702 DEP-LAH-8702	RF level switch/ ED-B001B Graphic alarm display/Control room	Liquid level in DEP-LDB- 00002 Presence or absence of liquid	0 gallons, LDB normally dry	9 gallons	N/A	DEP-LAH-8702 is driven by DEP-LSH-8702 Activates when in contact with liquid, set at 0.08 gal	Detect liquid in LDB: presence or absence of liquid LAH alarms detection of liquid in control room LSH stops transfers in co-axial pipe: DEP-YV-8687 closes to stop feeding leak DEP-UI-8688 notifies TOC to stop the transfer	Functional Test Annually Not Calibratable

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>LAWPS Transfer Leak Detection Box (DEP-LDB-00003) in Room ED-B001 (see 24590-BOF-M6-DEP-00011001)</b>								
DEP-LSH-8703 DEP-LAH-8703	RF level switch/ ED-B001B  Graphic alarm display/Control room	Liquid level in DEP-LDB- 00003  Presence or absence of liquid	0 gallons, LDB normally dry	9 gallons	N/A	DEP-LAH-8703 is driven by DEP-LSH-8703  Activates when in contact with liquid, set at 0.08 gallon	Detect liquid in LDB: presence or absence of liquid  LAH alarms detection of liquid in control room  LSH stops transfer in co-axial pipe by: Shutting off DEP-PMP- 00003A/00003B, DEP-PMP-00025  Closing DEP-YV- 8683/8687: DEP-UI- 8688 notifies TOC to stop the transfer	Functional Test Annually  Not Calibratable
<b>SBS / Plant Wash Transfer Leak Detection Box (DEP-LDB-00004) in Room ED-B001 (see 24590-BOF-M6-DEP-00011001)</b>								
DEP-LSH-8706 DEP-LAH-8706	RF level switch/ ED-B001B  Graphic alarm display/Control room	Liquid level in DEP-LDB- 00004  Presence or absence of liquid	0 gallons, LDB normally dry	9 gallons	N/A	DEP-LAH-8706 is driven by DEP-LSH-8706  Activates when in contact with liquid, set at 0.08 gallon	Detect liquid in LDB: presence or absence of liquid  LAH alarms detection of liquid in control room  LSH stops transfer in co-axial pipe by shutting off: RLD-PMP- 00003A/00003B and RLD-PMP- 00001A/00001B	Functional Test Annually  Not Calibratable

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>Scrubber Blowdown Leak Detection Box (DEP-LDB-00005) in Room ED-B001 (see 24590-BOF-M6-DEP-00011001)</b>								
DEP-LSH-8705 DEP-LAH-8705	RF level switch/ ED-B001B  Graphic alarm display/Control room	Liquid level in DEP-LDB- 00005  Presence or absence of liquid	0 gallons, LDB normally dry	9 gallons	N/A	DEP-LAH-8705 is driven by DEP-LSH-8705  Activates when in contact with liquid, set at 0.08 gallon	Detect liquid in LDB: presence or absence of liquid  LAH alarms detection of liquid in control room  LSH stops transfer in co-axial pipe by shutting off: LVP-PMP- 00002A/00002B.	Functional Test Annually  Not Calibratable
<b>LAB Transfer Leak Detection Box (DEP-LDB-00006) in Room ED-B001 (see 24590-BOF-M6-DEP-00011001)</b>								
DEP-LSH-8704 DEP-LAH-8704	RF level switch/ ED-B001B  Graphic alarm display/Control room	Liquid level in DEP-LDB- 00006  Presence or absence of liquid	0 gallons, LDB normally dry	9 gallons	N/A	DEP-LAH-8704 is driven by DEP-LSH-8704  Activates when in contact with liquid, set at 0.08 gallon	Detect liquid in LDB: presence or absence of liquid  LAH alarms detection of liquid in control room  LSH stops transfer in co-axial pipe by shutting off: RLD-PMP- 00182A/00182B	Functional Test Annually  Not Calibratable

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>Overhead Sampling Vessel (DEP-VSL-00004A) in E-0106 (see 24590-BOF-M6-DEP-00004001)</b>								
DEP-LT-8305; DEP-LI-8305; DEP-LI-8305A; DEP-LSHHH- 8305	Radar level transmitter – Room E-0106; graphic display liquid level indicator (control room); level interlock (software)	Liquid level in DEP-VSL-00004A	1,197 – 26,555 gal	36,600 gallons <sup>3</sup>	+/- 0.2 in.	DEP-LSHHH-8305 35,312 gallons	Overfill protection; measure and transmits liquid level to PCJ Level Switch High High High (LSHHH) activates the high high high alarm in control room LSHHH-8305 stops transfers to overhead sampling vessel (A) via DEP-YC-8301, -8302, -8304, -8316, -8631, -8628, -8634, -8657, FC-8321B and NLD-YC-8806 and open transfer path to DEP-VSL-00004B via DEP-YC-8308	Not Calibratable <sup>4</sup>

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>Overhead Sampling Vessel (DEP-VSL-00004B) in E-0106 (see 24590-BOF-M6-DEP-00004002)</b>								
DEP-LT-8312; DEP-LI-8312; DEP-LI-8312A DEP-LSHHH- 8312	Radar level transmitter – Room E-0106; graphic display liquid level indicator (control room); level interlock (software)	Liquid level in DEP-VSL-00004B	1,197 – 26,555 gallons	36,600 gallons <sup>3</sup>	+/- 0.2 in.	DEP-LSHHH-8312 35,312 gallons	Overfill protection; measure and transmits liquid level to PCJ LSHHH activates the high high high alarm in control room LSHHH-8312 stops transfers to overhead sampling vessel (B) via DEP-YC-8308,-8318,-8309,-8311,-8631,-8628,-8634,-8657, FC-8321B, and NLD-YC-8806 and open transfer path to DEP-VSL-00004A via DEP-YC-8301	Not Calibratable <sup>4</sup>
<b>Evaporator Feed Vessel (DEP-VSL-00002) in E-0105 (see 24590-BOF-M6-DEP-00002001/00002002)</b>								
DEP-LT-8156; DEP-LI-8156A; DEP-LSHHH- 8156;	RF level transmitter – Room E-0106A; graphic display liquid level indicator (control room); level interlock (software)	Liquid level in DEP-VSL-00002	420-29,635 gallons	38,000 gallons <sup>3</sup>	+/- 0.25 % span	DEP-LSHHH-8156 37,115 gallons	LSHHH-8156 stops transfers to overhead sampling vessel via DEP-YC-8151,-8152,-8153,-8276,and DEP-PNL-00001 LSHHH activates the high high high alarm in control room DEP-FV-8227B stops feed to vessel	Not Calibratable <sup>4</sup>

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>Evaporator Concentrate Vessel (DEP-VSL-00003A) in E-0105 (see 24590-BOF-M6-DEP-00005001)</b>								
DEP-LT-8357; DEP-LI-8357; DEP-LI-8357A; DEP-LSHHH- 8357	RF level transmitter – Room E-0106A; graphic display liquid level indicator (control room); level interlock (software)	Liquid level in DEP-VSL- 00003A	900-9,438 gallons	11,700 gallons <sup>3</sup>	+/- 0.25 % span	DEP-LSHHH-8357 10,948 gallons	Overfill protection; measure and transmits liquid level to PCJ LSHHH activates the high high high alarm in control room LSHHH-8357 stops transfers to evaporator concentrate vessel (A) via DEP-YC-8353, -8354,-8196,-8424, -8428, and -8419	Not Calibratable <sup>4</sup>
<b>Evaporator Concentrate Vessel (DEP-VSL-00003B) in E-0105 (see 24590-BOF-M6-DEP-00005002)</b>								
DEP-LT-8368; DEP-LI-8368; DEP-LI-8368A; DEP-LSHHH- 8368	RF level transmitter – Room E-0106A; graphic display liquid level indicator (control room); level interlock (software)	Liquid level in DEP-VSL- 00003B	900-9,438 gallons	11,700 gallons <sup>3</sup>	+/- 0.25 % span	DEP-LSHHH-8368 10,948 gallons	Overfill protection; measure and transmits liquid level to PCJ LSHHH activates high high high alarm in control room LSHHH-8368 stops transfers to evaporator concentrate vessel (B) via DEP-YC-8364, -8367,-8197,-8425, -8429, and -8419	Not Calibratable <sup>4</sup>

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>Evaporator Concentrate Vessel (DEP-VSL-00003C) in E-0105 (see 24590-BOF-M6-DEP-00005003)</b>								
DEP-LT-8379; DEP-LI-8379; DEP-LI-8379A; DEP-LSHHH- 8379	RF level transmitter – Room E-0106A; graphic display liquid level indicator (control room); level interlock (software)	Liquid level in DEP-VSL- 00003C	900-9,438 gallons	11,700 gallons <sup>3</sup>	+/- 0.25 % span	LSHHH-8379 10,948 gallons	Overfill protection; measure and transmits liquid level to PCJ LSHHH activates high high high alarm in control room LSHHH-8379 stops transfers to evaporator concentrate vessel (C) via DEP-YC-8375, -8378,-8198,-8426, -8430, and -8419	Not Calibratable <sup>4</sup>
<b>Feed Vessel Area Sump (DEP-SUMP-00004A) in E-0105 (see 24590-BOF-M6-DEP-00009002)</b>								
DEP-LT-8632; DEP-LI-8632A; DEP-LKY- 8632A	RF level transmitter – Room E-0106A; Graphic display liquid level and leak rate indicator (control room)	Liquid level in DEP-SUMP- 00004A	0 gallons, sump normally dry	50.5 gallons	+/- 0.25 % span	DEP-LI-8632A: High: 1 gallon High-High: 50.5 gallons DEP-LKY-8632A 0.1 gal/hr	Leak detection; measure and transmits liquid level to PCJ LI alarms high level in control room and activates the LKY function LI alarms high-high level in control room LKY alarms high leak rate in control room	Not Calibratable <sup>4</sup>

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>Feed Vessel Area Sump (DEP-SUMP-00004B) in E-0105 (see 24590-BOF-M6-DEP-00009002)</b>								
DEP-LT-8656; DEP-LI-8656A; DEP-LKY- 8656A	RF level transmitter – Room E-0106A; Graphic display liquid level and leak rate indicator (control room)	Liquid level in DEP-SUMP-00004B	0 gallons, sump normally dry	50.5 gallons	+/- 0.25 % span	DEP-LI-8656A: High: 1 gallon High-high: 50.5 gallons DEP-LKY-8656A 0.1 gal/hr	Leak detection; measure and transmits liquid level to PCJ LI alarms high level in control room and activates the LKY function LI alarms high-high level in control room LKY alarms high leak rate in control room	Not Calibratable <sup>4</sup>
<b>Process Condensate Lag Storage Vessel (DEP-VSL-00005A) in E-0106 (see 24590-BOF-M6-DEP-00006001)</b>								
DEP-LT-8458 DEP-LI-8458 DEP-LI-8458A DEP-LSHHH- 8458	Bubbler level transmitter – Room E-0106; graphic display liquid level indicator (control room); level interlock (software)	Liquid level in DEP-VSL-00005A	2,280-101,898 gallons	108,208 gallons <sup>3</sup>	Differential pressure accuracy: 0.05% span	DEP-LSHHH-8458 105,718 gallons	Overfill protection; measure and transmits liquid level to PCJ LSHHH alarms high high high level in control room LSHHH-8458 stops transfers to process condensate lag storage vessel (A) via DEP-YC-8451,-8452,-8453,-8454,-8456, and FC-8493A Stops feed to vessel with: DEP-PMP-00033A/B,-00035A/B via -8651,-8653,-8639,-8642	At least every 1825 Days

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

<b>Instrument/ Monitor Tag Number</b>	<b>Type and Location</b>	<b>Monitored Parameter</b>	<b>Expected Operating Range<sup>1</sup></b>	<b>Vessel Overflow<sup>1</sup></b>	<b>Accuracy<sup>1</sup></b>	<b>Setpoint(s)<sup>2</sup></b>	<b>Control Function</b>	<b>Minimum Calibration or Functional Test Frequency</b>
DEP-DI-8455 DEP-DT-8455	DCS – Density indicator and transmitter (bubbler) – Room E-0106	Density monitoring in DEP-VSL-00005A	55-70 lbm/ft <sup>3</sup>	N/A	0.035 % span	N/A	Information only – records concentration of the condensate stored in DEP-VSL-00005A	At least every 1825 Days
<b>Process Condensate Lag Storage Vessel (DEP-VSL-00005B) in E-0106 (see 24590-BOF-M6-DEP-00006002)</b>								
DEP-LT-8468 DEP-LI-8468 DEP-LI-8468A DEP-LSHHH-8468	Bubbler level transmitter – Room E-0106; graphic display liquid level indicator (control room); level interlock (software)	Liquid level in DEP-VSL-00005B	2,280-101,898 gallons	108,208 gallons <sup>3</sup>	Differential pressure accuracy: 0.05% span	DEP-LSHHH-8468 105,718 gallons	Overfill protection; measure and transmits liquid level to PCJ LSHHH-8468 stops transfers to process condensate lag storage vessel (B) via DEP-YC-8461,-8462,-8463,-8464,-8467,- and FC-8493A  Stops feed to vessel with: DEP-PMP-00033A/B, -00035A/B via 8651,-8653,-8639,-8642	At least every 1825 Days
DEP-DI-8481 DEP-DT-8481	DCS – Density indicator and transmitter (bubbler) – Room E-0106	Density monitoring in DEP-VSL-00005B	55-70 lbm/ft <sup>3</sup>	N/A	0.035 % span	N/A	Information only – records concentration of the condensate stored in DEP-VSL-00005B	At least every 1825 Days

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

<b>Instrument/ Monitor Tag Number</b>	<b>Type and Location</b>	<b>Monitored Parameter</b>	<b>Expected Operating Range<sup>1</sup></b>	<b>Vessel Overflow<sup>1</sup></b>	<b>Accuracy<sup>1</sup></b>	<b>Setpoint(s)<sup>2</sup></b>	<b>Control Function</b>	<b>Minimum Calibration or Functional Test Frequency</b>
<b>Process Condensate Vessel Area Sump (DEP-SUMP-00005A) in E-0106 (see 24590-BOF-M6-DEP-00009005)</b>								
DEP-LT-8638; DEP-LI-8638A; DEP-LKY- 8638A	RF level transmitter – Room E-0106; Graphic display liquid level and leak rate indicator (control room)	Liquid level in DEP-SUMP- 00005A	0 gallons, sump normally dry	50.5 gallons	+/- 0.25 % span	DEP-LI-8638A High: 1 gallon High-high: 50.5 gallons DEP-LKY-8638A High: 0.1 gal/hr	Leak detection; measure and transmits liquid level to PCJ LI alarms -high level in control room and activates the LKY function LI alarms high-high level in control room LKY alarms high leak rate in control room	Not Calibratable <sup>4</sup>
<b>Process Condensate Vessel Area Sump (DEP-SUMP-00005B) in E-0106 (see 24590-BOF-M6-DEP-00009005)</b>								
DEP-LT-8641; DEP-LI-8641A; DEP-LKY- 8641A	RF level transmitter – Room E-0106; Graphic display liquid level and leak rate indicator (control room)	Liquid level in DEP-SUMP- 00005B	0 gallons, sump normally dry	50.5 gallons	+/- 0.25 % span	DEP-LI-8641A High: 1 gallon High-high: 50.5 gallons DEP-LKY-8641A High: 0.1 gal/hr	Leak detection; measure and transmits liquid level to PCJ LI alarms high level in control room and activates the LKY function LI alarms high-high level in control room LKY alarms highleak rate in control room	Not Calibratable <sup>4</sup>

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>West Process Area Sump (DEP-SUMP-00002A) in E-0103 (see 24590-BOF-M6-DEP-00009001)</b>								
DEP-LT-8626; DEP-LI-8626A; DEP-LKY- 8626A	RF level transmitter – Room E-0103; Graphic display liquid level and leak rate indicator (control room)	Liquid level in DEP-SUMP- 00002A	0 gallons, sump normally dry	50.5 gallons	+/- 0.25 % span	DEP-LI-8626A High: 1 gallon High-high: 50.5 gallons DEP-LKY-8626A High: 0.1 gal/hr	Leak detection; measure and transmits liquid level to PCJ LI alarms high level in control room and activates the LKY function LI alarms high-high level in control room LKY alarms high leak rate in control room	Not Calibratable <sup>4</sup>
<b>West Process Area Sump (DEP-SUMP-00002B) in E-0103 (see 24590-BOF-M6-DEP-00009001)</b>								
DEP-LT-8629; DEP-LI-8629A; DEP-LKY- 8629A	RF level transmitter – Room E-0103; Graphic display liquid level and leak rate indicator (control room)	Liquid level in DEP-SUMP- 00002B	0 gallons, sump normally dry	50.5 gallons	+/- 0.25 % span	DEP-LI-8629A High: 1 gallon High-high: 50.5 gallons DEP-LKY-8629A 0.1 gal/hr	Leak detection; measure and transmits liquid level to PCJ LI alarms high level in control room and activates the LKY function LI alarms high-high level in control room LKY alarms high leak rate in control room Any leaks from DEP-RBLR-00001 drain to DEP-SUMP- 00002B	Not Calibratable <sup>4</sup>

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

<b>Instrument/ Monitor Tag Number</b>	<b>Type and Location</b>	<b>Monitored Parameter</b>	<b>Expected Operating Range<sup>1</sup></b>	<b>Vessel Overflow<sup>1</sup></b>	<b>Accuracy<sup>1</sup></b>	<b>Setpoint(s)<sup>2</sup></b>	<b>Control Function</b>	<b>Minimum Calibration or Functional Test Frequency</b>
<b>East Process Area Sump (DEP-SUMP-00003A) in E-0102 (see 24590-BOF-M6-DEP-00009004)</b>								
DEP-LT-8646; DEP-LI-8646A; DEP-LKY- 8646A	RF level transmitter – Room E-0102; Graphic display liquid level and leak rate indicator (control room)	Liquid level in DEP-SUMP- 00003A	0 gallons, sump normally dry	50.5 gallons	+/- 0.25 % span	DEP-LI-8646A High: 1 gallon High-high: 50.5 gallons DEP-LKY-8646A: 0.1 gal/hr	Leak detection; measure and transmits liquid level to PCJ LI alarms high level in control room and activates the LKY function LI alarms high-high level in control room LKY alarms high leak rate in control room	Not Calibratable <sup>4</sup>
<b>East Process Area Sump (DEP-SUMP-00003B) in E-0102 (see 24590-BOF-M6-DEP-00009004)</b>								
DEP-LT-8647; DEP-LI-8647A; DEP-LKY- 8647A	RF level transmitter – Room E-0102; Graphic display liquid level and leak rate indicator (control room)	Liquid level in DEP-SUMP- 00003B	0 gallons, sump normally dry	50.5 gallons	+/- 0.25 % span	DEP-LI-8647A High: 1 gallon High-high: 50.5 gallons DEP-LKY-8647A 0.1 gal/hr	Leak detection; measure and transmits liquid level to PCJ LI alarms high level in control room and activates the LKY function LI alarms high-high level in control room LKY alarms high leak rate in control room Contents of any leaks from DEP-COND- 00001, -00002, and -00003 drain to DEP-SUMP-00003B	Not Calibratable <sup>4</sup>

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>Effluent Management Facility Transfer Lines to LERF/ETF via Isolated Pretreatment RLD System Connection (see 24590-BOF-M6-DEP-00006003 and 24590-PTF-M6-PWD-00058002)</b>								
RLD-LSH-1001	Thermal level switch	Liquid level in RLD-LDB-00012 Presence or absence of liquid	0 gallons, LDB normally dry	7 gallons	N/A	RLD-LAH-1001 is driven by RLD-LSH-1001 Activates when in contact with liquid, set at 0.08 gallon	Detect liquid in LDB: presence or absence of liquid LAH alarms detection of liquid in control room LSH stops transfer in co-axial pipe by shutting off DEP-PMP-00005A, DEP-PMP-00005B and closing valves YV-8487 and YV-8488	Functional Test Annually Not Calibratable
RLD-LSH-1002	Thermal level switch	Liquid level in RLD-LDB-00013 Presence or absence of liquid	0 gallons, LDB normally dry	7 gallons	N/A	RLD-LAH-1002 is driven by RLD-LSH-1002 Activates when in contact with liquid, set at 0.08 gallon	Detect liquid in LDB: presence or absence of liquid LAH alarms detection of liquid in control room LSH stops transfer in co-axial pipe by shutting off DEP-PMP-00005A, DEP-PMP-00005B and closing valves YV-8487 and YV-8488	Functional Test Annually Not Calibratable

**Table 4G-5 Effluent Management Facility Tank System Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
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## Footnotes

<sup>1</sup>These values (i.e., expected operating range, vessel overflow and accuracy) are estimated, not automatic waste feed cut-offs and under the control of the Permittee.

<sup>2</sup>Instrument setpoint values are operational parameters controlled by the permittee(s), included in the permit for reference and may require adjustment during operations, as needed. Setpoints included as operational parameters do not necessitate notification to the Department of Ecology (Ecology). Sump setpoints provide minimum submergence for sump pump operation. Setpoints and associated alarms and interlock activation may require adjustment during initial operations in order to optimize waste processing. Adjustment of set-points can be made during the Technical Assistance Program period described in Permit Condition III.10.C.17 without being considered a modification to the permit. Following completion of the Technical Assistance Program period, any changes to the set-points in this table will be submitted as a permit modification. The Permittees will formally submit a permit modification notification to Ecology within 90 days of implementing changes to the identified setpoints, including subsequent updates to associated design documents included in permit appendices, if affected.

<sup>3</sup>Nominal, corresponding to vessel overflow.

<sup>4</sup>The RF type Level Transmitters are pre-calibrated with recommendation from the vendor to not recalibrate.

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**Table 4G-6 Effluent Management Facility Miscellaneous Unit Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>DEP-EVAP-00001 (Evaporator Separator Vessel) in E-0103 (see 24590-BOF-M6-DEP-00002003)</b>								
DEP-FT-8182	Flow transmitter – Magnetic (E-0103)	Monitor flow from DEP-PMP- 00002A/B to DEP-EVAP- 00001 bottoms	0 – 20 US gal/min	N/A	0.25% of indicated flow	N/A	Indicates flow rate to DEP-EVAP-00001 bottoms, adjusts DEP-LV-8210A	Not Calibratable <sup>3</sup>
<b>DEP-EVAP-00001 (Evaporator Separator Vessel) in E-0103 (see 24590-BOF-M6-DEP-00003001)</b>								
DEP-LE-8210 DEP-LT-8210 DEP-LI-8210	Level element – RF admittance (EP0103C); Level transmitter – RF Admittance	DEP-EVAP- 0001 level monitoring	51.75 – 66.75 inches	108 in. Note: Does not represent vessel overflow.	± 0.25% span	DEP-LSHH- 8210A 69.7 inches	Indicates DEP-EVAP- 00001 Level Secondary – provides input to DEP-HS-8210	Not Calibratable <sup>3</sup>

**Table 4G-6 Effluent Management Facility Miscellaneous Unit Process and Leak Detection System Instruments and Parameters**

<b>Instrument/ Monitor Tag Number</b>	<b>Type and Location</b>	<b>Monitored Parameter</b>	<b>Expected Operating Range<sup>1</sup></b>	<b>Vessel Overflow<sup>1</sup></b>	<b>Accuracy<sup>1</sup></b>	<b>Setpoint(s)<sup>2</sup></b>	<b>Control Function</b>	<b>Minimum Calibration or Functional Test Frequency</b>
DEP-LSHH-8210A	(E-0102); DCS Level Indicator; DCS Level Interlock			Higher levels prevent proper evaporator function.				
DEP-LE-8211 DEP-LT-8211 DEP-LI-8211 DEP-LI-8210A DEP-LSHH-8210A	Level element – RF admittance (EP0103C); Level transmitter – RF Admittance (E-0102); DCS Level Indicator	DEP-EVAP-0001 level monitoring	51.75 – 66.75 inches	108 in.  Note: Does not represent vessel overflow. Higher levels prevent proper evaporator function.	± 0.25% span	DEP-LSHH-8210A 69.7 inches	LI-8211 Indicates DEP-EVAP-00001 Level Primary – provides input to DEP-HS-8210  LI-8210A Indicates the lower of LI-8210 and LI-8211  LSHH activates the high-high alarm in control room  LSHH closes the following valves: DEP-YV-8205  LSHH stops DEP-PMP-00002A/B, -00014A/B and closes DEP-YV-8205	Not Calibratable <sup>3</sup>

**Table 4G-6 Effluent Management Facility Miscellaneous Unit Process and Leak Detection System Instruments and Parameters**

Instrument/ Monitor Tag Number	Type and Location	Monitored Parameter	Expected Operating Range <sup>1</sup>	Vessel Overflow <sup>1</sup>	Accuracy <sup>1</sup>	Setpoint(s) <sup>2</sup>	Control Function	Minimum Calibration or Functional Test Frequency
<b>DEP-FILT-00003 (Evaporator Feed Vessel Pre-Filter) in E-0103 (see 24590-BOF-M6-DEP-00002004)</b>								
DEP-PT-8192 DEP-PT-8194 DEP-PDI-8192	Pressure Transmitter with Diaphragm Seal in E-0103A	Pressure in DEP-FILT- 00003	135 – 195 psig	N/A	0.075 % span	DEP-PDI-8192 High 15 psi	High differential pressure alarm for DEP-FILT-00003. Measure and transmit pressure to PCJ PDI alarms high differential pressure across the filter in the control room	Calibration PT-8192, 365 Days PT-8194, 365 Days

Footnotes

<sup>1</sup>These values (i.e., expected operating range, vessel overflow and accuracy) are estimated, not automatic waste feed cut-offs and under the control of the Permittee.

<sup>2</sup>Instrument setpoint values are operational parameters controlled by the permittee(s), included in the permit for reference and may require adjustment during operations, as needed. Setpoints included as operational parameters do not necessitate notification to Ecology. Setpoints and associated alarms and interlock activation may require adjustment during initial operations in order to optimize waste processing. Adjustment of set-points can be made during the Technical Assistance Program period described in Permit Condition III.10.C.17 without being considered a modification to the permit. Following completion of the Technical Assistance Program period, any changes to the set-points in this table will be submitted as a permit modification. The Permittees will formally submit a permit modification notification to Ecology within 90 days of implementing changes to the identified setpoints, including subsequent updates to associated design documents included in permit Appendices, if affected.

<sup>3</sup>The RF type Level Transmitters are pre-calibrated with recommendation from the vendor to not recalibrate.

**Table 4G-7 Effluent Management Facility Plant Penetration Seal Location**

<b>Row Number</b>	<b>Room Number</b>	<b>Orientation</b>	<b>Discipline<sup>1</sup></b>	<b>Sequence Number</b>
1.	E-0102	E	PD	00220
2.	E-0102	E	PD	00283
3.	E-0102	N	PD	00173
4.	E-0102	N	PD	00175
5.	E-0102	N	PD	00176
6.	E-0102	N	PD	00177
7.	E-0102	N	PD	00179
8.	E-0102	N	PD	00180
9.	E-0102	N	PD	00181
10.	E-0102	N	PD	00182
11.	E-0102	N	PD	00183
12.	E-0102	N	PD	00184
13.	E-0102	N	PD	00188
14.	E-0102	N	PD	00189
15.	E-0102	N	PD	00190
16.	E-0102	N	PD	00191
17.	E-0102	N	PD	00195
18.	E-0102	N	PD	00196
19.	E-0102	N	PD	00197
20.	E-0102	N	PD	00198
21.	E-0102	N	PD	00199
22.	E-0102	N	PD	00200
23.	E-0102	N	PD	00201
24.	E-0102	W	PD	00209
25.	E-0102	W	PD	00211
26.	E-0102	W	PD	00227
27.	E-0102	N	PD	00237
28.	E-0102	N	PD	00238
29.	E-0102	N	PD	00239
30.	E-0102	W	PD	00295
31.	E-0102	W	PD	00305
32.	E-0102	W	BK	50100
33.	E-0102	W	BK	50200
34.	E-0103	E	PD	00212
35.	E-0103	E	PD	00228
36.	E-0103	E	PD	00258

**Table 4G-7 Effluent Management Facility Plant Penetration Seal Location**

<b>Row Number</b>	<b>Room Number</b>	<b>Orientation</b>	<b>Discipline<sup>1</sup></b>	<b>Sequence Number</b>
37.	E-0103	E	PD	00260
38.	E-0103	E	PD	00261
39.	E-0103	E	PD	00276
40.	E-0103	E	PD	00286
41.	E-0103	E	PD	00294
42.	E-0103	N	PD	00204
43.	E-0103	N	PD	00206
44.	E-0103	N	PD	00215
45.	E-0103	N	PD	00242
46.	E-0103	N	PD	00243
47.	E-0103	N	PD	00244
48.	E-0103	N	PD	00249
49.	E-0103	N	PD	00251
50.	E-0103	N	PD	00267
51.	E-0103	N	PD	00268
52.	E-0103	N	PD	00269
53.	E-0103	N	PD	00270
54.	E-0103	N	PD	00271
55.	E-0103	N	PD	00274
56.	E-0103	N	PD	00275
57.	E-0103	N	PD	00280
58.	E-0103	N	PD	00281
59.	E-0103	N	PD	00287
60.	E-0103	N	PD	00288
61.	E-0103	N	PD	00599
62.	E-0105	S	PD	00163
63.	E-0105	S	PD	00164
64.	E-0105	S	PD	00165
65.	E-0105	S	PD	00166
66.	E-0105	S	PD	00205
67.	E-0105	S	PD	00210
68.	E-0105	E	PD	00256
69.	E-0106	S	PD	00019
70.	E-0106	S	PD	00021
71.	E-0106	S	PD	00170
72.	E-0106	S	PD	00171

**Table 4G-7 Effluent Management Facility Plant Penetration Seal Location**

<b>Row Number</b>	<b>Room Number</b>	<b>Orientation</b>	<b>Discipline<sup>1</sup></b>	<b>Sequence Number</b>
73.	E-0106	S	PD	00187
74.	E-0106	S	PD	00240
75.	E-0106	S	PD	00257
76.	ED-0102	F	PD	00233
77.	ED-B001	C	PD	00231

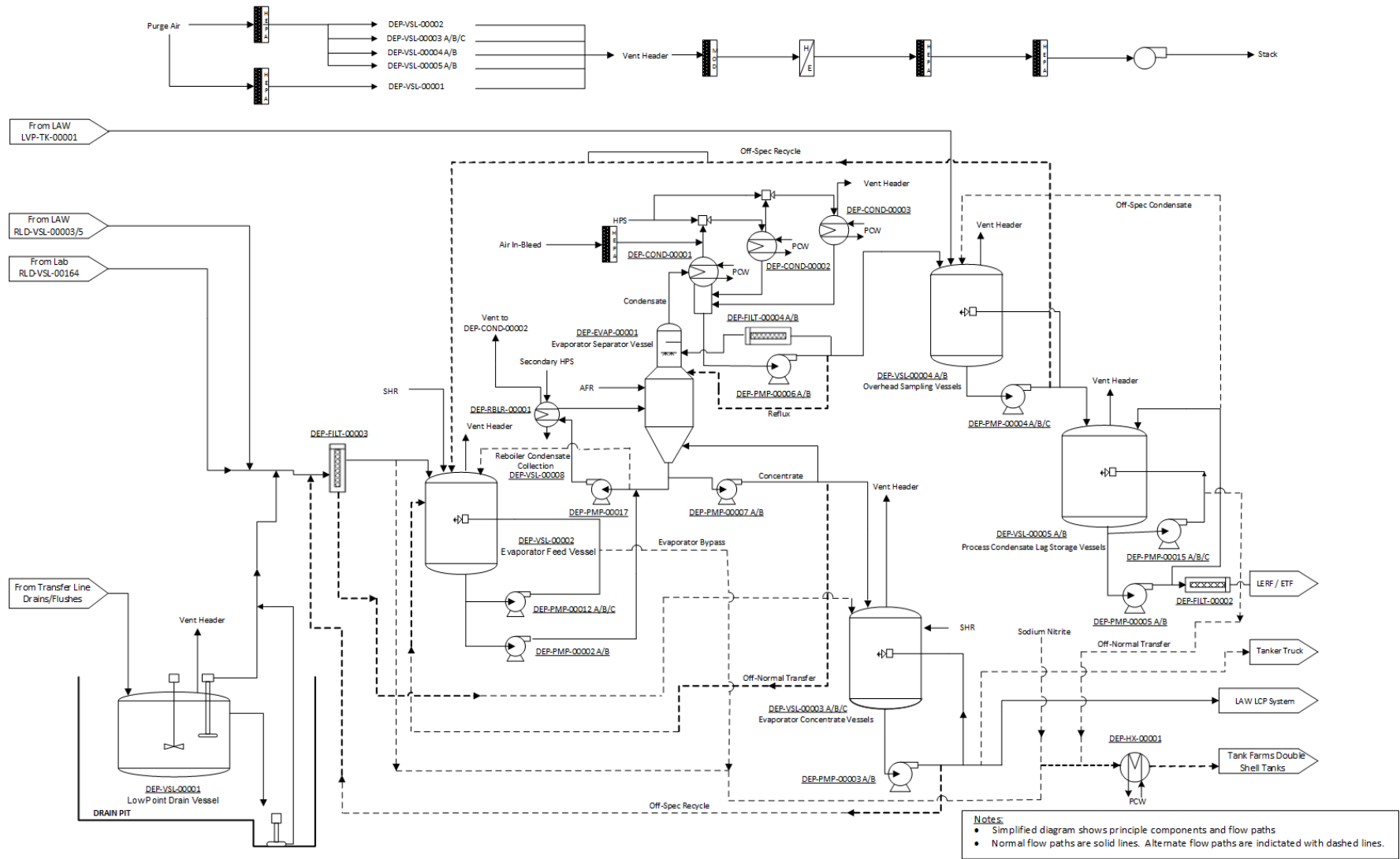
<sup>1</sup>Designation for penetration seal Discipline.

PD = Plant Design

BK = Concrete Opening with Multiple Penetrating Objects

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Figure 4G-1 Effluent Management Facility Process Flow

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