1.0 PURPOSE AND SCOPE

This procedure is used for tracking fissile material inventory within the Liquid Effluent Retention Facility (LERF) to ensure it is maintained at less than 24 g Pu-239. A fissile inventory of less than 24 g Pu-239 ensures the quantity is below 1.5 curies in LERF, the level in HNF-SD-LEF-ASA-002, “242AL Liquid Effluent Retention Facility Auditable Safety Analysis.” Refer to WRPS-1601296, “Transmittal of Criticality Safety Determination for LERF and ETF Operations.”

The fissile isotopes of potential concern are U-233, U-235, and Pu-239. Uranium in the LERF wastewaters are exempt from criticality safety control because the U-235 enrichment is less than 0.96 wt% of the total uranium. This procedure ensures the Pu-239 inventory at LERF is maintained below the threshold where the criticality safety program for the Tank Operations Contractor (TFC-PLN-49) would become applicable.

This procedure is used to track the fissile material inventory of the three LERF basins (Basin 42, Basin 43, and Basin 44). The LERF fissile material inventory is verified annually to ensure the inventory is less than 24 g Pu-239. All waste streams added or removed from the basins are tracked, including:

- Tanker additions to LERF from the Effluent Treatment Facility (ETF) Load-In Station
- Pipeline additions to LERF from 242-A Evaporator or ERDF
- Waste transfers from LERF to ETF during ETF processing.

New waste streams are evaluated for compliance with fissile material limits prior to transfer to LERF. This is accomplished by screening the fissile material inventory within the new wastewater feed against existing fissile material inventory within LERF. The screening of new wastewater feed is performed per TFC-ENG-FACSUP-P-34.

This procedure applies whenever wastewater is transferred into or out of the three LERF basins.

2.0 IMPLEMENTATION

This procedure is effective on the date shown in the header.

3.0 RESPONSIBILITIES

3.1 ETF Facility Manager

Ensures facility classification is maintained.

3.2 ETF Engineering Manager

Ensures fissile material inventory in the facility is determined and controlled.
4.0 PROCEDURE

4.1 Completion of LERF Basin Fissile Material Inventory Sheet (Figure 1)

NOTE: Multiple transfers of a wastewater of the same type may be combined into a single wastewater batch. For example, five tanker receipts of a wastewater at 5,000 gallons each may be combined into a single wastewater batch of 25,000 gallons.

ETF Engineer

1. Enter LERF basin number.

2. Enter the date in which wastewater batch transfer was completed.

3. Identify the source of wastewater batch transferred or enter “Basin to ETF” for transfers from LERF basin to ETF.

NOTE: Gross Alpha is used for wastewaters that do not have sample analysis for Pu-239.

4. Enter concentration of plutonium-239/Gross Alpha in wastewater batch transferred.

5. Enter volume of wastewater batch transferred.

   a. Enter a minus sign (-) for volume transferred from LERF basin to ETF.

   b. Enter a plus sign (+) for volume transferred to LERF basin.

NOTE: The simple formulas used in this procedure are considered computations per TFC-ENG-DESIGN-C-10, “Engineering Calculations.”

6. Calculate and enter the weight of Pu-239 in the wastewater batch:

   Batch Pu-239 (grams) = 6.10E-11 * Batch Pu-239 (pCi/L) * Batch Volume (gallons)

   Where:

   6.10E-11 = Factor for converting pCi/L to g/gallon = 3.7854 L/gal * 1E-12 Ci/pCi ÷ 0.06207 Ci/g, where 0.06207 Ci/g is the specific activity of Pu-239.

7. Repeat steps 1 through 6 for each wastewater batch received into the basin, attaching additional inventory sheets if needed.

8. Total the quantities of Pu-239 in Column 7.

9. Sign the inventory sheets.

10. Request a second ETF engineer review and signoff on the inventory sheets.
11. Repeat Steps 1 through 10 for the other LERF basins.

4.2 Complete LERF Fissile Material Totals Sheet (Figure 2)

ETF Engineer

1. Enter the date in which inventory was completed/updated.

2. Enter the total Pu-239 in LERF from previous totals sheet.

3. Enter Pu-239 added to/subtracted from each LERF Basin during the quarter from Sheet 1.
   a. Enter a minus sign (-) for Pu-239 transferred from LERF basin to ETF.
   b. Enter a plus sign (+) for Pu-239 transferred to LERF basin.

4. Calculate the total amount of Pu-239 added/subtracted during the quarter to the total Pu-239 previously identified in LERF.

5. Sign the totals sheet.

6. Request a second ETF Engineer review and signoff on totals sheet.

4.3 Final Actions

1. If the sum of Pu-239 in LERF exceeds 24 grams, notify the ETF Facility Manager.

2. Attach any laboratory data, volume data, and calculations used to update the fissile material inventory to the inventory sheets.

3. Retain a copy of the completed inventory sheets (Figure 1) and total sheet (Figure 2) and all attachments in the LERF Fissile Inventory binder in the ETF Records Control Center at 2025E/D3.

4. Forward the original completed inventory sheets (Figure 1) and total sheet (Figure 2) and all attachments to ETF Records for transmittal to Imaging Operations for retention in the IDMS records area.

5.0 DEFINITIONS

No terms or phrases unique to this procedure are used.

6.0 RECORDS

The following records are generated during the performance of this procedure:

- LERF Basin Fissile Material Inventory Sheet
- LERF Fissile Material Totals Sheet.
The record custodian identified in the Company Records Inventory and Disposition Schedule is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.

7.0 SOURCES

7.1 Requirements

No documents external to this procedure are required for performance.

7.2 References

3. TFC-BSM-IRM_DC-C-02, “Records Management.”
4. TFC-ENG-DESIGN-C-10, “Engineering Calculations.”
5. TFC-ENG-FACSUP-P-34, “New Waste Stream Acceptance at LERF/ETF.”
Figure 1. LERF Basin Fissile Material Inventory Sheet.

(The columns/rows are keyed to instructions in Section 4.1)

<table>
<thead>
<tr>
<th>Date (2)</th>
<th>Batch Source (3)</th>
<th>Batch Pu-239 (pCi/L) (4)</th>
<th>Batch Volume (gallons) (5)</th>
<th>Batch Pu-239 (grams) (6)</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Total grams added to LERF basin (8):

\[ \text{Batch Pu-239 (grams)} = 6.10E-11 \times \text{Batch Pu-239 Concentration (pCi/L)} \times \text{Batch Volume (gallons)} \]

Calculations by ________________________________ Date ___________

(print/sign)

Checked by ________________________________ Date ___________

(print/sign)
Figure 2. LERF Fissile Material Totals Sheet.

(The columns/rows are keyed to instructions in Section 4.2)

<table>
<thead>
<tr>
<th>Date (1):</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Total Pu-239 in LERF (from previous)(grams)(2):</td>
<td></td>
</tr>
<tr>
<td>Pu-239 added to/subtracted from LERF Basin 42 (grams)(3):</td>
<td></td>
</tr>
<tr>
<td>Pu-239 added to/subtracted from LERF Basin 43 (grams)(3):</td>
<td></td>
</tr>
<tr>
<td>Pu-239 added to/subtracted from LERF Basin 44 (grams)(3):</td>
<td></td>
</tr>
<tr>
<td>Total Pu-239 in LERF (grams)(4)^1:</td>
<td></td>
</tr>
</tbody>
</table>

^1*Total Pu-239 Limit ≤ 24 grams*

Calculations by ___________________________________________ Date ___________

(print/sign)

Checked by ___________________________________________ Date ___________

(print/sign)