

March 24, 2006
NEF#06-012

ATTN: Document Control Desk
Director
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Louisiana Energy Services, L. P.
National Enrichment Facility
NRC Docket No. 70-3103

Subject: Incorporation of Clarifications to the Cost Estimate for Depleted Uranium Disposition by Revision to Applications for a Material License Under 10 CFR 70, "Domestic licensing of special nuclear material," 10 CFR 40, "Domestic licensing of source material," and 10 CFR 30, "Rules of general applicability to domestic licensing of byproduct material"

- References:**
1. Letter NEF#03-003 dated December 12, 2003, from E. J. Ferland (Louisiana Energy Services, L. P.) to Directors, Office of Nuclear Material Safety and Safeguards and the Division of Facilities and Security (NRC) regarding "Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material, and for a Facility Clearance Under 10 CFR 95, Facility security clearance and safeguarding of national security information and restricted data"
 2. Letter NEF#04-002 dated February 27, 2004, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision 1 to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"
 3. Letter NEF#04-029 dated July 30, 2004, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"

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4. Letter NEF#04-037 dated September 30, 2004, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"
5. Letter NEF#05-021 dated April 22, 2005, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"
6. Letter NEF#05-022 dated April 29, 2005, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"
7. Letter NEF#05-025 dated May 25, 2005, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"
8. Letter NEF#05-029 dated June 10, 2005, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"
9. Letter NEF#05-033 dated November 23, 2005 from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Clarifying Information Related to Cost Estimate for Deconversion of Depleted UF₆"
10. Letter NEF#06-003 dated February 16, 2006 from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revised MONK 8A Validation and Verification and Revision to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"

11. Letter NEF#06-004 dated February 28, 2006, R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "MONK 8A Validation and Verification Report, Revision 3, and Clarifying Revision to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"
12. Letter NEF#06-007 dated March 16, 2006, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Louisiana Energy Services, L. P. Ownership and Associated Revision to Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material"

By letter dated December 12, 2003 (Reference 1), E. J. Ferland of Louisiana Energy Services (LES), L. P., submitted to the NRC applications for the licenses necessary to authorize construction and operation of a gas centrifuge uranium enrichment facility. Revision 1 to these applications was submitted to the NRC by letter dated February 27, 2004 (Reference 2). Subsequent revisions (i.e., revision 2, revision 3, revision 4, revision 5, revision 6, revision 7, revision 8, revision 9, and revision 10) to these applications were submitted to the NRC by letters dated July 30, 2004 (Reference 3), September 30, 2004 (Reference 4), April 22, 2005 (Reference 5), April 29, 2005 (Reference 6), May 25, 2005 (Reference 7), June 10, 2005 (Reference 8), February 16, 2006 (Reference 9), February 28, 2006 (Reference 10), and March 16, 2006 (Reference 11) respectively.

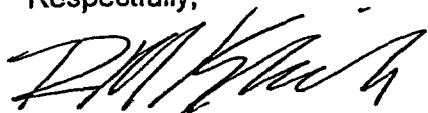
On a March 20, 2006, telephone call between LES and NRC representatives, the LES agreed to make certain revisions to the NEF License Application to reflect clarifications to the cost estimates for the disposition of depleted uranium from the National Enrichment Facility. Enclosure 1 provides the associated updated pages for Revision 11 of the Safety Analysis Report. [Enclosure 2 provides the associated updated pages for Revision 7 of the Environmental Report.] To facilitate the incorporation of the revised SAR pages into the License Application, page removal and insertion instructions are also provided in Enclosure 1. No changes are made to the Integrated Safety Analysis (ISA) Summary, the Environmental Report, the Emergency Plan, the Physical Security Plan, the Safeguards Contingency Plan, the Guard Force Training and Qualification Plan, the Standard Practice Procedures Plan for the Protection of Classified Matter or the Fundamental Nuclear Material Control Plan.

The License Application and ISA Summary, updated through Revision 11 of the SAR and Revision 7 of the Environmental Report, continue to meet the applicable requirements of 10 CFR 70.22, "Contents of applications," 10 CFR 40.31, "Application for specific licenses," and 10 CFR 30.32, "Application for specific licenses," as described in the Reference 1 letter.

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If you have any questions, please contact me at 630-657-2813.

Respectfully,

A handwritten signature in black ink, appearing to read 'R. M. Krich', written in a cursive style.

R. M. Krich
Vice President – Licensing, Safety, and Nuclear Engineering

Enclosures:

1. Updated Safety Analysis Report pages
2. Updated Environmental Report pages

cc: T. C. Johnson, NRC Project Manager
J. R. Park, NRC Environmental Project Manager

**NATIONAL ENRICHMENT FACILITY
SAFETY ANALYSIS REPORT, REVISION 11
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Urenco is currently contracted with a supplier for DUF_6 to DU_3O_8 conversion. The supplier has been converting DUF_6 to DU_3O_8 on an industrial scale since 1984.

The CEC costs given in Table 10.3-1, are those presented to John Hickey of the NRC in the CEC letter of June 30, 1993 (LES, 1993b) as adjusted for changes in units and escalated to 2002 (\$6.74 per kgU). The conversion cost of \$4.00 per kg U was provided to CEC by Cogema at that time. It should also be noted that this highest cost estimate is at least 10 years old and was based on the information available at that time. The value of \$5.50 per kgU used in the decommissioning cost estimate is 22% above the average of the more recent LLNL and UDS cost estimates, which is \$4.49 per kgU $\{(\$5.06 + \$3.92)/2\}$. The LLNL Cost Analysis Report (page 30) states that its cost estimate already includes a 30% contingency in the capital costs of the process and manufacturing facilities, a 20% contingency in the capital costs of the balance of plant; and a minimum of a 30% contingency in the capital costs of process and manufacturing equipment.

Also, the 1997 LLNL cost information is five years older than the more recent 2002 UDS cost information. The value of \$5.50 per kgU used in the decommissioning cost estimate for tails disposition is 40% greater than the 2002 UDS-based cost estimate of \$3.92 per kgU, which does not include offset credits for HF sales or proceeds from the sale of recycled products.

The costs in Table 10.3-1, indicate that \$5.50 is a conservative and, therefore, prudent estimate of total DU disposition cost for the NEF. Urenco has reviewed this estimate and, based on its current cost after tails disposal, finds this figure to be prudent.

In summary, there is already substantial margin between the value of \$5.50 per kgU being used by LES in the decommissioning cost estimate and the most recent information (2002 UDS) from which LES derived a cost estimate of \$3.92 per kgU.

Based on information from corresponding vendors, the value of \$5.50 per kgU (2002 dollars), which is equal to \$5.70 per kgU when escalated to 2004 dollars, was revised in December 2004 to \$4.68 per kgU (2004 dollars). The value of \$4.68 per kgU was derived from the estimates of costs from the three components that make up the total disposition cost of DUF_6 (i.e., deconversion, disposal, and transportation). The estimate of \$4.68 per kgU supports the Preferred Plausible Strategy of U.S. Private Sector Conversion and Disposal identified in section 4.13.3.1.3 of the ER as Option 1. In addition, \$0.60 per kgU has been added to this estimate to cover the cost of managing the empty UBCs once the DUF_6 has been removed for conversion.

In support of the Option 2 Plausible Strategy identified in Section 4.13.3.1.3 of the ER, "DOE Conversion and Disposal," considered the backup option, LES requested a cost estimate from the Department of Energy (DOE). On March 1, 2005, DOE provided a cost estimate to LES for the components that make up the total disposition cost (i.e., deconversion, disposal, and transportation, excluding the cost of loading the UBCs at the NEF site) (DOE, 2005). This estimate, which was based upon an independent analysis undertaken by DOE's consultant, LMI Government Consulting, estimated the cost of disposition to total approximately \$4.91 per kgU (2004 dollars). This estimate was subsequently corrected to \$4.68 per kgU (2004 dollars) and no additional amounts were added to account for UBC loading at the NEF site since this cost is minimal and the DOE transportation estimate is highly conservative. The Department's cost

estimate for deconversion, storage, and disposal of the DU is consistent with the contract between UDS and DOE. The cost estimate does not assume any resale or reuse of any products resulting from the conversion process.

For purposes of determining the total tails disposition funding requirement and the amount of financial assurance required for this purpose, the value of \$5.28 per kgU (based upon the cost estimate for the Preferred Plausible Strategy) was selected. Based on a computed tails production of 132,942 MTU during a nominal 30 years of operation and a tails processing cost of \$5.28 per kgU or \$5,280 per MTU, the total tails disposition funding requirement is estimated at \$701,933,760. This sum will be included as part of the financial assurance for decommissioning (see Table 10.1-14, Total Decommissioning Costs). Furthermore, this financial assurance will always cover the backup DOE option cost estimate, plus a 25% contingency, via the periodic update mechanism. See Environmental Report Section 4.13.3.1.6, Costs Associated with UF₆ Tails Conversion and Disposal, for additional details.

Table 10.1-14 Total Decommissioning Costs
Page 1 of 2

(Note 7)

Task/Components	Costs (\$000)		Total (\$000)	Percentage	Notes
	Separations Modules	Other Buildings			
Planning and Preparation (see Table 10.1-2)	1,200	0	1,200	1%	1
Decontamination and Dismantling of Radioactive Facility Components (see Table 10.1-9)	24,060	1,110	25,170	20%	8
Restoration of Contamination Areas on Facility Grounds (see Table 10.1-4)	1,357	0	1,357	1%	2
Final Radiation Survey (see Table 10.1-5)	2,500	0	2,500	2%	3
Cost of Third Party Use	39,829	1,232	41,061	32%	11
Site Stabilization and Long-term Surveillance	0	0	0	0%	4
Waste Processing Costs (see Table 10.1-10)	3,690	0	3,690	3%	5
Waste Disposal Costs (see Table 10.1-10)	17,904	440	18,344	14%	6
Equipment Costs (see Table 10.1-11)	21,260	100	21,360	17%	—
Supply Costs (see Table 10.1-11)	910	0	910	1%	—
Laboratory Costs (see Table 10.1-12)	870	0	870	1%	—
Period Dependent Costs (see Table 10.1-13)	10,000	0	10,000	8%	—
SUBTOTAL (2002)	123,580	2,882	126,462		—
SUBTOTAL (with escalation to 2004)	128,115	2,988	131,103		12
Tails Disposition (2004)	—	—	701,934		9
Contingency (25%)	—	—	208,259		—
TOTAL (2004)	—	—	1,041,296		10

Table 10.1-14 Total Decommissioning Costs
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Notes:

1. The \$1,200 includes planning, site characterization, Decommissioning Plan preparation, and NRC review for the entire plant.
2. Cost provided is for removal and disposal of liners and earthen covers of the facility Treated Effluent Evaporative Basin. The cost assumes transport and disposal of approximately 33,000 ft³ of contaminated soil and basin membrane at recent commercial rates. The cost of removal of the facility Treated Effluent Evaporative Basin material (33,000 ft³) is based on a \$30/ft³ disposal cost and includes the cost of excavation (\$5.00/yd³ which includes labor and equipment costs) and cost of transportation (\$4.00/mile for approximately 1,100 miles from the NEF site to the Envirocare facility in Utah). Other areas outside of the plant buildings are not expected to be contaminated.
3. The \$2,500 includes the Final Radiation Survey, NRC review, confirmatory surveys and license termination for the entire plant.
4. Site stabilization and long-term surveillance will not be required.
5. Waste processing costs are based on commercial metal melting equipment and unit rates obtained from Urenco experience in Europe.
6. Includes waste packaging and shipping costs. Waste disposal costs for Other Buildings are based on a \$150 per cubic foot unit rate which includes packaging, shipping and disposal at Envirocare in Utah.
7. More than 97% of the decommissioning costs for the facility are attributed to the dismantling, decontamination, processing, and disposal of centrifuges and other equipment in the Separations Building Modules, which are considered classified. Given the classified nature of these buildings, the data presented in these Tables have been structured to meet the applicable NUREG-1757 recommendations, to the extent practicable. However, specific information such as numbers of components and unit rates has been intentionally excluded to protect the classified nature of the data. The remaining 3% of the decommissioning costs are for the remaining systems and components in Other Buildings.
8. The \$1,110 for Other Buildings includes the decontamination and dismantling of contaminated equipment in the TBS, Blending and Liquid Sampling Area, Centrifuge Test and Post Mortem Facilities, and Gaseous Effluent Vent System.
9. Refer to Section 10.3, for Tails Disposition discussion.
10. Combined total for both decommissioning and tails disposition.
11. An adjustment has been applied to account for use of a third party for performing decommissioning operations associated with planning and preparation, decontamination and dismantling of radioactive facility components, restoration of contaminated grounds, and the final radiation survey. The adjustment includes an overhead rate on direct staff labor of 110%, plus 15% profit on labor and its overheads.
12. The escalation cost factor applied is based on the Gross Domestic Product (GDP) implicit price deflator. The resulting escalation cost factor for January 2002 to January 2004 is a 3.67% increase. The escalation cost factor is not applied to the tails disposition costs since these costs are provided in 2004 dollars.

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Under the terms of the agreement, the DOE also committed to perform "...research and development into the beneficial use of depleted uranium, and related activities and support services for depleted uranium-related activities". The agreement specifies that USEC will transfer to the DOE title to and possession of 2,026 48G cylinders containing approximately 16,673,980 kgU (18,380 tons of uranium). Under this agreement, DOE effectively committed to dispose of the USEC DUF₆ at an average rate of approximately 3.0 million kgU per year between the middle of calendar 1998 and the end of 2003 at a cost of exactly \$3.00 per kgU (\$1.36 per lb U), in 1998 dollars.

According to Urenco its depleted UF₆ disposal will be similar to those that will be generated by LES at the NEF. Urenco contracts with a supplier for depleted UF₆ to depleted U₃O₈ conversion. The supplier has been converting depleted UF₆ to depleted U₃O₈ on an industrial scale since 1984.

The Claiborne Energy Center costs given in Table 4.13-7, Summary of Depleted UF₆ Disposal Costs from Four Sources are based upon those presented to John Hickey of the NRC in the LES letter of June 30, 1993 (LES, 1993) as adjusted for changes in units and escalated to 2002. A conversion cost of \$4.00 per kgU was provided to LES by Cogema at that time. A value of \$1.00 per kgU U₃O₈ (\$0.45 lb U₃O₈) depleted U₃O₈ disposal cost was based on information provided by Urenco at the time.

As indicated earlier in this section, the NRC has noted that an existing exhausted underground uranium mine would be a suitable repository for depleted U₃O₈ (NRC, 1995). For purposes of comparing alternatives, the conservative assumption of constructing a new mine was assessed. A mine disposal facility would consist of surface facilities for waste receiving and inspection (the waste-form facility), and shafts and ramps for access to and ventilation of the underground portion of the repository, and appropriate underground transport and handling equipment. The mine underground would consist of tunnels (called "drifts") and cross-cuts for the transport and storage of stacked 208-L (55-gal) steel drums which are then back-filled. A great many features of a typical underground mine would be applicable to this disposal alternative.

The NEF, when operating at its nominal full capacity of 3.0 million Separative Work Units (SWUs) per year will produce 7,800 MT (8,598 tons) of depleted UF₆. A typical U.S. underground mine, operating for five days per week over fifty weeks of the year, excepting ten holiday days per year, would operate for 240 days per year. Thus, if LES UBCs were disposed uniformly over the year, the average disposal rate would be 32.5 MT (35.8 tons) of depleted UF₆ per day. This is much less than the rate of ore production in even a typical small underground mine. However, it may reasonably be assumed that the rate of emplacement of the drummed depleted U₃O₈ would be less than the rate of ore removal from a typical underground mine.

The estimated capital and operating costs for a 200 MT per day underground metal mine in a U.S. setting was provided by a U.S. mining engineering company, Western Mine Engineering, Inc. The costs are for a vein type mine accessed by a 160-m (524-ft) deep vertical shaft with rail type underground haulage transport. The operating costs for the 200 MT per day mine is estimated to be \$0.07 per kg (\$0.03 per lb) of ore and the capital cost is estimated to be approximately \$0.04 per kg (\$0.02 per lb) of ore, for a total cost of \$0.11 per kg (\$0.05 per lb) of ore. The capital cost of the mine is \$12.4 million 2002 dollars. In the case of an existing exhausted mine the capital costs could be much less.

The mine cost estimates presented indicate that the assumption of the much higher costs presented in Table 4.13-4, LLNL Estimated Life Cycle Costs for DOE Depleted UF₆ Disposal

Alternatives for the concrete vault alternative, represents an upper bound cost estimate for depleted U_3O_8 disposal. For example, the capital cost of the concrete vault alternative, which may be obtained by undiscounting the LLNL estimate costs presented in Table 4.13-4, is \$350 million in 2002 dollars, or 28 times the capital cost of the 200 MT (220 tons) mine discussed above.

The four sets of cost estimates obtained are presented in Table 4.13-7 in 2002 dollars per kgU. Note that the Claiborne Enrichment Center cost had a greater uncertainty associated with it. The UDS contract does not allow the component costs for conversion, disposal and transportation to be estimated. The costs in the table indicate that \$5.50 per kgU (\$2.50 per lb U) is a conservative and, therefore, prudent estimate of total depleted UF_6 disposition cost for the LES NEF. That is, the historical estimates from LLNL and CEC and the more recent actual costs from the UDS contract were used to inform the LES cost estimate. Urenco has reviewed this estimate and, based on its current cost for UBC disposal, finds this figure to be prudent.

Based on information from corresponding vendors, the value of \$5.50 per kgU (2002 dollars), which is equal to \$5.70 per kgU when escalated to 2004 dollars, was revised in December 2004 to \$4.68 per kgU (2004 dollars). The value of \$4.68 per kgU was derived from the estimates of costs from the three components that make up the total disposition cost of DUF_6 (i.e., deconversion, disposal, and transportation). The estimate of \$4.68 per kgU supports the Preferred Plausible Strategy of U.S. Private Sector Conversion and Disposal identified in section 4.13.3.1.3 of the ER as Option 1. In addition, \$0.60 per kgU has been added to this estimate to cover the cost of managing the empty UBCs once the DUF_6 has been removed for conversion.

In support of the Option 2 Plausible Strategy identified in Section 4.13.3.1.3 of the ER, "DOE Conversion and Disposal," considered the backup option, LES requested a cost estimate from the Department of Energy (DOE). On March 1, 2005, DOE provided a cost estimate to LES for the components that make up the total disposition cost (i.e., deconversion, disposal, and transportation, excluding the cost of loading the UBCs at the NEF site) (DOE, 2005). This estimate, which was based upon an independent analysis undertaken by DOE's consultant, LMI Government Consulting, estimated the cost of disposition to total approximately \$4.91 per kgU (2004 dollars). This estimate was subsequently corrected to \$4.68 per kgU (2004 dollars) and no additional amounts were added to account for UBC loading at the NEF site since this cost is minimal and the DOE transportation estimate is highly conservative. The Department's cost estimate for deconversion, storage, and disposal of the DU is consistent with the contract between UDS and DOE. The cost estimate does not assume any resale or reuse of any products resulting from the conversion process.

For purposes of determining the total tails disposition funding requirement and the amount of financial assurance required for this purpose, the value of \$5.28 per kgU (based upon the cost estimate for the Preferred Plausible Strategy) was selected. Furthermore, this financial assurance will always cover the backup DOE option cost estimate, plus a 25% contingency, via the periodic update mechanism. See Safety Analysis Report Table 10.1-14, Total Decommissioning Costs, for the total tails disposition funding cost.

4.13.3.2 Water Quality Limits

All plant effluents are contained on the NEF site. A series of evaporation retention/detention basins, and septic systems are used to contain the plant effluents. There will be no discharges

to a Publicly Owned Treatment Works (POTW). Contaminated water is treated to the limits in 10 CFR 20.2003, 10 CFR 20, Appendix B, Table 3 and to administrative levels recommended by Regulatory Guide 8.37 (CFR, 2003q; NRC, 1993). Refer to ER Section 4.4, Water Resource Impacts, for additional water quality standards and permits for the NEF. ER Section 3.12, Waste Management, also contains information on the NEF systems and procedures to ensure water quality.

4.13.4 Waste Minimization

The highest priority has been assigned to minimizing the generation of waste through reduction, reuse or recycling. The NEF incorporates several waste minimization systems in its operational procedures that aim at conserving materials and recycling important compounds. For example, all Fomblin Oil will be recovered where practical. Fomblin Oil is an expensive, highly fluorinated, inert oil selected specifically for use in UF_6 systems to avoid reactions with UF_6 . The NEF will also have in place a Decontamination Workshop designed to remove radioactive contamination from equipment and allow some equipment to be reused rather than treated as waste.

In addition, the NEF process systems that handle UF_6 , other than the Product Liquid Sampling System, will operate entirely at subatmospheric pressure to prevent outward leakage of UF_6 . Cylinders, initially containing liquid UF_6 , will be transported only after being cooled, so that the UF_6 is in solid form, to minimize the potential risk of accidental releases due to mishandling.

The NEF is designed to minimize the usage of natural and depletable resources. Closed-loop cooling systems have been incorporated in the designs to reduce water usage. Power usage will be minimized by efficient design of lighting systems, selection of high-efficiency motors, and use of proper insulation materials.

ALARA controls will be maintained during facility operation to account for standard waste minimization practices as directed in 10 CFR 20 (CFR, 2003q). The outer packaging associated with consumables will be removed prior to use in a contaminated area. The use of glove boxes will minimize the spread of contamination and waste generation.

Collected waste such as trash, compressible dry waste, scrap metals, and other candidate wastes will be volume reduced at a centralized waste processing facility. This facility could be operated by a commercial vendor such as GTS Duratek. This facility would further reduce generated waste to a minimum quantity prior to final disposal at a land disposal facility or potential reuse.

4.13.4.1 Control and Conservation

The features and systems described below serve to limit, collect, confine, and treat wastes and effluents that result from the UF_6 enrichment process. A number of chemicals and processes are used in fulfilling these functions. As with any chemical/industrial facility, a wide variety of waste types will be produced. Waste and effluent control is addressed below as well as the features and systems used to conserve resources.

4.13.4.1.1 Mitigating Effluent Releases

The equipment and design features incorporated in the NEF are selected to keep the release of gaseous and liquid effluent contaminants as low as practicable, and within regulatory limits.

They are also selected to minimize the use of depletable resources. Equipment and design features for limiting effluent releases during normal operation are described below:

The process systems that handle UF_6 operate almost entirely at sub-atmospheric pressures. Such operation results in no outward leakage of UF_6 to any effluent stream.

- The one location where UF_6 pressure is raised above atmospheric pressure is in the piping and cylinders inside the sampling autoclave. The piping and cylinders inside the autoclave confine the UF_6 . In the event of leakage, the sampling autoclave provides secondary containment of UF_6 .
- Cylinders of UF_6 are transported only when cool and when the UF_6 is in solid form. This minimizes risk of inadvertent releases due to mishandling.
- Process off-gas, from UF_6 purification and other operations, is discharged through desublimers to solidify and reclaim as much UF_6 as possible. Remaining gases are discharged through high-efficiency filters and chemical adsorbent beds. The filters and adsorbents remove HF and uranium compounds left in the gaseous effluent stream.
- Liquids and solids in the process systems collect uranium compounds. When these liquids and solids (e.g., oils, damaged piping, or equipment) are removed for cleaning or maintenance, portions end up in wastes and effluent. Different processes are employed to separate uranium compounds and other materials (such as various heavy metals) from the resulting wastes and effluent. These processes are described in ER Section 4.13.4.2 below.
- Processes used to clean up wastes and effluent create their own wastes and effluent as well. Control of these is also accomplished by liquid and solid waste handling systems and techniques, which are described in detail in the Sections below. In general, careful applications of basic principles for waste handling are followed in all of the systems and processes. Different waste types are collected in separate containers to minimize contamination of one waste type with another. Materials that can cause airborne contamination are carefully packaged; ventilation and filtration of the air in the area is provided as necessary. Liquid wastes are confined to piping, tanks, and other containers; curbing, pits, and sumps are used to collect and contain leaks and spills. Hazardous wastes are stored in designated areas in carefully labeled containers; mixed wastes are also contained and stored separately. Strong acids and caustics are neutralized before entering an effluent stream. Radioactively contaminated wastes are decontaminated insofar as possible to reduce waste volume.
- Following handling and treatment processes to limit wastes and effluent, sampling and monitoring is performed to assure regulatory and administrative limits are met. Gaseous effluent is monitored for HF and is sampled for radioactive contamination before release; liquid effluent is sampled and/or monitored in liquid waste systems; solid wastes are sampled and/or monitored prior to offsite treatment and disposal. Samples are returned to their source where feasible to minimize input to waste streams.

4.13.4.1.2 Conserving Depletable Resources

The NEF design serves to minimize the use of depletable resources. Water is the primary depletable resource used at the facility. Electric power usage also depletes fuel sources used in the production of the power. Other depletable resources are used only in small quantities.

Chemical usage is minimized not only to conserve resources, but also to preclude excessive waste production. Recyclable materials are used and recycled wherever practicable.

The main feature incorporated in the NEF to limit water consumption is the use of closed-loop cooling systems.

The NEF is designed to minimize the usage of natural and depletable resources as shown by the following measures:

- The use of low-water consumption landscaping versus conventional landscaping reduces water usage.
- The installation of low flow toilets, sinks and showers reduces water usage when compared to standard flow fixtures.
- Localized floor washing using mops and self-contained cleaning machines reduces water usage compared to conventional washing with a hose twice per week.
- The use of high efficiency washing machines compared to standard machines reduces water usage.
- The use of high efficiency closed cell cooling towers (water/air cooling) versus open cell design reduces water usage.
- Closed-loop cooling systems have been incorporated to reduce water usage.

Power usage is minimized by efficient design of lighting systems, selection of high-efficiency motors, use of appropriate building insulation materials, and other good engineering practices. The demand for power in the process systems is a major portion of plant operating cost; efficient design of components is incorporated throughout process systems.

4.13.4.1.3 Prevention and Control of Oil Spills

The NEF will implement a spill control program for accidental oil spills. The purpose of the spill control program will be to reduce the potential for the occurrence of spills, reduce the risk of injury in case of a spill occurs, minimize the impact of a spill, and provide a procedure for the cleanup and reporting of spills. The oil spill control program will be established to comply with the requirements of 40 CFR 112 (CFR, 2003aa), Oil Pollution Prevention. As required by Part 112, a Spill Prevention, Control, and Countermeasure (SPCC) plan will be prepared prior to either the start of facility operation of the facility or prior to the storage of oil onsite in excess of the de minimis quantities established in 40 CFR 112.1(d) (CFR, 2003aa). The SPCC Plan will be reviewed and certified by a Professional Engineer and will be maintained onsite.

As a minimum the SPCC Plan will contain the following information:

- Identification of potential significant sources of spills and a prediction of the direction and quantity of flow that would result from a spill from each such source;
- Identification the use of containment or diversionary structures such as dikes, berms, culverts, booms, sumps, and diversion ponds to be used at the facility where appropriate to prevent discharged oil from reaching navigable waters;
- Procedures for inspection of potential sources of spills and spill containment/diversion structures; and
- Assigned responsibilities for implementing the plan, inspections, and reporting.

In addition to preparation and implementation of the SPCC Plan, the facility will comply with the specific spill prevention and control guidelines contained in 40 CFR 112.7(e) (CFR, 2003aa), such as drainage of rain water from diked areas, containment of oil in bulk storage tanks, above ground tank integrity testing, and oil transfer operational safeguards.

4.13.4.2 Reprocessing and Recovery Systems

Systems used to allow recovery or reuse of materials are described below.

4.13.4.2.1 Fomblin Oil Recovery System

Fomblin oil is an expensive, highly fluorinated, inert oil selected specifically for use in UF_6 systems to avoid reaction with UF_6 . The Fomblin Oil Recovery System recovers used Fomblin oil from pumps used in UF_6 systems. All Fomblin oil is recovered; none is normally released as waste or effluent.

Used Fomblin oil is recovered by removing impurities that inhibit the oil's lubrication properties. The impurities collected are primarily uranyl fluoride (UO_2F_2) and uranium tetrafluoride (UF_4) particles. The recovery process also removes trace amounts of hydrocarbons, which if left in the oil would react with UF_6 . The Fomblin Oil Recovery System components are located in the Decontaminated Workshop in the Technical Services Building (TSB). The total annual volume of oil to be processed in this system is approximately 535 L (141 gal).

The Fomblin oil recovery process consists of oil collection, uranium precipitation, trace hydrocarbon removal, oil sampling, and storage of cleaned oil for reuse. Each step is performed manually.

Fomblin oil is collected in the Vacuum Pump Rebuild Workshop as part of the pump disassembly process. The oil is transferred for processing to the Decontamination Workshop in plastic containers. The containers are labeled so each can be tracked through the process. Used oil awaiting processing is stored in the used oil storage receipt array to eliminate the possibility of accidental criticality.

Uranium compounds are removed from the Fomblin oil in the Fomblin oil fume hood to minimize personnel exposure to airborne contamination. Dissolved uranium compounds are removed by the addition of anhydrous sodium carbonate (Na_2CO_3) to the oil container which causes the uranium compounds to precipitate into sodium uranyl carbonate $Na_4UO_2(CO_3)_3$. The mixture is agitated and then filtered through a coarse screen to remove metal particles and small parts such as screws and nuts. These are transferred to the Solid Waste Collection System. The oil is then heated to $90^\circ C$ ($194^\circ F$) and stirred for 90 minutes to speed the reaction. The oil is then centrifuged to remove UF_4 , sodium uranyl carbonate, and various metallic fluorides. The particulate removed from the oil is collected and transferred to the Solid Waste Collection Room for disposal.

Trace amounts of hydrocarbons are next removed in the Fomblin oil fume hood next by adding activated carbon to the Fomblin oil and heating the mixture at $100^\circ C$ ($212^\circ F$) for two hours. The activated carbon absorbs the hydrocarbons, and the carbon in turn is removed by filtration through a bed celite. The resulting sludge is transferred to the Solid Waste Disposal Collection Room for disposal.

Recovered Fomblin oil is sampled. Oil that meets the criteria can be reused in the system while oil that does not meet the criteria will be reprocessed. The following limits have been set for evaluating recovered Fomblin oil purity for reuse in the plant:

- Uranium - 50 ppm by volume
- Hydrocarbons - 3 ppm by volume

Recovered Fomblin oil is stored in plastic containers in the Chemical Storage Area.

Failure of this system will not endanger the health and safety of the public. Nevertheless, design and operating features are included that contribute to the safety of plant workers. Containment of waste is provided by components, designated containers, and air filtration systems. Criticality is precluded through the control of geometry, mass, and the selection of appropriate storage containers. To minimize worker exposure, airborne radiological contamination resulting from dismantling is extracted. Where necessary, air suits and portable ventilation units are available for further worker protection.

4.13.4.2.2 Decontamination System

The Contaminated Workshop and Decontamination System are located in the same room in the TSB. This room is called the Decontamination Workshop. The Decontamination Workshop in the TSB will contain the area to break down and strip contaminated equipment and to decontaminate that equipment and its components. The decontamination systems in the workshop are designed to remove radioactive contamination from contaminated materials and equipment. The only significant forms of radioactive contamination found in the plant are uranium hexafluoride (UF_6), uranium tetrafluoride (UF_4) and uranyl fluoride (UO_2F_2).

One of the functions of the Decontamination Workshop is to provide a maintenance facility for both UF_6 pumps and vacuum pumps. The workshop will be used for the temporary storage and subsequent dismantling of failed pumps. The dismantling area will be in physical proximity to the decontamination train, in which the dismantled pump components will be processed. Full maintenance records for each pump will be kept.

The process carried out within the Decontamination Workshop begins with receipt and storage of contaminated pumps, out-gassing, Fomblin oil removal and storage, and pump stripping. Activities for the dismantling and maintenance of other plant components are also carried out. Other components commonly decontaminated besides pumps include valves, piping, instruments, sample bottles, tools, and scrap metal. Personnel entry into the facility will be via a sub-change facility. This area has the required contamination controls, washing and monitoring facilities.

The decontamination part of the process consists of a series of steps following equipment disassembly including degreasing, decontamination, drying, and inspection. Items from uranium hexafluoride systems, waste handling systems, and miscellaneous other items are decontaminated in this system. The decontamination process for most plant components is described below, with a typical cycle time of one hour. For smaller components the decontamination process time is slightly less, about 50 minutes. Sample bottles and flexible hoses are handled under special procedures due to the difficulty of handling the specific shapes. Sample bottle decontamination and decontamination of flexible hoses are addressed separately below.

Criticality is precluded through the control of geometry, mass, and the selection of appropriate storage containers. Administrative measures are applied to uranium concentrations in the Citric Acid Tank and Degreaser Tank to maintain these controls. To minimize worker exposure, airborne radiological contamination resulting from dismantling is extracted. Air suits and portable ventilation units are available for further worker protection.

Containment of chemicals and wastes is provided by components, designated containers, and air filtration systems. All pipe work and vessels in the Decontamination Workshop are provided with design measures to protect against spillage or leakage. Hazardous wastes and materials are contained in tanks and other appropriate containers, and are strictly controlled by administrative procedures. Chemical reaction accidents are prevented by strict control on chemical handling.

4.13.4.2.3 General Decontamination

Prior to removal from the plant, the pump goes through an isolation and de-gas process. This removes the majority of UF_6 from the pump. The pump flanges are then sealed prior to movement to the Decontamination Workshop. The pumps are labeled so each can be tracked through the process. Pumps enter the Decontamination Workshop through airlock doors. The internal and external doors are electrically interlocked such that only one door can be opened at a given time. Pumps may enter the workshop individually or in pairs. Valves, pipework, flexible hoses, and general plant components are accepted into the room either within plastic bags or with the ends blinded.

Pumps waiting to be processed are stored in the pump storage array to eliminate the possibility of accidental criticality. The array maintains a minimum edge spacing of 600 mm (2 ft). Pumps are not accepted if there are no vacancies in the array.

Before being broken down and stripped, all pumps are placed in the Outgas Area and the local ventilation hose is positioned close to the pump flange. The flange cover is then removed. HF and UF_6 fumes from the pump are extracted via the exhaust hose, typically over a period of several hours. While in the Outgas Area, the oil will be drained from the pumps and the first stage roots pumps will be separated from the second stage roots pumps. The oil is drained into 5-L (1.3 gal) plastic containers that are labeled so each can be tracked through the process.

Prior to transfer from the Outgas Area, the outside of the bins, the pump frames, and the oil bottles are all monitored for radiological contamination. The various items will then be taken to the decontamination system or Fomblin oil storage array as appropriate.

Oil waiting to be processed is stored in the Fomblin oil storage array to eliminate the possibility of accidental criticality. The array maintains a minimum edge spacing of about 600 mm (2 ft) between containers. When ready for processing, the oil is transferred to the Fomblin Oil Recovery System where the uranics and hydrocarbon contaminants can be separated prior to reuse of the oil.

After out-gassing, individual pumps are removed from the Outgas Area and placed on either of the two hydraulic stripping tables. An overhead crane is utilized to aid the movement of pumps and tools over the stripping table. The tables can be height-adjusted and the pump can be moved and positioned on the table. Hydraulic stripping tools are then placed on the stripping tables using the overhead crane or mobile jig truck. The pump and motor are stripped to component level using various hydraulic and hand tools. Using the overhead crane or mobile jig

truck, the components are placed in bins ready for transportation to the General Decontamination Cabinet.

Degreasing is performed following disassembly of equipment. Degreasing takes place in the hot water Degreaser Tank of the decontamination facility system. The degreased components are inspected and then transferred to the next decontamination tank.

Following disassembly and degreasing, decontamination is accomplished by immersing the contaminated component in a citric acid bath with ultrasonic agitation. After 15 minutes, the component is removed, and is rinsed with water to remove the citric acid.

The tanks are sampled periodically to determine the condition of the solution and any sludge present. The Citric Acid Tank contents are analyzed for uranium concentration and citric acid concentration. A limit on ^{235}U of 0.2 g/L (0.02 ounces/gal) of bath has been established to prevent criticality. Additional citric acid is added as necessary to keep the citric acid concentration between 5% and 7%. Spent solutions, consisting of citric acid and various uranyl and metallic citrates, are transferred to a citric acid collection tank. The Rinse Water Tanks are checked for satisfactory pH levels; unusable water is transferred to an effluent collection tank.

All components are dried after decontamination. This is performed manually using compressed air.

The decontaminated components are inspected prior to release. The quantity of contamination remaining shall be "as-low-as-reasonably practicable." Components released for unrestricted use do not have contamination exceeding 83.3 Bq/100 cm² (5,000 dpm/100 cm²) for average fixed alpha or beta/gamma contamination and 16 Bq/100 cm² (1,000 dpm/100 cm²) removable alpha or beta/gamma contamination. However, if all the component surfaces cannot be monitored then the consignment will be disposed of as a low-level waste.

4.13.4.2.4 Sample Bottle Decontamination

Sample bottle decontamination is handled somewhat differently than the general decontamination process. The Decontamination Workshop has a separate area dedicated to sample bottle storage, disassembly, and decontamination. Used sample bottles are weighed to confirm the bottles are empty. The valves are loosened, and the remainder of the decontamination process is performed in the sample bottle decontamination hood. The valves are removed inside the fume hood. Any loose material inside the bottle or valve is dissolved in a citric acid solution. Spent citric acid is transferred to the Spent Citric Acid Collection Tank in the Liquid Effluent Collection and Treatment System.

Initially, sample bottles and valves are flushed with a 10% citric acid solution and then rinsed with deionized water. In the case of sample bottles, these are filled with deionized water and left to stand for an hour, while the valves are grouped together and citric acid is recirculated in a closed loop for an hour. These used solutions are collected and taken to the Citric Acid Collection Tank in the General Decontamination Cabinet. Any liquid spillages / drips are soaked away with paper tissues that are disposed of in the Solid Waste Collection Room. Bottles and valves are then rinsed again with deionized water. This used solution is collected in a small plastic beaker, and then poured into the Citric Acid Tank in the decontamination train. Both the bottles and valves are dried manually, using compressed air, and inspected for contamination and rust. The extracted air exhausts to the Gaseous Effluent Vent System (GEVS) to ensure airborne contamination is controlled. The bottles are then put into an electric oven to ensure

total dryness, and on removal are ready for reuse. The cleaned components are transferred to the clean workshop for reassembly and pressure and vacuum testing.

4.13.4.2.5 Flexible Hose Decontamination

The decontamination of flexible hoses is handled somewhat differently than the general process and has a separate area. The decontamination process is performed in a Flexible Hose Decontamination Cabinet. This decontamination cabinet is designed to process only one flexible hose at a time and is comprised of a supply of citric acid, deionized water and compressed air.

Initially, the flexible hose is flushed with a 10% citric acid solution at 60°C (140°F) and then rinsed with deionized water (also at 60°C) (140°F) in a closed loop recirculation system. The used solutions (citric acid and deionized water) are transferred into the contaminated Citric Acid Tank for disposal. Interlocks are provided in the recirculation loop to prevent such that the recirculation pumps from starting if the flexible hose has not been connected correctly at both ends. Both the citric acid and deionized water recirculation pumps are equipped with a 15-minute timer device. The extracted air exhausts to the Gaseous Effluent Vent System (GEVS) to ensure airborne contamination is controlled. Spill from the drip tray are routed to either the Citric Acid Tank or the hot water recirculation tank, depending upon the decontamination cycle. Each flexible hose is then dried in the decontamination cupboard using hot compressed air at 60°C (140°F) to ensure complete dryness. The cleaned dry flexible hose is then transferred to the Vacuum Pump Rebuild Workshop for reassembly and pressure testing prior to reuse in the plant.

4.13.4.2.6 Decontamination Equipment

The following major components are included in the Decontamination System:

- **Citric Acid Baths:** An open top Citric Acid Tank with a sloping bottom in hastelloy is provided for the primary means of removing radioactive contamination. The sloping-bottom construction is provided for ease of emptying and draining the tank completely. The tank has a liquid capacity of 800 L (211 gal). The tank is located in a cabinet and is furnished with ultrasonic agitation, a thermostatically controlled electric heater to maintain the content's temperature at 60°C (140°F), and a recirculation pump. Mixing is provided to accommodate sampling for criticality prevention. Level control with a local alarm is provided to maintain the acid level. The tank has a ring header and a manual hose to rinse out residual solids/sludge with deionized water after the batch has been pumped to the Liquid Effluent Collection and Treatment System. In order to minimize uranium concentration, the rinse water from the Rinse Water Tank that receives deionized water directly is pumped into the other Rinse Water Tank, which in turn is pumped into the Citric Acid Tank. The counter-current system eliminates a waste product stream by concentrating the uranics only in the Citric Acid Tank. The rinse water transfer pump is linked with the level controller of the Citric Acid Tank, which prevents overfilling of this tank during transfer of the rinse water. During transfer, the rinse water transfer pump trips at a high tank level resulting in a local alarm. The extracted air exhausts to the Gaseous Effluent Vent System (GEVS) to assure airborne contamination is controlled. The Citric Acid Tank contents are monitored and then emptied by an air-driven double diaphragm pump into the Spent Citric Acid Collection Tank in the Liquid Effluent Collection and Treatment System.

- **Rinse Water Baths:** Two open top Rinse Water Tanks with stainless steel sloping bottoms are provided to rinse excess citric acid from decontaminated components. Each of the tanks has a liquid capacity of 800 L (211 gal). Both tanks are located in an enclosure, and each tank is furnished with ultrasonic agitation, a thermostatically controlled electric heater to maintain the contents temperature at 60°C (140°F), and a recirculation pump to accommodate sampling for criticality prevention. The sloping-bottom is provided of emptying and draining the tank completely. Fresh deionized water is added to the tank. In order to minimize uranium concentration, the rinse water from the tank that receives deionized water directly is pumped into the other Rinse Water Tank, which in turn is pumped into the Citric Acid Tank. Level control is provided to maintain the deionized (rinse) water level. During transfer, the rinse water transfer pump trips at tank high level resulting in a local alarm. The Rinse Water Tank that directly receives deionized water is topped up manually with the water as necessary. The extracted air exhausts to the GEVS to assure airborne contamination is controlled. A manual spray hose is available for rinsing the tank after it has been emptied.
- **Decontamination Degreasing Unit:** An open top Degreaser Tank with a sloping bottom in hastelloy is provided for the primary means of removing the Fomblin oil and greases that may inhibit the decontamination process. Components requiring degreasing are cleaned manually and then immersed into the Degreaser Tank. The sloping-bottom construction is provided for ease of emptying and draining the tank completely. During the decontamination process, the tank contents are continuously recirculated using a pump. Recirculation is provided to accommodate sampling for criticality prevention. The tank has a capacity of 800 L (211 gal) and is located in a cabinet. It is furnished with an ultrasonic agitation facility, and a thermostatically-controlled electric heater to maintain the temperature at 60°C (140°F). The tank has a ring header and a manual hose to rinse out residual solids/sludge with deionized water after the batch has been pumped to the Liquid Effluent Collection and Treatment System. The extracted air exhausts to the Gaseous Effluent Vent System (GEVS) to ensure airborne contamination is controlled. Level control with a local alarm is provided to maintain the liquid level. The Degreaser Tank contents are monitored and then emptied by an air-driven double diaphragm pump into the Degreaser Water Collection Tank in the Liquid Effluent Collection and Treatment System.
- The activities carried out in the Decontamination Workshop may create potentially contaminated gaseous streams, which would require treatment before discharging to the atmosphere. These streams consist of air with traces of UF_6 , HF, and uranium particulates (mainly UO_2F_2). The Gaseous Effluent Vent System is designed to route these streams to a filter system and to monitor, on a continuous basis, the resultant exhaust stream discharged to the atmosphere. Air exhausted from the General Decontamination Cabinet, the Sample Bottle Decontamination Cabinet, and the Flexible Hose Decontamination Cabinet is vented to the GEVS. There will be local ventilation ports in the stripping area and Outgas Area that operate under vacuum with all air discharging through the GEVS. The room itself will have other HVAC ventilation.
- **Vapor Recovery Unit and distillation still.**
- **Drying Cabinet:** One drying cabinet is provided to dry components after decontamination.
- **Decontamination System for Sample Bottles (in a cabinet)** - a small, fresh citric acid tank; a small, deionized water tank; and 5 L (1.3 gal) containers for citric acid/uranic waste

- Decontamination System for Flexible Hoses (in a cabinet) - a small citric acid tank for fresh and waste citric acid, an air diaphragm pump and associated equipment
- Various tools for moving equipment (e.g., cranes)
- Various tools for stripping equipment
- An integral monorail hoist with a lifting capacity of one ton, located within the decontamination enclosure, is provided to lift the basket and its components into and out of the Degreaser Tank, Citric Acid Tank, and the two Rinse Water Tanks as part of the decontamination activity sequence.
- Citric Acid Tank and Degreaser Tank clean-up ancillary items, comprised for each tank, a portable air driven transfer pump and associated equipment
- Radiation monitors.

4.13.4.2.7 Laundry System

The Laundry System cleans contaminated and soiled clothing and other articles which have been used throughout the plant. It contains the resulting solid and liquid wastes for transfer to appropriate treatment and disposal facilities. The Laundry System receives the clothing and articles from the plant in plastic bin bags, taken from containers strategically positioned within the plant. Clean clothing and articles are delivered to storage areas located within the plant. The Contaminated Laundry System components are located in the Laundry room of the TSB.

The Laundry System collects, sorts, cleans, dries, and inspects clothing and articles used throughout the plant in the various Restricted Areas. The laundry system does not handle any articles from outside the radiological zones. Laundry collection is divided into two main groups: articles with a low probability of contamination and articles with a high probability of contamination. Those articles unlikely to have been contaminated are further sorted into lightly soiled and heavily soiled groups. The sorting is done on a table underneath a vent hood that is connected to the TSB Gaseous Effluent Vent System (GEVS). All lightly soiled articles are cleaned in the laundry. Heavily soiled articles are inspected and any considered to be difficult to clean (i.e., those with significant amounts of grease or oil on them) are transferred to the Solid Waste Collection Room without cleaning. Special containers and procedures are used for collection, storage, and transfer of these items as described in the Solid Waste Disposal System section. Articles from one plant department are not cleaned with articles from another plant department.

Special water-absorbent bags are used to collect the articles that are more likely to be contaminated. These articles may include pressure suits and items worn when, for example, it is required to disconnect or "open up" an existing plant system. These articles that are more likely to be contaminated are cleaned separately. Expected contaminants on the laundry include slight amounts of uranyl fluoride (UO_2F_2) and uranium tetrafluoride (UF_4).

Clothing processed by this system normally includes overalls, laboratory coats, shirts, towels and miscellaneous items. Approximately 113 kg (248 lbs) of clothing is washed each day. Upon completion of a cycle, the washer discharges to one of three Laundry Effluent Monitor Tanks in the Liquid Effluent Collection and Treatment System.

The washed laundry is dried in the hot air dryers. The exhaust air passes through a lint drawer to the atmosphere. Upon completion of a drying cycle, the dried laundry is inspected for

excessive wear. Usable laundry is folded and returned to storage for reuse. Unusable laundry is handled as solid waste as described in the Solid Waste Disposal System section.

When sorting is completed, the articles are placed into the front-loading washing machine in batches. The cleaning process uses 80°C (176°F) minimum water, detergents, and non-chlorine bleach for dirt and odor removal, and disinfection of the laundry. Detergents and non-chlorine bleach are added by vendor-supplied automatic dispensing systems. No "dry cleaning" solvents are used. Wastewater from the washing machine is discharged to one of three Laundry Effluent Monitor Tanks in the Liquid Effluent Collection and Treatment System. The laundry effluent is then sampled, analyzed, and transferred to the double-lined Treated Effluent Evaporative Basin with leak detection for disposal (if uncontaminated) or to the Precipitation Treatment Tank for treatment as necessary.

When the washing cycle is complete, the wet laundry is placed in a front-loading, electrically heated dryer. The dryer has variable temperature settings, and the hot wet air is exhausted to the atmosphere through a lint drawer that is built into the dryer. The lint from the drawer is then sent to the Solid Waste Disposal System as combustible waste.

Dry laundry is removed from the dryer and placed on the laundry inspection table for inspection and folding. Folded laundry is returned to storage areas in the plant.

The following major components are included in this system:

- Washers: Two industrial quality washing machines are provided to clean contaminated and soiled laundry. One machine is operating and one is a spare for standby. Each machine has an equal capacity that is capable of washing the daily batches.
- Dryers: Two industrial quality dryers are provided to dry the laundry cleaned in the washing machine. One dryer is operating and one is a spare for standby. Each machine has an equal capacity that is capable of drying the daily batches. The dryer has a lint drawer that filters out the majority of the lint.
- Air Hood: One exhaust hood mounted over the sorting table and connected to the TSB GEVS. The hood is to draw potentially contaminated air away as laundry is sorted prior to washing.
- Sorting Table: One table to sort laundry prior to washing.
- Laundry Inspection Table: One table to inspect laundry for excessive wear after washing and drying.

The Laundry System interfaces with the following other plant systems:

- Liquid Effluent Collection and Treatment System: The wastewater generated during the laundry process is pumped to one of three Laundry Effluent Monitor Tanks.
- Solid Waste Disposal System: The Solid Waste Disposal System receives clothing that has been laundered but is not acceptable for further use. It also receives clothing rejected from the laundry system due to excess quantities of oil or hazardous liquids.
- TSB GEVS: Air from the sorting hood is sent to the TSB GEVS.
- Process Water System: The Process Water System supplies hot and cold water to the washer.
- Compressed Air System: Compressed air will be supplied as required to support options selected for the Laundry washers and dryers.
- Electrical System: The washing machines and dryers consume power.

Piping, piping components, and a laundry room sump provide containment of any liquid radiological waste. Small leaks and spills from the washer are mopped up and sent to the Liquid Effluent Collection and Treatment System. A rarely occurring large leak is captured in the laundry room sump. Any effluent captured in the sump is transferred to the Liquid Effluent Collection and Treatment System by a portable pump.

Liquid effluents from the washers are collected in the Liquid Effluent Collection and Treatment System and monitored prior to discharge to the Treated Effluent Evaporative Basin. Clothing containing hazardous wastes is segregated prior to washing to avoid introduction into this system. The exhaust air blows to atmosphere because there is little chance of any contaminant being in it.

The washer and dryer are equipped with electronic controls to monitor the operation. The dryer has a fire protection system that initiates an isolated sprinkler inside the dryer basket if a fire is detected in the dryer.

4.13.5 Comparative Waste Management Impacts of No Action Alternative Scenarios

ER Chapter 2, Alternatives, provides a discussion of possible alternatives to the construction and operation of the NEF, including an alternative of "no action" i.e., not building the NEF. The following information provides comparative conclusions specific to the concerns addressed in this subsection for each of the three "no action," alternative scenarios addressed in ER Section 2.4, Table 2.4-2, Comparison of Environmental Impacts for the Proposed Action and the No-Action Alternative Scenarios.

Alternative Scenario B – No NEF; USEC deploys a centrifuge plant and continues to operate the Paducah gaseous diffusion plant (GDP): The waste management impact would be greater since a greater amount of waste results from GDP operation.

Alternative Scenario C – No NEF; USEC deploys a centrifuge plant and increases the centrifuge plant capability: The waste management impact would be greater in the short term because the GDP produces a larger waste stream. In the long term, the waste management impact would be the same once the GDP production is terminated.

Alternative Scenario D – No NEF; USEC does not deploy a centrifuge plant and operates the Paducah GDP at an increased capacity: The waste management impact would be significantly greater because a significant amount of additional waste results from GDP operation at the increased capacity.