NATIONAL ENRICHMENT FACILITY

10 CFR 30.6
10 CFR 40.5
10 CFR 70.5

January 7, 2005

NEF#05-001

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: Response to NRC Request for Additional Information Regarding Depleted Uranium Hexafluoride Disposition Costs

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 dated October 20, 2004, from T. C. Johnson (NRC) to R. Krich (Louisiana Energy Services) regarding "Louisiana Energy Services - Request for Additional Information on Decommissioning Funding Plan"

6. Letter NEF#04-052 dated December 10, 2004, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Response to NRC Request for Additional Information Regarding Decommissioning Funding Plan"

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 and revision 3) to these applications were submitted to the NRC by letters dated July 30, 2004 (Reference 3) and September 30, 2004 (Reference 4), respectively. By letter dated October 20, 2004 (Reference 5), the NRC requested additional information and clarification regarding the decommissioning funding plan be provided.

The Reference 5 letter includes Request for Additional Information (RAI) 1.c, RAI 2, RAI 3, and RAI 5 concerning depleted uranium hexafluoride disposition costs. In the Reference 6 letter, LES indicated that the information concerning depleted uranium hexafluoride disposition costs would be forthcoming. Attachment 1 to this letter provides the LES responses to RAI 1.c, RAI 2, RAI 3, and RAI 5. Attachment 2 to this letter provides information, in the form of updated License Application pages, which reflects the LES response to these RAIs. The updated pages will be formally incorporated into the License Application in a future revision.

If you have any questions or need additional information, please contact me at 630-657-2813.

Respectfully,

Daniel B. Hom for

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

Attachments:
1. LES response to October 20, 2004, Request for Additional Information 1.c, 2, 3, and 5
2. Updated License Application Page

cc: T.C. Johnson, NRC Project Manager

ATTACHMENT 1

Louisiana Energy Services
Response to October 20, 2004,
Request for Additional Information 1.c, 2, 3, and 5

Louisiana Energy Services
Requests for Additional Information on
Depleted Uranium Hexafluoride Disposition Costs

Introduction

In preparing the cost estimate for dispositioning the depleted uranium byproduct generated at the National Enrichment Facility (NEF), we first determined that we needed to consider the pertinent historical estimates that were available. These are the estimates in the Lawrence Livermore National Laboratory (LLNL) report (LLNL, 1997) and the Claiborne Enrichment Center (CEC) license application (CEC, 1991). We also determined that recent actual contract costs such as the Uranium Disposition Services (UDS) contract with the U.S. Department of Energy (DOE) and the contracts that Urenco has to disposition its byproduct would logically be given greater weight in arriving at our cost estimate. Finally, we considered the range of variables that affect the cost estimate, such as:

- Deconversion process
- Resale or disposal of the deconversion hydrogen fluoride (HF) byproduct
- Transportation mode and distance, and
- Disposal method.

We found that the three estimates and the Urenco contracts covered most if not all likely combinations of these variables.

In using the historical estimates (i.e., LLNL and CEC), we decided to treat these as "stand-alone" estimates; that is, we would not try to adjust these estimates to account for more recent information or for NEF site specific considerations since such adjustments, such as accounting for the more recent (i.e., reduced) cost of deconversion, transportation distance, HF byproduct resale, etc., may not be consistent with the methodology that was used to derive the original estimate. Accordingly, the manner in which we estimated the cost was to consider actual depleted uranium disposition costs (i.e., UDS and Urenco contracts) taking into account typical transportation and disposal (e.g., burial) costs. Based on these considerations, we established $5.50/kgU as the Louisiana Energy Services (LES) estimate. Since the Urenco contract costs were proprietary, we compared this figure to the average of the historical and UDS figures. This comparison showed the $5.50/kgU estimate to be reasonable. If, for example, the average of the historical and UDS costs had been higher, the LES estimate would have been adjusted commensurately.

Considering the above description of how the historical estimates were used to arrive at an LES cost estimate, revising the cost estimates to account for different values of the variables that make up the cost is not meaningful. Instead, as agreed to during a telephone conference with NRC representatives and their consultants on November 18, 2004, we are providing the following estimate of costs for the three components that make up the total disposition costs estimate, i.e., deconversion, disposal, and transportation (note that costs are in 2004 dollars and the $5.50/kgU (2002 dollars) has been escalated by a factor of 2.1% to $5.62/kgU). These individual cost estimates are based on information from corresponding vendors.

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Conversion: $2.69/kgU

This estimate is considered conservative and is independent of the deconversion process. This estimate includes the cost of disposing of the neutralized HF as industrial waste (i.e., approximately $0.02/kgU). Contrary to assumptions used in the LLNL report, actual experience shows that the HF product from the deconversion process is not contaminated above allowable free release levels.

Disposal: $1.14/kgU

This estimate is considered to reflect the costs associated with expected disposal methods.

Transportation: $0.85/kgU

This estimate is independent of distance traveled and accounts for the different rates for transporting UF_6 or U_3O_8.

Total: $4.68/kgU
25% contingency $5.85/kgU

Based on continuing discussions with the DOE, we expect the DOE cost estimate to disposition the depleted uranium byproduct to be significantly lower than the $5.85/kgU figure (i.e., under $5.00/kgU). Accordingly, while we consider our original estimate of $5.62/kgU to be a reasonable estimate for the purposes of estimating decommissioning costs, we have revised it to the $5.85/kgU figure to be consistent with this more recent conservative estimate.

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1. **Tables 10.1 through 10.3**

c. Packaging and shipping of radioactive wastes: Because packaging and shipping costs were included in the waste disposal costs, we cannot verify that adequate labor, containers, and transport rates were used, that an adequate number of containers were used, or that differences in shipping distance do not matter. This information should be provided for both the tails disposition costs as well as the disposal costs for wastes generated during decommissioning.

LES Response

1.c The requested information regarding packaging and shipping of radioactive wastes for wastes generated during decommissioning was provided in letter NEF#04-052 dated December 10, 2004, from R.M. Krich (Louisiana Energy Services, L.P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Response to NRC Request for Additional Information Regarding Decommissioning Funding Plan.

The shipping costs associated with depleted uranium byproduct disposition are included in the estimates provided in the Introduction. The packaging costs, i.e., filling the certified cylinders with depleted uranium hexafluoride and filling the disposal drums with depleted uranium oxide, are part of the enrichment and deconversion processes, respectively, and are therefore considered as part of the operating costs of these facilities.

2. **Section 10.1.3.2, p. 10.1-2 and Section 10.3, pp. 10.3-1 through 10.3-3**

Either revise or justify why the cost estimate for depleted uranium conversion is sufficient assuming no salvage value of any material produced given the fact that such costs are included in the cost estimate of the Lawrence Livermore National Laboratory (LLNL) report. Additionally, revise or justify the cost estimate to account for potential disposal costs for any materials that cannot be sold.

Under 10 CFR 70.25, an applicant for a uranium enrichment facility is required to prepare a decommissioning funding plan. The decommissioning funding plan includes a site-specific cost estimate for decommissioning and a financial assurance mechanism ensuring that funds will be available to decommission the facility.

In section 10.1.3.2 of the Safety Analysis Report (SAR) states that, "Credit is not taken for any salvage value that might be realized from the sale of potential assets (e.g., recovered material or decontaminated equipment) during or after decommissioning." However, in the LLNL report referenced, which provides one of the cost estimates for conversion, the DUF_6 conversion cost includes revenues generated from selling a byproduct of the conversion process, anhydrous hydrogen fluoride (AHF). Once these revenues are removed, the LLNL cost of conversion increases by approximately $0.95/kgU. After adjusting for this cost difference, the LLNL total cost estimate becomes approximately $6.00/kgU. This estimate is higher that the $5.50 estimate used by LES to calculate the cost of tails disposition.

Further, the LLNL report acknowledges that if the calcium fluoride (CaF_2) and AHF cannot be sold, which the authors describe as an unlikely scenario, then the byproducts will need to be disposed of as low-level radioactive waste (LLW), because the CaF_2 contains a small amount of uranium. This process would present significant costs which are not accounted for in the SAR.

LES Response

The response to this request is provided in the Introduction. As noted, adjusting the LLNL cost estimate is not meaningful.

3. **Section 10.3, pp. 10.3-1 through 10.3-3**

Revise the cost estimates for depleted uranium conversion to include appropriate transportation costs applicable to the actual distances from the Eunice site to the proposed processing sites, or provide additional justification why the increased distance would not cause a substantial increase in cost.

Under 10 CFR 70.25, an applicant for a uranium enrichment facility is required to prepare a decommissioning funding plan. The decommissioning funding plan includes a site-specific cost estimate for decommissioning and a financial assurance mechanism ensuring that funds will be available to decommission the facility.

With regard to the transport costs, the LLNL study assumes a transport distance of 1,000 kilometers. However, the proposed facility may be substantially farther than 1,000 kilometers from conversion and disposal facilities. Specifically, the proposed facility may be:

a. 1,636 kilometers from a disposal site in South Clive, Utah;
b. 1,670 kilometers from a proposed conversion site in Paducah, Kentucky; and
c. 2,243 kilometers from a proposed conversion site in Portsmouth Ohio.

While the LLNL report states that transportation costs are not sensitive to distance traveled, this conclusion was based on a determination that loading, shipping, and unloading costs make up less than 25 percent of those costs. Absent any explanation of what comprises the remaining 75 percent of the costs, it is not obvious that the shipping costs will not be substantial.

LES Response

The response to this request is provided in the Introduction. The estimate of transportation costs provided is independent of the distance traveled and includes loading and unloading costs.

5. **Section 10.3, p. 10.3-3**

Provide a contingency factor of 25 percent for tails disposition.

Under 10 CFR 70.25, an applicant for a uranium enrichment facility is required to prepare a decommissioning funding plan. The decommissioning funding plan includes a site-specific cost estimate for decommissioning and a financial assurance mechanism ensuring that funds will be available to decommission the facility.

LES is applying a 25 percent contingency factor to all decommissioning costs except those associated with tails disposition. LES explains that the 25 percent contingency factor was not applied to the costs associated with tails disposition because tails disposition contingency costs are built into the LLNL cost estimate which provides for a 20 percent contingency factor for conversion plant process and manufacturing facility and balance of plant capital costs and a 30 percent contingency factor for process and manufacturing equipment. In addition, LES points to the margin between the value LES is proposing and the most recent U.S. Department of Energy/Uranium Disposition Services (DOE/UDS) estimates.

The contingency factors cited by LES are applied to the LLNL capital costs (associated with buildings and some equipment). There are no contingencies applied to the technical development, regulatory compliance, operations and maintenance transportation, or preparation and disposal costs, which account for a substantial portion of the overall costs. A contingency factor should apply to all of these types of costs.

LES Response

The response to this request is provided in the Introduction. As noted there, adjusting the LLNL cost estimate is not meaningful.

ATTACHMENT 2

Updated License Application Pages

10.3 TAILS DISPOSITION

The disposition of tails from the NEF is an element of authorized operating activities. It involves neither decommissioning waste nor is it a part of decommissioning activities. The disposal of these tails is analogous to the disposal of radioactive materials generated in the course of normal operations (even including spent fuel in the case of a power reactor), which is authorized by the operating license and subject to separate disposition requirements. Such costs are not appropriately included in decommissioning costs (this principle (in the 10 CFR 50 context) is discussed in Regulatory Guide 1.159 (NRC, 1990), Section 1.4.2, page 1.159-8). Further, the "tails" products from the NEF are not mill tailings, as regulated pursuant to the Uranium Mill Tailings Radiation Control Act, as amended and 10 CFR 40, Appendix A (CFR, 2003j), and are not subject to the financial requirements applicable to mill tailings.

Nevertheless, LES intends to provide for expected tails disposition costs (even assuming ultimate disposal as waste) during the life of the facility. Funds to cover these costs are based on the amount of tails generated and the unit cost for the disposal of depleted UF_6.

It is anticipated that the NEF will generate 132,942 MT of depleted uranium over a nominal 30 year operational period. This estimate is conservative as it assumes continuous production of tails over 30 years of operation. Actual tails production will cease prior to the end of the license term as shown in Figure 10.1-1, NEF – Conceptual Decommissioning Schedule.

Waste processing and disposal costs for UF_6 tails are currently estimated to be $5.50 per kg U or $5,500 per MT U. This unit cost was obtained from four sets of cost estimates for the conversion of DUF_6 to DU_3O_8 and the disposal of DU_3O_8 product, and the transportation of DUF_6 and DU_3O_8. The cost estimates were obtained from analyses of four sources: a 1997 study by the Lawrence Livermore National Laboratory (LLNL) (Elayat, 1997), the Uranium Disposition Services (UDS) contract with the Department of Energy (DOE) of August 29, 2002 (DOE, 2002), information from Urenco, and the costs submitted to the Nuclear Regulatory Commission as part of the Claiborne Enrichment Center (CEC) license application (LES, 1993a) in the 1990s.

The four sets of cost estimates obtained are presented in Table 10.3-1, Summary Of Depleted UF_6 Disposal Costs From Four Sources, below, in 2002 dollars per kg of uranium (kg U). Note that the Claiborne Energy 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 kg U ($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 cost 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.

In May 1997, the LLNL published UCRL-AR-127650, Cost Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride (Elayat, 1997). The report was prepared to provide comparative life-cycle cost data for the Department of Energy's (DOE's) Draft 1997 Programmatic Environmental Impact Statement (PEIS) (DOE, 1997) on alternative strategies for management and disposition of DUF_6. The LLNL report is the most comprehensive assessment of DUF_6 disposition costs for alternative disposition strategies available in the public domain.

Urenco is currently contracted with a supplier for UF_6 to U_3O_8 conversion. The supplier has been converting UF_6 to U_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 $5.62 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). Based on a computed tails production of 132,942 MTU during a nominal 30 years of operation and a tails processing cost of $4.68 per kgU or $4,680 per MTU, the total tails disposition funding requirement is estimated at $622,169,000. This sum will be included as part of the financial assurance for decommissioning (see Table 10.1-14, Total Decommissioning Costs). See Environmental Report Section 4.13.3.1.6, Costs Associated with UF_6 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)	126,175	2,943	129,118		12
Tails Disposition (2004)	[redacted]	[redacted]	622,169		9
Contingency (25%)	[redacted]	[redacted]	187,821		[redacted]
TOTAL (2004)	--	--	939,108		10