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December 14, 1992

Mr. John W. N. Hickey, Chief
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Docket No.: 70-3070
Louisiana Energy Services
Claiborne Enrichment Center
Disposition of Depleted
Uranium Hexafluoride
File: MTS-6046-00-2001.01

Dear Mr. Hickey:

This letter is in response to your letter to Louisiana Energy Services (LES) dated September 22, 1992 regarding the disposition of depleted uranium hexafluoride (DUF₆) produced at the Claiborne Enrichment Center (CEC). As an applicant for a license to possess byproduct, source, and special nuclear material, LES is required by 10 CFR Parts 40.36, 70.22(a)(9), and 70.25 to submit a decommissioning funding plan containing a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning. However, the costs LES will incur for removal and disposition of DUF₆ are more properly characterized as operational and maintenance (O&M) in nature and thus should be treated in a manner different from the costs of decommissioning the CEC at the end of its useful life.

The decommissioning funding plan as well as the cost estimate for DUF₆ disposition are detailed in the LES License Application, Exhibit I, the LES Safety Analysis Report (SAR), section 11.8, and the LES Environmental Report (ER) section 4.4. The cost estimate for removing DUF₆ was provided in the same sections as the decommissioning cost estimate as a matter of convenience since DUF₆ eventually must be removed from the site in order to release the site for unrestricted use. Regarding decommissioning itself, LES understands that at this time it is not necessary for LES to submit a decommissioning plan required by 10 CFR Parts 30.36, 40.42, and 70.38. The decommissioning plan will be submitted to the NRC for approval shortly before cessation of licensed activities.

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The "LES CEC Depleted Uranium Hexafluoride Management Study" referred to in your letter provided further detailed bases for LES' decisions concerning disposition of the DUF_6 created at the CEC. Specifically, one option in the report analyzed conversion of DUF_6 to DUF_4 and then packaged, transported, and disposed of in a Near-Surface Disposal Facility licensed in accordance with 10 CFR Part 61. LES analyzed this option because it conformed to processes that are currently licensed and available in the United States.

Your letter of September 22, 1992 indicated that LES should convert DUF_6 to U_3O_8 and not dispose of the U_3O_8 in a Near-Surface Disposal Facility. Disposal should be in another alternative; deep mine disposal was suggested. Recognizing that the regulatory framework for disposal of DUF_6 is currently under consideration for revision, LES has prepared the following estimate in response to your letter and as an option in addition to the previously submitted disposition options.

Table 1 (attached) compares the previously submitted figures with additional ones prepared in accordance with the following assumptions:

- LES has the DUF_6 produced at the CEC converted to depleted triuranium octoxide (U_3O_8) for disposition. The conversion and disposition are performed at non-LES facilities off-site.
- LES commences conversion of DUF_6 to U_3O_8 within 15 years of initiating enrichment at the CEC or after production of no more than 80,000 tons of DUF_6 , whichever occurs first.
- For the purposes of the decommissioning and DUF_6 disposition cost estimate, LES assumes that the depleted U_3O_8 will be disposed of in a facility, other than a near-surface disposal facility, under cognizance of the NRC.

These additional figures provide a sufficient basis for assessing the adequacy of the O&M cost estimates contained in the ER. The cost estimates in the License Application, Safety Analysis Report and Environmental Report will be updated in the near future to reflect the additional figures.

LES believes that commitment to a definitive or prescriptive resolution of the manner of disposition would be premature at this time. The Energy Policy Act of 1992 ("Energy Act"), Sec. 1016 requires that a uranium inventory study be performed by the United States Department of Energy ("DOE") by October 24, 1993. Among other things, this study shall include "recommendations for the future use and disposition of such [uranium] inventories." The

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referenced inventories include depleted tailings (i.e., depleted uranium hexafluoride). By the year 2000, it is expected that three domestic entities - The DOE, the United States Enrichment Corporation ("USEC"), and Louisiana Energy Services ("LES") will possess significant quantities of depleted uranium hexafluoride.

The DOE currently possesses over 1 billion pounds of DUF_6 . The newly created United States Enrichment Corporation (USEC, see below) will continue to produce DUF_6 at a rate approximately 5-8 times that of the CEC, commencing on July 1, 1993. Production at the CEC only begins later this decade.

The Energy Act also requires that NRC, in consultation with the Environmental Protection Agency (EPA), must review the operations of the USEC with respect to the gaseous diffusion enrichment facilities leased by them from the DOE. The Energy Act requires that the NRC establish standards to govern the gaseous diffusion enrichment facilities in order to protect the public from radiological hazard and provide for the common defense and security. LES anticipates that there would be no basis to apply different standards to USEC-generated DUF_6 than to that produced at the CEC.

The establishment of similar standards for the USEC should allow the depleted uranium hexafluoride produced by the USEC and LES to be handled in a similar manner. This also will allow LES to assume the availability of reconversion and disposal facilities, and economies of scale in methods of handling the material. Also LES will not be at a competitive disadvantage in these areas with LES' major domestic competitor. The two years allowed by the Energy Act for the NRC to establish the standards for the gaseous diffusion enrichment facilities will permit additional information to be gathered by the NRC, EPA, DOE and LES on the disposition of depleted uranium hexafluoride, well in advance of the time scale for production from the CEC.

The DOE uranium inventory study referred to above will be a suitable forum for coordinating joint action among the three (or more) parties responsible for producing and disposing of the national inventory of depleted uranium. I enclose a copy of the letter LES sent DOE stating our belief that this material represents a potential national resource, and that its future storage and ultimate use or disposition should be handled jointly among the parties involved. LES has offered to participate in the study phase of the program and to contribute LES' appropriate share of the disposition costs themselves.

As stated currently in the License Application, Exhibit I, LES will

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review and adjust as necessary the decommissioning cost estimate and decommissioning funding at least once every five years. At such times, or more often if appropriate, LES will also review the cost basis of depleted uranium hexafluoride disposition. This element of O&M costs will be recovered in the current pricing of the facility's product and need not be provided in advance as a surety fund.

The funds thus gathered from enrichment services will be set aside by LES in a separate account to ensure the necessary funds are available to dispose of the current DUF₆ inventory possessed by LES at any point in time. Should the estimates for disposition of DUF₆ provided in this letter not prove adequate, LES will adjust product pricing accordingly. Since our domestic competitors would be dealing with similar regulations, LES anticipates being able to recover any necessary price adjustments in the market place. LES will also limit the on-site inventory of DUF₆ to the amount specified in your September 22, 1992 letter.

If there are any questions concerning this, please do not hesitate to call me at (704) 373-8466.

Sincerely,



Peter G. LeRoy
Licensing Manager

PGL/N71.112

Enclosures

Mr. John W. N. Hickey, Chief
December 14, 1992
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xc: (w/ enclosures)

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Louisiana Department of Environmental Quality
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Table 1
Comparison of Decommissioning and DUF₆ Disposition Costs

Cost Category	Present Estimate ^a (\$1996)	Revised Estimate ^a (\$1996)
Decontamination and Decommissioning (D&D) (one time costs)		
D&D Facility Capital	\$ 6.8	\$ 6.8
D&D Facility Labor	1.4	1.4
UF ₆ System Cleaning	1.1	1.1
Plant/System Dismantling	6.8	6.8
Decontamination	13.7	13.7
Aluminum Salvage Value	(7.9)	(7.9)
Waste Disposal	1.4	1.4
Hazardous & Mixed Waste Disposal	0.1	0.1
D&D Facility Decontamination	0.5	0.5
Final Radiation Survey	1.0	1.0
D&D Subtotal	\$ 24.9	\$ 24.9
DUF ₆ Disposition Costs (per year)		
DUF ₆ Transportation	0.8 /yr	0.8 /yr
DUF ₆ Conversion	8.2 /yr	12.0 /yr
Depleted Uranium Disposal	(as DUF ₆) 12.3 /yr	(as DUF ₆) 0.021 /yr ³
DUF₆ Disposition Subtotal (1 yr)	\$ 21.3 /yr	\$ 12.821 /yr
DUF₆ Disposition Subtotal (30 yrs)	\$ 639.0	\$ 384.6
Total Decommissioning and DUF₆ Disposition Cost	\$ 663.9	\$ 409.5

Notes: 1) All figures shown are millions of dollars.

2) No change to transportation costs. U₃O₈ occupies approximately 1.4 times more volume than UF₆. However, the weight of U₃O₈ is approximately 89% the weight of UF₆.

3) See Table 2 for DUF₆ disposition cost estimate basis.

Table 2

DU₃O₈ Disposition Estimated Costs

The CEC when operating at nominal capacity of 1.5 million SWU per year will produce approximately 300 48G cylinders of depleted UF₆ per year. Each cylinder of depleted UF₆ will result in approximately 11 tons (22,000 pounds) of depleted U₃O₈ when converted. Therefore, the CEC will produce approximately:

$$300 \text{ cylinders/year} \times 11 \text{ tons DU}_3\text{O}_8/\text{cylinder} = 3300 \text{ tons DU}_3\text{O}_8/\text{year}$$

The activities associated with deep mine disposal may be estimated by comparison with remedial action associated with uranium processing sites. As stated in The Energy Policy Act of 1992, Title X - Remedial Action and Uranium Revitalization, reimbursement made to licensees for remedial action shall not exceed \$5.50 per ton of material. This figure (\$5.50/ton) agrees well with the cost (= \$70 million - \$5.40/ton) of disposition of 13 tons of material at the Union Carbide Uravan Mill.

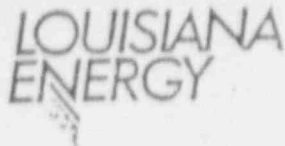
Therefore, using \$5.50 per ton of DU₃O₈, the cost (\$1992) of dispositioning 3300 tons of DU₃O₈ per year will be:

$$3300 \text{ tons DU}_3\text{O}_8 \times \$5.50 \text{ per ton} = \$18,150 (\$1992)$$

escalating this at 4% per year to \$1996:

$$\$18,150 (\$1992) \times (1.04)^4 \approx \$21,250 (\$1996)$$

Therefore, \$21,250 per year will be used for the purpose of estimating the dispositioning costs for DU₃O₈.



Louisiana Energy Services
2121 K Street, NW
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(202) 467-5490
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W. Howard Arnold
President

November 6, 1992

Mr. Leo Duffy, Assistant Secretary for Environmental
Restoration and Waste Management
United States Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Re: Louisiana Energy Services
Claiborne Enrichment Center
Energy Policy Act of 1992
Uranium Inventory Study
LES File #: 8.4.6

Dear Mr. Duffy:

The Energy Policy Act of 1992 ("Energy Act"), Sec. 1016 requires that a uranium inventory study be performed by October 24, 1993. Among other things, this study shall include "recommendations for the future use and disposition of such [uranium] inventories." The referenced inventories include depleted tailings (i.e., depleted uranium hexafluoride). By the year 2000, it is expected that at least three domestic entities - the Department of Energy ("DOE"), the United States Enrichment Corporation ("USEC"), and Louisiana Energy Services ("LES") will possess significant quantities of depleted uranium hexafluoride ("DUF₆").

Rather than have three or four separate entities deal with this issue in different ways and on different time scales, we would suggest that DOE take the lead and establish a national program for the handling of this potentially valuable material. Such a program would be most economical for all parties because of economies of scale, and a single point of control would allow the environmental consequences of shipment, conversion, handling and storage to be minimized. Absent such a coordinated program, one or more of these entities could take actions which might prejudice the optimum solution of this situation. LES would be pleased to participate in such a program, and we would be prepared to provide assistance in the study phase and share in expenses for conversion, storage and disposition on an equitable basis.

LES applied for a license to construct and operate the Claiborne Enrichment Center ("CEC") in January 1991. The application is currently under review by the United States Nuclear

Regulatory Commission ("NRC"). We expect a license to construct and operate the facility to be issued in the third quarter of 1994. One of the outstanding licensing issues is disposition of the depleted uranium hexafluoride produced at the CEC. Although not a waste, the NRC has indicated they believe it will be treated as such.

Depleted uranium is a potential energy source, and should be preserved in retrievable form. One potential is as input to a future enrichment plant, which would become economical were the price of separative work to drop significantly or the price of natural uranium ore to rise dramatically. Another potential is as breeding material in liquid metal reactors. Such reactors have been demonstrated to be technically feasible, and may become economical if the price of natural uranium ore becomes high enough. However, such uses are undoubtedly decades away, and extended storage of the material will be required before it can be decided that the material is indeed useful or should be dispositioned.

The LES license application postulated that UF_6 would be sufficiently stable for extended periods, but the NRC, by letter to LES dated September 22, 1992 (copy enclosed), has stated its preference for disposition to be as U_3O_8 in a facility not as yet defined other than that it is not licensed under 10 CFR ~~50~~ part 61. Such an approach, our studies show, could be quite costly and result in a disposal plan which reaches well beyond the low level of risk presented by depleted tails. However, we do agree that U_3O_8 is stable, non-corrosive, and insoluble in water so that it would be an excellent form for either extended storage or disposal. In a draft study prepared for DOE by Martin Marietta dated September 1991, it is stated that a preferable option (as opposed to disposing of the DU_3O_8) may be to create a strategic reserve and store the converted material in retrievable form in a facility designed for indefinite, low maintenance operation. This is currently being done in France with a portion of the DUF_6 being generated in the Eurodif gaseous diffusion facility.

DOE currently possesses essentially all the DUF_6 inventory in the United States. However, the USEC will begin to generate this material as soon as the DOE facilities come under its operational control via the lease specified in the Energy Act. Since the Energy Act also specifies that the USEC must be certified by the NRC within two years, we anticipate that the NRC requirements indicated to us in the letter of September 22 will apply to the USEC as well. The LES licensing and the USEC certification regulations are now being examined by the NRC, prompting an early resolution of this issue. This schedule is compatible with the time frame of your uranium inventory study, so we urge that you define its scope broadly enough to include these issues. As our date of commencement of operations is no earlier than the middle of 1997, and the deadline for removal of the first DUF_6 from the CEC site is well beyond 2010, we expect that there will be sufficient time for us to coordinate the specific arrangements for the actual handling of our material once the plan is in place. Indeed, in this time period other parties could also generate depleted uranium in the United States. For example, the Energy Act

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contemplates licensing the Atomic Vapor Laser Isotope Separation ("AVLIS") technology currently owned by DOE to a private entity who would build an enrichment plant.

As stated above, LES would be pleased to participate with you and the USEC in discussing this matter at your earliest convenience. We are prepared to provide input to your study, and would look forward to working with you in the implementation phase when our inventory of DUF₆ is to be dealt with.

Sincerely,

Howard Arnold

WHA/pp

Enclosure



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

September 22, 1992

Docket No: 70-3070

Louisiana Energy Services, L.P.
ATTN: W. Howard Arnold
President
2121 K Street, N.W.
Suite 850
Washington, DC 20037

Gentlemen:

Since disposition of depleted uranium (DU) tails is an important decommissioning licensing issue for the proposed Claiborne Enrichment Center, the Nuclear Regulatory Commission performed an assessment of the issues involved. Our evaluation assumes that the bulk of DU tails will eventually be disposed of as a waste. We examined the acceptability of disposal of the LES enrichment plant tails, as depleted UF_6 , in a licensed 10 CFR Part 61 disposal facility as suggested by LES's "Depleted Uranium Hexafluoride Management Study." We have completed our review of this proposal. Based on our analysis, we have reached the following conclusions.

The preferred chemical form for final disposition of the DU tails is U_3O_8 regardless of U-235 concentration. Even if stored tails were later further processed and depleted of U-235, the bulk of DU tails must still be disposed of. Compared with UF_6 , U_3O_8 is the more stable physicochemical form and the more compatible, as regards to safety, with long-term disposition of tails. Conversion of the DUF_6 to DUF_4 for final disposition is not acceptable because its physicochemical, long-term stability is incompatible with final disposal under 10 CFR Part 61.

The Environmental Impact Statement (EIS) supporting 10 CFR Part 61 did not contemplate large volumes of DU tails. Our analysis, using methodology similar to that used for the Part 61 EIS, concludes that near-surface disposal of such large quantities of DU tails is not appropriate, both because of its potential radiological impact and its chemical toxicity. However, other disposal alternatives under 10 CFR Part 61 may be viable; e.g., deep mine disposal. Therefore, disposal options, other than near-surface disposal, must be considered for the DU tails. Disposal options must be accompanied with supporting analyses. The analyses should include funding provisions for storage, tails conversion to the oxide form, final disposition and, if applicable, transportation costs.

Your analyses should also consider an appropriate schedule for conversion and disposal. Since you are proposing to start production in phases, which may take several years, the conversion of DUF_6 to DU_3O_8 , or other suitable waste form, should start 10 to 15 years after initiating production, or after generating 80,000 tons of tails, whichever is reached first.

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W. Howard Arnold

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In summary, demonstration of viable means of DU tails ultimate disposition and provision for financial assurance are needed. It is recognized that the total volume of waste to be generated for the LES Claiborne Enrichment Center is part of a much larger national inventory. Therefore, LES DU tails disposition may be addressed as part of the national inventory disposal scheme.

We would be pleased to discuss these matters further with you after you have considered them. If you have any questions, please contact Dr. Lidia A. Roche' at (301) 504-2695.

Sincerely,

A handwritten signature in cursive script, appearing to read "John W.N. Hickey".

John W.N. Hickey, Chief
Fuel Cycle Safety Branch
Division of Industrial and
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Office of Nuclear Material Safety
and Safeguards

cc: Attached list

ATTACHED LIST

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