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U.S. NUCLEAR REGULATORY COMMISSION
In the Matter of Louisiana Energy Services
Docket No. 70-3103-ML Official Exhibit No. LES/RC/1-P
OFFERED by: Applicant/Licensee Intervenor LES/PC
NRC Staff Other
IDENTIFIED on 10/24/95 Witness/Panel LES Decommission
Action Taken: ADMITTED REJECTED WITHDRAWN
Reporter/Clerk Bettsamy Engel

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	Docket No. 70-3070-ML
LOUISIANA ENERGY SERVICES, L.P.	ASLBP No. 91-641-02-ML (Special Nuclear Material License)
(Claiborne Enrichment Center)	February 27, 1995

TESTIMONY OF PETER G. LEROY AND BERNARD G. DEKKER
ON BEHALF OF LOUISIANA ENERGY SERVICES ADDRESSING
CONTENTION B, DECOMMISSIONING PLAN DEFICIENCIES, AND
CONTENTION J.3, ASSESSMENT OF DECOMMISSIONING COSTS UNDER NEPA

Q1. Please state your name, affiliation, qualifications and current job responsibilities.

Q1A. (PGL) My name is Peter G. LeRoy. I am employed by Duke Engineering and Services, Inc., as an Engineering Supervisor II, contracted to provide services to Louisiana Energy Services, L.P. ("LES"), as Licensing Manager. As LES Licensing Manager, I am responsible for securing the necessary licenses and permits to allow construction and operation of the Claiborne Enrichment Center ("CEC"). This includes preparing, submitting and gaining approval of the license application submitted to the United States Nuclear Regulatory Commission ("NRC").

I have worked on the LES project since July 1989. I am completely familiar with the decommissioning funding plans and

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obligations and decontamination and decommissioning plans of LES concerning the CEC. I was responsible for the compilation of the information on decommissioning planning and funding that was provided to the NRC in LES's License Application dated January 31, 1991, including the LES Decommissioning Funding Plan (Exhibit I to the CEC License Application), Sections 4.7 and 11.8 of the LES Safety Analysis Report ("SAR"), and Sections 4.4 and 8.0 of the Environmental Report ("ER").

A summary of my professional qualifications and experience is provided in Attachment 1 to this testimony, which is incorporated herein by reference.

(BGD) My name is Bernard G. Dekker. I am Manager of Safety, Safeguards, and Licensing for Urenco Nederland B.V., which operates uranium enrichment facilities at Almelo in the Netherlands. I have held this position since 1984. Through more than eighteen (18) years of service with Urenco Nederland B.V., I have gained expert knowledge and experience in the operation, decontamination, and decommissioning of gaseous centrifuge uranium enrichment facilities in Europe.

I have been retained by LES to advise on various matters concerning planning and funding for the decontamination and decommissioning of the CEC, including assisting in the development of the Decommissioning Funding Plan for the CEC. My participation is intended to ensure that LES's decommissioning and decommissioning funding plans for the CEC project will allow LES to satisfy the NRC's decommissioning regulations.

A summary of my professional qualifications and experience is provided in Attachment 2 to this testimony, which is incorporated herein by reference.

Q2. What is the purpose of your testimony?

Q2A. (PGL; BGD) We will address Citizens Against Nuclear Trash ("CANT") Contentions B, "Decommissioning Plan Deficiencies," and J.3, "Inadequate Assessment of Decommissioning Costs Under NEPA."

In Contention B, CANT alleges that:

> The LES decommissioning plan does not provide reasonable assurance that the CEC site can be cleaned up and adequately restored upon cessation of operations.[1/]

CANT stated six separate bases for Contention B as well as several other bases added (with the Board's permission) from Contention A which was withdrawn.

The Board admitted Contention B "insofar as it challenges the reasonableness of LES' decommissioning funding plan." Louisiana Energy Services, L.P. (Claiborne Enrichment Center), LBP-91-41, 34 NRC 332, 337. The Board further ruled that CANT had adequately alleged that LES's decommissioning funding plan "does not contain reasonable estimates for decommissioning nor does it adequately describe the underlying decommissioning strategy." 34 NRC at 338.

1/ "Citizens Against Nuclear Trash's Contentions on the Construction Permit/Operating License Application for the Claiborne Enrichment Center," October 3, 1991, at 3-8.

The Board found that Bases 1, 4, and 5 support the contention and that Bases 2, 3, and 6, and the bases transferred from Contention A do not. 34 NRC at 340. Bases 1, 4, and 5 concern the following:

> Basis 1 -- Intervenor asserts that there is no realistic basis for LES's estimate of the cost of disposition of depleted UF_6 tails (DUF_6) (at that time estimated at $9.5 million per year) because LES does not have a plan for the offsite disposal of depleted uranium.
>
> Basis 4 -- CANT alleges that LES provides no details on how the decommissioning costs were determined. CANT alleges a lack of information in several specific areas and incorporates by reference a June 25, 1991 request for additional information from NRC to LES. CANT requests that LES be made to explain the derivation of its estimated costs in order to assure that there is a rational basis for the decommissioning costs.
>
> Basis 5 -- CANT alleges that LES decommissioning costs do not indicate what facilities will be decontaminated and to what extent.

In admitting Bases 1, 4, and 5 of Contention B, the Board made the following observations:

> The NRC has no regulatory requirement that there must be a concrete plan for the disposal of the depleted uranium that the facility would generate each year and that before a license may issue such disposal plan must comply with all applicable environmental laws.
>
> The Commission in noticing the application for hearing indicated that the applicable regulations only require that an applicant have a <u>plausible strategy</u> for the disposition of depleted uranium hexafluoride tails. . . .
>
> The regulations do require that an applicant submit a decommissioning funding plan which must contain a cost estimate for decommissioning. 10 C.F.R. 70.25(a) and (e). Cost estimates may be adjusted periodically over the life of the facility. For the regulation to have meaning the cost estimate should contain <u>reasonable estimates for an adequately described decommissioning strategy</u>.

TESTIMONY ON CONTENTION B

Q3. What is your understanding of the requirements of the Commission's regulations for decommissioning which must be met by LES in connection with licensing of the CEC?

Q3A. (PGL) In a notice of hearing dated May 15, 1991, the Commission established that the matters of fact and law to be considered in the CEC licensing proceeding include, inter alia, whether the license application submitted by LES satisfies the standards set forth in 10 C.F.R. Parts 19, 20, 21, 30, 40, 61, 70, and 140, including requirements governing decommissioning funding and waste disposal.[2]

NRC decommissioning funding requirements applicable to the CEC are found in 10 C.F.R. §§ 40.36, and 70.25. These regulations require, in pertinent part, that:

> (a) Each applicant for a specific license authorizing the possession and use of more than 100 mCi of source material in a readily dispersible form shall submit a decommissioning funding plan as described in paragraph (d) of this section.
>
> * * *
>
> (c) (1) Each holder of a specific license issued on or after July 27, 1990, which is covered by paragraph (a) or (b) of this section, shall provide financial assurance for decommissioning in accordance with the criteria set forth in this section.
>
> * * *

2/ "Notice of Receipt of Application for License, Notice of Availability of Applicant's Environmental Report, Notice of Consideration of Issuance of License, and Notice of Hearing and Commission Order," May 15, 1991; 56 Fed. Reg. 23,310 (May 21, 1991) ("Hearing Order").

(d) Each decommissioning funding plan must contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from paragraph (e) of this section, including means of adjusting cost estimates and associated funding levels periodically over the life of the facility.

* * *

(e) Financial assurance for decommissioning must be provided by one or more of the following methods:

* * *

(3) An external sinking fund in which deposits are made at least annually, coupled with a surety method or insurance, the value of which may decrease by the amount being accumulated in the sinking fund. An external sinking fund is a fund established and maintained by setting aside funds periodically in an account segregated from licensee assets and outside the licensee's administrative control in which the total amount of funds would be sufficient to pay decommissioning costs at the time termination of operation is expected. An external sinking fund may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities. The surety or insurance provision must be as stated in paragraph (e)(2) of this section.

10 C.F.R. § 40.36(a), (c)(1), (d), (e)(3); see also 10 C.F.R. §§ 70.25(c)(1), (e), and (f)(3) (which apply to "Each applicant for . . . [a] specific license for a uranium enrichment facility." 10 C.F.R. § 70.25(a)(1)). This Board has ruled that for these regulations to have meaning, "the cost estimate should contain reasonable estimates for an adequately described decommissioning plan." 34 NRC at 338.

NRC regulations governing decommissioning planning, decommissioning, and license termination (as opposed to decommissioning funding) are found in 10 C.F.R. §§ 40.42, and 70.38. These regulations provide that:

> (b) Each licensee shall notify the Commission promptly . . . and request termination of the license when the licensee decides to terminate all activities involving materials authorized under the license. This notification and request for termination must include . . . a plan for completion of decommissioning, if required by paragraph (c)(2) of this section or by license condition.
>
> * * *
>
> (c)(2)(i) In addition to the information required under paragraphs (c)(1) (iv) and (v) of this section,[3/] the licensee shall submit a plan for completion of decommissioning . . . .
>
> * * *
>
> (iii) The proposed decommissioning plan . . . must include --
>
> (A) Description of planned decommissioning activities;
>
> (B) Description of methods used to assure protection of workers and the environment against radiation hazards during decommissioning;
>
> (C) A description of the planned final radiation survey;
>
> (D) The information required in § 40.36(f)(3) [and 70.25(g)(3)] that is considered necessary to support the adequacy of the decommissioning plan for approval;

3/ These provisions require the licensee to conduct a radiation survey of the premises where the licensed activities were carried out and submit a report of the results of the survey to the NRC, on or before the expiration date of the license. 10 C.F.R. §§ 40.42(c)(1) and 70.38(c)(1).

(E) An updated detailed cost estimate for decommissioning, comparison of that estimate with present funds set aside for decommissioning, and plan for assuring the availability of adequate funds for completion of decommissioning.

(c)(3) Upon approval of the decommissioning plan by the Commission, the licensee shall complete decommissioning in accordance with the approved plan. . . .

10 C.F.R. § 40.42(b), (c)(2), (c)(3); see also 10 C.F.R. § 70.38(b), (c)(2), (c)(3).

The Commission's May 15, 1991 Hearing Order states:

> These regulations also require that the applicant address the technical, financial, and insurance provisions and resources for dealing with the disposition of depleted uranium hexafluoride tails. Plausible strategies for the disposition of tails include: storing, as a potential resource, uranium hexafluoride tails at the plant site; continuously converting uranium hexafluoride tails to uranium oxide (or tetrafluoride) as a potential resource or for disposal; and a combination of both -- onsite storage with conversion of uranium hexafluoride at the end of plant life.

Hearing Order, 56 Fed. Reg. at 23,313 (referencing NRC SECY-91-019, "a Commission paper in which these strategies and issues relating to the disposition of depleted uranium tails from enrichment plants are discussed." (Exhibit LES 3)).

Q4. Does LES meet NRC requirements governing planning and funding for decommissioning of the CEC? If so, briefly explain.

Q4A. (PGL) LES has complied with the requirements of 10 C.F.R. §§ 40.36 and 70.25, which require that LES provide the NRC with detailed information regarding the financial mechanism to be used by LES to assure the availability of sufficient funds for

decommissioning of the CEC. As required by 10 C.F.R. §§ 40.36(d) and 70.25(e), LES has submitted to NRC a decommissioning funding plan (Exhibit I to CEC License Application) which contains a decommissioning cost estimate and a description of the method to be used to assure availability of funds for decommissioning. Information on LES's plans for decommissioning the CEC is provided in Sections 4.7 and 11.8 of the SAR. Potential environmental impacts of decommissioning are considered in Sections 4.4 and 8.0 of the ER. These submittals provide reasonable estimates for an adequately described decommissioning strategy.

Detailed information concerning actual decommissioning of the CEC is required to be submitted not at this time but rather at or near the termination of operations or expiration of the license for the CEC, in accordance with 10 C.F.R. §§ 40.42 and 70.38.

Q5. Did you rely upon any NRC guidance material to prepare the Decommissioning Funding Plan and Section 11.8 of the SAR for the CEC?

Q5A. (PGL) Yes. In developing the Decommissioning Funding Plan for the CEC, LES considered NRC Regulatory Guide 3.66, "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 C.F.R. Parts 30, 40, 70, and 72," June 1990. LES also considered the guidance in the Statement of Considerations to the NRC's 1988 final rule on

decommissioning (53 Fed. Reg. 24,018 (1988)). Although not directly applicable to uranium enrichment facility license applicants, LES also considered, as general guidance, NRC Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," August 1990.

LES also considered Regulatory Guide 3.25, "Standard Format and Content of Safety Analysis Reports for Uranium Enrichment Facilities" (see especially Sections 4.7 and 11.8) and Regulatory Guide 4.9, "Preparation of Environmental Reports for Commercial Uranium Enrichment Facilities" (see especially Section 4.4) in developing the Decommissioning Funding Plan and other decommissioning-related information for the CEC.

Q6. What information has LES submitted to the NRC in order to demonstrate compliance with the NRC's decommissioning planning and funding requirements?

Q6A. (PGL) LES's compliance with the decommissioning funding requirements of 10 C.F.R. §§ 40.36, and 70.25 is addressed in Exhibit I to the CEC License Application (Revision 7, October 1993) and Sections 4.7 and 11.8 of the SAR for the CEC, as updated in October 1993. Decommissioning costs are also addressed in Section 10 of the LES Financial Plan, which was submitted to the NRC by letter dated May 1, 1992 and updated by letter dated December 22, 1994.

Decommissioning and tails disposition were also discussed in the following correspondence between LES and the NRC (Exhibit LES4):

a) NRC Letter to LES dated March 21, 1991, which provided initial comments on the SAR and ER and advised LES that a substantive plan for the disposition of depleted UF_6 and a program for surveillance and maintenance of UF_6 cylinders were needed.

b) NRC Letter to LES dated June 25, 1991, which provided initial comments on LES's Decommissioning Funding Plan, including that LES should use Appendix F to Reg. Guide 3.66, that no credit for salvage value should be taken, and that LES should explain why ponds and grounds would not need remediation.

c) NRC Letter to LES dated November 7, 1991, which requested additional information and essentially repeated in more detail the NRC's request of March 21, 1991 regarding needed plans for DUF_6 disposition and UF_6 cylinder maintenance and inspection.

d) NRC Letter to LES dated May 20, 1992, which requested that LES adjust its decommissioning cost estimates to $1996 and provide estimates of radioactive, hazardous, and mixed waste from D&D activities.

e) NRC Letter to LES dated May 22, 1992, which requested additional, specific information on the chemical and physical characteristics of UF_4 and contemplated disposal containers for DUF_4.

f) NRC Letter to LES dated September 22, 1992, which indicated that the preferred chemical form for disposition of DUF_6 is U_3O_8, that LES should assume non-near-surface disposal in a 10 C.F.R. Part 61-licensed facility, that onsite storage of tails would be limited to 15 year or 80,000 tons, and that tails disposition could be addressed as part of the national inventory disposal scheme.

g) NRC Letter to LES dated June 18, 1993, which expressed agreement that "it is premature for LES to commit at this time to a prescriptive resolution of the disposition of tails" and advised LES to include tails disposition costs in decommissioning funding, to include conversion and transportation costs in tails disposition costs, and to assume a disposal (burial) cost of $1 per kilogram U_3O_8.

h) NRC Letter to LES dated September 15, 1993, which requested additional detailed information regarding facility decommissioning.

i) NRC Letter to LES dated September 27, 1993, which requested additional information to be included as part of decommissioning planning for the CEC.

j) NRC Letter to LES dated November 10, 1993, which noted changes that should be made to CEC license application documents, including addition of a condition that no withdrawal from the D&D Fund can exceed 20% of the Fund unless NRC approval is attached.

k) LES Letter to NRC dated October 1, 1991, by which LES submitted the LES Depleted UF_6 Management Study, which discussed conversion of UF_6 to UF_4 and disposal of UF_4 as low-level radioactive waste ("LLW") at a cost of ~ $13MM annually ($1990)).

l) LES Letter to NRC dated July 29, 1992, submitting July 31, 1992 SAR revisions escalating D&D costs to $1996 and including $0.1MM for D&D waste disposal.

m) LES Letter to NRC dated December 14, 1992, outlining LES's position on DUF_6 disposition -- that disposition costs should be treated as O&M costs rather than D&D costs, distinguishing a funding plan from a D&D plan, and noting implementation of NRC's recommendations that the tails disposal strategy include burial as U_3O_8 rather than UF_4, that LES, DOE, and USEC be treated evenly under a "national disposal scheme," and that onsite tails storage be limited to 15 years or 80,000 tons.

n) LES Letter to NRC dated June 30, 1993, providing revised costs estimates for D&D, including treatment of tails disposition as D&D cost, with no salvage credit taken.

o) LES Letter to NRC dated September 21, 1993, providing additional detail for basis of cost estimates for decommissioning funding, discussing Almelo decommissioning, forwarding a letter from F.A. Stockschlader to Dr. P.C. Upson, and noting revision of the CEC decommissioning cost estimate from $28.4MM to $23.1MM on the basis of information provided in Stockschlader letter.

p) LES Letter to NRC dated September 30, 1993, which added a time line and schedule description for CEC decommissioning.

Q7. Has LES accounted for estimated decontamination and decommissioning costs, including costs of disposition of DUF_6, for the CEC? If so, how?

Q7A. (PGL; BGD) Yes. The estimated costs of decontamination and decommissioning the CEC, including the costs of DUF_6 disposition, are described in the Decommissioning Funding Plan (Exhibit I to the CEC License Application), Section 10 of the LES Financial Plan, and Section 11.8 of the SAR.

SAR Table 11.8-2, Estimated Decommissioning Costs and Duration, provides a summary listing of the costs of the major decommissioning activities described in SAR Section 11.8.1.2. All costs are in 1996 dollars. As detailed below, the estimated total CEC decommissioning cost is $518.34 million. Costs are anticipated to change between the time of license application and decommissioning. The cost estimate will be adjusted periodically consistent with the requirements of 10 C.F.R. § 70.25(e) and the guidance in Regulatory Guide 1.159. This periodic adjustment is required by the CEC Proposed License Conditions Sections 1.6B and 7.0.

LES's evaluation of decommissioning costs included an evaluation of the actual decommissioning experience of Urenco, Ltd, an affiliate of one of the general partners in the CEC project, at its similar gaseous centrifuge enrichment facilities in Europe. Appropriate adjustments have been made to those actual decommissioning costs to account for cost differences

associated with the performance of specific activities in the United States, and the costs have been escalated to $1996.

Estimated costs of decommissioning the CEC are as follows:

Facility and Site Characterization $ 0.22 million

This is based upon Urenco's on-going experience in the decommissioning of gaseous centrifuge enrichment facilities.

NRC Review of Facility and Site Characterization $ 0.05 million

This is based upon the costs incurred to date by the NRC to review the LES license application.

Decommissioning Plan Development $ 0.22 million

This is based upon LES' experience in developing and submitting NRC required information.

NRC Review and Approval of Decommissioning Plan $ 0.05 million

This is based upon the costs incurred to date by the NRC to review the LES license application.

Idle Time Before Decommissioning $ 1.0 million

This is based on a 6-month delay between cessation of operations and start of decommissioning activities.

Decontamination Facility Installation
System Cleaning
Dismantling
Decontamination $ 23.1 million

This is based upon over ten years of Urenco experience with decommissioning two pilot uranium enrichment centrifuge facilities at the Almelo enrichment facility in the Netherlands.

Decontamination/Decommissioning of Decontamination Facility $ 1.9 million

This is based upon the size of the decontamination facility and an independent estimate provided by Naylor Industrial Services, Inc., transmitted by letter dated September 11, 1990.

Radioactive Waste Disposal $ 1.4 million

This assumes that 100 m^3 of LLW are generated during decommissioning that must be disposed of at a cost of $350 per ft^3, in 1992 dollars, escalated to 1996 dollars. This cost of disposal is estimated specifically for radioactive waste disposal in the Central States Compact.

Hazardous/Mixed Waste Disposal $ 0.1 million

CEC decontamination and decommissioning processes, as described in this section, do not result in the production of hazardous or mixed wastes for disposal. Normal accumulation of hazardous and mixed wastes will occur during the final months of CEC operation and will require disposal at the time of decommissioning. The volume of these final wastes, not due to D&D activities, are estimated to be approximately equivalent to the annual amounts listed in the CEC Safety Analysis Report, Table 7.1-1.

Tails Disposal $ 485.3 million

The annual tails disposal cost is estimated to be $16.175 million. This annual cost is multiplied by 30 years of facility operation to arrive at the $485.3 million figure. Costs are based on converting UF_6 to U_3O_8 with subsequent disposal in a facility under cognizance of the NRC. U_3O_8 conversion costs are based on estimates by a vendor which could make this service available to LES. Disposal costs are based on information in a letter from NRC to LES dated June 14, 1993, and in a report entitled "The Ultimate Disposition of Depleted Uranium," Martin Marietta, December 1990. Conversion, transportation, and disposal (burial) costs are added and escalated to 1996 dollars.

Funds to cover these costs, estimated at $16.175 million per equivalent years of tails production, will be set aside during the operating life of the CEC. Tails disposition costs are now explicitly reflected in the funding table (SAR Table 11.8-2, ER Table 4.4-2), which reflect both decommissioning funding and the separate matter of contingent end-of-life tails disposition funding.

Final Radiation Survey $ 1.5 million

This figure was estimated by two methods, as follows:

1) The first method is by extrapolation from "Technology and Cost of Termination Surveys Associated with Decommissioning of Nuclear Facilities," NUREG-2241, February, 1982. The 1980 costs of decommissioning a fuel fabrication facility and a UF_6 production facility were escalated at 5% per year to 1990. The higher of the two costs, (calculated for a 1 mrem and a 5 mrem dose to the public), were selected and then averaged, for a total of $750,000. Further escalation brings the cost to $950,000.

2) The second estimate was roughly approximated at $725,000 in 1990 dollars, and is escalated to 1996 dollars. The estimate was based on experience, using the following assumptions:

12,000 hours for grid of property and gamma count
$23,000 for soil sampling
150 core holes for depth profile
Building size of 750' x 380'
Workhour rate, including per diem, $60/hour
Extensive use of swipes
Final analyses and report included

Based upon the costs incurred to date to review the LES License Application, the cost of the NRC's confirmatory survey of the facility and site following the final radiation survey is estimated to be $0.5 million.

Contingency	$ 3.5 million

A contingency of $3.5 million has been added to the decommissioning cost estimate to account for unanticipated happenstance. LES will be updating the decommissioning cost estimate at least once every five years. Therefore, a larger contingency is not warranted.

Total Estimate	$ 518.34 million

Q8. Does LES plan to dispose of depleted uranium through burial?

Q8A. (PGL) Not necessarily. Disposal (burial) is only one of several options for disposition of depleted uranium. As the Commission has recognized, plausible strategies for the disposition of depleted uranium include storing DUF_6, as a potential resource; continuously converting DUF_6 to triuranium octoxide (U_3O_8) (or uranium tetrafluoride (UF_4)) as a potential resource or for disposal; and a combination of both -- storage with conversion of DUF_6 at the end of plant life.

LES has not yet made a final determination with respect to disposition of DUF_6 to be generated through operation of the CLC and continues to consider all reasonable options. For example, the U.S. Department of Energy is presently seeking recommendations from interested persons, industry, and other Government agencies for potential uses for the DUF_6 stored at the gaseous diffusion enrichment plants in Paducah, Kentucky, Portsmouth, Ohio, and Oak Ridge, Tennessee (59 Fed. Reg. 56,324 (Nov. 10, 1994)). The Department of Energy has also published an

advance notice of its intent to prepare an environmental impact statement to assess the potential environmental impacts of alternative strategies for the long-term management or uses of DUF_6 (59 Fed. Reg. 56,325 (Nov. 10, 1994). These are examples of initiatives that may result in the identification of additional options for the future disposition of DUF_6.

As a practical matter, LES is holding open its options for disposition of DUF_6. However, for purposes of this licensing proceeding, in order to satisfy the Commission's requirement that the CEC license application contain a "plausible strategy" for disposition of depleted uranium, LES has assessed, and factored into its decommissioning funding plan, the costs of conversion of DUF_6 to DU_3O_8 and land disposal (deep burial) of DU_3O_8 as if it were a waste.

Q9. Does DUF_6 constitute waste?

Q9A. (PGL; BGD) No. DUF_6 is source material as defined by the Atomic Energy Act of 1954, as amended, and in NRC regulations. Section 11(z) of the Atomic Energy Act of 1954, as amended, 42 U.S.C. § 2014(z) (definition of "source material"); 10 C.F.R. § 40.4 (definitions of "depleted uranium" and "source material"); Louisiana Energy Services, L.P. (Claiborne Enrichment Center), 34 NRC at 339, 340. However, as noted previously, for purposes of developing a decommissioning cost estimate for the CEC, LES has assumed that DUF_6 will be converted to DU_3O_8 and disposed of as if it were waste.

Enrichers in Europe generally consider depleted uranium tails to be a resource rather than a waste. Currently depleted uranium is stored on-site at Urenco facilities. Urenco has not yet undertaken permanent disposition of depleted uranium tails. A long-term plan for disposition of this depleted uranium is being studied. At present, the plan involves off-site conversion of depleted uranium to DU_3O_8.

Q10. What is the basis for LES's estimate of the cost of disposition of DUF_6?

Q10A. (PGL) LES's initial cost estimate for disposition of DUF_6 assumed that the DUF_6 would be converted to UF_4 and then disposed of as if it were waste. That initial cost estimate consisted of the following components:

Cost (millions/year of operation)	Activity
0.6	shipment
6.5	conversion to UF_4
2.4	UF_4 disposal

$ 9.5 million/year ($1990)	

This estimate was reflected in LES's original License Application, which was submitted to the NRC by letter dated January 31, 1991. For purposes of this initial estimate, it was assumed that the depleted uranium would be converted to depleted UF_4 and disposed of in a near-surface commercial LLW disposal facility licensed in accordance with 10 C.F.R. Part 61. Waste disposal costs were estimated at $80 per cubic foot, which was

the estimated cost for burial of LLW at the facility to be developed by the Central States LLW Compact.

In July 1992, LES revised its initial cost estimate for disposal of depleted uranium to express the estimate in $1996 (assuming an annual escalation rate of 4 percent) and to reflect an increase in the estimated cost of LLW burial at the disposal site to be developed by the Central States Compact from approximately $80 per cubic foot ($1990) to approximately $350 per cubic foot ($1996). The revised estimate was as follows:

Cost (millions/year of operation)	Activity
0.8	shipment
8.2	conversion to UF_4
12.3	UF_4 disposal

$21.3 million/year ($1996)	

This estimate was provided to the NRC by letter dated July 29, 1992 in the form of updates to the ER, SAR, and License Application for the CEC.

By letter dated September 22, 1992, the NRC Staff advised LES that LES should assume conversion of DUF_6 to U_3O_8 rather than to UF_4 and should assume disposal of U_3O_8 under 10 C.F.R. Part 61 in other than a near-surface disposal facility, such as a deep mine. LES therefore revised its cost estimate to reflect these assumptions.

The cost estimate prepared in response to the NRC Staff's September 22, 1992 letter contained the following elements:

Cost (millions/year of operation)	Activity
0.8	shipment
12.0	conversion to U_3O_8
0.021	U_3O_8 disposal

$12.821 million/year ($1996)	

As explained in Tables 1 and 2 to LES's letter to NRC dated December 14, 1992, this estimate assumed that the CEC would produce approximately 3300 tons of U_3O_8 per year and that the cost of disposal of U_3O_8 would be approximately $5.50 per ton. The $5.50-per-ton estimate was based on actual costs of disposal of wastes generated through remedial action at uranium processing sites. These assumptions resulted in an estimated disposal cost of $18,150 per year ($1992), which if escalated at 4% per year equates to $21,250 or $0.021 million per year ($1996).

By letter dated June 18, 1993, the NRC Staff advised LES to use $1.00 per kilogram U_3O_8 (kgU_3O_8), rather than $5.50 per ton, as a reasonable estimate of the cost of disposal of U_3O_8 in other than a near-surface disposal facility. As reflected in Tables 1 and 2 to a letter from LES to NRC dated June 30, 1993, the $1.00/$kgU_3O_8$ estimate translates into a disposal cost estimate of $3,374,592 per year ($1996). Incorporation of the $1.00/$kgU_3O_8$

disposal cost estimate resulted in the following overall DUF_6 disposition cost estimate:

Cost (millions/year of operation)	Activity
0.8	shipment
12.0	conversion to U_3O_8
3.375	U_3O_8 disposal

$16.175 million/year ($1996)	

LES provided this cost estimate to the NRC by letter dated June 30, 1993.

$16.175 million/year is LES's current estimate of the cost of disposal of DUF_6 as U_3O_8 under 10 C.F.R. Part 61 in other than a near-surface disposal facility. Based on this estimate, the total cost of depleted uranium disposal over 30 years of facility operation would be $485.25 million ($1996), and the total cost of facility decommissioning would be $518.05 million ($1996). Between June 1993 and October 1993, minor adjustments (e.g., slightly different breakdown of costs, rounding) to the decommissioning cost estimate resulted in a current total estimate of $518.34 million ($1996).

Q11. What is the basis for the $12 million-per-year estimate for the cost of conversion of DUF_6 to U_3O_8 that LES has utilized in its decommissioning cost estimate?

Q11A. (PGL; BGD) The cost of conversion of DUF_6 to depleted U_3O_8 is based on an estimated conversion cost of $4.86 per kilogram of uranium ($1996), which was provided to LES by

COGEMA, Inc., the U.S. affiliate of a French nuclear fuel services company.

COGEMA has indicated to LES in writing its willingness to consider providing, in the United States, conversion services for DUF_6. See Letters from Frank A. Shallo to W. Howard Arnold dated October 16, 1991 and February 22, 1995 (Exhibits LES5 A and LES6 A). In its letters to LES, COGEMA observes that the experience gained by its parent company in successfully operating a commercial-size defluorination facility in France could be used as the basis for employing technology in the United States to convert DUF_6 to U_3O_8. In 1991, COGEMA estimated that an appropriate fee for such services would be in the range of $3 to $5 per kilogram of uranium ($1991), assuming construction and operation in the U.S. under NRC standards. In its more recent letter, COGEMA provided an updated estimate of $4 to $6/kgU ($1995), which is in line with LES's conversion cost estimate of $4.86 ($1996) ($4.67 in $1995). These COGEMA estimates assume construction and operation of a deconversion facility in the United States and are based on COGEMA's actual experience in construction and operation of a commercial defluorination facility in France.

These cost estimates are also comparable to actual costs incurred by Urenco for deconversion of DUF_6 to U_3O_8 in Europe.

The estimate provided by COGEMA includes the understanding that COGEMA would assume responsibility of handling of any non-DU_3O_8 material produced during conversion (e.g., hydrofluoric acid-HF). LES is responsible for dispositioning the DU_3O_8 only.

Again, this is consistent with Urenco's actual deconversion experience in Europe, where HF remained with the deconverter.

As discussed in LES's "Depleted Uranium Hexafluoride Management Study," October 1, 1991 (at pp.18-19 and Appendix E), LES has also considered the possibility of transporting DUF_6 to France for conversion to DU_3O_8 by COGEMA. As detailed in the October 1991 Report, LES estimated the cost of conversion in France at $13.1 million/year ($1991) (which is comparable to LES's current estimate of $12.0 million/year ($1996) for conversion at a facility to be built in the United States). This estimate includes the extra cost of transportation to France.

Q12. What has LES estimated as the cost of transportation of depleted uranium tails and what is the basis for that estimate?

Q12A. (PGL) LES has estimated the cost of transportation of depleted uranium tails to be $800,000 per year of operation. This estimate is based on conversations with shippers of UF_6 and U_3O_8.

Q13. What is the basis for the $1.00/kg$U_3O_8$ estimate of the cost of disposal of depleted uranium that LES has utilized in its decommissioning cost estimate?

Q13A. (PGL) The $1.00/kg$U_3O_8$ estimate is based in part on a letter from NRC to LES dated June 18, 1993, in which the NRC stated: "[u]ntil the specific disposal site and method are

identified, the estimated cost is uncertain. However, for financial assurance planning purposes, we believe that it is reasonable to assume a disposal cost of approximately $1.00 per kilogram of U_3O_8." The NRC's basis for the $1.00/kg$U_3O_8$ included the findings in a December 1990 Martin Marietta report entitled "The Ultimate Disposition of Depleted Uranium" (Exhibit LES7 A_) and an internal NRC memorandum (See NRC Staff Answers dated January 13, 1995, to CANT Interrogatories, at 15-17).

Q14. The Martin Marietta report concluded in 1990 that $1.00/kgU was a prudent basis for <u>current</u> estimates of disposal costs; however, the report cautioned that it is "impossible to project disposal fees, even for the near future." Is the $1.00/kgU estimate still valid today?

Q14A. (PGL) Yes. More recent studies indicate that the $1.00/kgU estimate remains valid today. LES has recently reviewed a report entitled "Depleted Uranium Disposal Options Evaluation," May 1994, which was prepared by Science Applications International Corporation for EG&G Idaho, Inc., and the U.S. Department of Energy ("EG&G Report") (Exhibit LES8 A_). The EG&G Report (p.54) estimates the cost of <u>retrievable disposal</u> of DU_3O_8 by DOE at the Nevada Test Site to be $0.71/kgU ($1994). The Report suggests (p.51) that the rate incurred by non-DOE generators could be expected to be approximately 19% greater, or $0.84/kgU ($1994). The EG&G Report (p.51) estimates the cost of <u>non-retrievable burial</u> of DU_3O_8 by DOE at the Nevada Test Site to

be $0.15/kgU ($1994). Again, the Report states (p.51) that a non-DOE generator could expect to pay approximately 19% more, or $0.18/kgU ($1994). The Report notes that if increased burial depth is required the cost impact is unknown (i.e., not necessarily increased, not necessarily decreased). The EG&G Report also provides an estimate of $1.81/kgU ($1994) for burial of DU_3O_8 at the Hanford Site.

LES's estimate of $1.00/kg$U_3O_8$ ($1993) -- which translates to approximately $1.27/kgU ($1994) -- falls squarely within the range of estimates provided in the EG&G Report (i.e., $.18/kgU to $1.81/kgU ($1994)). These recent estimates show that the cost estimate of $1.27/kgU ($1994) used in LES' Decommissioning Funding Plan estimate remains plausible today.

Q15. Why has LES expressed tails disposal costs in terms of $/kg$U_3O_8$ rather than $/kgU and how does this affect LES's tails disposal cost estimate?

Q15A. (PGL) The tails disposal cost estimates stated in the 1990 Martin Marietta report and the EG&G Report are per-kilogram-<u>uranium</u> estimates. As requested by the NRC, LES has used an estimate of $1.00/kg$U_3O_8$. Since U_3O_8 is approximately 85% uranium by weight, LES's estimate for disposal is approximately 15% higher (more conservative) when compared to the Martin Marietta and EG&G Report estimates.

Q16. Intervenor has referred to a $10/kgU disposal cost for DOE's Waste Isolation Pilot Project. Does this estimate cause you to revise the $1.00/kg$U_3O_8$ figure?

Q16A. (PGL) No. As discussed in LES's testimony on Contention W in this proceeding, there are significant differences between depleted uranium to generated by the CEC and transuranic ("TRU") waste to be disposed of at the Waste Isolation Pilot Project site.[4/] As further discussed in LES's testimony on Contention W, these significant differences between the two types of material impact disposal methods and therefore disposal costs. Disposal of TRU waste at the WIPP site will be accomplished under methods, standards, and criteria comparable to NRC requirements in 10 C.F.R. Part 60 (see, e.g., 60 Fed. Reg. 5766 (Jan. 30, 1995)), which governs disposal of high-level radioactive wastes in geologic repositories. LES's cost estimate includes an assumption that tails will be disposed of in a facility licensed under 10 C.F.R. Part 61, which governs land disposal (near-surface or non-near-surface) of low-level radioactive waste. As discussed in LES's prefiled testimony on Contention W, the NRC Staff has demonstrated that this assumption is valid (see Appendix A to the Final EIS for the CEC). Because there is no reason to assume that tails will be disposed of in a facility licensed under the more stringent, and thus more costly,

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4/ LES's position on this matter is addressed in its submittal of February 1, 1995, responding to "CANT's Petition for Waiver of 10 C.F.R. § 61.55(a)(3) and 10 C.F.R. § 61.55(a)(6) and for Classification of Depleted Uranium Tails as Greater than Class C Radioactive Waste."

regime laid out in 10 C.F.R. Part 60, there is no basis for assuming that disposal costs will be akin to those incurred for disposal of TRU waste. Rather, LES concludes that costs will be closer to those estimated by the NRC, Martin Marietta, and EG&G for disposal of depleted uranium itself.

Q17. Does LES's decommissioning cost estimate include any costs of disposition of HF produced during conversion of DUF_6 to U_3O_8?

Q17A. (PGL) Yes. These costs would be reflected in the conversion fee charged to LES by the converter. As discussed previously, LES has estimated the total cost of conversion (including HF disposition) to be $4.86/kgU ($1996), based on the estimates provided to LES by COGEMA.

Q18. In developing its estimate of the cost of disposition of depleted uranium, has LES taken any credit for potential revenue that could be derived through sale of fluorine or HF as a resource?

Q18A. (PGL) No. LES has not taken credit for potential revenue that could be derived from the sale of fluorine or HF. According to COGEMA representatives, however, the HF produced as a result of the deconversion of DUF_6 to DU_3O_8 can be used as input or feed material in the forward conversion process (i.e., conversion of natural U_3O_8 to natural UF_6) or sold as HF to commercial industries. See SECY-91-019 at 3 and 5.

Q19. The EG&G Report cites a conversion cost of $8.40/kgU. Does this affect your conversion cost assumption discussed above?

Q19A. (PGL) No. The estimate of the deconversion process developed in the EG&G Report (p.47) includes HF neutralization. Since LES's cost of HF disposition is included as an element of the cost of conversion (which LES has estimated based on information provided by COGEMA), this portion of the EG&G Report's estimate is not applicable to LES. If the cost element for HF neutralization is removed from the EG&G estimate of $8.40/kgU, the conversion cost estimate becomes approximately $5.80/kgU ($1994). This is consistent with LES's estimate of $4.49/kgU ($1994) for deconversion.

Q20. Why does LES assume for purposes of its decommissioning cost estimate and decommissioning funding plan that DUF_6 would be converted to U_3O_8, as opposed to some other form, prior to permanent disposal?

Q20A. (PGL; BGD) Aside from the fact that the NRC directed us to assume for disposal estimate purposes such conversion, conversion to U_3O_8 powder is a prudent step in the disposition of DUF_6. As indicated in letters from COGEMA (discussed previously), conversion to U_3O_8 is considered prudent, since U_3O_8 is virtually insoluble in water, does not react with external chemical agents, is free of fluorine, and is the most compact form for storage, transportation, and disposal.

Q21. The $1.00/kgU tails disposal cost estimate is based on costs of near-surface disposal of depleted uranium, correct?

Q21A. (PGL) Yes, according to the Martin Marietta Report and EG&G Report.

Q22. In view of the fact that the Martin Marietta and EG&G cost estimates are based on near-surface disposal of depleted uranium, is LES's tails disposal cost estimate undercut by the fact that LES's current disposal strategy involves disposal in a deep cavity rather than near-surface disposal?

Q22A. (PGL) No. There are a number of factors which support the assumption that deep disposal will be no more costly and perhaps less costly than near-surface disposal.

For example, it is not contemplated that deep disposal of depleted uranium in the form of U_3O_8 would involve expenses for engineered barriers and containers that typically are incurred in near-surface disposal. The Martin Marietta cost estimate assumes containerized disposal and is calculated for the total volume of the waste package (p.17). However, the analysis of deep mine disposal contained in the FEIS concludes that deep mine disposal can easily meet regulatory limits on radiological and toxicological impacts (i.e., the Performance Objectives in 10 C.F.R. Part 61, Subpart C) with no special packaging or engineered barriers (p.A-14).

Similarly, the EG&G Report (p.54) notes that there is a significant cost difference between retrievable and non-

retrievable disposal ($0.15 versus $0.71), because the former includes costs for containers and engineered barriers (i.e., storage vaults) and the latter does not.

In addition, the likelihood of an intruder into a deep cavity disposal site is less than for a near-surface disposal site. This could make non-near-surface disposal less expensive than near-surface disposal from a security and safeguards standpoint.

Q23. Would increases in the estimated costs of disposal of depleted uranium at the Nevada Test Site or Hanford invalidate the LES decommissioning funding plan?

Q23A. (PGL) No. Should these underlying disposal cost estimates change significantly, LES will be required to adjust its overall decommissioning cost estimate accordingly and to make corresponding adjustments to its decommissioning funding contributions.

Q24. In developing its estimate of the cost of disposition of DUF_6, has LES taken any credit for potential revenue that could be derived through sale of depleted uranium as a resource?

Q24A. (PGL) No. LES's estimate does not recognize any potential revenue associated with the resale of depleted uranium as a resource. As a result, any speculation that depleted uranium may not be marketable in the future has no bearing on the validity of the LES decommissioning cost estimate. Conversely,

if such sales were to eventuate it would render LES's decommissioning cost estimate excessively conservative.

Q25. Is the LES decommissioning cost estimate undermined by the fact that LES has not identified a specific site for disposal of depleted uranium?

Q25A. (PGL) No. The Commission in noticing the application for hearing in this proceeding indicated that the applicable regulations only require that an applicant have a plausible strategy for the disposition of depleted uranium hexafluoride tails. 56 Fed. Reg. 23,310, 23,313 (May 21, 1991). Because LES is not required at this time to have identified a specific approach (e.g., permanent disposal) for disposition of DUF_6 or a specific site for disposal, it cannot be required to have a cost estimate that is based on a specific disposal site. The cost estimate need only contain reasonable estimates for an adequately described decommissioning <u>strategy</u>, and reasonable estimates can be developed without identification of a specific site for disposal of depleted uranium.

It should be noted that LES has committed to remove DUF_6 from the site 15 years after its production. Assuming commencement of operations in 1999, a disposal site would not be required until 2014. To identify a site now, needed that far in the future, would not be reasonable.

Q26. Is it reasonable to assume that a disposal site other than a near-surface disposal facility would be available to LES if LES chose to dispose of depleted uranium as if it were a waste?

Q26A. (PGL) Yes. There are dozens of underground uranium mines and other underground mines in the United States.

Q27. Why isn't it appropriate to use current or expected LLW disposal costs as the estimated cost for 'sposal of depleted uranium?

Q27A. (PGL) The cost estimates for tails disposal (Martin Marietta and EG&G Report) utilized by LES do not assume disposal in a commercial LLW disposal facility. Therefore, current or projected disposal costs for those facilities are not an appropriate basis for estimating tails disposal costs.

Differences between disposal of LLW in a commercial near-surface disposal facility and contemplated deep disposal of tails make cost comparisons inappropriate. First, as discussed previously, deep disposal would minimize expenses for engineered barriers and containers, as well as expenses associated with protection from intruders, that typically are incurred in near-surface disposal.

In addition, these disposal costs -- engineered barriers, packaging, intruder protection -- would be expected to be lower for tails than for commercial LLW due to the nature of the material itself. Commercial LLW disposal facilities are designed

1 and operated to accommodate all classes of waste identified in 10
2 C.F.R. § 61.55(a). A deep mine, on the other hand, would need to
3 accommodate only depleted uranium tails -- a naturally occurring
4 material.
5 Further, in contrast to commercial LLW disposal facilities
6 which typically handle numerous types and quantities of waste,
7 disposal of tails will involve disposal of a relatively large
8 quantity of a uniform material. The volume and uniformity of the
9 depleted uranium should reduce administrative and handling costs
10 typically associated with commercial LLW disposal.

11 **Q28. Turning now to the overall cost of decommissioning**
12 **(the focus of Basis 4 of Intervenor's Contention B), does the**
information submitted to NRC by LES provide details concerning
14 **the derivation of LES's decommissioning cost estimate?**
15 Q28A. (PGL; BGD) Yes. Details concerning the derivation
16 of LES's decommissioning cost estimate are provided in the LES
17 Decommissioning Funding Plan (Exhibit I to the CEC License
18 Application) and in Section 11.8.4.1 of the SAR for the CEC.
19 Table 11.8-2 of the SAR provides a listing of the costs of the
20 major decommissioning activities described in Section 11.8.1.2 of
21 the SAR. All costs are expressed in 1996 dollars.
22 As explained in Section 11.8.4.1 of the SAR, LES's
23 evaluation of decommissioning costs includes an evaluation of
24 current experience of Urenco, Ltd, an affiliate of one of the LES
25 general partners, with decontamination and decommissioning of

similar gaseous centrifuge uranium enrichment facilities in Europe. Appropriate adjustments to the European decommissioning costs were made to account for cost differences associated with the performance of specific activities in the United States and costs were escalated to 1996 dollars. Section 11.8.4.1 explains LES's estimated costs for each of the major activities associated with decommissioning, including the relevant European experience that LES factored into its estimate.

Q29. Has LES submitted to NRC detailed decommissioning cost estimate information as suggested in Appendix F to Regulatory Guide 3.66?

Q29. (PGL) Yes. While LES has not presented the information in the "table" format used in Appendix F to Regulatory Guide 3.66, LES's decommissioning cost estimate in Section 11.8.4.1 of the SAR addresses each of the cost elements identified in Appendix F -- preparation of documentation; submittal of decommissioning documents to NRC; site characterization; decontamination, dismantlement, and restoration of contaminated areas; packaging, shipping, and disposal of radioactive waste; and final radiation survey. In addition, the LES estimate contains a $3.5 million contingency and an allowance of $1.0 million for costs associated with idle time (postulated 6-month delay) prior to actual commencement of decommissioning.

Since LES used existing cost information from current decontamination and decommissioning activities, there is no need

to perform an estimate using the guidance in Appendix F to Regulatory Guide 3.66, "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72."

Q30. In developing its decommissioning cost estimate for the CEC, has LES taken into account the cost of disposal of LLW generated during decommissioning?

Q30A. (PGL) Yes. We have estimated the cost to be $1.4 million as set forth in SAR Table 11.8-2. A discussion of that cost is set forth in SAR § 11.8.4.1 with references.

Q31. Is such a disposal site presently in existence?

Q31A. (PGL) Not at this time; however, it is expected that the Central States compact site will be operational prior to LES' projected decommissioning.

Q32. In view of the fact that LES's estimate of the cost of decommissioning includes an estimated cost of disposal of LLW, would increases in the estimated costs of disposal of LLW invalidate the LES decommissioning funding plan?

Q32A. (PGL) No. The NRC's regulatory framework for ensuring the availability of decommissioning funding contemplates increases in estimated decommissioning costs. As part of its license application, LES has committed to update its decommissioning cost estimate at least every five years to

account for cost increases or decreases, including any increase in the estimated cost of LLW disposal.

Q33. In developing the decommissioning cost estimate for the CEC, has LES taken credit for the potential salvage value of DUF_6, scrap aluminum, or any other materials?

Q33A. (PGL; BGD) No. As explained in Section 11.8.1.2.6 of the SAR, operating equipment, wastes, and scrap aluminum are assumed not to have any salvage value.

In reality, it is likely that a significant amount of aluminum will be recovered, along with smaller amounts of steel, copper, and other metals, which can be smelted to standard ingots and sold at market prices. LES expects that aluminum recovered from the CEC will be decontaminated, processed through a smelter, and sold as secondary aluminum ingots on the market. Decontamination and smelting are simple, relatively inexpensive processes, the costs of which are not significantly affected by normally changing economic conditions. Hence, the cost of processing the aluminum for sale should not prevent LES from fully realizing expected salvage value. LES currently estimates that the salvage value of the large amount of aluminum to be recovered from centrifuges and UF_6 piping at the CEC would be $7.9 million ($1996).

Urenco experience at the Almelo facility in the Netherlands supports LES's assumptions concerning salvage value of aluminum. At the two pilot plants at Almelo, aluminum from centrifuges and

other equipment has been dismantled, cut up, decontaminated, and sent to an offsite smelter. Of 798 tons of aluminum reclaimed from these facilities, 710 tons (containing between 2 and 4 parts per million (ppm) uranium) were suitable for resale. In the Netherlands, the current market price for such aluminum is approximately 2.5 guilders ($1.39 US) per kilogram.

Secondary aluminum is consistently marketable in the United States and elsewhere. U.S. Department of Interior data show a steady increase in the share of aluminum production attributable to secondary aluminum, from 4 to 5 percent in the 1960s to almost 30 percent in the early 1990s (U.S. Department of the Interior, Bureau of Mines Publication Minerals Yearbook, Volume I, "Metals and Minerals," published annually) (Exhibit LES9 A). In 1992, U.S. aluminum supply/consumption data shows over 2.7 million metric tons of secondary aluminum was consumed in the U.S., including over 1.6 million tons of "old scrap" aluminum. This data supports LES's expectation that it will be able to recover significant value from aluminum salvaged from the CEC.

Q34. How do the LES decommissioning cost estimates relate to the actual costs associated with the decontamination and decommissioning of Urenco pilot plants in Europe?

Q34A. (PGL; BGD) This information was provided to NRC by letter dated September 21, 1993, in response to an NRC request for additional information, dated June 25, 1991 (see Exhibit LES4 A). LES's preliminary decommissioning plans and decommissioning cost

estimates are based on more than 10 years of actual experience and cost data from the dismantling and decontamination activities at Urenco pilot plants SP1 and SP2 at Almelo in the Netherlands. Urenco has a fully operational dismantling and decontamination facility at Almelo. Data and experience from this operating facility have allowed LES to develop a very realistic estimate of decommissioning activities and associated costs.

Based upon the costs incurred in the decommissioning of the two Urenco pilot plants at Almelo, the cost estimate for building the CEC decontamination facility, performing system cleaning, dismantling equipment and systems, and performing decontamination is $23.1 million. This estimate is based largely on scaling the costs associated with decommissioning at the Almelo facility to account for the difference between the number of centrifuges decommissioned at Almelo (approximately 14,500) and the number of centrifuges expected to require decommissioning at the CEC (approximately 40,000). This technique leads to a precise cost estimate, since the number of centrifuges also determines the amount of support systems, piping, and equipment that must be decommissioned.

The cost for decommissioning Almelo's 14,500 centrifuges (approximately 12,400 centrifuges from the pilot plants and 2,100 from other plants) was approximately $7.4 million. This cost includes the capital cost of equipment, as well as labor and management costs. These costs were adjusted to account for differences between such costs in the Netherlands and the United

States, resulting in an estimate of $20.5 million for decommissioning of the approximately 40,000 centrifuges planned for the CEC. Escalation of this estimate at 4% per year results in an estimate of $23.1 million ($1996).

Q35. Of the centrifuges decontaminated and decommissioned at Urenco's pilot plant enrichment facilities in Europe, what contamination levels were observed?

Q35A. (BGD; PGL) The centrifuges decommissioned contained approximately 10 grams of uranium prior to decontamination. Similar quantities are expected to be found at the CEC at the time of decommissioning. After decontamination and smelting, the levels of contamination in the aluminum resulting from the decommissioning recycling of the European centrifuges were approximately 2 to 4 ppm uranium.

Q36. Please describe the contamination levels at the decommissioned Almelo facilities before and after decontamination activities.

Q36A. (BGD) Contamination in the SP1 pilot plant building was essentially zero. To avoid absorption of fluids or moisture, floors and walls in the hex handling areas, laboratories, and decontamination areas are coated prior to facility operation. This is done to make decontamination, when necessary, very easy by simple cleaning. Floors in those areas were cleaned/washed at least once a week during plant operation. Dutch regulations

require that activity on surfaces be less than 0.4 Bq/cm^2 for low toxic alpha (uranium) and 4 Bq/cm^2 for beta plus gamma. In practice, the measured levels were generally much lower, comparable with background. There were only a few spots with contamination where the top layer of the floor (a few millimeters) had to be removed during decommissioning in order to satisfy regulatory limits. The total volume of material removed from these areas was no more than a few square meters. The SP1 building is now available for unrestricted use. The CEC facility will utilize similar surface coatings to avoid absorption of contamination and to facilitate cleaning.

The original decontamination facility for SP1 was also decommissioned. All former UF_6 and non-enrichment services were removed. The building remains. The cost estimates provided by Urenco and utilized by LES include the costs of removal of non-enrichment services.

For areas around the plant (soils), no radiological contamination associated with facility operation (i.e., no radiological contamination other than that which is naturally occurring) was found. Urenco Nederland conducted a general survey involving comparison of soil within the perimeter fence with soil in the immediate vicinity of the plant. No differences in radiation levels were observed.

The first stage of the SP2 pilot plant also has been decommissioned. Decontamination and decommissioning for those portions of the SP2 plant has been comparable.

Q37. How long will it take to decommission the CEC?

Q37A. (PGL) The time required for each of the major tasks associated with decommissioning is estimated in Table 11.8-2 of the SAR. The total amount of time required for decommissioning is estimated at 7.1 years.

Q38. Do schedule delays to date warrant updating of the decommissioning cost estimates contained in the LES Decommissioning Funding Plan?

Q38A. (PGL) No. LES's decommissioning cost estimates are current and are expressed in 1996 dollars. Following licensing, the estimates will be updated at least every five years, consistent with the requirements of 10 C.F.R. § 70.25(e) and the guidance in Regulatory Guide 1.159. This periodic adjustment is required, by LES Proposed License Conditions 1.6B and 7.0, to be made at least once every five years.

Q39. Do the licensing documents prepared by LES indicate which facilities will be decontaminated and returned to unrestricted use and whether radioactive areas will be fully dismantled?

Q39A. (PGL; BGD) This information was provided to the NRC in Section 11.8.1.2.1 of the SAR and Section 4.4 of the ER. The CEC will be decontaminated and dismantled such that the NRC

operating license may be terminated and the site and facilities released for unrestricted use.

All enrichment-related equipment will be removed from the buildings such that only the building shells and site infrastructure remain. The equipment to be removed includes, for example, all piping and components from systems providing UF_6 containment; systems in direct support of enrichment (e.g., refrigerant and chilled water); radioactive and hazardous waste handling systems; and contaminated HVAC filtration systems.

Contaminated portions of buildings will be decontaminated in accordance with NRC requirements. Structural contamination is expected to be limited to the areas indicated in Figure 8.2-1 of the SAR as being inside the Radiation Control Zones of the facility. (Table 11.8-1 identifies items expected to require decontamination during decommissioning.) Materials which cannot be decontaminated will be removed from the site and disposed of in a radioactive waste disposal facility. Any DUF_6 onsite at the time of cessation of operations (i.e., that has not already been sold or shipped offsite for storage or disposal) will be removed from the site as part of the decommissioning process.

The remainder of the site, including the holding pond and all land area, is not expected to require decontamination. Good housekeeping practices during normal operation should maintain the other areas clean. Except when the UF_6 is in a liquid state inside cylinders (which in turn are inside autoclaves (pressure vessels)), the entire enrichment process is performed under

vacuum. This results in an extremely small potential for contamination of buildings or process areas.

Moreover, NRC regulations require LES to keep records of information important to the safe and effective decommissioning of the facility, including:

- records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site, including any known information on identification of involved nuclides, quantities, forms, and concentrations;
- as-built drawings and modifications of structures and equipment in restricted areas where radioactive materials are used and/or stored, and of locations of possible inaccessible contamination such as buried pipes which may be subject to contamination; and
- all areas outside of restricted areas which contain material such that, if the license expired, the licensee would be required to either decontaminate the area to unrestricted release levels or apply for approval for disposal under 10 C.F.R. § 20.2002.

10 C.F.R. §§ 40.36(f) and 70.25(g). LES will be able to utilize any such documentation to facilitate efficient and thorough decontamination and decommissioning activities.

When decontamination and dismantlement are completed, all areas and facilities on the site will be surveyed to verify that further decontamination is not required. Decontamination activities will continue until the entire site is demonstrated to be suitable for license termination and release in accordance with NRC standards.

The SAR provides decommissioning information in the level of detail necessary to support the decommissioning cost estimate and decommissioning <u>funding</u> plan. LES is not required at this time

to provide all details of actual facility decommissioning. A more detailed decommissioning plan will be prepared and submitted to the NRC at or about the time of cessation of operations, in accordance with 10 C.F.R. §§ 40.42 and 70.38.

Q40. In which buildings at the CEC will decontamination activities be performed?

Q40A. (PGL; BGD) As explained in Section 11.8.1.2.1 of the SAR, decontamination of plant components and structures will require installation of two new facilities dedicated for that purpose. These two facilities will be housed within then-existing CEC buildings. One facility will be designed to accommodate repetitive cleaning of centrifuges, and the other will serve as a general purpose facility used primarily for decontamination of larger components. The decontamination area of the Separations Building, which will be used during normal operation, may also be used to decontaminate small items during decommissioning.

Q41. If the NRC promulgates requirements for cleanup of residual radioactivity in connection with decommissioning in the form that such radiological criteria are currently proposed, will those requirements invalidate LES's decommissioning cost estimate or impact LES's ability to successfully decommission the CEC?

Q41A. (PGL) No. The LES decommissioning cost estimate is based upon decontaminating the CEC site and facilities to the

levels specified in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, and Special Nuclear Material." The decontamination criteria are incorporated into LES Proposed License Conditions ("PLC"), Appendix A (see PLC Section 1.5.2B.). The NRC has proposed requirements (see 59 Fed. Reg. 43,200 (Aug. 22, 1994)) for decommissioning lands and structures which include a proposed criterion of 15 mrem/yr total effective dose equivalent ("TEDE") (plus ALARA) to allow release of sites for unrestricted use. This proposed criterion could be met by LES at no significant additional cost because of the ease in decontaminating and decommissioning a gaseous centrifuge enrichment facility.

TESTIMONY ON CONTENTION J.3

Q42. What is your understanding of NRC regulations governing the preparation of an Environmental Report for the CEC?

Q42A. (FGL) Before issuing a license authorizing construction and operation of a uranium enrichment facility, the NRC must assess the potential environmental effects of the proposed activities in order to ensure that issuance of the license is consistent with national environmental goals as set forth by the National Environmental Policy Act of 1969 (Public Law No. 91-190) ("NEPA"). To obtain information in support of this assessment, the NRC requires each applicant for a license to

submit a report on the potential environmental impact of the proposed plant and associated facilities.

NRC regulations implementing NEPA are codified in 10 C.F.R. Part 51. By Order dated May 15, 1991, the Commission made clear that those provisions of Part 51 that govern "the preparation of an environmental report and an environmental impact statement for a materials license" would be applied to the licensing of the CEC.

Under Part 51, an applicant for an NRC materials license, including an applicant for a license for the construction and operation of a uranium enrichment facility, is required to submit to the NRC Director of Nuclear Material Safety and Safeguards, along with its license application, a separate document entitled "Applicant's Environmental Report." 10 C.F.R. § 51.60(a), (b)(1)(vii). This ER must contain the following information:

> a description of the proposed action, a statement of its purposes, a description of the environment affected, and [a] discuss[ion of] the following considerations:
>
> (1) the impact of the proposed action on the environment. Impacts shall be discussed in proportion to their significance;
>
> (2) Any adverse environmental effects which cannot be avoided should the proposal be implemented;
>
> (3) Alternatives to the proposed action. The discussion of alternatives shall be sufficiently complete to aid the Commission in developing and exploring, pursuant to section 102(2)(E) of NEPA, "appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." To the extent practicable, the environmental impacts of the

proposal and the alternatives should be presented in comparative form;

(4) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and

(5) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

10 C.F.R. §§ 51.45(b), 51.60(a).

The ER must also contain an "analysis":

which considers and balances the environmental effects of the proposed action and the alternatives available for reducing or avoiding adverse environmental effects, as well as the environmental, economic, technical and other benefits of the proposed action.

10 C.F.R. § 51.45(c). This analysis must, to the fullest extent practicable, quantify the various factors considered. 10 C.F.R. § 51.45(c). To the extent that there are important qualitative considerations or factors that cannot be quantified, those considerations or factors must be discussed in qualitative terms. 10 C.F.R. § 51.45(c).

Q43. Did you rely upon any NRC guidance material in preparing the ER for the CEC?

Q43A. (PGL) Yes. LES considered, as guidance, NRC Regulatory Guide 4.9, Revision 1, "Preparation of Environmental Reports for Commercial Uranium Enrichment Facilities," October 1975. As the Reg. Guide itself states, "Regulatory Guides are not substitutes for regulations, and compliance with them is not required." Reg. Guide 4.9, Rev. 1, further states (at 4.9-4) that "a number of the topics may apply only in part, or not at

all " Nevertheless, LES utilized Reg. Guide 4.9 as guidance in development of the format and content of the ER for the CEC.

In particular, in developing the benefit-cost analysis section of the ER, LES considered Chapter 8 of Reg. Guide 4.9, "Benefit-Cost Analysis," including Table 2, "Benefits/Costs of Socioeconomic Factors Associated With Plant Construction and Operation," and Table 3, "Benefits/Costs of Environmental Factors Associated With Plant Construction and Operation." Reg. Guide 4.9 at 4.9-25 through 4.9-31.

LES also considered NRC Regulatory Guide 4.2, which provides guidance on preparation of Environmental Reports (including cost-benefit analyses) for nuclear power plants.

Q44. What information has LES submitted to the NRC in order to demonstrate compliance with 10 C.F.R. Part 51?

Q44A. (PGL) LES's compliance with the requirements of 10 C.F.R. Part 51 is addressed in the ER for the CEC, which was submitted to NRC on January 31, 1991, as subsequently revised. The ER is part of the CEC License Application. Environmental impacts of decommissioning are addressed in Section 4.4 of the ER. The benefit-cost analysis for the CEC is contained in Section 8.0 of the ER, and decommissioning costs are reflected as a component of that benefit-cost analysis in Section 8.1.1.6 of the ER.

Q45. Does the ER for the CEC address the costs and benefits of decontamination and decommissioning of the CEC, including the costs of disposal of DUF_6?

Q45A. (PGL) Yes. Section 4.4 of the ER addresses the environmental impacts of decontamination and decommissioning activities, including tails disposal. The benefit-cost analysis in Section 8.0 of the ER demonstrates that, with decontamination, decommissioning, and tails disposal impacts factored in, the benefits of the CEC project outweigh the costs.

Q46. What is the basis for these estimates

Q46A. (PGL) The decommissioning cost estimate utilized by LES in the benefit-cost analysis in Section 8.0 of the ER is taken from the LES Decommissioning Funding Plan and SAR Section 11.8. The basis for this estimate is explained in LES's prefiled testimony on Contention B, above. That testimony demonstrates that the cost estimate is reasonable and is therefore a valid component of the benefit-cost analysis in Section 8.0 of the ER for the CEC.

Q47. Does this conclude your testimony?

Q47A. (PGL; BGD) Yes.

Attachment 1

PETER G. LEROY
DUKE ENGINEERING & SERVICES, INC.
230 SOUTH TRYON STREET
P. O. BOX 1004
CHARLOTTE, NORTH CAROLINA 28201-1004

EDUCATION & TRAINING

Duke University, Durham, N.C., BS in Mechanical Engineering, 1982
Queens College, Charlotte, N.C., MBA (Blumenthal Scholar), 1990
Duke Power Management/Supervisor Training (150 hrs)
Duke Power, Catawba Nuclear Station, Systems Technical Training

PROFESSIONAL AFFILIATIONS & CERTIFICATIONS

American Society of Mechanical Engineers, Associate Member
American Nuclear Society, Member
Registered Professional Engineer - NC 13748, SC 12047, LA 23794, GA 19942

SECURITY CLEARANCES

NRC 'Q' clearance

WORK EXPERIENCE

FROM	TO	TITLE	COMPANY
9/89	Present	Engineering Supervisor	Duke Engineering & Services, Inc.

Responsible for managing the licensing effort for Louisiana Energy Services' Uranium Enrichment Facility in northwest Louisiana. This includes development and submission of the license application including an Environmental Report and Safety Analysis Report. Also responsible for developing, submitting and obtaining approval for all permits (e.g., NPDES, Air Discharge) necessary for construction and operation of the facility.

Responsible for managing the development and submittal to the Georgia Environmental Protection Division all necessary permit applications for the Transco Hartwell gas turbine power plant located near Hartwell, Georgia.

Assisted in licensing reviews of ABB-CE's System 80+ advanced light water reactor.

Assisted in preparation and review of safety evaluation and hazard analyses for several nuclear power plant steam generator replacement projects.

WORK EXPERIENCE

FROM	TO	TITLE	COMPANY
4/88	8/89	Support Engineer	Duke Power Company

Responsible for supervising coordination of all activities associated with the licensing of Catawba Nuclear Station. This includes ensuring all written and verbal communication with the Nuclear Regulatory Commission (NRC) is accurate and timely. Supervised a technical and engineering staff and served as Duke Power's primary representative on the Westinghouse Owners Group (WOG) and the Nuclear Utility Backfit and Reform Group (NUBARG). During this time was the coordinator for the response to 10 CFR 50.63. Loss of All Alternating Current Power, for all three of Duke Power's nuclear stations. This included acting as Duke Power's representative to the Nuclear Utility Group on Station Blackout (NUGSBO) working group.

1/87	3/88	Accountable Engineer	Duke Power Company

Responsible for the design and implementation of modifications to mechanical equipment at the Catawba Nuclear Station. Coordinated installations of new piping and HVAC systems. Responsible for designing electrical support equipment for mechanical equipment modification, control or electric power. Past projects include installation of 8 ton cooling unit to prevent premature electrical equipment failure, modification of valve control circuits to allow valve throttle, and modification of ventilation system to reduce differential pressure between plant areas.

1/84	12/86	Licensing Engineer	Duke Power Company

Responsible for all licensing activities at the Catawba Nuclear Station including development of the Final Safety Analysis Report, Technical Specifications, and coordination and resolution of NRC Regional issues. Developed computer programs for tracking and completing outstanding issues for station. During this time both units of Catawba Nuclear Station received operating licenses from the NRC.

WORK EXPERIENCE

FROM	TO	TITLE	COMPANY
9/82	12/83	Accountable Engineer	Duke Power Company

Responsible for the design and implementation of modifications to mechanical equipment at the Catawba Nuclear Station. Coordinated installations of new piping and HVAC systems. Responsible for designing electrical support equipment for mechanical equipment modification. control or electric power. Past projects include installation of 8 ton cooling unit to prevent premature electrical equipment failure, modification of valve control circuits to allow valve throttle, and modification of ventilation system to reduce differential pressure between plant areas.

Attachment 2

BERNARD G. DEKKER

PERSONAL SUMMARY

Date of Birth	September 27 1944
Place of Birth	Vriezenveen, The Netherlands
Address	Kerkstraat 31 NL-7671 HE Vriezenveen

PROFESSIONAL EXPERIENCE

1984 - Present Urenco NL - Manager SAF

Responsibilities Safety (personnel safety, radiation protection, environmental safety, and emergency preparedness); Safeguards (nuclear material control, liaison with inspectorates; Licenses (acquiring and maintenance of licenses, liaison with authorities).

Experience with decommissioning of pilot plants: Safety and radiation protection aspects of equipment and work procedures; Control of contamination levels, Establishing of (license) limit values; Liaison with authorities

1976 - 1984 Urenco NL - Senior System Engineer

Engineering and construction of decontamination plant and other infrastructure of enrichment plant; Licensing of new plants.

1969-1976 Polypenco, Dutch subsidiary of the Polymer Corporation, Reading, Pennsylvania

Product development and sales support of Engineering Plastics.

1967-1969 Military service.

1967 Graduated in Mechanical Engineering at the Technical High School, Zwolle, The Netherlands.