STAFF EXHIBIT 37

NUREG-1827

Safety Evaluation Report
for the National Enrichment Facility in Lea County, New Mexico

Docket No. 70-3103

Louisiana Energy Services

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Washington, DC 20555-0001

10.0 DECOMMISSIONING

The purpose of this review of the applicant's decommissioning plan is to determine that the applicant will be able to decommission the facility safely and in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements.

At the time of the initial license application for a uranium enrichment facility, the applicant is required to submit a decommissioning funding plan (DFP). The purpose of NRC's review of the DFP is to determine whether the applicant has considered decommissioning activities that may be needed in the future, has performed a credible site-specific cost estimate for those activities, and has presented NRC with financial assurance to cover the cost of those activities in the future. The DFP, therefore, should contain an overview of the proposed decommissioning activities, the methods used to determine the cost estimate, and the financial assurance mechanism. This overview must contain sufficient details to enable the reviewer to determine whether the decommissioning cost estimate is reasonably accurate.

10.1 REGULATORY REQUIREMENTS

The following NRC regulations require planning, financial assurance, and record-keeping for decommissioning, as well as procedures and activities to minimize waste and contamination:

10 CFR 20.1401-1406	"Radiological Criterial for License Termination" (Subpart E)
10 CFR 30.35	"Financial Assurance and Recordkeeping for Decommissioning"
10 CFR 30.36	"Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas"
10 CFR 40.36(d)	"Decommissioning Funding Plan"
10 CFR 40.36	"Financial Assurance and Recordkeeping for Decommissioning"
10 CFR 40.42	"Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas"
10 CFR 70.22(a)(9)	"Decommissioning Funding Plan"
10 CFR 70.25	"Financial Assurance and Recordkeeping for Decommissioning"
10 CFR 70.38	"Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas"

10.2 REGULATORY ACCEPTANCE CRITERIA

The "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," NUREG-1520 (NRC, 2002a) and "Consolidated NMSS Decommissioning Guidance," NUREG-1757 (NRC, 2003), define relevant regulatory guidance and appropriate acceptance criteria for decommissioning and DFPs contained in license applications.

10.3 STAFF REVIEW AND ANALYSIS

10.3.1 Conceptual Decontamination and Decommissioning Plan

10.3.1.1 Decommissioning Program

10.3.1.1.1 Radioactive Contamination Control

The applicant states, in Section 10.1.5.2 of the safety analysis report (SAR) (LES, 2005) that the following features will primarily serve to minimize the spread of radioactive contamination during operation and, therefore, simplify eventual plant decommissioning. As a result, worker exposure to radiation and radioactive waste volumes are minimized as well.

- Certain activities during normal operation are expected to result in surface and airborne radioactive contamination. Specially designed rooms are provided for these activities to preclude contamination spread. These rooms are isolated from other areas and are provided with ventilation and filtration. The Solid Waste Collection Room, Ventilated Room, and the Decontamination Workshop meet these specific design requirements.

- All areas of the plant are sectioned off into Unrestricted and Restricted Areas. Restricted Areas limit access for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. Radiation Areas and Airborne Contamination Areas have additional controls to inform workers of the potential hazard in the area and to help prevent the spread of contamination. All procedures for these areas fall under the Radiation Protection Program and serve to minimize the spread of contamination and simplify the eventual decommissioning.

- Non-radioactive process equipment and systems are minimized in locations subject to potential contamination. This limits the size of the Restricted Areas and limits the activities occurring inside these areas.

- Local air filtration is provided for areas with potential airborne contamination, to preclude its spread. Fume hoods filter contaminated air in these areas.

- Curbing, pits, or other barriers are provided around tanks and components that contain liquid radioactive wastes. These serve to control the spread of contamination in case of a spill.

10.3.1.1.2 Worker Exposure and Waste Volume Control

The applicant states, in Section 10.1.5.3 of the SAR (LES, 2005), that the following features will primarily serve to minimize worker exposure to radiation and minimize radioactive waste volumes during decontamination activities. As a result, the spread of contamination is minimized as well.

- During construction, a washable epoxy coating is applied to floors and walls that might be radioactively contaminated during operation. The coating will serve to lower waste volumes during decontamination and simplify the decontamination process. The coating is applied to floors and walls that might be radioactively contaminated during operation that are located in the Restricted Areas.

- Sealed, nonporous pipe insulation is used in areas likely to be contaminated. This will reduce waste volume during decommissioning.

- Ample access is provided for efficient equipment dismantling and removal of equipment that may be contaminated. This minimizes the time of worker exposure.

- Tanks are provided with accesses for entry and decontamination. Design provisions are also made to allow complete draining of the wastes contained in the tanks.

- Connections in the process systems provided for required operation and maintenance allow for thorough purging at plant shutdown. This will remove a significant portion of radioactive contamination before disassembly.

- Design drawings, produced for all areas of the plant, will simplify the planning and implementing of decontamination procedures. This, in turn, will shorten the durations that workers are exposed to radiation.

- Worker access to contaminated areas is controlled to assure that workers wear proper protective equipment and limit their time in the areas.

10.3.1.2 Decommissioning Steps

The plan for decommissioning is to promptly decontaminate or remove all materials, from the site, that prevent release of the facility for unrestricted use. This approach, referred to in the industry as DECON, avoids long-term storage and monitoring of wastes on site.

The applicant has briefly described the decommissioning approach to be employed at the facility. The applicant states that implementation of the DECON alternative for decommissioning the facility may begin immediately after Separations Building Module equipment shutdown. The applicant estimates that the DECON alternative will take approximately 9 years to complete in three phases (3 years/module).

Decommissioning activities will generally include: (1) installation of decontamination facilities; (2) purging of process systems; (3) dismantling and removal of equipment; (4) decontamination and destruction of Confidential and Secret Restricted Data material; (5) sales of salvaged materials; (6) disposal of wastes; and (7) completion of a final radiation survey. Credit is not taken for any salvage value that might be realized from the sale of potential assets (e.g., recovered materials or decontaminated equipment) during or after decommissioning.

<u>Overview</u>

Decommissioning, using the DECON approach, requires residual radioactivity to be reduced below specified levels so the facilities may be released for unrestricted use. Current NRC guidelines for unrestricted release serve as the basis for decontamination costs estimated by the applicant. The applicant intends to remove all enrichment-related equipment from the buildings in such a manner that only the building shells and site infrastructure remain. The equipment to be removed by the applicant will include: all piping and components from systems providing uranium hexafluoride (UF_6) containment; systems in direct support of enrichment (such as refrigerant and chilled water); radioactive- and hazardous-waste-handling systems;

and contaminated filtration systems, etc. The remaining site infrastructure will include services such as: electrical power supply; treated water; fire protection; ventilation systems; plant cooling water; communications; and sewage treatment.

The applicant will install two new facilities dedicated for decontamination of plant components and structures. Existing plant buildings are assumed to house the facilities. One facility will be specially designed to accommodate repetitive cleaning of thousands of centrifuges, and the other will serve as a general-purpose facility used primarily for larger components. The two new facilities will be the primary locations for decontamination activities. The small decontamination area in the Technical Services Building (TSB), used during normal operation, may also handle small items at decommissioning. The applicant estimates that the time for installation is approximately 1 year. The applicant provided details of the facilities in Section 10.1.7 of the SAR (LES, 2005).

The applicant states, in Section 10.1.6.1 of the SAR (LES, 2005), that decontaminated components may be reused or sold as scrap. The applicant will decontaminate all equipment that is to be reused or sold as scrap to a level at which further use is unrestricted. Materials that cannot be decontaminated will be disposed of by the applicant in a licensed radioactive-waste-disposal facility.

The applicant states in Section 10.1.6.1 of the application that contaminated portions of the buildings will be decontaminated as required. When decontamination is complete, the applicant will survey all areas and facilities on the site, to verify that further decontamination is not required. The applicant will continue decontamination activities until the entire site is demonstrated to be suitable for unrestricted use. NRC will independently confirm that the site is suitable to be released for unrestricted use. NRC will not authorize unrestricted release of materials and equipment unless all release criteria applicable at the time of decommissioning have been met. NRC will not authorize release of the site for unrestricted use until the applicant adequately demonstrates that all decommissioning criteria applicable at the time of decommissioning have been met.

Process System

The applicant states, in Section 10.1.6.3 of the SAR (LES, 2005), that at the end of the useful life of each Separations Building Module, the enrichment process will be shut down and UF_6 will be removed to the fullest extent possible by normal process operation. This will be followed by evacuation and purging with nitrogen. The applicant estimates that the shutdown and purging portions of the decommissioning process will take approximately 3 months.

Dismantling

Dismantling involves cutting out, disconnecting, etc., all components requiring removal. The operations themselves may be simple, but very labor-intensive. Depending on the level of contamination, the use of protective clothing may be required. The applicant states, in Section 10.1.6.4 of the SAR (LES, 2005), that the work process will be optimized, considering the following:

- Minimizing the spread of contamination and the need for protective clothing;

- Balancing the number of cutting and removal operations with the resultant decontamination and disposal requirements;

- Optimizing the rate of dismantling with the rate of decontamination facility throughput;

- Providing storage and laydown space required, as affected by retrievability, criticality safety, security, etc.; and

- Balancing the cost of decontamination and salvage with the cost of disposal.

The applicant states, in Section 10.1.6.4 of the SAR (LES, 2005), that the details of the complex optimization process will necessarily be decided near the end of plant life, taking into account specific contamination levels and available waste disposal sites. To avoid laydown space and contamination problems, dismantling will likely be allowed to proceed no faster than the downstream decontamination process. The applicant estimates that dismantling and decontamination will take approximately 3 years per Separations Building Module.

Sale/Salvage

Items to be removed from facilities can be categorized as potentially reusable equipment, recoverable scrap, and wastes. However, based on a 30-year operating life, the applicant does not assume that the facility operating equipment has any reuse value. According to the applicant, wastes will also have no salvage value. With respect to scrap, the applicant states, in Section 10.1.6.6 of the SAR (LES, 2005), that a significant amount of aluminum will be recovered, along with smaller amounts of steel, copper, and other metals. For security and convenience, the uncontaminated material will likely be smelted to standard ingots, then sold at market price. However, the applicant has not assigned salvage value to scrap, in estimating its decommissioning funding requirements. Contaminated material will be disposed of as low-level radioactive waste.

Disposal

The applicant states, in Section 10.1.6.7 of the SAR (LES, 2005), that all wastes produced during decommissioning will be collected, handled, and disposed of in a manner similar to that described for those wastes produced during normal operation. According to the applicant, wastes will consist of normal industrial trash, non-hazardous chemicals and fluids, small amounts of hazardous materials, and radioactive wastes. The radioactive waste will primarily be crushed centrifuge rotors, trash, and citric cake. Citric cake will consist of uranium and metallic compounds precipitated from citric acid decontamination solutions. The applicant estimates approximately 5000 cubic meters (m^3) [180,000 cubic feet (ft^3)] of radioactive waste to be generated over the 9-year period of facility decommissioning activities. This waste will be subject to further volume reduction processes before disposal.

The applicant states, in Section 10.1.6.7 of the SAR (LES, 2005), that radioactive wastes will ultimately be disposed of in licensed low-level radioactive-waste disposal facilities. Hazardous wastes will be disposed of in permitted hazardous waste-disposal facilities. Non-hazardous and non-radioactive wastes will be disposed of in a manner consistent with good industrial practice and in accordance with all applicable regulations. A complete estimate of the wastes and

effluents to be generated during decommissioning will be provided in the applicant's plan for completion of decommissioning, to be submitted to NRC at the time of decommissioning.

The applicant states, in Section 10.1.6.7 of the SAR (LES, 2005), that Confidential and Secret-Restricted Data components and documents on site will be disposed of in accordance with the requirements of 10 CFR Part 95. Classified portions of the centrifuges will be destroyed; piping will likely be smelted; documents will be destroyed; and other items will be handled in an appropriate manner. Details will be provided in the facility "Standard Practice Procedures Plan for the Protection of Classified Matter and Information," submitted separately, in accordance with Part 95.

Final Radiation Survey

The applicant states, in Section 10.1.6.8 of the SAR (LES, 2005), that it will perform a final radiation survey, to verify proper decontamination, to allow the site to be released for unrestricted use. The initial radiation survey performed before initial operation will provide data on the natural background radiation of the area that can be used to determine any increase in levels of radiation. The applicant states, in Section 10.1.6.8 of the SAR (LES, 2005), that radioactivity over the entire site will systematically be measured in the final survey. The intensity of the survey will vary depending on the location (i.e., the buildings, the immediate area around the buildings, the controlled fenced area, and the remainder of the site). The survey procedures and results will be documented in a report. The report will include, among other things, a map of the survey site, measurement results, and the site's relationship to the surrounding area. If the results are above allowable residual radioactivity limits, further decontamination will be performed until the results are determined to be below limits.

10.3.1.3 Management/Organization

The applicant states, in Section 10.1.5.4 of the SAR (LES, 2005), that management of the decommissioning program will ensure that proper training and procedures are provided to protect worker health and safety. The programs will focus heavily on minimizing waste volumes and worker exposure to hazardous and radioactive materials. Contractors assisting with decommissioning will likewise be subject to facility training requirements and procedural controls. The NRC staff finds the applicant's general plans acceptable regarding:

- Responsibilities of management of the decommissioning program;
- Minimization of waste volumes and worker exposures; and
- Procedural control and training requirements for contractors assisting in decommissioning.

Details related to these three items are typically provided in the detailed decommissioning plan at the time of decommissioning.

10.3.1.4 Health and Safety

The applicant states, in Section 10.1.5.5 of the SAR (LES, 2005), that, as with normal operation, during decommissioning, the policy will be to keep individual and collective occupational radiation exposures as low as is reasonably achievable (ALARA). A health physics program will identify and control sources of radiation, establish worker-protection requirements, and direct the use of survey and monitoring instruments.

10.3.1.5 Waste Management

The applicant states, in Section 10.1.5.6 of the SAR (LES, 2005), that radioactive and hazardous wastes produced during decommissioning will be collected, handled, and disposed of in accordance with all regulations applicable to the facility at the time of decommissioning. Generally, procedures will be similar to those described for wastes produced during normal operation. These wastes will ultimately be disposed of in licensed radioactive or permitted hazardous-waste-disposal facilities located elsewhere. Non-hazardous and non-radioactive wastes will be disposed of consistent with good industrial practice and in accordance with applicable regulations.

10.3.1.6 Security/Nuclear Material Control

The applicant states, in Section 10.1.5.7 of the SAR (LES, 2005), that requirements for physical security and for material control and accounting (MC&A) will be maintained, as required, during decommissioning, in a manner similar to the programs in force during operation. The plan for completion of decommissioning, submitted near the end of plant life, will provide a description of any necessary revisions to these programs.

10.3.1.7 Recordkeeping

The applicant states, in Section 10.1.5.8 of the SAR (LES, 2005), that records important for safe and effective decommissioning of the facility will be kept in the applicant's files. Information maintained in these records will include:

1. Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas, as in the case of possible seepage into porous materials such as concrete. These records will include any known information on identification of involved nuclides, quantities, forms, and concentrations.

2. As-built drawings and modifications of structures and equipment, in restricted areas, where radioactive materials are used or stored, and of locations of possible inaccessible contamination, such as buried pipes, which may be subject to contamination. Required drawings will be referenced as necessary, although each relevant document will not be indexed individually. If drawings are not available, appropriate records of available information concerning these areas and locations will be substituted.

3. Except for areas containing only sealed sources, a list contained in a single document and updated every 2 years, of the following:

a. All areas designed and formerly designated as Restricted Areas, as defined under 10 CFR 20.1003;

b. All areas outside of Restricted Areas that require documentation specified in item 1 above;

c. All areas outside of Restricted Areas where current and previous wastes have been disposed of, as documented under 10 CFR 20.2108; and

d. All areas outside of Restricted Areas that contain material such that, if the license expired, the licensee would be required to either decontaminate the area to meet the criteria for decommissioning, in 10 CFR Part 20, Subpart E, or apply for approval for disposal under 10 CFR 20.2002.

4. Records of the cost estimate performed for the DFP and records of the funding method used for assuring funds.

10.3.1.8 Decontamination

The following paragraphs discuss the facilities, procedures, and expected results of decontamination, as described by the applicant in Section 10.1.7 of the SAR (LES, 2005).

The applicant states, in Section 10.1.7.1 of the SAR (LES, 2005), that the primary contamination throughout the plant will be in the form of small amounts of UO_2F_2, with even smaller amounts of UF_4 and other compounds. Radiological contamination will be characterized by the applicant, before beginning decommissioning activities. NRC staff review of the final decommissioning plan will include a review of the nature and extent of contamination present at the time of decommissioning.

Facilities

The applicant states, in Section 10.1.7.2 of the SAR (LES, 2005), that a decontamination facility will be required to accommodate decommissioning. A specialized facility is needed for optimal handling of the thousands of centrifuges to be decontaminated, along with the UF_6 vacuum pumps and valves. Additionally, a general purpose facility is needed for handling the remainder of the various plant components. The applicant will most likely install these facilities in existing plant buildings (such as the Centrifuge Assembly Building).

The applicant describes the specialized facility as having four functional areas: a disassembly area; a buffer stock area; a decontamination area; and a scrap storage area for cleaned stock. The general purpose facility may share the specialized facility decontamination area. However, because of various sizes and shapes of other plant components needing handling, the disassembly area, buffer stock areas, and scrap storage areas may not be shared.

The applicant assumes that equipment in the decontamination facilities will include:

- Transport and manipulation equipment;

- Dismantling tables, for centrifuge externals;
- Sawing machines;
- Dismantling boxes and tanks, for centrifuge internals;
- Degreasers;
- Citric acid and demineralized water baths;
- Contamination monitors;
- Wet-blast cabinets;
- Crusher, for centrifuge rotors;
- Smelting and/or shredding equipment; and
- Scrubbing facility.

The applicant states, in Section 10.1.7.2 of the SAR (LES, 2005), that the decontamination facilities provided in the TSB for normal operational needs would also be available for cleaning small items during decommissioning.

Procedures

The applicant states, in Section 10.1.7.3 of the SAR (LES, 2005), that procedures for decontamination will be developed and approved by plant management to minimize worker exposure and waste volumes, and to assure work is carried out in a safe manner. If, as expected, European gas centrifuge enrichment facilities are decommissioned before the proposed facility, then the experience gained will be incorporated into the procedures to be developed by the applicant. NRC staff will assess the procedures used and the results of the final survey. A confirmatory survey is expected to be part of NRC's assessment of the final survey. The facility and site will not be released for unrestricted use unless it is demonstrated that the residual contamination is within the limits and criteria in place at the time of decommissioning.

The applicant states, in Section 10.1.7.3 of the SAR (LES, 2005), that contaminated plant components will be cut up or dismantled, then processed through the decontamination facilities.

The applicant states, in Section 10.1.7.3 of the SAR (LES, 2005), that the centrifuges will be processed through the specialized facility. The following operations will be performed:

- Removal of external fittings;
- Removal of bottom flange, motor and bearings, and collection of contaminated oil;
- Removal of top flange, and withdrawal and disassembly of internals;
- Degreasing of items as required;
- Decontamination of all recoverable items for smelting; and
- Destruction of other classified portions by shredding, crushing, smelting, etc.

Results

The applicant states, in Section 10.1.7.4 of the SAR (LES, 2005), that conventional decontamination techniques are effective for all plant items, based on their experience in decommissioning Urenco facilities in Europe. Recoverable items will be decontaminated and suitable for reuse except for a very small amount of intractably contaminated material. Material requiring disposal will primarily be centrifuge rotor fragments, trash, and residue from the effluent treatment systems. The applicant does not anticipate problems that will prevent the site from being released for unrestricted use.

10.3.1.9 Decommissioning Costs

The applicant submitted decommissioning cost information consistent with the recommendations in NUREG-1757, Volume 3, "Consolidated NMSS Decommissioning Guidance - Financial Assurance, Recordkeeping, and Timeliness" (NRC, 2003). The applicant presented its decommissioning cost estimate breakdown in SAR Tables 10.1-1 through 10.1-14 (LES, 2005). Decommissioning cost information included labor costs, proposed decontamination methods and unit costs, waste disposal costs, final survey costs, and costs for dispositioning depleted uranium tails. The decommissioning costs were based on the decommissioning experience of Urenco, the applicant's principal general partner, in decommissioning gas centrifuge enrichment plants in Europe.

The applicant estimates the cost of decommissioning the facility to be approximately $942 million, in 2004 dollars, which includes an estimated cost of $131 million to decommission the supporting structures, an estimated tails-disposition cost of $622 million, and a 25 percent contingency factor, equal to $188 million. More than 97 percent of the cost to decommission the structures are attributed to the dismantling of the centrifuges and other equipment in the Separation Building Modules.

The cost analysis for decommissioning the centrifuges and equipment supporting the Separation Building is classified. The staff reviewed the number of centrifuges, the estimated man-hours to decontaminate the centrifuges, and the estimated volume of material resulting from the disposal of the centrifuges and supporting equipment; confirmed that the estimate includes a 25 percent contingency; and also confirmed that no credit is taken for salvage of materials or equipment. The use of a 25 percent contingency factor and taking no credit for salvage value is consistent with staff guidance in NUREG-1757, Volume 3 (NRC, 2003).

The unclassified estimate for decommissioning the remainder of the facility was reviewed considering labor costs, decontamination methods and unit costs, waste disposal costs, depleted uranium disposition costs, and final survey costs. Both the classified and non-classified estimates were evaluated and found to be reasonable and consistent with estimates provided in NUREG/CR-6477, "Revised Analyses of Decommissioning Reference Non-Fuel-Cycle Facilities" (NRC, 2002b). While the cases in NUREG/CR-6477 (NRC, 2002b) do not include a case for decommissioning a gas centrifuge enrichment plant, some information can be compared with the cost estimates provided by the applicant. The following other considerations were also included in comparing the applicant's estimates with those in NUREG/CR-6477:

1. The proposed facility operates at subatmospheric pressures that minimize the spread of contamination throughout the plant.

2. The plant has design features and operating procedures to minimize releases of uranium hexafluoride (e.g., cylinder feed, withdrawal, blending, and sampling systems). These design and operating features are principally intended to minimize worker chemical exposures, but also result in low contamination levels in occupied areas of the plant.

3. Feed material will be restricted to material specifications meeting the requirements of American Society for Testing and Materials C787, "Standard Specification for Uranium Hexafluoride for Enrichment" (ASTM, 2003). Through this specification, the applicant will control the entry of other radioactive contaminants into the process systems.

4. Most of the process equipment in the plant is aluminum, which can be more easily cut and processed than the steel components assumed in the cases described in NUREG/CR-6477 (NRC, 2002b).

Based on the staff's review of the classified and unclassified information, the staff found the cost estimate for decommissioning the facility to be reasonable.

The applicant conservatively estimated that the facility will generate 132,942 MT of depleted uranium over a nominal 30 years of production, and did not reduce the estimate of depleted uranium based on the planned operations approach where production would actually end 5 years earlier. The applicant estimated the waste processing and disposal cost of UF_6 tails at $4.68 per kilogram of uranium (kg U) or $4,680 per metric ton of uranium (MTU). This cost is based on the total of the three cost components that make up the total disposition cost for DUF_6 (i.e., deconversion, disposal, and transportation). The staff reviewed the basis of each of these three costs components, and has concluded that they are reasonable.

The deconversion cost was based on proprietary information on a previously proposed private deconversion plant using the Cogema dry conversion process producing U_3O_8 and aqueous hydrogen fluoride (HF) (NRC, 2005). The proposed process was the same as the plant Cogema has been operating in Pierrelatte, France for 20 years. The cost estimate was adjusted to account for differences in planned operating capacities, Euros-to-dollars conversion, and other costs associated with "Americanization." "Americanization" refers to costs to obtain regulatory approval and costs to convert European equipment standards to standards used in the United States. These cost estimates used a proprietary Urenco business study of a proposed 3,500 Metric Tons (MT) U/year deconversion plant for the Capenhurst site. The study was based on a Cogema response to a Urenco request for proposal. The applicant modified the Cogema information to reflect a 7,000 MT U/year capacity by doubling the operating costs and by adding funds to reflect the increased capital and construction costs of a larger capacity plant considering the shared nature of some systems. Additional funds were also added for Americanizing the design and for licensing.

The Cogema proposal assumed that HF would be sold commercially and did not include the costs to neutralize aqueous HF to calcium fluoride. Staff consider that neutralization would have no effect on the overall deconversion costs because those costs would be balanced by the elimination of costs for equipment for storing HF prior to commercial sale. The cost of disposing the calcium fluoride ($0.02/kg U) was included in the estimate.

The transportation and disposal costs were based on estimates provided by vendors of transportation and disposal services (LES, 2005a). Transportation costs were based on an

estimate from Transportation Logistics International. This transportation estimate ($0.85/kg U) was independent of distance. The disposal cost of $1.14/kg U for depleted uranium oxides was based on an estimate provided by Waste Control Specialists. Staff compared the Waste Control Specialists estimate to an estimate for disposal of decommissioning wastes the applicant had obtained from Envirocare of Utah and found it to be consistent. The Envirocare disposal estimate for decommissioning waste was $2.12/m^3 ($75/ft^3) (LES, 2004). For the disposal of U_3O_8, the equivalent disposal cost at Envirocare is $1.07/kg U.

Further, the applicant submitted an estimate for tails disposition from the U.S. Department of Energy (DOE) (DOE, 2005) as additional evidence of the reasonableness of their estimate. The DOE estimate included conversion, transportation, storage, disposal, and decommissioning costs of the conversion facility and totaled $3.34/kg DUF_6 ($4.91/kg U) in 2004 dollars. This is less than 5 percent of the difference in the applicant's estimate of $4.68/kg U. Staff considers that the DOE estimate provides additional assurance that the applicant's estimate of depleted uranium disposition costs is reasonable.

Based on the staff's review of the classified and unclassified information, the staff found that the cost estimate for decommissioning the facility is reasonable and the cost estimate fulfills the requirements of 10 CFR 30.35(e), 10 CFR 40.36(d), and 10 CFR 70.25(e) and the evaluation criteria in Section 4.1 of NUREG-1757, Volume 3 (NRC, 2003) for the following reasons:

- The cost estimate is based on documented and reasonable assumptions;
- The cost estimates for individual facility activities and components are reasonable and, to the extent possible, consistent with NRC cost estimation reference documents;
- The cost estimate reflects decommissioning under appropriate facility conditions;
- The cost estimate includes costs for labor, equipment and supplies, overhead and contractor profit, sampling, and miscellaneous expenses;
- The cost estimate includes costs for all major decommissioning activities, including planning and preparation; decontamination or dismantling facility components; packaging, shipping, and disposal of wastes; restoration of facility grounds; and the final radiation survey.
- The computations are correct;
- No credit is taken for salvage value;
- The decommissioning cost estimate includes an adequate contingency factor of 25 percent; and
- The decommissioning cost estimate provides a description of how it will be adjusted periodically over the life of the facility.

10.3.1.10 Financial Assurance for Decommissioning

The applicant stated it will utilize a surety bond method to provide reasonable assurance of decommissioning funding as required by 10 CFR 30.35(f)(2), 10 CFR 40.36(e)(2), and 10 CFR 70.25(f)(2). The applicant provided draft copies of the surety bond and standby trust language. Finalization of the specific financial instruments to be utilized will be completed, and signed originals of those instruments will be provided to the NRC for final confirmation of the instrument prior to the applicant receiving licensed material at the facility. In addition, the applicant committed to provide continuous financial assurance through the completion of decommissioning and termination of the licenses. Although the applicant plans to sequentially install and operate the separations buildings modules over time, financial assurance for decommissioning of the full-size facility will initially be set aside, as well as an estimated 3 years of tails disposition. Thereafter, funding for tails disposition will be provided at a rate in proportion to the amount of accumulated tails onsite up to the maximum amount of the tails as described in Sections 10.2.1 and 10.2.2 of the SAR. If the applicant's schedule for future enrichment module phase-in changes, the applicant indicated it may reduce the funding for facility decontamination and decommissioning cost estimate to reflect the actual number of operating modules.

The surety bond method to be adopted by the applicant will provide a guarantee that decommissioning costs will be paid in the event the applicant is unable to meet its decommissioning obligations at the time of decommissioning. The surety bond will be structured consistent with applicable NRC requirements and in accordance with NRC regulatory guidance contained in NUREG-1757, Volume 3 (NRC, 2003). Accordingly, the applicant stated that its surety bond will contain, but not be limited to, the following attributes:

- The surety bond will be open-ended or, if written for a specified term, such as 5 years, will be renewed automatically unless 90 days or more prior to the renewal date, the issuer notifies the NRC, the trust to which the surety is payable; and the applicant of its intention not to renew. The surety bond will also provide that the full face amounts are paid to the beneficiary automatically prior to the expiration without proof of forfeiture if the applicant fails to provide a replacement acceptable to the NRC within 30 days after receipt of notification of cancellation.

- The surety bond will be payable to a standby trust established for decommissioning costs. The trustee and trust will be ones acceptable to the NRC. For instance, the trustee may be an appropriate State or Federal government agency or an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency.

- The surety bond and standby trust will remain in effect until the NRC has terminated the license.

In accordance with 10 CFR 30.35(e), 10 CFR 40.36(d), and 10 CFR 70.25(e), the applicant will update the decommissioning cost estimate for the facility and the associated funding levels, over the life of the facility. These updates will take into account changes resulting from inflation or site-specific factors, such as changes in facility conditions or expected decommissioning procedures. These funding level updates will also address anticipated accumulated tails. As required by 10 CFR 30.35(e), 10 CFR 40.36(d), and 10 CFR 70.25(e), such updates will occur at least every 3 years.

In Sections 1.2.5, 10.2.1, and 10.2.2 of the SAR (LES, 2005), the applicant described its approach to funding the surety bond financial assurance instrument to be used and for updating the DFP over time. Financial assurance for decommissioning will be provided during the operating life of the facility. Initially, the applicant will provide funding for decommissioning the facility and the tails expected to be generated during the first three years of operation. Funding for tails dispositioning will thereafter be provided at annual intervals. In Section 1.2.5 of the SAR (LES, 2005), the applicant requested an exemption to fund decommissioning on an incremental basis. Section 1.2.3.6 of this SER discusses the approval of this exemption request as required in 10 CFR 40.14 and 10 CFR 70.17.

Updates of the DFP and the financial assurance instrument will be provided as follows:

- In the initial executed financial assurance instrument submitted prior to receipt of licensed material, the applicant will provide full funding for decontamination and decommissioning of the full-size facility.

- In the initial executed financial assurance instrument submitted prior to receipt of licensed material, the applicant will provide funding for the disposition of depleted uranium tails in an amount needed to disposition the first three years of depleted uranium tails generation.

- Subsequent updated decommissioning funding estimates and revised funding instruments for facility decommissioning will be provided at least every three years. If the applicant reduces the amount of funding for the facility because of a change in module phase-in, the revisions will be submitted prior to the operation of each facility module. This will allow the applicant to modify its initial facility decommissioning funding approach to reflect changes in future enrichment module phase-in schedules.

- Subsequent updated decommissioning cost estimates and revised funding instruments for depleted uranium disposition will be provided annually on a forward-looking basis to reflect projections of depleted uranium byproduct generation.

The above DFP update schedule will provides updates at a frequency of at least every 3 years in accordance with 10 CFR 30.35(e), 10 CFR 40.36(d), and 10 CFR 70.25(e).

The initial financial obligation will be the entire facility decommissioning cost ($131 million), the cost for dispositioning the first three years of generation of depleted uranium ($22.7 million based on generating 4,861 MT of depleted uranium in the first 3-year period), and a 25 percent contingency of $38.5 million giving a total decommissioning obligation for this period of $192 million. These estimates are in 2004 dollars. This approach to funding the financial assurance instrument is acceptable to NRC staff because the amount of financial assurance will be sufficient to cover the decommissioning obligation of the licensee at any point in time in the event that the licensee is unable to complete decommissioning for any reason.

Because final executed copies of the financial assurance mechanism will not be provided to NRC until prior to receipt of licensed material, NRC staff is imposing the following license conditions:

"1. The licensee shall provide final copies of the proposed financial assurance instruments to NRC for review at least 6 months prior to the planned date for obtaining licensed material, and provide to NRC final executed copies of the reviewed financial assurance instruments prior to the receipt of licensed material.

2. In addition, the Decommissioning Funding Plan cost estimate shall be updated as follows:

   a. In the first executed financial assurance instrument submitted prior to receipt of licensed material, the licensee will provide full funding for decontamination and decommissioning of the full-size facility.

   b. In the first executed financial assurance instrument submitted prior to receipt of licensed material, the licensee will provide funding for the disposition of depleted uranium tails in an amount needed to disposition the first three years of depleted uranium tails generation.

   c. Subsequent updated decommissioning funding estimates and revised funding instruments for facility decommissioning will be provided, at a minimum, every three years. Any proposed reduction based on changes to module phase-in will be submitted 6 months prior to the scheduled operation of the facility module.

   d. Subsequent updated decommissioning cost estimates and revised funding instruments for depleted uranium disposition will be provided annually on a forward-looking basis to reflect projections of depleted uranium byproduct generation.

3. The Decommissioning Funding Plan cost estimates shall be provided to NRC for review, and subsequently, after resolution of any NRC comments, final executed copies of the financial assurance instruments shall be provided to NRC."

With the above proposed license conditions and the exemption discussed in Section 1.2.3.6, NRC staff finds the DFP and proposed surety bond method acceptable.

10.4 EVALUATION FINDINGS

The NRC staff has evaluated the applicant's decommissioning financial assurance plan in accordance with NUREG-1757 (NRC, 2003). On the basis of this evaluation, the NRC staff has determined that the applicant's financial assurance for decommissioning provides sufficient funding to ensure decommissioning and decontamination of the facility even if the licensee is unable to meet its financial obligations, and, therefore, provides reasonable assurance of protection for workers, the public, and the environment.

Because final executed copies of the financial assurance mechanism will not be provided to NRC until prior to receipt of licensed material, NRC staff is imposing the following license conditions:

"1. The licensee shall provide final copies of the proposed financial assurance instruments to NRC for review at least 6 months prior to the planned date for obtaining licensed material, and provide to NRC final executed copies of the reviewed financial assurance instruments prior to the receipt of licensed material.

2. In addition, the Decommissioning Funding Plan cost estimate shall be updated as follows:

   a. In the first executed financial assurance instrument submitted prior to receipt of licensed material, the licensee will provide full funding for decontamination and decommissioning of the full-size facility.

   b. In the first executed financial assurance instrument submitted prior to receipt of licensed material, the licensee will provide funding for the disposition of depleted uranium tails in an amount needed to disposition the first three years of depleted uranium tails generation.

   c. Subsequent updated decommissioning funding estimates and revised funding instruments for facility decommissioning will be provided, at a minimum, every three years. Any proposed reduction based on changes to module phase-in will be submitted 6 months prior to the scheduled operation of the facility module.

   d. Subsequent updated decommissioning cost estimates and revised funding instruments for depleted uranium disposition will be provided annually on a forward-looking basis to reflect projections of depleted uranium byproduct generation.

3. The Decommissioning Funding Plan cost estimates shall be provided to NRC for review, and subsequently, after resolution of any NRC comments, final executed copies of the financial assurance instruments shall be provided to NRC."

10.5 REFERENCES

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