

## INTERIM STAFF GUIDANCE FOR ESTIMATING DECOMMISSIONING COSTS FOR URANIUM ENRICHMENT FACILITIES

### Background

On February 5, 2009, the U.S. Nuclear Regulatory Commission (NRC) was briefed on the status of uranium enrichment in the United States by the NRC staff, industry representatives and a representative from the New Mexico Environment Department. Transcripts and exhibits from the briefing are available to the public at <http://www.nrc.gov/reading-rm/doc-collections/commission/tr/2009/> or through Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML090410464, ML090410578, and ML090370266, respectively.

Discussions on decommissioning costs during the February 5, 2009, Commission briefing were focused primarily on depleted uranium and the uncertainties associated with its disposal. Industry stated that they supported moving forward with rulemaking on depleted uranium in order for the licensing process to continue to be predictable and efficient.

Following the briefing, the Commission directed the staff in a Staff Requirements Memorandum (SRM), dated February 17, 2009, to, in part; look for ways to improve the guidance on financial assurance for decommissioning as it pertains to estimating decommissioning costs associated with uranium enrichment facilities (Meeting SRM M090205, ADAMS Accession No. ML090490032).

### Purpose and Scope

The purpose of this interim staff guidance (ISG) is to provide industry with guidance on developing decommissioning costs estimates that are unique to commercially licensed uranium enrichment facilities. Cost estimates are needed for determining sufficient financial assurance for these facilities as part of a license application. This guidance addresses industry concerns and should contribute to a clear and stable regulatory framework and an effective process for applicants to follow. The ISG provides an effective method for providing improvements until it can be incorporated into existing NRC guidance. Staff intends to add this ISG to its decommissioning guidance in NUREG-1757, Volume 3, "*Consolidated NMSS Decommissioning Guidance – Financial Assurance, Recordkeeping, and Timeliness*," dated September 2003, when it is updated in the future.

The scope of this guidance is limited to ways to improve decommissioning cost estimates, specifically, estimating decommissioning costs for uranium enrichment facilities. This scope is based on the comments, questions and discussions made during the Commission briefing and the Commission SRM directing staff to focus their efforts on uranium enrichment facilities. Detailed information on decommissioning cost estimates provided by licensees and/or applicants are, for the most part, considered to be company proprietary and/or security related information and have historically been withheld from public disclosure. Consequently, cost estimates that are discussed in this document have been taken from the publicly available versions of uranium enrichment facility applications and contain no sensitive, unclassified, classified, or safeguards information.

## Discussion

This section is divided into two topical areas because: (1) the major cost factors for physical site decommissioning facilities with low enriched uranium are well established within the industry (excluding depleted uranium tails) and constitutes a relatively small portion of the total decommissioning costs; and (2) the major cost factors for uranium deconversion and depleted uranium disposition is still evolving and constitutes the largest and most important area for estimating decommissioning costs. This is illustrated by the breakdown of the \$9.2 billion total decommissioning costs for the four licensed and/or proposed enrichment facilities (Louisiana Energy Services LLC (LES), Areva Enrichment Services LLC (AES), USEC Inc., and GE-Hitachi Global Laser Enrichment). Of the total estimated decommissioning cost proposed by these entities, \$8.1 billion or 88% was associated with de-conversion and dispositioning of the uranium tails and only \$1.1 billion or 12% was associated with facility decommissioning.

### **Cost of Facility Decommissioning Excluding Deconversion Costs**

A facility decommissioning cost estimate is comprised of three basic parts: (1) a facility description that includes a discussion on the extent and nature of contamination at the facility; (2) the estimated cost including labor costs, non-labor costs and a contingency factor to remediate the facility; and (3) key assumptions used in the cost estimate.

The principal guidance documents used by staff in their review of decommission cost estimates for the purpose of determining adequate financial assurance are found in the "References" section at the end of this document.

Applicants have consistently followed the decommissioning cost estimating format detailed in Appendix A of NUREG-1757, Volume 3. The appendix provides information on preparing site specific cost estimates with example tables. Although the tables shown are universal in nature, applicants have adapted them to their specific needs and have been able to take advantage of the modular design of an enrichment facility when combined with the universal list of components found in Appendix A Table A.3.5, "*Number and Dimension of Facility Components.*" With the proper supporting documentation, the NRC has found this approach to be acceptable when a component listed in the table was not present or notated that the total dimensions were not used. The applicants have included a 25 percent contingency fee in their cost estimates. The NRC has found this to be acceptable for those decommissioning costs associated with the facility decommissioning and that the level of detail provided in approved applications is consistent with the guidance found in Appendix A, §A.3.1.2.3, NUREG-1757, Volume 3. It is recommended that applicants include any supporting documentation in instances when it is not possible to provide the level of detail requested in Table A.3.5.

Recently, a few applications for licenses to construct and operate an enrichment facility have requested exemption from 10 CFR §§ 40.36(d) and 70.25(e) in order to seek approval to ramp up the level of decommissioning funding as the construction of each modular production unit is completed rather than fund the entire decommission cost at the time of licensing. In other words, the decommissioning funding would increase incrementally when a modular production unit came online just prior to the receipt of

each shipment of licensed material. Both LES and USEC have obtained approval for this approach. The NRC has determined, on a case by case basis, that the approach approved for these two specific facilities is reasonable. *See In the Matter of USEC Inc, (American Centrifuge Plant)*, ASLBP No. 05-838-01-ML, 65 NRC 429 (2007); *see also* NRC staff Approval of Amendment 6 to LES Materials License SNM-2010, ADAMS Accession No. ML080530351. It should be noted, as recommended in NUREG-1757, Vol. 3, that both of these cost estimates applied a 25 percent contingency factor to the grand total (bottom line number) of the cost estimate in order to provide reasonable assurance that the decommissioning would be adequately funded.

### **Use of Classified Equipment and Information**

If classified equipment requires disposition, the applicant should obtain estimates from entities knowledgeable in processing classified equipment and/or those records necessary for the purposes of decommissioning in accordance with the requirements found in 10 CFR Part 95, "*Facility Security Clearance and Safe-Guarding of National Security Information and Restricted Data.*" Also the applicant should provide sufficient information in the Decommissioning Funding Plan (DFP) (in a classified section, if needed) for the NRC staff to understand the basis for the decommissioning costs. The submittal should identify the equipment and the applicable unit processing and labor costs for the classified items (including all classified documents).

### **Cost of Deconversion and Disposal of Depleted Uranium**

Applicants can use the methods documented in prior licensing proceedings for uranium enrichment facility decommissioning and depleted uranium disposition costs. For example, one method that has been found to be acceptable is the cost and methodology detailed by the Department of Energy (DOE) in a response dated March 1, 2005 to an inquiry made by LES. (DOE, 2005). *See Louisiana Energy Service, L.P. (National Enrichment Facility)*, CLI-06-22, 64 NRC 37 (2006). As with the costs associated with facility decommissioning, a 25 percent contingency factor was applied to the grand total (bottom line number) of the cost estimate in order to provide reasonable assurance that the decommissioning would be adequately funded. Commercially available cost estimates may be acceptable if they are of sufficient detail such that the NRC can evaluate their reasonableness. LES's materials license, SNM-2010, includes a requirement to update the DFP prior to startup and to include, at that time, funding that would be adequate for dispositioning three years worth of depleted uranium tails. A further requirement is that after three years they will provide an annual update that includes revised calculations from the DOE for the dispositioning of the depleted uranium tails.

## References

(DOE, 2005) U.S. Department of Energy (DOE), letter to Louisiana Energy Services, "Conversion and Disposal of Depleted Uranium Hexafluoride (DUF6) Generated by Louis Energy Services, LP (LES)," March 1, 2005 (ADAMS Accession Nos. ML052910303 and ML060030362).

(NRC/PNNL, 2002) NUREG/CR-6477 *Revised Analyses of Decommissioning Reference Non-Fuel-Cycle Facilities*," dated December 2002.

(NRC, 2003) NUREG-1748, "*Environmental Review Guidance for Licensing Actions Associated with NMSS Programs*," dated August 2003.

(NRC, 2003) NUREG-1757, Volume 3, "*Consolidated NMSS Decommissioning Guidance – Financial Assurance, Recordkeeping, and Timeliness*," dated September 2003.

(NRC, 2005) NUREG-1827, "*Safety Evaluation Report for the National Enrichment Facility in Lea County New Mexico, Louisiana Energy Services*," dated June 2005.

(NRC, 2009) Staff Requirements Memorandum (SRM), Meeting SRM M090205 (ADAMS Accession No. ML090490032).

(NRC, 2009) Commission Meeting Transcripts and Briefing Package, "Briefing on Uranium Enrichment," February 5, 2009 (ADAMS Accession Nos. ML090410464, ML090410578, and ML090370266).

(NRC, 2010) NUREG-1520, Rev. 1 "*Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility*," dated May 2010.

10 CFR Part 40 "*Domestic Licensing of Source Material*."

10 CFR Part 70 "*Domestic Licensing of Special Nuclear Material*."

10 CFR Part 95 "*Facility Security Clearance and Safe-Guarding of National Security Information and Restricted Data*."