



July 17, 2012  
AET 12-0037

ATTN: Document Control Desk  
Ms. Catherine Haney, Director  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

**American Centrifuge Lead Cascade Facility  
Docket Number 70-7003; License Number SNM-7003  
Submittal of Revision to the Decommissioning Program for the American Centrifuge Lead  
Cascade Facility – Security-Related Information and USEC Proprietary Information**

**INFORMATION TRANSMITTED HEREWITH IS PROTECTED FROM PUBLIC  
DISCLOSURE AS CONFIDENTIAL COMMERCIAL OR FINANCIAL INFORMATION  
AND/OR TRADE SECRETS PURSUANT TO 10 CFR 2.390**

Dear Ms. Haney:

**Purpose**

The purpose of this letter is to request the U.S. Nuclear Regulatory Commission (NRC) review of proposed changes to Chapter 10.0 of the License Application and the Decommissioning Funding Plan (DFP) for the American Centrifuge Lead Cascade Facility (Lead Cascade), in accordance with 10 *Code of Federal Regulations* (CFR) 70.25(e) and 40.36(d).

**Background**

USEC Inc. (USEC) has revised the decommissioning cost estimate to ensure full funding for existing and future decommissioning liabilities, which includes the Cascade Demonstration Test Program (CDTP). Therefore, USEC is providing the revised decommissioning cost estimate for NRC's review and approval.

**Discussion**

Enclosure 1 to this letter provides a detailed description, justification for the proposed change, and USEC Inc.'s determination that the proposed change associated with this request is not significant. Enclosure 2 of this letter contains the proposed changes for Chapter 10.0 of the License Application and the DFP for the Lead Cascade. Enclosure 3 of this letter provides proposed changes for

~~Information transmitted herewith contains~~  
~~Security-Related Information - Withhold Under 10 CFR 2.390~~  
~~USEC Proprietary Information~~

When separated from the Enclosures 3, 4, and 6, this cover letter is uncontrolled.

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Appendix D of the DFP for the Lead Cascade. Enclosure 4 of this letter provides USEC's in-depth calculations related to the annual labor by classification and staffing estimated in phased man-days. Enclosure 5 of this letter provides the draft financial assurance instruments associated with this decommissioning cost estimate. Enclosure 6 of this letter contains a draft Certification of Financial Assurance. For the changes provided within Enclosures 2 and 3, changes from the previously approved documents are depicted with a revision bar in the right margin.

Enclosures 3 and 4 contain USEC Proprietary Information; therefore, USEC requests that these enclosures be withheld from public disclosure pursuant to 10 CFR 2.390(a)(4). An affidavit required by 10 CFR 2.390(b)(1)(ii) is provided as Enclosure 7 of this letter. Enclosure 6 contains Security-Related Information and USEC requests this enclosure be withheld from public disclosure pursuant to 10 CFR 2.390(d)(1).

**Action**

The proposed changes to the License Application and DFP require NRC prior review and approval. USEC requests NRC review and acceptance of the enclosed decommissioning cost estimate. Within 60 days following approval of the proposed changes, USEC will, in accordance with Materials License SNM-7003, Condition 15, submit a final executed financial assurance instrument for the approved decommissioning cost estimate to the NRC.

**Contact**

If you have any questions regarding this matter, please contact me at (301) 564-3470 or Vernon J. Shanks at (740) 897-2343.

Sincerely,



Peter J. Miner  
Director, Regulatory and Quality Assurance

Enclosures: As Stated

cc: J. Calle – NRC RII  
J. Downs – NRC HQ  
L. Pitts – NRC RII  
O. Siurano – NRC HQ  
B. Smith – NRC HQ

**Enclosure 1 of AET 12-0037**

**Detailed Description, Justification for Change, and Significance Determination**

**Information contained within  
does not contain  
Export Controlled Information**

**Reviewer: R.S. Lykowski  
Date: 06/26/2012**

The proposed changes described below relate to the decommissioning cost estimate for the American Centrifuge Lead Cascade Facility (Lead Cascade).

USEC Inc. (USEC) has revised the decommissioning cost estimate to ensure full funding for existing and future decommissioning liabilities. USEC plans to continue operations under the U.S. Nuclear Regulatory Commission (NRC) Materials License for the Lead Cascade during the Cascade Demonstration Test Program (CDTP) to enhance the technical readiness of the centrifuge technology for commercialization; therefore, USEC is providing the necessary changes to the decommissioning cost estimate for NRC's review and approval in two phases:

- Phase I Present day to November 30, 2012 (encompassed by this submittal).
- Phase II December 1, 2012 to CDTP completion. Upon approval of funding for this phase, USEC will update the DFP estimates and submit for NRC review and approval.

### **Detailed Description of Change**

The proposed changes to Chapter 10.0 of the License Application, DFP, and decommissioning cost estimate for the Lead Cascade cover existing and anticipated increases in equipment in use, area in use, contaminated material volume, and material and labor cost to perform decommissioning; and is calculated in calendar year 2012 dollars.

The proposed changes are contained in Enclosures 2 and 3 of this letter and are identified by the following method:

- ~~Blue Strikeout~~ - Identifies text to be removed
- Red underline – Identifies text to be added

### **Justification for Change**

USEC and the U.S. Department of Energy (DOE) have agreed to jointly fund a research, development, and demonstration (RD&D) program called the CDTP. As part of the RD&D program, USEC will construct and operate a demonstration cascade of approximately 120 machines. The proposed changes are necessary to address current operations and the addition of the CDTP cascade (i.e., 120 centrifuge machines) to the inventory of machines and support equipment. Additional support equipment will also be added to provide redundant functionality for the balance of plant systems such as plant air, machine cooling water, evacuation vacuum, purge vacuum, and electrical power. Additional dump carts will also be necessary to ensure there is adequate inventory removal capability.

Based on the current schedule, USEC intends to operate the Lead Cascade through calendar year 2013, assuming full funding of the CDTP. The purpose of the CDTP is to demonstrate the reliability of the commercial plant design for the centrifuge and the various support systems and to be able to

demonstrate that the equipment and system configurations are suitable to ensure a robust arrangement that will function reliably for the expected useful duration of the commercial plant.

At the current time, DOE has provided funding for its portion of the costs only to support the initial execution (Phase I) of the CDTP through November 30, 2012. The proposed changes to Chapter 10.0 of the License Application, DFP, and decommissioning cost estimate for the Lead Cascade cover existing and anticipated increases in equipment in use; area in use; contaminated material volume; and material and labor cost to perform decommissioning within the Lead Cascade through November 30, 2012. Once additional DOE funding has been authorized and made available for the program, USEC will update its decommissioning cost estimate for the remainder of the CDTP and submit to the NRC for review and approval.

These proposed changes to Chapter 10.0 of the License Application, DFP, and decommissioning cost estimate for the Lead Cascade address current operations and the additional costs associated with the CDTP and provide an update to the decommissioning cost estimate for the Lead Cascade to ensure it bounds the anticipated costs to decommission the Lead Cascade through November 30, 2012. These proposed changes do not introduce an undue risk to the public health and safety, the environment, or common defense and security.

### **Significance Determination**

USEC has reviewed the proposed changes associated with this request and provides the following Significance Determination for consideration.

1. No significant change to any condition to the License.

Material License SNM-7003, Condition 15, states “No later than every three years the licensee shall update the Decommissioning Funding Plan and provide it to the NRC for review. After resolution of any NRC comments, the licensee shall submit final executed copies of the financial assurance instruments.” The proposed changes will meet this condition and not make any significant change to any other condition to the license.

2. No significant increase in the probability of occurrence or consequences of previously evaluated accident.

The proposed changes will not change any accident scenarios identified in the Integrated Safety Analysis (ISA) Summary or exceed the performance requirements of 10 CFR 70.61; therefore, there is no significant increase in the probability of occurrence or consequences of the previously evaluated accident.

3. No new or different type of accident.

The proposed changes do not create new or different types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements of 10 CFR 70.61 and that have not previously been described in the ISA Summary for the Lead Cascade.

4. No significant reduction in margins of safety.

The proposed changes revise the decommissioning cost estimate only; therefore, the proposed changes do not decrease the margin of safety associated with any Items Relied On For Safety that are being credited to ensure the performance requirements of 10 CFR 70.61 are met.

5. No significant decrease in the effectiveness of any programs or plans contained in the licensing documents.

The proposed changes will not decrease the overall level of security system performance needed to protect against the loss or compromise of classified matter. Other than the DFP and Chapter 10.0 of the License Application, the proposed changes do not affect any other plant safety, safeguards, or security programs or any other programs or plans contained in the License Application and its supporting documents for the Lead Cascade. The proposed changes will not decrease the effectiveness of the Emergency Plan, Security Program/Plans, Fundamental Nuclear Material Control Plan, or Quality Assurance Program Description.

6. The proposed changes do not result in undue risk to: 1) public health and safety; 2) common defense and security; and 3) the environment.

There is no increase in the probability of occurrence or consequences of a previously evaluated accident or malfunction of equipment important to safety. The proposed changes will not increase the likelihood the protected material or special nuclear material will be accessible to unauthorized personnel. There are no new accident initiators, increases in hazardous materials or waste streams. Therefore, the proposed changes do not result in undue risk to public health and safety, the environment, or to the common defense and security.

7. There is no change in the type or significant increases in the amounts of any effluents that may be released off-site.

The proposed changes do not create any new or unusual sources of hazardous substances, hazardous waste, or new waste streams that could be generated or used in unacceptable levels that exceed applicable regulatory requirements. Therefore, there is no change in the type or significant increases in the amounts of any effluents that may be released off-site.

8. There is no significant increase in individual or cumulative occupational radiation exposure.

The proposed changes will not increase radiological or chemical releases beyond applicable regulatory limits and will not create any new or unusual sources of radioactive waste. Therefore, the proposed changes will have no significant increase in individual or cumulative occupational radiation exposure.

9. There is no significant construction impact.

The proposed changes related to the decommissioning cost estimate of the Lead Cascade would occur after operations have ceased; therefore, the proposed changes can not have any significant construction impact on the Lead Cascade.

**Enclosure 2 of AET 12-0037**

**Proposed Changes for Chapter 10.0 of the License Application and  
the Decommissioning Funding Plan for the Lead Cascade**

**Information contained within  
does not contain  
Export Controlled Information**

**Reviewer: R.S. Lykowski  
Date: 06/26/2012**

## 10.0 DECOMMISSIONING

The Lead Cascade is located on the U.S. Department of Energy (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) reservation. The Licensee has operated the Lead Cascade since June 6, 2007. Materials License SNM-7003 provides the expiration date for the license. Information on the Licensee, the location of the site, and the types and authorized uses of licensed material is provided in Section 1.2, Institutional Information, and a description of the site and immediate environs is provided in Section 1.3, Site Description.

Consistent with the Agreement between USEC and the DOE, any Commercial Plant would be sited either at the PORTS or the Paducah Gaseous Diffusion Plant. PORTS was chosen as the location for the Commercial Plant. Consequently, the Lead Cascade would likely be included in the Commercial Plant license and would be decommissioned as part of the Commercial Plant construction efforts. If no Commercial Plant is deployed, then at the end of Lead Cascade operation, the Lead Cascade would be decommissioned prior to being de-leased and returned to DOE. For conservatism, it was assumed that centrifuges and other installed equipment would be removed and the Lead Cascade decommissioned in accordance with the lease agreement with DOE.

Centrifuges, service modules, process headers, vacuum pumps, and traps are the typical equipment to be removed by the Licensee; only the building shells and the facility infrastructure, including equipment that existed at the time of lease (e.g., rigid mast crane, utilities, etc.) will remain. The cascade area floor will be monitored for contamination, and will be decontaminated, if required. The remaining facilities will be decontaminated where needed to comply with lease turnover requirements. Confidential and Secret Restricted Data material, components, and documents will be transferred to the Commercial Plant or dispositioned in accordance with the Security Program for the American Centrifuge Plant, Chapter 2: Security Plan for the Protection of Classified Matter. Uranium hexafluoride ( $UF_6$ ) material will be transferred to an authorized facility. Radioactive wastes will be disposed of at licensed low-level waste disposal sites. Hazardous wastes will be treated or disposed of at licensed hazardous waste facilities. Following the Licensee's decommissioning activities, the facilities will be de-leased and returned to DOE in accordance with Lease Agreement requirements.

Activities required for decommissioning have been identified and decommissioning costs have been estimated. Costs projected were developed based on the experience at PORTS during the transition to Cold Standby operation. Other activities and estimated costs for decommissioning were developed based on an evaluation prepared by USEC concerning removal of the DOE centrifuges that previously remained at the PORTS site in the former Gas Centrifuge Enrichment Plant (GCEP) process buildings. Additionally, USEC has performed dismantling and decontamination work at the gaseous diffusion plants; data and experience from these activities allowed a realistic estimation of decommissioning financial expenditures. Using the cost data as a basis, financial arrangements are made to cover costs required for returning the Lead Cascade facilities to DOE in accordance with the terms of the Lease Agreement. Updates on cost and funding will be provided periodically as costs or funding mechanisms change significantly. A more detailed Decommissioning Plan for the Lead Cascade will be submitted in accordance with 10 *Code of Federal Regulations* (CFR) 70.38 in order to terminate the license.

There are two locations that have been identified for the machine Decontamination Service Area (DSA).

The first option is to utilize the centrifuge assembly area as the disassembly area. The result would be that the X-7726 facility would become potentially contaminated and would need subsequent decontamination. The second machine decontamination option is to utilize the south half of X-3001 building for simplicity, but a machine dismantling stand would have to be fabricated. The rigid mast crane would be used to transport the centrifuge machines from the cascade area to this decontamination area.

The following assumptions were utilized in this decommissioning plan:

- Machine dismantling and decontamination activities would occur in the X-7726 facility (i.e., option one), which are concurrently utilized for machine assembly and disassembly activities today.
- Although the Commercial Plant can use Lead Cascade equipment (e.g., centrifuge machines), the plan conservatively assumes that this equipment is dismantled and disposed of at the end of the Lead Cascade's useful life. No credit is taken for salvage value of this equipment or materials.
- No Lead Cascade activity and no decontamination liability are anticipated other than the cascade area in the X-3001 building and its associated utility bay area including the mezzanine (i.e., two floors), and the anticipated DSA, and machine disassembly area in the X-7726 facility.
- No decontamination effort should be required ~~for the~~ other Lead Cascade leased buildings/facilities, such as: X-7725, X-7727H, and X-3012, but for conservatism, these areas are used in the estimate in labor calculations.

The remaining subsections describe decommissioning plans and funding arrangements, and provide a detailed examination of the decontamination aspects of the program. The information here was developed in connection with the decommissioning cost estimate and is provided for information. Specific elements of the planning may change with the submittal of the decommissioning plan required at the time of license termination.

## 10.1 Decommissioning Program

The plan for decommissioning is to promptly decontaminate or remove materials from the facilities that are required under the Lease Agreement to return the facilities to DOE.

Decommissioning planning begins by incorporating special design features into the facility. These features will simplify eventual dismantling and decontamination. The plans are implemented through proper management and Radiation Protection and Industrial Safety

## 10.2 Decommissioning Steps

Implementation of decommissioning may begin immediately following facility shutdown, since only low radiation levels exist at this facility. Overall, the decommissioning period is estimated to require slightly greater than six months from facility shutdown to completion of the final radiation survey. The order of activities to support decommissioning will generally be: process system purging, equipment dismantling and removal, decontamination, disposition of Confidential and Secret Restricted Data equipment and material, disposal of wastes, and completion of a final radiation survey. The next paragraphs provide an overview and explanation of each of these steps in more detail.

### 10.2.1 Overview

The intent of decommissioning the Lead Cascade is to turnover the buildings and facility infrastructure to the DOE as required by the Lease Agreement. The removed equipment includes: piping and components from systems providing UF<sub>6</sub> containment, systems in direct support of the centrifuges (e.g., cooling water), radioactive and hazardous waste handling systems, contaminated air filtration systems, etc. to the extent they are required to be removed by the Lease Agreement. The remaining facility infrastructure will include services such as electrical power supply, sanitary water, fire suppression, ventilation, communications, and sewage treatment.

Decontamination of facility components and structures will not require the installation of a new facility dedicated for that purpose since the Lead Cascade DSA will be designed to accommodate repetitive equipment decontamination of up to the currently expected number of centrifuge machines to be deployed in the Lead Cascade (e.g., up to ~~89~~<sup>122</sup> operating centrifuge machines plus an additional 128 machines in storage as a contingency), for a total of ~~217~~<sup>130</sup> centrifuge machines and other components. The DSA is one of the two locations described in Section 10.0 of this license application. It will be the primary location for decontamination activities.

Although components may be reused in the Commercial Plant, for conservatism this plan assumes that these components will be decontaminated in accordance with radiation protection requirements and classified parts will be dispositioned in accordance with the Security Program. Table 10.2-1, Items for Potential Decontamination at Decommissioning, lists major items from the facility that are expected to require decontamination.

Contaminated portions of the buildings will be decontaminated as required. Structural contamination should be limited to the areas indicated on Figure 10.1-1 inside the CCZ of the facility. The remainder of the Lead Cascade facility is not expected to require decontamination. Good housekeeping practices during normal operation will maintain the other areas contamination free. When decontamination is complete, the Lead Cascade facilities will be surveyed to verify that further decontamination is not required. Decontamination activities will continue until Lead Cascade facilities are demonstrated to be suitable for de-leasing and turnover to DOE in accordance with Lease Agreement requirements.

remains in the facility will be treated as scrap and disposed of appropriately. Smaller amounts of steel, copper, and other metals can be recovered at market price. However, no credit is taken for salvage value in the Decommissioning Funding Plan (DFP), which is submitted separate from this license application.

Other items are considered waste. Wastes have no intrinsic salvage value.

### 10.2.6 Disposal

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. Wastes will consist of normal industrial trash, non-hazardous chemicals and fluids, radioactive wastes and very small amounts of hazardous materials. The radioactive waste will primarily be accumulated centrifuge components, trash, and citric cake. Citric cake consists of uranium and metallic compounds precipitated from citric acid decontamination solutions. It is estimated that approximately ~~4,200~~<sup>4,100</sup> cubic meters (m<sup>3</sup>) of radioactive waste will be generated during the decommissioning operation. This waste may be subject to further volume reduction prior to disposal.

Radioactive wastes will ultimately be disposed of in licensed low-level radioactive waste disposal facilities. Hazardous wastes will be disposed of in 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 applicable regulations. A more complete estimate of the wastes and effluent to be produced during decommissioning will be provided in the Licensee's plan for completion of decommissioning, to be submitted prior to the time of license termination.

Confidential and Secret Restricted Data components and documents at the facility not transferred to the Commercial Plant will be dispositioned in accordance with the requirements of 10 CFR Part 95 and the Security Program.

### 10.2.7 Final Radiation Survey

A final radiation survey is performed to verify proper decontamination to allow the facilities to be returned to DOE in accordance with Lease Agreement requirements. The evaluation of the final radiation survey is based, in part, on an initial radiation survey performed prior to operation. The initial survey determines the background radiation of the area; providing a datum for measurements that determine any increase in levels of radioactivity.

The final survey will systematically measure radioactivity over the Lead Cascade. The intensity of the survey will vary depending on the location (i.e., the buildings/facilities, the immediate area around the buildings/facilities, 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 a map of the survey site, measurement results, and the site's relationship to the surrounding area. The results will be analyzed and shown to be below allowable residual radioactivity limits; otherwise, further decontamination will be performed.

**Table 10.2-1  
Items for Potential Decontamination at Decommissioning**

<u>Utilization</u>	<u>Category</u>	<u>Description</u>	<u>Estimated Quantity</u>
<u>LC Plant / Facility</u>	Centrifuges <sup>1</sup>	Casings, Rotor Assemblies, Motors, Suspensions, and Mounts	<del>217</del> 130
	Piping	Less than 1 in. <del>p</del> Process <del>p</del> Piping length (Lft) and <del>i</del> Includes <del>t</del> Tubing <sup>3</sup>	<del>3,020</del> 39,000
		1 – 4 in. <del>p</del> Process <del>p</del> Piping length (Lft)	<del>6,360</del> 2,925
	Pumps	Evacuation <del>v</del> Vacuum <del>p</del> Pumps ( <u>Leybold</u> )	<del>42</del>
		Purge <del>v</del> Vacuum <del>p</del> Pumps ( <u>Leybold</u> )	<del>84</del>
		<u>Tuthill Vacuum Pumps</u>	<del>7</del>
		<u>Miscellaneous Vacuum Pumps (used sample, dump and feed cart vacuum pumps, used mass spec pumps, calibration buggy pumps, and helium leak detector pumps, etc.)</u>	<del>34</del>
	Ventilation Ductwork	Ductwork length ( <del>feet</del> [Lft]) [4' x 3']	<del>540</del> 600
	<u>Electrical Equipment / Panels</u>	<u>Motor Control Centers, Transfer Switches, Distribution Panels, DCS Control Cabinets, Human Machine Interface (HMI) Panels, Machine Isolation Control Cabinet, and Server Cabinets</u>	<del>43</del>
	<u>Transformers</u>	<u>Transformers (225KVA and 150 KVA)</u>	<del>4</del>
	<u>Uninterruptable Power Supply (UPS)</u>	<u>UPS Batteries, Bypass Switch, and Bypass Maintenance Transformer</u>	<del>62</del>
	<u>Diesel Generators &amp; Auxiliaries</u>	<u>Diesel Generators including Fuel Tanks, Air Storage Tanks, Fuel Pumping Systems and Other System Auxiliaries</u>	<del>12</del>
	Building Surfaces <sup>2</sup>	Floors ( <del>square feet</del> [ft <sup>2</sup> ])	<del>57,700</del> 45,000
	Valves <sup>3</sup>	Process <del>v</del> Valves (Sets)	<del>187</del> 130
		Miscellaneous <del>v</del> Valves	<del>722</del> 524
Traps	Chemical <del>t</del> Traps (1 <del>s</del> Set of 4)	<del>4</del>	
Other Equipment	UF <sub>6</sub> Portable Carts, Buffer Storage <del>s</del> Stands, Mass Spectrometers, Mass Spectrometer <del>e</del> Enclosure, <del>and</del> <del>v</del> Vent <del>m</del> Monitor <del>t</del> Traps, and <u>Miscellaneous Fixtures</u>	<del>33</del> 16	

**Table 10.2-1  
Items for Potential Decontamination at Decommissioning**

<u>Utilization</u>	<u>Category</u>	<u>Description</u>	<u>Estimated Quantity</u>
<u>LC Plant / Facility</u>	<u>Misc. Accumulated Waste</u>	<u>Accumulated, Classified and Contaminated Waste in B-25 Boxes</u>	<u>52</u>
<u>Leased Personality Equipment<sup>4</sup></u>	<u>Other Equipment</u>	<u>South Bend Radial Drill and Lathe</u>	<u>2</u>
	<u>Carts<sup>5</sup></u>	<u>Centrifuge Transport Carts</u>	<u>3</u>
	<u>Valves</u>	<u>Cascade Isolation Valves (CIV), Sample Valves (SV), Sensor Manifold Valve Assembly (SMVA), Sensor Calibration Valves (SCV), Back Pressure Control Valves (BPCV), Pressure Control Valves (PCV – current name) and Machine Isolation Valve sets (MIV)</u>	<u>889</u>
	<u>Structure</u>	<u>Service Modules (sections + aisle module)</u>	<u>20</u>
	<u>Fixtures</u>	<u>Machine Mount Hardware and Process Piping Flexible Connectors</u>	<u>1,378</u>
	<u>Misc. Centrifuge Sub-Components</u>	<u>Upper Suspension, Transfer Head Spool Piece, Upper Column Test Stand, Column Assemblies, Lower Column Assembly – Cover Plates, and Miscellaneous Column Hardware</u>	<u>506</u>
<u>Decontamination Equipment</u>	<u>Decontamination Equipment Cart<sup>5</sup></u>	<u>Centrifuge <del>t</del>Transporter <u>C</u>art</u>	<u>1</u>
	<u>Other Equipment</u>	<u>Centrifuge <del>d</del>Disassembly <u>s</u>Stands</u>	<u>2</u>
		<u>Centrifuge <del>d</del>Disassembling <u>e</u>Equipment</u>	<u>4</u>
		<u>Cutting <del>m</del>Machines</u>	<u>2</u>
		<u>Degreasers</u>	<u>2</u>
		<u>Decontamination <del>t</del>Tanks</u>	<u>3</u>
		<u>Wet <del>b</del>Blast <u>e</u>Cabinet</u>	<u>1</u>

<sup>1</sup>Note 1: The current project quantity consists of ~~122 centrifuge machines plus 8 contingency centrifuge~~ Train 3 storage – 88, CTF Storage - 14, Buffer Storage – 26, Lead Cascade-1 – 25, Lead Cascade-3 – 42 and Demonstration Cascade or associated storage – 22 machines for a grand total of ~~217~~ 130 anticipated centrifuge machines, ~~which is less than the original estimate of 240 centrifuge machines.~~ This includes only a fraction of centrifuge machines and spares built for the RD&D scope.

<sup>2</sup>Note 2: The floor space listed is contained within the X-3001 ~~Train 3 Lead e~~ Cascade area footprint. The amount of wall area (ft<sup>2</sup>) is not provided because it is not anticipated to need decontamination at the time of decommissioning.

<sup>3</sup>Note 3: Process ~~v~~ Valve sets follow the estimated number of ~~machines constructed positions utilized (Lead Cascade-1 – 25, Lead Cascade-3 – 42, and Demonstration Cascade – 120 for a total of 187).~~ Miscellaneous valves quantity is an estimated are an actual physical count. (not estimate).

Note 4: Leased Personality is equipment requested by the Licensee as part of the facility lease process and was previously funded and captured by another vehicle that has been discontinued.

Note 5: There are 3 Centrifuge Transport Carts accumulated as waste/disposal. Only 1 cart is needed/considered to support further Decontamination efforts.

The centrifuges will be processed and 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;
- Weld flanges to casing to make the casing a permanent disposal “cask”; and
- Destruction of classified parts by burial.

### 10.8.3 Results

Recoverable items will be externally decontaminated and suitable for reuse except for a very small amount of intractably internal contaminated material that severely limits potential customers. Other than centrifuge machines, there is potentially a small amount of salvageable scrap material (i.e., service modules, etc.). Material requiring disposal will primarily be process piping, trash, and residue from the effluent treatment systems. No problems are anticipated which will prevent the Lead Cascade facilities from being released to DOE in accordance with Lease Agreement requirements.

## 10.9 Agreements with Outside Organizations

This decommissioning plan and the funding arrangements described below, provide for decontamination of the Lead Cascade for turnover to DOE. As such, no agreements with outside organizations are required for control of access to the facility following shutdown and decommissioning.

## 10.10 Arrangements for Funding

This section provides an estimate of decommissioning costs and explains the arrangements made to assure funding is available to cover these costs.

### 10.10.1 Decommissioning Costs

Table 10.10-1, provides a summary listing of the estimated costs of the major decommissioning activities described in Section 10.2. A more detailed breakdown of the cost estimates is provided in Section 3.0 of the DFP submitted with this application. Costs are in 2012+ dollars and a 7.56 percent general and administrative cost, a 15 percent contractor profitability factor, and a 25 percent contingency factor is added based on the NRC guidance of NUREG-1757, Volume 3, *Consolidated NMSS Decommissioning Guidance, Financial Assistance, Recordkeeping, and Timeliness*, dated September 2003. As shown in the table, the estimated total cost is \$13.669.55 million. Costs may change between the time of license

application and decommissioning. The cost estimate will be adjusted periodically and no less frequent than every three years consistent with the requirements of 10 CFR 70.25(e) and recent NRC changes to financial assurance amendments for materials licensees (Federal Register, Volume 68 Number 192, October 3, 2003). The method for adjusting the cost estimate will consider the following:

- Changes in general inflation (e.g., labor rates, consumer price index)
- Changes in price of goods (e.g., packing materials)
- Changes in price of services (e.g., shipping and disposal costs)
- Changes in facility condition or operations
- Changes in decommissioning procedures or regulations

Costs are estimated as explained below:

**Planning and Preparation: \$0.343 million**

This is based upon utilizing exempt workers at the current average cost distribution amounts for 5865 man-days of exempt and 34 man-day of non-exempt work to be completed in a three-month duration. Scope includes developing Project Execution Plan and schedule (including organization and staffing plan and needed services); developing and submitting to the U.S. Nuclear Regulatory Commission (NRC), a detailed decommissioning plan; developing/implementing Site Characterization Plan; developing/implementing decommissioning activity procedures; and designing DSA.

**Decontamination or Dismantling of Radioactive Facility Components: \$1.7513 million**

This is based upon utilizing both exempt and non-exempt workers at their respective current average cost distribution for 1,600241 man-days of exempt and 2,9291,798 man-days of non-exempt work over a five-month duration. This does not include any costs associated with cranes, platforms, fencing, etc. because they would already exist and be in place. Scope includes erecting DSA; decontamination of facilities – internals; dismantling centrifuge machines; waste segregation/staging; and dismantling facilities/components.

**Restoration of Contaminated Areas on Facility Grounds: \$0.108 million**

This is based upon utilizing both exempt and non-exempt workers at their respective current average cost distribution for 65 man-days of exempt and 17030 man-days of non-exempt work over a five-month duration. This also assumes the contamination of the facility grounds from the Lead Cascade operations will be minimal. Scope includes decontamination of facilities; performing health physics surveys; and removal of fixed contamination.

**Final Radiation Survey: \$0.098 million**

This is based upon utilizing exempt technicians at their current average cost distribution for 1350 man-days of work over a three and a half-month duration. Scope includes developing/implementing survey plans; collecting/analyzing data; performing confirmatory surveys; developing final survey report; and terminating license.

**Site Stabilization and Long-Term Surveillance: N/A**

As previously stated, the intent of decommissioning is to turnover the buildings and facility infrastructure to the DOE as required by the Lease Agreement. Hence, no long-term surveillance or site stabilization is required.

**Indirect Services: \$1.2260 million**

This includes services such as human resources; procurement; material management support; respirator issue and use; emergency and fire services; security support; sanitary water; sewage; and power and power operations utilities.

**Packing, Shipping, and Disposal of Radioactive Wastes: \$3.90186 million**

This is based upon disposition of ~~217430~~ centrifuge machines and becoming a total of approximately ~~2,6651,500~~ m<sup>3</sup> of wastes at current packaging, shipping, and disposal rates.

**Equipment/Supply Costs: \$0.4317 million**

This includes the purchase or lease of cutting machines, degreasers, decontamination tanks, blast cabinets, B-25 containers, and 55-gallon barrels.

**Laboratory Costs: \$0.063 million**

This includes the costs for laboratory analysis of contamination samples taken during various decommissioning activities.

**Miscellaneous Costs: \$1.3828 million**

This includes other direct costs of \$0.14 million for miscellaneous material for decommissioning and ~~\$1.2414~~ million for other indirect costs, such as NRC review fees for the submitted DP, license fees, DOE lease fees, and taxes on procured equipment and supplies.

**Total Decommissioning Cost Estimate \$13.669.55 million**

The total cost is a rounded-up summation of the individual costs plus a ~~67.5~~ percent general and administrative cost, 15 percent contractor profitability, and a 25 percent contingency.

**10.10.2 Funding Arrangements**

The funds for decommissioning the facility will be provided by one or more of the methods described in 10 CFR 40.36(e) and 10 CFR 70.25(f). The selected method(s) is(are) described in the DFP, included as part of this license application. In the DFP, methods are described for periodic adjustments in the cost estimate and resulting necessary adjustments to the funding method.

**Table 10.10-1  
Estimated Total Decommissioning Costs and Duration**

Task	Cost Estimate (Millions, 2012 <del>1</del> dollars)	Approx. Percentage
Planning and Preparation	\$0.34 <del>3</del>	5 <del>4</del> %
Decontamination or Dismantling of Radioactive Facility Components	\$1.75 <del>13</del>	19 <del>7</del> %
Restoration of Contaminated Areas on Facility Grounds	\$0.108	1%
Final Radiation Survey	\$0.09 <del>8</del>	2 <del>1</del> %
Site Stabilization and Long-Term Surveillance	<del>-\$0</del>	0%
Indirect Services	\$1.2260	24 <del>13</del> %
Packing, Shipping, and Disposal of Radioactive Wastes	\$3.90 <del>1.86</del>	28 <del>42</del> %
Equipment/Supply Costs	\$0.43 <del>17</del>	3 <del>4</del> %
Laboratory Costs	\$0.06 <del>3</del>	1%
Miscellaneous Costs - Other Direct Costs	\$0.14	2%
Miscellaneous Costs - Other Indirect Costs	\$1.24 <del>14</del>	17 <del>13</del> %
<b>Subtotal<sup>1</sup></b>	<b>\$9.276.56</b>	<b>100</b>
<del>General and Administrative</del> <b>G&amp;A</b> ( <del>67.5</del> percent) <sup>2</sup>	\$0.69 <del>39</del>	
Contractor Profit (15 percent) <sup>3</sup>	\$0.97 <del>69</del>	
Contingency (25 percent) <sup>4</sup>	\$2.73 <del>1.91</del>	
<b>Total Decommissioning Cost Estimate</b>	<b>\$13.669.55</b>	

Note 1: Subtotal includes labor/material/overhead allocation costs.

Note 2: General ~~and~~ & Administrative (**G&A**) cost assumed to be ~~67.5~~% based upon current company's experience.

Note 3: Contractor profit assumed to be 15% of subtotal plus General and Administrative minus Other Indirect Costs [excluding insurance] minus the outside services portion of the Packaging, Shipping, and Waste Disposal Costs (15% \* [9.276.56 + 0.6939 - 1.2414 - 2.231.20] = \$0.9769 M).

Note 4: Contingency assumed to be 25% on subtotal plus General and Administrative and contractor profit.

For related information, reference also the DFP, contained in the License Application for the American Centrifuge Lead Cascade Facility.

# Decommissioning Funding Plan

## American Centrifuge Lead Cascade Facility

in Piketon, Ohio



### Proposed Changes

Information Contained Within  
Does Not Contain  
Export Controlled Information

Docket No. 70-7003

Reviewer: R.S. Lykowski  
Date: 06-26-2012

July 2012

Change Package A 10 CFR 1045 review and approval completed by LMS, DOE-ORO on 08/29/03 and 10/24/03.

Revision 1 – 10 CFR 1045 review and approval completed on 06/29/05.

Revision 2 – 10 CFR 1045 review and approval completed on 11/30/05.

Revision 3 – 10 CFR 1045 review and approval completed on 2/27/06.

Revision 4 – 10 CFR 1045 review and approval completed on 3/20/06.

Revision 5 – 10 CFR 1045 review and approval completed on 7/13/06.

Revision 6 – 10 CFR 1045 review and approval completed on 1/14/09.

Revision 7 – 10 CFR 1045 review and approval completed on 1/27/09.

Revision 8 – 10 CFR 1045 review and approval completed on 5/15/09.

Revision 9 – 10 CFR 1045 review and approval completed on 7/8/09.

Revision 10 – 10 CFR 1045 review and approval completed on 4/5/10.

Revision 11 – 10 CFR 1045 review and approval completed on 10/14/10.

Revision 12 -- Reviewed and determined to be UNCLASSIFIED. Derivative Classifier R.S. Lykowski. Sensitive information reviews completed and approved for public release by R.S. Lykowski on 2/16/11.

Revision 13 -- Reviewed and determined to be UNCLASSIFIED. Derivative Classifier R.S. Lykowski. Sensitive information reviews completed and approved for public release by R.S. Lykowski on 2/8/12.

Proposed Changes – Reviewed and determined to be UNCLASSIFIED. Derivative Classifier R.S. Lykowski. Sensitive information reviews completed and approved for public release by R.S. Lykowski on 06/26/12.

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## 1.0 INTRODUCTION

The Licensee hereby submits, pursuant to the provisions of the *Atomic Energy Act* of 1954, as amended, and the rules and regulations of the U.S. Nuclear Regulatory Commission (NRC), its Decommissioning Funding Plan (DFP) for the American Centrifuge Lead Cascade Facility (hereafter referred to as the Lead Cascade) at the U.S. Department of Energy (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) reservation. This DFP sets forth that information required by 10 *Code of Federal Regulations* (CFR) Part 70 regarding the Applicant's plans for funding the ultimate decommissioning of the Lead Cascade.

As indicated below, the Licensee presently intends to provide for decommissioning funding through a surety bond and/or letter of credit in accordance with applicable requirements of 10 CFR Part 70. Appropriate model documentation for these funding methods is attached hereto. Upon acceptance of this funding estimate execution of the revised funding instrument(s), will be developed and the Licensee will supplement this portion of its application.

## 2.0 GENERAL INFORMATION

**Facility Description:** USEC is a global energy company and a leading supplier of enriched uranium utilized for reactor fuel for commercial nuclear power plants. USEC signed an Agreement with the DOE on June 17, 2002, in which it agreed to submit a license application for the Lead Cascade to support deployment of new, cost-effective advanced enrichment technology in the United States using gas centrifuges. The Lead Cascade is to be located in areas leased from the DOE at PORTS.<sup>1</sup>

**Licensed Material:** The License Application for the Lead Cascade supports authorization to operate the facility to recycle UF<sub>6</sub> through centrifuge machines as documented in Materials License SNM-7003. Uranium enriched in the <sup>235</sup>U isotope up to the certified limit of PORTS (10 weight percent <sup>235</sup>U) will be recombined with material depleted in the <sup>235</sup>U isotope. No enriched product will be removed from the cascade, except for samples. As currently envisioned the facility will have up to ~~89122~~ operating centrifuge machines in the Lead Cascade. Pursuant to 10 CFR 70.25(a), a DFP is required. For DFP funding purposes, the decommissioning estimate will be based on the planned ~~89122~~ operating centrifuge machines, plus an additional 128 machines in storage ~~to account for potential contingencies~~, for a total of ~~217130~~ centrifuge machines to be decommissioned.

**Schedule:** The projected operational date for the Lead Cascade is July 2006.

**Period of Operation:** USEC has operated the Lead Cascade since June 6, 2007. Materials License SNM-7003 provides the expiration date for the license.

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<sup>1</sup> Details regarding the planned operations of the Lead Cascade may be found in the License Application and the accompanying Environmental Report.

**Decommissioning Costs:** The Licensee has prepared a revised site-specific decommissioning cost estimate for the ultimate decommissioning of the Lead Cascade for de-leasing and return to DOE. This cost estimate utilizes current information regarding the activities and associated costs of decommissioning. The estimate and associated funding mechanisms will be adjusted over time, in accordance with the applicable provisions of 10 CFR Part 70.

**Decommissioning Funding:** As set forth in this DFP, the Licensee presently intends to utilize a surety bond and/or letter of credit to provide reasonable assurance of the availability of decommissioning funds when needed. These funding mechanisms are intended to satisfy the provisions of 10 CFR Part 70 with respect to decommissioning financial assurance for license applicants under those provisions.

### 3.0 DECOMMISSIONING COST ESTIMATE

Pursuant to 10 CFR 70.25(e) and the guidance provided by the NRC in NUREG-1757, *Consolidated Decommissioning Guidance*, the Licensee has evaluated the estimated costs of decommissioning the Lead Cascade. The facility will be decommissioned such that the facilities may be de-leased and returned to the DOE. The estimated costs of decommissioning, patterned after NRC guidance in Appendix A of NUREG-1757, Volume 3, *Consolidated NMSS Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness*, Final Report, September 2003 is set forth in the tables contained in Appendix C and D of this DFP and noted below. (Note: To maintain consistent table sequence numbers with those presented in Appendix A of NUREG-1757, Tables 3.1 through 3.3 are not used):

- Facility Description Summary (Table C3.4 and Table C3.4A)
- Number and Dimensions of Facility Components (Table C3.5 and Table C3.5A)
- Planning and Preparation (Table C3.6)
- Decontamination or Dismantling of Radioactive Facility Components (Table C3.7)
- Restoration of Contaminated Areas on Facility Grounds (Table C3.8)
- Final Radiation Survey (Table C3.9)
- Site Stabilization and Long-term Surveillance (Table C3.10)
- Total Work Days by Labor Category (Table C3.11)
- Worker Unit Cost Schedule (Table D3.12)
- Total Labor Costs by Major Decommissioning Task (Table D3.13)
- Packaging, Shipping, and Disposal of Radioactive Wastes (Table C3.14)
- Equipment/Supply Costs (Table C3.15)
- Laboratory Costs (Table C3.16)
- Miscellaneous Costs (Table C3.17)
- Total Decommissioning Costs (Table C3.18)
- Total Labor Distribution (Table C3.19)

Currently, the Licensee does not have an estimate of potential levels of contamination at the time of decommissioning. Chapter 10.0 of the License Application for the American Centrifuge Lead Cascade Facility describes specific features that serve to minimize the level and spread of radioactive contamination during operation that simplify the eventual facility decommissioning and minimize worker exposure. The total estimated cost of decommissioning the facility in 2012<sup>+</sup> dollars is \$13.66<sup>9.55</sup> million (see Table C3.18).

Key assumptions used in the decommissioning cost estimate are as follows:

- Details of planned surveys to be taken and decontamination efforts
- Release criteria to be used for the licensed material
- Information on facility building and grounds, dimensions, type, and number of components that will require decontamination
- Costs for labor and non-labor
- Levels of effort for decontamination activities; and volumes and types of wastes generated
- Decommissioning Cost Estimate unit quantities were developed based on actual USEC Gas Centrifuge Enrichment Plant (GCEP) Cleanout data. Costing of unit quantities used industry standard costs escalated to 2012<sup>+</sup> dollars, and 2012<sup>+</sup> estimated costs for services and materials, resulting in a Decommissioning Cost Estimate that reflects independent third-party costs to perform Lead Cascade decommissioning activities.

There are no decommissioning costs associated with disposition of UF<sub>6</sub> since the Licensee intends to utilize this material in future enrichment operations.

Finally, the Licensee recognizes the need to adjust cost estimates and funding levels periodically, pursuant to 10 CFR 70.25(e). These measures are in Section 5.0 of this DFP. The Licensee also recognizes that, pursuant to 10 CFR 70.38(g)(4)(v), it must update its detailed cost estimate at the time of license termination and provide, if necessary, additional assurance of the availability of adequate funds for completion of decommissioning.

#### 4.0 DECOMMISSIONING FUNDING MECHANISM

The Licensee presently intends to utilize a surety bond and/or letter of credit to provide reasonable assurance of decommissioning funding, pursuant to 10 CFR 70.25(f)(2). Accordingly, the Licensee provides with this application model documentation related to the use of the surety method of providing decommissioning financial assurance.<sup>2</sup> Upon acceptance of this cost estimate and finalization of the specific funding instruments to be utilized, the Licensee will supplement its application to include the executed documentation.

<sup>2</sup> The model documentation is derived from NRC guidance in NUREG-1757, Volume 3, Consolidated NMSS Decommissioning Guidance, Financial Assistance, Recordkeeping, and Timeliness, dated September 2003. The Licensee will consider this model documentation as guidance in preparing and executing funding instruments for the Lead Cascade. In the event the Licensee ultimately selects another form of decommissioning funding, model documentation from NUREG-1757 will also be used as guidance in the preparation of funding instruments.

**Appendix C**  
**Decommissioning Cost Estimate Tables**

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**Table C3.4 Facility Description Summary**

<p><b>NRC License Numbers and Types (i.e., Parts 30, 40, 70, or 72)</b></p> <p>- 10 CFR Part 70 - To possess and use special nuclear, source, and by-product materials.</p>
<p><b>Types and Quantities of Materials Authorized Under the Licenses Listed Above.</b></p> <p>- 250 kg UF<sub>6</sub> (Uranium Hexafluoride)</p>
<p><b>Description of How Licensed Materials Are Used.</b></p> <p>- Support of the test facility (Lead Cascade); cascade will be on 'Recycle' operations, where the enriched stream is recombined with the depleted stream; no enriched product will be withdrawn, except for laboratory samples necessary to confirm the machine's enrichment performance.</p>
<p><b>Description of Facility, Including Buildings, Rooms, Grounds, and Description of Where Particular Types of Materials Are Used.</b></p> <p><u>X-7726 Centrifuge Training and Test Facility (CTTF)</u> – The CTTF is the area where material and components are received; components or subassemblies are inspected and tested; the components are assembled as centrifuge machines; the final assembly is evacuated and leak checked; and repairs are performed to the machine or subassemblies.</p> <p><u>X-7725 Recycle/Assembly (R/A) Building</u> - Small area of a larger, multiple level building to allow the temporary storage or movement of completed centrifuge machines from the X-7726 facility to the X-7727H Interplant Transfer Corridor. The X-7725 Buffer Storage Area may also be used for storage, handling, and assembly preparation activities of centrifuge components. An area in the X-7725 R/A, 3<sup>rd</sup> level storage area between column lines C3 and C8 will be used for centrifuge component handling and storage. Areas of the X-7725 will be used for shipping, receiving, and storage of materials.</p> <p><u>X-7727H Interplant Transfer Corridor</u> - Area that provides an enclosed throughway from the X-7725 building or X-7726 facility to the X-3001 Process Building (Lead Cascade Area).</p> <p><u>X-3001 Process Building</u> - Area that houses the Lead Cascade. The Lead Cascade is supplied normal UF<sub>6</sub> feed material from a cylinder located on a portable cart, also located in this area.</p> <p><u>X-3012 Process Support Building</u> - Area that houses the Area Control Room, maintenance shops and stores, and other support areas.</p>
<p><b>Quantities of Materials or Waste Accumulated Before Shipping or Disposal.</b></p> <p>- See Table C3.4(A)</p>

**Table C3.4(A) Quantities of Materials or Waste Accumulated Before Shipping or Disposal**

Utilization	Category	Description	Estimated Quantity
<u>LC Plant / Facility</u>	Centrifuges <sup>1</sup>	Casings, Rotor Assemblies, Motors, Suspensions, and Mounts	<u>217</u> <del>130</del>
	Piping	Less than 1 in. Process Piping length (Lft) and Includes Tubing <sup>3</sup>	<u>3,020</u> <del>39,000</del>
		1-4 in. Process Piping length (Lft)	<u>6,360</u> <del>2,925</del>
	Pumps	Evacuation Vacuum Pumps	<u>42</u>
		Purge Vacuum Pumps	<u>84</u>
		<u>Tuthill Vacuum Pumps</u>	<u>7</u>
		<u>Miscellaneous Vacuum Pumps (used sample, dump and feed cart vacuum pumps, used mass spec pumps, calibration buggy pumps, and helium leak detector pumps, etc.)</u>	<u>34</u>
	Ventilation Ductwork	Ductwork length (Lft) [4'x3']	<u>540</u> <del>600</del>
	<u>Electrical Equipment / Panels</u>	<u>Motor Control Centers, Transfer Switches, Distribution Panels, DCS Control Cabinets, Human Machine Interface (HMI) Panels, Machine Isolation Control Cabinet, and Server Cabinets</u>	<u>43</u>
	<u>Transformers</u>	<u>Transformers (225KVA and 150 KVA)</u>	<u>4</u>
	<u>Uninterruptable Power Supply (UPS)</u>	<u>UPS Batteries, Bypass Switch, and Bypass Maintenance Transformer</u>	<u>62</u>
	<u>Diesel Generators &amp; Auxiliaries</u>	<u>Diesel Generators including Fuel Tanks, Air Storage Tanks, Fuel Pumping Systems and Other System Auxiliaries</u>	<u>12</u>
	Building Surfaces <sup>2</sup>	Floors (ft <sup>2</sup> )	<u>57,700</u> <del>45,000</del>
	Valves <sup>3</sup>	Process Valves (sets)	<u>187</u> <del>130</del>
		Miscellaneous Valves	<u>722</u> <del>524</del>
	Traps	Chemical Traps (1 sSet of 4)	4
Other Equipment	UF <sub>6</sub> Portable Carts, Buffer Storage Stands, Mass Spectrometers, Mass Spectrometer Enclosure, and Vent Monitor Traps, and Miscellaneous Fixtures	<u>33</u> <del>16</del>	
<u>Misc. Accumulated Waste</u>	<u>Accumulated, Classified and Contaminated Waste in B-25 Boxes</u>	<u>52</u>	

**Table C3.4(A) Quantities of Materials or Waste Accumulated Before Shipping or Disposal**

Utilization	Category	Description	Estimated Quantity
<u>Leased Personality Equipment<sup>4</sup></u>	<u>Other Equipment</u>	<u>South Bend Radial Drill and Lathe</u>	<u>2</u>
	<u>Carts<sup>5</sup></u>	<u>Centrifuge Transport Carts</u>	<u>3</u>
	<u>Valves</u>	<u>Cascade Isolation Valves (CIV), Sample Valves (SV), Sensor Manifold Valve Assembly (SMVA), Sensor Calibration Valves (SCV), Back Pressure Control Valves (BPCV), Pressure Control Valves (PCV – current name) and Machine Isolation Valve sets (MIV)</u>	<u>889</u>
	<u>Structure</u>	<u>Service Modules (sections + aisle module)</u>	<u>20</u>
	<u>Fixtures</u>	<u>Machine Mount Hardware and Process Piping Flexible Connectors</u>	<u>1,378</u>
	<u>Misc. Centrifuge Sub-Components</u>	<u>Upper Suspension, Transfer Head Spool Piece, Upper Column Test Stand, Column Assemblies, Lower Column Assembly – Cover Plates, and Miscellaneous Column Hardware</u>	<u>506</u>
	<u>Decontamination Equipment</u>	<u>Decontamination Equipment</u>	<u>Centrifuge Transporter Cart</u>
<u>Other Equipment</u>		<u>Centrifuge Disassembly Stands</u>	<u>2</u>
		<u>Centrifuge Dismantling Equipment</u>	<u>4</u>
		<u>Cutting Machines</u>	<u>2</u>
		<u>Degreasers</u>	<u>2</u>
		<u>Decontamination Tanks</u>	<u>3</u>
		<u>Wet Blast Cabinet</u>	<u>1</u>

<sup>1</sup> Note 1: The current project quantity consists of Train 3 storage – 88, CTF Storage - 14, Buffer Storage – 26, Lead Cascade-1 – 25, Lead Cascade-3 – 42 and Demonstration Cascade or associated storage – 22+22 centrifuge machines plus 8 contingency centrifuge machines for a grand total of 217+30 anticipated centrifuge machines, which is less than the original estimate of 240 centrifuge machines. This includes only a fraction of centrifuge machines and spares built for the RD&D scope.

<sup>2</sup> Note 2: The floor space listed is contained within the X-3001 Train 3 cascade area Lead Cascade footprint. The amount of wall area (ft<sup>2</sup>) is not provided because it is not anticipated to need decontamination at the time of decommissioning.

<sup>3</sup> Note 3: Process Valve sets follow the estimated number of machines constructed positions utilized (Lead Cascade-1 – 25, Lead Cascade-3 – 42, and Demonstration Cascade – 120 for a total of 187). Miscellaneous Valves quantity is an actual physical estimated count (not estimate).

Note 4: Leased Personality is equipment requested by the Licensee as part of the facility lease process and was previously funded and captured by another vehicle that has been discontinued.

Note 5: There are 3 Centrifuge Transport Carts accumulated as waste/disposal. Only 1 cart is needed/considered to support further Decontamination efforts.

**Table C3.5 Number and Dimensions of Facility Components  
(Total Volume)**

Component	Number of Components	Dimensions of Component (specify units)	Total Volume (ft <sup>3</sup> )	Compacted Factor (Volume Remaining)	Total Compacted Volume (ft <sup>3</sup> )	Level of Contamination
<b>X-3001</b>						
Centrifuges	130 units	~30" dia x 45'	28,716			High Alpha
Vacuum Pumps	6 ea	4' x 5' x 4'	480	1.0	480	High Alpha
Chemical Traps	4 ea	8" dia x 8'	11	0.2	2	High Alpha
Process Piping	2,925 Lft	1", 2", and 4" dia	255	0.2	51	High Alpha
Piping <1"; Tubing	39,000 Lft	<1" dia	213	0.2	43	High Alpha
Ventilation Ductwork (HVP)	600 Lft	4' x 3'	7,200			Low Alpha
Process Valves	130 ea	0.4 ft <sup>3</sup>	52	1.0	52	High Alpha
Miscellaneous Valves	524 ea	0.4 ft <sup>3</sup>	210	1.0	210	High Alpha
UF <sub>6</sub> Portable Carts	4 ea	3' x 5' x 4'	240	0.5	120	Low Alpha
Buffer Storage Stands	5 ea	5' x 25' x 1.5'	300	0.3	90	Low Alpha
Mass Spectrometers	3 ea	2' x 4' x 2' *VF	96	1.0	96	Low Alpha
Mass Spectrometer Enclosure	1 ea	50' x 30' x 14'	21,000	0.15	3,150	Low Alpha
Vent Monitor Traps	3 ea	3" Dia x 1.5'	0	0.3	0	Low Alpha
<b>Total Component Volumes</b>			<b>37,377</b>		<b>4,293</b>	

**Assumptions:**

- Service module structural steel is not considered waste. These items are to be removed, disassembled, decontaminated to NRC 'Free Release' criteria (see Section 4.8.2.4 of License Application for the Lead Cascade) and stored for later disposition or other use. Centrifuge machines are considered waste and accounted for in Table C3.14.
- Total Compacted Volume does not include the centrifuge machines or service modules (structures); the ventilation ductwork is decontaminated to a 'free release' criteria and remains in the building; centrifuge machines/casings are accounted in the waste stream by a unique pathway (see Table C3.14, page 2) and the service module structure is decontaminated to a 'free release' criteria and is stored for later disposition or other use.
- Highlighted rows represent centrifuge casings and service module structure items.
- Highlighted rows represent ventilation ductwork (HVP system).

**Table C3.5 Number and Dimensions of Facility Components  
(Total Volume)**

<u>Component</u>	<u>Number of Components</u>	<u>Dimensions of Component (specify units)</u>	<u>Total Volume (ft<sup>3</sup>)</u>	<u>Compaction Factor (Volume Remaining)</u>	<u>Total Compacted Volume (ft<sup>3</sup>)</u>	<u>Level of Contamination</u>
<b>X-3001</b>						
Centrifuges	217 units	30" dia x 43'	47,934	0.0	0	High Alpha
Vacuum Pumps	53 ea	4' x 6' x 4' * VF	1,175	1.0	1,175	High Alpha
Chemical Traps (1 set of 4)	4 ea	8" dia x 8'	11	0.2	2	High Alpha
Process Piping	6,360 Lft	1", 2", & 4" dia	555	0.2	111	High Alpha
Piping <1"; Tubing	3,020 Lft	<1" dia	16	0.2	3	High Alpha
Ventilation Ductwork (HVP)	540 Lft	4' x 3'	6,480	0.0	0	Low Alpha
Process Valves	187 sets	0.4 ft <sup>3</sup>	75	1.0	75	High Alpha
Motor Control Centers	2 units	5' x 7' x 3'	210	0.4	84	Low Alpha
Transfer Switches	15 ea	2' x 4' x 18"	180	0.4	72	Low Alpha
Distribution Panels	6 ea	2' x 3' x 9"	27	0.4	11	Low Alpha
Transformers (225KVA)	3 units	4' x 4' x 5'	240	0.7	168	Low Alpha
Transformers (150KVA)	1 unit	3' x 3' x 4'	36	0.7	25	Low Alpha
Diesel Generators	1 unit	19.2' x 7.5' x 9'	1,296	0.8	1,037	Low Alpha
Day Tank (Fuel-650gal)	1 ea	19.2' x 7.5' x 1.13'	163	0.2	33	Low Alpha
Fuel Tank (2000gal)	1 ea	4.5' dia x 13'	207	0.2	41	Low Alpha
Air Storage Tanks (300gal)	2 ea	3' dia x 7.5'	106	0.2	21	Low Alpha
Air Compressors (30hp)	2 ea	0.63' x 1.5' x 2'	4	1.0	4	Low Alpha
Fuel Pumping System	2 ea	3' x 1' x 1'	6	1.0	6	Low Alpha
UPS (Batteries)	60 units	1.5' x 1' x 1'	90	0.8	72	Low Alpha
UPS Bypass Switch	1 ea	2' x 4' x 18"	12	0.4	5	Low Alpha
UPS Bypass Transformer	1 ea	3' x 3' x 4'	36	0.7	25	Low Alpha
DCS Control Cabinets (with Network Patch Panels)	7 ea	6' x 5' x 2'	420	0.4	168	Low Alpha
Human Machine Interface Panels	3 ea	9" x 9" x 6"	1	0.4	0	Low Alpha
Machine Isolation Control Cabinet	1 ea	4' x 2' x 1'	8	0.4	3	Low Alpha
Server Cabinets	9 units	6' x 5' x 2'	540	0.4	216	Low Alpha

**Table C3.5 Number and Dimensions of Facility Components  
(Total Volume)**

<u>Component</u>	<u>Number of Components</u>	<u>Dimensions of Component (specify units)</u>	<u>Total Volume (ft<sup>3</sup>)</u>	<u>Compaction Factor (Volume Remaining)</u>	<u>Total Compacted Volume (ft<sup>3</sup>)</u>	<u>Level of Contamination</u>
<u>Valves (Miscellaneous and Leased Personalty Equipment)</u>	<u>1,611 ea</u>	<u>0.4 ft<sup>3</sup></u>	<u>644</u>	<u>1.0</u>	<u>644</u>	<u>High Alpha</u>
<u>UF<sub>6</sub> Portable Carts</u>	<u>17 ea</u>	<u>3' x 5' x 4'</u>	<u>1,020</u>	<u>0.5</u>	<u>510</u>	<u>Low Alpha</u>
<u>Buffer Storage Stands</u>	<u>5 ea</u>	<u>5' x 25' x 1.5'</u>	<u>938</u>	<u>0.3</u>	<u>281</u>	<u>Low Alpha</u>
<u>Mass Spectrometers</u>	<u>3 ea</u>	<u>2' x 5' x 3'</u>	<u>90</u>	<u>1.0</u>	<u>90</u>	<u>Low Alpha</u>
<u>Mass Spec Room Enclosure</u>	<u>1 ea</u>	<u>50' x 30' x 14'</u>	<u>21,000</u>	<u>0.15</u>	<u>3,150</u>	<u>Low Alpha</u>
<u>Vent Monitors Traps</u>	<u>3 ea</u>	<u>3" Dia x 1.5'</u>	<u>0</u>	<u>0.3</u>	<u>0</u>	<u>Low Alpha</u>
<b>X-3012</b>						
<u>Diesel Generators</u>	<u>1 unit</u>	<u>14.7' x 5' x 7'</u>	<u>515</u>	<u>0.8</u>	<u>412</u>	<u>Low Alpha</u>
<u>Day Tank (Fuel-250gal)</u>	<u>1 ea</u>	<u>6.3' x 5' x 1'</u>	<u>32</u>	<u>0.2</u>	<u>6</u>	<u>Low Alpha</u>
<u>Fuel Tank (1000gal)</u>	<u>1 ea</u>	<u>5' dia x 7'</u>	<u>137</u>	<u>0.2</u>	<u>27</u>	<u>Low Alpha</u>
<b>General</b>						
<u>Miscellaneous Fixtures (B-25 Boxes)</u>	<u>4 ea</u>	<u>4' x 4' x 6'</u>	<u>384</u>	<u>1.0</u>	<u>384</u>	<u>None</u>
<u>Miscellaneous Accumulated Classified Waste (B-25 Boxes)</u>	<u>52 ea</u>	<u>4' x 4' x 6'</u>	<u>4,992</u>	<u>1.0</u>	<u>4,992</u>	<u>Low Alpha</u>
<b>Total Component Volumes</b>			<b>84,588</b>		<b>8,861</b>	

**Assumptions:**

- Service module structural steel is not considered waste. These items are to be removed, disassembled, decontaminated to NRC 'Free Release' criteria (see Section 4.8.2.4 of License Application for the Lead Cascade), and stored for later disposition or other use. Centrifuge machines are considered waste and accounted for in Table C3.14.
- Total Compacted Volume does not include the centrifuge machines or service modules (structures); the ventilation ductwork is decontaminated to a 'free release' criteria and remains in the building; centrifuge machines/casings are accounted in the waste stream by a unique pathway (see Table C3.14, page 2) and the service module structure is decontaminated to a 'free release' criteria and is stored for later disposition or other use.
- Miscellaneous Fixtures is accumulated items provided in a B-25 boxes and consists of Leased Personalty equipment (fixtures and misc. sub-components). The other Leased Personalty equipment (i.e., drill, lathe, centrifuge transport carts, and Service Module structure) will be decontaminated to a 'free release' criteria and is stored for later disposition or other use.
- Miscellaneous Accumulated Classified Waste consists of 27 existing B-25 Boxes and it is anticipated that another 24 will be generated from 25% cross-over from unclassified contaminated waste for a total of 51.
- Highlighted rows represent centrifuge casings and service module structural items.
- Highlighted rows represent ventilation ductwork (HVP system).
- Highlighted rows represent distinct waste flowpath and Volume not summed in Total or Compacted Volume.

**Table C3.5(A) Number and Dimensions of Facility Components  
(Total Area)**

COMPONENT	Number of Components	Dimensions of Component /Area (specify units) <sup>1</sup>	Total Area (ft <sup>2</sup> ) <sup>1</sup>	Level of Contamination
<b>X-3001</b>		416' x 730'		
Floor (entire building footprint)	1 Building	303,680 ft <sup>2</sup>		
Floors <sup>1</sup> (PB Train 3 area) [104' x 315']	1 Building	<del>32,760</del> 25,260 ft <sup>2</sup>	<del>32,760</del> 25,260	Low Alpha
Floors <sup>1</sup> (PB Utility Bay area) [50' x 416' * 25%]	1 Building	5,200 ft <sup>2</sup>	5,200	Low Alpha
Floors <sup>1</sup> (PB Train 6 proposed Decontamination Service Area DSA)	1 Building	19,740 ft <sup>2</sup>	19,740	Low Alpha
<b>X-3012</b>		240' x 201'		
Floor (entire building footprint)	1 Building	48,240 ft <sup>2</sup>		
Maintenance Shop	3 (floors only)	100' x 39'	11,700	Low Alpha
Floors (Potential; ~60%) <sup>2</sup>	1 Building	28,950 ft <sup>2</sup>	28,950	Low Alpha
<b>X-7725</b>		540' x 820'		
Floor (entire building footprint)	1 Building	442,800 ft <sup>2</sup>		
Buffer Storage <sup>2</sup>	1 Area	~208' x 283'	64,946	Low Alpha
South Bldg Floors <sup>3</sup>	1 Area	536' x 272'	28,084	Low Alpha
<b>X-7726</b>		286' x 84'		
Floor (entire building footprint)	1 Building	24,024 ft <sup>2</sup>		
Floors (multiple levels)	1 Building	28,066 ft <sup>2</sup>	28,066	Low Alpha
<b>X-7727H</b>		~750' x 30'		
Floors	1 Building	26,078 ft <sup>2</sup>	26,078	Low Alpha
<b>Total Area</b>			<del>245,524</del> 232,824	

Dimensions - amount listed is general ground floor area and may not equate to a straight area calculation (l\*w).

Note 1: Areas include Lead Cascade 'Operational' area (Train 3 specific) = ~~32,760~~25,260 ft<sup>2</sup> and 25% PB Utility Bay/Mezzanine area = 5,200 ft<sup>2</sup> and the proposed DSA (Train 6) = 19,740 ft<sup>2</sup> for a Total = ~~57,700~~45,000 ft<sup>2</sup>.

Note 2: Area includes Buffer Storage, passage way, centrifuge staging, transfer corridor, maintenance and battery charging area for a Total = 64,946 ft<sup>2</sup>.

Note 3: Area includes Maintenance Material Storage areas (C/C1) for a Total = 28,084 ft<sup>2</sup>.

Note 4: Percentages/Areas listed are total facility areas considered and the realistic probability of floor space needing potential Decontamination, based upon relationship of area with radiological material or process. Anticipated areas of decontamination are much less, but this value was used to determine resources necessary.

**Table C3.6 Planning and Preparation  
(Productive Work Days)**

Group	Type	# Workers	Dur (#y)	Avail Factor	Total (wd)
Supervision	Exempt	1	34	219	34
Engineering	Exempt	3	92	219	2765
Operations	Exempt	0	022	219	0
	Non-Exempt	0	022	219	0
Maintenance	Exempt	2	69	219	138
	Non-Exempt	0	022	219	0
Support	Exempt	2	69	219	138
	Non-Exempt	1	34	219	34
<b>Totals</b>		<b>9</b>			<b>62019</b>

**Assumptions:**

- Anticipated duration = 1-3m or 22-92d
- Availability Factor = average annual work days = 219 md/y = 260 - 41(Paid Absences)

**Anticipated tasks considered:**

- Develop Project Execution Plan and Schedule (including organization and staffing plan and needed services)
- Develop Decommissioning Plan
- Develop/Implement Site Characterization Plan
- Review/Approve Site Decommissioning Plan by NRC; Regulatory/License issues
- Develop Decommissioning Activity Procedures
- Design Decommissioning Service Area (DSA)
- Initial Project Support/Organization
- Initial Plant Security

**Table C3.7 Decontamination or Dismantling of Radioactive Facility Components  
(Productive Work Days)**

Group	Type	# Workers	Dur (#y)	Avail Factor	Total (wd)
Supervision	Exempt	1	110	219	110
Engineering	Exempt	4	<del>80</del> 42	219	<del>320</del> 168
Operations	Exempt	2	110	219	220
	Non-Exempt	<del>3</del> 4	<del>63</del> 28	219	<del>189</del> 113
Maintenance	Exempt	4	<del>95</del> 74	219	<del>380</del> 294
	Non-Exempt	<del>23</del> 16	<del>110</del> 1 02	219	<del>2,530</del> 1, 629
Support	Exempt	<del>6</del> 5	<del>95</del> 90	219	<del>570</del> 449
	Non-Exempt	<del>10</del> 5	<del>21</del> 11	219	<del>210</del> 56
<b>Totals</b>		<del>53</del> 41			<del>4,529</del> <del>3,039</del>

**Assumptions:**

- Anticipated duration = 5m or 110d
- Availability Factor = average annual work days = 219 md/y = 260 - 41(Paid Absences)

**Anticipated tasks considered:**

- Erect Decontamination Facility (minimal comparative effort)
- Decontamination of facilities - ~~i~~Internals
- Dismantle centrifuge machines; ~~w~~Waste segregation/staging [46.6 mh/machine]
- Dismantle facilities/components
- Continued Project and Security Support

**Table C3.8 Restoration of Contaminated Areas on Facility Grounds  
 (Productive Work Days)**

Group	Type	# Workers	Dur (#y)	Avail Factor	Total (wd)
Supervision	Exempt	0	<del>110</del>	219	0
Engineering	Exempt	0	<del>110</del>	219	0
Operations	Exempt	1	65	219	65
	Non-Exempt	2	<del>8565</del>	219	<del>170130</del>
Maintenance	Exempt	0	<del>110</del>	219	0
	Non-Exempt	0	<del>110</del>	219	0
Support	Exempt	0	<del>110</del>	219	0
	Non-Exempt	0	<del>110</del>	219	0
<b>Totals</b>		<b>3</b>			<del><b>235195</b></del>

**Assumptions:**

- Anticipated duration = 5m or 110d
- Availability Factor = average annual work days = 219 md/y = 260 - 41(Paid Absences)
- Shares resource allocation concurrent with Decontamination or Dismantling phase effort
- Minimal loose contamination and cleanup anticipated

**Anticipated tasks considered:**

- Decontamination of facilities
- Remove fixed contamination

**Table C3.9 Final Radiation Survey  
(Productive Work Days)**

Group	Type	# Workers	Dur (#y)	Avail Factor	Total (wd)
Supervision	Exempt	0	<del>075</del>	219	0
Engineering	Exempt	0	<del>075</del>	219	0
Operations	Exempt	0	<del>075</del>	219	0
	Non-Exempt	0	<del>075</del>	219	0
Maintenance	Exempt	0	<del>075</del>	219	0
	Non-Exempt	0	<del>075</del>	219	0
Support	Exempt	3	<del>4544</del>	219	<del>135130</del>
	Non-Exempt	0	<del>075</del>	219	0
<b>Totals</b>		<b>3</b>			<b><del>135130</del></b>

**Assumptions:**

- Anticipated duration = 3.5m or 75d
- Availability Factor = average annual work days = 219 md/y = 260 - 41(Paid Absences)
- Work period occurs concurrent with the last 3.5 months of the D&D phase

**Anticipated tasks considered:**

- Develop/~~i~~Implement survey plans
- Collect/~~a~~Analyze data
- Perform confirmatory surveys
- Develop final survey report
- Terminate license

**Table C3.10 Site Stabilization and Long-Term Surveillance  
 (Productive Work Days)**

Group	Type	# Workers	Dur (#y)	Avail Factor	Total (wd)
Supervision	Exempt	0	<del>130</del>	219	0
Engineering	Exempt	0	<del>130</del>	219	0
Operations	Exempt	0	<del>130</del>	219	0
	Non-Exempt	0	<del>130</del>	219	0
Maintenance	Exempt	0	<del>130</del>	219	0
	Non-Exempt	0	<del>130</del>	219	0
Support	Exempt	0	<del>130</del>	219	0
	Non-Exempt	0	<del>130</del>	219	0
<b>Totals</b>		<b>0</b>			<b>0</b>

**Assumptions:**

- Anticipated duration = ~ 6m (concurrent with P&P and D&D)
- Availability Factor = average annual work days = 219 md/y = 260 - 41(Paid Absences)

**Anticipated tasks considered:**

- Site stabilization - not required.
- Maintain maintenance/surveillances on IROFS equipment necessary until license terminated (~ ½ year); LC has no IROFS surveillances needed while performing D&D.

**Table C3.11 Total Work Days by Labor Category**

Task	Labor Category Supervision (E)	Labor Category Engineering (E)	Labor Category Operations (E)	Labor Category Operations (N)	Labor Category Maintenance (E)	Labor Category Maintenance (N)	Labor Category Support (E)	Labor Category Support (N)	Total Labor
Planning and Preparation	34	<del>276</del> 275	0	0	138	0	138	34	<del>620</del> 619
Decontamination or Dismantling of Radioactive Facility Components	110	<del>320</del> 168	220	<del>189</del> 113	<del>380</del> 294	<del>2,530</del> 1,629	<del>570</del> 449	<del>210</del> 56	<del>4,529</del> 3,939
Restoration of Contaminated Areas of Facility Grounds	0	0	65	<del>170</del> 130	0	0	0	0	<del>235</del> 195
Final Radiation Survey	0	0	0	0	0	0	<del>135</del> 130	0	<del>135</del> 130
Site Stabilization and Long-Term Surveillance	0	0	0	0	0	0	0	0	0
<b>Total by Category</b>	<b>144</b>	<b><del>596</del>443</b>	<b>285</b>	<b><del>359</del>243</b>	<b><del>518</del>432</b>	<b><del>2,530</del>1,629</b>	<b><del>843</del>717</b>	<b><del>244</del>90</b>	<b><del>5,519</del>3,983</b>

**Assumption:**

- Individual tables describe other assumptions; this table is a summation of previous table information categorized by Exempt and Non-Exempt per phase.

**Table D3.12 Worker Unit Cost Schedule**

This Table is withheld pursuant to 10 CFR 2.390 and is located in Appendix D of this DFP

**Table D3.13 Total Labor Costs by Major Decommissioning Task**

This Table is withheld pursuant to 10 CFR 2.390 and is located in Appendix D of this DFP

**Table C3.14 Packaging, Shipping, and Disposal of Radioactive Wastes**

Waste Type	[A] Disposal Volume (ft <sup>3</sup> ); # Centrifuges	[B] Number of Containers	[C] Container Volume	[D] Unit Cost (\$/ft <sup>3</sup> or \$/gal)	[E] Total Unclassified Waste Disposal Costs
1: Miscellaneous Total Compacted Equipment Solid Waste	8,8614,293	7449	9690	\$ 52.7652.47	\$ 374,807231,393
2: Liquid Waste	217130	53	55	\$ 94.4777.80	\$ 25,97912,837
<b>Sub-Total</b>					\$ <b>400,786244,230</b>

**Assumptions:**

- Unclassified, Low-Level Contaminated ~~W~~waste; ~~L~~iquid waste from machine disassembly to Energy Solutions site
- [A<sup>1</sup>] = Total Compacted Volume (Table C3.5); [A<sup>2</sup>] = # centrifuges (installed plus ~~s~~Spares) (Table C3.4A)
- [B<sup>1</sup>] = A<sup>1</sup>/90~~C~~<sup>+</sup> (usable volume) minus 25% cross-over to classified waste disposal process [H<sup>3</sup>]; [B<sup>2</sup>] = A<sup>2</sup>\*5.4 qt/machine/220 qt/barrel; [C<sup>1</sup>] = B-25 ~~b~~Boxes volume = 9690 ft<sup>3</sup> (including box itself), [usable volume = 90 ft<sup>3</sup>]; [C<sup>2</sup>] = 55 gal/barrel
- [D<sup>1</sup>] = Unit Cost<sup>1</sup> = \$52.7647/ft<sup>3</sup> = \$32.3467 (eCurrent ~~d~~Disposal cost) + \$3.8269 (Ttransportation costs ~~to~~— Energy Solutions, Clive, UT utilizing B-25 boxes [1,791 miles one way trip and ~~b~~Brokerage eCosts]) + \$15.8133/ft<sup>3</sup> (~~L~~Labor costs - Handling, Waste Engineering, Radiological Waste NDA Characterization, and HP Support) + \$0.798/ft<sup>3</sup> (Radiological Characterization Equipment); [D<sup>2</sup>] = Unit Cost<sup>2</sup> = \$94.4777.80 = \$82.7870.00/gal (~~i~~ncineration and ~~d~~Disposal costs to Diversified Scientific Services Inc. {DSSI}, Oak Ridge, TN) + \$0.874.02/gal (Ttransportation and ~~b~~Brokerage cost [350 miles one way trip to DSSI]) + \$10.826.78/gal (~~L~~Labor costs - Handling, Sampling, Lab Analyses) [\$2012~~+~~]
- [E<sup>1</sup>] = B<sup>1</sup>C<sup>1</sup>D<sup>1</sup>; [E<sup>2</sup>] = B<sup>2</sup>C<sup>2</sup>D<sup>2</sup>
- Unclassified Waste Disposal Prorated Ratio [only used in computation for contractor profitability] = amount of waste cost that is directly associated with waste disposal and not subject to contractor profit: <sup>1</sup>(eCurrent ~~d~~Disposal cost and + ~~T~~ransportation cost) / (~~T~~Total eCompacted ~~s~~Solid ~~w~~Waste cost) = 0.69; <sup>2</sup> (~~i~~ncineration and ~~d~~Disposal cost + ~~T~~ransportation cost) / (~~T~~Total ~~L~~iquid ~~w~~Waste Disposal cost) = 0.89~~+~~

**Table C3.14 Packaging, Shipping, and Disposal of Radioactive Wastes**

Waste Type	[F] # of Centrifuges	[G] Factor (B-25/ma)	[H] Number of Containers	[J] Container Volume	[K] Unit Cost (\$/ft <sup>3</sup> )	[M] Total Classified Waste Disposal Costs
<u>3</u> : Classified Waste (Misc. B-25 Boxes)	<u>0</u>	<u>0</u>	<u>52</u>	<u>96</u>	<u>\$43.95</u>	<u>\$219,398</u>
<u>34</u> : Classified Waste (Machine Externals)	<u>217</u> <del>130</del>	0.9	<u>195</u> <del>117</del>	<u>96</u> <del>90</del>	<u>\$43.95</u> <del>36.86</del>	<u>\$824,010</u> <del>388,136</del>
<u>45</u> : Classified Waste (Machine – Casing and Internals)	<u>217</u> <del>130</del>	1.0	<u>217</u> <del>130</del>	290	<u>\$39.10</u> <del>32.59</del>	<u>\$2,460,563</u> <del>1,228,643</del>
<b>Sub-Total</b>						<b><u>\$3,503,971</u></b> <del>1,616,779</del>
<b>Grand Total</b>						<b><u>\$3,904,757</u></b> <del>1,861,009</del>
<b>Grand Total (Rounded, M)</b>						<b><u>\$3.90</u></b> <del>1.86</del>

**Assumptions:**

- Classified, Low-Level Contaminated Waste **to Nevada National Security Site (NNSS)**
- [G<sup>4</sup>] - historical evidence = 0.9 B-25 boxes/machine (includes machine and service module components not disposed in sealed casing); [G<sup>3,4</sup>] = 1 (no factor really needed)
- [H<sup>3</sup>] = **from Table C3.5 Misc. Accumulated Waste in B-25 Boxes, which includes 25% cross-over from unclassified waste disposal process in Column B<sup>1</sup> of this table.**
- [H<sup>4</sup>] = **n**Number of B-25 **b**Boxes = F<sup>4</sup>G<sup>4</sup>; [H<sup>3,4</sup>] = **n**Number of **m**Machine **e**Casings
- [J<sup>3,4</sup>] = B-25 **b**Boxes volume = 960 ft<sup>3</sup> (**including box itself**); [J<sup>2,4</sup>] = **e**Casing attributed volume = 290 ft<sup>3</sup>
- [K<sup>3,4</sup>] = Unit Cost<sup>3,4</sup> = \$43.95~~36.86~~/ft<sup>3</sup> = \$16.79~~35~~/ft<sup>3</sup> (**e**Current DOE **e**Classified **d**Disposal cost **-to NNSS NTS, NV utilizing B-25 boxes as shipping package**) + \$4.86~~40~~/ft<sup>3</sup> (**t**ransportation [2,136 miles one way trip and **b**rokerage **e**Costs) + \$21.51~~15.33~~/ft<sup>3</sup> (**l**abor costs - Handling, Waste Engineering, Radiological NDA Waste Characterization, and HP Support) + \$0.79~~8~~/ft<sup>3</sup> (Radiological Characterization Equipment); [K<sup>2,4</sup>] = Unit Cost<sup>2,4</sup> = \$39.10~~32.59~~/ft<sup>3</sup> = \$16.79~~35~~/ft<sup>3</sup> (**e**Current DOE **e**Classified **d**Disposal cost **-NTS to NNSS, NV utilizing Casings as shipping package**) + \$6.03~~5.11~~/ft<sup>3</sup> (**t**ransportation [2,136 miles one way trip and **b**rokerage **e**Costs) + \$15.49~~0.35~~/ft<sup>3</sup> (**l**abor costs - Handling, Waste Engineering, Radiological NDA Waste Characterization, and HP Support) + \$0.79~~8~~/ft<sup>3</sup> (Radiological Characterization Equipment) [2012~~1~~]
- [M<sup>3</sup>] = H<sup>3</sup>J<sup>3</sup>K<sup>3</sup>; [M<sup>4</sup>] = F<sup>4</sup>G<sup>4</sup>H<sup>4</sup>J<sup>4</sup>K<sup>4</sup>; [M<sup>2</sup>] = F<sup>2</sup>G<sup>2</sup>J<sup>2</sup>K<sup>2</sup>
- B-25 boxes contain volume gaps, which are anticipated to be filled to capacity from associated **miscellaneous** sources
- Classified Waste Disposal Prorated Ratio [only used in computation for contractor profitability] = amount of waste cost that is directly associated with waste disposal and not subject to contractor profit: <sup>43</sup>(**e**Current DOE **d**Disposal cost + **t**ransportation cost<sup>3</sup>) / (**t**Total **e**Classified **w**Waste cost<sup>3</sup>) = 0.49~~56~~; <sup>24</sup>(**e**Current DOE **Classified** **d**Disposal cost + **t**ransportation cost<sup>4</sup>) / (**t**Total **e**Classified **w**Waste **Disposal** cost<sup>4</sup>) = 0.58~~66~~

**Table C3.15 Equipment/Supply Costs**

Equipment/Supplies	[A] Quantity	[B] Unit Cost	[C] Total Equipment/Supply Cost
Centrifuge Dismantling Equipment <sup>1</sup>	4	N/C	-
Cutting Machines <sup>2</sup>	2	\$315,308	\$630,616
Degreasers <sup>3</sup>	2	\$525,514	\$1,050,1028
Decontamination Tanks <sup>4</sup>	3	\$1,576,541	\$4,728,4623
Blast Cabinets <sup>5</sup>	1	\$1,051,027	\$1,051,027
B-25 Containers <sup>6</sup>	294,166	\$1,422,964	\$418,068,160,024
55 gallon Barrels <sup>7</sup>	53	\$90,76	\$450,228
<b>TOTAL</b>			<b>\$425,977,167,546</b>
<b>TOTAL (Rounded, M)</b>			<b>\$0.4317</b>

Note 1: Anticipate using existing specialized tooling and lift fixtures for handling various machine components.

Note 2: Hand-tool metal cutting saws for cutting long parts into manageable sizes.

Note 3: Portable pressure washer for removing residue from the machines.

Note 4: Cost includes tank supports, suction pumps, associated valves and piping.

Note 5: Ad-hoc enclosures to support the degreasers operations.

Note 6: Approved metal containers for storage/shipment of dismantled machine and machine components. Quantity is sum of B-25 containers needed to be procured (i.e., 27 already exist) from Table C3.14 (7449 + 25117 + 195 = 294166).

Note 7: Barrels for the capturing of dismantled machine and machine component fluids from Table C3.14 (53).

**Assumptions:**

- Some of these components currently exist by some means and works in conjunction with Table C3.17.
- The primary option for centrifuge disassembly methodology is utilizing the X-77267 CTTF.
- [C] = AB
- Unit costs increased by Inflation Index = CY2009 (1.10.9%) \* CY2010 (1.20.8%) \* CY2011 (1.50%) \* CY2012 (1.2%); Total Inflation Index (CY12+) = 1.0509272.
- [Reference A] = Past Inflation: GDP Price Index values (2004 – 2010) The Annual Inflation values for 2009 – 2011 (estimates) are from the Bureau of Economic Analysis of the Department of Commerce; Future Inflation projections: Annual Inflation values (2011 – 2012) are from the Congressional Budget Office –GDP Price Index Forecast; The Budget and Economic Outlook – An Update (August 20110).

**Table C3.16 Laboratory Costs**

Phase	Activity	# Workers	# Yr	Routine Freq (Samples/y)	Recall Freq (Samples/y)	Incident Freq (Samples/y)	Sample Factor	Unit Cost (\$)	Total Cost
1	Planning and Preparation	9	0.25 <del>31</del> 4	4	0.2	2	6.2	121 <del>118</del>	\$1,688 <del>2,068</del>
2	Decontamination or Dismantling of Radioactive Facility Components	53 <del>41</del>	0.417 <del>2</del> 31	12	0.6	6	18.6	121 <del>118</del>	\$49,741 <del>20,787</del>
3	Restoration of Contaminated Areas on Facility Grounds	3	0.417 <del>2</del> 97	12	0.6	4	16.6	121 <del>118</del>	\$2,513 <del>1,745</del>
4	Final Radiation Survey	3	0.292 <del>1</del> 98	12	0.6	4	16.6	121 <del>118</del>	\$ 1,760 <del>1,164</del>
5	Site Stabilization and Long-Term Surveillance	0	0.5	4	0.2	2	6.2	121 <del>118</del>	-
<b>TOTALS</b>		<b>68<del>56</del></b>							<b>\$55,702<del>25,764</del></b>
<b>TOTAL (Rounded, M)</b>									<b>\$0.0<del>63</del></b>

**Assumptions:**

- The utilization of the 'On-Site' laboratory facility is anticipated; therefore, there are no associated transportation costs included in the derivation of the Unit Cost.
- Routine Frequency is the anticipated number of samples per individual per year (see Table 4.7-3 of the Lead Cascade License Application).
- Recall Frequency assumes 5% recall rate; Recall = an individual sample submitted when analysis results exceed a predetermined urinalysis program action level (see Table 4.7-3 of the Lead Cascade License Application).
- Incident Frequency assumes 2 samples submitted for each incident; Incident = a special sample submitted for analysis due to an incident (for example, a personnel contamination event or an airborne release of radioactive material event occurs).
- Sample Factor = Routine freq % + Recall % + Incident %; Total Cost = (# workers/phase) \* (# yr) \* Sample Factor \* Unit Cost.
- # samples = (# workers/phase) \* (Routine freq % + Recall % + Incident %) \* # yr.
- Analytical Unit Cost = \$121~~118~~ / sample [Amount based for uranium isotopic analysis by alpha spectrometry and includes analysis performance, laboratory work, as well as Quality Assurance/Quality Control labor, and cost of materials plus overheads] (\$CY12~~1~~).

**Table C3.17 Miscellaneous Costs**

**Other Direct Costs**

Cost Item	Total Cost
Miscellaneous Material for DeCon <sup>1</sup>	\$140,000
<b>Total</b>	<b>\$140,000</b>
<b>Total (Rounded, M)</b>	<b>\$0.14</b>

Note 1: Estimate based upon percentage of Decommissioning Cost subtotal (1.5% \* Total Other Indirect Costs [Table C3.18 = Indirect Services + Packaging/Shipping & Waste Disposal + Equipment + Laboratory + Other Direct + Other Indirect Costs]) (values from Table C3-18); [0.015 \* (Total Other Indirect costs); factor then rounded].

**Other Indirect Costs**

Cost Item	Total Cost
NRC Staff Review and Approval DP <sup>2</sup>	<del>\$84,392</del> 82,200
NRC Fees <sup>3</sup>	<del>\$612,500</del> 526,500
DOE Lease	\$516,990 <del>1</del>
Business Insurance	-
Taxes <sup>4</sup>	<del>\$29,818</del> 11,728
<b>Total</b>	<b><del>\$1,243,700</del>1,137,419</b>
<b>Total (Rounded, M)</b>	<b>\$1.2414</b>

Note 2: Estimate based upon review and approval for Decommissioning Plan (DP). Inflation Index = CY2009 (1.10.9%) \* CY2010 (1.20.8%) \* CY2011 (1.50%) \* CY2012 (1.2%) [See Reference A in Table C3.15].

Note 3: Estimate based upon 6 months of NRC Annual Operational Fees for plant.

Note 4: Estimate based upon procured items [Total Table C3.15 \* 7% tax rate].

**Table C3.18 Total Decommissioning Costs**

Ref	Task	Calculated Costs (\$2012 <del>1</del> , M)	Approximate Percentage
D3.13	Planning and Preparation	\$0.34 <del>3</del>	4 <del>5</del> %
D3.13	Decontamination or Dismantling of Radioactive Facility Components	\$1.75 <del>13</del>	19 <del>7</del> %
D3.13	Restoration of Contaminated Areas of Facility Grounds	\$0.108	1%
D3.13	Final Radiation Survey	\$0.09 <del>8</del>	1 <del>2</del> %
D3.13	Site Stabilization and Long-Term Surveillance	<del>\$0</del>	0%
	Indirect Services	\$1.22 <del>1.60</del>	13 <del>24</del> %
C3.14	Packing, Shipping, and Waste Disposal Costs	\$3.91 <del>1.86</del>	42 <del>28</del> %
C3.15	Equipment/Supply Costs	\$0.43 <del>17</del>	4 <del>3</del> %
C3.16	Laboratory Costs	\$0.06 <del>3</del>	1%
C3.17	Other Direct Costs	\$0.14	2%
C3.17	Other Indirect Costs	\$1.24 <del>14</del>	13 <del>7</del> %
	<b>Subtotal<sup>1</sup></b>	<b>\$9.27<del>6.56</del></b>	<b>100%</b>
	<b>General &amp; Administrative<sup>2</sup></b>	<b>\$0.69<del>39</del></b>	
	<b>Contractor Profit<sup>3</sup></b>	<b>\$0.97<del>69</del></b>	
	<b>Contingency<sup>4</sup></b>	<b>\$2.73<del>1.91</del></b>	
	<b>Total Decommissioning Cost Estimate</b>	<b>\$13.66<del>9.55</del></b>	

Note 1: Subtotal includes labor/materials/overhead allocations costs.

Note 2: General & Administrative (G&A) cost assumed to be 6~~7.5~~% based upon current company's experience.

Note 3: Contractor Profit assumed to be 15% on the subtotal plus G&A minus Other Indirect Costs [excluding insurance] minus the outside services portion of the Packaging, Shipping, and Waste Disposal Costs (15% \* [9.27~~6.56~~ + 0.69~~39~~ - 1.24~~14~~ - 2.23~~1.20~~] = \$0.97~~69~~M).

Note 4: Contingency assumed to be 25% on subtotal plus G&A and contractor profit.

**Table C3.19 Total Labor Distribution**

Group	Type	Job/Personnel/Benchmark Descriptions
Supervision	Exempt	Project Manager
Engineering	Exempt	Design Engineer, <del>Systems Engineer (Systems)</del> , Nuclear Engineer, <del>Nuclear Safety Engineer</del> , Engineer (Regulatory)
Operations	Exempt	Production Supervisor
	Non- Exempt	Hazardous Materials Technician
Maintenance	Exempt	Maintenance Supervisor, Scheduler/ <del>-Planner</del>
	Non- Exempt	Mechanic, Groundskeeper ( <del>laborer</del> )
Support	Exempt	Health Physics (HP) Supervisor, <del>HP/Industrial Hygiene</del> , Engineer (Waste)
	Non- Exempt	HP Technician, Security Officers – Armed, Research Technician, Hazardous Materials Technician

**Enclosure 5 to AET 12-0037**

**Draft Financial Assurance Instruments**

**Information contained within  
does not contain  
Export Controlled Information**

**Reviewer: R.S. Lykowski**

**Date: 06/26/2012**

R I D E R

To be attached to and form part of:

Bond Number K07228582  
dated 4/25/2006  
issued by the WESTCHESTER FIRE INSURANCE COMPANY  
in the amount of \$9,550,000.00  
on behalf of USEC Inc.  
(Principal)  
and in favor of U.S. NUCLEAR REGULATORY COMMISSION  
(Obligee)

Now therefore, it is agreed that in consideration of the premium charged, the attached bond shall be amended as follows:

**The bond amount shall be increased as follows:**  
**FROM: \$9,550,000.00**  
**TO: \$13,660,000.00**

It is further understood and agreed that all other terms and conditions of this bond shall remain unchanged.

This Rider is to be Effective this \_\_\_\_\_ day of \_\_\_\_\_, 2011.

Signed, Sealed & Dated this \_\_\_\_\_ day of \_\_\_\_\_, 2011.

USEC Inc.

By: \_\_\_\_\_  
(Principal)

WESTCHESTER FIRE INSURANCE COMPANY  
(Surety)

By: \_\_\_\_\_  
K.D. Conrad, Attorney-in-Fact

**STANDBY TRUST AGREEMENT SCHEDULES**

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**Schedule A**

This Agreement demonstrates financial assurance for the following cost estimates or certification amounts for the following licensed activities:

<b>U.S. NUCLEAR REGULATORY COMMISSION LICENSE NUMBER(S)</b>	<b><u>NAME AND ADDRESS OF LICENSEE</u></b>	<b><u>ADDRESS OF LICENSED ACTIVITY</u></b>	<b><u>COST ESTIMATES FOR REGULATORY ASSURANCES DEMONSTRATED BY THIS AGREEMENT</u></b>
SNM-7003	USEC Inc. 6903 Rockledge Drive, Suite 400 Bethesda, MD 20817	American Centrifuge Lead Cascade Facility 3930 U.S. Route 23 South P.O. Box 628 Piketon, OH 45661-0628	\$13,660,000.00

The cost estimates listed here were last adjusted on July 17, 2012 and submitted for NRC approval.

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**Schedule B**

DOLLAR AMOUNT: \$13,660,000.00

AS EVIDENCED BY: Payment surety bond number K07228582 dated April 25, 2006 by Westchester Fire Insurance Company, as filed with NRC.

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**Schedule C**

**TRUSTEE:**

U.S. Bank National Association  
c/o Melody M. Scott, Assistant Vice President and Account Manager  
U. S. Bank Corporate Trust Services  
Two James Center  
1021 E. Cary Street, 18th Floor  
Richmond, VA 23219  
Phone: (804) 343-1560  
Fax: (804) 343-1572  
Email: melody.scott@usbank.com

Trustee's fees shall be \$1,500.00 plus expenses, which are not to exceed 10% of the annual fee, per year. These fees are subject to change upon funding of the trust.

**Enclosure 7 to AET 12-0037**

**Affidavit**

**Information contained within  
does not contain  
Export Controlled Information**

**Reviewer: R.S. Lykowski  
Date: 06/26/2012**

**AFFIDAVIT OF PETER J. MINER  
SUPPORTING APPLICATION TO WITHHOLD FROM  
PUBLIC DISCLOSURE CERTAIN INFORMATION CONTAINED  
IN ENCLOSURES 3 AND 4 OF AET 12-0037 FOR THE  
AMERICAN CENTRIFUGE LEAD CASCADE FACILITY**

I, Peter J. Miner, of USEC Inc. (USEC), having been duly sworn, do hereby affirm and state:

1. I have been authorized by USEC to (a) review the information owned by USEC and is referenced herein relating to the worker unit cost and total labor costs as part of the decommissioning cost estimate for the American Centrifuge Lead Cascade Facility (Lead Cascade), which USEC seeks to have withheld from public disclosure pursuant to section 147 of the *Atomic Energy Act* (AEA), as amended, 42 U.S.C § 2167, and 10 CFR 2.390(a)(4), and 9.17(a)(4), apply for the withholding of such information from public disclosure by the U.S. Nuclear Regulatory Commission (NRC) on behalf of USEC.
2. Consistent with the provisions of 10 CFR 2.390(b)(4) of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
  - i. The information sought to be withheld from public disclosure is owned and has been held in confidence by USEC.
  - ii. The information is of a type customarily held in confidence by USEC and not customarily disclosed to the public. USEC has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitute USEC policy and provide the rational basis required. Under that system, information is held in confidence if it falls in one or more

of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

- a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where presentation of its use by any of USEC's competitors without license from USEC constitutes a competitive economic advantage over other companies.
  - b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage (e.g., by optimization or improved marketability).
  - c) Its use by a competitor would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.
  - d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of USEC, its customers or suppliers.
  - e) It reveals aspects of past, present, or future USEC or customer funded development plans and programs of potential commercial value to USEC.
  - f) It contains patentable ideas, for which patent protection may be desirable.
  - g) It reveals information concerning the terms and conditions, work performed, administration, performance under or extension of contracts with its customers or suppliers.
- iii. There are sound policy reasons behind the USEC system which include the following:
- a) The use of such information by USEC gives USEC a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the USEC competitive position.

- b) It is information, which is marketable in many ways. The extent to which such information is available to competitors diminishes USEC's ability to sell products and services involving the use of the information.
  - c) Use by our competitors would put USEC at a competitive disadvantage by reducing their expenditure of resources at USEC expense.
  - d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components or proprietary information, any one component may be the key to the entire puzzle, thereby depriving USEC of a competitive advantage.
  - e) Unrestricted disclosure would jeopardize the position of prominence of USEC in the world market, and thereby give a market advantage to the competition of those countries.
  - f) The USEC capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.
- iv. The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.
- v. The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.
3. The proprietary information sought to be withheld is contained in Enclosures 3 and 4 to USEC letter AET 12-0037. Enclosure 3 contains USEC's decommissioning worker unit cost and total labor costs captured in Appendix D of the Decommissioning Funding Plan for the Lead Cascade. Enclosure 4 contains USEC's in-depth calculations related to the annual labor by classification and staffing estimated in phased man-days as used in the development of the Decommissioning

Cost Estimate for the Lead Cascade. The information contained within Enclosures 3 and 4 have not been previously disclosed and is likely to cause substantial harm to the competitive position of USEC because it contains details of our labor rates which may provide insights into USEC's forward pricing rates.

This information is part of that which will enable USEC to:

- Continue to deploy the Lead Cascade; and
- Ensure adequate funding is available for decommissioning activities for the Lead Cascade.

Further, this information has substantial commercial value as follows:

- The development of the information described in part is the result of applying many person-hours and expenditure of thousands of dollars on analysis to develop the information which is sought to be withheld; and
- In order for a competitor of USEC to duplicate this information sought to be withheld, a similar process would have to be undertaken and a significant effort and resources would have to be expended.

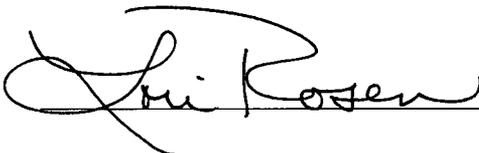
Further the deponent sayeth not.

Peter J. Miner, having been duly sworn, hereby confirms that I am the Director, Regulatory and Quality Assurance of USEC, that I am authorized on behalf of USEC to review the information attached hereto and to sign and file with the U.S. Nuclear Regulatory Commission this affidavit and the attachments hereto, and that the statements made and matters set forth herein are true and correct to the best of my knowledge, information, and belief.

  
\_\_\_\_\_  
Peter J. Miner

State of Ohio     )  
                                  ) ss.  
County of Pike    )

On this 17<sup>th</sup> day of July 2012, the individual signing above personally appeared before me, is known by me to be the person whose name is subscribed to within the instrument, and acknowledged that he executed the same for the purposes therein contained. In witness hereof I hereunto set my hand and official seal.

  
\_\_\_\_\_

Lori Rosen, Notary Public  
My commission expires March 9, 2013



LORI ROSEN  
NOTARY PUBLIC, STATE OF OHIO  
MY COMMISSION EXPIRES 03/09/2013