USEC
A Global Energy Company

November 30, 2005
AET 05-0095

Mr. Jack R. Strosnider
Director, Office of Nuclear Material Safety and Safeguards
Attention: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

American Centrifuge Plant
Docket Number 70-7004
Submittal of Additional Information Regarding Decommissioning Funding for the American Centrifuge Plant (TAC Nos. L32306, L32307, and L320308)

Dear Mr. Strosnider:

Pursuant to Reference 1, USEC Inc. (USEC) hereby submits to the U.S. Nuclear Regulatory Commission (NRC) additional information related to decommissioning funding for the American Centrifuge Plant. This additional information was verbally requested by Mr. Yawar Faraz of your staff on November 10, 2005.

Enclosure 1 provides clarifying information related to the decommissioning funding exemption. Enclosure 2 provides changed pages for the License Application and Decommissioning Funding Plan. Revision bars in the right hand margin depict changes from the previous version submitted to the NRC.

If you have any questions regarding this matter, please contact Peter J. Miner at (301) 564-3470.

Sincerely,

S. A. Toelle

Steven A. Toelle
Director, Nuclear Regulatory Affairs

cc: Y. Faraz, NRC HQ
B. Smith, NRC HQ

Enclosures: As Stated

Reference:

1. Telephone Summary from Yawar Faraz to Brian Smith regarding decommissioning funding exemption, dated November 10, 2005.

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NMSS01

Enclosure 1 of AET 05-0095

Additional Response

(Non-Proprietary Information)

1. NRC has requested USEC to remove from the decommissioning funding exemption request, the cost of decommissioning the facility as the exemption should only account for the cost of dismantling/disposing those centrifuges that are to be installed and for dispositioning the amount of tails that is to be generated. It would be reasonable to incrementally make prior funding arrangements on an annual basis for the number of centrifuges that are conservatively anticipated to be installed and operated and the amount of tails that is conservatively anticipated to be generated.

   NRC indicated that in addition to clarifying the exemption request, USEC should modify the decommissioning funding plan by providing a decommissioning cost estimate for the first year of operation. This would include the cost of decommissioning the facility plus the cost of decommissioning a conservatively estimated number of centrifuges to be installed during the first year plus the cost of dispositioning a conservatively estimated amount of tails to be generated during the first year of operation. NRC further requested that, on at least an annual basis, USEC should commit to providing such advance information to the NRC with sufficient lead times to allow the NRC to review the estimates.

<u>USEC Response</u>

USEC Inc. (USEC) has revised the decommissioning funding exemption to include the incremental cost of decommissioning the centrifuges and dispositioning of tails. Full funding for decommissioning of the facilities will be provided in the initial executed financial assurance instrument.

The decommissioning cost estimate for the first year of operation is $168.5 million. This estimate includes the total cost of decommissioning the facilities, to include total labor and material costs for facility decontamination, as well as the following costs for the first year of operation: the incremental cost of dismantling/disposing of installed centrifuge machines, the incremental cost of dispositioning the amount of tails that has been generated and the appropriate contingencies. Table C3.18A (of the Decommissioning Funding Plan) depicts the total incremental decommissioning costs by calendar year. Table C3.19A (of the Decommissioning Funding Plan) depicts the estimated incremental machine disposal costs by calendar year. There is a difference in the total number of machines used within the calculations (i.e., Table C3.19 uses 11,520 machines and Table C3.19A uses 12,000 machines). The 11,520 is the number of machines installed and available to produce Tails material. The 12,000 machines is the total anticipated number of machines (11,520 plus spares) needing to be disposed. These two new tables (C3.18A and C3.19A) have been added to Appendix C of the Decommissioning Funding Plan.

USEC commits to update the cost estimates and provide a revised funding instrument for decommissioning annually, prior to operation at full capacity, and after full capacity has been reached to annually adjust the cost estimate for UF_6 tails disposition and to adjust all other decommissioning costs periodically, and no less frequently than every three years. The updated cost estimate will be submitted to the U.S. Nuclear Regulatory Commission (NRC) by October 31st of each year. The revised financial assurance instrument to cover the updated cost estimate will be submitted to the NRC no later than 30 days following NRC acceptance of the updated cost estimate.

Chapters 1.0 and 10.0 of the license application and the Decommissioning Funding Plan have been revised appropriately. Changed pages for the license application and the Decommissioning Funding Plan are provided in Enclosure 2 of this letter.

Enclosure 2 of AET 05-0095

Changed Pages for the License Application and Supporting Documents

(Non-Proprietary Information)

Enclosure 1 of AET 05-0095
Remove and Insert Instructions

Remove (and properly destroy)	Insert
LA-3605-0001, License Application for the American Centrifuge Plant	
Cover Page – Revision 11	Cover Page – Revision 12
Inside Cover Page – Revision 11	Inside Cover Page – Revision 12
ULOEP-1 through ULOEP-4	ULOEP-1 through ULOEP-4
Chapter 1.0 – pages 1-51 through 1-54	Chapter 1.0 – pages 1-51 through 1-54
Chapter 10.0 – pages 10-13/10-14 and 10-17 through 10-20	Chapter 10.0 – pages 10-13/10-14 and 10-17 through 10-20
NR-3605-0006, Decommissioning Funding Plan for the American Centrifuge Plant	
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Appendix C: C-21 through C-22	Appendix C: C-21 through C-24

LA-3605-0001

License Application

for the American Centrifuge Plant

in Piketon, Ohio

The American Centrifuge™

USEC's Advanced Uranium Enrichment Technology

Revision 12

Docket No. 70-7004

November 2005

Information contained within
does not contain
Export Controlled Information

Reviewer: D. Hupp
Date: 11/22/05

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LA-3605-0001

LICENSE APPLICATION

for the American Centrifuge Plant in Piketon, Ohio

Docket No. 70-7004

Revision 12

Information contained within does not contain Export Controlled Information

Reviewer: D. Hupp
Date: 11/22/05

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UPDATED LIST OF EFFECTIVE PAGES

Revision 0 – 10 CFR 1045 review completed by L. Sparks on 07/29/04 and the Export Controlled Information review completed by R. Coriell on 07/30/04.

Revision 1 – 10 CFR 1045 review completed by L. Sparks on 03/04/05 and the Export Controlled Information review completed by R. Coriell on 03/10/05.

Revision 2 – 10 CFR 1045 review completed by J. Weidner on 04/29/05 and the Export Controlled Information review completed by R. Coriell on 04/29/05.

Revision 3 – 10 CFR 1045 review completed by J. Weidner on 05/23/05 and the Export Controlled Information review completed by R. Coriell on 05/23/05.

Revision 4 – 10 CFR 1045 review completed by R. Coriell on 06/16/05 and the Export Controlled Information review completed by D. Hupp on 06/16/05.

Revision 5 – 10 CFR 1045 review completed by J. Weidner on 06/21/05 and the Export Controlled Information review completed by D. Hupp on 06/21/05.

Revision 6 – 10 CFR 1045 review completed by J. Weidner on 08/30/05 and the Export Controlled Information review completed by D. Hupp on 08/30/05.

Revision 7 – 10 CFR 1045 review completed by J. Weidner on 09/02/05 and the Export Controlled Information review completed by R. Coriell on 09/02/05.

Revision 8 – 10 CFR 1045 review completed by J. Weidner on 09/27/05 and the Export Controlled Information review completed by D. Hupp on 09/13/05.

Revision 9 – 10 CFR 1045 review completed by J. Weidner on 10/05/05 and the Export Controlled Information review completed by D. Hupp on 10/05/05.

Revision 10 – 10 CFR 1045 review completed by J. Weidner on 11/04/05 and the Export Controlled Information review completed by D. Hupp on 11/04/05.

Revision 11 – 10 CFR 1045 review completed by J. Weidner on 11/17/05 and the Export Controlled Information review completed by D. Hupp on 11/14/05.

Revision 12 – 10 CFR 1045 review completed by J. Weidner on 11/28/05 and the Export Controlled Information review completed by D. Hupp on 11/22/05.

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1.2.3 Type, Quantity, and Form of Licensed Material

The type, quantity, and form of NRC-regulated special nuclear, source, and by-product material are shown in Table 1.2-1.

1.2.4 Authorized Uses

The ACP enriches UF_6 up to 10 wt. percent ^{235}U. The specific authorized uses for each class of NRC-regulated material are shown in Table 1.2-2.

USEC will provide a minimum 60-day notice to the NRC prior to initial customer product withdrawal of licensed material exceeding 5 wt. percent ^{235}U enrichment. This notice will identify the necessary equipment and operational changes to support customer product withdrawal, storage, processing, and shipment for these assays.

1.2.5 Special Exemptions or Special Authorizations

The following exemption to the applicable 10 CFR Part 20 requirements are identified in Section 4.8 of this license application:

- UF_6 feed, product, and depleted uranium cylinders, which are routinely transported inside the DOE reservation boundary between ACP locations and/or storage areas at the ACP, are readily identifiable due to their size and unique construction, and are not routinely labeled as radioactive material. Qualified radiological workers attend UF_6 cylinders during movement.

- Containers located in Restricted Areas within the ACP are exempt from container labeling requirements of 10 CFR 20.1904, as it is deemed impractical to label each and every container. In such areas, one sign stating that every container may contain radioactive material will be posted. By procedure, when containers are to be removed from contaminated or potentially contaminated areas, a survey is performed to ensure that contamination is not spread around the reservation.

- In lieu of the requirements of 10 CFR 20.1601(a), each High Radiation Area with a radiation reading greater than 0.1 roentgen equivalent man per hour (rem/hour) at 30-centimeters (cm) but less than 1 rem/hour at 30 cm is posted Caution, High Radiation Area and entrance into the area shall be controlled by an RWP. Physical and administrative controls to prevent inadvertent or unauthorized access to High and Very High Radiation Areas are maintained.

The on-site radiological impacts from the proposed exemptions to the requirements of 10 CFR 20.1904 and 20.1601 would be minimal and are consistent with previously approved exemptions found in the GDP certification. Moreover, pursuant to the regulations in 10 CFR 20.2301, the requested exemption is authorized by law and would not result in undue hazard to life or property.

The following exemption from the applicable 10 CFR 70.50 reporting requirement is identified in Section 11.6.3 of this license application:

- The 10 CFR 70.50(c)(2) reporting criteria require that the ACP submit a written follow-up report within 30 days of the initial report required by 10 CFR 70.50 (a) or (b) or by 10 CFR 70.74 and Appendix A of Part 70. In lieu of the 30-day requirement described in 10 CFR 70.50(c)(2), NRC approval to submit the required written reports within 60 days of the initial notifications is hereby requested.

  10 CFR 70.17 allows the Commission, upon application of any interested person or upon its own initiative, to grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. The requested exemption is authorized by law because there is no statutory prohibition on extending the reporting period to 60 days.

  Furthermore, granting this exemption request will not endanger life or property or the common defense and security, in that the exemption request does not relieve the ACP from other requirements contained in 10 CFR 70.50 (a) or (b) or by 10 CFR 70.74 and Appendix A of Part 70, such as 1-hour, 4-hour, and 24-hour reporting requirements for defined events.

  The proposed exemption would result only in written reports being submitted within the time limit currently allowed under 10 CFR 50.73 for commercial nuclear power plants. It would be consistent with the exemption granted to the gaseous diffusion plants for reporting of events pursuant to 10 CFR 76.120(d)(2) (67 Federal Register 68699, November 12, 2002) and the exemption granted to the Lead Cascade during licensing.

  This proposal allows for completion of required root cause analyses after event discovery and fewer supplemental reports, thereby reducing regulatory burden and confusion. Thus, it is clearly consistent with the public interest.

  USEC notes that the requirements of 10 CFR 20.2201 and 20.2203 require written reports of certain events within 30 days after their occurrence. USEC is not requesting an exemption from these reporting requirements.

The following exemption from the requirements of 10 CFR 70.25(e) addressing the decommissioning funding requirements is identified in Section 10.10.4 and the Decommissioning Funding Plan (DFP) of this license application:

- 10 CFR 70.25(e) requires, in part, that "The decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning...". As noted in Section 10.10.4 of this license application, the financial assurance for a portion of the decommissioning costs, to include the disposition of centrifuge

machines and UF_6 tails, which constitutes a major portion of the decommissioning liability, will be provided incrementally as centrifuges are installed, operated on process gas, and UF_6 tails generated. Full funding for decommissioning of the facilities will be provided in the initial executed financial assurance instrument.

This exemption is justified for the following reasons: 1) It is authorized by law because there is no statutory prohibition on incremental funding of decommissioning costs. 2) The requested exemption will not endanger life or property or the common defense and security for the following reasons: the unique modular aspects of the American Centrifuge technology allow enrichment operations to begin well before the full capacity of the plant is reached. Thus, the decommissioning liability for centrifuge machines and UF_6 tails is incurred incrementally as more centrifuge machines are added to the process, until full capacity of the facility is reached; at which point the UF_6 tails are generated at a relatively constant rate throughout the life of the plant. As such, requiring full funding for decommissioning liability, to include centrifuge machines and UF_6 tails disposition, incurred over the lifetime of the plant, at the time of initial license issuance, produces an unnecessary financial burden on the licensee.

Furthermore, incremental funding of decommissioning costs, to include centrifuge machines and UF_6 tails disposition, is justified based upon USEC's commitments to update the cost estimates and provide a revised funding instrument for decommissioning annually, prior to operation at full capacity, and after full capacity has been reached to annually adjust the cost estimate for UF_6 tails disposition and to adjust all other decommissioning costs periodically, and no less frequently than every three years. In addition, the relative stability of the factors, which are utilized to generate the UF_6 tails volumes, allows actual inventory values to be provided for prior periods of operation and reliable estimates for the upcoming periods of operation. The NRC has previously accepted an incremental approach to decommissioning funding costs for the United States Enrichment Corporation's operation of the GDPs. 3) Finally, granting this exemption is in the public interest for the same reasons as stated above and will facilitate deployment of gas centrifuge enrichment technology by eliminating an unnecessary financial burden on the licensee.

The following exemption from the requirements of 10 CFR 70.24 addressing criticality monitoring is identified in Section 3.10.6 of the ISA Summary and discussed in Section 5.4.4 of this License Application. Exemption is required for criticality monitoring of the UF_6 cylinder storage yards.

- 10 CFR 70.24, *Criticality Accident Requirements*, requires that licensees authorized to possess special nuclear material in a quantity exceeding 700 g of contained ^{235}U shall maintain in each area in which such licensed special nuclear material is handled, used, or stored, a monitoring system capable of detecting a criticality that produces an absorbed dose in soft tissue of 20 rads of combined neutron and gamma radiation at an unshielded distance of two meters from the reacting material within one minute.

10 CFR 70.17 allows the Commission, upon application of any interested person or upon its own initiative, to grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. The requested exemptions are authorized by law because there is no statutory provision prohibiting the grant of the exemption. The requested exemptions will not endanger life or property or the common defense and security and is otherwise in the public interest for the reasons discussed below.

Transportation, handling and storage of solid UF_6 filled cylinders are doubly contingent. Double contingency is established by multiple controls that limit the likelihood for a solid product cylinder to be breached during transportation, handling or storage, and the likelihood for a breach to not be identified and repaired before sufficient moderation results in a criticality. Moderation control of UF_6 filled cylinders is maintained by ensuring cylinder integrity through periodic cylinder inspections. If a UF_6 filled cylinder is found to be breached, the cylinder is covered within 24-hours after discovery to reduce the potential accumulation of moderating material, i.e., rainwater. This time limit ensures a corresponding heavy rainfall will not result in accumulation of sufficient amounts of water to cause a criticality. Damaged cylinders are repaired as necessary and emptied. UF_6 cylinders are uniquely identified and their design requirements are controlled to further ensure cylinder integrity and reliability (i.e., UF_6 cylinders are QL-1 components and are controlled in accordance with the Quality Assurance Program Description); and USEC implements onsite cylinder handling practices (i.e., requiring the use of approved equipment in accordance with approved procedures), which reduces the likelihood that a solid UF_6 cylinder would be breached. These requirements are established as items relied on for safety to ensure the health and safety of the public and workers.

The UF_6 cylinders stored in storage yards are not covered by a criticality monitoring system unless those cylinders contain licensed material greater than 5.0 weight percent ^{235}U. NCS evaluation of product cylinders of any size, configured in infinite planar arrays, containing material enriched up to 5.25 weight percent ^{235}U, has concluded that subcritical conditions are maintained. The ACP ISA has concluded that cylinders containing licensed material less than or equal to 5.0 weight percent ^{235}U cannot be involved in a criticality accident sequence that has a probability of occurrence that exceeds 5×10^{-6}/year.

The frequency of criticality events in the cylinder yards have been decreased to the Highly Unlikely range ($<10^{-5}$/year) through the establishment of preventive controls established by the ISA in accordance 10 CFR 70.62. Considering the conservatism of the ISA methodology in developing the unmitigated frequency and actual historical data related to cylinder operations, the frequency values could be reduced further. This additional reduction considers the fact that during 50 years of GDP operations, only one cylinder breach has occurred due to

- Dismantling area
- Cutting machines
- Dismantling boxes and tanks (e.g., B-25 boxes)
- Degreasers
- Citric acid and demineralized water baths
- Contamination monitors
- Wet blast cabinets
- Crushers or size reduction equipment
- Shredding equipment
- Scrubbing facility

There is no normal operational need for the ACP to have a decontamination facility readily available.

10.8.2 Procedures

Procedures for decontamination will be developed and approved by plant management to minimize worker exposure and waste volumes, and to assure work is carried out in a safe manner. At the end of useful plant life, some of the equipment, most of the buildings, and the outdoor areas should already be acceptable for release for unrestricted use in accordance with 10 CFR 20.1402. If these areas were inadvertently contaminated during ACP operation, they would likely be cleaned up when the contamination is discovered. This limits the scope of necessary decontamination at the time of decommissioning.

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;
- Degreasing of items, as required; and

- Destruction of classified parts by shredding, crushing, burial, etc.

10.8.3 Results

Recoverable items will be externally decontaminated and suitable for reuse except for a very small amount of internally contaminated items where recovery and reuse is not feasible. There is potentially a small amount of salvageable scrap material. Material requiring disposal will be process piping, trash, and residue from the effluent treatment systems. No problems are anticipated which will prevent the facilities from being released for unrestricted use.

10.9 Agreements with Outside Organizations

The decommissioning activities described herein and in the DFP provide for decontamination of the ACP for unrestricted use. As such, no agreements with outside organizations are required for control of access to the plant following shutdown and decommissioning.

10.10 Arrangements for Funding

This section provides a general estimate of plant decommissioning costs and UF_6 tails disposition costs, as well as explains the arrangements made to assure funding is available to cover these costs. A more detailed description of these costs and the financial assurance mechanism is provided in the DFP.

10.10.1 Plant Decommissioning Costs

Table 10.10-1, provides a summary of the cost estimates of the major decommissioning activities described in Section 10.2. Costs are provided in 2004 dollars with a 25 percent contingency factor added based on the NRC guidance (Reference 4). As noted below, the total estimated cost to decommission the 3.5 million SWU ACP, excluding UF_6 tails disposition, is $261.3 million. Since costs will likely change between the time of license issuance and actual decommissioning, USEC will adjust the cost estimate annually prior to operation of the facility at full capacity, and after full capacity is reached, no less frequently than every three years consistent with the requirements of 10 CFR 70.25(e) and recent NRC changes to financial assurance requirements for materials licensees (Reference 8). 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);

liquid waste from the centrifuge internals and 1,730,000 cubic feet of classified waste in non-reusable packaging.

Equipment and Supply: $15 million

This includes the purchase or lease of dismantling, cutting, degreasing, and crushing equipment; decontamination tanks, wet blast cabinets, and over 20,000 containers (B-25 boxes and 55 gallon drums).

Laboratory: $1.3 million

This includes labor costs for sampling, transport, testing, and analysis of samples.

Indirect Services: $33.6 million

This includes support services (such as laundry, janitorial, etc) and infrastructure costs (such as water, power, etc) not included in other tasks.

Miscellaneous: $27.6 million

This includes direct costs of $2.5 million for miscellaneous material for decommissioning and $25.1 million for indirect costs, such as NRC review fees for the submitted DP, license fees, DOE lease fees, business insurance, and taxes.

Subtotal	**$174.5 million**
General and Administrative (6 percent)	**$10.4 million**
Contractor Profit (15 percent)[4]	**$24.0 million**
Contingency (25 percent)	**$52.2 million**
Total Plant Decommissioning Cost Estimate	**$261.3 million**

[4] Contractor Profit = 0.15[(Subtotal + General and Administrative) - (NRC Review Fees + License Fees + DOE Lease Fees)]

10.10.2 UF_6 Tails Disposition Costs

Cost estimates to dispose of UF_6 tails generated during ACP operation are separate from the cost estimates to decommission the plant. As noted previously, the ultimate disposal of UF_6 tails remains to be determined. USEC intends to evaluate possible commercial uses of UF_6 tails before having the tails processed by the DOE UF_6 conversion facility in Piketon, Ohio. UF_6 tails are stored in steel cylinders until they can be processed in accordance with the disposal strategy established by USEC. Depending on technological developments and the existence of facilities available prior to ACP shutdown, the tails may have commercial value and may be marketable for further enrichment or other processes. However, for the purposes of calculating the UF_6 tails disposition cost, USEC assumes that the total quantity of tails generated during ACP operation are processed by the DOE UF_6 conversion facility in Piketon, Ohio.

For conservatism, USEC provides financial assurance to fund the estimated cost of conversion and disposal of the depleted uranium inventory as it is generated during ACP operation. This funding is described in the DFP and is in addition to the funding requirements for decommissioning the ACP. As with plant decommissioning, the cost estimate will likely change between the time of license issuance and actual decommissioning. USEC commits to adjust the cost estimate for tails disposal annually. The method for adjusting the cost estimate will consider the same factors as previously described in Section 10.10.1 of this chapter.

At full capacity, the ACP will generate approximately 9,520 MT of UF_6 tails annually. As with other decommissioning costs, the disposal cost estimate for UF_6 tails disposal is provided in 2004 dollars. In view of the commitment to annually adjust tails disposal cost estimates, the ability to know with certainty the tails inventory from prior years of ACP operation, and USEC's demonstrated ability to accurately and conservatively predict anticipated tails generation one year ahead of time, a 10 percent contingency factor is applied to the tails disposal cost estimate. This contingency factor is consistent with that used for tails generated from the United States Enrichment Corporation's GDP operations. The total estimated cost to dispose of UF_6 tails over the 30-year license, including a four-year ramp up to full capacity and the 10 percent contingency factor, is $953.0 million. The basis for this estimate is provided in the DFP.

10.10.3 Total Decommissioning Liability

USEC's total decommissioning liability is the sum of the total plant decommissioning costs and the tails disposition costs. USEC's total liability for decommissioning the ACP, including applicable contingencies, is:

Plant Decommissioning Cost	$ 261.3 million
UF_6 Tails Disposition Cost	$ 953.0 million
Total Decommissioning Liability	$1,214.4 million

10.10.4 Funding Arrangements

Per the exemption request in Section 1.2.5 of this license application, the financial assurance for a portion of the decommissioning costs to include disposition of centrifuge machines and UF_6 tails will be provided incrementally as centrifuges are installed, operated on process gas, and UF_6 tails generated. The modular aspect of the American Centrifuge technology allows enrichment operations to begin well before the full capacity of the plant is reached. Thus, the decommissioning liability for centrifuge machines and UF_6 tails is incurred incrementally as more centrifuge machines, and associated equipment, are added to the process, until such time as full capacity of the facility (i.e., 3.5 million SWU) is achieved. Once full capacity of the facility is achieved, the UF_6 tails are generated at a relatively constant rate throughout the life of the plant.

Full funding for decommissioning of the facilities will be provided in the initial executed financial assurance instrument. To ensure adequate financial assurance is in place as centrifuge machines, and associated equipment, are added to the process and placed into operation, USEC will update the cost estimates and provide a revised funding instrument to NRC annually prior to operation at full capacity. Once full capacity of the facility is achieved, USEC will annually adjust the cost estimate for UF_6 tails disposal and all other decommissioning costs will be adjusted periodically, and no less frequently than every three years. In this way, financial assurance will be made available as the decommissioning liability is incurred. This exemption is justified based on the unique modularity aspects of centrifuge technology that allow enrichment operations to begin well before the full capacity of the plant is reached. In addition, the NRC has accepted an incremental approach to funding disposal cost of tails for the GDPs. Financial assurance will be provided in the form of a surety method or other guarantee method as required by 10 CFR 70.25(f). The selected guarantee method is 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.

10.11 References

1. NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility,* March 2002

2. NUREG-1757, Consolidated NMSS Decommissioning Guidance, Volume 1, Revision 1, *Decommissioning Process for Materials Licensees,* Final Report, September 2003.

3. NUREG-1757, Consolidated NMSS Decommissioning Guidance, Volume 2, *Characterization, Survey, and Determination of Regulation Criteria,* Final Report, September 2003

4. NUREG-1757, Consolidated NMSS Decommissioning Guidance, Volume 3, *Financial Assurance, Recordkeeping, and Timeliness,* Final Report, September 2003

5. NR-3605-0004, Security Program for the American Centrifuge Plant, Revision 0

6. NR-3605-0005, Fundamental Nuclear Material Control Plan for the American Centrifuge Plant, Revision 0

7. NR-3605-0006, Decommissioning Funding Plan for the American Centrifuge Plant, Revision 0

8. Federal Register, Volume 68 Number 192, *Financial Assurance for Materials Licensees,* Final Rule, October 3, 2003

NR-3605-0006

Decommissioning Funding Plan

for the American Centrifuge Plant

in Piketon, Ohio

The American Centrifuge™

USEC's Advanced Uranium Enrichment Technology

Revision 7

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NR-3605-0006

DECOMMISSIONING FUNDING PLAN
for the American Centrifuge Plant
in Piketon, Ohio

Docket No. 70-7004

Revision 7

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Revision 7 – 10 CFR 1045 review completed by J. Weidner on 11/22/05 and the Export Controlled Information review completed by D. Hupp on 11/22/05.

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1.0 INTRODUCTION

USEC Inc. (USEC) 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 Plant (ACP) in Piketon, Ohio. This DFP sets forth the information required by 10 *Code of Federal Regulations* (CFR) Part 70 regarding USEC's plans for funding the decommissioning of the ACP and disposal of depleted uranium generated as a result of ACP operations.

As indicated below, USEC presently intends to provide for decommissioning funding through a surety bond in accordance with applicable requirements of 10 CFR Part 70. However, USEC may choose to utilize alternate financial assurance funding methods. Alternate funding methods, if chosen, will be prepared using the guidance provided in NUREG 1757, Volume 3, Appendix A and will satisfy the requirements of 10 CFR Part 70. The actual funding method to be used will be executed prior to the commencement of enrichment operations. In the interim, appropriate model documentation for this funding method is provided in Appendix A and B of this plan. Upon execution of the funding instruments, USEC will supplement this portion of its application.

2.0 GENERAL INFORMATION

Plant Description: The ACP is located in the U.S. Department of Energy (DOE) reservation in Piketon, Ohio, in areas and facilities leased by USEC from the DOE.[1] The ACP encompasses the construction, start-up, operation, and maintenance of a uranium enrichment process using American Centrifuge technology that will produce 3.5 million separative work units (SWU) annually at full capacity. Chapter 1.0 of the License Application for the American Centrifuge Plant provides a description of the various facilities associated with the ACP.

Licensed Material: The License Application for the ACP seeks authorization to operate a uranium enrichment plant to enrich uranium hexafluoride (UF_6) using centrifuge technology. Uranium enriched in the ^{235}U isotope up to the licensed limit of 10 weight percent ^{235}U will be withdrawn and shipped from the plant. Material depleted in the ^{235}U isotope (UF_6 tails) will also be withdrawn and stored on site. At full capacity, the ACP generates approximately 9,520 Metric Tons (MT) of UF_6 tails annually. Therefore, pursuant to 10 CFR 70.25(a), a DFP is required.

Schedule: Construction of the ACP will commence following issuance of a license by the NRC. Based on the unique modular aspects of the centrifuge technology, capacity is brought on line in phases.

[1] Details regarding the planned operations of the ACP may be found in the License Application and the accompanying Environmental Report.

Period of Operation: The License Application seeks authorization to operate for a period of 30 years.

Decommissioning Costs: USEC has prepared a site-specific decommissioning cost estimate for the decommissioning of the ACP and disposal of the UF_6 tails. This cost estimate utilizes current information regarding the activities and associated costs of decommissioning the 3.5 million SWU plant.

The estimate and associated funding mechanisms will be adjusted over time, in accordance with the applicable provisions of 10 CFR Part 70 as described in Section 5.0 of this plan.

Decommissioning Funding: As set forth in this DFP, USEC presently intends to utilize a surety bond to provide reasonable assurance of the availability of decommissioning funds when needed. This funding mechanism is intended to satisfy the provisions of 10 CFR Part 70 with respect to decommissioning financial assurance for license applicants. However, as described in Section 1.0 of this plan, USEC may choose to utilize alternate financial assurance funding methods. As described in Section 10.10.4 of the License Application for the American Centrifuge Plant, the financial assurance for a portion of the decommissioning costs to include the disposition of centrifuge machines and UF_6 tails will be provided incrementally as centrifuges are installed, operated on process gas, and UF_6 tails generated. Full funding for decommissioning of the facilities will be provided in the initial executed financial assurance instrument. In this way, financial assurance will be made available as the decommissioning liability is incurred.

3.0 DECOMMISSIONING COST ESTIMATE

Pursuant to 10 CFR 70.25(e) and the guidance provided by the NRC in NUREG-1757, *Consolidated NMSS Decommissioning Guidance*, USEC has evaluated the estimated costs of decommissioning the ACP. These estimated costs involve plant decommissioning costs and tails disposal costs. The plant will be decommissioned such that the facilities may be released for unrestricted use. The estimated costs for decommissioning are patterned after NRC guidance in Appendix A of NUREG-1757 Volume 3, as 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 NUREG-1757, Appendix A, 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 Incremental Decommissioning Costs (Table C3.18A)
- Estimated Volume of Annual Depleted Uranium Generated (Table C3.19)
- Estimated Incremental Machine Disposal Cost (Table C3.19A)
- Total Labor Distribution (Table C3.20)

Chapter 10.0 of the License Application for the American Centrifuge Plant describes specific features that serve to minimize the level and spread of radioactive contamination during operation that simplify the eventual plant decommissioning and minimize worker exposure. The decommissioning estimated costs are based on decontaminating the plant to the radiological criteria for unrestricted use in 10 CFR 20.1402. The total estimated cost of plant decommissioning in 2004 dollars, excluding tails disposition costs, is $261.3 million (Table C3.18).

The following assumptions are utilized in the decommissioning cost estimate:

- No credit is taken for salvage value of equipment or materials;
- Inventories of materials and wastes at the time of decommissioning will be in amounts that are consistent with routine plant conditions and operations over the 30-year license;
- Decommissioning activities take place immediately on cessation of operations without multiyear storage-for-decay periods; and

Cost estimates to dispose of UF_6 tails generated during ACP operation are presented in Table C3.19. The ultimate disposal of UF_6 tails is to be determined. USEC intends to evaluate possible commercial uses of UF_6 tails. UF_6 tails, which are not commercially reused, will be converted to a stable form and disposed of in accordance with the USEC Privatization Act and other applicable statutory authorizations and requirements at DOE's DUF_6 conversion facilities and/or other licensed facilities. UF_6 tails are stored in steel cylinders until they can be processed

in accordance with the disposal strategy established and selected by USEC. Depending on technological developments and the existence of facilities available prior to ACP shutdown, the tails may have commercial value and may be marketable for further enrichment or other processes. However, for the purposes of calculating the UF_6 tails disposition costs, USEC assumes that the total quantity of tails generated during ACP operation are processed by the DOE DUF_6 conversion facility in Piketon, Ohio.

USEC provides financial assurance to incrementally fund the estimated cost of conversion and disposal of the UF_6 tails inventory as it is generated during ACP operation. The estimated cost of conversion and disposal is based on the actual accumulated depleted uranium inventory and a conservative forecast of the amount of depleted uranium to be generated for the upcoming period of operation. This funding is in addition to the funding requirements for decommissioning the ACP as described above.

At full capacity, the ACP will generate approximately 9,520 MT of UF_6 tails annually. USEC estimates that it will take approximately four years for the ACP to ramp up to the full capacity of 3.5 million SWU per year.

Our examination of the available information has identified that the unit cost to dispose of tails for the ACP could range between $3.00/kilogram (kg) uranium (U) to $4.83/kg U, depending on a number of factors and assumptions. The unknown factors include: location(s) for processing USEC depleted uranium, transportation costs, escalation rate(s) of various construction cost components; de-escalation rate(s) of future operating costs (to present day dollars); volume of tails disposed; revenue/avoided disposal cost from sale of conversion products (e.g., hydrogen fluoride) or higher assay tails (tail stripping); construction and operations budget contingencies; allocation of decontamination and decommissioning costs (between USEC and DOE); and DOE oversight costs.

USEC has developed the tails disposal cost estimate for the ACP based on the estimated cost of disposal provided in the DOE's March 1, 2005 letter to LES. Based on this letter, we have calculated the estimated tails disposal cost for the ACP to be $4.83/kg U subject to the review requirements specified in the license application. We believe that the $4.83/kg U should be viewed as the conservative upper bound of the range mentioned above and is based on the DOE estimate of $3.34/kg depleted UF_6 ($4.91/kg U) less $0.08 (the estimated cost avoidance of transportation of USEC tails to the DOE conversion facility). Based on the total estimated volume of depleted uranium generated over the 30-years of operation and the estimated cost for disposal, USEC's liability for disposal of depleted uranium is $866.4 million in 2004 dollars. With a 10 percent contingency, this represents a total liability of $953.0 million in 2004 dollars for 30-years of operation. Although a total liability is provided, USEC will incrementally fund the estimated costs associated with disposal of the depleted uranium inventory as the depleted uranium is generated during ACP operation.

USEC's total decommissioning liability is the sum of the total plant decommissioning costs and the tails disposition costs. USEC's total liability for decommissioning the ACP, including applicable contingencies, is $1,214.4 million.

4.0 DECOMMISSIONING FUNDING MECHANISM

USEC presently intends to utilize a surety bond to provide reasonable assurance of decommissioning funding, pursuant to 10 CFR 70.25(f). Accordingly, USEC provides with this application model documentation related to the use of the surety method of providing decommissioning financial assurance.[2] However, as described in Section 1.0 of this plan, USEC may choose to utilize alternate financial assurance funding methods. Upon finalization of the specific funding instruments to be utilized and at least 90 days prior to the commencement of enrichment operations, USEC will supplement its application to include the signed, executed documentation.

As noted above, USEC presently intends to utilize a surety bond to provide financial assurance for decommissioning. The surety bond will provide an ultimate guarantee that decommissioning costs will be paid in the event USEC is unable to meet its decommissioning obligations at the time of decommissioning. A copy of a model surety bond is provided in Appendix A to this plan. USEC describes below the particular attributes it presently anticipates including in the surety bond.

With respect to the surety bond, USEC presently anticipates providing for the following attributes: First, a company that is listed as a qualified surety in the Department of Treasury's most recent edition of Circular 570 for the State where the surety was signed with an underwriting limitation greater than or equal to the level of coverage specified in the bond will issue the bond. Second, the bond will be written for a specified term and will be renewable automatically unless the issuer serves notice at least 90 days prior to expiration of intent not to renew. Such notice must be served upon the NRC, the trustee of the external or standby trust, and USEC. Further, in the event USEC is unable to provide an acceptable replacement within 30 days of such notice, the full amount of the bond will be payable automatically, prior to expiration, without proof of forfeiture.

The surety bond will require that the surety company will deposit any funds paid under its terms directly into either an external trust or a standby trust. A copy of a model standby trust is provided as Appendix B to this plan.

[2] The model documentation is derived from Appendix A.9 in NUREG-1757 Volume 3, Consolidated NMSS Decommissioning Guidance, *Financial Assurance, Recordkeeping, and Timeliness,* September 2003. USEC will consider this model documentation as guidance in preparing and executing funding instruments for the ACP. In the event USEC ultimately selects another form of decommissioning funding, model documentation from this volume of NUREG-1757 will also be used as guidance in the preparation of funding instruments.

5.0 ADJUSTING DECOMMISSIONING COSTS AND FUNDING

Pursuant to 10 CFR 70.25(e), USEC will update the decommissioning cost estimate for the ACP and the financial assurance over the life of the plant. The modular aspect of the American Centrifuge technology allows enrichment operations to begin well before the full capacity of the plant is reached. Thus, the decommissioning liability for centrifuge machines and UF_6 tails is incurred incrementally as more centrifuge machines, and associated equipment, are added to the process, until such time as full capacity of the facility (i.e., 3.5 million SWU) is achieved. Once full capacity of the facility is achieved, the UF_6 tails are generated at a relatively constant rate throughout the life of the plant.

Full funding for decommissioning of the facilities will be provided in the initial executed financial assurance instrument. To ensure adequate financial assurance is in place as centrifuge machines, and associated equipment, are added to the process and placed into operation, USEC will update the cost estimates and provide a revised funding instrument to NRC annually prior to operation at full capacity. Once full capacity of the facility is achieved, USEC will annually adjust the cost estimate for UF_6 tails disposal and all other decommissioning costs will be adjusted periodically, and no less frequently than every three years, consistent with the requirements of 10 CFR 70.25(e) and the recent NRC final rule regarding financial assurance for materials licensees (68 FR 57327, 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 plant condition or operations
- Changes in decommissioning procedures or regulations

A record of the updating effort and results will be retained for review (see further discussion regarding record keeping below).

6.0 RECORD KEEPING PLANS RELATED TO DECOMMISSIONING FUNDING

Pursuant to 10 CFR 70.25(g), USEC will keep records of information that could have a material effect on the ultimate costs of decommissioning until termination of the license. Information maintained in these records includes:

- Records of spills or other unusual occurrences involving the spread of contamination in and around the plant, equipment, or site. Records of spills or other unusual

Table C3.18A Total Incremental Decommissioning Costs

Calendar Year	Total Facility Cost	Total Machine Disposal Cost (Table C3.19A)	Total Labor and Materials Cost (Includes G&A, Contractor Profit, Contigency)	Total Tails Disposal Cost (Table C3.19 * 10 percent contingency)	Total Incremental Decommissioning Cost ($, 2004)
2007	$112,741,940	$618,287	$168,105,146	$356,095	$168,461,240
2008	$112,741,940	$13,911,455	$188,360,610	$8,012,130	$196,372,740
2009	$112,741,940	37,612,452	$224,475,005	$21,662,425	$246,137,430
2010	$112,741,940	$59,355,541	$257,606,037	$34,185,087	$291,791,124
2011-2036	$112,741,940	$61,828,688	$261,374,495	$888,812,271	$1,150,186,766
Total	$112,741,940	$61,828,688	$261,374,495	$953,028,008	$1,214,402,503

Assumptions:
- Operational (license) life = 30 years (from 2006 – 2036); 365 days/yr; 24 hr/day
- Facility Cost = Table C3.18 (Total Decommissioning Costs) subtotal – (Packaging, Shipping, and Waste Disposal Cost) – (Equipment/Supply Costs) [Assumed to be conservatively constant during construction and needed upon license receipt and prior to construction commencement]
- Total Machine Disposal Cost = Incremental machine installation captured from Table C3.19A
- Total Labor and Material Cost (Calculated the same as Table C3.18) = Facility Cost + Machine Cost + G&A + Contractor Profit + Contingency
- Total Tails Disposal Cost = Incremental Tails generation captured from Table C3.19 * 10 percent Contingency
- Total Incremental Decommissioning Cost (during initial construction period) = sum of Total Labor and Materials Cost + Total Tails Disposal Cost

Table C3.19 Estimated Volume of Annual Depleted Uranium Generated

Calendar Year	[Q] # Machines	[R] DUF_6 Generated [1,000 MT]	[S] DUF_6 Accumulated [1,000 MT]	[T] DU Generated [1,000 MT]	[U] Tails Disposal Cost [$M, 2004]	[V] # Tails Cylinders
2006	200	0	0	0	$0	0
2007	120	0.099	0.099	0.067	$323,722	8
2008	2,700	2.23	2.33	1.51	$7,283,754	179
2009	7,300	6.03	8.36	4.08	$19,693,114	483
2010	11,520	9.52	17.88	6.43	$31,077,352	763
2011-2036	11,520	247.43	265.30	167.29	$808,011,156	19,836
Total		265.30	265.30	179.38	$866,389,098	21,269

Assumptions: Operational (license) life = 30 years (from 2006 - 2036); 365 days/yr; 24 hr/day
Tails Output during Operation (@ 3,500 MTSWU/yr) = 2,395 lbs. UF_6/hr
Weight Conversion Factor = 0.45359 kg/lb; Tails Material Conversion Factor = 0.30668 kg/lb UF_6; Tails Purity = 0.67612 gU/g; based upon 0.35% Average Tails
U disposal cost = $4.83/kg U
R=Q/11,520*number of years*2,395*24*365; T=R*0.67612; U=T*4.83
V=R*1,000,000/0.45359/27,500
~21,269 Tails cylinders generated; 27,500 # UF_6 fill weight = 1,000 generated parent cylinders (@ EOL)

Table C3.19A Estimated Incremental Machine Disposal Cost

Calendar Year	[Q] # Machines	[R^2] Estimated Disposal Cost	[S^2] Machine Ratio	[U^2] Incremental Machine Disposal Cost [$, 2004]
2007	120	$61,828,688	0.01	$618,287
2008	2,700	$61,828,688	0.23	$13,911,455
2009	7,300	$61,828,688	0.61	$37,612,452
2010	11,520	$61,828,688	0.96	$59,355,541
2011-2036	12,000	$61,828,688	1.00	$61,828,688
Total		$61,828,688	1.00	$61,828,688

Assumptions:

- Operational (license) life = 30 years (from 2006 – 2036); 365 days/yr; 24 hr/day

- Calendar year and Q = # Machines; consistent with Table C3.19; The difference in total number of machines is the estimated number of spares needed, which in the Tails consumption do not generate inventory from Table C3.19.

- R^2 = sum of machine disposal cost identified in Table C3.14 and the associated equipment/supply cost captured from Table C3/15 [basically all the supply costs minus the B-25 containers and 55-gallon barrels] ($3,689,200 + $43,822,080 + $14,302,681 + $14,727} [Assumed to be a fixed cost over the initial construction period]

- S^2 = machine ratio (incremental installation over construction period) = Q/Total # Machines
$U^2 = R^2 * S^2$

Table C3.20 Total Labor Distribution

Group		Type	Job/Personnel Descriptions
Supervision		Salary	Program Manager, Project Manager, Office Manager, QA/Reg Manager, Rad-Environmental-Safety and Health Manager, FNMCA Manager
Engineering		Salary	Design Engineer, Field Support, NCS Engineer, Nuclear Safety, Regulatory
Operations		Salary	Operations FLM
		Hourly	Chemical Operations, UMH
Maintenance		Salary	Maintenance FLM, Scheduler-Planner
		Hourly	Mechanic, Laborer, Field Service Technician
Support	Plant Support	Salary	HP Support
		Hourly	Protection Forces
	Production Support	Salary	Waste Engineer
		Hourly	Waste Handler

Information contained within does not contain Export Controlled Information

Reviewer: D. Hupp
Date: 11/22/05