



August 11, 2006
AET 06-0087

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 Planned Changes to the License Application and Supporting Documents for the
American Centrifuge Plant (TAC Nos. L32306, L32307, and L32308)**

Dear Mr. Strosnider:

As committed to in a conference call held with the U.S. Nuclear Regulatory Commission (NRC) staff on August 8, 2006, USEC is providing additional clarification on the decommissioning cost calculations provided in submittal AET 06-0088, dated July 21, 2006. USEC's responses are provided as Enclosure 1 of this letter.

The applicable cost tables and associated notes of Chapter 10.0 of the License Application and the Decommissioning Funding Plan have been amended to provide this clarification and are provided as Enclosure 2 of this letter. These planned changes will be finalized and submitted to the NRC in the next revision of the License Application and supporting documents.

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

Sincerely,

Steven A. Toelle
Director, Regulatory Affairs

cc: S. Echols, NRC HQ
T. Johnson, NRC HQ
B. Smith, NRC HQ

Enclosures: As Stated

USEC Inc.
6903 Rockledge Drive, Bethesda, MD 20817-1818
Telephone 301-564-3200 Fax 301-564-3201 <http://www.usec.com>

UMSS01

Enclosure 1 of AET 06-0087

USEC Response to NRC Requests for Clarification

Enclosure 1 of AET 06-0087

On August 8, 2006, USEC Inc. (USEC) held a telephone conference call with the U.S. Nuclear Regulatory Commission (NRC) to discuss questions concerning Chapter 10.0 of the license application and the Decommissioning Funding Plan (DFP) for the American Centrifuge Plant (ACP). USEC agreed to provide clarification concerning the following issues associated with the July 21, 2006 revisions to the DFP:

- Q1. The proration process used in Table C3.14 should be explained and the numerical factors justified. NRC assumed that this is used only in computation of the contractor profit.

USEC Response:

The proration process used only in the computation of contractor profit defines the waste costs directly associated with waste disposal that are not subject to contractor profit. The proration is applied in three areas: unclassified low-level contaminated compacted (dry) waste, unclassified low-level contaminated liquid waste, and classified low-level contaminated waste disposal costs. The proration factor for unclassified low-level contaminated compacted (dry) waste is 0.66. This number is the current disposal and transportation cost divided by the total compacted solid waste cost ($\$28.00 / \$42.13 = 0.66$). The proration factor for unclassified low-level contaminated liquid waste is 0.91. This number is the current incineration and disposal cost plus the transportation cost divided by the total classified waste cost ($\$65.00 + \$0.34 / \$72.12 = 0.91$). The proration factor for classified low-level waste is 0.44. This number is the current U.S. Department of Energy (DOE) disposal cost plus the transportation cost divided by the total liquid waste cost ($\$7.25 + \$3.97 / \$25.35 = 0.44$). Planned changes for Table C3.14 of the DFP providing this clarification are included in Enclosure 2 of this letter.

- Q2. In Table C3.17 for indirect costs, there is a line item for taxes but, no cost entry. Is something missing? Also, why is business insurance not deducted within the contractor profit calculation?

USEC Response:

Ohio Tangible Personal Property Tax as reformed by H.B. 66 states "New Manufacturing Machinery and Equipment purchased on or after January 1, 2005, is no longer subject to the Ohio Personal Property Tax." The line item has been removed from Table C3.17. Planned changes removing reference to taxes in Table C3.17 of the DFP are included in Enclosure 2 of this letter.

Business insurance is considered an element of the indirect costs associated with decommissioning; therefore, it is included within the contractor profit calculation.

Information contained within
does not contain
Export Controlled Information

Reviewer: G. Peed

Date: 08/11/06

Q3. The assumption in the fourth bullet of Table C3.18A is unclear. NRC could not follow how the computation for the labor and materials cost was made.

USEC Response:

Table C3.18A has been expanded to show each element in the labor and material cost calculation. The revised table and corresponding assumptions show that total labor and materials cost includes: the total facility cost, plus the total machine disposal cost, plus general and administrative cost, plus contractor profit, plus contingency. Planned changes for Table C3.18A of the DFP are included in Enclosure 2 of this letter.

Q4. It appears that there is a typographical error in the Table C3.19A assumption describing how R2 is calculated. It appears that some of the terms should be subtracted rather than added.

USEC Response:

This assumption has been clarified on Table C3.19A. The estimated machine disposal costs (R2) in Table C3.19A are comprised of the total unclassified and classified waste disposal costs from Table C3.14 plus the cost of the B-25 containers and 55-gallon barrels from Table C3.15 [$\$50.3\text{M} + \$16.8\text{M} = \$67.1\text{M}$]. Planned changes for Table C3.19A of the DFP are included in Enclosure 2 of this letter.

Q5. On page C-4, Note 1, the number of contaminated spare centrifuges is listed as 400. However, on Table 10.2-1 of the license application, it is listed as 480. Which number is correct?

USEC Response:

The correct number is 480 contaminated spare machines. Planned changes for Table C3.4(A) of the DFP are included in Enclosure 2 of this letter.

Q6. NRC assumed that the some information in Table C3.14 is based on design information and cost information from USEC gaseous diffusion plant (GDP) operations. If so, can this be stated?

USEC Response:

This assumption is correct. The unit cost information in Table C3.14 of the DFP is based upon current design information and actual cost information from the United States Enrichment Corporation GDP operations including those activities associated with the DOE Gas Centrifuge Enrichment Plant equipment removal project.

Q7. In Table C3.16 under Laboratory Costs, there are no transportation costs. NRC assumed that it is intended that the on-site laboratory will be used and will be operational even if a third-party contractor is used for the decommissioning work.

USEC Response:

This assumption is correct. Utilization of an on-site laboratory facility is anticipated; therefore, there are no associated transportation costs included in the derivation of unit costs within Table C3.16 of the DFP.

Enclosure 2 of AET 06-0087

**Planned Changes for the License Application and Decommissioning Funding Plan
for the American Centrifuge Plant**

- 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 UF₆ 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 2006 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 UF₆ tails disposition, is \$317.7 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: \$17.6 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: \$1.5 million

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

Indirect Services: \$58.1 million

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

Miscellaneous: \$35.4 million

This includes direct costs of \$2.7 million for miscellaneous material for decommissioning and \$32.7 million for indirect costs, such as NRC review fees for the submitted DP, license fees, DOE lease fees, and business insurance.

Subtotal	\$215.4 million
General and Administrative (6 percent)	\$12.9 million
Contractor Profit (15 percent)¹	\$25.9 million
Contingency (25 percent)	\$63.5 million
Total Plant Decommissioning Cost Estimate	\$317.7 million

¹ Contractor Profit = 0.15[Subtotal + General and Administrative - Other Indirect Costs (excluding insurance) - Outside Services portion of the Packaging, Shipping, and Waste Disposal Costs]

10.10.2 UF₆ Tails Disposition Costs

Cost estimates to dispose of UF₆ tails generated during ACP operation are separate from the cost estimates to decommission the plant. As noted previously, the ultimate disposal of UF₆ tails remains to be determined. USEC intends to evaluate possible commercial uses of UF₆ tails before having the tails processed by the DOE UF₆ conversion facility in Piketon, Ohio. UF₆ 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 UF₆ tails disposition cost, USEC assumes that the total quantity of tails generated during ACP operation are processed by the DOE UF₆ 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 UF₆ tails annually. As with other decommissioning costs, the disposal cost estimate for UF₆ tails disposal is provided in 2006 dollars. Consistent with the recommendation in the NRC's guidance on decommissioning (Section A.3.1.2.3 of Reference 4), a 25 percent contingency factor is applied to the tails disposal cost estimate. The total estimated cost to dispose of UF₆ tails over the 30-year license, including a four-year ramp up to full capacity and the 25 percent contingency factor, is \$1,036.0 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	\$ 317.7 million
<u>UF₆ Tails Disposition Cost</u>	<u>\$1,036.0 million</u>
Total Decommissioning Liability	\$1,353.7 million

Table 10.10-1 Plant Decommissioning Cost Estimates and Expected Duration

Task/Item	Cost Estimate (Millions, 2006 dollars)	Approx. Percentage
Planning and Preparation	\$2.7	1%
Decontamination and/or Dismantling of Radioactive Facilities	\$45.2	21%
Restoration of Contaminated Areas On Plant Grounds	\$0.8	1%
Final Status Survey	\$1.1	1%
Site Stabilization and Long-Term Surveillance	\$2.7	1%
Packing Materials, Shipping, and Waste Disposal	\$50.3	23%
Equipment and Supply	\$17.6	8%
Laboratory	\$1.5	1%
Indirect Services	\$58.1	27%
Miscellaneous	\$35.4	16%
Subtotal	\$215.4	100%
General and Administrative (6%)	12.9	
Contractor Profit (15%)	25.9	
Contingency (25%)	\$63.5	
Total Plant Decommissioning Cost	\$317.7	
UF₆ Tails Disposal Costs	\$828.8	
UF₆ Tails Contingency (25%)	207.2	
Total UF₆ Tails Disposition Cost	\$1,036.0	
Total Decommissioning Liability	\$1,353.7	

- 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 2006 dollars, excluding tails disposition costs, is \$317.7 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 UF₆ tails generated during ACP operation are presented in Table C3.19. The ultimate disposal of UF₆ tails is to be determined. USEC intends to evaluate possible commercial uses of UF₆ tails. UF₆ 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 DUF₆ conversion facilities and/or other licensed facilities. UF₆ tails are stored in steel cylinders until they can be processed

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 \$1,353.7 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.⁴ 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.

⁴ 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.

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

Category	Description	Estimated Quantity
Centrifuges ^{1,2}	Internals: Rotor Assemblies, Motors, Suspensions, and Mounts (classified)	12,000
Service Modules ²	Structural Components	0
Piping	Less than 1 in. Process Piping length (Lft) Includes Tubing ³	0
	1-10 in. Process Piping length (Lft)	168,100
Pumps	Vacuum Pumps (Evacuation/Purge)	246
Ventilation	Ductwork; Misc. Gulper Ducting (ft ³) ³	118
Surfaces	Building Floors, Yards, Equipment (ft ²) ⁴	2,795,642
Valves	Process Valves (excluding Sheetmetal)	7,250
	Miscellaneous Valves	652
Process Equipment	Feed Ovens, Autoclaves, Cold Boxes	78
Cranes	Ridge Mast (RMC), Bridge, Wall and Jib Cranes	0
Scales	Process Weighing Equipment	6
Compressors	Process Gas Compressors	12
Heat Exchangers	Machine Cooling Water HX, Freezer/Sublimers, Train Coolers ³	16
Traps	Chemical Traps (8 banks of 4); Cold Traps, Roughing Filters, Misc. Traps	111
Tanks	Mixing, Holdup, Surge, and Dump Tanks	15
Cylinders	Tails (14, 10 Ton)	21,269
Cylinders	Tails, Parent (2.5 Ton)	1,000
Other Equipment	UF ₆ Portable Carts; Buffer Storage Stands; and Gas Test Stand Equipment (Valve boxes)	66
Decontamination Equipment	Centrifuge Transporter ⁵	3
	Cranes (RMC) ⁵	8
	Cranes, Bridge X-7725 ⁵	2
	Centrifuge Mobile Equipment ⁵	4
	Centrifuge Dismantling Equipment (X-7725 Assembly Stands)	6
	Cutting Machines	2
	Degreasers	2
	Decontamination Tanks	4
	Wet Blast Cabinets	2
	Crusher	1

Note 1: Amount includes 11,520 operational units plus 480 contaminated spare centrifuges.

Note 2: Centrifuge casings and service module structural steel is not considered waste. These items are to be removed, disassembled, decontaminated to NRC 'Free Release' criteria, and stored for later disposition.

Note 3: Piping <1" (assumed to be instrument piping/tubing), ventilation ductwork, and heat exchanger are assumed to not be internally contaminated. Therefore, these components can be externally decontaminated and remain as part of the building Balance of Plant (BOP).

Note 4: Amount of wall ft² not given because it is not anticipated to need decontamination at the time of decommissioning.

Note 5: Equipment re-utilized from operational phase (not new or purchased).

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

Waste Type	[A] Disposal Volume (ft ³); # Centrifuges	[B] Number of Containers	[C] Container Volume	[D] Unit Cost (\$/ft ³ or \$/gal)	[E] Total Unclassified Waste Disposal Costs
1: Misc Total Compacted Equ't Solid Waste	59,835	665	90	\$44.57	\$2,667,515
2: Liquid Waste	12,000	295	55	\$76.29	\$1,237,805
Total		960			\$3,905,320

Assumptions:

- Unclassified, Low-Level Contaminated waste; Liquid waste from machine disassembly
- [A¹] = Total Compacted Volume (Table C3.5); [A²] = # centrifuges (Installed plus Spares) (Table C3.4a)
- [B¹] = A¹/C¹; [B²] = A²*5.4 qt/machine/220 qt/barrel; [C¹] = B-25 boxes volume = 90 ft³; [C²] = 55 gal/barrel
- [D¹] = Unit Cost¹ * [Inflation Index]; Unit Cost¹ = \$42.13/ft³ = \$28.00/ft³ (Current disposal and transportation cost - Energy Solutions, Clive, UT [1,791 miles one way trip and Brokerage Costs]) + \$13.41/ft³ (Labor costs - Handling, Waste Engineering, Radiological Waste NDA Characterization, and HP Support) + \$0.72/ft³ (Rad Characterization Equipment); [D²] = Unit Cost² * [Inflation Index]; Unit Cost² = \$72.12/gal = \$65.00/gal (incineration and disposal @ Diversified Scientific Services Inc. {DSSI}, Oak Ridge, TN) + \$0.34/gal (Transportation and Brokerage cost [350 miles one way trip]) + \$6.78/gal (Labor costs - Handling, Sampling, Lab Analyses); Inflation Index = CY2005 (2.8%) * CY2006 (2.9%) [Ref. A]
- [E¹] = B¹C¹D¹; [E²] = B²C²D²; Ref. A - Implicit Price Deflator of the Gross Domestic Product for 2005; Administration (Department of Treasury) June 8, 2006 estimate for 2006
- Unclassified Waste Disposal Prorated Ratio: [only used for contractor profitability] = amount of waste cost that is directly associated with waste disposal and not subject to contractor profit: ¹(Current disposal and transportation cost) [\$28.00]/(Total compacted solid waste cost) [\$42.13] = 0.66; ² (incineration and disposal cost [\$65.00]+ transportation cost [\$0.34])/(Total liquid waste cost [\$72.12]) = 0.91
- Unit cost information is based upon current design information and cost information from United States Enrichment Corporation gaseous diffusion operations, specifically Gas Centrifuge Enrichment Plant cleanup.

Waste Type	[F] # of Centrifuges	[G] Factor (B-25/ma)	[H] Number of Containers	[J] Containers Volume	[K] Unit Cost (\$/ft ³)	[M] Total Classified Waste Disposal Costs
Classified Waste	12,000	1.6	19,200	90	\$26.82	\$ 46,344,960
Total			19,200			\$ 46,344,960
Grand Total						\$ 50,250,280
Grand Total (Rounded)						\$ 50.3M

Assumptions:

- Classified, Low-Level Contaminated Waste
- [G] - historical event = 1.6 B-25 boxes/machine
- [H] = number of B-25 boxes = FG
- [J] = B-25 boxes volume = 90 ft³
- [K] = Unit Cost * [Inflation Index]; Unit cost = \$25.35/ft³ = \$7.25/ft³ (Current DOE classified disposal cost - NTS, NV) + \$3.97/ft³ (Transportation [2,136 miles one way trip and Brokerage Costs]) + \$13.41/ft³ (Labor costs - Handling, Waste Engineering, Radiological NDA Waste Characterization, and HP Support) + \$0.72/ft³ (Rad Characterization Equipment); Inflation Index = CY2005 (2.8%) * CY2006 (2.9%) [Ref. A]
- [M] = HJK
- B-25 boxes contain volume gaps, which are filled to capacity from scarified yard materials/debris.
- 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: (Current DOE Disposal cost [\$7.25] + Transportation cost [\$3.97])/(Total Classified waste cost [\$25.35]) = 0.44
- Unit cost information is based upon current design information and cost information from United States Enrichment Corporation gaseous diffusion operations, specifically Gas Centrifuge Enrichment Plant cleanup.

Table C3.15 Equipment/Supply Costs

Equipment/Supplies	[A] Quantity	[B] Unit Cost	[C] Total Equ't/Supply Cost
Centrifuge Dismantling Equipment ¹	6	\$26,445	\$158,670
Cutting Machines ²	2	\$26,445	\$52,890
Degreasers ³	2	\$15,867	\$31,734
Decontamination Tanks ⁴	4	\$26,445	\$105,780
Blast Cabinets ⁵	2	\$26,445	\$52,890
Crushers ⁶	1	\$264,453	\$264,453
Negative Air Machines ⁷	2	\$13,752	\$27,504
B-25 Containers ⁸	19,865	\$848	\$16,845,520
55 gallon Barrels ⁹	295	\$53	\$15,635
TOTALS			\$17,555,076
TOTAL (Rounded)			\$17.6M

Note 1: Specialized tooling and lift fixtures for handling various machine components. Estimate based on in-house design and fabrication.

Note 2: 10" heavy-duty metal band saws, floor mounted, for cutting long parts into manageable sized. Estimate cost includes electrical hook-up and anchoring.

Note 3: All electric pressure cleaner for removing residue from the machines. Estimated cost includes electrical hook-up and anchoring.

Note 4: Geometrically safe stainless steel holding tanks for supporting the cleaning operation. Cost includes tank supports, suction pumps, associated valves and piping.

Note 5: Booth enclosures to support the degreasing operation.

Note 6: Heavy-duty metal hydraulic crusher for volume reduction, surface mounted. Estimated cost includes associated components, utility hook-ups, and anchoring.

Note 7: Heavy duty air filtration device to maintain negative air differential and filtration between an enclosure and atmosphere.

Note 8: Approved metal containers for storage/shipment of dismantled machine and machine components. Quantity is sum of B-25 containers from Table C3.14 (665 + 19,200).

Note 9: Barrels for the capturing of dismantled machine and machine component fluids.

Assumptions:

- [C] = AB
- Unit costs are derived utilizing industrial standard equipment and Department of Energy Gas Centrifuge Enrichment Plant cleanout project experience.
- Unit costs increased by Inflation Index = CY2005 (2.8%) * CY2006 (2.9%) [Ref. A]; except B-25 containers, which are listed in actual \$CY06 in lieu of 2004 indexed to 2006 dollars.

Table C3.16 Laboratory Costs

Phase	Activity	# Workers	# Year	Routine Freq (samples/y)	Recall Freq (samples/y)	Incident Freq (samples/y)	Sample Factor	Unit Cost (\$)	Total Cost
1	Planning and Preparation	36	1	4	0.2	2	6.2	115	\$25,668
2	Decontamination or Dismantling	129	5	12	0.6	6	18.6	115	\$1,379,655
3	Restoration of Contaminated Areas	7	2	12	0.6	4	16.6	115	\$26,726
4	Final Radiation Survey	6	2.5	12	0.6	4	16.6	115	\$28,635
5	Long Term Surveillance	5	6	4	0.2	2	6.2	115	\$21,390
TOTALS		183							\$1,482,074
TOTAL (Rounded)									\$1.5M

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.
- # samples = (# men/phase) * (Routine freq % + Recall % + Incident %)* # yr
- Analytical Unit Cost = \$115/sample [Amount based for uranium isotopic analysis by alpha spectrometry and includes analysis performance, labor, and cost of materials plus overheads] (\$CY06).
- Recall Frequency assumes 5 percent recall rate; Recall = an individual sample submitted when analysis results exceed a predetermined urinalysis program action level (see Table 4.7-3 of the ACP License Application).
- Incident Frequency assumes two 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).

Table C3.17 Miscellaneous Costs

Other Direct Costs

Cost Item	Total Cost
Miscellaneous Material for DeCon ¹	\$2,737,500
Total	\$2,737,500
Total (Rounded)	\$2.7M

Note 1: Estimate based upon percentage of Decommissioning Cost subtotal (1.5% Direct Labor and Equipment; no Indirect Costs) (values from Table C3.18) $[0.015 * (\text{Subtotal} - \text{Other Indirect Costs})] = [0.015 * 182,500,000]$.

Other Indirect Costs

Cost Item	Total Cost
NRC Staff Review and Approval DP ²	\$84,625
License Fees ³	\$18,690,000
DOE Lease	\$13,479,240
Business Ins	\$ 450,000
Total	\$32,703,865
Total (Rounded)	\$32.7M

Note 2: Estimate based upon review and approval for Decommissioning Plan (DP). Inflation Index = CY2005 (2.8%) * CY2006 (2.9%) [Ref. A].

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

Table C3.18 Total Decommissioning Costs

Ref	Task	Calculated Costs (\$2006, M)	Percentage
D3.13	Planning and Preparation	\$ 2.7	1%
D3.13	Decontamination and/or Dismantling of Radioactive Facility Components	\$ 45.2	21%
D3.13	Restoration of Contaminated Areas on Facility Grounds	\$ 0.8	1%
D3.13	Final Radiation Survey	\$ 1.1	1%
D3.13	Site Stabilization and Long-Term Surveillance	\$ 2.7	1%
CS-3-6	Indirect Services	\$ 58.1	27%
C3.14	Packaging, Shipping, and Waste Disposal Costs	\$ 50.3	23%
C3.15	Equipment/Supply Costs	\$ 17.6	8%
C3.16	Laboratory Costs	\$ 1.5	1%
C3.17	Other Direct Costs	\$ 2.7	1%
C3.17	Other Indirect Costs	\$ 32.7	15%
	Subtotal¹	\$215.4	100%
	G&A ²	\$ 12.9	
	Contractor Profit ³	\$ 25.9	
	Contingency ⁴	\$ 63.5	
	Total Labor & Materials Cost	\$317.7	
	Tails Disposal Cost	\$ 828.8	
	Tails Contingency ⁵	\$207.2	
	Total Tails Disposal Cost	\$1,036.0	
	Total Decommissioning Cost Estimate (Including Tails Disposal)	\$1,353.7	

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

Note 2: General & Administrative cost assumed to be 6% based upon current company's experience.

Note 3: Contractor Profit assumed to be 15% of the subtotal plus G&A minus other indirect costs ([excluding insurance] minus fees outside services portion of the Packaging, Shipping, and Waste Disposal Costs (15% [215.4 + 12.9 - 32.2 - 23.4] = \$25.9M).

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

Note 5: Contingency assumed to be 25% on Tails Disposal cost.

Table C3.18A Total Incremental Decommissioning Costs

Calendar Year	Total Facility Cost	Total Machine Disposal Cost	G&A (6%)	Contractor Profit (15%)	Contingency (25%)	Total Labor and Materials Cost	Tails Disposal Cost (Table C3.19)	Tails Contingency	Total Tails Disposal Cost	Total Incremental Decommissioning Cost
2007 *	\$148.3	\$0.7	\$8.9	\$15.3	\$43.3	\$216.5	\$0.5	\$0.1	\$0.6	\$217.1
2008	\$148.3	\$15.4	\$9.8	\$17.7	\$47.8	\$239.0	\$6.9	\$1.7	\$8.6	\$247.6
2009	\$148.3	\$40.9	\$11.3	\$21.7	\$55.6	\$277.8	\$18.9	\$4.8	\$23.7	\$301.5
2010	\$148.3	\$64.4	\$12.8	\$25.5	\$62.7	\$313.7	\$29.6	\$7.4	\$37.0	\$350.7
2011-2036	\$148.3	\$67.1	\$12.9	\$25.9	\$63.5	\$317.7	\$772.9	\$193.2	\$966.1	\$1,283.8
Total						\$317.7	\$828.8	\$207.2	\$1,036.0	\$1,353.7

Note: Values are in \$2006, Million

* - based upon Lead Cascade potential Production capabilities that can produce material and the number of machines available.

Assumptions:

- Operational (license) life = 30 years (from 2006 – 2036); 365 days/yr; 24 hr/day
- Facility Cost = Total Labor (Planning and Preparation) [D3.13] + Decommissioning and/or Dismantling of Radioactive Facility Components [D3.13] + Restoration of Contaminated Areas on Facility Grounds [D3.13] + Final Radiation Survey [D3.13] + Site Stabilization and Long-term Surveillance [D3.13] + Indirect Services [C3.18] + Equipment/Supply {not associated with Machine Disposal; i.e., total minus B-25 boxes and 55 gallon drums} [C3.15] + Miscellaneous Direct [C3.17] + Indirect Costs [C3.17] {Conservatively assumed to be constant during construction period and needed upon license receipt.}
- Total Machine Disposal Cost = Incremental machine installation captured from Table C3.19A
- Total Labor and Material Cost (Calculated the same as Table C3.18) = Total Facility Cost + Total Machine Disposal Cost + G&A + Contractor Profit + Contingency. The last value under years 2011-2036 is the anticipated Total Labor and Materials Cost including G&A, Contractor Profit, and Contingency. The Total is not the sum of the column, it is based upon the facilities and machine disposal cost, which is at full load by the year 2011.
- Total Tails Disposal Cost = Incremental Tails disposal cost captured from Table C3.19 + 25% Contingency
- Total Incremental Decommissioning Cost (during initial construction period) by year = sums across Total Labor and Materials Cost + Total Tails Disposal Cost. The Total Incremental Decommissioning Cost is not the sum of the columns.

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 [\$, 2006]	[V] # Tails Cylinders
2006	200	0.0	0.0	0.0	\$0.0	0
2007	120*	0.1	0.1	0.1	\$0.5	8
2008	2,700	2.2	2.3	1.5	\$6.9	179
2009	7,300	6.0	8.4	4.1	\$18.9	483
2010	11,520	9.5	17.9	6.4	\$29.6	763
2011-2036	11,520	247.4	265.3	167.3	\$772.9	19,836
Total		265.2		179.4	\$828.8	21,269

* - based upon Lead Cascade potential Production capabilities that can produce material and number of machines considered.

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. UF₆/hr
- Weight Conversion Factor (WCF) = 0.45359 kg/lb; Tails Material Conversion Factor = 0.30668 kg/lb UF₆; Tails Purity (TP) = 0.67612 gU/g; based upon 0.35% Average Tails
- U disposal cost = \$4.62/kg U
- $R = Q / 11,520 * \text{number of years} * 2,395 * 24 * 365 * WCF / 1M$; $T = R * 0.67612$
- $U = T * 4.62 * 1M$; The Tails Disposal Cost is best summed across and not the sum of the column.
- $V = R * 1M / 0.45359 / 27,500$
- ~21,269 Tails cylinders generated; 27,500 # UF₆ 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 [\$, 2006]
2007	120*	\$67.1	0.01	\$0.7
2008	2,700	\$67.1	0.23	\$15.4
2009	7,300	\$67.1	0.61	\$40.9
2010	11,520	\$67.1	0.96	\$64.4
2011-2036	12,000	\$67.1	1.00	\$67.1
Total		\$67.1	1.00	\$67.1

* - based upon Lead Cascade potential Production capabilities that can produce material and number of machines available.

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 computation do not generate inventory from Table C3.19.
- R² = sum of Total Classified and Unclassified Waste Disposal Cost from Table C3.14 plus the cost of the B-25 containers and 55-gallon barrels from Table C3.15 (\$50.3M + \$16.8M = \$67.1M) [Assumed to be a fixed cost over the initial construction period].
- S² = machine ratio (incremental installation over construction period) = Q/Total # Machines
- U² = R² * S²