USEC
A Global Energy Company

March 14, 2005
AET 05-0008

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 Revision 1 of the License Application and Supporting Documents for the American Centrifuge Plant (TAC Nos. L32306, L32307, and L32308)

Dear Mr. Strosnider:

The purpose of this letter is to submit USEC Inc.'s (USEC) Revision 1 of the License Application and supporting documents for the American Centrifuge Plant to the U. S. Nuclear Regulatory Commission (NRC).

Enclosure 1 contains the changed pages of the License Application and supporting documents that incorporate the proposed changes described in Reference 1. Changes from Revision 0 submitted to the NRC by Reference 2 are designated with revision bars in the right hand margin.

Enclosure 1 has been reviewed in accordance with the December 21, 2004 NRC Review Criteria to Identify Sensitive Information in Fuel Cycle Documents and the appropriate pages are being submitted under separate cover (AET 05-0009).

NMSS01

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

Sincerely,

S. A. Toelle

Steven A. Toelle
Director, Nuclear Regulatory Affairs

cc: B. Smith, NRC HQ
Y. Faraz, NRC HQ
J. Henson, NRC Region II

Enclosures: As Stated

Reference:

1. USEC Letter (S.A. Toelle) AET 05-0006 to the U.S. Nuclear Regulatory Commission (J.R. Strosnider), "Responses to Request for Additional Information Regarding the License Application (TAC Nos. L32306, L32307, and L32308)," dated March 9, 2005.

2. USEC Letter (S.A. Toelle) AET 04-0022 to the NRC (J. Strosnider), "Submittal of the License Application for the American Centrifuge Plant," dated August 23, 2004.

Enclosure 1 to AET 05-0008

Revision 1 of the License Application and Supporting Documents for the American Centrifuge Plant (Non-Proprietary Information)

Remove and Insert Instructions for Revision 1
Enclosure 1 of AET 05-0008 dated March 14, 2005
American Centrifuge Plant

Remove and Properly Destroy	Insert
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Chapter 2.0 – 2-15/2-16	Chapter 2.0 – 2-15/2-16
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Chapter 6.0 – 6-5 through 6-10	Chapter 6.0 – 6-5 through 6-10
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LA-3605-0001

License Application

for the American Centrifuge Plant

in Piketon, Ohio

The American Centrifuge™

USEC's Advanced Uranium Enrichment Technology

Revision 1

Docket No. 70-7004 **March 2005**

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LA-3605-0001

LICENSE APPLICATION

for the American Centrifuge Plant
in Piketon, Ohio

Docket No. 70-7004

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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.

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ACRONYMS AND ABBREVIATIONS

ACL	Administrative Control Level
ACP	American Centrifuge Plant
ACR	Area Control Room
AHJ	Authority Having Jurisdiction
ALARA	as low as reasonably achievable
amsl	above mean sea level
ANS	American Nuclear Society
ANSI	American National Standards Institute
ARA	Airborne Radioactivity Area
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BCS	Boundary Control Station
BDC	Baseline Design Criteria
BEQ	Baseline Effluent Quantity
CA	Contamination Area
CAA	Controlled Access Area
CAAS	Criticality Accident Alarm System
CCZ	Contamination Control Zone
CEDE	Committed Effective Dose Equivalent
CER	Compliance Evaluation Reports
CFR	*Code of Federal Regulations*
CM	Configuration Management
CVP	Cylinder Valve Protectors
DA	Design Authority
DAC	Derived Air Concentration
DBE	design basis earthquake
DFP	Decommissioning Funding Plan
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DP	Decommissioning Plan
DSA	Decontamination Service Area
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EV	evacuation vacuum
FCA	Fixed Contamination Area
FPPA	*Farm Protection Policy Act*
FHA	Fire Hazards Analysis
FNAD	Fixed Nuclear Accident Dosimeters
FNMCP	Fundamental Nuclear Material Control Plan
GCEP	Gas Centrifuge Enrichment Plant
GDP	gaseous diffusion plant
GET	General Employee Training
HAZCOM	hazardous communication
HCA	High Contamination Area

HEPA	high efficiency particulate air
HP	Health Physics
HRA	High Radiation Area
HVAC	Heating, Ventilation, and Air Conditioning
ICP/MS	Inductively Coupled Plasma/Mass Spectrometry
IHS	Industrial Hygiene and Safety
IPP	Interconnecting Process Piping
IROFS	items relied on for safety
ISA	Integrated Safety Analysis
ISTP	Integrated Systems and Test Plan
LCC	local control center
LEC	Liquid Effluent Collector
LLMW	low level mixed waste
LLRW	low level radioactive waste
LSDA	Lower Suspension and Drive Assembly
MCW	machine cooling water
MDA	Minimum Detectable Activity
MEI	Maximally Exposed Individual
MM	Modified Mercalli
MSDS	Material Safety Data Sheet
M&TE	measuring and test equipment
NCS	Nuclear Criticality Safety
NCSE	Nuclear Criticality Safety Evaluation
NEPA	National Environmental Protection Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NHPA	*National Historic Preservation Act*
NIOSH	National Institute for Occupational Health and Safety
NIST	National Institute of Standards and Technology
NMC&A	Nuclear Materials Control and Accountability
NMMSS	Nuclear Materials Management and Safeguards System
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OEPA	Ohio Environmental Protection Agency
OJT	on-the-job training
OSHA	Occupational Safety and Health Administration
PA	Public Address
PGA	peak ground acceleration
PGDP	Paducah Gaseous Diffusion Plant
PBT	Performance Based Training
PM	preventive maintenance
PMF	Probably Maximum Flood
PMT	post-maintenance testing
PORTS	Portsmouth Gaseous Diffusion Plant
PPE	personal protective equipment

1.0 GENERAL INFORMATION

This license application is being submitted by USEC Inc. (USEC) (licensee) for the American Centrifuge Plant (ACP). It encompasses the construction, manufacturing, start-up, operations, maintenance, and decommissioning of a uranium enrichment facility using American Centrifuge technology that will produce approximately 3.5 million separative work units (SWU) annually. The ACP is located on the U.S. Department of Energy (DOE) reservation near Piketon, Ohio.

The ACP is the third step in USEC's plan to deploy the American Centrifuge technology. The first step is the centrifuge machine testing in Oak Ridge, Tennessee, (which is underway) to upgrade, and demonstrate an economically attractive gas centrifuge machine and enrichment process. The second step is the deployment of the Lead Cascade Demonstration Facility (Lead Cascade) in Piketon, Ohio (which is also underway), which will provide reliability, performance, cost, and other vital data on the ACP enrichment process. The American Centrifuge Plant design is modular, with the basic building block of enrichment capacity being a cascade of centrifuge machines. The demonstration phase (centrifuge testing and Lead Cascade) will provide information on performance, reliability, and economics that will be used in the construction of the ACP. This license application is being submitted pursuant to the *Atomic Energy Act* of 1954 as amended, 10 *Code of Federal Regulations* (CFR) Parts 70, 40, and 30, and other applicable laws and regulations. The ACP is designed to enrich, safely contain and handle uranium hexafluoride (UF_6) up to 10-weight (wt.) percent uranium-235 (^{235}U). USEC is requesting a license for a term of 30 years from the start of operations.

This license application follows the format and content guidelines provided in NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility* (Reference 1). The information provided reflects the design in sufficient detail to enable a reviewer to make a definitive evaluation that the ACP can be constructed and operated without undue risk to the health and safety of the public and with no significant impact to the environment.

The ACP uses portions of the Portsmouth Gaseous Diffusion Plant (GDP) and the former DOE Gas Centrifuge Enrichment Plant (GCEP) along with buildings/facilities constructed for the ACP. The ACP utilizes existing utilities and infrastructure that support the DOE reservation along with the utilities and infrastructure that support the ACP alone. Agreements, including performance requirements, are established for those services not self-performed by USEC to help ensure they are available and reliable. Some new buildings/facilities are necessary to efficiently operate the ACP. USEC has updated the gas centrifuge technology from that used in the GCEP program, but the American Centrifuge components remain compatible with existing infrastructure and buildings/facilities.

1.1 Plant and Process Description

This section describes the buildings and facilities that comprise the ACP located on the DOE reservation in Piketon, Ohio, and describes the process by which the plant will operate. Facilities are those buildings and systems identified in the lease agreement between the United States Enrichment Corporation and DOE. The ACP buildings and facilities are grouped in two categories, primary and secondary in the Integrated Safety Analysis (ISA) Summary. Figure 1.1-1 (located in Appendix A) depicts the entire DOE reservation and the area where the ACP resides in the southwest quadrant. Figure 1.1-2 (located in Appendix A) depicts a closer view of the ACP area and shows the Primary and Secondary buildings. Primary facilities are those buildings or areas that could contain licensed material in quantities that could potentially result in consequences that exceed the performance criteria defined in 10 CFR 70.61 resulting from credible accidents or that directly control a primary facility. All other ACP facilities are considered to be secondary. A further description of primary and secondary facilities and a list of these buildings/facilities are in Sections 1.1.3 and 1.1.4 of the ISA Summary.

The uranium element appears in nature in numerous isotopes; the three major isotopes of interest have atomic weights of 234, 235, and 238. The ^{235}U isotopes are fissionable and capable of sustaining a critical reaction. Natural uranium contains 0.711 percent ^{235}U isotope. Isotopic separation processes separate uranium into two fractions, one enriched in the ^{235}U isotope, and the other depleted.

Prior to the enrichment process, uranium is combined with fluorine to form UF_6 from the uranium feed suppliers. The UF_6 arrives at the plant in a solid state and this UF_6 is sublimed from a solid to a gas and fed into the system. In the gas centrifuge process, the isotopic separation is accomplished by centrifugal force, which uses the difference in weight of the uranium isotopes to achieve this isotopic separation. UF_6 can be enriched up to 10 wt. percent assay ^{235}U in the ACP. The plant withdraws the enriched (product) stream and the depleted (tails) stream in the gaseous state. The product and tails streams are then sublimed back into a solid state for handling and movement. The plant minimizes the amount of UF_6 in the liquid state.

Two process buildings are included in the initial deployment of the ACP to support a 3.5 million SWU production capacity with centrifuge machines arranged in cascades.

1.1.1 Site Boundary

The ACP is located approximately one and one half miles east of U.S. Route 23 on the approximately 3,700 acre DOE reservation. The area around the reservation is sparsely populated, with the nearest residential center located approximately four miles to the north of the reservation. The ACP is located in the southwest quadrant of the reservation and is situated on approximately 200 acres. The site boundary is the DOE reservation boundary, which is depicted in Figure 1.1-1 (located in Appendix A). Proximity of the ACP to the nearest member of the public (i.e., permanent residence) is about 2,200 feet (ft) [670 meters (m)].

Access between the X-3001 and X-3002 buildings is provided via the transfer aisleway, which also provides access between the operational and maintenance areas of the X-3012 building.

1.1.3.3 Feed, Withdrawal, and Product Operations

Figure 1.1-4 (located in Appendix B) depicts a process flow schematic of Feed, Withdrawal, and Product operations.

1.1.3.3.1 X-3346 Feed and Customer Services Building

The X-3346 building is located in the southwest quadrant of the DOE reservation. The X-3346 building is located approximately 1,000 ft south-southwest of the X-3001 building. The nearest reservation boundary is 1,865 ft to the west of the X-3346 building. The X-3346 building is connected to the X-3001 and X-3002 buildings by the X-2232C piping.

The X-3346 building has a covered floor area of approximately 154,000 ft^2 with two distinct areas of operation to meet process feed, sampling, and transfer requirements. The X-3346 building has two distinct areas of operation. The first area, referred to as the Feed Area, supports the front end of the overall enrichment process by housing the equipment necessary to provide UF_6 feed. The second area, referred to as the Customer Services Area, supports the back end of the enrichment process by housing the sampling equipment necessary to ensure customer products meet specifications and to transfer UF_6 material to customer cylinders. Figure 1.1-5 (located in Appendix B) depicts the typical general equipment and process flow for the X-3346 building layout.

The Feed Area of the X-3346 building houses electrically heated feed ovens. UF_6 feed is processed through purification burp systems before being fed into the process manifolds/piping. There are separate manifolds that direct each stream to the X-3001 and X-3002 buildings. The Feed Area has accountability scales for weighing the feed cylinders. The feed oven's location provides the bridge crane sufficient room to transport the UF_6 cylinders between rows of ovens. Cylinders are placed on rail-carts that move the cylinders into and out of the feed ovens.

The Customer Services Area is the only building where liquid UF_6 may be present and provides a confinement barrier should an accident occur during sampling and transfer activities. In the Customer Services Area, the basic approach to product operations is to liquefy the UF_6 contained in 10-ton source cylinders, sample the liquid, transfer the material to the required number of 2.5-ton customer cylinders (typically three to four), then allow the customer cylinders to cool until the UF_6 has re-solidified. However, any approved UF_6 container may be heated in an electrically heated containment autoclave for sampling and transfer purposes. Cooling capability is supplied to expedite the cylinder heel cool-down process and shorten the cycle time. The receiving UF_6 cylinder lines and valves are kept warm during the transfer. When the transfer is complete, the cylinders are cooled in combination with autoclaves/freezers that also provide containment. The parent cylinders and the receiving cylinders are enclosed in containment autoclaves when the UF_6 is in the liquid phase, to minimize the potential for a release of liquid UF_6.

The primary specialized support systems are those associated with purge and evacuation. These support systems service both process lines and equipment and local area UF_6 "wisp" (gulper) management systems that control small releases that might occur during operations (i.e., disconnecting pigtails from cylinders). The purge and evacuation vents are monitored and permitted through the OEPA. Other major support equipment includes refrigeration units, precision scales, and bridge cranes. Other auxiliaries are those that are customary (e.g., electrical supply, instrument air, cooling water, etc.).

1.1.3.3.2 X-3346A Feed and Product Shipping and Receiving Building

The X-3346A building is located in the southwest quadrant of the DOE reservation approximately 300 ft south of the X-3346 building. The building measures approximately 100 ft in width, 40 ft in height, and 190 ft in length with a covered floor area of approximately 19,000 ft^2. This building serves as the focal point for the receipt and shipping of natural and enriched uranium in U.S. Department of Transportation (DOT) approved cylinders and Protective Shipping Packages (PSPs), as required. The nearest reservation boundary is 1,820 ft to the west of the X-3346A building. Figure 1.1-6 (located in Appendix B) depicts the typical general equipment and process flow for the X-3346A building layout.

The X-3346A building is connected to the X-3346 building by a bridge crane rail system that serves both the X-3346 and X-3346A buildings. X-3346A has doors on the north and south sides of the building for either trucks (tractor trailer) or straddle carriers/mobile equipment or cranes utilized for movement of cylinders.

The X-3346A building contains the operations associated with receiving full UF_6 feed cylinders and returning empty feed cylinders to vendors and the receipt of empty product cylinders and shipment of full product cylinders to customers. The building includes a large shipping and receiving area, cylinder staging area, offices, and a trucker's rest area.

1.1.3.3.3 X-3356 Product and Tails Withdrawal Building

The X-3356 building is located in the southwest quadrant of the DOE reservation bounded on three sides by the X-3001 (to the west), X-3002 (to the east), and X-3012 buildings (to the north). The building has a covered floor area of approximately 36,000 ft^2 with two distinct areas of operation to meet the process withdrawal requirements: one for product withdrawal and the other for tails withdrawal. The nearest reservation boundary is 3,010 ft to the west of the X-3356 building. Figure 1.1-7 (located in Appendix B) depicts the typical general equipment and process flow for the X-3356 building layout.

The X-3356 building houses the equipment that functions to withdraw enriched and depleted UF_6 from the process. The X-3356 building has the product withdrawal equipment. Product withdrawal is performed via sublimation into cold traps, which is then transferred to product cylinders. Different product assays can be withdrawn to the X-3356 building from the X-3001 and X-3002 buildings. The west side of the X-3356 building has the tails withdrawal equipment. Tails withdrawal is performed via compression and direct sublimation of the UF_6

into tail cylinders.

The X-3356 building is a two-story building with a crane. The crane moves above the cylinder handling equipment. Scales are located near the entry/exit of the building to weigh the UF_6 cylinders. The Brine System, Evacuation System, and Vent System support the tails and product withdrawal systems. Light gas management for product withdrawal is accomplished using the backup traps, Evacuation System, and building vent.

1.1.3.4 X-7725 Recycle/Assembly Facility

The X-7725 facility is located in the southwest quadrant of the DOE reservation. The X-7725 facility is connected to X-7726 facility and the X-7727H corridor and is located to the north of the X-3001 and X-3002 buildings. The X-7725 facility is approximately 540 ft x 820 ft (approximately 442,800 ft^2 area), and it contains a total floor space of about 837,900 ft^2 on five floors. The nearest reservation boundary is 2,431 ft to the west of the X-7725 facility. Figure 1.1-8 (located in Appendix B) depicts the typical general equipment and process flow for the X-7725 building layout and its relationship to X-7726 and the X-7727H buildings.

The purpose of the X-7725 facility is to provide an area where centrifuge machines can be manufactured, assembled, tested, and maintained. This facility also includes an area for maintenance of the centrifuge transporters and other mobile equipment. The assembly of centrifuge machines begins with receipt of centrifuge machine components. Then these components are stored and staged for assembly. Centrifuge components and subassemblies are assembled into a complete centrifuge machine on one of the machine assembly stands.

If some of the centrifuges are assembled faster than can be transported for installation, these centrifuges can be stored in the buffer storage area. Some completely assembled centrifuge machines are tested in the Gas Test stands using UF_6 to verify the correct placement of machine components and the proper operation of the centrifuge machine. The Gas Test is performed in the X-7725 facility prior to moving the centrifuge machines to the process building for installation.

There are various support areas throughout the building on each level. These areas include cranes; mechanical equipment rooms; electrical equipment rooms; freight and personnel elevators; HVAC equipment rooms; maintenance areas; offices; restrooms; shower/locker rooms; and other material handling equipment.

An overhead crane system traverses the buffer storage area and assembly area of the X-7725 facility for movement of centrifuge machines or other large components.

Two dedicated rooms are located in the southwest corner of the X-7725 facility to support the maintenance and operation of the centrifuge transporters and other mobile equipment. There is a maintenance room and a battery charging room.

1.1.3.5 X-7726 Centrifuge Training and Test Facility

The X-7726 facility is located in the southwest quadrant of the DOE reservation. The X-7726 facility is connected and adjacent to the northwest corner of the X-7725 facility. The X-7726 facility has an overall height of approximately 80 ft, contains approximately 28,000 ft^2 of floor space at ground level and contains a total of 49,500 ft^2. The nearest reservation boundary is 2,431 ft to the west of the X-7726 facility. Figure 1.1-8 (located in Appendix B) depicts the typical general equipment and process flow for the X-7726 facility layout and its relationship to X-7725 facility and the X-7727H corridor.

The facility was originally built to support training of plant personnel for centrifuge assembly and testing. This facility will initially be used for centrifuge component manufacturing and centrifuge machine assembly, and then primarily used for a machine assembly training and machine component preparation area for the ACP.

The X-7726 facility is an 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 until the X-7725 facility is available for use. Then these functions will be performed in the X-7725 facility. The X-7726 facility will then be used as a backup manufacturing/assembly area and may also be used for select repair of failed centrifuge machines or for disassembly of failed machines for failure analysis. The X-7726 facility will continue to be used as a training area for centrifuge subassembly preparation, column assembly, and machine assembly.

An overhead crane system traverses the length of the X-7726 facility for movement of centrifuge machines or other large components.

There are various support areas throughout the building to provide the necessary ancillary support for the centrifuge assembly operations and personnel. These areas include mechanical equipment rooms; electrical equipment rooms; freight and personnel elevators; HVAC equipment rooms; maintenance areas; offices; restrooms; and shower/locker rooms.

1.1.3.6 X-7727H Interplant Transfer Corridor

The X-7727H corridor is located in the southwest quadrant of the DOE reservation. The nearest reservation boundary is 2,480 ft to the west of X-7727H corridor. The X-7727H corridor measures approximately 30 ft in width, 59 ft in height, and 750 ft in length. There are 55 ft by 25 ft doors located where the corridor meets the X-7725 facility and X-3001 building. Figure 1.1-9 (located in Appendix B) depicts the typical general equipment and process flow for the X-7727H building layout.

The X-7727H corridor is an elongated structure that connects the X-7725 facility with the X-3001 building. It provides a protected pathway to transport centrifuge machines from the X-7725 facility or X-7726 facility to the process buildings or back as necessary. The X-7727H corridor also serves as a shipping and receiving area for equipment and components during

1.1.5.3 Centrifuge Fundamentals

Figure 1.1-12 shows a simplified schematic of a gas centrifuge machine. A centrifuge machine consists of a large rotating cylinder and piping for the feeding of UF_6 gas, and the withdrawal of depleted and enriched UF_6 gas streams. The rotating cylinder, called the rotor, is contained within a stationary cylinder, called the casing, which maintains the rotor in a vacuum and provides physical containment of components in the unlikely event of a major machine failure. Other major components of a centrifuge include upper and lower suspension systems, and a column.

Figure 1.1-12 depicts a modern centrifuge. The outer casing is at a high vacuum to minimize the drag on the high-speed rotor. Feed enters the machine approximately mid-way down the column and mixes with the up flowing process gas layer near the rotor wall. The lighter component (enriched) stream flows upward where a scoop, positioned near the rotor wall, withdraws the enriched stream. The remaining portion of the gas stream flows down the wall, becoming the depleted stream where a scoop, positioned near the rotor wall, similarly withdraws the depleted stream.

The separation capacity of a centrifuge is a function of the difference in the assay at the top and bottom of the rotor. Radial separation (separation factor) is created by centrifugal force. Axial separation is created by the net transport of $^{235}UF_6$ to the top and $^{238}UF_6$ to the bottom of the centrifuge. The separation factor of the centrifuge separation unit (machine) is higher than that of the gaseous diffusion separation element (converter). Due to the higher separation factor of the centrifuge separation unit, there are fewer stages required in a centrifuge cascade than in a gaseous diffusion cascade. However, the production rate for a single centrifuge separation unit is much less than a gaseous diffusion separation unit. Therefore, it is necessary to operate multiple centrifuge separation units in parallel in order to achieve production levels.

The high vacuum and partially armored casing serves two key functions: to minimize drag and confine the potential debris generated from a rotor failure while operating. The current machine design relies on a diffusion pump on each machine backed-up by a mechanical vacuum pump to maintain this high vacuum in the casing. The primary function of the vacuum system is to remove any traces of gases that escape from the rotor through the column gap or atmospheric leaks from the casing seals.

Centrifuge machines are arranged in parallel to make-up a stage. The machines in a stage receive a common feed and discharge enriched material and depleted material into common headers. Stages are then arranged in series to make-up a cascade. The inter-stage flow arrangement is depicted schematically in Figure 1.1-13 for a typical cascade. Each stage is represented by a single machine, but the concept is that the enriched stream of the lower stage is set to closely match the assay of the external cascade feed and the depleted stream of the upper stage is also set to closely match that assay. The lower stage depleted stream header is the cascade tails header and the upper stage enriched stream header is the cascade product header.

1.1.5.4 Enrichment Process Theory

To produce enriched uranium at the desired ^{235}U assay, separation units are connected in series to form an enrichment cascade. Multiple cascades may be connected in parallel in order to produce enough product material of a given assay to meet customer orders.

1.1.5.5 Total Process Configuration

Total process configuration refers to how the enrichment process is carried out from the time natural uranium is received until finished product and process waste is shipped off-site. The process is divided into seven normal operations: 1) receipt of UF_6; 2) feeding of UF_6 into the enrichment process; 3) actual enrichment process, where the UF_6 assay is increased to its desired enrichment; 4) material withdrawal, where enriched and depleted UF_6 is removed from the enrichment process; 5) UF_6 sampling and transfer, where enriched UF_6 is sampled to ensure it meets customer specifications and the enriched UF_6 product material is transferred to customer cylinders; 6) loading of UF_6 cylinders for shipment to customers; and 7) waste handling from waste generated from the entire process.

1.1.5.5.1 Receiving Operations

UF_6 feed cylinders, cylinders containing enriched product (such as Russian LEU material), customer shipping cylinders and overpacks, as well as, new and cleaned empty cylinders are received on-site via the X-3346A. The received cylinders are off-loaded, weighed, paperwork checked, and then the cylinders are transferred to the appropriate cylinder storage areas until needed (see Figure 1.1-4 [located in Appendix B] for functional depiction of cylinder movements/transfers).

1.1.5.5.2 Feed Operations

Feed ovens are the primary components in the feed process. Feed ovens are enclosures that restrict air-leakage to provide efficient heating of the cylinders, but are not designed as pressure vessels. The ovens heat the cylinders utilizing electrically heated air and are fitted with chillers. UF_6 is sublimed from the solid phase into a vapor for enrichment in the process buildings. The feed process has several stages. The feed is vaporized, monitored for "lights," purified, held, mixed, and pressure controlled before entering the process buildings. "Lights" refer to light gases (e.g. N_2, O_2, HF, etc.) entrained in the feed material. There are two feed headers located in the Feed Area. The oven heating system is programmed to hold the air temperature constant at approximately 185° Fahrenheit (F). Any solid UF_6 left in the feed cylinder after the feed rate declines to a predetermined level is "heeled" to a freezer-sublimer in the Burp System. "Heeling" is the process for removing residual UF_6 from a cylinder when it can no longer be used to feed material into the cascade. The emptied feed cylinder is then moved on to storage. Each feed oven is equipped with a UF_6 leak detector. A conductivity cell is provided for UF_6 leak detection inside the oven.

1.1.5.5.3 Enrichment Operations

The enrichment process is contained in the X-3001 and X-3002 buildings. Each process building contains multiple cascades to optimize operating costs and production flexibility. Each cascade is capable of enriching UF_6 gas to the desired product assay. UF_6 feed material is supplied from the X-3346 building to the process buildings via the X-2232C piping. In the process buildings, feed is distributed to the feed control systems for each cascade. The feed flow rates to each cascade are automatically controlled to ensure the desired feed is added to the cascade to support the production rate. As the feed enters the cascade, it is mixed with material already in the cascade and is separated into enriched and depleted material streams. This process continues until the material exits the top of the cascade as enriched product or the bottom of the cascade as tails material. The proportion of feed that becomes enriched product is controlled by the stage control valves, which are adjusted to provide the desired product and tails assays. Product and tails material are withdrawn from each cascade and sent to the X-3356 building. The product is sublimed into cold traps. The tails material is sublimed directly into tails cylinders. The cascade is limited to a maximum assay of 10 wt. percent ^{235}U.

The major components that support the enrichment operations are: centrifuge machines; centrifuge floor mount systems; service modules; inter-machine flow and control; X-2232C piping; and isolations valves.

1.1.5.5.3.1 Centrifuge Machines

The gas centrifuge machine is comprised of a number of subassemblies (see Figure 1.1-12): Casing; Rotor; Column; Upper Suspension Assembly (USA); Lower Suspension and Drive Assembly (LSDA); and the Diffusion Pump (not depicted in figure). A more extensive description of each of these components can be found in the ISA Summary.

1.1.5.5.3.2 Floor Mount

The machine mount system is the primary structural interface between the soil subgrade of the process building floors and the centrifuge machines. The machine mount system is a hard-torsion, hard-shear, and soft-rocking system. It consists of recessed steel floor modules encased in a large isolated concrete foundation mat. A mount at the bottom of the floor module, known as the fifth point, is designed to carry the full vertical weight of the centrifuge machine. Four specialty designed anchor pins with elastomeric isolators are arranged in a symmetrical pattern around the base of each machine at the operating floor level. These pins attach the machine to the encased steel frame and provide hard shear resistance in the event of horizontal thrust or torque lock-up, but allow vertical movement at the pin for the rocking motion.

The centrifuge mount system is designed so that each machine responds to its operating environment independently of other machines. This is accomplished by having the massive concrete foundation mitigate the effects of torque and shear experienced during an operational upset such as a rotor failure. The overturning forces experienced during an operational upset or by external events such as an earthquake are attenuated by the machine mount's soft rocking suspension.

1.1.5.5.3.3 Service Module

The piping configuration used to connect the centrifuges in the UF_6 enrichment process is designed to minimize the likelihood of a major interruption of operations, provide isolation of machines and minimize construction costs. A primary purpose of isolation is to prevent or limit the transport of light gases to centrifuges that are operating satisfactorily. Light gases can be introduced from leaks, miss-operation of the UF_6 feed system, and centrifuges that are encountering operational problems. Figure 1.1-14 (located in Appendix B) depicts the Service Module and its general layout and systems interfaces.

Within the process building, utilities and process piping are routed to the centrifuge machines via service modules that consist of a frame structure with pipe headers and valves; control and instrument cabling; ventilation ductwork; and electrical distribution cables running the full length. Pipe headers for process gas, vacuum, and recycle are aluminum, while those for air, cooling water, and fire suppression are steel. Smaller branch pipes connect the headers to each of the centrifuge machines. The machine isolation valves, machine power controls, and machine instrumentation are also mounted on the service modules. Each service module services multiple centrifuge machines and the service modules are connected in series to support an operating cascade.

1.1.5.5.3.4 Inter-Machine Flow and Control

The inter-machine flow and control system consists of process piping headers and valves for transporting the process gas to and from the centrifuges; feed control system for controlling the feed rate to the cascades in each train; inventory control system for each stage, which maintains the proper backpressure on each stage; instrumentation and controls for header pressures and centrifuge machine status; and sampling taps to provide sampling capability to determine product and tails assays and product contaminants.

1.1.5.5.4 Withdrawal Operations

Product withdrawal occurs in the X-3356 building via sublimation into cold traps. As many as three product assays can be fed to the X-3356 building from the process buildings. Product material is first sublimed into cold traps with the off-gas from the cold traps passing through evacuation cold traps and venting through an evacuation system. The cold traps are heated and the UF_6 is sublimed into source cylinders located in cold boxes. The filled source cylinders are then moved to interim storage and subsequently moved to the X-3346 building sampling and transfer area.

Tails withdrawal, also in the X-3356 building, is accomplished through compression and direct sublimation of UF_6 material into tails cylinders and does not involve UF_6 pressures above atmospheric pressure. The tails withdrawal design incorporates the capability for simultaneously withdrawing two uranium assays. The compression train consists of centrifugal compressors arranged in series with coolers and with recycle capability. Tails withdrawal is used for emergency inventory removal.

Table 1.1-1 American Centrifuge Plant Major Facilities

Facility No.	Facility Description	Facility Function
X-3002	Process Building	Houses the centrifuge machines and their support systems.
X-3012	Process Support Building	Houses the operational and maintenance areas and the transfer aisleway that services the X-3002 building.
X-3346	Feed and Customer Services Building	Supports the front end of the enrichment process by housing the equipment to provide UF_6 feed material.
X-3346A	Feed and Product Shipping and Receiving Building	Supports the back end of the enrichment process by housing the equipment to sample product material to ensure it meets customer specifications and to transfer UF_6 material to customer cylinders.
X-3356	Product and Tails Withdrawal Building	Houses two distinct areas of operation to meet the process withdrawal requirements: one for product withdrawal and the other for tails withdrawal.
X-6000	Pumphouse and Air Plant	Contains the necessary equipment/systems to distribute dry compressed air to the ACP and to provide the requisite water to the X-6001 Cooling Towers for the removal of heat from the process buildings.
X-6001	Cooling Tower	Provides the necessary cooling requirements for the process buildings.
X-6002	Boiler System	Provides hot water for heating.
X-7721	Maintenance, Stores and Training Building	Provide areas for maintenance shops; stores and receiving activities; and training.
X-7725	Recycle/Assembly Facility	An area where the centrifuge machines can be manufactured, assembled, tested, and maintained.
X-7725A	Waste Accountability Facility	Serves as a storage area for equipment and parts necessary for the maintenance and repair of the process and process support equipment.
X-7725C	Chemical Storage Building	Provides clean, non-contaminated, protected, storage area of manufacturing chemicals.
X-7726	Centrifuge Training and Test Facility	Initially used for centrifuge component manufacturing and centrifuge machine assembly, then used for machine assembly training and machine component preparation.

Table 1.1-1 American Centrifuge Plant Major Facilities

Facility No.	Facility Description	Facility Function
X-7727H	Interplant Transfer Corridor	Provides a protected pathway to transport centrifuge machines from the X-7725 or X-7726 buildings to the process buildings or back, as necessary. This area also serves as a shipping and receiving area for equipment and components during construction.
X-7745R	Recycle/Assembly Storage Yard	Provides clean, non-contaminated, outside, horizontal rack storage of centrifuge casings prior to being moved inside the building for machine assembly.
X-7746E	Cylinder Storage Yard	Allows for movement and storage of UF_6 material outside of the process (product source cylinders, full and empty customer cylinders, and cylinder protective shipping packages).
X-7746N	Cylinder Storage Yard	Allows for movement and storage of UF_6 material outside of the process (various cylinder types).
X-7746S	Cylinder Storage Yard	Allows for movement and storage of UF_6 material outside of the process (full and empty feed cylinders).
X-7746W	Cylinder Storage Yard	Allows for movement and storage of UF_6 material outside of the process (feed cylinders).
X-7756S	Cylinder Storage Yard	Allows for movement and storage of UF_6 material outside of the process (product source cylinders).

1.2 Institutional Information

USEC Inc. is the applicant for the ACP license.

1.2.1 Corporate Identity

USEC is a global energy company and its subsidiary, the United States Enrichment Corporation, is the world's leading supplier of enriched uranium fuel for commercial nuclear power plants. USEC, including its wholly owned subsidiaries, was organized under Delaware law in connection with the privatization of the United States Enrichment Corporation.

USEC is responsible for the design, manufacturing, assembling, installation, operation, maintenance, modification, and testing of the ACP in Piketon, Ohio.

USEC's principal office is located at 6903 Rockledge Drive, Bethesda, MD 20817. USEC is listed on the New York Stock Exchange under the ticker symbol USU. Private and institutional investors own the outstanding shares of USEC. The principal officers of USEC are listed below and are citizens of the United States.

James R. Mellor, President and Chief Executive Officer
Lisa E. Gordon-Hagerty, Executive Vice President and Chief Operating Officer
Ronald F. Green, Senior Vice President
Philip G. Sewell, Senior Vice President
Robert Van Namen, Senior Vice President
Ellen C. Wolf, Senior Vice President and Chief Financial Officer
W. Lance Wright, Senior Vice President
James F. McDonnell, Vice President, Chief Information and Security Officer

The mailing address for the ACP is:

USEC Inc.
American Centrifuge Plant
P. O. Box 628
Piketon, Ohio 45661

The NRC has issued Certificates of Compliance to the United States Enrichment Corporation, a wholly owned subsidiary of USEC, to operate the Paducah and Portsmouth GDPs (Docket Numbers 70-7001 and 70-7002, respectively). Consistent with the requirements in 10 CFR 76.22 and in connection with the issuance of these Certificates, the NRC has determined that USEC is neither owned, controlled, nor dominated by an alien, a foreign corporation, or a foreign government. Issuance of a license to USEC would be consistent with the requirements of 10 CFR 40.38 and 70.40, since the NRC concluded that USEC has satisfied similar requirements in 10 CFR 76.22. Furthermore, more recently the NRC has issued a license to USEC to operate the Lead Cascade Demonstration Facility (Docket No. 70-7003) pursuant to 10 CFR Part 70. There have been no changes in ownership or control that would invalidate the NRC's previous findings.

Further, issuance of a license would not be inimical to the common defense and security of the United States or to the maintenance of a reliable and economical domestic source of enrichment services. To the contrary, issuance will support those important goals. Commercial deployment of American Centrifuge technology by USEC will help ensure the United States will continue to maintain a reliable and economic, domestic source of enriched uranium. Deployment of the ACP is in furtherance of the goals of the June 17, 2002, DOE-USEC Agreement to "facilitate the deployment of new, cost effective advanced enrichment technology in the United States on a rapid schedule." It will enable USEC to deploy a modern, efficient and reliable enrichment plant to supplement and replace its current 50+ year-old GDPs.

1.2.1.1 Site Location

The ACP is located on the DOE reservation. The reservation is located at latitude 39°00'30" north and longitude 83°00'00" west measured at the center of the reservation on approximately 3,700-acres of federally owned land in Pike County, Ohio, one of the state's lesser populated counties. The largest cities within an approximate 50-mile radius are Portsmouth, Ohio, located approximately 27 miles to the south, and Chillicothe, Ohio, located approximately 27 miles to the north. The reservation occupies approximately 750 security-fenced acres and is located about one and one half miles east of U.S. Route 23 and two miles south of U.S. Route 32, and two miles east of the Scioto River.

USEC, through its subsidiary the United States Enrichment Corporation, leases a significant portion of the DOE reservation from the DOE. The ACP is within the space leased by the United States Enrichment Corporation and occupies approximately 200 acres of the southwest quadrant of the CAA. USEC and its agents will conduct USEC activities within the ACP buildings/facilities and access and egress thereto, in accordance with this license application.

1.2.1.2 Other Reservation Activities

The United States Enrichment Corporation operates the GDP in accordance with a NRC Certificate of Compliance issued pursuant to 10 CFR Part 76 requirements. These operations include:

- Maintaining the GDP in Cold Standby status under a contract with the DOE;
- Performing uranium deposit removal activities in the cascade facilities; and
- Removing technetium-99 (^{99}Tc) from potentially contaminated uranium feed in accordance with the June 17, 2002 agreement between DOE and the United States Enrichment Corporation.

The United States Enrichment Corporation also possesses a license for radioactive material operations from the State of Ohio for the conduct of laboratory and associated support activities. This license encompasses laboratory analyses, in-field analyses for radioactive material deposits, health physics survey, and characterization activities.

In addition to the United States Enrichment Corporation's operations, the DOE plans to construct and operate a depleted uranium hexafluoride (DUF_6) Conversion Facility on the reservation adjacent to the ACP and is also engaged in environmental restoration activities in a number of locations on the reservation. DOE utilizes contractors and sub-contractors to perform this work. DOE self-regulates DOE activities conducted in non-leased areas in accordance with applicable DOE requirements. Additionally, the Ohio National Guard maintains an area on the reservation for the maintenance, reconditioning, and storage of equipment. No ordnance is permitted. The activities are accomplished in and around the X-751 facility, located on the south end of the reservation.

The DUF_6 Conversion Facility on the reservation will be built to convert DUF_6 inventories into depleted uranium oxide (U_3O_8); to transport the depleted uranium conversion products and waste materials to a disposal facility; to transport and sell the hydrogen fluoride (HF) produced as a conversion co-product; and to neutralize the excess HF to calcium fluoride (CaF_2) or either sell or dispose of it appropriately in the event that the HF product is not sold (Reference 2).

1.2.2 Financial Qualifications

USEC estimates the total cost to construct the initial 3.5 million SWU capacity for the ACP to be up to $1.5 billion (in as spent dollars) (Reference 3) (see Appendix C of this license application), excluding capitalized interest, tails disposition, decommissioning, and any replacement equipment required during the life of the plant outside of normal spare equipment. The American Centrifuge Plant design is modular and can be constructed and installed incrementally over time. Upon receipt of a license, USEC plans to implement the initial phase of its commercial operations as described in Appendix C of this license application. In parallel, USEC plans to construct the plant and install machines in phases until it reaches a capacity of 3.5 million SWU approximately four years after receipt of a license. Phase I construction activities are those construction activities that occur during the 12 month period immediately following receipt of the license. As groups of machines are installed, operations will be initiated and will result in enrichment production that will generate revenue and cash flow. USEC may construct and install additional capacity thereafter as operations and market conditions permit subject to additional NRC licensing approval. Financing for each phase of incremental capacity may be raised using different financial instruments, and the ratio of equity to debt may vary over time for each increment. At no time will foreign equity ownership exceed ten percent.

USEC anticipates that its funding for various phases of construction may come from a variety of sources including, but not limited to, funds from operations, capital raised by USEC, potential partners, lending and/or lease arrangements and that the mix of funding sources may vary depending upon the phase of the project. For example, initial construction activity may be funded entirely from USEC funds from operations and/or USEC-raised capital, whereas later phases may be funded solely by project finance. Prior to initiating each phase, USEC will make available for inspection on a confidential basis, its budget estimate for such phase and documentation of the source of funds available or committed to fund that increment.

In general, USEC's financial qualifications to operate the ACP are demonstrated by the Selected Financial Data provided on pages 27-28 of its Form 10-K Annual Report for 2003, and its more detailed Consolidated Financial Statements provided on pages 57-60. A copy of this Annual Report is provided as Appendix D to this license application.

In order to meet the financial qualifications requirements for construction and operation of the facility, USEC proposes that the license be conditioned as follows:

- Construction of each incremental phase of the facility shall not commence before funding for that increment is available or committed. Of this funding, the applicant must have in place before constructing such increment, commitments for one or more of the following: equity contributions from the applicant, its parents, affiliates and/or partners, along with lending and/or lease arrangements that solely or cumulatively are sufficient to ensure funding for the particular increment's construction costs. The Applicant will make available for NRC inspection on a confidential basis, documentation of both the budgeted costs for such phase and the source of funds available or committed to pay those costs.

- Operation of the facility shall not commence until USEC has in place, either: (1) long term contracts lasting five years or more that provide sufficient funding for the estimated cost of operating the facility for the five year period; (2) documentation of the availability of one or more alternative sources of funds that provide sufficient funding for the estimated cost of operating the facility for five years; or (3) some combination of (1) and (2).

The DOE-USEC Agreement required that the ACP be constructed on the DOE reservation located at either the Portsmouth Gaseous Diffusion Plant or the Paducah Gaseous Diffusion Plant. Pursuant to Section 3107 of the USEC *Privatization Act*, the United States Enrichment Corporation leases the portions of the DOE reservation from DOE on which the ACP is located. Under its lease with DOE, and in accordance with Section 3107, the United States Enrichment Corporation is indemnified under Section 170d of the *Atomic Energy Act* for liability claims arising out of any occurrence within the United States, causing, within or outside the United States, bodily injury, sickness, disease, or death, or loss of or damage to property, or loss of use of property, arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of chemical compounds containing source or special nuclear material arising out of activities under the lease. This indemnification is sufficient to meet the requirements of Section 193(d) of the *Atomic Energy Act* of 1954, as amended, and 10 CFR 140.13b, because the DOE indemnity provides greater financial protection than commercially available liability insurance. Therefore, the appropriate amount of separate liability insurance that should be required by the NRC is zero.

Information indicating how reasonable assurance will be provided that funds will be available to decommission the facility as required by 10 CFR 70.22(a)(9), 10 CFR 70.25, and 10 CFR 40.36 is described in Chapter 10.0 of this license application.

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.

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 10.3 of this license application, the financial assurance for decommissioning the plant, to include the disposition of the 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. In this way, funds will be made available as the decommissioning liability is incurred.

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 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 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 UF_6 tails disposition, is justified based upon USEC's commitments to update the cost estimates and provide a revised funding instrument for decommissioning and UF_6 tails disposition prior to operation of each additional increment of capacity on process gas, 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.

Similar to the exemption granted for the GDP regarding criticality monitoring of the UF_6 cylinder storage yards the following exemption from the requirements of 10 CFR 70.24 addressing criticality monitoring is identified in Section 5.4.4 of this License Application and the ISA Summary Section 3.10.6.

- 10 CFR 70.24, *Criticality Accident Requirements*, requires that licenses 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 with 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 exemption is authorized by law because there is no statutory provision prohibiting the grant of the exemption. The requested exemption will not endanger life or property or the common defense and security and is otherwise in the public interest for the reasons discussed below.

The UF_6 cylinder storage yards are not covered by a criticality monitoring system because the frequency for criticality accidents in the cylinder yards range between 5 x 10^{-6}/year and 1 x 10^{-6}/year (Highly Unlikely), the increased vehicular and pedestrian traffic in support of CAAS maintenance and calibration requirements causes a subsequent increased likelihood for impact events involving cylinders, and there is an increased safety risk for workers from radiation exposure due to the ongoing CAAS maintenance and calibration requirements.

The frequencies of criticality events in the cylinder yards have been decreased to the Highly Unlikely range (<10^{-5}/year) through the establishment of preventative controls. 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 inspection. If a UF_6 filled cylinder is found to be breached, the cylinder is covered within 5-hours after discovery to reduce the potential accumulation of moderating material (e.g., rainwater). This time limit ensures a corresponding 100-yr 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. Workers performing cylinder repairs in the UF_6 cylinder storage yards are required to wear personal alarming devices since CAAS coverage is not available. These requirements are established as items relied on for safety to ensure the health and safety of the public and workers.

Similar to the GDPs, the following exemption to the material status reporting requirements specified in 10 CFR 74.13(a) has been identified in the Fundamental Nuclear Material Control Plan (FNMCP) for the American Centrifuge Plant. 10 CFR 74.13(a) states, in part, the following:

> Each licensee, including nuclear reactor licensees as defined in §§ 50.21 and 50.22 of this chapter, authorized to possess at any one time and location special nuclear material in a quantity totaling more than 350 grams of contained uranium-235, uranium-233, or plutonium, or any combination thereof, shall complete and submit, in computer-readable format Material Balance Reports concerning special nuclear material that the licensee has received, produced, possessed, transferred, consumed, disposed of, or lost. This prescribed computer-readable report replaces the DOE/NRC form 742, which has been previously submitted in paper form. The Physical Inventory Listing Report must be submitted with each Material Balance Report. This prescribed computer-readable report replaces the DOE/NRC form 742C, which has been previously submitted in paper form. Each licensee shall prepare and submit the reports described in this paragraph in accordance with instructions (NUREG/BR-0007 and Nuclear Materials Management and Safeguards System (NMMSS) Report D-24 "Personal Computer Data Input for NRC Licensees").

As described in the NRC's letter to the United States Enrichment Corporation (Reference 19) and summarized in the Compliance Evaluation Reports (CER) prepared to support the current Certificates of Compliance for the GDPs (Reference 20) the GDPs are currently operating under an exemption to the requirements of 10 CFR 74.13. As noted in References 19 and 20, the current exemption for the GDPs remains in effect until the reporting guidance is revised and appropriate programming changes are made to the NMMSS.

The FNMCP submitted with this license application describes how USEC intends to perform material status reporting for the ACP. The material status reporting for the ACP will be performed utilizing a program similar to the GDPs. As a result, the FNMCP for the ACP will also not completely satisfy the requirements of 10 CFR 74.13 (a). As such, a similar exemption to that currently in effect for the GDPs is requested for the ACP.

Although the appropriate material status reporting guidance has been revised as noted in Reference 20, due to the nature of the enrichment process, this revised guidance will not fully support complete and accurate material reporting for the ACP for the following reasons:

- Provisions to report enrichment cascade transactions (Material Type 89), which are transactions between cascade and depleted, normal, and enriched uranium material types, are not provided.
- Balanced DOE/NRC Form 742, *Material Status Reports* cannot be created for each material type, without cascade transactions (Material Type 89).

- Submittal of data in summary form does not provide sufficient detail to satisfy DOE material management/financial requirements. The DOE requires line item detail to allocate government-owned materials into appropriate DOE projects and assign financial valuation.

- Provisions to apply rounding bias adjustments have not been provided which adversely affects inventory difference results. Inability to apply rounding bias adjustments has a larger impact due to the amounts of source material uranium and crossover between material types.

In a letter to the NRC dated April 1, 2004 (Reference 21), USEC submitted these and other concerns, as well as provided proposed revisions to the reporting guidance identified in 10 CFR 74.13(a) to resolve these concerns. This submittal is currently under review by the NRC staff. USEC requests that an exemption to the requirements of 10 CFR 74.13(a) be issued for the ACP, similar to that currently in effect for the GDPs, until such time as the NRC staff has made a final determination on USEC's April 1, 2004 submittal.

10 CFR 74.7 allows the Commission, upon its own initiative or upon application of the Corporation, to grant exemptions from the requirements of the regulations "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." USEC asserts that the law authorizes granting this exemption, because there is no statutory prohibition of the requested exemption.

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 USEC from material status reporting or other applicable requirements contained in Part 74. The proposed exemption would result only in use of the material status reporting at the ACP, similar to that currently in effect at both GDPs which has been demonstrated to satisfy the United States Enrichment Corporation's material status reporting responsibilities.

The following Special Authorization has been identified in this license application:

- Surface Contamination Release Levels for Unrestricted Use – Items may be released for unrestricted use if the surface contamination is less than the levels listed in Table 4.6-1.

1.2.6 Security of Classified Information

USEC is required by 10 CFR 70.22(m) to submit, as part of its application for a license for the ACP, a plan describing the plant's proposed security procedures and controls, as set forth in 10 CFR Part 95, for the protection of classified matter. USEC satisfies the 10 CFR 70.22(m) requirements by submittal of the Security Plan for the Protection of Classified Matter as Chapter 2 of the Security Program for the American Centrifuge Plant. The Security Program is being submitted for NRC review along with this license application. In accordance with 10 CFR Part 95.15(b), USEC will submit, at least 60 days prior to operation of the ACP, an application for the transfer of Facility Clearance from DOE to the NRC.

Table 1.2-1 Possession Limits for NRC Regulated Materials and Substances

[Information from this page has been withheld pursuant to 10 CFR 2.390]

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N14.1-1990 or 2001 designs, a derivative of this design, or a grade 5 bolt. Cylinders with these type of CVPs may be subsequently transferred to the ACP.

D. Cylinder Plugs: Use of steel or aluminum-bronze plugs in UF_6 cylinders is acceptable at the United States Enrichment Corporation GDP's for the following operations: heating, feeding, sampling, filling, transferring between cylinders, and onsite transport and storage. Therefore, these cylinders with these types of plugs may be subsequently transferred to the ACP.

E. 48HX Cylinders: None of the model 48HX cylinders in use by the United States Enrichment Corporation GDP's were manufactured to ANSI N14.1-2001 standard and this model of cylinder is no longer in production. However, the 2001 edition of this standard mistakenly lists the minimum volume for this cylinder as 139 ft3 and the maximum fill limit at 26,840 pounds. Previous editions of the standard list the minimum volume for this cylinder type as 140 ft3 and the maximum fill weight as 27,030 pounds. Model 48HX cylinders in use at the GDP's comply with the volume requirements and fill limits listed in the 1990/1995 editions of ANSI N14.1 standard and may be subsequently transferred to the ACP.

For the reference to this standard, see the Sections 2.2.3.5.1, 2.2.4.5, 2.2.5.5.1, 2.2.10.5, and 2.2.12.5 of the ISA Summary for the ACP.

1.4.3 American National Standards Institute/American Society of Mechanical Engineers

- ANSI/ASME NQA-1-1994, *Quality Assurance Requirements for Nuclear Facility Applications*

USEC satisfies the provisions of this standard as stated below, with clarification stated in the QAPD:

A. USEC satisfies the definitions, as stated in the Introduction of Part I of ASME NQA-1-1994.

B. Indoctrination and training satisfies the provisions of Supplement 2S-4, "Supplementary Requirements for Personnel Indoctrination and Training" of Part 1 of ASME NQA-1-1994.

C. Quality Control personnel performing inspection and testing satisfies the provisions of Supplement 2S-1, "Supplementary Requirements for the Qualification of Inspection and Test Personnel" of Part 1 of ASME NQA-1-1994.

D. QA audit personnel satisfy the provisions of Supplement 2S-3, "Supplementary Requirements for the Qualification of Quality Assurance Program Audit Personnel" of Part 1 of ASME NQA-1-1994.

E. Design outputs that consist of computer programs are developed, validated, and managed in accordance with ASME NQA-1-1994 Part II, Subpart 2.7, Basic Requirement 11.

F. Methods of design verification satisfy the provisions of Supplement 3S-1 of ASME NQA-1-1994.

G. Computer Program Testing is performed in accordance with ASME NQA-1-1994, Basic Requirement 11, "Test Control," and Supplement 11S-2, "Supplementary Requirements for Computer Program Testing."

H. Lifetime records are defined in accordance with ASME NQA-1-1994, Supplement 17S-1, "Supplementary Requirements for Quality Assurance Records," Section 2.7.1.

I. Hard copy or microfilm storage facilities satisfies the guidance of ASME NQA-1-1994, Supplement 17S-1, "Supplementary Requirements for Quality Assurance Records," Section 4.4.

For the references to this standard, see Section 11.5.1 of this license application and Sections 2.0, 3.0, and 11.0 of the QAPD for the ACP.

- ANSI/IEEE 336-1985, *Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities*

  Periodic inspections and testing of items relied on for safety will be in accordance with Clause 7.

1.4.4 American Society of Mechanical Engineers

- ASME N509-1989, *Nuclear Power Plant Air-Cleaning Units and Components*

  New and existing fixed HEPA filter systems needed to ensure compliance with release limits or to control worker radiation exposure satisfy the provisions of this standard with the following exceptions/clarifications:

  Section 5.2 - Do not satisfy; No credit is taken for absorbers

  Section 5.5 - Do not satisfy requirements for air heaters

  Section 8.0 - Quality assurance requirements for applicable systems are identified in the QAPD

  Appendix A - Do not sample adsorbents

  Appendix B - Do not use allowable leakage guidance

  Appendix C – This appendix is used as guidance only

Appendix D - The manifold qualification program uses this appendix as guidance only

For the reference to this standard, see Section 4.6.1 of this license application.

- ASME N510-1989, *Testing of Nuclear Air-Treatment Systems*

New and existing fixed HEPA filter systems that satisfy the requirements of ASME N509 and are needed to ensure compliance with release limits or to control worker radiation exposure satisfy the provisions of this standard with the following exceptions/clarifications:

Section 6.0 - Only satisfy this section for new seal-welded duct systems or for connections to a system where this section has been previously applied

Section 7.0 - Do not use guidance for monitoring frame pressure leak tests

Existing fixed HEPA filter systems that do not satisfy the requirements of ASME N509 are tested using the requirements of this standard or another industry accepted standard as guidance only

For the reference to this standard, see Section 4.6.1 of this license application.

1.4.5 National Fire Protection Association

- NFPA 10-2002, *Standard for Portable Fire Extinguishers*

USEC satisfies the provisions of this standard with the following exceptions/clarification:

The provisions of this standard were used as guidance in determining the size, selection, and distribution of portable fire extinguishers. USEC will satisfy the provisions of this standard for modifications to the facility except as documented and justified by the Authority Having Jurisdiction (AHJ).

For references to this standard, see Section 7.4.3 of this license application.

- NFPA 13-2002, *Standard for the Installation of Sprinkler Systems*

USEC satisfies the provisions of this standard with the following exceptions/clarification:

The provisions of this standard were used as guidance for the design and installation of wet and dry pipe automatic sprinkler systems. In addition, the Process Building meets the definition of Ordinary Hazard Occupancies (Group 2) as stated in this standard and the fire protection system exceeds the sprinkler discharge requirement for this type of occupancy. USEC will satisfy the

provisions of this standard for modifications to the facility except as documented and justified by the AHJ.

For the reference to this standard, see Section 7.3.1 of this license application.

- NFPA 15-2001, *Standard for Water Spray Fixed Systems for Fire Protection*

  USEC will satisfy the provisions of this standard for modifications to the facility except as documented and justified by the AHJ.

  For the reference to this standard, see Section 7.3.1 of this license application.

- NFPA 25-2004, *Standard for Inspection, Testing, and Maintenance of Water-Based Protection*

  USEC will satisfy the provisions of this standard except as documented and justified by the AHJ.

  For the reference to this standard, see Section 7.1.2 of this license application.

- NFPA 30-2003, *Flammable and Combustible Liquids Code*

  USEC satisfies the requirements of this standard with the following exceptions/clarification:

  Above ground storage tanks were installed using the provisions of this standard for guidance only. USEC will satisfy the provisions of this standard for modifications to the facility except as documented and justified by the AHJ.

  For references to this standard, see Section 7.3 of this license application.

- NFPA 51B-2003, *Standard for Fire Prevention During Welding, Cutting, and Other Hotwork*

  USEC uses the provisions of this standard as guidance for the review of hot work permitting.

  For the reference to this standard, see Section 7.1.1 of this license application.

- NFPA 70-2005, *National Electrical Code*

  This NFPA standard was used as guidance for the installation of the electrical systems.

  For the reference to this standard, see Section 7.3 of this license application.

- NFPA 72-2002, *National Fire Alarm Code*

  This NFPA standard was used as guidance for the installation of the fire alarm systems.

  For the reference to this standard, see Section 7.3.2 of this license application.

- NFPA 75-2003, *Standard for the Protection of Electronic Computer/Data Processing Equipment*

  This NFPA standard was used as guidance for the protection of the computer systems.

  For the reference to this standard, see Section 7.0, Table 7.1-1 of this license application.

- NFPA 80-1999, *Standard for Fire Doors and Fire Windows*

  USEC will satisfy the provisions of this standard except as documented and justified by the AHJ.

  For the reference to this standard, see Section 7.0, Table 7.1-1 of this license application.

- NFPA 101-2003, *Life Safety Code*

  USEC uses the provisions of this standard as guidance for the review of emergency egress paths.

  For the reference to this standard, see Section 7.3 of this license application.

- NFPA 220-1999, *Standard on Types of Building Construction*

  USEC uses the provisions of this standard as guidance for the review of building construction.

  For the reference to this standard, see Section 7.0 Table 7.1-1 of this license application.

- NFPA 232-2000, *Standard for the Protection of Records*

  USEC satisfies the provisions of this standard with the following exceptions/clarification:

  As described in Section 11.7.1.8 of the licensing application, there are several acceptable methods for the storage of permanent records. If the NFPA 232

method of storage in 2-hour-rated containers is used, any exceptions to this standard will be documented and justified by the AHJ.

For the reference to this standard, see Section 11.7.1.8 of this license application.

- NFPA 241-2000, *Standard Safeguarding Construction, Alteration, and Demolition Operations*

  USEC uses the provisions of this standard as guidance for the review of construction activities.

  For the reference to this standard, see Section 7.1.1 of this license application.

- NFPA 801-2003, *Standard for Fire Protection for Facilities Handling Radioactive Material*

  USEC will utilize this standard for any future modifications to the fire protection program as stated in Section 7.1.1 of this license application.

  For the reference to this standard, see Section 7.1.1 of this license application.

1.4.6 Nuclear Regulatory Commission Guidance

- Regulatory Guide 1.59, Revision 2, *Design Basis Floods for Nuclear Power Plants*

  USEC satisfies the provisions of this Regulatory Guide (RG) to the extent applicable to a Part 70 licensee.

  For references to this standard, see Sections 1.3.4.3 and 1.3.4.3.2 of this license application.

- Regulatory Guide 3.67, Revision 0, *Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities*

  USEC utilized the provisions of this RG as guidance for DOE reservation Emergency Plan.

  For references to this RG, see Sections 8.1 and 8.2 of this license application.

- Regulatory Guide 3.71, Revision 0, *Nuclear Criticality Safety Standards for Fuels and Material Facilities*

  This RG endorses ANSI/ANS-8 standards. USEC commits to ANSI/ANS-8.1-1983, ANSI/ANS-8.19-1996, and ANSI/ANS-8.20-1991 as described above.

  For the reference to this RG, see Section 5.5 of this license application.

- Regulatory Guide 8.13, Revision 2, *Instructions Concerning Prenatal Radiation Exposure*

  USEC satisfies the provisions of this RG.

  For the reference to this RG, see Section 4.1.1 of this license application.

- Regulatory Guide 1.109, Revision 1, *Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I*

  USEC satisfies the provisions of this RG to the extent applicable to Part 70 licensee.

  For references to this RG, see Sections 9.2.2.1.2 and 9.2.2.2.2 of this license application.

- NUREG-1065, *Acceptable Standard Format and Content for the Fundamental Nuclear Material Control Plan Required for Low Enriched Uranium Facilities*

  This NUREG was used for general reference purposes in structuring the FNMCP for the ACP.

  For references to this NUREG, see Section 15.0 of the FNMCP for the ACP.

- NUREG-1513, *Integrated Safety Analysis Guidance Document*

  This NUREG was used as a general reference and guidance document during the development of the ISA and ISA Summary.

  For references to this NUREG, see Sections 3.1.2, 3.2, 3.3, 5.5, 6.4, 7.2.2, 7.6, 8.2, 9.2.3, and 9.4 of this license application.

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

  This NUREG was used as a general reference and guidance document during the development of the license application. This license application follows the format and guidelines of the NUREG.

  For references to this NUREG, see Sections 1.0, 1.4, 3.2, 5.5, 6.4, 7.6, 8.2, 9.2.3, 9.4, 10.11, and 11.9 of this license application.

- NUREG-1601, *Chemical Process Safety at Fuel Cycle Facilities*

  This NUREG was used as a general reference and guidance document during the development of the license application.

  For the references to this NUREG, see Section 6.14 of this license application.

- NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs*

  This NUREG was used as a general reference and guidance document during the development of the license application.

  For the references to this NUREG, see the Environmental Report for the ACP.

- NUREG-1757, *Consolidated NMSS Decommissioning Guidance, Volumes 1, 2, and 3, Final Report, September 2003*

  This NUREG was used as a general reference and guidance document during the development of the decommissioning section of the license application.

  For the references to this NUREG, see Section 10.10.1 of this license application.

- NUREG/BR-0006, *Instructions for Completing Nuclear Material Transfer Reports*

  This NUREG describes the requirements for reporting nuclear material transactions to the national database. 10 CFR 74.15 requires that instructions in this NUREG be followed.

  USEC satisfies the provision of this NUREG.

  For the reference to completion of Nuclear Material Transaction Reports, see Section 10 of the FNMCP for the ACP.

- NUREG/BR-0007, *Instructions for the Preparation and Distribution of Material Status Reports*

  This NUREG describes the requirements for submitting material status reports to the national database. 10 CFR 74.13 requires that instructions in this NUREG be followed.

  USEC satisfies the provisions of this NUREG to the extent possible for uranium enrichment facilities.

  For the reference to this NUREG, see Section 8.7 of the FNMCP for the ACP.

- NUREG/BR-0096, *Instruction and Guidance for Completing Physical Inventory Summary Reports, NRC Form 327*

  This NUREG provides line-by-line instructions for preparing NRC Form 327, Special Nuclear Material and Source Material Physical Inventory Summary Reports.

  USEC satisfies the provisions of this NUREG.

  For the reference to this NUREG, see Section 12.4 of the FNMCP for the ACP.

- NUREG/CR-4604, *Statistical Methods for Nuclear Material Management*

  This NUREG contains techniques and formulas used to estimate random and systematic error variances associated with nuclear material measurement methods.

  For the reference to this NUREG, see Section 9.1.1 of the FNMCP for the ACP.

- NUREG/CR-5734, *Standard Format and Content for the Fundamental Nuclear Material Control Plan Required for Low Enriched Uranium Enrichment Facilities*

  This NUREG is used to establish the Detection Quantity for evaluation of nuclear material inventory differences.

  For the reference to this NUREG, see Section 9.4 of the FNMCP for the ACP.

- NUREG/CR-6410, *Nuclear Fuel Cycle Facility Accident Analysis Handbook*

  Portions of this NUREG were used as a general reference and guidance document in the development of the accident analyses in the ISA.

  For the reference to this NUREG, see Section 3.3 of the ISA Summary for the ACP.

- NRC Information Notice No. 88-100: *Memorandum of Understanding between NRC and OSHA Relating to NRC-Licensed Facilities (53 FR 43950, October 31, 1988)*, December 23, 1988

  USEC has reviewed the information contained in this Information Notice.

  For the reference to this IN, see Section 6.4 of this license application.

1.4.7 Other Codes, Standards, and Guidance

- Federal Guidance Report No. 11, "*Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*

The data contained in Tables 2-1 and 2-2 of this document used to calculate dose conversion factors for radionuclides of concern. This data is also used to calculate the Derived Air Concentrations (DACs) listed in Table 4.7-4.

For the reference to this guidance document, see Section 4.7.4 of this license application.

- American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A, June 1980 Edition

  USEC satisfies the provisions of this recommended practice.

  For the reference to this recommended practice, see Section 2.0 of the QAPD for the ACP.

- IAEA Safeguards Technical Manual, Part F, Volume 3

  The method used to establish sample sizes for item monitoring activities was obtained from this manual.

  For the reference to this recommended practice, see Section 7.4 of the FNMCP for the ACP.

2.2 Management Controls

USEC has established management measures with associated policies, administrative procedures, and management controls to ensure the ACP equipment, facilities and procedures; the staff (including training and qualifications); and the programs provide for the protection of the health and safety of workers and the public, protection of the environment, and for the common defense and security. Management controls have been established to maintain configuration management of the plant. These controls are described in Section 11.1 of this license application. Organizations with environmental, health, nuclear safety, safeguards, security, and quality responsibilities have been established with a reporting chain, independent from the operations organization. Effective lines of communication and authority among the organizations involved in the engineering, environmental, safety, and health, and operations functions of the plant are clearly defined.

The management controls established by USEC for the ACP include policies, management systems, and administrative procedures that are communicated to plant personnel. Policies related to the protection of health and safety of workers and the public, protection of the environment, and providing for the common defense and security are discussed in pertinent sections of this license application. Activities that are essential for effective implementation of the environmental, safety, and health functions are documented in approved, written procedures, prepared in compliance with a document control program. Procedure development and document control are described in Section 11.4 of this license application and Section 5.0 and 6.0 of the QAPD.

Management measures required to ensure the availability and reliability of items relied on for safety (IROFS) are described in Chapter 11.0 of this license application. Controls specific to plant programs are identified in the QAPD, Fundamental Nuclear Material Control Plan, and Security Program for the American Centrifuge Plant.

The commitment tracking and Corrective Action Programs are integrated to prioritize ACP actions consistent with their safety and safeguards significance. Any person working in the plant may report potentially unsafe conditions or activities by submitting a condition notification. Reported concerns are investigated, assessed, and resolved as described in Section 11.6 of this license application.

Where safety, security or safeguards might be adversely impacted by cost or schedule considerations, it is the policy of USEC to subordinate cost and schedule considerations to ensure adequate treatment of safety and safeguards in full compliance with applicable regulatory requirements.

The integration of ACP operations and the various programs and requirements is accomplished through a variety of management practices, including:

- Staff meetings to discuss issues and policy implementation;
- Review of performance indicators;
- Review of identified events or conditions;
- Multi-discipline reviews by the Plant Safety Review Committee (PSRC); and
- Work permit systems that provide the integration in the field of various health, safety, and environmental program requirements and hazard evaluations.

Additionally, oversight of the integration of various program elements is provided by the QA organization.

Letters of agreement exist with off-site emergency resources (i.e., fire, police, ambulance/rescue units, and medical services). These interface agreements are addressed in more detail in the Emergency Plan for the American Centrifuge Plant.

2.2.1 Plant Safety Review Committee

The PSRC performs multi-discipline reviews of day-to-day and proposed activities to ensure that these activities are and/or will be conducted in a safe manner. The PSRC advises the Director, American Centrifuge Plant on matters related to Radiation Protection, Nuclear Safety, Chemical Safety, Fire Safety, and Environmental Protection. The specific membership, qualifications, meeting frequency, quorum, functions, responsibilities, and required records are provided in a plant procedure. Auditing and oversight of PSRC activities is the responsibility of the QA Manager.

Subcommittees may be established by the PSRC chairperson to provide assistance in conducting reviews and assessments as described in the PSRC procedure. The PSRC chairperson approves the subcommittee procedures, membership, and member qualifications. The PSRC maintains the overall responsibility for any required reviews.

2.3 Pre-operational Testing and Initial Start-up

Specific plans have been established to ensure the safe and efficient turnover, testing, and start-up of centrifuge machines, equipment, and support systems. These plans cover the transition from the refurbishment/construction phase to the operations phase.

The minimum requirements for a qualified Senior NCS Engineer are:

- Completion of the minimum requirements for a qualified NCS Engineer;
- Performance of the functions of a qualified NCS Engineer;
- Completion of one year as a qualified NCS Engineer; and
- Approval by the NCS Manager (or equivalent).

The NCS Manager (or equivalent) may modify the minimum Senior NCS Engineer qualification requirements for personnel who have worked for a minimum of five years at other facilities as a nuclear criticality safety engineer.

5.3 Management Measures

5.3.1 Procedure Requirements

Operations to which NCS pertains are governed by written procedures or work packages. These procedures or work packages contain the appropriate NCS controls for processing, storing, and handling fissile material. The NCSE requirements that specify employee actions are incorporated into procedures or work packages as work instructions and are identified. Identifying these requirements ensures changes to these requirements are not made without review and approval by NCS. The NCSE requirements are incorporated into the appropriate procedures or work packages as required by the NCS Program procedure.

New and modified procedures or work packages are reviewed by the appropriate safety organizations, including NCS, as specified in the procedure for procedure control and/or work control process. NCS reviews the procedures and/or work instructions to verify that the appropriate NCSE requirements have been incorporated and to verify that the proposed operation complies with NCS Program requirements. Section 11.4 of this license application provides more details related to the procedure development and change process.

5.3.2 Posting and Labeling Requirements

Administrative NCS limits and controls for areas, equipment, and containers are presented through the use of postings and labels as specified in approved NCSEs and procedures. Postings and labels are proposed, reviewed, and approved during the NCSE review and approval process. Postings and/or labels are not required for engineered controls and may not be required for administrative controls when those limits and controls are included in "in-hand" operating procedures. These limits and controls are posted on

the NCS requirements signs as required by the plant NCS procedures. Approved NCSEs specify the wording for the postings. Labels are prepared in accordance with the plant NCS procedures and used as required by NCSEs. Limits and controls are printed or written in an appropriate size, and the postings and labels are placed in conspicuous locations such that they are legible to the operator at the work location, on the specific component, item, or piece of equipment, or posted at the entrance to an operating area or storage area. The specific locations may be specified in the applicable NCSE or determined by the supervision responsible for the material.

5.3.3 Change Control

A configuration management (CM) program ensures that any change from an approved baseline configuration is managed so as to preclude inadvertent degradation of safety or safeguards. The CM Program, described in Section 11.1 of this license application, includes organization and administrative processes to ensure accurate, current design documentation that matches the plant's physical configuration. The CM program applies to NCS and a change control process is utilized that helps ensure that the requirements of 10 CFR 70.72 are met, including the ISA Summary update requirements contained in 10 CFR 70.72(d)(3).

Functional and physical characteristics of operations controlled for NCS are described in NCSEs. Components and features that are identified in the NCSEs are analyzed to determine the "boundary" of the system, encompassing those interconnecting and/or supporting items that are essential to ensure availability and reliability. The boundaries are identified on system drawings, and the configuration is verified to be as-built. These components and features are maintained in a design control document for the building or process. Each time a change is planned, the document is reviewed by the individual (e.g., design authority, systems engineer, operations manager, maintenance, etc.) planning the change to determine if the change affects an IROFS. The NCS Program establishes and maintains NCS safety limits and NCS operating limits for IROFS in nuclear processes and maintains adequate management measures to ensure the availability and reliability of the IROFS.

The change control process specifies the organizations required to perform reviews of changes. If an item is relied on for the criticality safety of an operation (i.e., is an IROFS), it will be identified and NCS reviews the NCSE for the specific operation and determines if the change affects the analysis performed and the conclusions made in the NCSE. The change request will be approved by NCS only if the change does not adversely impact NCS, or once a revised NCSE has determined that the change is acceptable and meets NCS Program requirements. If a change affects the ISA Summary, it is updated appropriately. In this way, modifications to controlled operations are evaluated and approved prior to implementation and placing the affected structures, systems, or components in service.

Records management and document control (RMDC) is another element of CM and is described in Section 11.7 of this license application. Procedures, documents, and records control programs provide for centralized control and issuance of documents essential to the maintenance of the design history, and a repository for records to verify this maintenance. NCSEs are specifically included in the index of documents that are required to be controlled.

within specified values. If two controls are implemented for one parameter, the violations or failure scenarios addressed by the controls will be independent. Application of this principle ensures that no single credible event can result in an accidental criticality or that the occurrence of events necessary to result in a criticality is not credible.

The NCSE will document the basis for the conclusion that a change in a process or parameter is "unlikely". The basis may be an engineered feature, administrative control, the natural or credible course of events, or any combination of these or other means necessary to ensure the change is unlikely to occur. The parameters or conditions relied on and the limits must be specified in the NCSE and controlled.

Where the natural or credible course of events is relied upon in whole or in part to prevent a process condition change, the factors that influence the process are described in sufficient detail in the NCSE as items related to NCS and programmatically controlled. For items that are established, maintained, and implemented by non-NCS programs, credit for availability and reliability is established as described in Section 11.1 of this license application without the need for additional NCS controls. For situations where the NCS-credited controls do not provide adequate assurance of availability or reliability (i.e., situations where non-NCS programmatic and physical plant changes could adversely affect the intended criticality safety function of the items relied upon for criticality safety), specific NCS controls are established, maintained, and implemented to ensure criticality safety.

The NCS evaluation process involves a review of the proposed operation and procedures or work instructions, discussions with the subject matter experts to determine the credible process upsets which need to be considered, development of the controls necessary to meet the double contingency principle, and identification of the assumptions and equipment (i.e., physical controls) needed to ensure criticality safety.

Engineering judgment of both the analyst and the technical reviewer is used to ascertain independence of events and their likelihood or credibility. The basis for this judgment is documented in the NCSEs. Depending on the complexity of the operation, analytical methods such as Fault Tree and Event Tree Analyses may be used in the evaluation process to examine potential accident scenarios. When needed to support the analytical method, qualitative or quantitative estimates of event frequency are developed to support the determination of the likelihood of an event.

Once the NCSE is completed, a technical review of the evaluation is performed and documented. The technical review of an NCS evaluation is performed by a Senior NCS Engineer or is a NCS Engineer completing the technical review under the guidance of a Senior NCS Engineer.

The NCSE documents the NCS requirements for the operation. The NCS requirements include the process conditions that must be maintained to meet the double contingency principle or preserve the documented basis for criticality safety and restrict the modes of operation to those that have been analyzed in the NCSE. The requirements to be included in operating procedures and/or work instructions, and postings are identified.

The NCSE approval process first involves the acceptance of the NCSE by the technical reviewer. A review is then performed by the NCS Manager to ensure consistency with other NCSEs and other potentially conflicting requirements or regulations. After approval by the NCS Manager, a review is performed in accordance with 10 CFR 70.72 as described in Section 11.1.4 of this license application to determine whether prior NRC approval of the NCSE is required. If NRC approval is not required, the NCSE is reviewed by the responsible organization manager. Editorial changes require only the approval of the NCS Manager. Editorial changes are defined as changes that do not change the technical basis of the NCSE. Once approved, the NCS controls, limits, evaluation assumptions, and safety items are verified to be fully implemented in the field. The operations organization and NCS personnel perform this verification process. The documentation of this verification process is maintained as a quality record along with the NCSE.

Management of the operating organization is responsible for implementing, through training and procedures or work instructions, the conditions delineated in the NCSE. Operational aids such as postings, labels, boundaries for fissile material operations, and fissile material movement guidelines are provided as specified in the NCSE. The manager/supervisor ensures postings and labels are prepared and verify that they are properly installed as required by the NCSE. The procedures and/or work instructions are prepared or modified to incorporate the NCSE requirements. Managers/supervisors are responsible for ensuring the employees understand the procedures and/or work instructions and understand the NCS requirements before the work begins.

Each completed NCSE is issued as a controlled document. Completed NCSEs are archived and retrievable as permanent quality records in accordance with the RMDC requirements described in Section 11.7 of this license application. The NCSE process provides assurance that operations will remain subcritical under both normal and credible abnormal conditions.

Emergencies arising from unforeseen circumstances can present the need for immediate action. If NCS expertise or guidance is needed immediately to avert the potential for a criticality accident, direction will be provided orally or in writing. Such direction can include a stop work order or other appropriate instructions. Documentation will be prepared within 48 hours after the emergency condition has been stabilized.

New operations must comply with the double contingency principle.

5.4.2.1 Non-Fissile Material Operations

Some operations involve situations in which the uranium has an enrichment of less than 1 wt. percent ^{235}U or an inventory of less than 100 g ^{235}U. These operations are termed "non-fissile material operations" and are performed without the need for NCS double contingency controls. The determination of which operations are fissile versus which operations are non-fissile may be contained within a NCSE or as a separate document. When the determination is outside a NCSE, the determination need not be performed by a qualified NCS Engineer. The determination of an operation being non-fissile must include normal and credible abnormal upset conditions to ensure the enrichment and/or inventory are maintain below 1 wt. percent ^{235}U or below 100 g ^{235}U. Controls are sometimes applied to a non-fissile material operation to ensure it does not inadvertently involve fissile

material. These controls can be either engineered or administrative and may be incorporated into applicable operating procedures or work instructions at the discretion of the responsible line manager.

5.4.3 Design Philosophy and Review

Through the CM Program, designs of new fissile material equipment and processes must be approved by NCS before implementation. Where practical, the use of engineered controls on mass, geometry, moderation, volume, concentration, interaction, or neutron absorption will be used as the preferred approach over the use of administrative controls. Advantage will be taken of the nuclear and physical characteristics of process equipment and materials, provided control is exercised to maintain them if they may credibly degrade such that control of the parameter is jeopardized.

The preferred design approach includes two goals. The first is to design equipment such that NCS is independent of the amount of internal moderation or fissile concentrations, the degree of interspersed moderation between units, or the thickness of reflectors. The second is to minimize the possibility of accumulating fissile material in inaccessible locations and, where practical, to use favorable geometry for those inaccessible locations. The adherence to this approach is determined during the preparation and technical review of the NCSE performed to support the equipment design. This preferred design approach is implemented as described in NCS procedures.

Fissile material equipment designs and modifications are reviewed to ensure that engineered controls are used for NCS to the extent practical. Administrative limits and controls will be implemented to satisfy the double contingency principle for those cases where the preferred design approach is not practical.

5.4.4 Criticality Accident Alarm System Coverage

A criticality accident alarm system (CAAS) that complies with 10 CFR 70.24 and ANS/ANSI-8.3-1997 is provided to alert personnel if a criticality accident occurs. The system utilizes an audible and/or visual signal to alert personnel in the area to evacuate to reduce radiation exposure resulting from the incident.

The need for CAAS coverage is considered during the development process for NCS evaluations. In general, coverage is provided for fissile material operations, except the UF_6 cylinder storage yards as specified in Section 1.2.5 of this license application. Other exceptions to CAAS coverage are documented in NCS evaluations and are based on a conclusion in the NCSE that a criticality accident is non-credible in the area where the fissile material operation is ongoing. Conclusions of non-credibility require at a minimum that the inventory of ^{235}U in the area is less than 700 g, less than 50 g per square meter, or less than 5 g in any 10 liter volume. In addition, CAAS is not required for areas having material that is either packaged or stored in accordance with 10 CFR Part 71 or specifically exempt according to 10 CFR 71.53. Areas that do not contain fissile material operations do not require a NCSE and do not require CAAS coverage.

The CAAS is designed to detect neutron radiation levels that would result from the minimum criticality accident of concern as defined by ANSI/ANS 8.3-1997 and to provide an audible evacuation alarm. A secondary function is to activate the building radiation warning lights and alarms at the X-3012 Process Support Building Area Control Room (ACR) and the X-1020 Emergency Operations Center.

For each area requiring CAAS coverage, a monitoring system is installed that provides coverage of the area by at least two independent detection units, each with the ability to actuate the alarm. This arrangement allows for one detection unit to be temporarily out of service with fissile operations continuing under the coverage of the other detection unit. A detection unit is a set of at least three neutron sensitive radiation detectors that may be co-located or may be distributed over the area. The detection logic of the system requires that two of the three neutron detectors must be activated to initiate the building evacuation alarm system. Each detector may be logically part of more than one detection unit.

The building evacuation alarm system includes interior evacuation horns and exterior radiation warning lights to deter personnel from re-entering the building after an evacuation. In addition, facilities within 200 feet of a building/facility requiring CAAS coverage have radiation evacuation horns installed inside and radiation warning lights installed on the exterior. Personnel who have routine access to these facilities have been trained to recognize and respond to these indications as described in Section 11.3.1.1.2 of this license application.

To protect against the loss of coverage, the CAAS includes redundant decision logic, a backup power supply, detector status information and system self-diagnostic information are provided to the X-3012 building ACR and X-1020 building. The CAAS has been designed to survive and/or withstand credible abnormal events as described in the accident analysis for a sufficient time to warn personnel to evacuate. In the event CAAS coverage is lost for an operation, plant procedures provide for compensatory actions, which may include shutdown of equipment, limiting access, halting movement of uranium-bearing material, or other actions.

Additional information provided by the CAAS includes a historical log of events and the capability to monitor and record the criticality accident for managing the post-accident situation and any remedial action. Nuclear accident planning and response is discussed in Section 2.2.4 of the Emergency Plan for the American Centrifuge Plant.

5.4.4.1 Portable CAAS

In the event a fissile material operation requiring CAAS coverage is performed beyond the detection range of established CAAS instrumentation, a portable unit may be used. The portable unit has the same detection capabilities as the permanently installed units, although those capabilities may be based on gamma radiation. Alarm annunciation, however, is usually limited to the immediate area within the audible range of the unit's alarm with an additional telemetric link to the X-3012 ACR and X-1020. This link will transmit the location of the unit, if mobile, and allow the use of the plant PA system to warn personnel within 200 feet of the area of the portable unit to evacuate. A

maintenance procedures are subject to the requirements of the Procedures Program described in Section 11.4 of this license application.

6.2.2.3.3 Preventive Maintenance and Quality Considerations

Manufacturers' recommendations are used as guides for preventive maintenance on specific chemical systems and equipment. If operational experiences or system characteristics indicate a need for a different preventive maintenance schedule, the preventive maintenance baseline can be changed after appropriate review. ACP personnel perform inspection and testing to fulfill requirements for quality in accordance with the CM Program, which is described in Section 11.1 of this license application.

Independent overview of maintenance activities on chemical system hardware and requirements are addressed by the QAPD and CM Program, as applicable. These independent overview programs include:

- Procurement Quality Requirements
- Construction Inspection
- Testing and Pre-Operational Inspection
- Pressure Vessel Inspection
- Crane Inspection
- Pre-Operational Safety Review and Pre Start-up Safety Review Programs
- Plant Safety Review Committee (PSRC)

The pre-operational safety review process is conducted in accordance with program implementing procedures. The scope of the safety review is determined by the PSRC which considers the specific issue and system being reviewed and the potential safety concerns present.

Deficiencies associated with maintenance activities are dispositioned in accordance with the QAPD and the Corrective Action Program, as described in Section 11.6 of this license application.

6.2.2.4 Configuration Management

The CM Program is described in Section 11.1 of this license application. Engineering, as the design authority for the ACP, administers the CM Program. The CM Program includes an organizational structure and administrative processes and controls to ensure that accurate, current design documentation is maintained that matches the building physical configuration.

6.2.2.5 Emergency Planning

Emergency Management is described in Chapter 8.0 of this license application. The Emergency Management Plan for the American Centrifuge Plant outlines the roles and responsibilities of personnel during an emergency and describes the emergency response measures, including on-site and off-site protective actions.

Personnel who have emergency response assignments or duties associated with chemical safety are adequately trained to respond to chemical and operational upsets per 29 CFR 1910.120(q) requirements.

Operators, in compliance with the plant "See and Flee" policy, are not expected to participate in emergency response activities for chemical releases. The policy specifies that employees promptly move to a safe location, away from the immediate release area. Mitigating actions, as described by procedure, may be performed during evacuation from the immediate release area if they do not hinder safe egress. Personnel outside the immediate release area may perform mitigating actions, as described by procedure, prior to evacuation. If plant procedures direct an employee response to a minor spill, an employee can implement the plant response procedure after "See and Flee" requirements have been accomplished and the area may be reentered.

6.2.2.6 Incident Investigation

Identification, reporting, and incident investigation, described in Section 11.6 of this license application, are conducted in accordance with plant procedures. The level of investigation is based upon severity and significance of the event, as well as the regulatory requirements involved. Unacceptable performance deficiencies are addressed in accordance with the ACP Corrective Action Program. Documentation is retained in accordance with RMDC requirements described in Section 11.7 of this license application.

Occupational injury and illness investigations related to chemical safety are part of the IHS programs. Investigations are conducted in accordance with OSHA requirements.

6.2.2.7 Audits and Inspections

Formal audit responsibilities are assigned to the Quality Assurance Manager. In addition, internal organizations have monitoring programs, assessments, and reviews as required by program implementation procedures. The Audit and Assessment Program is described in Section 11.5 of this license application and includes chemical safety.

6.2.2.8 Quality Assurance

The QAPD describes the programmatic requirements that apply to Quality Level (QL)-1 and QL-2 items. These quality assurance elements and requirements apply to chemical safety items classified as QL-1 or QL-2 in a graded approach, as described in the QAPD.

6.2.2.9 Human Factors

Human factors design responsibility for plant and system design in the ACP is assigned to Engineering, with specific technical assistance from Industrial Safety personnel. Human factors reviews address the interface of people with processes and its impact on system operation.

6.2.2.10 Detection and Monitoring

Chemicals with significant radiological impact such as UF_6, HF, and UO_2F_2 that are processed in the X-3346 facility are provided with detection and monitoring systems to identify chemical releases as described in Sections 2.2.3.5 and 7.3.4.2 of the ISA Summary. Non-radiological chemicals that do not have significant radiological impact are maintained below PSM/RMP threshold quantities and do not require detection and monitoring.

6.2.2.11 Chemical Safety Control Strategy

The chemical safety control strategy first requires that the chemicals used be identified and the listing of chemicals be kept current. Then the chemicals are reviewed for potential hazards. In order of decreasing risk and decreasing significance, the chemical hazards are addressed within the ISA Summary and by the applicable IHS programs.

6.2.2.11.1 Identification and Inventory Control

Three processes are used to identify hazardous or toxic chemicals to be evaluated/controlled and to ensure that inventories are maintained below PSM/RMP threshold quantities. The first process identifies and inventories chemicals used at the ACP. This process ensures that chemicals used at the plant are appropriately addressed for safety. The process includes:

- Purchase requisition reviews;
- A listing of chemicals used;
- Material Safety Data Sheet (MSDS) library, upgrades, and distribution services to the plant; and
- Identification of new chemicals for the review process.

The second process is the formal request for engineering services required for modifications to existing systems. The request process provides a mechanism that identifies new or revised usages of chemicals, chemical processes, and/or associated possible logistics that require engineering involvement. A request for engineering services may not be required unless physical modifications or updated engineering evaluations are needed. If changes to hazardous chemical inventories or locations exist as a result of a request for a new, modified, or decommissioned building, process or storage location, an appropriate chemical safety review is

applied to address regulatory requirements. Physical changes to the plant, including inventory limits and changes of location for hazardous chemicals, are evaluated in accordance with the requirements of 10 CFR 70.72.

The third process is associated with contractors on-site. When work is to be performed by contractors, a review of the contractors' Safety and Health Plan is conducted to identify the presence of hazardous and toxic materials to be brought onsite by the contractor. The contractor provides MSDSs for these chemicals and the list of chemicals is forwarded to Industrial Hygiene and appropriate supervision.

6.2.2.11.2 Chemicals Addressed By Integrated Safety Analysis Summary

The ISA addresses risks associated with UF_6 and its airborne release reaction products, HF and UO_2F_2. Chapter 6.0 of the ISA Summary provides an evaluation of accidents that involve the release of UF_6, including both radiological and toxicological hazards. The HF, which evolves from a UF_6 release, is one of the toxicological hazards. The analyses identify IROFS. Appendix B of the ISA Summary identifies other chemicals and typical industrial materials (e.g., acetone, solvents, acids, fuels, and oils) that are used in the ACP for assembly and maintenance activities.

6.2.2.11.3 Chemicals Addressed by Process Safety Management and the Risk Management Program

Chemical quantities are maintained below PSM/RMP threshold quantities as described in Sections 6.2.2.11.1 and 6.3 of this license application.

6.2.2.11.4 Industrial Hygiene and Safety Program Managed Chemicals

Hazardous and toxic chemicals are effectively managed using IHS programs. To address these hazards, the IHS program provides the necessary protective barriers and controls that enable safe use of these chemicals in accordance with OSHA requirements (29 CFR Part 1910).

Commercial chemicals have varying toxicity and hazardous ranges and categories. Because chemicals can be used within the facilities for various purposes, the IHS program applications to chemical safety are comprehensive and are based on industry accepted standards and regulatory requirements for controlling occupational exposures. To address the potential exposure risks associated with IHS program managed chemicals, the ACP uses chemical review programs, program procedures, and MSDSs. Implementation of these IHS programs provides employee protection from hazardous chemicals during daily operations and emergency response.

6.2.2.12 Multi-Occupancy of the Department of Energy Reservation

USEC subleases, from the United States Enrichment Corporation, certain support buildings/facilities on the DOE reservation. The ACP and the gaseous diffusion plant are separate entities for purposes of chemical safety. Each has its own chemical safety programs and shares information regarding hazardous chemicals used by the other. The DOE environmental restoration contractors and sub-contractors use the remaining reservation sectors. The DOE provides information regarding any hazardous chemicals used by these "third-parties" that could impact ACP operations. Third-party chemicals are covered by a shared site agreement and reviewed in accordance with procedures.

6.3 Requirements for New Buildings/Facilities or New Processes at Existing Facilities

System design requirements adhere to the 10 CFR 70.64 Baseline Design Criteria for chemical protection in new ACP buildings/facilities. Revision or modification to an existing chemical system is initiated via a request for engineering services that initiates the design process and includes a 10 CFR 70.72 review. For systems that become subject to the requirements of the PSM/RMP program, a pre-startup safety review is performed based on changes to the process safety information. The pre-startup safety review is an independent review to address the readiness of the system hardware, associated hazard controls, personnel (including required training), procedures, and process safety information. Records of chemical releases and documentation relating to chemical process safety are retained in accordance with Records Management and Document Control (RMDC) requirements described in Section 11.7.1.5 of this License Application to ensure compliance with NRC's chemical process safety requirements.

6.4 References

1. 29 CFR Part 1910, *Occupational Safety and Health Standards*
2. 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*
3. 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*
4. 40 CFR Part 68, *Chemical Accident Prevention Provisions*
5. LA-3605-0003, Integrated Safety Analysis Summary for the American Centrifuge Plant
6. NR-3605-0003, Quality Assurance Program Description for the American Centrifuge Plant
7. NRC Information Notice No. 88-100: *Memorandum of Understanding between NRC and OSHA Relating to NRC-Licensed Facilities* (53 *Federal Register* 43950, October 31, 1988), December 23, 1988
8. NUREG-1513, *Integrated Safety Analysis Guidance Document*
9. NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility*
10. NUREG-1601, *Chemical Process Safety at Fuel Cycle Facilities*

- Utility shut-offs/start-ups,
- Fire loading concerns,
- Unique fire fighting strategy and tactics,
- Fire extension concerns, and
- Ventilation methodology.

Trained personnel review these pre-fire plans as part of the building inspection. As buildings are modified to meet the changing operations, the pre-fire plans are scheduled for review and updates to assure the revised conditions are addressed. As new buildings are added to meet the changing operations, pre-fire plans will be developed prior to placing the buildings in operation.

Table 7.1-1 Applicable National Fire Protection Agency Codes and Standards

Code No.	Title	Revision
NFPA 10	*Standard for Portable Fire Extinguishers*	2002
NFPA 13	*Standard for the Installation of Sprinkler Systems*	2002
NFPA 15	*Standard for Water Spray Fixed Systems for Fire Protection*	2001
NFPA 25	*Standard for the Inspection, Testing, and Maintenance of Water-Based Protection*	2004
NFPA 30	*Flammable and Combustible Liquids Code*	2003
NFPA 51B	*Standard for Fire Prevention During Welding, Cutting, and Other Hotwork*	2003
NFPA 70	*National Electric Code*	2005
NFPA 72	*National Fire Alarm Code*	2002
NFPA 75	*Standard for the Protection of Electronic Computer/Data Processing Equipment*	2003
NFPA 80	*Standard for Fire Doors and Fire Windows*	1999
NFPA 101	*Life Safety Code*	2003
NFPA 220	*Standard on Types of Building Construction*	1999
NFPA 232	*Standard for the Protection of Records*	2000
NFPA 241	*Standard for Safeguarding Construction, Alternation, and Demolition Operations*	2000
NFPA 801	*Standard for Fire Protection for Facilities Handling Radioactive Materials*	2003

7.2 Fire Hazards Analysis

FHAs have been performed for the following buildings and areas; **[This information has been withheld pursuant to 10 CFR 2.390]**. These FHAs ensure that the fire prevention and fire protection requirements have been evaluated and incorporated. The analyses consider the building's/facility's specific design, layout, and anticipated operating needs and considers acceptable means for separation or control of hazards, the control or elimination of ignition sources, and the suppression of fires. A FHA will be performed for the **[This information has been withheld pursuant to 10 CFR 2.390]** prior to construction.

This information was used in the Integrated Safety Analysis (ISA) for the ACP to determine the credible fire accident scenarios, their likelihood of occurrence, the associated consequences, and the necessary IROFS to reduce the likelihood of occurrence and/or theconsequences to meet performance requirements. The results of the ISA are presented in the ISA Summary for the American Centrifuge Plant.

To ensure an adequate level of safety is maintained, fire hazards for each of the buildings are evaluated periodically and documented in a building survey. The building survey results are

used to update the FHAs and ISA as necessary. Further discussion of the FHA, ISA, and building survey approaches are described below.

For new buildings or facilities, FHAs are performed during the design development process to ensure that the fire prevention and fire protection requirements have been evaluated and incorporated into the design. The analysis considers the facility's specific design, layout, and anticipated operating needs and considers acceptable means for separation or control of hazards, the control or elimination of ignition sources, and the suppression of fires.

7.2.1 Fire Hazards Analysis Approach

Fire Hazards Analyses provide a general description of the physical characteristics of the buildings/facilities that outlines the fire prevention and fire protection systems to be provided. A FHA defines the fire hazards that can exist, and states the loss-limiting criteria to be used in the design of a building and/or facility. FHAs provide a formal review and periodic evaluation of the occupancy and the fire protection associated with a building/facility and includes the following elements:

- A listing of the codes and standards is used for the design of the fire protection systems, including the published standards of NFPA.
- The FHA defines and describes the characteristics associated with potential fires for areas that contain combustible materials, such as fire loading, hazards of flame spread, smoke generation, toxic contaminants, and contributing fuels.
- The FHA lists the fire protection system criteria and the criteria to be used in the basic design for such items as water supply, water distribution systems, and fire pump supply.
- The FHA describes the performance criteria for the detection systems, alarm systems, automatic suppression systems, manual systems, chemical systems, and gas systems for fire detection, confinement, control, and extinguishment.
- The FHA describes the design for suppression systems and for smoke, heat, and flame control; combustible and explosive gas control; and toxic and contaminant control as necessary. The FHA also describes the operating functions of the ventilating and exhaust systems to be used during the period of fire extinguishment and control.

- The FHA uses the features of building and facility arrangements and the structural design features to generally define the methods for fire prevention, fire extinguishing, fire control, and control of hazards created by fire. Fire barriers, egress, firewalls, and the isolation and containment features provided for flame, heat, hot gases, smoke, etc., are also addressed.

- The FHA identifies the dangerous and hazardous combustibles and the maximum quantities estimated to be present in the building/facility. The FHA also identifies where these materials can be located appropriately in the building/facility.

- Based on the expected quantities of combustible materials, the types of potential fires, their estimated severity, intensity, duration, and the potential hazards created for each fire scenario reviewed, the probable and possible maximum losses from fires are described in the FHAs.

- Where safe shut down of safety related equipment is necessary, the FHA will define the essential electric circuit integrity needed during fire, and evaluates the electrical and cable fire protection; the fire confinement control; and the fire extinguishing systems that will be needed to maintain their integrity.

- The FHA evaluates life safety, protection of critical process/safety equipment, lightning protection, provision to limit contamination, potential for radioactive release, and restoration of the building/facility after a fire.

7.2.2 Integrated Safety Analysis

An ISA of the design, construction, and operation of the ACP was conducted in accordance with the guidance provided in NUREG-1513, *Integrated Safety Analysis Guidance Document* and the requirements of 10 CFR 70.62(c). The ISA contains the following elements:

[This information has been withheld pursuant to 10 CFR 2.390]

[This information has been withheld pursuant to 10 CFR 2.390]

7.2.3 Building Surveys

The building surveys are conducted, in accordance with written procedures on a periodic basis, to ensure the buildings/facilities, systems, and operations continue to meet the codes and standards to which they were built and operated, and do not violate any safety bases that were established in the ISA for the credible accident scenarios. The building surveys also ensure no new credible fire scenarios have been created.

7.3 Building/Facility Design

[This information has been withheld pursuant to 10 CFR 2.390]

[This information has been withheld pursuant to 10 CFR 2.390]

[This information has been withheld pursuant to 10 CFR 2.390]

7.4 Process Fire Safety

The ACP has addressed process fire safety through the design of the buildings and operations such that consideration is taken for fire hazards that may be present in order to protect the workforce and public. Hazardous areas are identified to ensure the workforce is cognizant of hazardous material and operations. The ISA has been performed to identify the credible accident scenarios and establish the necessary IROFS to ensure the health and safety of the workforce and public.

The ACP buildings/facilities are designed in accordance with the codes and standards as identified in Section 7.1 above. The ACP hazardous areas are identified as part of the pre-fire plans required in Section 7.1.4 above. The ACP ISA is discussed in Section 7.2.2 of this chapter and Chapter 3.0 of this license application.

The ISA determines the likelihood of occurrence for the explosion and fire scenarios and resulting consequences associated with the release of UF_6 and its airborne release reaction product, HF assuming the accident is unmitigated. The ISA identifies IROFS and related management measures necessary to prevent the accident and/or mitigate the consequences in accordance with the performance criteria in 10 CFR 70.61. The IROFS identified by the ISA to prevent or mitigate explosion and fire related scenarios are grouped in the following three categories.

- Combustible Material Control
- Fire Suppression and Response
- Fire/Explosion Prevention

[This information has been withheld pursuant to 10 CFR 2.390]

7.5 Fire Protection and Emergency Response

The design and operation of the buildings/facilities are evaluated on a periodic basis to ensure fire hazards are controlled. Fire protection systems are present to further reduce the risk of fires that could result in a release of hazardous material. Emergency response is provided to add defense-in-depth to the fire protection systems and respond to areas where fire protection systems do not exist.

7.5.1 Fire Protection Engineering

Fire protection engineering support is available to evaluate fire hazards; review changes to maintenance and process systems; and provide in-house consultation under the direction of the Fire Safety Manager. They also perform the building surveys as described in Section 7.2.3 of this chapter.

Fire protection engineers assist in the development of project design criteria, perform design review, and conduct routine engineering consultation as necessary. Fire protection engineering is part of project design teams and routinely reviews project design packages to ensure applicable fire safety issues are addressed. These issues may include construction, egress, building/facility protection, separation of fire areas, detection systems, and special hazard protection. Fire protection engineers are either graduates of a technical program or have at least six years experience in fire protection work.

Reported fires are investigated using a graded approach through the Corrective Action Program. This includes investigations by fire officers, engineers, or by multidiscipline teams as warranted. Results of investigations are considered for distribution throughout ACP operations to prevent future reoccurrences. Details of incident investigation in the ACP are described in Section 11.6 of this license application.

7.5.2 Alarm and Fixed Fire Suppression Systems

[This information has been withheld pursuant to 10 CFR 2.390]

[This information has been withheld pursuant to 10 CFR 2.390]

7.5.3 Firewater Distribution System

[This information has been withheld pursuant to 10 CFR 2.390]

7.5.4 Mobile and Portable Equipment

[This information has been withheld pursuant to 10 CFR 2.390]

7.5.5 Emergency Response

[This information has been withheld pursuant to 10 CFR 2.390]

7.5.6 Control of Combustible Materials

The ISA credits combustible materials control programs inside and outside the ACP buildings/facilities to ensure that credible fire accident scenarios do not result in consequences that would exceed the performance criteria established in 10 CFR 70.61. This covers the ACP primary facilities and is addressed on a continuous basis by the building/facility custodians. It also includes limited use of fossil fuel and other combustible material. Combustible materials control is assured through training and procedures as discussed in Sections 11.3 and 11.4 of this license application.

7.5.7 Use of Noncombustible Materials

The ISA credits use of noncombustible materials in the construction and operation of the ACP buildings/facilities to ensure that credible fire accident scenarios do not result in consequences that would exceed the performance criteria established in 10 CFR 70.61. This includes use of construction material such as concrete, steel, insulation, and refrigerant. Use of noncombustible materials is assured through the Configuration Management Program discussed in Section 11.1 of this license application.

7.5.8 Control of Combustible Mixtures

The ISA credits control of combustible gases and mixtures in the construction and operation of the ACP buildings/facilities and manufacture of equipment to ensure that credible fire accident scenarios do not result in consequences that would exceed the performance criteria established in 10 CFR 70.61. Control of combustible mixtures is assured through the Maintenance Program discussed in Section 11.2 of this license application.

7.5.9 Placement of Equipment and Operations

The ISA credits placement of equipment in ACP buildings/facilities to ensure that credible fire accident scenarios do not result in consequences that would exceed the performance criteria established in 10 CFR 70.61. Proper placement of equipment and operations is assured through the Configuration Management Program discussed in Section 11.1 of this license application.

7.6 References

1. 29 CFR Part 1910, *Occupational Safety and Health Standards*
2. LA-3605-0003, Integrated Safety Analysis Summary for the American Centrifuge Plant
3. NFPA 10-2002, *Standard for Portable Fire Extinguishers*
4. NFPA 13-2002, *Standard for the Installation of Sprinkler Systems*
5. NFPA 15-2001, *Standard for Water Spray Fixed Systems for Fire Protection*
6. NFPA 25-2004, *Standard for the Inspection, Testing, and Maintenance of Water-Based Protection*
7. NFPA 30-2003, *Flammable and Combustible Liquids Code*
8. NFPA 51B-2003, *Standard for Fire Prevention During Welding, Cutting, and Other Hotwork*
9. NFPA 70-2005, *National Electric Code*
10. NFPA 72-2002, *National Fire Alarm Code*
11. NFPA 75-2003, *Standard for the Protection of Electronic Computer/Data Processing Equipment*
12. NFPA 80-1999, *Standard for Fire Doors and Fire Windows*
13. NFPA 101-2003, *Life Safety Code*
14. NFPA 220-1999, *Standard on Types of Building Construction*
15. NFPA 232-2000, *Standard for the Protection of Records*
16. NFPA 241-2000, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*
17. NFPA 801-2003, *Standard for Fire Protection for Facilities Handling Radioactive Materials*
18. NUREG-1513, *Integrated Safety Analysis Guidance Document*
19. NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility*

8.0 EMERGENCY MANAGEMENT

Pursuant to 10 *Code of Federal Regulations* (CFR) 70.22(i), an Emergency Plan for the American Centrifuge Plant operated by USEC Inc. has been developed. The Emergency Plan is written to encompass the American Centrifuge Plant operated by USEC Inc. and other on-going activities on the U.S. Department of Energy reservation in Pike County Ohio. The plan conforms to the Regulatory Guide 3.67, *Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities,* dated January 1992.

The information documented in this plan includes: 1) description of the facility; 2) summary credible emergencies; 3) classification and notification of accidents; 4) responsibilities; 5) emergency response measures; 6) equipment and facilities designated for use during emergencies; 7) methods for maintaining emergency preparedness; 8) emergency records and reports; 9) recovery and restoration measures; and 10) a commitment to comply with the *Community Right-To-Know Act.*

The plan is submitted for review as part of this license application as document NR-3605-0008, Emergency Plan for the American Centrifuge Plant in Piketon, Ohio.

[Information from the rest of this chapter has been withheld pursuant to 10 CFR 2.390]

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The effluents from both sub-systems are combined and vented to the atmosphere through a common vent after each sub-system has removed the uranium. Each vent is equipped with continuous gas flow monitoring instrumentation with local readout as well as the analytical instrumentation required to continuously sample, monitor and to alarm UF_6 breakthrough in the effluent gas stream. The continuous vent monitor/sampler is described in Section 9.2.2.1 of this chapter.

Ventilation air in the X-3356 building is monitored under the Radiation Protection Program as described in Section 4.7 of this license application. Environmental Compliance personnel review summaries of the monitoring data at least quarterly to verify that ventilation exhausts are insignificant as defined in the SRP (i.e., less than 3×10^{-13} μCi/mL uranium).

<u>**X-3012 Process Support Building**</u>

The X-3012 building provides process control functions and maintenance support as described in Section 1.1 of this license application. From time to time, contaminated components may be serviced in the maintenance shops in the X-3012 building. Components requiring repair or examination that have been in service will be opened using appropriate personnel protective equipment (PPE), and may also include engineered local ventilation systems to capture any residual uranium.

Ventilation air in the X-3012 building is monitored under the Radiation Protection Program as described in Section 4.7 of this license application. Environmental Compliance personnel review summaries of the monitoring data quarterly to verify that ventilation exhausts are insignificant as defined in the SRP (i.e., less than 3×10^{-13} μCi/mL uranium).

<u>**X-7725 Recycle/Assembly Facility; X-7726 Centrifuge Training and Test Facility; and X-7727H Interplant Transfer Corridor**</u>

Centrifuges are assembled and may be disassembled for repair or inspection as described in Section 1.1 of this license application in either the X-7725 or X-7726 facilities. The extent to which a centrifuge is disassembled depends upon the nature of the fault. Centrifuges requiring repair or examination that have been in service will be opened using appropriate PPE, and may also include engineered local ventilation systems to capture any residual uranium.

As described in Section 1.1 of this license application, some completely assembled centrifuge machines are tested with UF_6 in the Gas Test Stands. This is a separate room within X-7725 facility with its own ventilation and emission control system. UF_6 for the test stands is supplied from a small cylinder within this room. Exhaust from the test stands passes through alumina traps to a continuously monitored vent. The vent is equipped with continuous gas flow monitoring instrumentation with local readout, as well as the analytical instrumentation required to continuously sample, monitor, and to alarm UF_6 breakthrough in the effluent gas stream. The continuous vent monitor/sampler is described in Section 9.2.2.1 of this chapter.

Ventilation air in both the X-7725 and X-7726 facilities is monitored under the Radiation Protection Program as described in Section 4.7 of this license application. Environmental Compliance personnel review summaries of the monitoring data quarterly to verify that ventilation exhausts are insignificant as defined in SRP (i.e., less than 3×10^{-13} µCi/mL uranium).

As described in Section 1.1, the X-7727H corridor is used only to provide indoor transport for sealed components (e.g., individual centrifuges) between the X-7725 facility and the process buildings and is closed off from these buildings except when such transport is actually occurring. Consequently, the X-7727H corridor is never directly exposed to a source of gaseous uranium although it does have some air transfer from the process buildings and X-7725 facility. At worst, the airborne uranium concentration in the X-7727H corridor will not exceed that in the process buildings or X-7725 facility. This is insignificant as defined in the SRP (i.e., less than 3×10^{-13} µCi/mL uranium).

Waste Management

The ACP obtains waste management services for various radiological and non-radiological materials. The radiological waste management services are obtained from a qualified provider licensed/certified by the NRC or an agreement state.

Laboratory Services

The ACP obtains analytical services for various radiological and non-radiological materials. The radiological analytical services are obtained from a qualified laboratory licensed/certified by the NRC or an agreement state.

9.2.1.2.2 Control of Liquid Effluents

The centrifuges and PV/EV vacuum pumps are cooled by a closed-loop Machine Cooling Water (MCW) system to minimize the amount of water potentially contaminated by uranium. There is no routine blowdown from the MCW system. Waste heat from the MCW system is discharged via heat exchangers to the Tower Water Cooling (TWC) system, which is cooled by a single cooling tower. Waste heat from the cold trap refrigeration systems in X-3346 and X-3356 buildings is also discharged to the TWC system. Currently, the TWC discharges its blowdown to the GDP Recirculating Cooling Water (RCW) system under a service agreement, which in turn discharges its blowdown directly to the Scioto River via an underground pipeline (National Pollutant Discharge Elimination System [NPDES] Outfall 004). The RCW system does not provide any treatment of the TWC blowdown; it simply provides a convenient pathway to a suitable permitted discharge point. At some point in the future, DOE is expected to decommission and decontaminate the GDP, including the RCW system. By that time, the TWC blowdown will have to be modified to bypass the RCW system and discharge directly to the RCW discharge pipeline. The schedule for this has not been established. There should be no licensed material in the TWC blowdown.

In the interim, the GDP RCW system has ample capacity to accept the TWC effluent without either physical modification or adjustment to its discharge limits. The GDP RCW system consists of three sequential loops, which have design capacities of 48,000 gallons per minute (X-626), 153,000 gallons per minute (X-630), and 489,000 gallons per minute (X-633). Current flow rates in these loops are only 8,000, 17,000, and 20,000 gallons per minute (17 percent, 11 percent, and 4 percent of design) and are not expected to increase. The TWC system is currently fitted with three 10,800 gallon per minute pumps and even assuming a conservative blowdown rate of ten percent, TWC blowdown flow will be no more than 3,240 gallons per minute. Adding this to the current flows in the GDP RCW loops gives maximum flows that are only 23 percent, 13 percent, and 5 percent of the respective design capacities of the three loops.

Discharges from the RCW System are monitored by an automated sampler, which collects a weekly composite sample of the liquid effluent for radiological analysis as well as sample(s) for NPDES-mandated analyses. This data is available to the ACP as assurance that no unanticipated discharge of licensed material has occurred.

Leakage from the MCW system and incidental spills of water elsewhere in the ACP, are collected by the Liquid Effluent Collection (LEC) system. The LEC system consists of a set of drains and underground collection tanks for the collection and containment of leaks and spills of chemically treated water. The drains are located throughout the ACP. The tanks have a capacity of 550 gallons (gal) each and are monitored by liquid level gauges mounted above grade on pipe stands. Water accumulated in the LEC tanks is sampled and analyzed prior to disposal. If the contents meet the requirements of 10 CFR 20.2003, they may be pumped to the reservation sanitary sewer system. Otherwise the tank contents will be containerized for off-site disposal. An integrity assurance plan developed by Engineering assures that the tanks are not leaking as the ACP take possession of them. Following completion of this integrity assurance plan, inventory monitoring of the tank contents is used to detect leaks from the LEC System.

Storm water runoff from the ACP area, along with some once-through cooling water (sanitary water), drains to a pair of holding ponds.

- The X-2230N West Holding Pond (NPDES Outfall 012) provides a quiescent zone for settling suspended solids, dissipation of chlorine, and oil diversion and containment. The pond discharges to the same unnamed tributary of the Scioto River as X-230J-5. An automated sampler collects a weekly composite sample of the liquid effluent for radiological analysis as well as sample(s) for NPDES-mandated analyses.
- The X-2230M Southwest Holding Pond (NPDES Outfall 013) provides a quiescent zone for settling suspended solids, dissipation of chlorine, and oil diversion and containment. The pond discharges to an unnamed tributary of the Scioto River. An automated sampler collects a weekly composite sample of the liquid effluent for radiological analysis as well as sample(s) for NPDES-mandated analyses.

Most of the ACP cylinder storage pads are within the drainage of the X-2230M and X-2230N Holding Ponds. The ACP also uses cylinder storage pads on the north end of the reservation (X-745G-2 and X-745H). The ACP conducts an inspection and maintenance program for its UF_6 cylinders to ensure that no licensed material is released to the storage pads in accordance with USEC-651, *Uranium Hexafluoride: A Manual of Good Handling Practices.*

Stormwater runoff from the north pads drains to holding ponds in accordance with a service agreement. Holding pond effluents are currently continuously monitored with automated samplers in accordance with the NRC-certified GDP environmental protection plan (Chapter 5.1, USEC-02, Application for United States Nuclear Regulatory Commission Certification, Portsmouth Gaseous Diffusion Plant, Safety Analysis Report). This data is available to ACP environmental personnel as assurance that no unanticipated discharge occurred.

9.2.1.3 As Low As Reasonably Achievable Reviews and Reports to Management

Action levels for control of both gaseous and liquid radioactive effluents from the ACP have been established based on the ALARA philosophy. The action levels described in Table 9.2-1 ensure operational control system deficiencies are documented and acted upon in a responsible manner and in a timeframe to remain well within the regulatory limits and below ALARA goals. The required actions described in Table 9.2-1 include the analyses of trends in release data, evaluations of the probable impact of the releases and an assessment of the need for additional effluent controls to meet the ALARA goals. The Operations Supervisor is responsible for assuring that action levels are acted upon.

The BEQs used in Table 9.2-1 is the maximum effluent expected under normal operation. BEQs have been established by the ACP environmental personnel and the responsible building management for every continuously monitored radiological vent and liquid discharge point to unrestricted areas. These BEQs are reviewed annually, at a minimum, by environmental personnel, the responsible building management and the ACP ALARA Committee to ensure the principles described in the ACP's ALARA policy are followed. This review also includes analyses of trends in radioactive effluents and environmental monitoring data. The results of this review are reported to the ACP Regulatory Manager and other senior management as described in Chapter 4.0 of this license application.

The specific values of the BEQs are listed in Table 9.2-2. The liquid release points are existing discharges and, while the ACP does not increase releases beyond historic levels, it does not decrease them either. Therefore, the liquid BEQs in Table 9.2-2 are based on GDP historic release rates.

9.2.1.4 Waste Minimization

Radioactive waste minimization and pollution prevention activities are coordinated by ACP environmental compliance and waste management personnel with the support of USEC senior management.

Individual waste streams are identified and characterized based on process knowledge, routine radiation surveys as described in Chapter 4.0 and laboratory analysis, as needed. Generation of individual waste streams and waste management costs are tracked through a formal Request-for-Disposal database system administered by waste management personnel and the annual budgeting process.

Waste generating activities are evaluated for waste minimization opportunities with emphasis on those that generate hazardous wastes, low-level mixed wastes (LLMW), and low-level radioactive wastes (LLRW). Both LLMW and LLRW waste generation is inherently reduced in the ACP by the fact that the process operates under a high vacuum, which prevents radioactive material from escaping. Equipment that must be removed for maintenance is evacuated to the rest of the process first. The routine radiation surveys described in Chapter 4.0 of this license application verify that there is no spread of contamination within or out of the ACP. Hazardous waste generation is minimized by minimizing the procurement and use of hazardous substances. Waste that is generated is treated to the extent practical to reduce the volume, toxicity, or mobility before storage or disposal. USEC provides annual employee training that includes waste minimization information and encourages employee suggestions.

USEC provides environmental and waste management professionals with opportunities to attend offsite training and conferences for the purpose of seeking and exchanging technical information on waste minimization.

Waste minimization recommendations are evaluated by waste management and environmental compliance personnel and implemented, as appropriate, by waste management, materials procurement (for hazardous materials), and operations personnel.

This applies to ACP operations, associated support operations, and ACP subcontractors that generate waste.

9.2.2 Effluent and Environmental Monitoring

Based on historic GDP experience and operating plans, the radionuclides anticipated to be present in ACP gaseous effluents are ^{234}U, ^{235}U, and ^{238}U. The intention is to not introduce feedstock contaminated with significant concentrations of other nuclides into the process. Feed material that meets the American Standards for Testing and Materials (ASTM) specification for recycled feed may be used in the ACP, which may contain radionuclides such as ^{236}U and Technetium (^{99}Tc). Based on historic GDP experience ^{99}Tc may eventually appear in some ACP gaseous effluents. The radionuclides anticipated to be present in ACP liquid effluents are ^{234}U, ^{235}U, ^{238}U, and ^{99}Tc, due to historic contamination of the reservation. Consequently, ACP effluents will be analyzed for these four nuclides as described in the applicable sections below.

9.2.2.1 Airborne Effluent Monitoring

9.2.2.1.1 Anticipated Effluent Levels

The maximum anticipated gaseous effluents from the ACP have been modeled using the EPA-approved and distributed dispersion model, CAP88-PC, and reservation meteorological data from calendar years 1998-2002. The results are summarized in Table 9.2-3. The maximum gaseous effluent anticipated under normal operations is 1.1 millicuries (mCi) of uranium over a week, or up to 0.057 curie (Ci) per year. The maximum exposed individual (MEI) for the ACP is

located in the south-southwest sector of the reservation boundary. The projected maximum airborne concentration of total uranium due to ACP operations is only 3.2×10^{-15} µCi/mL, with an associated TEDE of 0.33 mrem. The uranium concentration is roughly three orders of magnitude lower than the applicable values in 10 CFR Part 20, Appendix B, Table 2. The projected TEDE due to ACP operations contributes roughly 66 percent to the ALARA goal given in Section 9.2.1.1 of this chapter, even assuming the average annual emission rates are equal to the maximum weekly emission rates. Average emission rates are expected to be much lower.

9.2.2.1.2 Demonstration of Compliance

Characterization of the radiological consequences of radionuclides released to the atmosphere from the ACP is accomplished by annually calculating the TEDEs to the maximally exposed person and to the entire population residing within 80 kilometers (km) (50 miles) of the plant. This approach is mandatory under the EPA regulations at 40 CFR Part 61 and has been accepted by the NRC for previous uranium enrichment operations at the reservation. The annual National Emission Standards for Hazardous Air Pollutants (NESHAP) Report includes the reservation identification, a description of plant operations (whether included under this license or not) during the previous year, the amount of radionuclides released to the atmosphere during the previous year, and the calculated TEDE to the most exposed member of the public.

Annual radionuclide releases to air are measured by the continuous vent samplers, as described in Section 9.2.2.1.3 of this license application, or estimated in accordance with guidance in 40 CFR Part 61, Appendices D and E. Atmospheric dispersion of the releases is modeled and the consequent public radiation dose is estimated using the EPA approved computer models in accordance with EPA guidance. An annual report summarizing the atmospheric releases and the dose assessment results is submitted in accordance with 40 CFR Part 61, Subpart H and EPA guidance, with a copy provided to the NRC. In accordance with EPA requirements, the reported public dose includes gaseous radioactive effluents from the DOE reservation.

The dose calculations are made using either the original CAP88 package of computer codes or the CAP88-PC package distributed by the EPA. The CAP88/CAP88-PC packages contain an EPA approved version of the AIRDOS-EPA and DARTAB computer codes and the ALLRAD88 radionuclide data file. The AIRDOS-EPA computer code implements a steady-state, Gaussian plume, atmospheric dispersion model to calculate concentrations of radionuclides in the air and on the ground based on radionuclide releases to the atmosphere and annualized meteorological data. It then uses Regulatory Guide 1.109, *Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50,* Appendix I (October 1977), food-chain models to calculate radionuclide concentrations in foodstuffs (e.g., vegetables, meat, milk) and subsequent intakes by individuals. The DARTAB computer code then uses these calculated uptakes and radionuclide data from the ALLRAD88 data file to calculate annual radiation doses to members of the public.

The annualized meteorological data used in the calculations consist of joint frequency stability array distributions of wind direction, wind speed, and atmospheric stability that are prepared from data collected from the reservation meteorological tower. Data from the National

Weather Service may be used in lieu of or to supplement reservation meteorological data in the event the on-site tower becomes inoperable. The reservation has a consistent annual pattern of low-level southwesterly winds predominating over the year. During the winter season, northeasterly winds are common though. This is largely attributable to the channeling effect of the hills and ridges on either side of the reservation, which runs roughly southwest to northeast.

Distances to the nearest residences are taken from U.S Geological Survey maps and population distributions are from the 2000 census data. EPA published default values for other off-site parameters (such as local crop productivity) are used in the AIRDOS-EPA model and, in accordance with EPA recommendations; rural patterns for food sources (i.e., home grown versus local production versus national supermarket chains) are assumed.

9.2.2.1.3 Monitoring of Gaseous Release Points

Each process vent in the X-3001, X-3002, X-3346, X-3356, and X-7725 has gas flow monitoring instrumentation with local readout as well as analytical instrumentation to continuously sample, monitor and to alarm UF_6 breakthrough in the effluent gas stream. The locations of these vents are shown in Figure 9.2-1. The continuous vent sampler draws a flow proportional sample of the vent stream through two alumina traps in series by way of an isokinetic probe. Both vent and sampler flows are monitored by the sampler's electronic controller. The controller adjusts a control valve in the sample line to maintain a constant ratio between the vent and sample flows. The flow instruments are calibrated at least annually. The primary sample trap is equipped with an automated radiation monitor to continuously monitor the accumulation of uranium in the sampler. This radiation monitor provides the real-time indicator of effluent levels for operational control of the gaseous effluent control systems.

Detailed effluent calculations are based on laboratory analysis of the collected samples. Each vent sampler has two traps permanently dedicated to each trap position, with one in-service and the other either being processed or standing by to replace the in-service trap. Normally, the primary sample traps are replaced weekly and the secondary traps are replaced quarterly. In the event of an unplanned or seriously elevated release, the involved sampler traps are collected for immediate analysis as soon as the situation has stabilized. Alternatively, the sampling period may be extended, provided the sampler is operating continuously while the vent is operating. A hydrated alumina is used in the vent samplers to convert absorbed UF_6 to UO_2F_2. The UO_2F_2 does not easily separate from the alumina, so no special handling is necessary to avoid loss of uranium between sample collection and analysis. Annually, the sampler tubing and traps are also replaced and rinsed, and the rinsates analyzed for the same parameters as the alumina.

Vent samples are analyzed for ^{234}U, ^{235}U, ^{238}U, and ^{99}Tc as described in Section 9.2.2.5 of this chapter. GDP experience in uranium enrichment has shown that these three uranium isotopes account for more than 99 percent of the public dose due to uranium emissions. ^{99}Tc is a fission product that has contaminated much of the fuel cycle. Feed material that meets the ASTM specification for recycled feed may be used in the ACP, which may contain additional radionuclides (i.e., ^{236}U and ^{99}Tc). Based on GDP historic experience ^{99}Tc may eventually appear in some ACP gaseous effluents. The ACP therefore monitors process vent samples for technetium as a precautionary measure.

Weekly gaseous effluents are calculated based on the primary trap analytical results and measured flows. These are compared to the action levels in Table 9.2-1 to determine whether gaseous effluents are threatening to exceed regulatory limits or ALARA goals. The weekly effluents are also accumulated to provide source terms for the annual public dose assessment required under 40 CFR Part 61. Quarterly and annual corrections to the accumulated weekly effluents are calculated based on the secondary trap and rinsate analyses, respectively, to complete the source terms.

Anticipated radionuclide concentrations in ventilation exhausts from occupied areas are insignificant as defined in the SRP. Radionuclide concentrations in room air are monitored as described in Section 4.7 of this license application. The results are reviewed by environmental engineers at least quarterly to verify that airborne concentrations are less than ten percent of the applicable values in 10 CFR Part 20, Appendix B, Table 2.

In the event of a radionuclide release outside the effluent monitoring system, the activity of the release will be estimated based on available data and engineering calculations (i.e., inventory data and mass balances).

9.2.2.1.4 Action Levels

Action levels for control of gaseous radioactive effluents from ACP operations have been established based on the ALARA philosophy. The action levels described in Table 9.2-1 ensure operational control system deficiencies are documented and acted upon in a responsible manner and in a timeframe to remain well within the regulatory limits and below ALARA goals. The BEQs used in Table 9.2-1 are the maximum effluents expected under normal operating conditions. BEQs have been established for every continuously monitored radiological vent. The specific BEQ values established for the monitored ACP vents are listed in Table 9.2-2.

9.2.2.1.5 Other Permits and Licenses

New air pollutant sources or modifications of existing sources in the State of Ohio are required to have a Permit-to-Install (PTI) from the Ohio EPA prior to installation of the source. The ACP therefore needs PTIs for its process vents. Within one year of the PTI being issued, the ACP also needs to apply to the Ohio EPA for a modification to its Title V permit to incorporate the entire ACP into the existing permit. The Title V permit supersedes the PTI once it is modified.

Sources of airborne radionuclides at DOE-owned plants are covered by an EPA Permit-By-Rule issued under 40 CFR Part 61, (NESHAP) Subpart H. This rule imposes a limit on airborne effluents of 10 mrem/year to the MEI, which applies to the entire reservation regardless of who "owns" any individual source within the reservation. The rule also requires an annual report, submitted by June 30 of the following year, detailing the processes at the reservation, the airborne effluents from each source, and annual TEDE to the MEI as calculated by a method approved by the EPA. A copy of this report is provided to NRC as described in Section 9.3.2 of this chapter.

Also, under the NESHAP rule, new or modified sources of airborne radionuclides at DOE-owned plants are required to have prior Permission to Construct from EPA unless the change has a projected maximum public TEDE of less than 0.1 mrem/year. This will be necessary for the ACP since it has the potential to exceed this threshold.

9.2.2.2 Liquid Effluent Monitoring

9.2.2.2.1 Anticipated Effluent Levels

Anticipated routine radioactive effluents from the ACP are expected to be minimal. The bulk of liquid radioactive effluents from a uranium enrichment plant are decontamination and cleaning solutions. Centrifuges will not be routinely changed out, but routine maintenance such as instrument repair or repair to the PV/EV systems occurs. There are also maintenance activities that require cleaning and/or decontamination. The ACP uses dry decontamination methods to the extent practical to minimize liquid releases.

Spills are accumulated in the LEC system. The LEC collection tanks are sampled and analyzed for radioactive constituents prior to being emptied. If analysis indicates that LEC tank contents meet the criteria of 10 CFR 20.2003, the contents may be discharged to the reservation sanitary sewer. Otherwise, LEC tank contents will be containerized for disposal off-site. These are the only anticipated liquid discharges of licensed material from the ACP.

Actual sanitary wastewater (i.e., excluding LEC discharges) from the ACP is not anticipated to contain licensed radioactive material. Any licensed material that may be discharged will be released in accordance with the requirements of 10 CFR 20.2003. Consequently, anticipated radionuclide concentrations in the sanitary wastewater itself are anticipated to be insignificant as defined in the SRP.

There are no anticipated radioactive effluents from the MCW system, since it is a closed-loop system with no routine blowdown. The TWC system is a standard industrial recirculating water system with a routine blowdown stream to control the accumulation of solids within the cooling water. The TWC does not come in contact with licensed material unless there is leakage from the process to the MCW and then from the MCW to the TWC. This is unlikely since the MCW lines are on the outside of the centrifuge casings. Consequently, radionuclide concentrations in the TWC blowdown are also anticipated to be insignificant as defined in the SRP.

Storm water runoff and some once-through cooling water (sanitary water) flows through two holding ponds as described in Section 9.2.1.2.2 of this chapter, then discharges to the Scioto River in accordance with 10 CFR 20.1301. Radioactive materials in these streams are dominated either by naturally occurring radioactive materials or existing contamination from previous reservation operations. ACP effluents are not expected to cause any significant difference from historic release levels, which are insignificant as defined in the SRP.

The ACP will use cylinder storage pads on the north end of the plant (X-745G-2 and X-745H). A cylinder inspection and maintenance program ensures that no licensed material is

released to the storage pad. Nevertheless, runoff from the pads may drain to the existing X-230L North Holding Pond. This pond is maintained and monitored in accordance with 10 CFR 20.1301 and the monitoring data is available to the ACP. ACP operations are not expected to have any measurable impact on these ponds.

Anticipated radioactive releases from these points are summarized in Table 9.2-4, along with the limits from 10 CFR Part 20, Appendix B, Table 2 for comparison. The anticipated discharge levels are at least one order of magnitude below the Table 2 limits even before they mix with the Scioto River. Activity concentrations in the table are based on monthly grab samples from 1995 through 2000 for the X-2230M and X-2230N holding ponds. Activity concentrations for the other ACP-influenced continuous discharges are based on weekly composite samples from 1998 through 2002. Activity concentrations for the LEC system are based on the effluent being characterized prior to discharge.

No other ponds or impoundments at the ACP manage special nuclear material (SNM) and since the concentrations involved are well below the 10 CFR Part 20, Appendix B discharge limits, leakage to the soil is not a concern. The only underground tanks that potentially manage SNM are the LEC System described in Section 9.2.1.2.2 of this chapter. Inventory monitoring will be used to detect leakage from these tanks.

9.2.2.2.2 Demonstration of Compliance

Characterization of the radiological consequences of radionuclides released in liquid effluents from the ACP is accomplished by comparing measured concentrations to the values in 10 CFR Part 20, Appendix B, Tables 2 and 3 and the requirements of 10 CFR 20.1301 and 10 CFR 20.2003, as applicable. The results are incorporated into semiannual reports submitted to the NRC in accordance with 10 CFR 70.59.

Accumulated liquids in the LEC tanks are sampled for uranium and technetium prior to being removed from the tanks. ACP environmental personnel track the analytical results, volumes and disposition of the liquids. LEC liquids that do not meet the requirements of 10 CFR 20.2003 and 10 CFR Part 20, Appendix B, Table 3 are containerized for disposal at a suitable NRC-licensed site. LEC liquids that do meet the requirements of 10 CFR 20.2003 and 10 CFR Part 20, Appendix B, Table 3 may be either containerized for disposal off-site or discharged to the reservation sanitary sewer.

Sanitary wastewater from the ACP (exclusive of LEC effluents) is not expected to be contaminated with licensed material. Therefore, the ACP does not sample or analyze the untreated sewage. The sanitary sewer discharges to a sewage treatment plant located on the reservation that is regulated by both the NRC and the OEPA for radionuclides and which does sample and analyze it's effluent for uranium and technetium. This data is available to the ACP and is tracked by ACP environmental personnel against the applicable values 10 CFR Part 20, Appendix B, Table 2.

The other liquid effluent streams from the ACP are monitored as described in Section 9.2.2.2.3 of this chapter and compared to the applicable values in 10 CFR Part 20, Appendix B,

Table 2 to demonstrate compliance with 10 CFR 20.1301. These streams are the TWC blowdown, X-2230M Southwest Holding Pond discharge, and X-2230N West Holding Pond discharge.

The ACP will use existing cylinder storage pads at the north end of the plant (X-745G-2 and X-745H). Runoff from the pads drain to the X-230J-5 Northwest Holding Pond and X-230L North Holding Pond, both of which are sampled and analyzed for uranium and technetium. This data is available to the ACP and these discharges will be tracked against the applicable values in 10 CFR Part 20, Appendix B, Table 2.

9.2.2.2.3 Monitoring of Liquid Release Points

There are only two ACP outfalls that discharge directly to publicly accessible areas, the X-2230M and X-2230N holding ponds. The locations of these outfalls are shown in Figure 9.2-2. The TWC blowdown discharges to a utility system (the RCW system) that provides a pathway to the Scioto River but does not provide any radiological treatment. These three discharges are equipped with automated samplers and continuous flow measurement. The flow monitors are calibrated at least annually. The combined discharge of the RCW system, the DOE reservation sewage treatment plant discharge and other reservation holding ponds are also equipped with automated samplers and continuous flow measurement. The data from these outfalls are available to the ACP as a defense in depth.

Outfall samples are analyzed for Gross Alpha and Gross Beta Activities, ^{99}Tc Activity and Total Uranium concentration as described in Section 9.2.2.5 of this chapter. Measurable Gross Alpha Activity is presumed to be due to uranium discharges from uranium enrichment operations, while Gross Alpha Activities below the Minimum Detectable Activity (MDA) are presumed to be due to naturally occurring radioactive materials. The isotopic distribution of enriched uranium discharges (i.e., ^{234}U, ^{235}U, and ^{238}U) is estimated to match the measured Gross Alpha Activity based on process knowledge. ^{99}Tc is a fission product that has contaminated much of the national fuel cycle and is present on the reservation. Measured technetium concentrations in reservation outfalls have been falling for several years, but are detected occasionally. The ACP therefore routinely monitors radioactive effluents for technetium.

The only underground tanks in the ACP used to collect material that might contain radionuclides are the tanks of the LEC system. The LEC system consists of a set of drains and collection tanks primarily for collecting leaks and spills of chemically treated water. The drains are located throughout the process buildings. The tanks have a capacity of 550 gal each. Liquid level gauges mounted above grade on pipe stands monitor the tanks. Routine monitoring of the tanks' contents is based on observing and tracking the levels indicated on the gauges. Inventory tracking is relied on to indicate any leaks from the tanks. The contents of the LEC system will be sampled and analyzed for the same parameters as the continuous outfalls prior to disposal.

If analytical results indicate that LEC contents meet the requirements of 10 CFR 20.2003, they may be released to the reservation sanitary sewer system. Otherwise they will be containerized for disposal off-site.

9.2.2.2.4 Action Levels

Action levels for control of liquid radioactive effluents from the ACP have been established based on the ALARA philosophy. The action levels described in Table 9.2-1 ensure operational control system deficiencies are documented and acted upon in a responsible manner and in a timeframe to remain well within the regulatory limits and below ALARA goals. The BEQs used in Table 9.2-1 are the maximum effluents expected under normal operating conditions. BEQs have been established for every ACP liquid discharge point to unrestricted areas (i.e., X-2230M and X-2230N holding ponds) and for the TWC blowdown to the GDP area. BEQs have also been established for the LEC discharges, which are characterized before they are discharged, based on ten percent of the 10 CFR 20.2003 requirements. The specific BEQ values established for the ACP outfalls are listed in Table 9.2-2.

The ACP sanitary sewers, TWC blowdown, and runoff from the north cylinder storage pads discharge to NRC regulated units operated a service provider. The service provider has established and administers BEQ-based action levels for these discharges as documented in USEC-02, *United States Nuclear Regulatory Commission Certification of Compliance for the Portsmouth Gaseous Diffusion Plant.*

9.2.2.2.5 Other Permits and Licenses

Point discharges to waters of the State of Ohio are required to be authorized under a NPDES Permit issued by the Ohio EPA. There are two NPDES Permits currently issued to the site. Between them, these permits already cover all liquid discharges from the ACP. The ACP is required to submit a permit modification to collect all its discharge points into one or the other of the permits.

9.2.2.3 Waste Management

9.2.2.3.1 Waste Segregation and Collection

ACP generated wastes are collected and packaged by the individual(s) generating the waste. However, this is not appropriate in cases where waste would have to be "double handled" (e.g., surveying wastes expected to be contamination-free). In this case, it is most appropriate to survey prior to packaging. Wastes known to be suitable for release to unrestricted areas based on the point and process of generation are segregated at the source, when possible, from wastes not suitable for release to unrestricted areas. Wastes from areas controlled for loose radioactive contamination are considered to be potentially contaminated until characterized. Wastes requiring characterization to determine whether they may be released to unrestricted areas are segregated upon completion of such characterization.

9.2.2.3.2 Waste Packaging and Labeling

Containers known to contain radioactive waste, including packaging, are labeled in accordance with procedural requirements developed in accordance with the commitments in Section 11.4 of this license application and 10 CFR Part 20.

Waste is packaged in appropriate containers to meet U. S. Department of Transportation (DOT) and 10 CFR Part 71 requirements. Some general types of waste packaging include, but are not limited to:

- Solid Waste (5-, 30-, 55-, or 110-gal drums)
- Liquid Wastes (5-, 30-, or 55-gal drums)
- Corrosives, Acids (Polybottles or polydrums)
- Scrap Metal (B-25 boxes or other similar boxes, and various drums)

In addition, 85- and 110-gal overpacks may be used for damaged containers if the wastes are appropriate for these size containers.

9.2.2.3.3 Radioactive Waste Storage

Those ACP wastes that are regulated for radiological content only are removed from the generating building and stored at an on-site radioactive waste storage area prior to final disposal. Those ACP wastes that are regulated for both radiological content and hazardous constituents and/or characteristics are stored at an on-site radioactive waste storage area under a conditional exemption for mixed waste (40 CFR Part 266, Subpart N [Federal] and Ohio Administrative Code-3745-266 [State]) prior to final disposal.

Other areas may be utilized as waste storage areas as required by plant operations. If outdoor storage is necessary, radioactive wastes with removable contamination are packaged in containers, and wrapped or covered to prevent the release of radioactivity. Storage areas are posted in accordance with procedural requirements.

Access to waste storage containers is restricted to trained personnel in accordance with 10 CFR 20.1905. Containers are inspected quarterly, at a minimum, to ensure container integrity and to identify and correct any leaks or other problems.

9.2.2.3.4 Radioactive Waste Treatment

Mixed aqueous wastes that cannot be processed on-site are stored until treatment is available at commercial treatment plants that are licensed in accordance with 10 CFR Part 61, or applicable NRC Agreement State requirements.

9.2.2.3.5 Off-site Waste Shipments

Off-site shipments of radioactive wastes are manifested in accordance with 10 CFR 20.2006. Waste shipments are packaged, labeled, and manifested in accordance with applicable State, DOT, NRC, and EPA requirements.

9.2.2.3.6 Waste Disposal

ACP generated radioactive wastes are disposed of at commercial disposal facilities that are licensed in accordance with 10 CFR Part 61 or applicable NRC Agreement State requirements. Packages are inspected prior to shipment, as appropriate, to verify compliance with applicable packaging and transportation requirements. Copies of the disposal site license are retained in accordance with procedural requirements.

Waste disposals are in compliance with 10 CFR Part 20, Subpart K. Waste disposal records are retained in accordance with 10 CFR 20.2108. Classified waste is disposed of in accordance with 10 CFR Part 95 and Security Program requirements.

9.2.2.3.7 Waste Tracking and Documentation

LLRW and LLMW generated at the ACP are tracked through a Request for Disposal system. Each waste container is given a unique identification number. The identification numbers are entered and maintained in a computer-based database. The database is updated to reflect location, characterization, treatment data, and waste disposal information.

9.2.2.3.8 Other Permits and Licenses

The ACP is classified as a large-volume generator of *Resource Conservation and Recovery Act* of 1976 hazardous wastes, which transfers solid wastes to appropriately permitted Treatment, Storage, and Disposal Facilities within 90 days.

9.2.2.4 Environmental Monitoring

The ACP is located contiguous to an existing uranium enrichment plant (the GDP) with approximately 50 years of accumulated experience in managing uranium and UF_6. The GDP was operated by the United States Enrichment Corporation, a subsidiary of USEC, from 1993 until it was placed in standby, and by predecessor organizations of the United States Enrichment Corporation prior to 1993. The environmental monitoring system for the ACP is based on the experience and data accumulated at the GDP.

9.2.2.4.1 Air Monitoring

Between 1980 and 1999, annual gaseous uranium effluents from the GDP ranged between 0.97 and 0.010 Ci/yr. Ambient air samples collected over this period by the GDP operators showed that these levels of effluents do not produce a quantifiable difference in ambient air concentrations in unrestricted areas. ACP operations are not expected to exceed these levels of effluents. Consequently, ambient air monitoring is not useful in detecting or evaluating a public impact due to routine gaseous effluents from the ACP.

In addition, experience at the GDP has shown that any release large enough to produce high or intermediate consequences will first produce a large and very visible cloud of white smoke at the point of release. The ACP has a written procedure for dealing with unplanned

releases ("See and Flee") that includes the immediate reporting of observed releases to the Operations Supervisor and evaluation by environmental professionals based on available credible information. Effluent monitoring will quantify routine gaseous effluents, but some accidental release scenarios may require information such as mass balances or measured environmental contamination to quantify an accidental release that did not pass through a monitored vent.

The United States Enrichment Corporation ceased sampling ambient air and returned the reservation's network of permanent air samplers to DOE in 1999, which upgraded the samplers for its own purposes. Based on the DOE Annual Environmental Reports published since 1999, average airborne uranium concentrations have been 1.1×10^{-15} micrograms per milliliter (μg/mL) on-site (i.e., within the DOE reservation), 7.4×10^{-16} μg/mL in unrestricted areas, and 5.5×10^{-16} μg/mL at the DOE background station. These results are consistent with the gross activity monitoring conducted prior to the turnover/upgrade. They are also a minimum of three orders of magnitude less than the applicable discharge limits for uranium isotopes in 10 CFR Part 20, Appendix B.

The reservation maintains a meteorological tower that is located on the southern section of the reservation. The tower is equipped with instruments at the ground, 10-, 30-, and 60-meter levels. Among the parameters measured are air temperature, wind speed, wind direction, relative humidity, solar radiation, barometric pressure, precipitation, and soil temperature. Data from the National Weather Service or other local sources may be used in lieu of or to supplement reservation data.

The effluent monitoring and meteorological data are used to calculate the environmental impacts of airborne effluents from the ACP using EPA-approved dispersion models as described in Section 9.2.2.1 of this chapter.

9.2.2.4.2 Soil and Vegetation

Between 1980 and 2002, annual gaseous uranium effluents from the GDP have ranged between 0.97 and 0.005 Ci/yr. Soil and vegetation samples collected over this period by the GPD operators show that these levels of effluents do not produce a statistically significant difference in soil and vegetation concentrations in unrestricted areas. (Liquid effluents do not have a direct impact on soil and terrestrial vegetation around the reservation.) ACP operations are not expected to exceed these levels of effluents. Consequently, soil and vegetation monitoring is not useful in detecting a public impact due to gaseous effluents from the ACP. Therefore, atmospheric impacts of ACP operation, including action levels, will be based on gaseous effluent monitoring or other effluent information and atmospheric dispersion modeling as described in Section 9.2.2.1 of this chapter.

Soil and vegetation monitoring may be useful in assessing the long-term impacts of effluents from ACP operations or DOE environmental remediation projects or in assessing the impact of a high or intermediate consequence release that has already been detected and controlled. Therefore, the ACP maintains a soil and vegetation monitoring program for these purposes.

Soil and vegetation (wide-blade grass, typical of local cattle forage) samples are collected semiannually. The sampling networks completely surround the reservation, including the predominant downwind directions, and are administratively divided into on-site, off-site (up to 5 kilometers) and remote (5 to 16 kilometers off-site). A map of sampling locations in each group is provided in Figure 9.2-3. Soil samples are analyzed for gross alpha activity, gross beta activity, technetium beta activity, and total uranium concentration. Vegetation samples are analyzed for technetium beta activity and total uranium concentration. Specific details of the analytical methods are presented in Section 9.2.2.5 of this chapter. See Table 9.2-5 for a summary of the last five calendar years of soil and vegetation results (1998-2002).

In addition to the semiannual vegetation samples, the ACP also collects annual crop samples from local gardeners and farmers on a voluntary basis. Because of the voluntary nature of these samples, the sampling locations change from year to year. Crop samples are normally analyzed for technetium beta activity and total uranium concentration only. The analytical methods are the same as for the vegetation samples. No contamination has been found in crop samples.

9.2.2.4.3 Surface Water

Between 1980 and 2002, annual waterborne uranium effluents from the GDP have ranged between 0.71 and 0.026 Ci/yr. Surface water samples collected over this period by the GDP operators show that these levels of effluents do not produce a statistically significant difference in the Scioto River. ACP operations are not expected to exceed these levels of effluents. Consequently, surface water monitoring is not useful in detecting or evaluating a public impact due to liquid effluents from the ACP. Therefore, impacts of ACP operation on local receiving waters, including action levels, will be based on effluent monitoring and pathways modeling as described in Section 9.2.2.2 of this chapter.

Surface water monitoring may be useful in assessing impacts of effluents from DOE environmental remediation projects or historical contamination. The ACP maintains a surface water monitoring program for this purpose.

Radiological analyses are performed on grab samples from upstream and downstream locations in Little Beaver Creek, Big Beaver Creek, Big Run Creek, and the Scioto River. A map of the sampling locations is found in Figure 9.2-4. Samples are collected weekly from the Scioto River and one location (RW8) in Little Beaver Creek. Other locations are sampled monthly. Specific details of the analytical methods are presented in Section 9.2.2.5 of this chapter. See Table 9.2-6 for a summary of the last five calendar years of surface water results (1998-2002).

9.2.2.4.4 Sediment Monitoring

Between 1980 and 2002, annual waterborne uranium effluents from the GDP have ranged between 0.71 and 0.026 Ci/yr. Sediment samples collected over this period by the GDP operators show that these levels of effluents do not produce a statistically significant difference in the Scioto River. ACP operations are not expected to exceed these levels of effluents.

Consequently, sediment monitoring is not useful in detecting a public impact due to liquid effluents from the ACP. Therefore, impacts of ACP operation on local receiving waters, including action levels, will be based on effluent monitoring and pathways modeling as described in Section 9.2.2.2 of this chapter.

Sediment monitoring may be useful in assessing the long-term impacts of effluents from DOE environmental remediation projects or historical contamination. The ACP maintains a sediment monitoring program for this purpose.

Sediment sampling around the reservation is conducted semiannually to assess potential radionuclide accumulation in the surrounding receiving streams. The sampling locations include both upstream and downstream locations. A map of the sample locations is provided in Figure 9.2-5. Sediment sample analyses include gross alpha activity, gross beta activity, and technetium beta activity and total uranium concentration. Specific details of the analytical methods are presented in Section 9.2.2.5 of this chapter. See Table 9.2-7 for a summary of the last five calendar years of sediment results (1998-2002).

9.2.2.4.5 Groundwater

Due to historical operations, the reservation has multiple plumes of groundwater contamination. The primary contaminate in the plumes is the halogenated solvent trichloroethylene, but limited areas of technetium contamination also exist.

DOE is conducting a site-wide environmental remediation program under an Agreed Order with the State of Ohio. As part of this program, reservation groundwater monitoring is under the control of DOE and the data is reported as part of DOE's Annual Environmental Report for the reservation. The ACP does not conduct a separate groundwater monitoring program. The current nuclides of interest in the DOE groundwater monitoring program are ^{99}Tc, ^{234}U, ^{235}U, ^{236}U, ^{238}U, ^{237}Np, ^{238}Pu, ^{240}Pu, and ^{241}Am.

9.2.2.4.6 Direct Gamma Radiation Monitoring

The only significant sources of environmental gamma radiation introduced to the reservation by man are the uranium isotope ^{235}U and the short-lived ^{238}U daughters. There are small amounts of other gamma emitters present on site as sealed sources and laboratory standards, but these are not detectable at any large distance. Gamma radiation levels in unrestricted areas around the ACP are dominated by naturally occurring radioactive materials.

The reservation conducts external gamma radiation monitoring consisting of lithium fluoride thermoluminescence dosimeters (TLDs) positioned at various site locations and at locations off-site. There are nine dosimeters spaced within Perimeter Road on the reservation; eight dosimeters spaced around the reservation boundary; and two dosimeters located off-site. Maps of the TLD locations are presented in Figures 9.2-6 and 9.2-7. These dosimeters are collected and analyzed quarterly. Processing and evaluation are performed by a processor holding current accreditation from the National Voluntary Laboratory Accreditation Program of the National Institute of Standards and Technology (NIST). See Table 9.2-8 for a summary of the last five calendar years of TLD results (1998-2002).

9.2.2.5 Laboratory Standards

A National Voluntary Laboratory Accreditation Program-certified service provider processes the site's environmental TLDs as described in Section 9.2.2.4.6. A laboratory licensed/certified by the NRC or an Agreement State provides other radiological and chemical analyses. The following description is based on current services provided by the on-site X-710 building laboratory, which is licensed by the State of Ohio and certified by the NRC, but is not part of the ACP. Off-site vendors providing analytical services for the ACP will be required to meet the equivalent standards as part of the contract.

Vent samples (i.e., activated alumina) are analyzed for uranium isotopes (^{234}U, ^{235}U, and ^{238}U) and ^{99}Tc. Uranium isotope concentrations are determined using either alpha spectrometry or Inductively Coupled Plasma/Mass Spectrometry (ICP/MS). Technetium concentrations are determined using liquid scintillation counting. Analytical results are reported in micrograms of analyte per gram of alumina. These results are converted to grams released using recorded flow data and the measured weight of alumina in the sampler and to activity using published specific activities for individual isotopes. Gaseous effluents equivalent to an annual public dose of less than 0.1 mrem are routinely quantified. Since the airborne concentrations in 10 CFR Part 20, Appendix B, Table 2 are equivalent to an annual dose of 50 mrem, the MDA of these methods are equivalent to less than 0.2 percent of the 10 CFR Part 20, Appendix B, Table 2 values.

Water samples from NPDES outfalls are analyzed for gross alpha and gross beta activity, technetium beta activity, and total uranium concentration. The gross activities are determined by proportional counter and the technetium activity by liquid scintillation. The MDAs are 5×10^{-9} µCi/mL for gross alpha, 1.5×10^{-8} µCi/mL for gross beta, 2×10^{-8} µCi/mL for technetium beta. The total uranium concentration is determined by ICP/MS, with a minimum detectable concentration of 0.001 µg/mL. The isotopic distribution of the total uranium is estimated to match the calculated uranium alpha activity to the measured gross alpha activity. The Table 2 values for liquid releases are 3×10^{-7} µCi/mL for each of the uranium isotopes and 6×10^{-5} µCi/mL for technetium. Consequently, the MDAs for liquid effluents are less than two percent of the applicable 10 CFR Part 20, Appendix B, Table 2 values.

Environmental samples are analyzed for gross activities by proportional counter and technetium activity by liquid scintillation. To accommodate a data sharing agreement with DOE, uranium concentrations in environmental samples are determined by alpha spectrometry. The minimum detectable activities/concentrations are comparable to those for effluent samples.

Laboratory quality control (QC) includes the use of a dedicated Chain of Custody system, formal written procedures, NIST-traceable standards, matrix spikes, duplicate, and replicate samples, check samples, and blind and double-blind QC samples.

Any laboratory providing analytical services to the ACP will be required to participate in at least one laboratory intercomparison program covering each type of analysis contracted for. Intercomparision programs that the United State Enrichment Corporation's X-710 building laboratory currently participates in include: the EPA Discharge Monitoring Report Study;

National Institute of Occupational Safety and Health (NIOSH) Proficiency Analytical Testing Program; EPA Water Pollution Performance Evaluation Study; EPA Water Supply Study; NIOSH Environmental Lead Proficiency Analytical Testing Program; Proficiency Environmental Testing program, a commercial program sponsored by the Analytical Products Department of Belpre, Ohio; DOE Environmental Measurements Laboratory Radionuclide Quality Assessment Program; and DOE's Mixed Analyte Performance Evaluation Program.

9.2.2.6 Description of Status of Federal/State/Local Permits/Licenses

The ACP must comply with the applicable regulations under the *Atomic Energy Act* of 1954, as amended; 10 CFR Part 40; and 10 CFR Part 70 to hold a license to possess and use source and SNM. In addition, the ACP must comply with pertinent NRC regulations in 10 CFR Part 20 related to radiation dose limits to individual workers and members of the public. USEC is submitting an Environmental Report to the NRC in accordance with 10 CFR Part 51.

As described in previous sections, the ACP will require PTIs from the State of Ohio to install all new air emission sources followed by a modification to the existing Title V air permit for the operation of those sources. The ACP will also be subject to the Radionuclide NESHAP administered by the EPA Region V. An additional PTI from the State of Ohio will be needed if the ACP installs any new wastewater lines. A modification to the existing NPDES permit will be needed to allow construction and operation of the ACP by USEC. These are the only Federal, State and local permits or other authorizations that USEC expects will be necessary for the ACP. Table 9.2-9 gives a full listing of the Federal, State and local permits and other authorizations and consultations that potentially could be required and the current status of each.

The ACP permit and reporting requirements will be incorporated and administered in the United States Enrichment Corporation permits and reporting requirements until a like USEC compliance organization is established. The Lead Cascade Demonstration Facility, X-3001 purge vacuum and evacuation vacuum system, is currently incorporated in the United States Enrichment Corporation Title V air permit (PTI number 06-07470).

Informal consultations have been made with the responsible agencies in compliance with the following:

- Section 7 of the *Endangered Species Act*
- *Fish and Wildlife Coordination Act*
- *National Historic Preservation Act* (NHPA), Section 106
- *Farmland Protection Policy Act* (FPPA)/Farmland Conservation Impact Rating

Consultation letters and responses are included in Appendix B of the accompanying Environmental Report.

9.2.3 Integrated Safety Analysis Summary

An Integrated Safety Analysis (ISA) Summary, meeting the requirements of 10 CFR 70.65(b), was prepared in accordance with the guidance contained in Chapter 3.0 of the SRP and NUREG-1513, *Integrated Safety Analysis Guidance Document.* The ISA Summary for the American Centrifuge Plant is submitted for review (separate from this license application) as document LA-3605-0003, Integrated Safety Analysis Summary for the American Centrifuge Plant.

9.3 Reports to the Nuclear Regulatory Commission

9.3.1 10 *Code of Federal Regulations* 70.59 Reports

The ACP submits a written report to the NRC Regional Office and the Office of Nuclear Material Safety and Safeguards by March 1 and August 30 of the each year detailing: uranium and technetium (if any) amounts and concentrations in gaseous and liquid effluents during the previous reporting period (July through December and January through June, respectively) in accordance with 10 CFR 70.59. These reports also include an estimate of the public dose due to gaseous effluents over the previous year.

9.3.2 National Emission Standards for Hazardous Air Pollutants Reports

The ACP submits a written report to the EPA, OEPA, NRC Regional Office and Office of Nuclear Material Safety and Safeguards by June 30 of each year detailing: plant operations and gaseous effluent monitoring during the previous calendar year, gaseous radioactive effluents over the previous year, an assessment of the public TEDE caused by those effluents, and an explicit comparison of the calculated TEDE to the EPA public dose limit (10 mrem annually). This report would become monthly if the maximum public TEDE exceeds 10 mrem annually.

This report is required under 40 CFR 61.94 and by the conditions of the Title V Permit issued by the State of Ohio. It also fulfills the requirement to demonstrate of compliance with 10 CFR 20.1301 and 10 CFR 20.1101 as described in Section 9.2.2.1.2 of this chapter.

9.3.3 Baseline Effluent Quantity Reports

The ACP assesses any weekly effluent that exceeds any of the action levels as described in Table 9.2-1. Many years of experience by the GDP operators have shown that radioactive effluents less than the action levels in Table 9.2-1 cannot produce a public radiation dose that is within an order of magnitude of the dose restriction in 10 CFR 20.1101, let alone the dose limit of 10 CFR 20.1301. Any weekly effluent that exceeds the action levels in Table 9.2-1 requires a written estimate of the probable impact of the effluent, in conjunction with other monitored effluents from ACP operations, on the annual public radiation dose.

These reports are available on request by the NRC. They are not routinely submitted to outside authorities because they are considered interim assessments that are superceded by the

semiannual reports and annual public dose assessment described in Sections 9.3.1 and 9.3.2 of this chapter.

In the event that evaluated releases threaten to exceed the public dose constraint in 10 CFR 20.1101, the NRC will be notified according to written procedures.

9.4 References

1. LA-3605-0002, Environmental Report for the American Centrifuge Plant
2. NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility*
3. U.S. Department of Energy, Portsmouth Annual Environmental Report for 2000, DOE/OR/11-3077&D1, December 2001
4. U.S. Department of Energy, Portsmouth Annual Environmental Report for 2001, DOE/OR/11-3106&D1, November 2002
5. Regulatory Guide 1.109, *Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I*, October 1977
6. USEC-02, United States Nuclear Regulatory Commission Certification of Compliance for the Portsmouth Gaseous Diffusion Plant
7. LA-3605-0003, Integrated Safety Analysis Summary for the American Centrifuge Plant
8. USEC-651, *Uranium Hexafluoride: A Manual of Good Handling Practices*

Table 9.2-1 American Centrifuge Plant Action Levels for Radionuclide Effluents

Weekly Sample Results		
Uranium[a]	Technetium[a]	Required Actions[b]
BEQ	BEQ	Review release data for previous six months for trends, and estimate probable impact over calendar year. Evaluate whether additional controls would significantly reduce public exposure.
10 x BEQ or 2 x BEQ averaged over 6 months	80 x BEQ or 16 x BEQ averaged over 6 months	Determine whether increased releases are ongoing or a single spike. Initiate investigation into cause(s) of increased releases. Evaluate whether mitigative and/or corrective measures are necessary to reduce public dose. Implement mitigative and/or corrective measures as needed.
EPA Reportable Quantity[c] (RQ) (0.1 Ci in 24 hours)	EPA RQ[c] (10 Ci in 24 hours)	Notify Operations Supervisor Trace source of abnormal releases and establish control or shutdown as needed. If releases cannot be mitigated within 24 hours, elevate to next level.
1 Ci[d]	8 Ci[d]	Close affected discharge points until control of releases is re-established.

[a] Uranium has an approximately 8-fold greater dose rate response than ^{99}Tc over air dominated exposure pathways. Uranium dose response completely dominates ^{99}Tc over water dominated exposure pathways.

[b] Required actions for any level include required actions listed under lower emission levels.

[c] RQ does not include permitted emissions. The ACP is regulated under 40 CFR Part 61, Subpart H for release of airborne radionuclides from the entire reservation up to the equivalent of 10 mrem/year TEDE to the most exposed member of the public.

[d] 1 Ci or 8 Ci in one weekly sample analysis.

Note: The Operations Supervisor has the authority to allow a restart.

10.0 DECOMMISSIONING

In accordance with Reference 1, this chapter provides an overview of proposed decommissioning activities for the American Centrifuge Plant (ACP). The ACP is located in a leased area of the U.S. Department of Energy's (DOE) reservation in Piketon, Ohio. USEC Inc. (USEC) requests a 30-year license to accommodate plans to operate the ACP through 2036. At the end of useful plant life, the ACP will be decommissioned such that the facilities will be either returned to the DOE in accordance with the requirements of the Lease Agreement with the DOE or will be released for unrestricted use. The criteria for final disposition of facilities will be established in the Decommissioning Plan (DP) which, as noted below, will be submitted prior to license termination. Nevertheless, for the purposes of the License Application for the American Centrifuge Plant, the decommissioning discussions in this Application and the decommissioning estimated costs are based on decontaminating the plant to the radiological criteria for unrestricted use in 10 *Code of Federal Regulations* (CFR) 20.1402. Information about USEC, the location of the site, and the types and authorized uses of licensed material are provided in Section 1.2 of the license application and a description of the site and immediate environs is provided in Section 1.3 of the license application.

A detailed DP for the ACP will be submitted by USEC in accordance with 10 CFR 70.38(g) and applicable risk-informed U.S. Nuclear Regulatory Commission (NRC) guidance (References 2, 3, and 4) prior to the time of license termination. Prior to decommissioning, an assessment of the radiological status of the ACP will be made. Enrichment equipment will be removed, leaving only the building shells and the plant infrastructure, including equipment that existed at the time of lease with the DOE (e.g., rigid mast crane, utilities, etc.). Classified material, components, and documents will be destroyed or disposed of in accordance with the Security Program for the American Centrifuge Plant (Reference 5). Requirements for nuclear material control and accountability will be maintained during decommissioning in a manner similar to the programs in force during ACP operation (Reference 6). Depleted uranium hexafluoride (UF_6) material (tails), if not sold or disposed of prior to decommissioning, will be sold, or converted to a stable, non-volatile uranium compound and disposed of in accordance with regulatory requirements utilizing facilities constructed by DOE, as authorized by the USEC Privatization Act, and/or other licensed facilities. Radioactive wastes will be disposed of at licensed low-level waste disposal sites. Hazardous wastes will be treated or disposed of in licensed hazardous waste facilities.

The DP submitted at the time of license termination consists of several interrelated components, including (1) site characterization information, (2) remediation plan, and (3) a final status survey plan. The costs for activities required for these components have been identified in this chapter and estimated in the Decommissioning Funding Plan (DFP). Costs projected were developed based on the experience at the Portsmouth Gaseous Diffusion Plant during the transition to Cold Standby operation and decommissioning cost estimates developed for the American Centrifuge Demonstration Facility. Additionally, USEC has performed dismantling and decontamination work at the gaseous diffusion plants. Data and experience from these activities allowed a realistic estimation of expected decommissioning financial expenditures.

Using the cost data as a basis, financial arrangements are made to cover costs required to release the ACP for unrestricted use and to dispose of the tails. Updates on cost and funding will be provided periodically as describe in Section 10.10.4. In accordance with 10 CFR 70.22(a)(9) and 70.25(a)(1), a DFP is submitted as part of the license application for the ACP (Reference 7).

The following assumptions are utilized in the plan for decommissioning:

- No credit is taken for salvage value of equipment or materials.
- Decontamination liability is anticipated in the X-3001 and X-3002 Process Buildings, X-3012 Process Support Building, X-3346 Feed and Customer Services Building, X-3346A Feed and Product Shipping and Receiving Building, X-7725 Recycle/Assembly Facility, X-7726 Centrifuge Training and Test Facility, X-7727H Interplant Transfer Corridor, X-3356 Product and Tails Withdrawal Building, X-2232C Interconnecting Process Piping, and miscellaneous cylinder storage yards.
- No decontamination is anticipated for the other ACP leased facilities.
- Decommissioning estimated costs are based on decontaminating the plant to the radiological criteria for unrestricted use in 10 CFR 20.1402.

The centrifuge assembly area in the X-7725 facility is identified as the Decontamination Service Area (DSA). The centrifuge machine transport system is used to transport the centrifuge machines from the cascade area to the DSA.

The remaining sections of this chapter describe decommissioning plans and funding arrangements, and provide a detailed examination of the decontamination aspects of the program. The information herein 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 detailed DP required near the time of license termination.

10.1 Decommissioning Program

The plan for decommissioning is to decontaminate or remove materials from the facilities promptly after cessation of ACP operations. Decommissioning planning begins by incorporating special design features into the plant. These features simplify dismantling and decontamination. The plans are implemented through proper management of Radiation Protection and Industrial Health and Safety programs for the ACP. Decommissioning policies address radioactive waste management, physical security, and nuclear material control and accountability.

10.2 Decommissioning Steps

Decommissioning may begin immediately following termination of operation, since only low radiation levels exist at this plant. Overall, the decommissioning is estimated to require approximately six years from plant shutdown to completion of the final status survey of radiological conditions. The order of activities to support decommissioning will generally be: planning and preparation; process system purging; equipment dismantling and removal; decontamination; disposition of equipment and material (including classified items); disposal of wastes; completion of a final status survey. The following sections provide an overview and explanation of each of these steps.

10.2.1 Overview

The intent of decommissioning is to return the ACP to an unrestricted use state. Removed equipment includes the centrifuges, the feed and withdrawal equipment, piping and components from systems providing UF_6 containment, systems in direct support of the centrifuges (e.g., cooling water), radioactive and hazardous waste handling systems, contaminated air filtration systems, etc. The remaining plant infrastructure includes utility services such as electrical power supply, sanitary water, fire suppression, ventilation, communications, and sewage treatment.

Decontamination of the plant will not require the installation of a new facility dedicated for that purpose since the X-7725 facility will serve as the DSA and will accommodate repetitive equipment decontamination of centrifuges and other components. The DSA is described in Section 10.8.1 of this license application and will be the location for decontamination activities.

Although certain unclassified components may be reused or sold as scrap, for conservatism this plan assumes only that components will be decontaminated in accordance with radiation protection requirements. Classified parts will be dispositioned in accordance with the Security Program. Table 10.2-1 of this license application lists components for potential decontamination at decommissioning.

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 UF_6 conversion facilities and/or other licensed facilities. UF_6 tails are stored in steel cylinders until the tails material can be processed in accordance with the disposal strategy established by USEC. USEC provides financial assurance to fund the estimated cost of conversion and disposal of the depleted uranium inventory as it is generated during operation. This funding is described in the DFP and is in addition to the funding requirements for decommissioning the ACP. At full capacity, the ACP will generate approximately 9,520 Metric Ton (MT) of UF_6 tails annually. Over the 30-year license, that is a total of approximately 270,200 MT of UF_6 tails, as noted in Table C3.19 of the DFP. 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, funding provisions are made to dispose of the tails should that become necessary.

Contaminated portions of the buildings will be decontaminated. Structural contamination is expected to be limited to the areas indicated on Figure 10.1-1 (located in Appendix A) inside the CCZ of the plant. The remainder of the ACP is not expected to require decontamination. Good housekeeping practices during normal operation and cleanup activities following spills or contamination events will maintain these other areas contamination free. Decontamination activities will continue until facilities satisfy the specified radiological criteria.

10.2.2 Purging

At the end of useful operation, the ACP is shut down and UF_6 material is removed to the fullest extent possible by normal process operation. This is followed by evacuation and purging of process systems. This shutdown and purging portion of the decommissioning process is estimated to take approximately three months.

10.2.3 Dismantling and Removal

Dismantling is the process of unbolting, disconnecting, cutting, etc., of components requiring removal. The dismantling and removal activities are simple but labor intensive. They generally require the use of protective equipment. The work process will be optimized, considering the following:

- Minimize spread of contamination and the need for protective equipment;
- Balance the number of cutting and removal operations with the resultant decontamination and disposal requirements;
- Optimize the rate of dismantling with the rate of decontamination plant throughput;
- Provide storage and laydown space required, as impacted by retrievability, criticality safety, security, etc.; and
- Balance the cost of decontamination with the cost of disposal.

Details of the complex optimization process will be decided near the end of plant useful life, taking into account specific contamination levels, market conditions, and available waste disposal sites. To avoid laydown space and contamination problems, dismantling will proceed generally no faster than the downstream decontamination process. The time frame to accomplish both dismantling and decontamination is estimated to be five years.

10.2.4 Decontamination

The decontamination process is addressed separately in Section 10.8 of this chapter. The decommissioning estimated costs are based on decontaminating the plant to the radiological criteria for unrestricted use in 10 CFR 20.1402.

10.2.5 Salvage and Sale

Items to be removed from the facilities can be categorized as potentially re-usable equipment (whether contaminated or decontaminated), recoverable decontaminated scrap, and wastes. Based on a 30-year plant operating life, operating equipment is not assumed to have a significant reuse value. Equipment-bearing aluminum that remains in the plant will be treated and disposed of appropriately. Smaller amounts of steel, copper, and other metals can be recovered and sold at market price. However, for conservatism, no credit is taken for salvage value in the DFP.

Other items are considered waste. Wastes have no 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, small amounts of hazardous materials, and low-level mixed (LLMW) and radioactive (LLRW) wastes. The radioactive waste will primarily be crushed centrifuge rotors, trash, and citric cake. Citric cake consists of uranium and metallic compounds precipitated from citric acid decontamination solutions. It is estimated that approximately 60,000 cubic feet of compacted radioactive waste will be generated during the decommissioning operation. This waste may be subject to further volume reduction prior to disposal.

Radioactive wastes (both LLRW and LLMW) 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 DP to be submitted at or about the time of license termination.

The ultimate disposal of UF_6 tails remains to be determined between potential commercial uses or processing at the DOE UF_6 conversion facility in Piketon, Ohio. However, for conservatism, USEC provides financial assurance to fund the estimated cost of conversion and disposal of the depleted uranium inventory. This funding is described in the DFP and is in addition to the funding requirements for decommissioning the ACP. Classified components and documents will be disposed of in accordance with the requirements of the Security Program for

the American Centrifuge Plant.

10.2.7 Final Status Survey

A final status survey of the radiological conditions of the plant is performed to verify proper decontamination. 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 status survey will systematically take measurements and perform sampling to describe radioactivity over the ACP. The intensity of the survey will vary depending on the location (i.e., the buildings, the immediate area around the buildings, the controlled fenced area, and the remainder of the site). The survey procedures and results will be documented in a report. The results of the report will become part of the application to terminate the license. The format and content of the report will follow current NRC guidance (Section 4.5 of Reference 3).

Table 10.2-1 Components for Potential Decontamination at Decommissioning

Components	Description [units]	Estimated Quantity
Centrifuges	Internals: Rotor Assemblies, Motors, Suspensions and Mounts (Classified)	12,000[1]
Piping	1 to 10 inch process piping length (Lft)	168,100
Pumps	Vacuum Pumps (Evacuation/Purge)	246
Ventilation	Ductwork; Miscellaneous Gulper Ducting (ft^3);	118
Surface Areas[2]	Building Floors, Yards, Equipment (ft^2)	2,795,642
Valves	Process valves (excluding Sheetmetal)	7,250
	Miscellaneous valves	652
Process Equipment	[This information has been withheld pursuant to 10 CFR 2.390]	
Scales	Process Weighing Equipment	6
Compressors	Process Gas Compressors	12
Heat Exchangers	Machine Cooling Water HX, Freezer/Sublimers Compressor Train Coolers	16
Traps	Chemical traps (8 banks of 4), Cold Traps, Roughing Filters, Miscellaneous Traps	111
Tanks	Mixing, Holdup, Surge, and Dump Tanks	15
Cylinders	Tails (14, 10 Ton)	21,661
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[3]	3
	Cranes (RMC)[3]	8
	Cranes, Bridge X-7725[3]	2
	Centrifuge Mobile Equipment[3]	4
	Centrifuge Dismantling Equipment (X-7725 Assembly Stands)	6

[1] Includes 11,520 operational units plus contaminated spare centrifuges.
[2] Wall surface areas excluded since these areas are not anticipated to require decontamination.
[3] Equipment re-utilized from operational phase.

Components	Description [units]	Estimated Quantity
Decontamination Equipment (Continued)	Cutting Machines	2
	Degreasers	2
	Decontamination Tanks	4
	Wet Blast Cabinets	2
	Crusher	1

10.3 Management/Organization

Management of the decommissioning program will assure proper training and procedures are provided to assure worker health and safety. The programs will focus on minimizing waste volumes and worker exposure to hazardous or radioactive materials. Qualified contractors assisting with decommissioning will be subject to ACP security and training requirements, and procedural controls.

10.4 Health and Safety

Consistent with the policy during ACP operation, the policy during decommissioning is to keep individual and collective occupational radiation exposure with the ALARA principle. A Radiation Protection Program will identify and control sources of radiation, establish worker protection requirements and direct the use of survey and monitoring instruments.

10.5 Waste Management

Radioactive and hazardous wastes produced during decommissioning will be collected, handled, and disposed of in accordance with regulations applicable to the ACP at the time of decommissioning. Generally, procedures will be similar to those described for wastes produced during operation. These wastes will ultimately be disposed of in licensed radioactive or hazardous waste disposal facilities. Non-hazardous and non-radioactive wastes will be disposed of consistent with good industrial practice, and in accordance with applicable regulations.

10.6 Security and Nuclear Material Control

Requirements for physical security and for nuclear material control and accountability will be maintained during decommissioning in a manner similar to the programs in force during ACP operation. This includes requirements for control of classified information and classified

equipment described in the Security Program for the American Centrifuge Plant and the requirements for control of nuclear materials in the Fundamental Nuclear Material Control Plan for the American Centrifuge Plant. The DP is submitted near the end of plant life and will provide a description of revisions to these programs.

10.7 Record Keeping

Records important for safe and effective decommissioning of the ACP are maintained in accordance with established Records Management and Document Control procedural requirements. Information maintained in these records include:

- 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 occurrences may be limited only to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records will include any known information on identification of involved radionuclides, quantities, forms, and concentrations;
- As-built drawings and modifications of structures and equipment in areas where radioactive materials are used and/or stored, including locations that possibly could be inaccessible (e.g., buried pipes which may be subject to contamination); and
- A list contained in a single document that is updated every two years of the following:
  - Areas designated and formerly designated as restricted areas as defined under 10 CFR 20.1003.
  - Areas outside of restricted areas that require documentation under 10 CFR 70.25(g)(1).
  - Areas outside of restricted areas where current and previous wastes have been buried as documented under 10 CFR 20.2108.
  - Areas outside of restricted areas that contain material such that, if the license expired, USEC would be required to either decontaminate the area to meet the criteria for decommissioning in 10 CFR Part 20, Subpart E or would apply for NRC approval for disposal under 10 CFR 20.2002.
- Records of the cost estimate performed for the DFP, and records of the funding method used for assuring funds, including a copy of the financial assurance mechanism and any supporting documentation.

10.8 Decontamination

The DSA, the general procedures used to decontaminate, and the expected results of decontamination are described in the paragraphs below. Table 10.2-1 lists the major components and structures that may need to be decontaminated to some extent at the plant. Other components and structure will generally not require any decontamination. USEC anticipates low amounts and areas of actual contamination due to strict adherence to ALARA principles throughout the plant's life.

There are two general methods of decontamination, which may be used to decontaminate the ACP: dry and wet. Dry involves using an always safe vacuum cleaner (vacuuming), scooping up the material with a dust pan (low abrasive materials), sweeping material up with a brush or broom, or high abrasive (chipping or wire brush). Wet decontamination involves using films of cleaning solutions with mops, squeegees, rags, or dip tanks. Although wet decontamination or a dry decontamination variation, such as dry ice blasting, may be utilized for decontamination of the ACP, these methods are not anticipated to be utilized to a significant extent, and, therefore, are not included in the DFP estimate. For decontamination and decommissioning of the ACP and establishing the associated funding, it is assumed that a dry decontamination process is utilized throughout. The actual decontamination method or methods to be utilized to decontaminate and decommission the ACP will be established based upon the site characterization survey performed during the decommissioning planning and preparation phase and will be described in the Decommissioning Plan.

The DFP estimate does consider scarifying, to a 1/8-inch depth, the cylinder yard areas in their entirety as a conservative action. Any time surfaces are disturbed, such as with scarifying concrete, there is a potential to produce airborne radioactivity. To mitigate these concerns, airborne monitoring for the personnel performing the work would be provided, these individuals would be included in the internal monitoring program (urinalysis), and if the conditions exist, respiratory protection may be required. Furthermore, scarifying equipment may use a water spray to minimize dust, cool the cutting wheels, or use a limited amount of water as a media, but this is not considered to be a liquid waste as it is anticipated to evaporate to leave a dry debris for solid waste disposal.

10.8.1 Decontamination Service Area

The centrifuge assembly area within X-7725 facility is identified as the DSA. The centrifuge machine transport system would be used to transport the centrifuge machines from the process buildings to the DSA. The DSA handles centrifuges, feed, withdrawal, sampling and transfer equipment to be disassembled and dispositioned along with the UF_6 vacuum pumps, valves, piping, and other miscellaneous equipment. Unusable material will be destroyed. The DSA will have four functional areas: disassembly area, buffer stock area, decontamination area, and scrap storage area. Equipment in the decontamination area may include:

- Transport and manipulation equipment

- 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 $256.4 million. Since costs will likely change between the time of license issuance and actual decommissioning, USEC will adjust the cost estimate prior to operation of each additional increment of capacity on process gas, 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);

- Changes in plant condition or operations; and
- Changes in decommissioning procedures or regulations.

These costs are estimated as explained below:

Planning and Preparation: $2.6 million

Scope to be completed in one year and includes developing and submitting a detailed DP as a license amendment for NRC review and approval. Activities anticipated during this phase include:

- Develop Project Execution Plan and Schedule (including the organization and staffing plan and needed services);
- Develop and submit the Decommissioning Plan;
- Develop/implement Site Characterization Plan;
- Review/approve Site Decommissioning Plan by the NRC;
- Develop Decommissioning Activity Procedures; and
- Design Decommissioning Service Area (DSA).

Decontamination and/or Dismantling of Radioactive Facilities: $39.6 million

This is based upon utilizing salary and hourly workers at their respective average cost over a five-year duration. For conservatism, decommissioning estimated costs are based on decontaminating the plant to the radiological criteria for unrestricted use in 10 CFR 20.1402. Activities anticipated during this phase include:

- Prepare the decontamination Service Area;
- Internal decontamination of facilities;
- Dismantle centrifuge machines to include waste segregation and staging;
- Dismantle facilities and components; and
- Tails cylinder movement/disposition to include material title transfer to DOE.

Restoration of Contaminated Areas On Plant Grounds: $0.7 million

This is based upon utilizing salary and hourly workers at their respective current average cost distribution over a two-year duration. This assumes the contamination of the plant grounds from the ACP operations will be minimal. Activities anticipated during this phase include:

- External decontamination of facilities;
- Perform Health Physics surveys;
- Scarify cylinder storage yard surfaces; and
- Collect/dispose of yard debris.

Final Status Survey: $1.0 million

This is based upon utilizing salary technicians at their current average cost distribution for a period of 2.5 years. Costs do not include any NRC confirmatory surveys to verify the results of the Final Status Survey. Activities anticipated during this phase include:

- Develop/implement survey plans;
- Collect/analyze data;
- Perform confirmatory surveys;
- Develop final survey report; and
- Prepare License Amendment to terminate the license.

Site Stabilization and Long-Term Surveillance: $2.4 million

As previously stated, the intent of decommissioning is to return the plant to the radiological criteria for unrestricted use. To accomplish this activity, stabilization and surveillance is required due to the number of components involved and the duration of the decommissioning effort. This scope of work occurs throughout the six year decommissioning period and involves maintenance and surveillance activities on IROFS, as required, until the license is terminated

Packing Materials, Shipping, and Waste Disposal: $47.5 million

This is based upon shipping and disposal of the internals for 12,000 centrifuge machines (which includes operating machines as well as contaminated spares), feed and withdrawal equipment, and other components totaling approximately 60,000 cubic feet of solid waste, 16,000 gallons of

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	**$171.3 million**
General and Administrative (6 percent)	**$10.3 million**
Contractor Profit (15 percent)[4]	**$23.5 million**
Contingency (25 percent)	**$51.3 million**
Total Plant Decommissioning Cost Estimate	**$256.4 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 prior to operation of each additional increment of capacity on process gas and no less frequent than annually, once full capacity is achieved. 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 $602.9 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	$256.4 million
UF_6 Tails Disposition Cost	$602.9 million
Total Decommissioning Liability	$859.3 million

10.10.4 Funding Arrangements

Per the exemption request in Section 1.2.5 of this license application, the financial assurance for decommissioning the plant and disposal of 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 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.

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 for decommissioning and UF_6 tails disposal and provide a revised funding instrument to NRC prior to operation of additional incremental capacity on process gas. 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

Table 10.10-1 Plant Decommissioning Cost Estimates and Expected Duration

Task/Item	Cost Estimate (Millions, 2004 dollars)	Approx Percentage
Planning and Preparation	$2.6	2%
Decontamination and/or Dismantling of Radioactive Facilities	$39.6	23%
Restoration of Contaminated Areas On Plant Grounds	$0.7	0%
Final Status Survey	$1.0	1%
Site Stabilization and Long-Term Surveillance	$2.4	1%
Packing Materials, Shipping, and Waste Disposal	$47.5	28%
Equipment and Supply	$15.0	9%
Laboratory	$1.3	1%
Indirect Services	$33.6	20%
Miscellaneous	$27.6	15%
Subtotal	$171.3	100%
General and Administrative (6%)	10.3	
Contractor Profit (15%)	23.5	
Contingency (25%)	$51.3	
Total Plant Decommissioning Cost	$256.4	
UF_6 Tails Disposal Costs UF_6 Tails Contingency (10%)	$548.1 54.8	
Total UF6 Tails Disposition Cost	$602.9	
Total Decommissioning Liability	$859.3	

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11.0 MANAGEMENT MEASURES

Management measures are functions that are applied to items relied on for safety (IROFS) to provide reasonable assurance that the IROFS are available and reliable to perform their functions when needed. The phrase "available and reliable," as used in 10 *Code of Federal Regulations* (CFR) Part 70, means that, based on the analyzed, credible conditions in the Integrated Safety Analysis (ISA), IROFS will perform their intended safety function when needed to prevent accidents or mitigate the consequences of accidents to an acceptable level. Management measures are implemented to provide reasonable assurance of compliance with the performance requirements, considering factors such as necessary maintenance, operating limits, common-cause failures, and the likelihood and consequences of failure or degradation of the IROFS and the measures. This chapter addresses each of the management measures included in the 10 CFR Part 70 definition of management measures, i.e., configuration management (CM), maintenance, training and qualifications, procedures, audits and assessments, incident investigations, records management, and other quality assurance (QA) elements. Management measures are applied in a graded approach. The degree to which management measures are applied to the IROFS is a function of the item's importance in terms of meeting the performance requirements as evaluated in the ISA.

11.1 Configuration Management

The Configuration Management (CM) Program for the American Centrifuge Plant (ACP) is described in the following paragraphs.

11.1.1 Configuration Management Policy

In accordance with 10 CFR 70.72, a CM Program is implemented to ensure that changes from the plant baseline configuration are identified and controlled to help ensure safety through consistency among the plant design and operational requirements, the physical configuration, and the plant documentation. The CM Program includes:

- Identification and documentation of IROFS;
- Organizational descriptions of duties and responsibilities; and
- Administrative controls, procedures and policies, to implement and document activities that maintain the plant's configuration.

The goal of the CM program is to ensure that the ACP has accurate, current documentation that matches the plant's physical/functional configuration, while complying with applicable requirements.

11.1.1.1 Program Overview

The Engineering Manager has primary responsibility for the implementation of the CM Program for the ACP. The CM Program is applicable to the plant, structures, processes, systems, equipment, components, computer programs, and activities of personnel, regardless of the item's Quality Level (QL) classification.

CM Program procedures provide for a graded application of resources taking into consideration:

- QL (risk significance);
- Applicable regulations, industry codes, and standards;
- Complexity or uniqueness of an item or activity and the environment in which it has to function;
- Quality history of the item in service;
- Degree to which functional compliance can be demonstrated or assessed by test, inspection, or maintenance methods;
- Anticipated life span;
- Degree of standardization;
- Importance of data generated;
- Reproducibility of results; and
- Consequence of failure.

QLs are established in accordance with their importance to safety as follows:

<u>Level Criteria</u>

QL-1 A single IROFS that prevents or mitigates a high consequence event.

QL-2 Two or more IROFS that prevent or mitigate a high consequence event; one or more IROFS that prevents or mitigates an intermediate consequence event.

QL-3 Any item other than QL-1 and QL-2; QL-3 items are controlled in accordance with standardized commercial practices.

In accordance with the requirements of 10 CFR 70.72, the ACP implements change control processes for changes to the physical plant and for changes to procedures and controlled documents. These processes are described in Sections 11.1.4.1 and 11.1.4.2 of this license application, respectively. The Plant Safety Review Committee reviews appropriate changes to the ACP or to ACP operations, including tests and experiments, as specified in procedures. Procedures also specify the approval authority for the changes.

11.1.4.1 Control of Changes to the Physical Plant

The ACP has implemented a change control process using written procedures to control changes to the physical plant. This change control process meets the requirements established in 10 CFR 70.72 and in the QAPD. Key elements of the change control process are described in the following paragraphs:

- Requests for engineering assistance, after initiator's management approval, are forwarded to the DA for:
  - ➢ Review to determine if the proposed change is acceptable based upon scope, applicability, justification, and/or technical merit;
  - ➢ Engineering approval; and
  - ➢ Disposition and assignment to the appropriate Engineering discipline.
- Construction Project requests for plant modifications, additions, or changes have a 10 CFR 70.72 review performed to determine if the change can be made without prior NRC approval. Information utilized in the 10 CFR 70.72 review includes the following, as appropriate:
  - ➢ SRDs;
  - ➢ Conceptual design descriptions;
  - ➢ Drawings/specifications; and
  - ➢ Other documentation providing a project description.
- Modifications (permanent and temporary) are evaluated, as appropriate, for any required changes or additions to the plant's procedures, personnel training, testing programs, or the ISA Summary. Modifications are also evaluated, as appropriate, for potential radiation exposure, potential chemical exposure, nuclear criticality safety (NCS), and worker safety requirements and/or restrictions. Other areas of consideration in evaluating modifications may include: modification costs, similar completed modifications, QA aspects, potential equipment availability or maintainability concerns, constructability concerns, environmental considerations, and human factors.

- Critical repair parts for IROFS are identified during the design process.
- Proposed plant changes receive an independent, technical review that considers the technical feasibility and merit of the proposed change and the identification of appropriate interfaces for inclusion in the change package (e.g., procedures, training, safety).

A final review prior to release for operation is conducted which verifies that:

- The safety analysis documentation is complete and approved
- Operational procedure changes, if required, are completed and other supporting procedure changes have been initiated
- Operational training and qualification changes, if required, have been completed
- Design changes are completed and any as-built changes are identified and approved
- Document changes, if required, are completed
- For temporary changes, the change duration is documented and the modified equipment tagged
- Post-modification testing has been successfully completed
- Appropriate approvals have been obtained

11.1.4.2 Control of Changes to Procedures and Controlled Documents

Changes to procedures and controlled documents are controlled in accordance with the programs described in Sections 11.4 and 11.7 of this license application, respectively.

11.1.5 Assessments

The CM Assessment Program systematically evaluates the development and effective implementation of the CM Program processes. It assesses the adequacy of the implementation of administrative requirements, the configuration of items, and their documentation. The CM Assessment Program includes both initial and periodic assessments. Both document assessments and physical assessments (system walk downs) are conducted periodically to confirm the adequacy of the CM function.

Initial assessments of the CM program are performed during readiness reviews of the ACP. The initial assessment provides for field verification of design requirements and design documentation, verification of procedures, and verification of training.

- If needed, hold points or safety checkpoints are identified at appropriate steps in the procedure;
- A mechanism is specified for revising and reissuing procedures in a controlled manner;
- Current procedures are available and used at work locations; and
- The plant Training Program trains the required persons in the use of the latest procedures available.

The procedure process utilizes nine basic elements to accomplish procedure development, review, approval, and control: Identification; Development; Verification; Validation; Review and Comment Resolution; Approval; Issuance; Change Control; and Periodic Review. These elements are discussed in the following sections.

11.4.2.1 Identification

ACP organization managers have the responsibility for identifying which tasks will be proceduralized within their areas of control.

As a minimum, a procedure is required for:

- The operation of IROFS and the management measures supporting those IROFS as identified in the ISA Summary
- Operator actions necessary to prevent or mitigate the consequences of accidents described in the ISA Summary
- Safe work practices to control processes and operations with special nuclear material, IROFS, and/or hazardous chemicals incident to the processing of licensed material.

A detailed procedure is normally not needed if the task analysis determines that:

- The work is not complex or only involves a few actions (unless failure to properly conduct those actions could result in significant consequences)
- The task requires those skills normally possessed by a qualified person (otherwise known as "skill-of-the-craft")
- The consequences of an error would be minimal

Maintenance activities can be addressed by written procedures, documented work instructions, or drawings appropriate to the circumstances as discussed in Appendix A.6, paragraph (a), of ANSI/ANS 3.2-1994, *Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants.*

11.4.2.2 Development

Procedure development and quality is the user organization's responsibility. Procedure development is accomplished in accordance with procedural guidance. A general description follows:

- A system is in place to track and document the procedure process.
- Interviews with procedure users and process walk downs are utilized to ensure procedures are usable; reflect as-built conditions and process operations; and maintain management controls for nuclear safety, safeguards, and security.
- The procedure use category is determined. This determination documents the designation of a procedure as In-Hand (Continuous Use), Reference Use, or Information Use. The designation is based on the administrative or non-administrative use of the procedure, and the safety or financial consequences of failing to adhere to procedural requirements. Procedure use is discussed in Section 11.4.7 of this license application.
- As the procedure is drafted, attributes that enhance procedural use are included, such as standard style organization, format, cautions, and warnings.
- Input and review by affected parties is required. Other selected reviews are obtained, such as QA to ensure that QA requirements are identified and included in operating procedures.
- The approval process for the procedure is described in Section 11.4.2.6 of this license application.

11.4.2.3 Verification

Verification is a process that ensures the technical accuracy of the procedure and that it can be performed as written. Procedures are verified by the procedure owner/user during the procedure development/change process. There are two basic attributes of the verification process. The first attribute relates to the technical accuracy of the procedure. It ensures that technical information including formulas, set points, and acceptance criteria are correctly identified in the procedure. The second attribute is administrative, in that it verifies the procedure format and style and that it is consistent with the procedure-writing guide. Verification consists of a walk-down of the procedure in the field or a tabletop walk-through. A standard checklist is used to ensure required attributes are included.

11.4.2.4 Validation

The purpose of procedure validation is to ensure that no technical errors or human factor issues were inadvertently introduced during the procedure review process. Validation is required for new procedures or for intent changes to the procedure. Validation is performed in the field

NR-3605-0003

Quality Assurance Program Description

for the American Centrifuge Plant in Piketon, Ohio

Revision 1

Docket No. 70-7004

March 2005

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NR-3605-0003

QUALITY ASSURANCE PROGRAM DESCRIPTION FOR THE AMERICAN CENTRIFUGE PLANT

in Piketon, Ohio

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- Formulating the QAPD documented in the Quality Assurance Program Description for the American Centrifuge Plant;
- Review and approval of QAPD implementing procedures;
- Review and approval of supplier QA programs;
- Monitoring the implementation of the QAPD and assessing the effectiveness of the QAPD through audit and surveillance;
- Investigating any aspect of the QAPD to identify problems with execution and to verify that corrective action is taken in a timely manner;
- Stopping unsatisfactory work or controlling further processing when warranted for safety considerations;
- Attending status meetings, and staying abreast of day-to-day activities to ensure adequate oversight; and
- Providing quality control activities for purchased and in-house manufactured items.

The organizational philosophy is based on the following principles:

- Quality is achieved by those responsible for performing work. This includes identifying, correcting, or recommending solutions for quality problems.
- Quality verifications and controls are performed by persons who are independent of the work performance activities, but who may report to the management of the same organization. Persons responsible for assurance and verification of quality have sufficient organizational freedom to identify problems, initiate solutions, verify solutions and control further processing when necessary.
- Quality related activities may be delegated to others, but management retains responsibility for the overall effectiveness of the QAPD.
- Suppliers and contractors are required to have approved QA programs consistent with this QA program, as applicable to the scope of work as specified in Section 4.0 of this QAPD.

Specific organizational responsibilities are defined in the implementing procedures developed and implemented in accordance with Section 5.0 of this QAPD.

2.0 QUALITY ASSURANCE PROGRAM

QA elements of this section are applied to the design, fabrication, testing, operation, procurement, inspection, maintenance, and modification of items relied on for safety (IROFS), and activities affecting those IROFS, to ensure they will be available and reliable to perform their safety function when needed. The QAPD is applied to IROFS in a graded approach to an extent commensurate with their importance to safety. Quality Levels (QL) are established in accordance with their importance to safety as follows:

Level	Criteria
QL-1	A single IROFS that prevents or mitigates a high consequence event.
QL-2	Two or more IROFS that prevent or mitigate a high consequence event; or one or more IROFS that prevents or mitigates an intermediate consequence event.
QL-3	Any item other than QL-1 and QL-2. QL-3 items are controlled in accordance with standard commercial practices.

The requirements of the QAPD are applied in total to QL-1 IROFS. The process for selecting modifications to QAPD requirements for QL-2 IROFS is described below. QL-3 items are outside the scope of this QAPD. The application of the QAPD is documented, planned, implemented, and maintained to provide reasonable assurance that, together with other management measures, IROFS will be available and can be relied on, when needed.

Procedures provide for a graded approach taking into consideration:

- QL (risk significance);
- Applicable regulations, industry codes, and standards;
- Complexity or uniqueness of an item or activity and the environment in which it has to function;
- Quality history of the item in service;
- Degree to which functional compliance can be demonstrated or assessed by test, inspection, or maintenance methods;
- Anticipated life span;
- Degree of standardization;

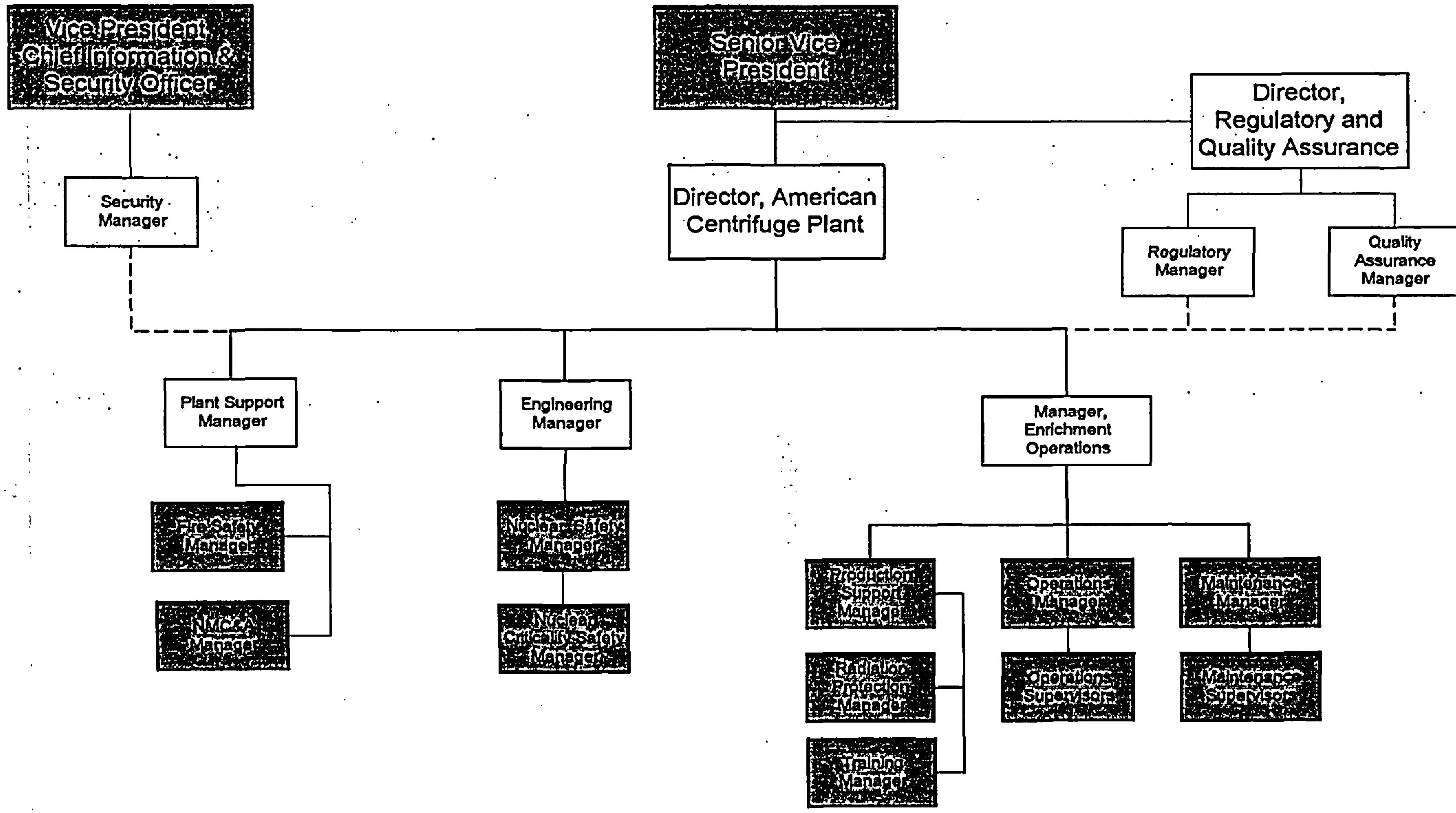

Figure 1.1-1 American Centrifuge Plant Organizational Chart

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NR-3605-0006

Decommissioning Funding Plan

for the American Centrifuge Plant

in Piketon, Ohio

The American Centrifuge™

USEC's Advanced Uranium Enrichment Technology

Revision 1

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DECOMMISSIONING FUNDING PLAN
for the American Centrifuge Plant
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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 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 decommissioning the plant and disposal of UF_6 tails will be provided incrementally as centrifuges are installed, operated on process gas, and UF_6 tails generated. 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)
- Estimated Volume of Annual Depleted Uranium Generated (Table C3.19)
- 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 $256.4 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.

The current estimated cost for disposal of depleted uranium is estimated to be $3.00 per kilogram of uranium (kgU). This cost for disposal is based upon the cost in the DOE/USEC Agreement of June 30, 1998[2]. USEC has compared this cost for disposal of depleted uranium against cost information from the DOE contract for the conversion facilities currently being constructed at Piketon, Ohio and Paducah, KY as well as the proposal to build and operate the uranium hexafluoride conversion facilities for DOE, submitted by the American Conversion Services (ACS) partnership, which included USEC. This proprietary ACS proposal was based on comprehensive cost projections developed by the partnership. The ACS proposal and the DOE conversion facilities cost information support the $3.00 per kgU disposal cost for depleted uranium used in this plan. 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 $538.1 million in 2004 dollars. With a 10 percent contingency, this represents a total liability of $591.9 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 $848.3 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

[2] Memorandum of Agreement between the United States Department of Energy and the United States Enrichment Corporation Relating to Depleted Uranium, dated June 30, 1998.

application model documentation related to the use of the surety method of providing decommissioning financial assurance.[3] 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.

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 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.

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

[3] 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.

estimates for decommissioning and UF_6 tails disposal and provide a revised funding instrument to NRC prior to operation of additional incremental capacity on process gas. 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). The NRC will be notified of any material changes to the decommissioning cost estimate and associated funding levels (e.g., significant increases in costs beyond anticipated inflation or the price of goods and services). To the extent the underlying instruments are revised to reflect changes in funding levels, the NRC will be notified as appropriate.

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 occurrences may be limited only to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records will include any known information on identification of involved radionuclides, quantities, forms, and concentrations;
- As-built drawings and modifications of structures and equipment in areas where radioactive materials are used and/or stored, including locations that possibly could be inaccessible (e.g., buried pipes which may be subject to contamination); and

- A list contained in a single document that is updated every two years of the following:
  - Areas designated and formerly designated as restricted areas as defined under 10 CFR 20.1003.
  - Areas outside of restricted areas that require documentation under 10 CFR 70.25(g)(1).
  - Areas outside of restricted areas where current and previous wastes have been buried as documented under 10 CFR 20.2108.
  - Areas outside of restricted areas that contain material such that, if the license expired, USEC would be required to either decontaminate the area to meet the criteria for decommissioning in 10 CFR Part 20, Subpart E or would apply for NRC approval for disposal under 10 CFR 20.2002.
- Records of the cost estimate performed for the DFP, and records of the funding method used for assuring funds, including a copy of the financial assurance mechanism and any supporting documentation.

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Appendix A

Model Payment Surety Bond

PAYMENT SURETY BOND

Date bond executed: ____________________

Effective date: ____________________

Principal: [*Insert legal name and business address of licensee*]

Type of organization: [*Insert "proprietorship," "partnership," or" corporation"*]

State of incorporation: _______________ (if applicable)

NRC license number, name and address of facility, and amount for decommissioning activities guaranteed by this bond: __________________________

Surety: [*Insert name and business address*]

Type of organization: [*Insert "proprietorship," "partnership," or "corporation"*]

State of incorporation: _______________ (if applicable)

Surety's qualification in jurisdiction where license facility is located.

Surety's bond number: ________________

Total penal sum of bond: $_____________

Know all persons by these presents, that we, the Principal and Surety hereto, are firmly bound to the U.S. Nuclear Regulatory Commission (hereinafter called NRC) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as it is set forth opposite the name of such Surety; but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

WHEREAS, the U.S. Nuclear Regulatory Commission, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I, of the Code of Federal Regulations, Part [*insert 30, 40, 70, or 72*], applicable to the Principal, which require that a license holder or an applicant for a facility license provide financial assurance that funds will be available when needed for facility decommissioning;

NOW, THEREFORE, the conditions of the obligation are such that if the Principal shall faithfully, before the beginning of decommissioning of each facility identified above, fund the standby trust fund in the amount(s) identified above for the facility;

Or, if the Principal shall fund the standby trust fund in such amount(s) after an order to begin facility decommissioning is issued by NRC or a U.S. District Court or other court of competent jurisdiction;

Or, if the Principal shall provide alternative financial assurance, and obtain NRC's written approval of such assurance, within 30 days after the date a notice of cancellation from the Surety is received by both the Principal and NRC, then this obligation shall be null and void; otherwise it is to remain in full force and effect.

The Surety shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above. Upon notification by NRC that the Principal has failed to perform as guaranteed by this bond, the Surety shall place funds in the amount guaranteed for the facility into the standby trust fund.

The liability of the Surety shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligations of the Surety hereunder exceed the amount of said penal sum.

The Surety may cancel the bond by sending notice of cancellation by certified mail to the Principal and to NRC provided, however, that cancellation shall not occur during the 90 days beginning on the date of receipt of the notice of cancellation by both the Principal and NRC, as evidenced by the return receipts.

The Principal may terminate this bond by sending written notice to NRC and to the Surety 90 days prior to the proposed date of termination, provided, however, that no such notice shall become effective until the Surety receives written authorization for termination of the bond from NRC.

The Principal and Surety hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new amount, provided that the penal sum does not increase by more than 20 percent in any one year and no decrease in the penal sum takes place without the written permission of NRC.

If any part of this agreement is invalid, it shall not affect the remaining provisions that will remain valid and enforceable.

In Witness Whereof, the Principal and Surety have executed this financial guarantee bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety.

Principal

[*Signatures*]
[*Names*]
[*Titles*]
[*Corporate Seal*]

Corporate Surety

[*Name and address*]

State of Incorporation: ____________________

Liability limit: $_________________

[*Signatures*]
[*Names and titles*]
[*Corporate Seal*]

[*For every co-surety, provide signatures, names and titles, corporate seal, and other information in the same manner as for the Sureties above*].

Bond Premium: $______________

Model Certification of Financial Assurance

CERTIFICATION OF FINANCIAL ASSURANCE

Principal: [*Legal names and and business address of licensee*]
NRC license number, name and address of the facility

Issued to: U.S. Nuclear Regulatory Commission

I certify that [*insert name of licensee*] is licensed to possess the following types of [*insert all that apply: "sealed sources or plated foils with a half-life great than 120 days licensed under 10 CFR Part 30," "unsealed byproduct material with a half-life greater than 120 days licensed under 10 CFR Part 30," "source material in a readily dispersible form licensed under 10 CFR Part 40," and "unsealed special nuclear material licensed under 10 CFR Part 70"*] in the following amounts:

Type of Material	Amount of Material

[*List materials and quantities of materials noted above. For byproduct materials and special nuclear materials, list separately the type and amount of each isotope authorized by the license.*]

I also certify that financial assurance in the amount of [*insert the total of all prescribed amounts calculated from Checklist 2, or the amount of the site-specific cost estimate, in US dollars*] has been obtained for the purpose of decommissioning as prescribed by 10 CFR Part [*insert 30, 40, or 70*].

[*Signatures and titles of officials of institution*]
[*Corporate seal*]
[*Date*]

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Appendix B

Model Standby Trust Agreement

STANDBY TRUST AGREEMENT

TRUST AGREEMENT, the Agreement entered into as of [*insert date*] by and between [*insert name of licensee*], a [*insert name of State*] [*insert "corporation," "partnership," or "proprietorship"*], herein referred to as the "Grantor," and [*insert name and address of a trustee acceptable to NRC*], the "Trustee."

WHEREAS, the U.S. Nuclear Regulatory Commission (NRC), an agency of the U. S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I of the *Code of Federal Regulations*, Part [*insert 30, 40, 70, 72*]. These regulations, applicable to the Grantor, require that a holder of, or an applicant for, a materials license pursuant to 10 CFR Part [*insert 30, 40, 70, or 72*] provide assurance that funds will be available when needed for required decommissioning activities.

WHEREAS, the Grantor has elected to use a [*insert "letter of credit," "line of credit," "surety bond," "insurance policy," "parent company guarantee," or "self-guarantee"*], to provide [*insert "all" or "part"*] of such financial assurance for the facilities identified herein; and

WHEREAS, when payment is made under a [*insert "letter of credit, "line of credit," "surety bond," insurance policy," "parent company guarantee," or "self-guarantee"*], this standby trust shall be used for the receipt of such payment; and

WHEREAS, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee;

NOW, THEREFORE, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

(a) The term "Grantor" means NRC licensee who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the trustee who enters into this Agreement and any successor Trustee.

Section 2. Costs of Decommissioning. This Agreement pertains to the costs of decommissioning the materials and activities identified in License Number [*insert license number*] issued pursuant to 10 CFR Part [*insert 30, 40, 70, 72*], as shown in Schedule A.

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a standby trust fund (the Fund) for the benefit of NRC. The Grantor and the Trustee intend that no third party have access to the Fund except as provided herein.

Section 4. Payments Constituting the Fund. Payments made to the Trustee for the Fund shall consist of cash, securities, or other liquid assets acceptable to the Trustee. The Fund is established

initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the Trustee are referred to as the "Fund," together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount of, or adequacy of the Fund, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by NRC.

Section 5. Payment for Required Activities Specified in the Plan. The Trustee shall make payments from the Fund to the Grantor upon presentation to the Trustee of the following:

(a) A certificate duly executed by the Secretary of the Grantor attesting to the occurrence of the events, and in the form set forth in the attached Certificate of Events, and

(b) A certificate attesting to the following conditions;

(1) that decommissioning is proceeding pursuant to an NRC-approved plan;

(2) that the funds withdrawn will be expended for activities undertaken pursuant to that plan; and

(3) that NRC has been given 30 days prior notice of [*insert name of licensee*]'s intent to withdraw funds from the escrow fund.

No withdrawal from the Fund for a particular license can exceed 10 percent of the remaining funds available for that license unless NRC written approval is attached.

In addition, the Trustee shall make payments from the Fund as NRC shall direct, in writing, to provide for the payment of the costs of required activities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by NRC from the Fund for expenditures for required activities in such amounts as NRC shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as NRC specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 6. Trust Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge its duties with respect to the Fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and which like aims; except that:

(a) Securities or other obligations of the Grantor, or any other owner or operator of the

facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended (15 U.S.C. 80a-2(a)), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(b) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal government, and in obligations of the Federal government such as GNMA, FNMA, and FHLM bonds and certificates or State and Municipal bonds rated BBB or higher by Standard & Poor's or Baa or higher by Moody's Investment Services; and

(c) For a reasonable time, not to exceed 60 days, the Trustee is authorized to hold uninvested cash, awaiting investment or distribution, without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940 (15 U.S.C. 80a-1 et seq.), including one that may be created, managed, underwritten, or to which investment advice is rendered, or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretion conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered;

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale, as necessary to allow duly authorized withdrawals at the joint request of the Grantor and NRC or to reinvest in securities at the direction of the Grantor;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name, or in the name of a nominee, and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, to reinvest interest payments and funds from matured and redeemed instruments, to file proper forms concerning securities held in the Fund in a timely fashion with appropriate government agencies, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities

may be merged and held in bulk in the name of the nominee or such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the U.S. Government, or any agency or instrumentality thereof, with a Federal Reserve Bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. After payment has been made into this standby trust fund, the Trustee shall annually, at least 30 days before the anniversary date of receipt of payment into the standby trust fund, furnish to the Grantor and to NRC a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days before the anniversary date of the establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and NRC shall constitute a conclusively binding assent by the Grantor, barring the grantor from asserting any claim or liability against the Trustee with respect to the matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting on the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon the writing with the Grantor. (See Schedule C).

Section 13. Successor Trustee. Upon 90 days notice to NRC and the Grantor, the Trustee may resign; upon 90 days notice to NRC and the Trustee, the Grantor may replace the Trustee; but such resignation or replacement shall not be effective until the Grantor has appointed a successor Trustee, the successor accepts the appointment, the successor is ready to assume its duties as Trustee, and NRC has agreed, in writing, that the successor is an appropriate Federal or State government agency or an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency. The successor Trustee shall

have the same powers and duties as those conferred upon the Trustee hereunder. When the resignation or replacement is effective, the Trustee shall assign, transfer, and pay over to the successor Trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor Trustee or for instructions. The successor Trustee shall specify the date on which it assumes administration of the trust, in a writing sent to the Grantor, NRC, and the present Trustee, by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are signatories to this Agreement or such other designees as the Grantor may designate in writing. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. If NRC issues orders, requests, or instructions to the Trustee these shall be in writing, signed by NRC or its designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or NRC hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or NRC, except as provided for herein.

Section 15. Amendment of Agreement. The Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee, and NRC, or by the Trustee and NRC if the Grantor ceases to exist. All amendments shall meet the relevant regulatory requirements of NRC.

Section 16. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 15, this trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and NRC, or by the Trustee and NRC if the Grantor ceases to exist. Upon termination of the trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor or its successor.

Section 17. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with and act or omission, made in good faith, in the administration of this trust, or in carrying out any directions by the Grantor or NRC issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the trust fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 18. This Agreement shall be administered, construed, and enforced according to the laws of the State of [*insert name of State*].

Section 19. Interpretation and Severability. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each

section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement. If any part of this agreement is invalid, it shall not affect the remaining provisions which will remain valid and enforceable.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed by the respective officers duly authorized and the incorporate seals to be hereunto affixed and attested as of the date first written above.

[*Insert name of licensee (Grantor)*]
[*Signature of representative of Grantor*]
[*Title*]

ATTEST:
[*Title*]
[*Seal*]

[Insert name and address of Trustee]
[Signature of representative of Trustee]
[Title]

ATTEST:
[*Title*]
[*Seal*]

Schedule A

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

U.S. NUCLEAR REGULATORY COMMISSION LICENSE NUMBER(S)	NAME AND ADDRESS OF LICENSEE	ADDRESS OF LICENSED ACTIVITY	COST ESTIMATES FOR REGULATORY ASSURANCES DEMONSTRATED BY THIS AGREEMENT

The cost estimates listed here were last adjusted and approved by NRC on [*insert date*].

Schedule B

DOLLAR AMOUNT ____________
AS EVIDENCED BY ___________________

Schedule C

[*Insert name, address, and phone number of Trustee.*]
Trustee's fees shall be $_______________________ per year.

Model Specimen Certificate of Events

[*Insert name and address of trustee*]

Attention: Trust Division

Gentlemen:

In accordance with the terms of this Agreement with you dated __________, I, __________, Secretary of [*insert name of licensee*], hereby certify that the following events have occurred:

1. [*Insert name of licensee*] is required to commence the decommissioning of its facility located at [*insert location of facility*] (hereinafter called the decommissioning).

2. The plans and procedures for the commencement and conduct of the decommissioning have been approved by the United States Nuclear Regulatory Commission, or its successor, on ________ (copy of approval attached).

3. The Board of Directors of [*insert name of licensee*] has adopted the attached resolution authorizing the commencement of the decommissioning.

____
Secretary of [*insert name of licensee*]

____
Date

Model Specimen Certificate of Resolution

I, ____________________, do hereby certify that I am Secretary of [*insert name of licensee*], a [*insert State of incorporation*] corporation, and that the resolution listed below was duly adopted at a meeting of this Corporation's Board of Directors on ____________, 20____.

IN WITNESS WHEREOF, I have hereunto signed my name and affixed the seal of this Corporation this _________ day of __________, 20_____.

____
Secretary

RESOLVED, that this Board of Directors hereby authorizes the President, or such other employee of the Company as he may designate, to commence decommissioning activities at [*insert name of facility*] in accordance with the terms and conditions described to this Board of Directors at this meeting and with such other terms and conditions as the President shall approve with and upon the advice of Counsel.

Model Letter of Acknowledgment

STATE OF ____________________________

To Wit: ____________________________

CITY OF ____________________________

On this___day of _________, before me, a notary public in and for the city and State aforesaid, personally appeared ____________________, and she/he did depose and say that she/he is the [*insert title*] of ____________________[if applicable, insert ",*national banking association*" or ", *State banking association*"], Trustee, which executed the above instrument; that she/he knows the seal of said association; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the association; and that she/he signed her/his name thereto by like order.

____

[*Signature of notary public*]

My Commission Expires: ____________________

[*Date*]

Model Power of Attorney

[Insert Name of Issuing Company]
Principal Bond Office: *[Insert Business Address of Issuing Company]*

KNOW ALL MEN BY THESE PRESENTS:

That *[Insert Name of Issuing Company]* does hereby appoint

[*Insert Names of Attorney(s)-in-Fact*]

its true and lawful Attorney(s)-in-Fact, with full authority to execute on its behalf bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, *[Insert Name of Issuing Company]* have executed these presents
[Affix Company Seal] this *[Insert Date]* day of *[Insert Month/Year]*

[Insert Name of Company Official/Title]

STATE OF *[Insert State]* }
COUNTY OF *[Insert County]* }ss.

On this *[Insert Date]* day of *[Insert Month]*, 200*[Insert Year]*, before me came the above named officer of *[Insert Issuing Company]*, to me personally known to be the individual and officer described herein, and acknowledged that he executed the foregoing instrument and affixed the seals of said corporations thereto by authority of his office.

[Insert Notary Name] Notary

CERTIFICATE

Excerpts of Resolutions adopted by the Boards of Directors of *[Insert Issuing Company Name]* on *[Insert Date of Resolutions]*:

"**RESOLVED,** that the Chairman of the Board, the President, or any Vice President be, and hereby is, authorized to appoint Attorneys-in-Fact to represent and act for and on behalf of the Company to execute bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, and to attach thereto the corporate seal of the Company, in the transaction of its surety business;

"**RESOLVED,** that the signatures and attestations of such officers and the seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or Certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company when so affixed with respect to any bond, undertaking, recognizance or other contract of indemnity or writing obligatory in the nature thereof;

"**RESOLVED,** that any such Attorney-in-Fact delivering a secretarial certification that the foregoing resolutions still be in effect may insert in such certification the date thereof, said date to be not later than the date of delivery thereof by such Attorney-in-Fact."

I, *[Insert Name]*, Secretary of *[Insert Name of Issuing Company]* do hereby certify that the foregoing excerpts of Resolutions adopted by the Boards of Directors of this corporation, and the Powers of Attorney issued pursuant thereto, are true and correct, and that both the Resolutions and the Powers of Attorney are in full force and effect.

IN WITNESS WHEROF, I have hereunto set my hand and affixed the facsimile seal of each corporation

[Affix Company Seal] this *[Insert Date]* day of *[Insert Month/Year]*

[Name of Issuing Company] Secretary

APPENDIX C

DECOMMISSIONING COST ESTIMATE TABLES

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Table C3.4 Facility Description Summary

NRC license Numbers and Types (i.e., Part 30, 40, 70, or 72)
- 10 CFR Part 70 - To construct and operate a uranium enrichment facility
Types and Quantities of Materials Authorized Under the Licenses Listed Above
- 300,000 Metric Tons of UF_6 (Uranium Hexafluoride)
Description of How Licensed Materials Are Used
- Uranium is fed to the plant, where it is enriched to the desired ^{235}U assay. The enriched product is withdrawn and transferred to customer cylinders. The enriched product is shipped to fuel fabricators for further processing and will ultimately be used to generate electricity in nuclear power plants around the world. Tails (uranium depleted in ^{235}U isotope) will be stored on-site without undue risk. Final disposition of depleted material will be determined pending a future evaluation of the number of existing and potential uses for this material.
Description of Facility, Including Buildings, Rooms, Grounds, and Description of Where Particular Types of Materials Are Used
- X-3001 and X-3002 Process Buildings - Buildings that house the centrifuge machines and auxiliary process equipment. - X-3012 Process Support Building - Area that houses the Area Control Room, maintenance shops and stores, and other support areas. - X-3346 Feed and Customer Services Building - Area that houses the equipment necessary to supply UF_6 to the process buildings. - X-3346A Feed and Product Shipping and Receiving Building - Area that houses the equipment necessary to receive UF_6 feed material from previous process manufacturers and to liquid sample UF_6 product cylinders, and transfer and prepare this UF_6 material for shipment to customers. - X-3356 Product and Tails Withdrawal Building - Area that houses the equipment necessary to withdraw UF_6 from the process buildings in its enriched and depleted concentrations. - X-7725 Recycle/Assembly Facility - A large, multiple level building where material and components are received, components or subassemblies are inspected or tested, and centrifuge machines are assembled. This facility also stores wrecked contaminated centrifuges not handled for failure analysis. - X-7726 Centrifuge Training and Test Facility - Initially, the area where material and components are received; components or subassemblies are inspected and tested; components are assembled into centrifuge machines; final assembled machine is evacuated and leak checked; and limited repairs are performed to the machine or subassemblies. As the X-7725 facility becomes available, these functions will transfer to the X-7725 and X-7726 facilities utilization will wane. - X-7727H Interplant Transfer Corridor - Area that provides an enclosed throughway from the X-7725 or X-7726 facilities to the X-3001 and X-3002 buildings. - X-7746N, S,E,W; X-7756S and X-745G-2 - Cylinder Storage Yards - Areas that provide UF_6 (Feed, Tails, or Product) cylinder (empty or full) and overpack storage; and allows cylinder handling equipment access.
Quantities of Materials or Waste Accumulated Before Shipping or Disposal
- See table 3.4 (A)

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	**[This information has been withheld pursuant to 10 CFR 2.390]**	
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	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

[1] Amount includes 11,520 operational units plus contaminated spare centrifuges.
[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.
[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).
[4] Amount of wall ft^2 not given because it is not anticipated to need decontamination at the time of decommissioning.
[5] Equipment re-utilized from operational phase (not new or purchased).

Table 3.5 Number and Dimensions of Facility Components (Total Volume)

COMPONENT	Number of Components	Dimensions of Component (specify units)	Total Volume (ft³)	Compacted Factor (Volume Remaining)	Total Compacted Volume (ft³)	Level of Contamination
X-3001 and X-3002						
Centrifuges Casings	12,000 units	~30" dia x 45'	2,650,725	[redacted]	[redacted]	High Alpha
Service Modules – Structure	576 units	~45' x 6' x 13'	2,021,760	[redacted]	[redacted]	High Alpha
Service Modules – Piping	129,600 Lft	~45' x 3" dia x 5 runs	31,808	0.2	6,362	High Alpha
Vacuum Pumps	224 ea	2' x 5' x 2'	4,480	1.0	4,480	High Alpha
Chemical Traps	32 ea	8" dia x 10'	112	0.2	22	High Alpha
Building Headers	12,000 Lft	6" & 10" dia	6,545	0.2	1,309	High Alpha
Misc. Piping	12,000 Lft	1", 2", & 4" dia	1,047	0.2	209	High Alpha
Piping <1"; Tubing	640,000 Lft	<1" dia	3,491	[redacted]	[redacted]	High Alpha
Heat Exchangers	16 ea	4' x 4' x 7'	1,792	[redacted]	[redacted]	Low Alpha
HVP Ductwork	6,000 Lft	4' x 3'	72,000	[redacted]	[redacted]	Low Alpha
Valves	6,000 ea	0.4 ft³	2,400	1.0	2,400	High Alpha
Valves, Miscellaneous	640 ea	0.4 ft³	256	1.0	256	High Alpha
Carts	30 ea	3' x 5' x 4'	1,800	0.5	900	Low Alpha
X-3012						
HVAC Ductwork	1,225 Lft	2' x 1'	2,450	[redacted]	[redacted]	Low Alpha
X-3346						
Electric Feed Ovens	[This information has been withheld pursuant to 10 CFR 2.390]	22' x 6' x 6'	23,760	0.5	11,880	High Alpha
Autoclaves	[This information has been withheld pursuant to 10 CFR 2.390]	22' x 6' x 6'	14,256	0.5	7,128	High Alpha
Piping	1,000 Lft	24" dia	3,142	0.2	628	High Alpha

Table 3.5 Number and Dimensions of Facility Components (Total Volume)

COMPONENT	Number of Components	Dimensions of Component (specify units)	Total Volume (ft^3)	Compacted Factor (Volume Remaining)	Total Compacted Volume (ft^3)	Level of Contamination
Piping <1"; Tubing	24,000 Lft	<1" dia	131			High Alpha
Valves	625 ea	0.4 ft^3	250	1.0	250	High Alpha
Freezer Sublimers	4 ea	67" dia x 78"	637	0.5	318	High Alpha
Chemical Traps	8 ea	8" dia x 96"	22	0.2	4	High Alpha
Cold Traps	4 ea	22' x 6' x 6'	3,168	0.2	634	High Alpha
Roughing Filters	4 ea	3' dia x 4'	113	0.2	23	High Alpha
Mixing Tanks	2 ea	3' dia x 7'	99	0.5	49	High Alpha
Holdup Tanks	2 ea	8' dia x 14'	1,407	0.5	704	High Alpha
Surge Drums	4 ea	8' dia x 14'	2,815	0.5	1,407	High Alpha
Gulper System Ducting	300 Lft	6" dia	59	0.1	6	High Alpha
Vacuum Pumps	6 ea	3' x 3' x 3'	162	1.0	162	High Alpha
HVAC Ductwork	3500 Lft	3' x 2'	21,000			High Alpha
Tails Cylinders	21,269 ea	139 ft^3	2,956,383			High Alpha
Tails Parent Cylinders	1,000 ea	108.9 ft^3	108,900			High Alpha
X-3356						
Cold Boxes	[This information has been withheld pursuant to 10 CFR 2.390]	22' x 6' x 6'	23,760	0.5	11,880	High Alpha
Compressors	12 ea	6' x 5' x4'	1,440	1.0	1,440	High Alpha
Compressor Train Coolers	12 ea	4' dia x 4'	603	0.5	302	High Alpha
Surge Tanks	5 ea	10' x 6' dia	1,414	0.5	707	High Alpha
Dump Drums	2 ea	26 ft^3	52	0.5	26	High Alpha
Chemical Traps	10 ea	8" dia x 96"	28	0.2	6	High Alpha
Cold Traps	45 ea	10' x 1' dia	353	0.2	71	High Alpha
Piping	6,000 Lft	6" dia	1,178	0.2	236	High Alpha
Gulper System Ducting	300 Lft	6" dia	59	0.1	6	High Alpha

Table 3.5 Number and Dimensions of Facility Components (Total Volume)

COMPONENT	Number of Components	Dimensions of Component (specify units)	Total Volume (ft^3)	Compacted Factor (Volume Remaining)	Total Compacted Volume (ft^3)	Level of Contamination
Vacuum Pumps	6 ea	2' x 5' x 2'	120	1.0	120	High Alpha
HVAC Ductwork	750 Lft	3' x 2'	4,500			High Alpha
Piping <1"; Tubing	24,000 Lft	1" dia	131			High Alpha
Valves	625 ea	0.4 ft^3	250	1.0	250	High Alpha
X-2232C						
IPP (3 loops)	7,500 Lft	10" dia	4,091	0.2	818	High Alpha
X-7725						
Buffer Storage Stands	24 ea	5' x 25' x 1.5'	4,500	1.0	4,500	Low Alpha
Traps, Gas Test Stand	8 ea	8" dia x 96"	22	0.8	18	Low Alpha
HVAC Ductwork	3,800 Lft	3' x 2'	22,800			Low Alpha
Vacuum Pumps	10 ea	2' x 5' x 2'	200	1.0	200	Low Alpha
Valves Miscellaneous	12 ea	0.4 ft^3	5	1.0	5	Low Alpha
Gas Test Stand Equ't (Valve boxes)	12 ea	2' x 5' x 1'	120	1.0	120	Low Alpha
X-7727H						
HVAC Ductwork	23 units	3' x 1' x 50'	3,450			Low Alpha
Total Component Volume			**8,006,045**		**59,835**	

Assumptions: 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. Centrifuge machine internals are considered for waste and accounted for in table C3.14.

Total Component Volume does not include the centrifuge casing, service modules (structure), piping <1", HVAC ductwork, some heat exchangers, and Tails cylinder component volume in this volumetric calculation; the piping, HVAC ductwork, and heat exchangers are essentially decontaminated to a 'free release' criteria, remain in the buildings; the centrifuge casings and service module structure are decontaminated to a 'free release' criteria and are stored for later disposition. Tails cylinders are considered to be part of the Tails classified waste disposal costs calculated by a different means in table C3.19 elsewhere.

X-7725 facility Manufacturing areas/items were excluded from the estimate.

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

Component	Number of Components	Dimensions of Component (specify units) [1]	Total Area (ft^2) [1]	Level of Contamination
X-3001 and X-3002		416' x 730'		
Cranes (RMC)	4/Building	~650' x 2' x 2 rails	20,800	Low Alpha
Floors	2 Buildings	303,680 ft^2	607,360	Low Alpha
X-3012		240' x 201'		
Maintenance Shop	3 (floors only)	100' x 39'	11,700	Low Alpha
Work Bench	5	3' x 5'	75	Low Alpha
Small Parts	Misc.	Varied	11	Low Alpha
Floors (~60%) [2]	1 Building	28,950 ft^2	28,950	Low Alpha
X-3346		488' x 352'		
Scales	2 ea	11' x 6'	132	Low Alpha
Cranes	3 ea	~1,000' x 2' x 2 rails	12,000	Low Alpha
Floors	1 Building	154,000 ft^2	154,000	Low Alpha
X-3346A		100' x 190'		
Cranes	2	~200' x 2' x 2 rails	1,600	Low Alpha
Floors	1 Building	19,000 ft^2	19,000	Low Alpha
X-3356		200' x 200'		
Scales	4 ea	11' x 6'	264	Low Alpha
Cranes	2 ea	~200' x 2' x 2 rails	1,600	Low Alpha
Floors	1 Building	36,000 ft^2	36,000	Low Alpha
Cylinder Storage Yards				
X-745G-2	1 lot	245' x 550'	135,057	Low Alpha
X-745H	1 lot	486' x 2178'	1,059,150	Low Alpha
X-7746N	1 lot	584' x 241'	136,553	Low Alpha
X-7746E	1 lot	530' x 137'	75,732	Low Alpha
X-7746S	1 lot	197' x 163'	32,968	Low Alpha
X-7746W	1 lot	796' x 166'	132,543	Low Alpha
X-7756S	1 lot	71' x 201'	14,277	Low Alpha

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

Component	Number of Components	Dimensions of Component (specify units) [1]	Total Area (ft^2) [1]	Level of Contamination
X-2232C		2500' x 5'		
Housing	1 Equivalent Area	12,500 ft^2	12,500	Low Alpha
X-7725		540' x 820'		
Cranes, Bridge (Trolley)	3 ea	~250' x 2' x 2 rails (shared)	1,000	Low Alpha
Cranes, Bridge	48 ea	~100' x 2' x 2 rails	19,200	Low Alpha
Cranes, Wall	5 ea	~50' x 2' x 2 rails	1,000	Low Alpha
Buffer Storage (~75%) [2]	1 lot	~208' x 283'	45,000	Low Alpha
South Bldg Floors	1 lot	536' x 272'	145,792	Low Alpha
X-7725C		125' x 120'		
Floors	1 Building	15,000 ft^2	15,000	Low Alpha
X-7726		286' x 84'		
Cranes	4 ea	~50' x 2' x 2 rails	800	Low Alpha
Floors (multiple levels)	1 Building	49,500 ft^2	49,500	Low Alpha
X-7727H		~750' x 30'		
Floors	1 Building	26,078 ft^2	26,078	Low Alpha
Total Area			**2,795,642**	

[1] Actual areas were determined by AutoCAD and may vary somewhat from a given straight area calculation (1xw).
[2] Percentages/Areas listed are realistic probability of floor space needing potential Decontamination.

Highlighted light-yellow rows represent items/equipment to remain in-place and have been decontaminated to a 'Free Release' criteria.

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

Group		Type	# Workers	Dur (#y)	Prod Factor	Total (wd)
Supervision		Salary	3	1	219	657
Engineering		Salary	8	1	219	1,752
Operations		Salary	2	1	219	438
		Hourly	2	1	219	438
Maintenance		Salary	4	1	219	876
		Hourly	0	1	219	0
Support	Plant Support	Salary	2	1	219	438
		Hourly	15	1	219	3,285
	Production Support	Salary	0	1	219	0
		Hourly	0	1	219	0
Total			36			7,884

<u>Assumptions:</u>
Anticipated duration = 1 y
Productivity Factor = 219 wd/y = 260 - 41(Paid Absences)
Constant $ Pay
Security - 3 Stations - manned (typical) 24/7

<u>Anticipated tasks considered:</u>
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)	Prod Factor	Total (wd)
Supervision		Salary	6	5	219	6,570
Engineering		Salary	5	5	219	5,475
Operations		Salary	3	5	219	3,285
		Hourly	21	5	219	22,995
Maintenance		Salary	9	5	219	9,855
		Hourly	44	5	219	48,180
Support	Plant Support	Salary	5	5	219	5,475
		Hourly	17	5	219	18,615
	Production Support	Salary	8	5	219	8,760
		Hourly	11	5	219	12,045
Total			129			141,255

<u>Assumptions:</u>
Anticipated duration = 5 y
Productivity Factor = 219 wd/y = 260 - 41 (Paid Absences)
Constant $ Pay
Security - 4 Stations - manned (typical) 24/7

<u>Anticipated tasks considered:</u>
Erect Decontamination Facility
Decontamination of facilities - Internals
Dismantle centrifuge machines; Waste segregation
Dismantle facilities/components
Tails Cylinder movement/disposition [material title transfer DOE/UDS]

Continued Project and Security Support

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

Group		Type	# Workers	Dur (#y)	Prod Factor	Total (wd)
Supervision		Salary	0	2	219	0
Engineering		Salary	0	2	219	0
Operations		Salary	1	2	219	438
		Hourly	5	2	219	2,190
Maintenance		Salary	0	2	219	0
		Hourly	0	2	219	0
Support	Plant Support	Salary	1	2	219	438
		Hourly	0	2	219	0
	Production Support	Salary	0	2	219	0
		Hourly	0	2	219	0
Total			7			3,066

<u>Assumptions:</u>
Anticipated duration = 2y
Productivity Factor = 219 wd/y = 260 - 41 (Paid Absences)
Constant $ Pay
1 person cleans ~600 - 900 ft^2/d (750 ft^2/d used) loose contamination (minimal amount of loose contamination anticipated)
Shares resource allocation coincident with Decontamination or Dismantling phase effort
Minimal loose contamination and cleanup anticipated

<u>Anticipated tasks considered</u>:
Decontamination of facilities - external/outside; cylinder yards
Perform HP surveys
Remove fixed contamination; Scarify cylinder storage yards surfaces
Collect/dispose of yard debris

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

Group		Type	# Workers	Dur (#y)	Prod Factor	Total (wd)
Supervision		Salary	0	2.5	219	0
Engineering		Salary	1	2.5	219	548
Operations		Salary	0	2.5	219	0
		Hourly	0	2.5	219	0
Maintenance		Salary	0	2.5	219	0
		Hourly	1	2.5	219	548
Support	Plant Support	Salary	3	2.5	219	1,643
		Hourly	1	2.5	219	548
	Production Support	Salary	0	2.5	219	0
		Hourly	0	2.5	219	0
Total			6			3,285

<u>Assumptions</u>:
Anticipated duration = 2.5y
Productivity Factor = 219 wd/y = 260 - 41 (Paid Absences)
Constant $ Pay
Work period occurs coincident with the last 2.5 years of the D&D phase.

<u>Anticipated tasks considered</u>:
Develop/implement survey plans
Collect/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)	Prod Factor	Total (wd)
Supervision		Salary	0	6	219	0
Engineering		Salary	1	6	219	1,314
Operations		Salary	1	6	219	1,314
		Hourly	1	6	219	1,314
Maintenance		Salary	0	6	219	0
		Hourly	2	6	219	2,628
Support	Plant Support	Salary	0	6	219	0
		Hourly	0	6	219	0
	Production Support	Salary	0	6	219	0
		Hourly	0	6	219	0
Total			5			6,570

Assumptions:
Anticipated duration = 6y (coincident with P&P and D&D)
Productivity Factor = 219 wd/y = 260 - 41 (Paid Absences)
Constant $ Pay

Anticipated tasks considered:
Site stabilization - not required
Maintain maintenance/surveillances on IROFS equipment necessary until license terminated (~ year six)

Table C3.11 Total Work Days by Labor Category

Task	Labor Category Supervision (S)	Labor Category Eng. (S)	Labor Category Operations (S)	Labor Category Operations (H)	Labor Category Maint. (S)	Labor Category Maint. (H)	Labor Category Support (S)	Labor Categor y Support (H)	Total Phase Labor
Planning and Preparation	657	1,752	438	438	876	0	438	3,285	7,884
Decontamination and/or Dismantling of Radioactive Facility Components	6,570	5,475	3,285	22,995	9,855	48,180	14,235	30,660	141,255
Restoration of Contaminated Areas of Facility Grounds	0	0	438	2,190	0	0	438	0	3,066
Final Radiation Survey	0	548	0	0	0	548	1,643	548	3,285
Site Stabilization and Long-Term Surveillance	0	1,314	1,314	1,314	0	2,628	0	0	6,570
Total	7,227	9,089	5,475	26,937	10,731	51,356	16,754	34,493	162,060

Assumptions: Individual tables describe other assumptions; this table is a summation of previous information.
Constant $ Pay
Some efficiency gained across phases or tasks by pooling or sharing resources.

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
Compacted Equ't Solid Waste from Table	59,835	665	90	$42.13	$2,520,856
Liquid Waste	12,000	295	55	$72.12	$1,168,344
Total		959			$3,689,200

Assumptions: Unclassified, Low-Level Contaminated waste; Liquid waste from machine disassembly
[A^1] = Total Compacted Volume (Table C3.5); [A2] = # centrifuges
[B^1] = A^1/C^1; [B^2] = A^2*5.4 qt/machine/220 qt/barrel
[C^1] = B-25 Boxes volume = 90 ft^3 = 2.7 m^2; [C^2] = 55 gal/barrel
[D^1] = $42.13/$ft^3$ = $28.00/$ft^3$ (Current disposal and transportation cost - EnviroCare, Clive, UT [1791 miles one way trip and Brokerage Costs]) + $13.41/$ft^3$ (Labor costs - Handling, Waste Engineering, Radiological Waste NDA Characterization, and HP Support) + $0.72/$ft^3$ (Rad Characterization Equipment); [D^2] = $72.12/gal = $65.00/gal (incineration & Disposal @ DSSI, Oak Ridge, TN) + $0.34/gal (Transportation & Brokerage cost [350 miles one way trip]) + $6.78/gal (Labor costs - Handling, Sampling, Lab Analyses)
[E^1] = A^1D^1; [E^2] = $B^2C^2D^2$

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	$25.36	$ 43,822,080
Total			19,200			$ 43,822,080

Assumptions: Classified, Low-Level Contaminated Waste
[G] = GCEP Cleanout estimate ratio = 1.6 B-25 boxes / machine (2000 boxes / 1376 machines)
[H] = # B-25 Boxes = FG
[J] = B-25 Boxes volume = 90 ft^3
[K] = $25.36/$ft^3$ = $7.25/$ft^3$ (Current DOE classified disposal cost - NTS, NV) + $3.97/$ft^3$ (Transportation [2136 miles one way trip & Brokerage Costs) + $13.41/$ft^3$ (Labor costs - Handling, Waste Engineering, Radiological NDA Waste Characterization, and HP Support) + $0.72/$ft^3$ (Rad Characterization Equipment)
[M] = HJK
B-25 boxes contain volume gaps, which are filled to capacity from scarified yard materials/debris.

Table C3.15 Equipment/Supply Costs

Equipment/Supplies	Quantity	Unit Cost	Total Equ't/Supply Cost
Centrifuge Dismantling Equipment[1]	6	$25,000	$150,000
Cutting Machines[2]	2	$25,000	$50,000
Degreasers[3]	2	$15,000	$30,000
Decontamination Tanks[4]	4	$25,000	$100,000
Blast Cabinets[5]	2	$25,000	$50,000
Crushers[6]	1	$250,000	$250,000
Negative Air Machines[7]	2	$13,000	$26,000
B-25 Containers[8]	19,865	$720	$14,302,681
55 gallon Barrels[9]	295	$50	$14,727
TOTALS	19,884		$14,973,409

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.

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

Unit costs are derived utilizing industrial standard equipment and DOE GCEP cleanout project experience.

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	105	$23,436
2	Decontamination or Dismantling	129	5	12	0.6	6	18.6	105	$1,259,685
3	Restoration of Contaminated Areas	7	2	12	0.6	4	16.6	105	$24,402
4	Final Radiation Survey	6	2.5	12	0.6	4	16.6	105	$26,145
5	Long Term Surveillance	5	6	4	0.2	2	6.2	105	$19,530
	TOTALS	178							$1,353,198

Assumptions:
samples =(# men/phase) * (Routine freq % + Recall % + Incident %)* # yr
Analytical Unit Cost = $105/sample [Amount based for uranium isotopic analysis by alpha spectrometry and includes analysis performance, labor, and cost of materials plus overheads]
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]	$2,500,000
Total	**$2.500.000**

Note 1: Estimate based upon percentage of Decommissioning Cost subtotal (1.5% Direct Labor and Equipment) (C3.18).

Other Indirect Costs

Cost Item	Total Cost
NRC Staff Review and Approval DP [2]	$80,000
License Fees [3]	$18,600,000
DOE Lease	$6,000,000
Business Ins	$ 300,000
Taxes	$ 180,455
Total	**$25,160,455**

Note 2: Estimate based upon review and approval for Decommissioning Plan (DP).
Note 3: Estimate based upon NRC Annual Operational Fees for plant.

Table C3.18 Total Decommissioning Costs

Task	Calculated Costs	Percentage
Planning and Preparation	$ 2,577,789	2%
Decontamination and/or Dismantling of Radioactive Facility Components	$ 39,591,019	23%
Restoration of Contaminated Areas on Facility Grounds	$ 738,273	0%
Final Radiation Survey	$ 962,898	1%
Site Stabilization and Long-Term Surveillance	$ 2,357,001	1%
Indirect Services	$ 33,581,337	20%
Packaging, Shipping, and Waste Disposal Costs	$ 47,511,280	28%
Equipment/Supply Costs	$ 14,973,409	9%
Laboratory Costs	$ 1,353,198	1%
Other Direct Costs	$ 2,500,000	1%
Other Indirect Costs	$ 25,160,455	15%
Subtotal	**$171,306,658**	**100%**
G&A (6%)	$ 10,278,400	
Contractor Profit (15%)	$ 23,535,759	
Contingency (25%)	$ 51,280,204	
Total Labor & Materials Cost	**$256,401,021**	
Tails Disposal Cost	$538,129,875	
Tails Contingency (10%)	$ 53,812,987	
Total Tails Disposal Cost	**$591,942,862**	
Total Decommissioning Cost Estimate (Including Tails Disposal)	**$848,343,883**	

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 Accumulated [1,000 MT]	[U] Tails Disposal Cost [$, 2004]	[V] # Tails Cylinders
2006	200		0	0	0	$0	0
2007	120	*	0.099	0.099	0.067	$201,070	8
2008	2700		2.23	2.33	1.51	$4,524,071	179
2009	7300		6.03	8.36	4.08	$12,231,748	483
2010	11520		9.52	17.88	6.43	$19,302,703	763
2011-2036	11520		247.43	265.30	167.29	$501,870,283	19,836
Total			265.30	265.30	179.38	**$538,129,875**	21,269

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

<u>Assumptions:</u>

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 = $3/Kg U
R=Q/11,520*number of years*2,395*24*365; T=R*0.67612; U=T*3
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 C3.20 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: Original signed by RL Coriell
Date: 03/10/05

APPENDIX D

DECOMMISSIONING COST ESTIMATE TABLES

The information contained in this appendix is being submitted to the NRC under separate cover in accordance with the requirements of 10 CFR 2.390

Information contained within
does not contain
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Date: 03/10/05

NR-3605-0008

Emergency Plan

for the American Centrifuge Plant
in Piketon, Ohio

Revision 1

Docket No. 70-7004

March 2005

Information contained within does not contain Export Controlled Information

Reviewer: Original signed by RL Coriell
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NR-3605-0008

EMERGENCY PLAN
FOR THE AMERICAN CENTRIFUGE PLANT
in Piketon, Ohio

Docket No. 70-7004

Revision 1

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UPDATED LIST OF EFFECTIVE PAGES

Revision 0 – 10 CFR 1045 review completed by L. Sparks on 07/27/04 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.

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2.1.3 Loss of Confinement

The concern with loss of confinement events, as with other release mechanism types, is the release of UF_6, and the generation of HF gas and particulate UO_2F_2 as the UF_6 mixes with moist air. Most loss of confinement events involve UF_6 releases in solid or gaseous state, which limits potentially significant chemical and radiological consequences to receptors except for personnel in the Restricted Area.

2.1.4 Direct Radiological/Chemical Exposure Events

Because of the nature of the process, there is a potential for direct radiological or chemical exposure. Plant procedures are used to provide for worker safety.

2.1.5 Criticality

Occurrence of a criticality accident is theoretically possible in a number of areas on the reservation, but the Nuclear Criticality Safety (NCS) Program ensure a significant margin of safety. Equipment and operations are evaluated to the double contingency principle.

The potential consequences of an inadvertent criticality event are limited to a localized region. Because criticality produces local radiation effects, the potential consequences are limited to the workers within the Controlled Area with no off-site effects to the public health and safety. No significant fission product release and transport are anticipated from an inadvertent criticality event. In addition, there are no chemical consequences associated with a nuclear criticality accident.

2.1.6 External Events

External events include external explosions, physical impacts (e.g., vehicle crashes), and miscellaneous other man-made events (e.g., a Security Event) that could cause a loss of confinement event. In addition, external fire events include a brush or forest fire, a fire that starts in a nearby building, and a fire that starts in a nearby vehicle. These events are considered in the hazard evaluation.

2.1.7 Natural Phenomenon Events

Natural phenomenon events include earthquakes, with and without a subsequent fire, and tornadoes or high straight-line winds that impact the buildings or UF_6 cylinders and cause an uncontrolled release of hazardous material. Other events include those involving hazardous material release associated with a direct lightning strike; flooding (both major and shallow) as a result of heavy rains and a rising river or plugged storm drainage system; and roof collapse resulting from heavy snow and ice loading.

2.2 Detection of Accidents

The ACP and GDP enrichment process buildings have Area Control Rooms (ACR), which permits operators to monitor process equipment, make changes in operations, and take corrective action to mitigate abnormal operating conditions. The Plant Shift Superintendent (PSS) is notified of conditions or incidents on the DOE reservation that would require activation of the Emergency Response Organization. During emergencies, the PSS functions as the Incident Commander (IC) and determines immediate actions.

Alarm systems are designed to alert personnel to initiate actions so that the consequences of a major malfunction can be mitigated prior to adverse effect on the plant population and the general public. These include UF_6 detection equipment and associated alarms, a Criticality Accident Alarm System (CAAS), automatic sprinkler systems, various chemical detectors, and other alarm systems.

Descriptions of the various alarms and detection methods for the hazards that have been analyzed are described in the following sections.

2.2.1 Fire

An extensive fire protection system is installed throughout the plants, primarily consisting of automatic sprinkler systems and fire alarms. Upon actuation of a sprinkler system, affected ACR operators receive a visual and/or audible fire alarm for the specific building/facility area. The actuation of a fire alarm reported to the PSS requires the activation and response of on-site field Emergency Response Organization (ERO) personnel.

2.2.2 Uranium Hexafluoride

The UF_6 Release Detection System is used to monitor selected equipment and areas that possess a potential for a UF_6 release in the process buildings. The UF_6 Release Detection System provides timely notification to workers in the Restricted Area of a UF_6 release. This serves as a design control to reduce the potential quantity of UF_6 and the time of exposure during loss of confinement events.

Upon system actuation, audible and visual alarms alert personnel to take appropriate response measures delineated by plant policy. Another means of detecting UF_6 releases is by operator observation through sight or smell.

Emergency response measures for a UF_6 release incident classified as an emergency are provided in Section 5.0 of this plan.

2.2.3 Other Toxic Chemical Releases

Detection equipment and/or chemical release alarms for various toxic chemicals in the plant have been installed at strategic locations where particular chemicals are present. As in a UF_6 release, if an operator is in the immediate vicinity of a chemical release, the operator should detect the release by sight or smell. Upon recognition or detection of a release, the release is

APPENDIX E

OFF-SITE RESPONSE ORGANIZATION COMMENTS

Off-site Response Organization Comments

Pursuant to the requirements of 10 CFR 70.22(i)(4), this enclosure provides any comments received from the off-site response organizations' review of the proposed draft Emergency Plan for the American Centrifuge Plant. Comments received by these organizations have been incorporated into this plan. This plan was submitted to the following off-site response organizations.

Off-Site Response Organization

Pike County Emergency Management Agency

Pike County Sheriff's Office/Pike County Local Emergency Planning Committee

Pike County Health Department

Pike County Fire Fighters Association

Pike County Emergency Medical Service

Scioto County Emergency Management Agency

Southern Ohio Medical Center

Pike Community Hospital

Adena Regional Medical Center (Hospital)

Word Alive Fellowship

Waverly City School District

Pike County Schools (Eastern/Western High Schools)

Valley Local School District

Ohio Emergency Management Agency

Ohio State Highway Patrol

To manage an unlikely event requiring the use of this plan, the plant has procedures that serve to protect not only employees, but also through coordination with appropriate off-site Emergency Response Organizations, the plant's neighbors as well.