USEC
A Global Energy Company

June 15, 2005
AET 05-0046

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 Changed Pages for the License Application and Supporting Documents for the American Centrifuge Plant (TAC Nos. L32306, L32307, and L32308)

Dear Mr. Strosnider:

USEC Inc. (USEC) hereby submits to the U.S. Nuclear Regulatory Commission (NRC) changed pages for the License Application and supporting documents for the American Centrifuge Plant.

Enclosure 1 provides these changed pages. Changes from the previous revision are designated with revision bars in the right hand margin. Changed pages that contain USEC Proprietary Information are being submitted under separate cover (AET 05-0047).

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: M. Blevins, NRC HQ
J. Davis, NRC HQ
Y. Faraz, NRC HQ
B. Smith, NRC HQ

Enclosures: As Stated

NMSS01

Enclosure 1 to AET 05-0046

Changed Pages for the License Application and Supporting Documents for the American Centrifuge Plant (Non-Proprietary Information)

Remove and Insert Instructions
American Centrifuge Plant
June 15, 2005

Remove and Properly Destroy	**Insert**
LA-3605-0001, License Application	
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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 4

Docket No. 70-7004

June 2005

Information contained within does not contain Export Controlled Information

Reviewer: D. Hupp
Date: 06/16/05

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LA-3605-0001

LICENSE APPLICATION

for the American Centrifuge Plant in Piketon, Ohio

Docket No. 70-7004

Revision 4

Information contained within does not contain Export Controlled Information

Reviewer: D. Hupp
Date: 06/16/05

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UPDATED LIST OF EFFECTIVE PAGES

Revision 0 – 10 CFR 1045 review completed by L. Sparks on 07/29/04 and the Export Controlled Information review completed by R. Coriell on 07/30/04.
Revision 1 – 10 CFR 1045 review completed by L. Sparks on 03/04/05 and the Export Controlled Information review completed by R. Coriell on 03/10/05.
Revision 2 – 10 CFR 1045 review completed by J. Weidner on 04/29/05 and the Export Controlled Information review completed by R. Coriell on 04/29/05.
Revision 3 – 10 CFR 1045 review completed by J. Weidner on 05/23/05 and the Export Controlled Information review completed by R. Coriell on 05/23/05.
Revision 4 – 10 CFR 1045 review completed by R. Coriell on 06/16/05 and the Export Controlled Information review completed by D. Hupp on 06/16/05.

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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

The X-3346A building is the usual receiving point for cylinders. 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. Full feed cylinders (10- and 14-ton), customer cylinders (2.5-ton), and overpacks with customer cylinders are off-loaded, weighed, paperwork checked, and then the cylinders and overpacks are transferred to the appropriate 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.

The major components that support the withdrawal operations are withdrawal (compression) trains, cold boxes, cold traps, assay spectrometers, and vents.

1.1.5.5.5 Sampling and Transfer Operations

UF_6 sampling and transfer operations for UF_6 product material is carried out in the product operations area of the X-3346 building. Since the American Society for Testing and Materials (ASTM) sampling standards necessitate that sampling must be from homogenized UF_6, the design involves liquid UF_6 material in the source cylinders and the transfer operations. Autoclaves with heating and cooling capability are used to liquefy UF_6 in the source cylinders, to facilitate transfer into customer cylinders and then to solidify the UF_6 heel remaining in the cylinders at the end of the transfer. The autoclaves are pressure vessels and are designed to contain a UF_6 release. Electrically heated hot air is the heating medium and cold air is used for cooling.

The major components that comprise the sampling and transfer operations are autoclaves, cold traps, and vents.

1.1.5.5.6 Shipping Operations

The X-3346A building is also the shipping point for emptied cylinders leaving the ACP as well as UF_6 cylinders shipped to fulfill customer product orders (including Russian LEU), and UF_6 cylinders containing feed or depleted material. Any approved UF_6 cylinder may be shipped from this facility. See Figure 1.1-4 (located in Appendix B) for a schematic of the Feed, Withdrawal, and Product Operations.

Filled customer product cylinders, emptied feed cylinders, and other UF_6 cylinders will be prepared for shipment and shipped in accordance with U.S. Nuclear Regulatory Commission (NRC) and DOT regulatory requirements from the X-3346A.

1.1.5.5.7 Waste Handling Operations

Depleted UF_6 tails material is considered a resource material with the ultimate disposition to be determined and is not considered a waste. USEC intends to evaluate possible commercial uses for depleted UF_6. Depleted UF_6 is stored in steel cylinders within cylinder storage yards until this material can be processed in accordance with the disposition strategy established by USEC. Depending upon technological developments and the existence of facilities available prior to the ACP shutdown, the depleted UF_6 may have commercial value and may be marketable for further enrichment or other processes.

Waste generated by the ACP is collected, handled, packaged, segregated, stored, and shipped for off-site treatment/disposal in a safe and environmentally acceptable manner in accordance with applicable state and federal regulations, and plant procedures. Waste accumulation areas are established throughout the ACP as necessary to meet these regulatory requirements.

The ACP obtains waste management services from a qualified provider licensed/certified by the NRC or an agreement state. Waste may be further sampled/measured to assist in determining the proper waste characterization and proper disposal/treatment method.

Potential waste streams generated include Low-Level Radioactive Waste, LLMW, RCRA Hazardous Waste, Sanitary/Industrial Waste, Recyclable Waste, and Classified/Sensitive Waste.

Waste generating activities are evaluated for waste minimization opportunities to reduce the volume and toxicity of waste generated to the degree determined to be economically practicable.

A further description of the transportation impacts can be found in Section 4.2 and the waste impacts can be found in Section 4.13 of the Environmental Report for the American Centrifuge Plant.

1.1.5.5.8 Liquid and Air Waste Discharge Points

Waste discharge points are categorized by either liquid (water) or air.

For liquid, wastewater discharges are handled by different means depending upon the originating source: process, sanitary, or storm water.

No process wastewater is intentionally discharged from the liquid effluent tanks. Accumulated water in these tanks are sampled and managed according to analytical results. Trained professionals using approved spill response protocols and spill response equipment will promptly contain liquid spills within the process buildings. Spill materials will be collected, sampled, analyzed, and managed in accordance with applicable federal and state laws. The only intentional process wastewater discharge resulting from plant operations is the blow down from the TWC (Tower Cooling Water) system. This cooling water system is not interconnected with the MCW (Machine Cooling Water) system located in the process buildings. The MCW system is a closed-loop system, which requires minimal makeup water, but does not have blow down discharges.

Sanitary wastewater (e.g., showers, toilets, etc.) located within the area discharge to the plant sanitary sewer system and ultimately to the X-6619 Sewage Treatment Plant. Treated sanitary wastewaters are discharged from X-6619 directly to the Scioto River via an underground pipeline via a permitted NPDES outfall.

Storm water runoff from the ACP area, along with some once-through cooling water (sanitary water), drain to a pair of holding ponds (X-2230N West Holding Pond and X-2230M

Even for releases from cylinders containing liquid UF_6, the key is the size of the release relative to the surrounding atmosphere. For the liquid cylinder drop event, a flash model is developed for the evaluation of the source term. The ISA does not attempt to develop a cylinder fire model but instead uses the results from the simulation analysis used in the Cylinder Yard SAR. For additional detail with regard to chemical consequence determination for specific events and groups of similar events, refer to Appendix D, Event Consequence Development, of the ISA Summary.

The calculated airborne concentrations from the release and dispersion models estimated at the receptors of interest are then compared to the chemical consequence limits selected by the ISA team. The chemical consequence limits selected are the Emergency Response Planning Guidelines (ERPGs) given in Table A-6 of Appendix A of the ISA Summary. The ERPGs are airborne concentration limits used for emergency response personnel, below which are believed that nearly all individuals could be exposed for up to one hour without experiencing certain health effects. The ERPG-1, ERPG-2, and ERPG-3 values for UF_6 are 5 mg/m^3, 15 mg/m^3, and 30 mg/m^3, respectively. Since UF_6 can readily react with the moisture in the air forming uranium compounds and HF, the chemical effects of HF have to be considered also. The ERPG-1, ERPG-2, and ERPG-3 values for HF are 1.5 mg/m^3, 16.4 mg/m^3, and 41 mg/m^3, respectively. Special ERPG values for 10-minute exposures are also used for HF, with the ERPG-1, ERPG-2, and ERPG-3 values being 1.5 mg/m^3, 41 mg/m^3, and 139 mg/m^3, respectively (Reference 9). Instead of using the ERPG values for uranium compounds, the ISA uses the uranium intakes of 10 mg, 30 mg, and 100 mg as the equivalency for ERPG-1, ERPG-2, and ERPG-3, respectively (Reference 10). From Table A.1-1 (Reference 11), the 50 percent lethality limit of soluble uranium compounds uptake is 1.63 mg U/kg body weight. With a 50 percent retention, it can be shown that the 50 percent uranium lethal intake is 228 mg for a person of 70 kg (154.4 lb). As a result, the ISA uses a 100 mg intake, which is approximately half of the 50 percent lethal intake as the equivalency of the ERPG-3. Comparison of the calculated chemical airborne concentrations at the receptor to the appropriate ERPG values (or uranium intake values) allows the assignment of a chemical consequence level of High, Intermediate, or Low to each receptor as outlined in Table A-6. Unless otherwise stated, exposures are assumed to be for one hour for all receptors and the one-hour ERPG values will be used.

High consequences for the Off-site receptor are generally based on airborne concentrations exceeding the ERPG-2 value (or 30 mg uranium intake), while Intermediate consequences to the Off-site receptor are based on exceeding the ERPG-1 value (or 10 mg uranium intake). High consequences to the WCA and WRA receptors are based on airborne concentrations exceeding the ERPG-3 value (or 100 mg uranium intake), while intermediate consequences to the WCA and WRA receptors are based on concentrations exceeding the ERPG-2 value (or 30 mg uranium intake). For those events that involve only the release of UF_6 from cylinders or pipes in the absence of fire, the rate of diffusion of UF_6 is generally very low such that the UF_6 has sufficient time to react with air and the product UO_2F_2 has time to deposit or plate out. Only the peak HF concentrations are used to compare with the ERPG values for both on-site and off-site receptors during these events. The consequence classification for HF is based upon the peak HF concentration at any time during the event.

Environmental Consequences

Environmental consequences were addressed by the ISA Team when considering the credible accident scenarios where release quantities exceeded the levels established by the Performance Requirements of 10 CFR 70.61(c)(3). The methods used and results are provided in Appendix I of the ISA Summary.

3.1.2.3.2.2.6 Unmitigated Risk Level

Using event frequency and consequence levels, the events are "binned" in frequency-consequence space to assess relative risk in accordance with 10 CFR 70.61. A risk rank for each receptor is individually determined for both radiological consequences and chemical consequences. The objective of risk binning is to focus attention on those events that pose the greatest risk to the public and workers. Higher risk events are candidates for additional analysis and/or selection of IROFS to reduce the risk.

Tables A-7, A-8, and A-9 of the ISA Summary are risk binning matrices for the three receptor locations considered in the ISA [i.e., WRA (close-in), WCA (100 m), and Off-site (500 m, 700 m, or 800 m)]. Table A-7 is the risk binning matrix for the Worker in the Restricted Area, who is typically located anywhere inside the facility with the hazardous release or hazardous condition. Table A-8 is the risk binning matrix for the Worker in the Controlled Area (100 m receptor) located outside the facility. Table A-9 is the risk binning matrix for off-site receptors (Public).

In each of these tables, a rectangular matrix defines bins in frequency-consequence space. Each bin that is lettered with the letter "A" indicates that 10 CFR 70.61 Performance Requirements are exceeded, in which case IROFS must be implemented to reduce the risk. Alternately, bins designated with the letter "B" indicates that 10 CFR 70.61 Performance Requirements are met, and no IROFS are required.

Accidents that are considered not to be "Credible" (i.e., events having a frequency less than 10^{-6}/year) are generally not shown, but would have a risk rank of "B". Accidents that have Low consequences have a risk rank of "B." In either case, the risk rank of "B" requires no further analysis or designation of IROFS to control risk (unless the control is an IC, in which case the control would be designated as an IROFS).

The HE Tables in Appendix C of the ISA Summary provide a bin letter in the unmitigated risk level column for both radiological and chemical consequences, representing risk for each receptor location for each of the postulated release events.

3.1.2.3.2.3 Available Preventive and Mitigative Controls

3.1.2.3.2.3.1 Preventive Controls

A preventive control is any feature that may be relied upon to reduce the frequency of a hazardous release event (up to the point of release). The selection of preventive controls is made

6.2.2 Management Measures

Each of the management measures that helps ensure the IROFS are available and reliable, are briefly described in the following sections.

6.2.2.1 Procedures

6.2.2.1.1 Operating Procedures

Procedures are prepared in accordance with the requirements of a formal procedure system. The Procedures Program is described in Section 11.4 of this license application.

6.2.2.1.2 Safety and Health Program Procedures

USEC subleases from the United States Enrichment Corporation, certain support buildings/facilities on the DOE reservation. The ACP and the DOE have their own chemical safety programs and share information regarding hazardous chemicals used by each entity. The DOE environmental restoration contractors and sub-contractors may also be present on the reservation. 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 with DOE and reviewed in accordance with procedures.

IHS programs used for chemical safety and implemented by safety and health program procedures include:

- Lockout/Tagout
- Hazard Communication
- Confined Space Entry
- Safety and Health Work Permit
- Hot Work Permit
- Personal Protective Equipment
- Signs/Labeling/Tagging
- Safety Training

These safety and health programs apply to chemical safety as described in the program implementation documents.

6.2.2.2 Training

The Production Support Manager has overall responsibility for employee training. ACP operators, maintenance personnel, management, and emergency response personnel have prerequisite and periodic training requirements that are necessary for initial and continued job qualification.

Personnel who operate, maintain, manage, handle, and have emergency response duties for chemicals are adequately trained for the particular chemical system or related activity. This training supplements the plant Training Program and occurs at the job-specific level.

Contractor (typically construction, maintenance, and service) personnel receive access training and plant-specific safety training prior to starting work. The contractor or the contractor-designated Safety and Health Officer has the contractual responsibility for internal contractor employee training. USEC also approves the contractor's Safety and Health Plan. The Site Technical Representative is the liaison between the contractor and USEC. If construction activities interface with chemical systems, ACP representatives ensure appropriate job review, training, and guidance is provided.

6.2.2.3 Maintenance and Inspection

Maintenance and inspection programs are summarized below and described in Sections 11.1 and 11.2 of this license application, and in the Quality Assurance Program Description (QAPD) for the American Centrifuge Plant.

Engineering develops maintenance and inspection requirements and criteria for chemical systems in conjunction with the specific plant maintenance organization, manufacturer's recommendations, and ISA Summary. These chemical safety requirements are based on the functions of IROFS identified in the ISA Summary, and manufacturer's recommendations for a particular chemical component/system.

6.2.2.3.1 Calibration and Inspection

Specific calibration and inspection requirements are based on operating characteristics, past operating experience, system operating environments, and manufacturer's recommendations.

Maintenance of chemical systems is performed in accordance with the plant maintenance programs. These plant programs are based upon calibration and inspection requirements from operational experience and characteristics of the system.

6.2.2.3.2 Maintenance Work Packages

Maintenance work packages are prepared to provide the necessary technical and safety guidance for maintenance activities as described in Section 11.2 of this license application. These work packages are applicable to chemical systems and equipment. Supporting 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. Additional discussion regarding the ACP graded approach to quality assurance is provided in Chapter 11.0 of the License Application.

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. The Human Factors Engineering program is described in Section 2.6 of the ISA Summary.

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. Material Safety Data Sheets (MSDSs) are maintained in a central location in the ACP and are available at all times to plant employees, including emergency response and fire department personnel from on- and off-site. 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;
- A centrally-located MSDS library, which is maintained and routinely updated by Industrial Hygiene; 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 the latest revision of MSDSs for these chemicals. Hard copies are maintained by the contractor at the job site, by Industrial Hygiene in a central location, and by appropriate Facility Custodians.

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.

7.1.1.2 Hot Work Permits

Hot work is controlled by procedure complying with NFPA 51B-2003 and applicable Occupational Safety and Health Administration (OSHA) requirements per 10 CFR Part 1910. The permit system ensures that cutting, welding, and other hot work conducted in plant areas not normally used for such purposes will be conducted utilizing a permit system/process and performed in a manner that is consistent with industry fire prevention practices. This includes pre-job inspection, stationing a fire watch during the hot work as required, and post-job fire watch to prevent delayed ignition of any combustibles.

Selected managers and supervisors are trained and authorized to write hot work permits. Personnel performing fire watches receive additional training. The Fire Safety Manager, or designee, is notified by the line manager prior to the initial use of a hot work permit. The permits are logged and a field surveillance of work is conducted during routine building inspections and when concerns or unusual circumstances exist.

7.1.2 Inspection, Testing, and Maintenance

Fire protection equipment is inspected and tested upon installation in accordance with NFPA 25-2004. Periodic inspection and testing of fire protection equipment are performed by or overseen by trained personnel to help ensure that fire safety related IROFS are available and reliable. The testing and inspection of equipment is performed in accordance with procedures that include test frequencies as defined by the Fire Safety Manager. The major elements of the plant inspection program are identified as follows.

- Flow test sprinkler systems
- Test manual fire alarms (pull stations)
- Test sprinkler water flow alarms
- Test supervisory alarm devices including control valves, low air pressure, low temperature, and loss of power
- Operate sprinkler system control valves
- Test special fire alarm indicators, such as heat and smoke detection systems
- Inspect major buildings to evaluate housekeeping, check fire emergency equipment, and exit pathways
- Inspect sprinkler systems risers
- Inspect portable fire extinguishers

7.1.3 Emergency Response Organization Qualifications, Drills, and Training

The ACP relies upon a qualified provider to perform emergency response to fire and other types of accident scenarios occurring at the ACP. Employees receive initial and biennial fire safety training as part of General Employee Training (GET) on emergency preparedness. This includes emergency reporting, building/facility evacuation, and fire extinguisher familiarization. GET is described in Section 11.3.1.1 of this license application.

A qualified supplier provides fire department response to an emergency. This supplier is staffed, trained, and equipped adequately to meet the needs of the ACP and the commitments contained in this license application. The qualified provider will have adequate resources to meet the needs of the ACP. This requires appropriately trained and qualified fire fighting personnel, available 24-hours per day, as well as a minimum complement of equipment. There will be a minimum of four qualified fire fighters and one supervisor available to respond per shift. These four fire fighters cover entry and backup (two each). Equipment requirements include one pumper truck with a minimum capacity of 1,000 gpm, one ambulance, and one HAZMAT truck with radiological and rescue equipment. The time to establish a command post will not exceed 20 minutes, 90 percent of the time. This is assured through assessments performed in accordance with Section 11.5 of this license application that confirms that the level of service is consistent with performance requirements specified in a letter of agreement.

Firefighter training is equivalent to the state certified firefighter training curriculum. Emergency medial response personnel meet requirements for state certification as emergency medial technicians and are usually also firefighters.

Qualified instructors provide a range of classroom and hands-on training to maintain standards of performance for all response personnel. Training needs are reviewed annually and the training program modified to meet identified needs. Training records are kept of the training activities. Training is based on national standard emergency response methodology with plant-specific training on issues unique to the plant. Specific training activities include firefighting, hazardous material response, confined space rescue, emergency medical response, radiological emergencies, and rescue. Drills are conducted as part of the plant emergency plan.

7.1.4 Pre-Fire Planning

Pre-fire plans are developed as part of the building emergency packet for the following buildings and areas; X-3001 Process Building; X-3002 Process Building; X-3012 Process Support Building; X-3346 Feed and Customer Services Building; X-3346A Feed and Product Shipping and Receiving Building; X-3356 Product and Tails Withdrawal Building; X-7725 Recycle/Assembly Facility; X-7726 Centrifuge Training and Test Facility; X-7727H Interplant Transfer Corridor; and the Cylinder Storage Yards (X-745G-2, X-745H, X-7746N, X-7746S, X-7746E, X-7746W, and X-7756S).

Each pre-fire plan contains the following applicable information about the building or area:

- Facility description/construction,
- Specific hazards to emergency responders,
- Search and rescue considerations,
- Fire protection equipment/systems available,
- 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; X-3001, X-3002, X-3012, X-7725, X-7726, X-7727H, X-3346, X-3346A, X-3356, X-745G-2, X-7746N, X-7746S, X-7746E, X-7746W, and X-7756S. 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 X-745H 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.

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. This plan will be completed and will be added to this application as a reference prior to the NRC's pre-operational inspections. 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.

Table 9.2-7 Environmental Baseline Activities/Concentrations 1998 - 2002

	Total Uranium µg/g	Technetium pCi/g	Gross Alpha pCi/g	Gross Beta pCi/g
Sediment/Upstream Big Beaver Creek				
Num. of Samples	10 (0)	10 (2)	10 (4)	10 (6)
Average	2.1	<0.3	<7	<13
Minimum	0.9	<0.1	<5	<7
Maximum	4.6	0.7	9	25
Sediment/Downstream Big Beaver Creek				
Num. of Samples	10 (0)	10 (0)	10 (1)	10 (2)
Average	4.0	4.7	<11	<18
Minimum	2.8	1.1	<6	<12
Maximum	5.5	14.6	33	24
Sediment/Upstream Big Run Creek				
Num. of Samples	11 (0)	11 (8)	11 (3)	11 (8)
Average	3.8	<0.2	<7	<13
Minimum	2.3	<0.1	4	9
Maximum	4.8	<0.2	13	<17
Sediment/Downstream Big Run Creek				
Num. of Samples	29 (0)	29 (6)	29 (6)	29 (18)
Average	4.1	<0.8	<9	<14
Minimum	1.1	<0.1	<4	<7
Maximum	5.9	2.7	33	28
Sediment/Upstream Scioto River				
Num. of Samples	11 (0)	11 (11)	11 (7)	11 (8)
Average	2.1	<0.1	<7	<12
Minimum	0.9	<0.1	3	<7
Maximum	4.6	<0.2	<9	<17

The "number of samples" shows the total number of samples collected, including replicate and duplicate samples collected for QA purposes, followed by the number of samples that were lower than the Minimum Detectable Concentration in parentheses.

Table 9.2-7 Environmental Baseline Activities/Concentrations 1998 - 2002

	Total Uranium µg/g	Technetium pCi/g	Gross Alpha pCi/g	Gross Beta pCi/g
Sediment/Downstream Scioto River				
Num. of Samples	10 (0)	10 (8)	10 (5)	10 (6)
Average	2.1	<0.2	<9	<14
Minimum	1.4	<0.1	5	<8
Maximum	4.4	0.4	17	19
Sediment/Background Creeks				
Num. of Samples	40 (0)	40 (37)	40 (22)	40 (25)
Average	3.2	<0.2	<6	<13
Minimum	1.3	<0.1	<3	<7
Maximum	6.8	2.7	13	24

The "number of samples" shows the total number of samples collected, including replicate and duplicate samples collected for QA purposes, followed by the number of samples that were lower than the Minimum Detectable Concentration in parentheses.

[a] In Fall 2002, duplicate samples taken at the RM8 sample point contained 689 and 801 pCi/g of technetium. A replicate sample taken at the same time and a few yards away contained only 13 pCi/g of technetium. The RM8 sample taken the following spring contained only 13 pCi/g, which is consistent with previous samples.

Table 9.2-8 Environmental Baseline Radiation Levels 1998-2002

Area of Readings	Average	Minimum	Maximum
Reservation (includes 518, 737, 862, 906, 933, 1404A, A35, A36, and A40)	10.5 µRad/hr	6.4 µRad/hr	17.9 µRad/hr
X-746 Cylinder Yard (includes 874)	70.5 µRad/hr	60.1 µRad/hr	82.3 µRad/hr
Boundary (includes A3, A8, A9, A12, A15, A23, A24, and A29)	10.5 µRad/hr	6.2 µRad/hr	22.6 µRad/hr
Piketon (includes A6)	9.6 µRad/hr	7.4 µRad/hr	13.9 µRad/hr
Camp Creek (includes A28)	10.4 µRad/hr	7.8 µRad/hr	14.9 µRad/hr

Note: Locations ACP-1, ACP-2, ACP-3, ACP-4, and ACP-5 are new monitoring locations that will be established as the ACP is built.

LA-3605-0002

Environmental Report

for the American Centrifuge Plant
in Piketon, Ohio

Revision 2

Docket No. 70-7004

June 2005

Information contained within does not contain Export Controlled Information

Reviewer: D Hupp
Date: 06/16/05

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LA-3605-0002

ENVIRONMENTAL REPORT
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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.
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Table 4.2.3.2-15 Risk of Latent Cancer Fatalities from Accidents during Truck Transportation of Radioactive Materials

Material	Route	Source of Exposure			
		Ground	Inhaled	Resuspended Soils	Cloudshine
Feed Material in Type 48X Cylinder	Port Hope, ON	$5.23 x10^{-7}$	$3.97 x10^{-5}$	$2.74 x10^{-5}$	$7.93 x10^{-12}$
Feed Material in Type 48Y Cylinder	Metropolis, IL	$1.66 x10^{-7}$	$1.20 x10^{-5}$	$1.07 x10^{-5}$	$2.39 x10^{-12}$
Feed Material in Type 30B Cylinder	Wilmington, DE	$8.66 x10^{-7}$	$7.03 x10^{-5}$	$4.61 x10^{-5}$	$1.37 x10^{-11}$
Product in Type 30B Cylinder	Richland, WA	$1.92 x10^{-7}$	$1.18 x10^{-4}$	$3.70 x10^{-5}$	$7.43 x10^{-13}$
Product in Type 30B Cylinder	Columbia, SC	$8.70 x10^{-7}$	$7.57 x10^{-5}$	$2.37 x10^{-5}$	1.48 x10-11
Product in Type 30B Cylinder	Wilmington, NC	$1.29 x10^{-6}$	$1.02 x10^{-4}$	$3.19 x10^{-5}$	$2.23 x10^{-11}$
Product in Type 30B Cylinder to Korea	Seattle, WA	$2.97 x10^{-7}$	$2.48 x10^{-5}$	$1.63 x10^{-5}$	4.85 x10-^{12}
Product in Type 30B Cylinder to Japan	Seattle, WA	$2.46 x10^{-7}$	$2.00 x10^{-5}$	$1.31 x10^{-5}$	$3.90 x10^{-12}$
Heels in Type 30B Cylinder	Richland, WA	$2.75 x10^{-6}$	$2.74 x10^{-3}$	$3.37 x10^{-5}$	$1.12 x10^{-11}$
Heels in Type 30B Cylinder	Columbia, SC	$3.10 x10^{-7}$	$4.21 x10^{-5}$	$2.76 x10^{-5}$	$4.65 x10^{-12}$
Classified/Refurbishment Waste in 55-Gal Drums	Nevada Test Site, NV	$2.56 x10^{-10}$	$1.46 x10^{-8}$	$4.39 x10^{-8}$	$1.02 x10^{-14}$
Unclassified Waste in B-25 Boxes	Clive, UT	$1.53 x10^{-9}$	$1.27 x10^{-7}$	$1.48 x10^{-7}$	$8.34 x10^{-14}$
Mixed Waste in 55-Gal Drums	Gainesville, FL	$5.90 x10^{-11}$	$3.32 x10^{-9}$	$1.52 x10^{-8}$	$2.34 x10^{-15}$
Total Transportation for Refurbishment and D&D Phase					
Classified Solid Waste from D&D in B-25 Boxes	Nevada Test Site, NV	$5.70 x10^{-7}$	$4.47 x10^{-5}$	$8.28 x10^{-5}$	$2.94 x10^{-11}$
Unclassified Solid Waste from D&D in B-25 Boxes	Clive, UT	$9.43 x10^{-9}$	$7.40 x10^{-7}$	$1.37 x10^{-6}$	$4.86 x10^{-13}$
Liquid Waste from D&D in 55 -Gal Drums	Kingston, TN	$2.32 x10^{-10}$	$1.41 x10^{-8}$	3.15 x10-^{8}	$9.93 x10^{-15}$
Solid Waste from GCEP Cleanup in B-25 Boxes	Nevada Test Site, NV	$3.56 x10^{-8}$	$2.79 x10^{-6}$	$5.17 x10^{-6}$	$1.83 x10^{-12}$

4.2.3.2.1.9 Analysis of Impacts of Transportation of Chemical Materials

Chemical hazards do not pose cargo-related risks to humans during routine (non-accident) transportation-related operations. Transportation operations are generally well regulated with respect to packaging, such that small spills or seepages during routine transport are kept to a minimum. With respect to chemical hazards, the cargo-related impacts to human health during transportation would be caused by exposure occurring as a result of container failure and chemical release during an accident. Therefore, chemical risks are assessed for cargo-related transportation accidents. The potential release, transport, and dispersion of chemicals into the environment and the subsequent exposure of people primarily through inhalation exposure constitute the chemical risk from transportation-related accidents.

Releasing UF_6 to the atmosphere would result in the formation of hydrofluoric acid and uranyl fluoride from the reaction of UF_6 with moisture in the atmosphere. Both compounds are toxic to humans. The risks could be either acute or latent and the severity of the immediate health effects depend on the toxicity and exposure concentration of the specific chemical(s) released. The severity of the acute health effects could range from slight irritation to fatality for the exposed individuals. Neither the uranium compounds nor HF are carcinogens or suspected carcinogens. Therefore, latent cancer incidences and fatalities from chemical exposure are not expected and not assessed for potential accidents.

DOE analyzed the chemical impacts from the transportation of UF_6 cylinders from the East Tennessee Technology Park (ETTP) to the Portsmouth and Paducah GDPs (ANL 2001). These results were used to estimate the chemical impacts associated with the proposed ACP. The ETTP study considered two potential health effects endpoints: 1) adverse effects and 2) irreversible adverse effects. Potential adverse effects range from mild and transient effects — such as respiratory irritation, redness of the eyes, and skin rash — to more serious and potentially irreversible effects. Potential irreversible adverse effects are defined as effects that generally occur at higher concentrations and are permanent in nature — including death, impaired organ function (such as damaged central nervous system or lungs), and other effects that may impair everyday functions. In the ETTP study, it was assumed that for uranium compounds, an intake of 10 mg or more would cause potential adverse effects and an intake of 30 mg or more would cause potential irreversible adverse effects. For HF in the ETTP study, potential adverse effects levels were assumed to occur at levels that correspond to Emergency Response Planning Guideline No. 1 (ERPG-1) or equivalent levels, and potential irreversible adverse effects levels were assumed to occur at levels that correspond to ERPG-2 or equivalent levels.

Since DOE postulated a hypothetical accident that could occur at any location, the results in the ETTP Transportation study are applicable to the ACP because the chemical impacts would not vary with: 1) the shipping route, 2) the amount of enrichment (uranium content of DUF containers were used to bound analysis), and 3) similar shipping containers. DOE evaluated chemical impacts to rural (15 persons/mi^2), suburban (1,798 persons/mi^2), and urban (4,018 persons/mi^2) areas. Chemical impacts are only dependent on the amount of uranium or UF_6 in the container.

The accident consequence assessment for chemical impacts assumes that an accident of the highest severity category (Category VIII) has occurred. The consequences, in terms of adverse affects and irreversible adverse effects for chemical impacts, were calculated for both exposed populations and individuals in the vicinity of an accident. Table 4.2.3.2-16, which is adapted from ANL 2001, presents the chemical consequences to the population from severe accidents involving shipment of depleted UF_6. The potential transportation chemical consequences of an accident involving UF_6 either traveling to or from the ACP are believed to be bounded by those shown in Table 4.2.3.2-16. The results show that while adverse chemical impacts would be high, few individuals would experience irreversible adverse health effects and less than one death would be expected.