USEC
A Global Energy Company

July 29, 2005
AET 05-0061

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

American Centrifuge Plant
Docket Number 70-7004
Submittal of Additional Information Related to Requests for Additional Information Regarding the Environmental Report (TAC No. L32307) – Proprietary Information

INFORMATION TRANSMITTED HEREWITH IS PROTECTED FROM PUBLIC DISCLOSURE AS CONFIDENTIAL COMMERCIAL OR FINANCIAL INFORMATION AND/OR TRADE SECRETS PURSUANT TO 10 CFR 2.390 AND 9.17(a)(4)

Dear Mr. Strosnider:

USEC Inc. (USEC) hereby submits to the U.S. Nuclear Regulatory Commission (NRC) additional information related to the Requests for Additional Information regarding the Environmental Report for the American Centrifuge Plant. The additional information is provided in Enclosure 1. Enclosures 2 and 3 provide the changed pages to the Environmental Report.

The changes to the Environmental Report contained in Enclosure 3 affects pages currently withheld from the public. USEC has initiated a comprehensive review of withheld information in accordance with Reference 1. Reference 1 requested that USEC "resubmit all previously submitted documents with only the sensitive information appropriately marked as sensitive under the criteria of 10 CFR 2.390." The pages provided in Enclosure 3 are subject to the ongoing review and may be affected by the request in Reference 1. We expect to complete our review and resubmit the appropriate documents by August 15, 2005. Accordingly, until the review is completed, USEC requests that Enclosure 3 be withheld from the public disclosure pursuant to 10 *Code of Federal Regulations* (CFR) 2.390(d)(1).

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

Sincerely,

S. A. Toelle

Steven A. Toelle
Director, Nuclear Regulatory Affairs

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

Enclosures: As Stated

Reference: 1. James W. Clifford (NRC) letter to Steven A. Toelle (USEC), Request for Resubmission of Documents Related to USEC Inc.'s (USEC's) License Application for the American Centrifuge Plant (ACP)," dated July 7, 2005.

Enclosure 1 to AET 05-0061

Submittal of Additional Information Related to the Environmental Report

Enclosure 1 of AET 05-0061

The Environmental Report only provides data for the 5 percent enrichment scenario, however, USEC has requested a license to enrich up to 10 percent. Thus, the analysis must address the potential impacts from enriching up to 10 percent. Following are the areas where additional clarification is needed.

1. Radiological Air Quality and Human Health Impacts – Sections 4.6.3.2 and 4.12.3.2 of the Environmental Report need to be updated for 10 percent enrichment. Specifically air emissions in Table 4.6.3.2-1 and Table 4.12.3.2.1-1 will need to be updated.

USEC Response

Sections 4.6.3.2 and 4.12.3.2.1 of the Environmental Report have been revised to reflect 10 percent enrichment, including Tables 4.6.3.2-1 and 4.12.3.2.1-1.

2. Transportation - Section 4.2.3.2.1.2 (Enriched Uranium Product) of the Environmental Report needs to be updated for the 10 percent enrichment. Information to update includes quantities and isotopic concentration of the 10 percent product, the containers and overpacks to be used for shipping 10 percent product, external dose rates in the vehicle cab or outside the container, destination of the 10 percent product, and the number of shipments.

USEC Response

Section 4.2.3.2.1.2 of the Environmental Report has been revised to reflect the 10 percent enrichment, including Tables 4.2.3.2-2 and 4.2.3.2-6.

3. The existing Environmental Report discusses the tails to be generated with product enriched to 4.95 weight percent for a 3.5 million Separative Work Units (SWU) and 7 million SWU facility. Additional text is required to be added to the Environmental Report for product enriched to 10 weight percent for a 3.5 million SWU and 7 million SWU facility.

USEC Response

Production of higher assay product at the same tails assay results in lower rates of tails generation. If the plant were to produce product at the maximum licensed assay of 10 weight percent ^{235}U, the tails generation rate would be about 87.4 percent of the rate stated in the Environmental Report (8,321 MT of tails per year for 3.5 million SWU per year of plant capacity).

Section 4.13.3.4, subsection entitled *Tails to be Produced*, of the Environmental Report has been revised to reflect this response.

Enclosure 2 to AET 05-0061

Submittal of Changed Pages to the Environmental Report
(Non-Proprietary Information)

Table 4.2.3.2-1 Projected Annual Transportation Requirements for Feed Material for the American Centrifuge Plant

Shipper	Feed Material		
	Cameco	Honeywell	Russia[a]
Container Type	48X	48Y	30B
Diameter (in.)	48	48	30
Length (in.)	119	150	81
Minimum Volume (ft^3)	108.9	142.7	26
Material of Construction	Steel	Steel	Steel
Maximum Net Weight (lb)	21,000	27,560	5,000
Containers per Shipment	2	1	3
Shipments per Year	550	550	200
Maximum Curie Content ^{234}U	1.98	1.98	4.68
Maximum Curie Content ^{235}U	0.14	0.14	0.16
Maximum Curie Content ^{238}U	2.86	2.86	0.51

[a] Conservative estimates based on assumption all Russian feed material will be delivered to the ACP.

4.2.3.2.1.2 Enriched Uranium Product

The enriched uranium product, up to 10 weight percent, of the ACP is transported in 30-inch 2.5-ton cylinders. These cylinders are designed, fabricated, and shipped in accordance with the NRC and DOT regulations, and the ANSI standard for packaging and transporting UF_6 cylinders, N14.1 (ANSI 1990). The assumption has been made in this analysis that regulatory approval has been granted to ship up to 10 weight percent product in the 30B cylinders. **[This information has been withheld pursuant to 10 CFR 2.390 and is located in Appendix C of this report]**

Table 4.2.3.2-2 summarizes the radioactive shipments of enriched uranium product that are anticipated for the ACP.

Table 4.2.3.2-2 Projected Annual Transportation Requirements for Enriched Uranium Product from the American Centrifuge Plant

[This table has been withheld pursuant to 10 CFR 2.390 and is located in Appendix C of this Environmental Report]

4.2.3.2.1.3 Heeled Cylinders

According to 10 CFR 110.2, *Heels* means small quantities of natural, depleted or low-enriched uranium (to a maximum of 20 percent), in the form of UF_6 left in emptied transport cylinders being returned to suppliers after delivery of the product.

Approximately fifty 30-inch heel cylinders are shipped to vendors monthly for cleaning and recertification or washing only. These cylinders have heel weights of less than 25 pounds.

4.2.3.2.1.8.1 Radioactive Material Description

The radioactive materials transported to and from the proposed ACP are subject to both NRC (10 CFR Part 71) and DOT (49 CFR Parts 171-173) shipping regulations. Shipments can be transported in Type A shipping containers. The enriched product can be shipped in Type A containers but requires an overpack surrounding the shipping container. Several different types of radioactive materials are proposed for shipment. Table 4.2.3.2-6 summarizes the radionuclide maximum curie content of the containers proposed for the shipment of feed, product, heels, and waste. The relevant specifications for the containers are shown in Tables 4.2.3.2-1 through 5. The radionuclide data and shipping container characteristics are used as input into RADTRAN 5.5.

Table 4.2.3.2-6 Content of the Transportation Containers Proposed for Use by the American Centrifuge Plant

Radionuclide	Feed Material			Product		Heels	Waste	
	Natural Uranium as UF_6		Enriched Uranium	Enriched Uranium as UF_6 4.95%	Enriched Uranium as UF_6 10%			
	48X	48Y	30B	30B	30B	30B	55 Gal	B-25
^{234}U	1.98	1.98	4.68	4.68	10.95	0.5	0.0033	0.0429
^{235}U	0.14	0.14	0.16	0.16	0.39	0.05	0.0002	0.0020
^{236}U	0.006	0.006	0.013	0.013	0.047	0.013	0.00002	0.0003
^{238}U	2.86	2.86	0.51	0.51	0.54	2.88	0.0033	0.0429
^{231}Th	0.14	0.14	0.16	0.16	0.39	0.05	0.0002	0.0020
^{234}Th	2.86	2.86	0.51	0.51	0.54	2.88	0.0033	0.0429
^{234m}Pa	2.86	2.86	0.51	0.51	0.54	2.88	0.0033	0.0429

Assumes uranium daughters in equilibrium with parent.

Table 4.2.3.2-7 summarizes the direct radiation surrounding the shipping containers based on measurements made by USEC except for the dose rate for waste containers, which is taken from DOE 2002.

Table 4.2.3.2-7 Direct Radiation Surrounding Shipping Containers

Item	Feed Material			Product	Heels	Waste	
	48X	48Y	30B	30B	30B	55-GAL	B-25
Direct Radiation at 1 meter (mrem/h)	0.7	0.7	0.7	0.3	0.3	1	1
Dose at Cab of Truck (mrem/h)	0.5	0.5	0.1	0.1	0.1	0.125	0.125

Operations

Operations of the ACP in Piketon will result in the release of small amounts of radioactive materials to the atmosphere through monitored exhaust vents. The model evaluated the impacts of emissions from the two existing process buildings (X-3001 and X-3002), X-3346, X-3356, X–710, and the emissions from two additional process buildings with similar design specifications and supporting feed and withdrawal buildings. The feed, withdrawal and product operations ^{235}U design assay range is approximately 1.6 percent to 10 percent. However, the customer product range is from approximately 2.4 percent to 4.95 percent. The ACP will require analytical services and the United States Enrichment Corporation X-710 Laboratory is an obvious potential supplier. Air emissions from the X-710 are included as a bounding case.

EPA's CAP88-PC was used to model the radiological impacts of ACP emissions. CAP88-PC is approved by EPA for demonstrating compliance with 40 CFR Part 61, Subpart H (standards for atmospheric releases of radionuclides from the DOE reservation). The CAP88 suite of programs includes:

- A Gaussian plume dispersion module (AIRDOS) with algorithms to account for deposition, environmental scavenging, and radioactive decay of radionuclides;
- A dose conversion module (DARTAB) to convert environmental concentrations into annual external and internal exposures and impacts (50-year EDE and Total Lifetime Fatal Cancer Risks) in accordance with Regulatory Guide 1.109, *Calculation of Annual Dose to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I*;
- A database (RADRISK) of dose and risk conversion factors; and
- A preprocessor to convert STAR-format wind data into a format used by AIRDOS.

The projected maximum emission rate for the ACP is 2.71 millicuries (mCi) per week, or 0.141 curies per year (Ci/yr) of total uranium. Feed material that meets the ASTM specification for recycled feed may be used in the ACP. Vent samples are analyzed for ^{234}U, ^{235}U, ^{238}U, and ^{99}Tc as described in Section 9.2.2.5 of the license application. GDP site experience in uranium enrichment has shown that these uranium isotopes account for more than 99 percent of the public dose due to uranium emissions.

Table 4.6.3.2-1 Projected Emission Rates for the American Centrifuge Plant Curies per Year

[This table is withheld pursuant to 10 CFR 2.390 and is located in Appendix C of this Environmental Report]

As shown in Table 4.6.3.2-1, the feed operation's emissions will derive from natural uranium. The process and withdrawal buildings are assumed to have an average 2 percent ^{235}U assay. The average emission assay of these buildings is independent of the product assay, because at all levels of enrichment the average assay throughout these buildings will still be equal to the natural uranium feedstock. This is increased to 2 percent for this analysis to provide a margin of conservatism. To bound the possible emissions, the customer services building and analytical laboratory are assumed to have average emissions of 10 percent ^{235}U assay. These two buildings' emissions will normally derive from material having a ^{235}U assay of no more than 5 percent. The process building vent characteristics were based on the existing process vents in X-3001 and X-3002 where the vent height is 23 m (75 ft) above grade and the vent diameter is 0.05 m (2 in.). The vent heights for the feed, withdrawal, and customer services buildings are 12 m (39 ft) above grade. The analytical laboratory vent height is 9 m (30 ft) above grade. A zero-plume-rise was used in the model, so the vent diameter was not used in the model calculations. Finally, the X-710 is treated as if it were co-located with the other vents in the model; however, it is almost twice the distance (850 m) upwind from the MEI relative to the other vents. The model conservatively ignores this difference in distance.

Wind velocities used in the model are from the on-site meteorological station and represent measurements collected at 30 m (98 ft) above grade from 1998 to 2002. The DOE reservation is in an ancient river valley running roughly from southwest to northeast. Low-level winds commonly blow either up this valley to the northeast or down the valley to the southwest. Historically, the preponderance of winds blow up the valley and are offset for dispersion purposes by the fact that the DOE reservation "bulges" in the northeast corner. Consequently, the historic point of maximum impact from existing emission sources is along the southern edge of the bulge. The ACP, however, is located in the extreme southwest corner of the active GDP plant site and is farther from the eastern side of the DOE reservation than any of the existing vents.

Distances between the ACP vents and the nearest member of the public are measured from the center point between the four process buildings to the DOE reservation boundary in each of the 16 compass directions. The model also evaluates the two on-site tenant organizations (the Ohio National Guard at the X-751 Mobile Equipment Maintenance Shop and the OVEC office building on the Main Access Road) as the nearest members of the public. Distances were scaled from a blueprint-size site map with the Universal Transverse Mercator (UTM) grid (100 m or 328 ft increments) overlaid.

A rural food consumption pattern was used to conservatively model the dose to the hypothetical individual living at the DOE reservation boundary and the collective population dose for an 80 km (50 mile) radius around the ACP. This assumes a high percentage of foodstuffs are produced at home or at the point of exposure (70 percent vegetables, 40 percent milk, and 44 percent meat), with the remainder produced within an 80-km radius. On-site tenants were assumed to consume foodstuffs produced within the 80-km radius area surrounding the ACP, but not food products raised on the DOE reservation. This is nevertheless a conservative consumption, since few people actually consume a diet produced exclusively within 80 km of their residence.

Table 4.12.3.2.1-1 American Centrifuge Plant Dose Modeling

Process	Location of Maximally Exposed Individual	ACP Estimated Effective Dose Equivalent (mrem/yr)	2002 Combined Maximum Effective Dose Equivalent (mrem/yr)	Estimated Combined Effective Dose Equivalent (mrem/yr)
UF_6 Process	555 m E Ohio National Guard	0.40	0.031	≤0.43
	1,526 m NNW OVEC Office Bldg	0.26		≤0.29
	Boundary MEI 1,118 m SSW Boundary	0.80		≤0.83

Source: Waste Management, Environmental Compliance, Industrial Safety

The worst-case estimated operational emissions are approximately 0.83 mrem/yr, which is a fraction of the EPA 10 mrem/yr standard and of the NRC TEDE 100 mrem/yr limit.

The collective EDE for the population living within an 80 km (50 mile) radius of the ACP would be 4.50 person-rem/yr.

The CAP-88 model predicts that average uranium airborne concentration would be 5.82×10^{-3} $\mu g/m^3$ at the Ohio National Guard X-751 Mobile Equipment Shop. The NIOSH Time-Weighed Average Recommended Exposure Level and ACGIH TLV for uranium is 200 $\mu g/m^3$. The maximum average uranium concentration at the plant boundary will be a minimum of four orders of magnitude (i.e., thousand times less) than the occupational exposure standards. Details of the CAP-88 models and their respective results are discussed in section 4.6.3.2 of this ER.

Accident Analysis

Accident analyses were performed for potential on-site accidents as part of the Integrated Safety Analysis and documented in the ISA Summary for the American Centrifuge Plant. Off-reservation radiological and chemical impacts from the postulated accidents were evaluated and IROFS to either prevent postulated accidents or to mitigate their consequences to an acceptable level were identified and documented (Appendix F of the ISA Summary for the American Centrifuge Plant). **[This information has been withheld pursuant to 10 CFR 2.390 and is located in Appendix C of this Environmental Report.]** The ISA identifies this bounding case in the facility's operations, designates IROFS to either prevent accidents or mitigate their consequences to an acceptable level, and describes management measures to provide reasonable assurance of the availability and reliability of the IROFS.

period. Over a thirty-year period, the 7 million SWU ACP is expected to produce approximately 42,818 cylinders of depleted uranium compared to the Piketon DOE reservation and ETTP inventory, currently planned for conversion at the Piketon facility, of 21,900 cylinders.

Production of higher assay product at the same tails assay results in lower rates of tails generation. If the plant were to produce product at a maximum licensed assay of 10 weight percent ^{235}U, the tails generation rate would be about 87.4 percent of the rate stated above (8,321 MT of tails per year for 3.5 million SWU/Yr of plant capacity).

Cylinder Management

ACP DUF_6 cylinders will be managed in accordance with both NRC requirements that apply to the proper storage of low-level radioactive waste (LLRW) and with EPA and OEPA rules for Storage, Treatment, Transportation and Disposal of Mixed Wastes. Generally, the environmental rules include requirements for waste storage compatibility, personnel training, inventory and emergency planning, as well as full compliance with the NRC license. Under this dual regulatory approach, the ACP DUF_6 can be stored at the Piketon site until final disposal.

Depleted UF_6 is stored in steel cylinders until it can be processed in accordance with the disposal strategy established by USEC. USEC manages depleted UF_6 at the ACP in accordance with 40 CFR Part 266 and OAC 3745-266.

The cylinders primarily used for storage of tails are known as Model 48G cylinders. These cylinders are made of carbon steel and are about 4 feet in diameter, 12 feet long and weigh about 30,000 pounds when full. While a cylinder is being filled, it is cooled so that the gaseous DUF_6 is solidified. A filled cylinder is then moved to a cylinder yard where it is stacked in place. USEC will store the DUF_6 cylinders in a manner designed to minimize risk to workers, the public and the environment.

The ACP tails storage capability will consist of two storage pads. One already exists and provides approximately 135,000 square feet of storage space. It is estimated that this will support the first five years of plant operations. The second storage pad will be 1,060,000 square feet, which is estimated to be enough space to support the remaining 25 years of operations. The extra USEC storage capacity will be constructed early to ensure adequate, available storage capacity (in case timing of the conversion plant is delayed).

The design of the cylinder storage yards was based on the determination of accident scenarios, which might result from natural phenomena, operations, fire, impact, etc. The only credible events that can result in offsite consequences are fire-related events. An accident scenario is considered "credible" if its probability is greater than one chance in a million. The health issue of concern with regard to consequences of exposure would be chemical in nature - due to uranium intake and hexafluoride exposure - not radiological. The ACP integrated safety analysis has established that fire-related events have a likelihood of occurrence that is "highly unlikely" ($<10^{-5}$) or the associated consequences have a likelihood of occurrence that is "highly unlikely". The structures, systems, equipment, components and activities of personnel that are put in place to prevent potential accidents include the following:

1) Cylinder integrity
2) No liquid UF_6 is present in the cylinder storage yards
3) The concrete pads are graded/sloped to minimize the pooling effect for spilled fuel
4) Cylinders are not overfilled

Enclosure 3 to AET 05-0061

Submittal of Changed Pages of the Environmental Report
(Proprietary Information)