

# Environmental Report

## for the American Centrifuge Plant

in Piketon, Ohio



Revision 0

Docket No. 70-7004

August 2004

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Reviewer: Original signed by RI Coriell  
Date: 07/30/04

## 1.1 Purpose and Need for the Proposed Action

Nuclear power generates about 20 percent of the electricity for the United States. Construction and operation of a gas centrifuge plant utilizing the US-origin advanced technology is key to supporting DOE's national energy security goals by providing a reliable and secure domestic source of enriched uranium. The primary purpose of this action is to allow USEC to construct and operate a plant to enrich uranium up to 10 weight (wt.) percent with an initial capacity of approximately 3.5 million SWU expandable to 7 million SWU, at USEC's option, using advanced U.S. centrifuge technology at the DOE reservation located in Piketon, Ohio.

The gas centrifuge is an enrichment process that increases the concentration of uranium-235 ( $^{235}\text{U}$ ), the isotope desired for production of nuclear energy. The gas centrifuge process has three inherent characteristics that make it particularly attractive: (1) it is a proven technology; (2) it has low operating cost; and (3) it is amenable to modular architecture. The low energy requirements of gas centrifuge technology, approximately 5 percent of that required by a comparably-sized Gaseous Diffusion Plant, provide for considerably lower operating costs. The modularity of gas centrifuge technology allows for a flexible deployment of enrichment capacity, enabling responsiveness to market demand.

The ACP is a crucial step toward advancing the national energy security goal of maintaining a reliable and economical domestic source of enriched uranium. The plant uses American Centrifuge enrichment technology that supports the national energy security goals. Congress privatized the U.S. Government's uranium enrichment operations creating USEC to, among other things, conduct research and development as required to evaluate alternative technologies for uranium enrichment, and to help maintain a reliable and economical domestic source of enriched uranium. It is also important for meeting the commercial needs of the corporation to replace higher cost and aging production with new lower cost production.

To support these statutory and commercial objectives, on June 17, 2002, USEC and the U.S. Government, represented by the DOE, entered into the DOE-USEC Agreement. Assuming successful demonstration of the technology, the DOE-USEC Agreement requires that USEC begin operations of an enrichment facility at the DOE reservation in Piketon, Ohio, or PGDP, using advanced technology with annual capacity of 1 million SWU (expandable to 3.5 million SWU) in accordance with certain milestones (see Table 1.1-1). The milestone schedule contains target dates for various steps including milestones associated with testing, NRC licensing, financing, and construction. The milestones require, among other things, that a centrifuge facility (1) begin commercial operations in Piketon, Ohio, no later than January 2009 and achieve an annual capacity of 1 million SWU by March 2010 or (2) begin commercial operations in Paducah, Kentucky, no later than January 2010 and achieve an annual capacity of 1 million SWU by March 2011.

**Table 1.1-1 Milestones in the DOE-USEC Agreement (June 17, 2002) Related to Development of the American Centrifuge Plant**

Date	Milestone
March 2005	Submit License Application to NRC for Commercial Centrifuge Plant
May 2005	NRC docket Commercial Centrifuge Plant application
October 2006	Satisfactory reliability and performance data obtained from Lead Cascade operations
January 2007	Financing commitment secured for a 1 million SWU Centrifuge Plant
June 2007	Begin Commercial Centrifuge Plant construction/refurbishment
January 2009	Begin Commercial Centrifuge Plant operations
March 2010	Centrifuge Plant annual capacity at 1 million SWU per year
September 2011	Centrifuge Plant (if expanded at USEC's option) projected to have an annual capacity at 3.5 million SWU per year

The American Centrifuge will play a major role in supporting our nation's energy security and national security interests while providing a reliable, competitive fuel source for nuclear power plants around the world. Secretary Spencer Abraham, U.S. Secretary of Energy, has stated: "As a clean, affordable and reliable energy source, nuclear energy is important to the nation's future energy supply ... USEC, and its partners in the nuclear industry, continue to take important steps enhancing national energy security with private sector development of advanced American technology." In addition to advancing national energy security goals, the ACP supports USEC's corporate goal of remaining a competitive and reliable domestic provider of enriched uranium to the nuclear industry. USEC's subsidiary, the United States Enrichment Corporation, currently produces about 5 million SWU per year using gaseous diffusion technology at PGDP. The PGDP is over 50 years old and the power costs to produce SWU are significant. Electricity at the Paducah plant represents about 60 percent of production cost. Global LEU suppliers compete primarily in terms of price, and secondarily on reliability of supply and customer service.

In addition, as Executive Agent for the U.S. Government, the United States Enrichment Corporation agreed to purchase, if made available by the Russian Executive Agent, 5.5 million SWU per year of LEU that is derived from down blending of HEU from Russian warheads (Megatons to Megawatts Program). The agreement under which the United States Enrichment Corporation supplies LEU from this source expires in 2013. Nearly every commercial nuclear power reactor in the United States has been refueled at some point in the past decade with low-enriched uranium from this program. About one in ten homes and businesses in the United States are powered with fuel from the Megatons to Megawatts program.

A plant utilizing the gaseous diffusion process requires large-scale use of Freon, electricity, and non-contact cooling water, which results in leakage to the environment. The ACP does not require this large-scale use of electricity and Freon, and requires much less use of cooling water.

UF<sub>6</sub> production will continue at PGDP under the No Action Alternative, resulting in continued emissions and resource use at PGDP.

### **2.1.2 Proposed Action**

As discussed in section 1.2 above, the Proposed Action is to refurbish, construct and operate the ACP at the DOE reservation in Piketon, Ohio. The purpose of the ACP is to meet the DOE-USEC Agreement requirements for USEC to deploy an advanced technology enrichment plant and meet the need for lower cost production and for replacement of the aging GDP. UF<sub>6</sub> production will ultimately cease at PGDP after the ACP becomes operational, resulting in reduced emissions and resource use (i.e., water, electricity and Freon). Decontamination and Decommissioning (D&D) of those facilities currently leased to the United States Enrichment Corporation will begin once the GDP ceases operation (DOE 2004b).

### **Corporate Identity**

USEC is a global energy company and 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 the only private corporation providing enrichment services to the nuclear industry and the only U.S. producer of enriched uranium. In 2003 USEC, through its subsidiary, supplied enrichment for approximately 56 percent of the North American market and approximately 30 percent of the world market.

USEC is responsible for the design, refurbishment, construction, manufacturing, installation, testing, operation, maintenance, and modification 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 citizens of the United States.

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 Gaseous Diffusion Plants (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.

USEC's subsidiary, the United States Enrichment Corporation, is also the exclusive agent for a United States Government agreement program to convert highly enriched uranium taken from dismantled Russian nuclear warheads into LEU fuel for peaceful use in nuclear power

LES Exhibit #	Description
54	Albright, 1997. Plutonium and Highly Enriched Uranium 1996, World Inventories, Capabilities and Policies, Oxford University Press, D. Albright, et al., 1997 [LES-02711 to LES-02725]
55	U.S. Nuclear Regulatory Commission, "Status of License Renewal Applications and Industry Activities" ( <a href="http://www.nrc.gov/reactors/operating/licensing/renewal/applications.html">http://www.nrc.gov/reactors/operating/licensing/renewal/applications.html</a> ). (December 14, 2004)
56	Nuclear Energy Institute, "Approved Power Uprates (1977-2004)" (July 2004)
57	U.S. Department of Energy, Energy Information Administration, "International Energy Outlook 2004," DOE/EIA-0484 (2004), Table E1, p. 221 ( <a href="http://www.eia.doe.gov/oiaf/ieo/index.html">www.eia.doe.gov/oiaf/ieo/index.html</a> )
58	U.S. Department of Energy, "Sale of Surplus Highly Enriched Uranium" (Oct. 5, 2004)
59	"DOE to Sell Up to 17.4 MT of HEU for Downblending," <u>Nuclear Fuel</u> , Vol. 29, No. 21 (Oct. 11, 2004), pp. 1-2
60	Combs, J., Ux Consulting, "Full Review: Enrichment – Facing New Challenges," <u>Nuclear Engineering International</u> , pp. 20-25 (Sept. 2004)
61	Neff, T., Massachusetts Institute of Technology, "Legacies Shaping the Future: Uranium Production, Inventories & Prices – 1947 – 2004," presented at the NEI International Uranium Fuel Seminar 2004
62	"Current Uranium Pricing Indicators (US\$/lb U3O8)," <u>Nuclear Fuel</u> , Vol. 30, No. 1 (Jan. 3, 2004), pp. 1-2 <i>and November 10, 2003 version</i>
63	Non-confidential excerpt from "Initial Implementing Contract for the Agreement Between the Government of the United States of America and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons" (between USEC and Techsnabexport Co. Ltd.) (Jan. 14, 2004)
64	Excerpt from the Environmental Report for the American Centrifuge Plant in Piketon, Ohio (Revision 0), NRC Docket No. 70-7004, United States Enrichment Corporation (Aug. 2004), pp. 1-10, 2-2
65	<b>PROPRIETARY</b> Executed Uranium Enrichment Services Contract between LES and Utility #1 (provided under separate cover)
66	<b>PROPRIETARY</b> Executed Uranium Enrichment Services Contract between LES and Utility #2 (provided under separate cover)