U.S. NUCLEAR REGULATORY COMMISSION

REPORT TO CONGRESS

ON THE HEALTH, SAFETY,

AND ENVIRONMENTAL CONDITIONS AT THE

GASEOUS DIFFUSION PLANTS

LOCATED NEAR

PADUCAH, KENTUCKY,

AND PORTSMOUTH, OHIO

October 1, 2003, to September 30, 2008

EXECUTIVE SUMMARY

This report is provided to Congress as required by Section 1701 of the Atomic Energy Act (AEA). This is the fourth report issued on the health, safety, and environmental condition of the gaseous diffusion uranium enrichment plants near Paducah, Kentucky, and Portsmouth, Ohio. It covers the 5-year period from October 1, 2003, to September 30, 2008. The information reported herein is current as of September 30, 2008, unless otherwise specified. As directed by the AEA, the staff of the U.S. Nuclear Regulatory Commission (NRC) consulted with the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) in preparing this report. DOE continues to be responsible for regulatory oversight of portions of both plants and the oversight of other nonenrichment activities in nonleased portions of both sites.

The Federal Reports Elimination Act of 1998 amended Section 1701 of the AEA to decrease the frequency of this report to Congress on the status of health, safety, and environmental conditions at the gaseous diffusion plants (GDPs) from annually to a report required not later than the date on which a certificate of compliance is issued by the NRC. Certificates for each of the GDPs must be applied for at least every 5 years. The current certificates were issued December 29, 2003, and expire December 31, 2008. The NRC intends to issue renewed certificates, with an expiration date of December 31, 2013, following issuance of this report.

During this reporting period, the United States Enrichment Corporation (USEC), as a privatized entity, generally met NRC regulatory requirements. The Paducah and Portsmouth GDPs have continued to provide adequate protection of public health, safety, safeguards, security, and the environment. Offsite radiological doses, as well as doses to the workers, are very low, and well within regulatory limits. In the last 5 years, there have been no significant events requiring activation of the emergency operations center (EOC) at Portsmouth GDP. Paducah GDP had not activated the EOC in the past 5 years until recently. On September 14, 2008, the EOC was activated for an Unclassified Emergency in accordance with plant procedures at the Paducah GDP. The Unclassified Emergency was a result of high winds and storms that came through west Kentucky that weekend and caused some damage to site structures. There were no radiological impacts. No events have resulted in a significant release of radioactive material at either site. The NRC conducted licensee performance reviews at Paducah in 2007 and at Portsmouth in 2008 and in both cases concluded that their performance was acceptable.

In May 2001, USEC terminated enrichment operations at the Portsmouth GDP. During this reporting period, Portsmouth transitioned from a cold standby to a cold shutdown condition. However, the transfer facility at Portsmouth continues to be used for the processing of out-of-specification uranium hexafluoride (UF_6),[1] and limited decommissioning activities also continue. DOE plans to begin major decommissioning activities during the next renewal period. A number of the currently leased buildings will transition back to DOE for decontamination and decommissioning.

[1] Out-of-specification UF_6 is material that contains technetium and other contaminants.

Although USEC has terminated enrichment operations at Portsmouth, it continues development of its replacement technology involving gas centrifuges. The prototype for this technology is the Lead Cascade. The purpose of the Lead Cascade is to test and evaluate centrifuge enrichment technology for commercial use. During this period, USEC was granted a license and has begun construction on a full-scale gas centrifuge uranium enrichment plant known as the American Centrifuge Plant.

The Paducah GDP remains a leading supplier of uranium fuel for the commercial nuclear power plants and the only currently operating enrichment facility within the United States. USEC is the U.S. executive agent for the Megatons to Megawatts nuclear nonproliferation program, which implements the 1993 agreement between the United States and the Russian Federation. During 2007–2008, the Paducah GDP operated at 2000 megawatts, the highest power level in over 20 years and had the largest ever number of cells on line (over 166).

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CHAPTER 1

BACKGROUND

ENERGY POLICY ACT

In October 1992, Congress enacted the Energy Policy Act (EPAct) of 1992, which amended the Atomic Energy Act of 1954 (AEA), to create the United States Enrichment Corporation (USEC).[2] Provisions of the AEA direct the U.S. Department of Energy (DOE) to lease the gaseous diffusion plants (GDPs) near Paducah, Kentucky, and Portsmouth, Ohio, to USEC. These GDPs produce enriched uranium. Although the AEA established USEC as a Government corporation, the AEA also required that within 2 years after the transition date of July 1, 1993, USEC prepare a plan for transferring ownership of USEC to private investors. On July 28, 1998, USEC was privatized through an initial public offering. In the *Lease Agreement Between The United States Department of Energy and The United States Enrichment Corporation* (hereafter referred to as the Lease) dated July 1, 1993, and in other subsequent agreements, DOE and USEC established the roles and responsibilities for each organization at both GDPs. The AEA also requires the U.S. Nuclear Regulatory Commission (NRC) to report to Congress on the status of health, safety, and environmental conditions at the GDPs. The Federal Reports Elimination Act of 1998 (Public Law 105-363) was signed into law in November 1998. This bill amended Section 1701(b)(1) of the AEA to require the NRC to report to Congress "not later than the date on which a certificate of compliance is issued" instead of "at least annually." This is the fourth such report. It encompasses the 5-year period from October 1, 2003, through September 30, 2008, unless otherwise stated.

The AEA assigns safety, safeguards, and security regulatory responsibility at the USEC-operated GDPs to the NRC. Further, the AEA requires that within 2 years of the date of the passage of the EPAct, the NRC establish, by regulation, both (1) safety, safeguards, and security standards for the GDPs and (2) a certification process to ensure that USEC complies with these standards. This certification process is in lieu of any requirement for a license. Thus, the AEA made the NRC regulation of the GDPs conditional on the issuance of new regulations, which were to be promulgated by October 1994. In accordance with these requirements, the NRC promulgated Title 10, Part 76, "Certification of Gaseous Diffusion Plants," of the *Code of Federal Regulations* (10 CFR Part 76) in September 1994.

The EPAct changes to the AEA provided for the possibility that USEC might not initially be able to comply with the safety, safeguards, and security standards established by the NRC. To address this contingency, the AEA permitted the NRC to approve continued USEC operation of the GDPs if the NRC approved DOE-prepared plans for bringing the GDPs into compliance with any unsatisfied provisions of the DOE regulations. On November 26, 1996, the NRC issued certificates of compliance certifying USEC's operation of the GDPs in accordance with 10 CFR Part 76 and approved a compliance plan for each GDP for achieving compliance with the NRC regulations for those areas not in full compliance. After an interim period allowing for USEC to transition to the NRC regulation in an orderly manner, the NRC began regulatory oversight of USEC operations on March 3, 1997. The NRC has continued regulatory oversight of USEC operation of the GDPs for the entire period covered by this report. In fall 2003, all compliance plan issues associated with the initial certification were completed.

[2] A listing of abbreviations and acronyms can be found in Appendix A.

NRC/DOE INTERFACE AND RESPONSIBILITIES

The AEA does not require that DOE lease the entire GDP sites to USEC. For example, those areas containing legacy material from operations under DOE that are not required to support current enrichment activities, and those areas containing significant quantities of accessible highly enriched uranium (HEU) (i.e., uranium that is enriched to 20 percent or more in uranium-235) are excluded from the Lease. Consequently, DOE retains responsibility for the environmental protection, safety, safeguards, and security for those portions of the GDP sites that are not leased to USEC and for those portions of the GDPs leased to USEC that contain HEU material. At the Portsmouth GDP, DOE regulates the HEU material activities occurring in the leased areas until (1) all the HEU material is down-blended into the low-enriched uranium (LEU) cascade, (2) all cylinders that contained residual HEU material were cleaned, (3) all remaining HEU in those areas was transferred elsewhere, and (4) the associated areas were transitioned to NRC regulation. These activities were completed in October 2000; however, DOE still retains responsibility for as-found HEU. As part of the cold shutdown activities, DOE has recently contracted with USEC to remove residual deposits of HEU material from the X-326 Process Building. This is material that is held up in installed, but shutdown, cells and equipment. The uranium hexafluoride (UF_6) and treatment gases will then be bled back to the operating cascade, where there is near instantaneous blend down to LEU. This LEU material then flows through the normal process, where it will be recovered.

DOE regulatory oversight continues only for those areas within the GDP sites that are not leased to USEC. An exception to this is the Federal arming and arrest authority the security forces exercise at both GDPs, which DOE provides and regulates. The AEA further assigns responsibility to DOE for the payment of any costs of decontamination and decommissioning, response actions, or corrective actions that are related to conditions existing before USEC leased the GDPs. Decommissioning activities ongoing at the Portsmouth plant require a significant commitment by DOE. It is estimated that it may take 35 years or more to decommission 10 million square feet (ft^2) of floor space and complete the remediation of contaminated soils and ground water. The project will require an annual average employment of 1,000 workers. With this assignment, DOE retains responsibility for environmental restoration activities and legacy[3] waste management at the GDP sites and for the operation of facilities used for the storage of DOE-owned special nuclear and source material, such as the cylinder storage yards that contain depleted UF_6 generated before July 1993, and surplus uranium material in interim storage at the Portsmouth GDP.

In December 1993, the NRC and DOE approved a “Joint Statement of Understanding between the Nuclear Regulatory Commission and the Department of Energy on Implementing the Energy Policy Act Provisions on the Regulation of Gaseous Diffusion Uranium Enrichment Plants.” This joint statement established the areas of responsibility between the NRC and DOE. In August 1994, the NRC and DOE approved an “Agreement Establishing Guidance for the NRC Inspection Activities at the Paducah and Portsmouth Gaseous Diffusion Plants between Department of Energy Regulatory Oversight Manager and Nuclear Regulatory Commission.” This agreement supplemented the joint statement by defining in more detail the role of the NRC observers at the GDPs in the interim period during which DOE exercised public health and safety and common defense and security regulatory oversight of the leased GDPs. In March 1995, the NRC and DOE established the “Agreement Defining Security Responsibilities at

[3] The term “legacy” refers to items that are a carryover from the period before DOE leased the facilities to USEC (e.g., legacy waste and legacy equipment).

the Paducah and Portsmouth Gaseous Diffusion Plants between the Department of Energy's Office of Safeguards and Security and the Nuclear Regulatory Commission." This agreement also supplements the joint statement by defining in greater detail the security roles and responsibilities of DOE and the NRC after NRC assumption of regulatory oversight of USEC activities.

In October 1994, the NRC and DOE signed an agreement providing for the conduct of inspection activities at the GDPs. It defined the way DOE and the NRC would cooperate to facilitate obtaining information and knowledge regarding the GDPs and USEC's operation thereof, through routine and special inspection activities, during the interim before the NRC took regulatory control of the facility.

In October 1997, the NRC and DOE signed a memorandum of understanding (MOU) entitled "Memorandum of Understanding between the Department of Energy and the Nuclear Regulatory Commission—Cooperation Regarding the Gaseous Diffusion Plants." This MOU defines the responsibilities of DOE and the NRC regarding continuing cooperation at the GDPs after NRC assumption of regulatory oversight for USEC activities. The MOU also clarifies the framework for coordination regarding issues that may involve DOE and NRC areas of responsibility. In addition to the recognition of these continuing DOE responsibilities, DOE and the NRC (1) agreed to exchange information and technical support, (2) defined responsibilities for emergency response, and (3) agreed that the manner in which issues identified during an inspection by either agency would be resolved would be the August 1994 "Agreement Establishing Guidance for NRC Inspection Activities at the Paducah and Portsmouth Gaseous Diffusion Plants Between Department of Energy Regulatory Oversight Manager and Nuclear Regulatory Commission."

In January 2001, the NRC and DOE signed a joint procedure (JP) entitled "Response to Emergencies in the Leased Areas at the Gaseous Diffusion Plants." The JP provides that the NRC would be the lead Federal agency (LFA) for responding to emergencies in areas leased to USEC, unless it were later determined that DOE or another agency should be the LFA. The JP also provides for continuous exchange of information between DOE and the NRC concerning emergencies and for coordination of any response actions.

In 2004, DOE and the NRC entered into an MOU pertaining to the USEC Inc. Lead Cascade facility, leased from DOE at its GDP site near Portsmouth, Ohio. The purpose of the Lead Cascade is to test and evaluate centrifuge enrichment technology for commercial use. The purpose of the MOU was to delineate the respective roles and responsibilities of DOE and the NRC in the transition of regulatory oversight of the Lead Cascade and its facilities, to ensure adequate oversight, and to avoid dual regulation. Also in 2004, USEC Inc. notified the NRC that it intended to construct and operate a commercial enrichment facility at the GDP site, to be known as the American Centrifuge Plant (ACP). On April 13, 2007, DOE and the NRC entered into an MOU addressing the ACP, for the same general purposes as the earlier MOU for the Lead Cascade. Under this MOU, the NRC is solely responsible for activities that affect the safe operation of the ACP for compliance with NRC requirements. DOE retains responsibility for granting access to certain data related to the technology, as well as for DOE information security requirements that exceed or are not addressed by NRC security requirements. In addition, DOE continues to be solely responsible for, among other things, Export Controlled Information, personnel access authorization programs, and Foreign Ownership, Control, or Influence review for ACP activities.

In December 2007, DOE and USEC formally agreed to “Supplemental Agreement Number 1 to the Lease Agreement between the United States Department of Energy and the United States Enrichment Corporation.” This supplemental agreement allows for the long-term leasing of the gas centrifuge enrichment plant (GCEP) facilities.

Through these aforementioned agreements, statements, formal MOUs, and other cooperative NRC/DOE efforts, the agencies have continued to coordinate activities of interest to both DOE and the NRC.

CHAPTER 2

GASEOUS DIFFUSION PLANT OPERATIONS

The principal process that the NRC regulates at the GDPs is the production of enriched uranium (EU) for reactor fuel. The GDPs receive UF_6, enrich it (i.e., process the material to increase the concentration of fissionable uranium-235 (^{235}U)), and then ship the enriched UF_6 to other fuel cycle facilities, where it is processed into fuel assemblies for use in nuclear power reactors. In the gaseous diffusion separation process, UF_6 gas passes through a material (barrier) with small pores that are large enough to permit the transfer or diffusion of single molecules but are too small to permit bulk flow of the gas. The gas that emerges from the pores has a slightly higher concentration of ^{235}U atoms than the gas that does not pass through the barrier. This process creates two streams of gas, one with a higher ^{235}U concentration (enriched) and one with a lower concentration (depleted). Because the degree of enrichment achieved by the use of a single barrier (i.e., a single diffusion stage) is very small, the process must be repeated many times, employing a cascade of many stages to achieve the required enrichment levels. The outputs of the cascade are EU product and depleted uranium (DU). The DU is stored at the GDPs, awaiting ultimate disposition. As of the writing of this report, the Paducah GDP continues to enrich uranium.

The main components of a GDP are (1) large cylindrical vessels called diffusers that contain the barrier, (2) compressors used to compress the gas to the pressures needed to flow through the barrier tubes and from one stage to another, (3) electric motors to drive the compressors, heat exchangers, and cooling systems for removing the heat of compression from the UF_6, (4) piping for the stage and interstage connections, and (5) block and control valves to adjust and direct the gas flow. In addition to this process stage equipment, GDPs require (1) auxiliary systems such as the UF_6 feed and withdrawal systems, (2) an extensive electrical power distribution system, and (3) cooling towers to dissipate the waste process heat.

The major areas of NRC oversight at the GDPs include (1) plant operations, (2) nuclear criticality safety, (3) physical protection, (4) security of classified information, (5) material control and accounting (MC&A), (6) radiological controls for onsite and offsite personnel, (7) waste management, (8) transportation of radiological materials, (9) maintenance and surveillance, (10) training, and (11) emergency preparedness. The NRC is responsible for (1) regulatory oversight of the design, operation, and maintenance of hardware (i.e., structures, systems, and components) relied on for safe operation, (2) operational aspects involving the human element, such as training, staffing, and adherence to procedures, and (3) management organization and controls necessary to ensure effective management oversight of facility operations. Management organization and controls include (1) policies and procedures, (2) internal reviews and audits, (3) safety review committees, (4) configuration management, (5) records management, (6) event investigation and reporting, and (7) quality assurance programs. The NRC also reviews and approves accident analyses and technical safety requirements (TSRs) developed by USEC. The accident analyses describe potential credible accidents and the facility response to those accidents to demonstrate that the facility is capable of responding in a fashion that will not jeopardize public health and safety. The TSRs define the safety envelope and operating parameters within which the facility is required to operate for safety.

The NRC ensures safe operations through issuance of a certificate of compliance amendments after a thorough review of design and operational information and by field inspections conducted by specialists from both the NRC Headquarters and NRC Region II. In addition, two NRC resident inspectors are located at the Paducah GDP. Because of decreased activity at the Portsmouth GDP, the NRC reduced the number of resident inspectors at the Portsmouth site from two to one in July 2002, and as of September 30, 2003, the NRC no longer maintains a resident inspector at the Portsmouth site. The resident inspectors (at Paducah) perform daily inspections covering a broad range of site activities.

The GDP Lease agreement between USEC and DOE was renewed, at the request of USEC, on June 23, 2008. The Lease covers both the Portsmouth and Paducah GDPs, extends the lease for a period of 8 years, and expires (unless extended) on July 1, 2014.

ACTIVITIES ONGOING AT PORTSMOUTH DURING COLD SHUTDOWN

USEC ended the Portsmouth LEU enrichment operations in 2001. At that time, equipment sufficient to allow for a stand-alone enrichment capacity of 3 million separative work units (SWUs) per year was placed in a "cold standby" activity condition. "Cold standby" is defined as a process condition such that the 3 million SWU enrichment capacities could be reestablished in approximately 18 months. USEC phased out shipment and transfer operations of enriched UF_6 at the Portsmouth GDP in June 2002. However, in 2006, DOE directed USEC to transition from a cold standby to a cold shutdown condition with the ultimate goal being to place associated cold standby equipment in a more permanent shutdown condition and to cease performing the surveillance and maintenance activities that were previously required. The transition from cold standby to cold shutdown primarily affects only the X-330 and X-333 process facilities.

At the conclusion of the transition to cold shutdown, gaseous UF_6 will have been removed from the cascade process equipment to a UF_6 "negative" level, the recirculating cooling water and lube oil will have been drained and isolated from the equipment, and the equipment buffered with plant dry air. In addition, USEC will reduce all solid uranium deposits to quantities below an individually always-safe mass.

This process condition does not require continuous or frequent routine monitoring because of its passive condition. The primary process-support systems (seal exhaust, cold recovery, wet air evacuation, freezer sublimers, booster stations, and process piping systems) will also have been shut down and evacuated of gaseous UF_6. The only remaining systems important to safety that will continue to be operable will be the criticality accident alarm system and the high-pressure fire water system.

The shipment and transfer facility at the Portsmouth GDP continues to be used for cleanup of out-of-specification UF_6. The shipment and transfer operations for enriched UF_6 formerly conducted at the Portsmouth GDP were transferred to the Paducah GDP, which began producing EU at an assay of up to 5.5 weight percent (wt %) ^{235}U. In May 2002, the Paducah GDP shipped its first product cylinder directly to a customer. At this time, the Paducah GDP continues to operate independently of the Portsmouth GDP. Even though GDP activities are slowing, USEC still employs approximately 1,100 employees at the Portsmouth site.

Although the Portsmouth facility is in cold shutdown, there are a significant number of operational activities either ongoing or just completed. These include the following:

- Greater-than-safe-mass uranium deposit removal—Final greater-than-safe-mass deposit removal was completed in 2007.

- Caretaker monitoring (nondestructive analysis monitoring)—Biennial monitoring of 158 cells that were used to process high-assay uranium is performed to ensure that no migration or accumulation of any residual high-assay uranium occurs (i.e., to identify any potential changes in conditions).

- Feed cleanup activities (technetium removal)—Technetium removal is performed for out-of-specification DOE cylinders for reuse by the nuclear industry; 15,067 metric tons have been cleaned as of September 30, 2008.

- Upcoming processing of DOE-owned out-of-specification material for ultimate reuse—An additional number of DOE-owned cylinders containing out-of-specification material has been identified for processing and material reuse.

- Lube oil (polychlorinated biphenyl (PCB)) removal—Process lubrication oil and electrical transformer oil have been removed from process equipment; both oils contain PCBs.

- Transfer of facilities to DOE for environmental cleanup—Ongoing facility transfers to DOE will continue for several years. During the current decontamination and decommissioning, 16 facilities have been demolished.

- Installation of dry-pipe sprinkler systems—The fire-suppression system in the X-333 Facility has been converted from wet to dry; the X-330 system was completed by September 30, 2008.

- X-533 Switchyard Deactivation—This deactivation will permit the deenergizing of the X-533 Switchyard, ultimate removal of Ohio Valley Electric Corporation and American Electric Power transmission lines, and the complete shutdown of the switchyard.

- Continued long-term low-temperature (LTLT) recovery of process system uranium inventory in the X-330 Facility.

- X-326 HEU Deposit Removal—Portsmouth has recently received NRC approval to use LTLT treatments to initiate controlled in-system down-blending of HEU deposits to recover uranium at assays of 4.95 percent or lower. Construction activities are complete, and treatments have commenced.

- Surveillance and maintenance of site facilities—Continued daily facility support and maintenance activities are performed as needed for required site facilities.

- Maintenance of site infrastructure and provision of support services (water, power, sewage, fire protection, emergency response, etc.).

- Services are provided to the ACP (infrastructure, laboratory, security, and support testing).

ACTIVITIES ONGOING AT PADUCAH

The Paducah plant continues to be a leading supplier of EU fuel for the commercial nuclear power industry. The Paducah plant is currently producing approximately 6 million SWUs annually. When the material from the Megatons to Megawatts (described below) is included, USEC has approximately 29 percent of the worldwide market share. The plant is operating at the highest power level it has in decades (2,000 megawatts) and in combination with the highest number of production cells on-line, it set an all-time monthly production record in December 2007. USEC employs approximately 1,200 personnel at Paducah.

Paducah continues to participate in the commercially financed Government-industry partnership in which bomb-grade uranium from dismantled Russian nuclear warheads is being processed into LEU to produce fuel for American nuclear power plants. As of June 30, 2008, 337 metric tons of bomb-grade HEU has been down-blended into 9,800 metric tons of LEU. According to USEC, this is equivalent to 13,497 nuclear warheads eliminated. This program now supplies the reactor fuel used to generate approximately 10 percent of U.S. electricity.

CHAPTER 3

STATUS OF COMPLIANCE PLAN ACTIVITIES

The Atomic Energy Act permitted the NRC to authorize operation of the GDPs in cases where the plants do not fully comply with NRC regulations, provided that DOE prepares and NRC approves a plan (i.e., a compliance plan) for bringing the plants into compliance. In November 1996, the NRC approved compliance plans for each plant.

As documented in the 2003 report to Congress, USEC had completed all actions required by the compliance plans as of September 2003. The completion was confirmed by NRC inspection, and the issues were closed.

CHAPTER 4

HEALTH, SAFETY, AND ENVIRONMENTAL STATUS

The NRC has responsibility to ensure that the health and safety of the public and the workers at the GDPs are protected from hazards involving radioactive material and radiation. NRC regulation 10 CFR 76.60, "Regulatory Requirements Which Apply," requires USEC to comply with applicable sections of 10 CFR Part 20, "Standards for Protection Against Radiation." Health, safety, and environmental (HS&E) conditions are reflected in radiation doses received by workers and in radioactive effluents. This chapter contains information relating to the HS&E conditions for the leased areas of the GDPs under NRC regulatory oversight. DOE was contacted in the preparation of this report, and the input from DOE is included as Appendix B.

Both the Paducah and Portsmouth GDPs monitor air and water emissions to the environment and maintain environmental dosimeters to monitor gamma radiation levels both on and off site. The most recent data from the environmental dosimeters show that ambient gamma exposure levels at the site boundaries for both Paducah and Portsmouth are very small and well within regulatory limits. Maximum annual doses to the nearest offsite individuals from exposure to radioactive effluents from USEC operations (DOE operations are discussed below), for calendar years (CYs) 2003 through 2007, are calculated to be no more than 3.5×10^{-4} millisievert (mSv) [(0.035 millirem (mrem)] at Paducah and 3.3×10^{-4} mSv (0.033 mrem) at Portsmouth. These values are far below the NRC regulatory limit of 1 mSv/year (100 mrem/year) for members of the public, as specified in 10 CFR Part 20. Table 4-1 provides the maximum offsite individual doses for CYs 2003 through 2007 for Paducah and Portsmouth.

Table 4-1
Maximum Offsite Individual Dose, Paducah and Portsmouth, 2003–2007

Calendar Year	Paducah Maximum Offsite Dose, mSv/yr (mrem/yr)[a] Airborne Emissions	Portsmouth Maximum Offsite Dose, mSv/yr (mrem/yr) Airborne Emissions
2003	3.5×10^{-4} (0.035)	3.3×10^{-4} (0.033)
2004	1.7×10^{-4} (0.017)	2.5×10^{-4} (0.025)
2005	2.2×10^{-4} (0.022)	2.9×10^{-5} (0.0029)
2006	1.2×10^{-4} (0.012)	4.5×10^{-5} (0.0045)
2007	9.1×10^{-5} (0.009)	3.4×10^{-5} (0.0034)

[a] Sv—Sievert; rem—röentgen equivalent man

Exposure to the public is not limited to USEC operations. DOE also continues to conduct operations at both Paducah and Portsmouth. Table 4-2 shows the maximum collective doses from all plant effluents (covering both USEC and DOE operations), to the population, within an 80-kilometer (km) (50-mile (mi)) radius, for both Paducah and Portsmouth, for CYs 2003–2007. These exposures are also very low.

Table 4-2
Collective 80-km (50-mi) Population Doses, Paducah and Portsmouth, 2003–2007

Calendar Year	Paducah Collective 80-km (50-mi) Population Dose, person-Sv (person-rem)	Portsmouth Collective 80-km (50-mi) Population Dose, person-Sv (person-rem)
2003	2.0×10^{-3} (0.2)	1.8×10^{-3} (0.18)
2004	9.0×10^{-4} (0.09)	1.4×10^{-3} (0.14)
2005	9.0×10^{-4} (0.09)	1.3×10^{-4} (0.013)
2006	6.0×10^{-4} (0.06)	1.4×10^{-3} (0.14)
2007	6.0×10^{-4} (0.06)	7.7×10^{-4} (0.077)

Both the maximum individual and collective population doses have been very low, and the major variation is attributable to the two dominating effects of nonroutine releases and the conservative manner in which these releases are estimated.

Collective occupational and maximum individual occupational radiation dose for both plants for CYs 2003–2007 are provided in Table 4-3.

Table 4-3
Collective and Maximum Individual Occupational Dose,
Paducah and Portsmouth, 2003–2007

Calendar Year	Paducah		Portsmouth	
	Collective Occupational Dose, person-Sv (person-rem)	Maximum Individual Occupational Dose, mSv (mrem)	Collective Occupational Dose, person-Sv (person-rem)	Maximum Individual Occupational Dose mSv (mrem)
2003	1.1×10^{-1} (11.21)	3.68×10^{-3} (.368)	1.7×10^{-1} (17.60)	4.96×10^{-3} (0.496)
2004	8.8×10^{-2} (8.816)	2.76×10^{-3} (.276)	1.3×10^{-1} (13.559)	4.16×10^{-3} (0.416)
2005	7.1×10^{-2} (7.140)	3.27×10^{-3} (.327)	1.4×10^{-1} (14.320)	3.70×10^{-3} (0.370)
2006	8.7×10^{-2} (8.772)	3.74×10^{-3} (.374)	1.4×10^{-1} (14.063)	4.03×10^{-3} (0.403)
2007	8.6×10^{-2} (8.687)	3.52×10^{-3} (.352)	1.3×10^{-1} (13.515)	4.31×10^{-3} (0.431)

Since the end of the last reporting period, the collective occupational dose at Portsmouth has decreased from 17.6 person-rem in 2003 to 13.5 person-rem in 2007, primarily as a result of the as low as reasonably achievable (ALARA) initiatives associated with the Contaminated Feed Cleanup Project. In July 2002, USEC began the Contaminated Feed Cleanup Project at the X-344 building. Because of the nature of this project, higher than normal dose rates were encountered for certain work groups, including uranium material handlers, chemical operators, maintenance, and health physics/industrial health personnel. Since the inception of the cleanup program, product flow increased from approximately 18,144 kilograms (kg) (40,000 pounds (lb)) *per week* to 18,144kg (40,000 lb) *per day*. The higher dose rates are attributed to the large amount of contaminated material being removed from the product which concentrates in the traps. This buildup of uranium and thorium daughters increases the dose levels. Shielding and other ALARA principles were introduced, which has helped to lower the collective occupational dose since the inception of the project. However, because of the nature of this work, dose rates have been higher than expected.

The data indicate that, for these years, individual worker exposure has not exceeded 5 mSv (500 mrem), which is the administrative control level the plants use. These values are within the historical ranges for the sites and well within the NRC regulatory limit of 50 mSv/year (5000 mrem/year) specified in 10 CFR Part 20 for workers. There were no instances where the 10 CFR Part 20 individual limits for workers, including the 10 milligrams (0.000353 ounce) intake of soluble uranium per week, were exceeded.

During the period from 2003 to 2008, safety improvements made at Portsmouth GDP included the following:

- USEC clothing contamination and personnel contamination events have trended downward. More significantly, personnel contamination events were reduced to zero during 2007, and only one has been recorded thus far in 2008.

- USEC has reduced contaminated areas at Portsmouth by over 196,000 ft^2.

- USEC's Portsmouth ALARA Program has been successful in reducing the amount of total dose received by workers by over 50 percent per cylinder transfer operation, and the received dose has successively decreased in each of the past 5 years.

During the period from 2003 to 2008, safety improvements made at Paducah GDP included the following:

- USEC Radiation Work Permit violations continued to trend downward due to improved radiological worker ownership and programmatic enforcement by line management through both walk-around and self-assessments.

- USEC continues to successfully minimize the spread of contamination and occupational uptake through the use of engineered controls such as negative ventilation and containment systems.

CHAPTER 5

CERTIFICATION ACTIVITIES

The regulation in 10 CFR 76.45, “Application for Amendment of Certificate,” describes the process for amending the certificates to cover new or modified activities.

AMENDMENTS TO THE PORTSMOUTH CERTIFICATE

During the past 5 years, USEC has requested and was granted nine amendments to its certificate of compliance. The majority of the requests were administrative in nature but were required because they modified a licensing document such as a TSR. Many of the amendment requests involved either the processing of out-of-specification materials or new processes not previously described in the certification documents.

AMENDMENTS TO THE PADUCAH CERTIFICATE

During the past 5 years, USEC has requested and was granted 12 amendments to its certificate of compliance. Most of the requests were administrative in nature but were required because they modified a licensing document such as a TSR. One amendment was required when USEC requested authorization to operate Paducah GDP at the top level of its power range. During this period, some parts of the Paducah GDP that had been operating at subatmospheric pressure would be pressurized and, therefore, safety equipment required for above-atmospheric operations needed to be installed.

INTERIM COMPENSATORY MEASURES

On June 17, 2002, in response to the terrorist attacks of September 11, 2001, and the intelligence information subsequently obtained, the NRC issued orders to USEC that modified its current certificates of compliance to impose certain interim safeguards and security measures. USEC has implemented all these compensatory measures for both GDPs, and the NRC has confirmed their implementation by inspection. Since the original orders were issued, the measures have been modified several times. Several changes were made at the request of USEC, because of changing conditions, and several were requested by the NRC staff. However, each modification was reviewed to ensure that both the capability and readiness of the GDPs to respond to a threat were maintained and enhanced. The NRC continues to inspect and ensure that Portsmouth and Paducah GDPs maintain security and safeguards of both their facilities and personnel.

NEW ORDERS ISSUED IN THE PAST 5 YEARS

NRC Order EA-04-191, dated November 5, 2004, requires that the GDP plants protect safeguards information categorized as Safeguards Information Modified Handling (SGI-M).

NRC Order EA-04-123, dated January 27, 2005, is a confirmatory order that applied only to Paducah and was issued to address specific commitments made by USEC associated with employee protection training. The Order was discussed during an alternative dispute resolution session and, subject to satisfactory completion of the commitments, the NRC did not pursue further enforcement action on this issue.

NRC Order EA-07-087, dated April 30, 2007, imposes fingerprinting and criminal history records check requirements.

RECERTIFICATION

USEC submitted its applications for renewal to NRC on April 10, 2008. USEC states that the renewal application(s) relies on existing documentation. Therefore, as required by 10 CFR 76.36, "Renewals," which covers the renewal of the certificates for the GDPs, the staff has reviewed USEC's initial applications, as revised to reflect authorized USEC self-approved changes and NRC-approved amendments. USEC has incorporated by reference previous applications, statements, and reports into the renewal application. USEC did not request any changes to the application within the renewal request.

The NRC staff's review focused on the following elements of 10 CFR 76.36:

(i) Any proposed changes in the existing certificate of compliance conditions or technical safety requirements;
(ii) Any proposed changes to the documents submitted with the previous application in accordance with 10 CFR 76.35;
(iii) Any changes which the Corporation has made without prior NRC approval pursuant to 10 CFR 76.68; and,
(iv) Any changes to certificate conditions or technical safety requirements for which the Corporation has sought and received Commission approval pursuant to 10 CFR 76.45.

The NRC staff has completed its review of USEC's applications, considered public comments received, and consulted with EPA and DOE as required. The NRC staff has prepared compliance evaluation reports (CERs) for both Paducah and Portsmouth and concluded that the applications fulfill the requirements of 10 CFR Part 76 and should be approved. The renewed certificates of compliance will be issued for a period of 5 years, ending on December 31, 2013, following the issuance of this report.

CHAPTER 6

INSPECTIONS

Subparts F and G of 10 CFR Part 76, 10 CFR 76.70, 10 CFR 76.72, 10 CFR Part 95, and 10 CFR Part 2 address NRC inspections of the GDPs, violations of NRC regulations, and civil penalties. These regulations implement NRC authority to take enforcement action for violations of the AEA, NRC regulations, or conditions of a certificate, compliance plan, or Order. Further, these regulations state that the NRC may impose civil penalties for certain violations of NRC regulations.

Violations identified during NRC regulations inspections are classified into one of four severity levels, with Severity Level I assigned to the most significant violations, and Severity Level IV being assigned to the least significant. Additionally, there are violations characterized as "noncited" violations (NCVs) which are identified and promptly corrected by the licensee. They are considered nonrecurring Severity Level IV violations, corrected without NRC involvement, and not subject to formal enforcement action. Finally, there are other violations of minor safety or environmental significance that are below Severity Level IV. These violations must meet certain criteria and are not subjected to formal enforcement action. More information about the NRC's enforcement policy is provided on the NRC web site at www.nrc.gov/about-nrc/regulatory/enforcement.html.

During the 5-year reporting period from October 1, 2003, to September 30, 2008, the NRC performed a total of 80 inspections, at Paducah and Portsmouth, totaling 11,820.5 inspection-hours. These inspections included the activities of two resident inspectors at Paducah and specialist inspections by inspectors from the NRC's Region II and the Headquarters offices. As listed in the table below, the number of inspections represents the number of inspection reports issued during the fiscal year (FY). For Paducah, each report describes the completion of multiple inspection procedures of various disciplines by the resident inspectors, regional inspectors, and/or Headquarters staff. For Portsmouth, each report describes the completion of multiple inspection procedures of various disciplines by regional inspectors and/or Headquarters staff. The number of inspections and the number of inspection hours are detailed in Table 6-1.

Table 6-1
Number of Inspections and Inspection-Hours Spent per FY

	Paducah		**Portsmouth**	
Fiscal Year	**Number of Inspections**	**Number of Inspection-Hours**	**Number of Inspections**	**Number of Inspection-Hours**
2004	11	2316.4	7	290.5
2005	10	2618.8	5	207.3
2006	8	2037.6	7	270.7
2007	10	2399.5	7	196.8
2008	8	1272.9	7	210
Total	**47**	**10645.2**	**33**	**1175.3**

These inspections were focused on the areas of (1) plant operations, (2) plant

maintenance, (3) plant support, (4) engineering, (5) fire safety, (6) chemical process safety, (7) nuclear criticality safety (NCS), (8) MC&A, (9) security of classified information, and (10) physical security. Three significant violations were identified as detailed below.

ESCALATED ENFORCEMENT VIOLATION AT PADUCAH

In 2006, a Severity Level III violation was issued to Paducah for failure to maintain a criticality monitoring alarm in an operable state.

ESCALATED ENFORCEMENT VIOLATIONS AT PORTSMOUTH

In 2004, two Severity Level III violations, with a $60,000 total civil penalty, were issued to Portsmouth for failure to control classified information. These violations stemmed from an incident involving the mailing of improperly marked and addressed classified information to the NRC and the discovery of an unmarked classified document in the unclassified computer Intranet system.

OTHER VIOLATIONS AT BOTH PADUCAH AND PORTSMOUTH

With the exception of the three violations detailed above, the non-escalated violations were in the areas of plant operations, criticality safety, security, maintenance and surveillance. Most violations involved procedural violations, for either implementing incorrect procedures or failing to follow procedures, and were either Severity Level IV violations or NCVs.

Table 6-2 illustrates the total number of violations in each FY covered by the reporting period. A brief description of the violations follows.

Table 6-2
Number of Violations Identified per FY 2003–2008

	Paducah	**Portsmouth**
FY	**Number of Violations**	**Number of Violations**
2004	10	4
2005	6	1
2006	5	0
2007	3	1
2008	2	0
Total	**26**	**6**

For the Paducah GDP, nine violations were identified in plant operations, three violations in the areas of maintenance and surveillance, six violations in the area of NCS, two in quality assurance, one in fire protection, one in an audit process, one in radiation protection and three in the area of security. The majority of the violations were procedural violations (e.g., plant personnel either failed to follow procedures or implemented incorrect procedures, there was a falsified security form, improper classification of documents, and individuals without proper security clearances).

For the Portsmouth GDP, six violations were identified in the areas of plant operations, security, radiation protection, and maintenance and surveillance activities. These violations were mostly procedural violations where plant personnel either failed to follow procedures or implemented incorrect procedures. There were three violations related to security, two of those were Severity Level III violations which were discussed above.

For these violations and all other ones identified during inspections, USEC took immediate corrective actions to bring the facility back into compliance with NRC regulations and implemented comprehensive corrective action plans to prevent recurrence.

CHAPTER 7

EVENT REPORTS

The regulation in 10 CFR 76.120, "Reporting Requirements," describes the requirements for reporting certain events to the NRC. The regulations specify events that must be reported to the NRC within three different time limits and describe the contents and schedule for submitting written follow-up reports. First, USEC is required to report any criticality event, loss of special nuclear material, or emergency conditions that have been declared an Alert or Site Area Emergency, to the NRC Operations Center, within 1 hour after discovery. Second, events that prevent immediate protective actions necessary to avoid releases or exposures to radiation or radioactive materials that could exceed regulatory limits must be reported to the NRC Operations Center within 4 hours after discovery. The third reporting requirement specifies that (1) certain contamination events, (2) failure of certain TSR-required safety equipment with no backup equipment available, (3) fires or explosions that damage radioactive material or containers holding radioactive material, and (4) events that require offsite medical treatment of a contaminated person must be reported to the NRC Operations Center within 24 hours. USEC reports losses and compromises or possible compromises of classified information or materials as required by 10 CFR 95.57, "Reports." Also, USEC reports any loss of contingency for NCS as required by NRC Bulletin 91-01, "Reporting Loss of Criticality Safety Controls," dated October 18, 1991. Although not required by 10 CFR Part 76, USEC reports safety system actuations and notifications made to other State and Federal agencies. DOE has a separate event reporting system for DOE-regulated operations, and DOE statistics are not included in this summary.

During 2003–2008, there has been a significant drop in reportable events. At Paducah GDP, the total number of reportable events dropped from 228 to 49 and at Portsmouth GDP from 228 to 6. This reduction is to the result of several factors. One important factor is the maturing of USEC's formal approach of its "Corrective Action Program and Engineering's System Health." This approach has focused USEC resources on improving the reliability of safety-related components/systems, which in turn reduces equipment failure. A summary of event reports for those that occurred between October 1, 2003, and September 30, 2008, is provided below.

EVENT NOTIFICATION SUMMARY FOR PADUCAH

Paducah reported a total of 62 events during this period. Of these, 13 events were either retracted by USEC as not meeting the reporting criteria or classified as primarily reportable to another Federal or State agency, rather than the NRC. Therefore, USEC reported a total of 49 NRC-reportable events to the NRC during the reporting period. The majority of these 49 events involved safety equipment failure and NCS issues. Table 7-1 illustrates the number of events reported per FY at the Paducah GDP for the 5-year period covered by this report.

Table 7-1
Number of Events Reported to NRC, per FY, at the Paducah GDP

FY	Number of Events Reportable to NRC
2004	16
2005	5
2006	5
2007	13
2008	10
Total	**49**

A total of 16 events were reported under NRC Bulletin 91-01, which requires reporting to the NRC any loss or degradation of NCS controls. For the majority of these events, the safety significance was minimal because of the maintenance of at least one of the two controls normally required.

There were also instances in which safety equipment required to be available and operable failed or was discovered to be not in a ready-to-use condition. Paducah reported 32 events of this kind, which were mainly related to autoclaves, UF_6 release-detection systems, and fire protection equipment failures. Autoclave-related events consisted of failures of autoclave subsystems. Events related to UF_6 release detection systems mainly consisted of detector head failures, control power loss, computer malfunction, or inadvertent actuations of the alarm system. There were also events reported for cases in which fire protection equipment was declared inoperable. These incidents were mainly caused by water leaks or potential frozen conditions from ambient temperatures.

USEC also made a notification under the provision of Section 1.6.4 of its TSR when a tornado warning required that the facility remove an in-place smoke watch stationed because of maintenance work. No release to the environment and no personnel contamination were reported in any of these events. No events at Paducah were declared as an Alert or Site Area Emergency, or required the activation of the Emergency Operations Center (EOC). On September 14, 2008, the EOC was activated for an Unclassified Emergency in accordance with plant procedures. The Unclassified Emergency was a result of high winds and storms that came through West Kentucky that weekend and caused some damage to site structures. There were no radiological impacts.

EVENT NOTIFICATION SUMMARY FOR PORTSMOUTH

During 2003–08, Portsmouth reported 13 events. Of these, seven events were either (1) retracted by USEC as not meeting the reporting criteria, or (2) classified as primarily reportable to another Federal or State agency, rather than the NRC. Therefore, USEC reported a total of six NRC-reportable events to the NRC during the reporting period. The majority of these events resulted from autoclave-related equipment failures. Table 7-2 illustrates the number of events reported per FY at the Portsmouth GDP for the 5-year period covered by this report.

Table 7-2
Number of Events Reported to NRC, per FY, at the Portsmouth GDP

FY	Number of Events Reportable to NRC
2004	1
2005	1
2006	1
2007	3
2008	0
Total	**6**

The NRC was notified of only one event under NRC Bulletin 91-01, which requires reporting to the NRC any loss or degradation of a single NCS control. The safety significance was minimal because of the maintenance of at least one of the two controls normally required, and no written report was required.

There were also instances in which safety equipment required to be available and operable failed or was discovered to be not in a ready-to-use condition. Portsmouth reported five events of this kind, all of which were related to autoclaves or autoclave safety features. There were no events at Portsmouth that were declared as an Alert or Site Area Emergency or required the activation of the EOC. In a few instances, Portsmouth GDP staffed the EOC to provide technical support in response to operational and/or security events that were not classified as emergencies.

CHAPTER 8

REGULATORY ACTIVITIES

RULEMAKING ACTIVITIES

There were no significant GDP rulemaking activities during this reporting period.

EMERGENCY PREPAREDNESS EXERCISES

Under the requirements of 10 CFR 76.91, "Emergency Planning," USEC must conduct biennial onsite exercises at both GDPs to test response to simulated emergencies. Participation of offsite response organizations, although recommended, is not required. In addition to the exercises, inspections of the emergency preparedness program at the GDPs are conducted annually. Several emergency preparedness exercises were conducted at both plants from October 1, 2003, to September 30, 2008, and the most recent are discussed below.

PORTSMOUTH EXERCISE

The NRC staff from the Region II office conducted an inspection of the most recent Portsmouth biennial emergency response exercise in November 2007. The inspection involved the observation and evaluation of the Portsmouth personnel performance. The goal of the exercise was to ensure that the scenario developed for this exercise was both challenging and provided a unique learning opportunity that adequately tested elements of the emergency response program. The NRC observed that command and control by the incident commander was adequate, and the emergency teams were well coordinated. The NRC staff observed that technical issues were properly identified, resolved in a timely manner, and that notifications and communications with offsite agencies were timely and effective. Overall, the Portsmouth response to the postulated accident was considered a successful demonstration, in that the emergency response program has been maintained in a state of operational readiness, and trained personnel who are familiar with procedures for implementing the emergency plan are available and capable of responding to an emergency.

PADUCAH EXERCISE

The NRC staff from the Region II office conducted an inspection of a Paducah biennial emergency response exercise in September 2008. This was a "full participation" exercise involving not only the NRC (both Headquarters and Region II) and USEC but also local, State, and Federal agencies with responsibilities at the Paducah GDP. The inspectors determined that the exercise objectives and scenario adequately and thoroughly exercised major elements of the emergency plan. The inspectors determined that the certificate holder's incident commander and other responding personnel performed in a manner that would have protected the public and workers' safety and resulted in timely mitigation of the simulated event; weaknesses identified from a previous exercise did not recur. However, a weakness was identified in the certificate holder's procedures to ensure that all site personnel were accounted for following a weather or similar emergency that requires plant personnel to be sheltered in place. Overall, Paducah's performance in responding to the postulated accident was considered a successful demonstration, in that the emergency response program has been maintained in a state of operational readiness and trained personnel who are familiar with procedures for implementing the emergency plan are available and capable of responding to an emergency.

NEW TECHNOLOGIES AT THE PORTSMOUTH SITE—GAS CENTRIFUGE ENRICHMENT TECHNOLOGY

Gas centrifuge technology involves the use of centrifugal forces to achieve the separation and subsequent extraction of uranium enriched in the ^{235}U isotope. Similar to the gaseous diffusion process, it employs the use of gaseous UF_6 feedstock. However, in this process, UF_6 gas is placed in a centrifuge machine, consisting of a large vertical rotating cylinder and piping to feed UF_6 and the withdrawal of enriched and depleted UF_6 streams. The cylinder is rotated at high speed to achieve separation of the heavier gas molecules (containing ^{238}U) and the lighter gas molecules (containing ^{235}U). Several hundred centrifuge machines may be connected in either a series or parallel arrangement to form a cascade to achieve the desired ^{235}U assay. It should be noted that this technology has been licensed under the provisions of 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."

On December 20, 2002, USEC Inc. signed a lease with DOE for use of centrifuge-related equipment and facilities owned by DOE for its former Gas Centrifuge Enrichment Program. USEC Inc. submitted its license application for the Lead Cascade facility on February 11, 2003. On January 27, 2004, the NRC staff issued a Notice containing its Finding of No Significant Impact and an announcement of availability of the environmental assessment, pursuant to its regulations implementing the National Environmental Policy Act. The staff issued its safety evaluation report for the Lead Cascade facility on January 28, 2004. The staff then issued USEC Inc. a material license (SNM-7003) on February 24, 2004, for the Lead Cascade demonstration facility.

In March 2004, the NRC and DOE entered into an MOU to foster cooperation between the two agencies regarding the USEC Lead Cascade facility and the ACP. On August 25, 2006, the NRC assumed regulatory oversight of the Lead Cascade facility from DOE, pursuant to the MOU.

On August 23, 2004, USEC submitted its license application for its commercial facility, to be known as the American Centrifuge Project or American Centrifuge Plant (ACP). In May 2006, after a period that included multiple public meetings and public review and comment of its draft environmental impact statement (EIS), the NRC staff completed its environmental review of the proposed ACP and issued its final EIS. On September 11, 2006, the staff completed its safety and security reviews of the proposed ACP and issued its safety evaluation report. In March 2007, the Atomic Safety and Licensing Board held its mandatory hearing and rendered its decision on April 13, 2007, authorizing the staff to issue a license for the ACP. The staff issued USEC its license on the same day.

USEC began construction on the ACP in May 2007 and is scheduled to begin plant operations in 2010. The ACP is anticipated to begin full operation by the end of 2012 and will provide approximately 3.8 million SWUs of enrichment.

CHAPTER 9

NRC CONSULTATION WITH EPA AND DOE

RESULTS OF DOE CONSULTATION

DOE no longer provides annual reports on the status of HS&E conditions at the Paducah and Portsmouth GDPs to support the preparation of this report. However, DOE did provide the material contained in Appendix B to this report, which summarizes DOE's activities at the GDPs between October 1, 2003 and September 30, 2008.

RESULTS OF EPA CONSULTATION

In a letter (Agencywide Documents Access and Management System (ADAMS) Accession No. ML082840196) dated September 15, 2008, EPA provided the following comments on the recertification request by USEC for the GDPs:

> For the Portsmouth GDP, our [EPA] data for the past 5 years indicates no formal enforcement actions and several informal actions under the Clean Water Act (CWA) and the Resource Conservation and Recovery Act (RCRA). The Portsmouth recertification package reports all of the CWA actions listed in EPA's databases as well as additional details. Five of the twelve RCRA actions reported in EPA's databases are listed in the compliance section of the recertification package. The seven missing actions are all state actions.
>
> Both facilities have several violations in CWA, CAA and RCRA. While some of the violations led to NOVs (mostly issued by the state), and one led to a non-penalty Administrative Order, none appear to be significant, unresolved or unaddressed at this time. Based on this review, and the clear evidence that the local regulators (Kentucky and Ohio), as well as EPA Regions 4 and 5, are regularly inspecting and citing the GDPs when they have discharges exceeding their permits, the EPA supports the GDPs recertification.

CHAPTER 10

SUMMARY ASSESSMENT OF PERFORMANCE

During the review period, the Paducah and Portsmouth GDPs have provided adequate protection of health and safety and the environment and have generally operated in compliance with NRC regulatory requirements. There were no radiation-related deaths or illnesses from the use of radioactive materials and no significant radiation exposures. At both plants, offsite radiological doses, as well as doses to the workers, remained very low and well within NRC regulatory limits. Neither facility incurred a loss or diversion of certified material, nor were there any nuclear criticality events. During the assessment period, the Portsmouth plant shifted from a cold-standby to a cold-shutdown condition.

The Paducah and Portsmouth GDPs are more than 50 years old, and have been enriching uranium since the 1950s. The Paducah plant completed 55 years of continuous enrichment in 2008. These facilities were built at a time when design standards and quality assurance standards were significantly different from current requirements, and documentation requirements were less stringent. The age of the facilities, some poor documentation of design and safety bases, and the requirements in effect when the plants were constructed have resulted in difficulties in maintaining the material condition of the facilities. Although DOE replaced virtually all the uranium equipment at Paducah in a major upgrade project in the 1970s and 1980s, these shortcomings have continued to challenge USEC's performance. However, both the material condition of the plants and the design and safety bases documentation were substantially upgraded as part of the completion of compliance plan requirements.

PADUCAH

Overall performance and conduct of plant operations at Paducah were adequate. Paducah continued to conduct its activities safely and securely, as determined during the review period covering September 26, 2004, and ending October 4, 2006. The NRC staff conducted licensee performance reviews at Paducah in 2007 and concluded that its performance was acceptable. The NRC recognized that USEC staff has been effective in identifying issues regarding human performance, including adherence to procedures related to conduct of operations and maintenance. However, taking effective corrective actions to address these challenges was an area identified as needing improvement in the latest review dated February 9, 2007. The Paducah GDP's most recent performance, with the period ending in September 2008, will not be assessed until the first quarter of CY 2009, and therefore, is not covered in this report.

Paducah plant maintenance and surveillance activities associated with safety-related systems, structures, and components were adequate. Reliability was demonstrated as shown in the plant personnel's handling of the cascade-related equipment during a period when Paducah operated at the highest power levels in the past 20 years.

Paducah is currently implementing additional security upgrades to the facility. The upgrades being undertaken were reviewed and approved by the NRC staff on July 22, 2008, and should improve Paducah's ability to respond to current and possible future security challenges.

PORTSMOUTH

Overall performance at the Portsmouth GDP and conduct of plant operations were adequate. During the review period, the plant staff placed the cascade in a cold shutdown condition and started undertaking some remediation activities. The NRC Region II and Headquarters staff completed the most recent review of NRC-certified activities at Portsmouth, covering the period beginning July 2, 2006, and ending July 5, 2008. Portsmouth's performance was evaluated in five major areas: (1) safety operations, (2) safeguards, (3) radiological controls, (4) facility support, and (5) special topics. The review was discussed in a public meeting held on September 10, 2008, where the NRC noted that there were no areas for improvement.

CHAPTER 11

SUMMARY OF COMPLIANCE WITH APPLICABLE NRC REGULATIONS

USEC is required to comply with all NRC regulations applicable to the GDPs, most specifically, 10 CFR Part 76. Other NRC regulations or portions thereof that apply include (1) 10 CFR Part 19, "Notices, Instructions, and Reports to Workers: Inspection and Investigations"; (2) 10 CFR Part 20, "Standards for Protection Against Radiation"; (3) 10 CFR Part 21, "Reporting of Defects and Noncompliance"; (4) 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material"; (5) 10 CFR Part 71, "Packaging and Transportation of Radioactive Material"; (6) 10 CFR Part 73, "Physical Protection of Plants and Materials"; (7) 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material"; and (8) 10 CFR Part 95, "Security Facility Approval and Safeguarding of National Security Information and Restricted Data."

As part of recertification activities, the NRC has reviewed USEC's applications for recertification to determine compliance with NRC regulations. The results of this review are described in CERs, one each for the Paducah and Portsmouth GDPs, in support of an NRC staff decision to renew the GDP certificates of compliance. In those reports, the NRC staff concludes that the applications comply with the requirements of 10 CFR Part 76 and that there is reasonable assurance that the GDPs will continue to be operated in a manner such that public health and safety and the environment will be adequately protected. In addition, as part of the NRC's review and approval of privatization in 1998, the Commission determined that the private corporation would meet all applicable NRC regulatory requirements, including those derived from the National Industrial Security Program, which restricts foreign involvement in entities that require access to classified information, and the USEC Privatization Act, regarding foreign ownership, control, and domination; common defense and security; and the maintenance of a reliable and economical source of domestic enrichment services. No changes have occurred since privatization was completed on July 28, 1998 that would alter those determinations.

During the 5-year reporting period from October 1, 2003, to September 30, 2008, the NRC performed 80 inspections, at both Paducah and Portsmouth, totaling 11,820.5 inspection-hours. These inspections included the activities of two resident inspectors at Paducah and specialist inspections conducted by inspectors from the NRC's Region II and Headquarters offices. The inspection effort identified a total of 32 violations; however, only three were considered to be significant.[4]

For those instances where noncompliances with NRC regulations were identified, plant management took immediate corrective actions to bring the facility back into compliance with NRC regulations and implemented comprehensive correction action plans to prevent recurrence. In many cases, USEC also identified long-term actions to prevent recurrence.

In summary, the NRC is satisfied with USEC's performance and has concluded that the operations at the GDPs are protective of the public health and safety and the environment, are secure, and the facilities continue to operate in compliance with all applicable regulations.

[4] Chapter 6 of this report gives details of these violations.

CHAPTER 12

LEAD FEDERAL AGENCY/EMERGENCY COORDINATION

DOE and the NRC agree that the NRC is the initial LFA for GDP events having actual or potential adverse impacts on safety and/or common defense and security. However, the nature of GDP events could warrant DOE or another organization becoming the LFA. In this regard, the NRC and DOE have agreed to notify each other before transfer of the LFA responsibility and confirm acknowledgment of the transfer at the time another organization assumes the LFA role. DOE and the NRC will continue information exchanges before, during, and after the transfer.

APPENDIX A

ABBREVIATIONS AND ACRONYMS

ACP	American Centrifuge Plant
AEA	Atomic Energy Act
ALARA	as low as reasonably achievable
CER	compliance evaluation report
CFR	*Code of Federal Regulations*
CWA	Clean Water Act
CY	calendar year
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DU	depleted uranium
DUF_6	depleted uranium hexafluoride
EIS	environmental impact statement
EOC	emergency operations center
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 1992
ETTP	(DOE's) East Tennessee Technology Park
EU	enriched uranium
FY	fiscal year
GCEP	Gaseous Centrifuge Enrichment Plant
GDP	gaseous diffusion plant
HEU	highly enriched uranium
HS&E	health, safety, and environmental
ISMS	Integrated Safety Management System
JP	joint procedure
kg	kilogram
km	kilometer
LEU	low-enriched uranium
LFA	lead Federal agency
LTLT	long-term low-temperature
MC&A	material control and accounting
mi	mile
MOU	memorandum of understanding
mrem	millirem; a measure of radiological dose
mSv	millisievert; SI (System Internationale) measure of radiological dose
NCS	nuclear criticality safety
NCV	noncited violation
NOV	Notice of Violation
NRC	U.S. Nuclear Regulatory Commission
RCRA	Resource Conservation and Recovery Act
RIIs	recordable injuries/illnesses
SGI-M	Safeguards Information Modified Handling
SSAB	site-specific advisory board
SWU	separative work unit
TSR	technical safety requirement
^{235}U	uranium-235

UF_6	uranium hexafluoride
USEC	United States Enrichment Corporation
wt%	weight percent

APPENDIX B

SUMMARY OF DOE ACTIVITIES AT THE PADUCAH AND PORTSMOUTH GASEOUS DIFFUSION PLANTS

DOE SUMMARY OF ACTIVITIES COMMON TO PADUCAH AND PORTSMOUTH

U.S. Department of Energy (DOE) activities to enhance and improve environmental health and safety (ES&H) conditions at both the Paducah and Portsmouth gaseous diffusion plants (GDPs) between October 1, 2003, and September 30, 2008, have been numerous and extensive. These activities include, but are not limited to, the following.

Environmental Safety and Health Initiatives

- The Portsmouth and Paducah GDPs received the Federal Electronic Challenge Bronze Level Award for their electronic recycling efforts during 2007.

- In 2008, the Portsmouth GDP established a Site-Specific Advisory Board (SSAB). DOE's objective is to provide SSAB members with a reasonable, accurate, and well-rounded education base from which SSAB members will represent the public and advise DOE on environmental issues related to the Portsmouth GDP.

- The Paducah GDP Citizens Advisory Board (CAB), a site-specific advisory board chartered by DOE under the Federal Advisory Committees Act, completed its 12th full year of operation in September 2008. The CAB holds regular board meetings to discuss issues such as water quality, waste disposition, community outreach, and long-range strategies and stewardship. All meetings are open to the public, and all regular board meetings are publicly advertised.

DOE SUMMARY OF ACTIVITIES AT PADUCAH

DOE activities to enhance and improve ES&H conditions at the Paducah GDP between October 1, 2003, and September 30, 2008, include, but are not limited to, the following.

Environmental Safety and Health Initiatives

- Swift & Staley Team's (SST's) Recycling Program continued to include recycling spent fuel filters, various types of scrap metal, rechargeable batteries, paper products (i.e., newspapers, magazines, office paper, pamphlets, etc.), aluminum cans, toner cartridges, used oil, spent fluorescent light bulbs, nonregulated waste, antifreeze, tires, vehicular batteries, spent oil filters, and unusable/outdated electronics. Approximately 89,000 pounds was recycled during 2007 through the third quarter of fiscal year (FY) 2008.

- DOE developed and implemented a 14-month training curriculum designed to provide supervisors and other employees of SST with additional insight, understanding, and skills to enable them to be as proficient as possible in their jobs. This set of courses and sessions included topics that cross the various sectional aspects of SST business and included functions such as ES&H.

- The SST Safety Committee continues to emphasize safety and address concerns associated with the activities that support DOE operations at the Paducah GDP. The goal of the committee is to provide consistent ES&H emphasis and focus within SST. The SST Safety Committee has met regularly and has been an effective element of the overall SST program.

- SST identified the potentially most severe mishaps that could occur during its activities and performed very detailed potential problem analyses (PPAs) in the areas of health, safety, radiological control, and waste handling. Nine potential incidents were selected from a list of over 50 that could have the most significant negative impact. The PPAs also identified potential causes, preventive measures in place, and additional preventive or corrective measures needed to stop the incidents from occurring.

- SST conducted extensive evaluations of all its existing activity hazard analyses (AHAs) and procedures. As a result, SST now has a standard set of comprehensive AHAs that received worker and management input. Work hazards are cross-checked against the standard AHAs and supplemented as necessary.

- Monthly all-hands safety meetings are conducted routinely. These meeting topics, presented by a member of upper-level management or front-line supervisors on a voluntary basis, include current ES&H, Integrated Safety Management System (ISMS) and Environmental Management System (EMS) programs, and security topics. Workers are encouraged to participate and provide feedback.

- SST continues to offer two programs (Employee Concerns and Employee Suggestions) to provide employees with additional methods to report and resolve employee concerns or ideas for continuous improvement.

- The ES&H representative for the hourly workers employed by SST and appointed by the United Steelworkers continues to be actively involved in the development of safety programs, procedures, and policies that affect the hourly workers. The union safety representative is an active participant in the safety program and is involved in appropriate incident investigations.

- The ES&H Plan is in compliance with Title 10, Part 851, of the *Code of Federal Regulations* (10 CFR Part 851). This plan satisfies the requirement for a comprehensive worker health and safety program, and DOE has reviewed and approved it twice.

- The Phase I and Phase II verification of the Paducah ISMS and EMS programs was conducted by the DOE Portsmouth/Paducah Project Office (PPPO). The SST ISMS/EMS was verified to be adequate. All identified opportunities for improvement from the PPPO evaluation have been addressed.

- SST remains actively involved with the sitewide safety organization, Safety Team of Paducah (STOP), for sitewide discussion and coordination of safety items.

- SST recognized a potential adverse trend associated with back strains and employee readiness to work. To help eliminate or reduce possible soft tissue injuries and strains, SST implemented a company-endorsed Stretch & Flex Program. All SST employees are encouraged to perform daily stretching as part of the morning plan-of-the-day meeting or before the start of the work shift.

- SST reviewed and revised all ES&H procedures.

- SST submitted Federal Electronic Challenge goals for FY 2008. The Paducah Site received the Federal Electronic Challenge Bronze Level Award for its electronic recycling efforts during 2007.

- The janitorial staff, management, and first-aid responders continue to participate in bloodborne pathogens training and automated external defibrillator training. As a precautionary measure, the hepatitis B vaccine was offered to anyone who wanted it in August 2007, with the secondary booster administered in January 2008.

Environmental Safety and Health Status

DOE goals in safety and health at the Paducah GDP include (1) zero accidents/injuries, (2) zero incidents (especially for electrical, elevated work, and near misses), (3) limiting exposures to chemicals and radiation to as low as reasonably achievable (ALARA), and (4) no Notices of Violations (NOVs), Occurrence Reporting and Processing System (ORPS) reportable events, personnel contaminations, or security violations. The basis of the safety and health requirements supporting these goals includes 10 CFR Part 835 for radiation protection; 29 CFR Part 1910 and Part 1926 series for industrial hygiene, safety, and fire protection; and commitments to DOE.

SST successfully met or performed better than required for every DOE goal. SST has experienced no NOVs, ORPS reportable events, personnel or offsite contamination events, DOE reportable events, lost-time injuries, or personnel exposures to any chemical or radioactive source above any limit. SST consistently has attained a level of safety performance that is significantly better than the industry level of performance. SST has not had an Occupational Safety and Health Administration (OSHA) lost time injury since September 2005.

During FY 2006 through the third quarter of FY 2008, SST and SST subcontractors at PGDP worked approximately 413,975 hours and drove approximately 238,210 miles in government vehicles.

The number of personnel monitored for protection from radiation exposure during FY 2006 through the third quarter of FY 2008 was approximately 200 SST employees and 160 DOE employees, escorts, and visitors. No individual received occupational radiological exposures in excess of regulatory limits. The total cumulative and individual exposures were maintained ALARA and were well within the ALARA administrative goals for SST and DOE. No SST employee exposure exceeded the administrative occupational exposure control limit set by SST of 100 mrem per person per year.

DOE SUMMARY OF ACTIVITIES AT PORTSMOUTH

DOE activities to enhance and improve ES&H conditions at the Portsmouth GDP between October 1, 2003, and September 30, 2008, include, but are not limited to, the following.

Environmental Cleanup Initiatives

DOE continued to implement environmental cleanup initiatives at both GDPs. These initiatives were related to an Agreed Order between DOE and the Commonwealth of Kentucky at the Paducah GDP; a Consent Decree between DOE and the State of Ohio; and an Administrative Consent Order signed by DOE, the Ohio Environmental Protection Agency (EPA), and the U.S. EPA for the Portsmouth GDP, as well as cleanup of the Gaseous Centrifuge Enrichment Plant (GCEP) facilities at Portsmouth as discussed below.

Because of the extensive cleanup that had already occurred at the site, an accelerated cleanup plan was not developed for the Portsmouth GDP. Between 1990 and 2008, the following significant environmental cleanup accomplishments have been achieved at Portsmouth:

- All remedies that have been identified for Quadrants I, III, and IV have been installed and are now operational. The Portsmouth GDP has not received the U.S. EPA and Ohio EPA Decision Document for Quadrant II. However, in the interim, remediation activities are continuing in Quadrant II on the two units identified in the X-701B Decision Document (X-701B Holding Pond/Retention Basins and X-701B Groundwater). For X-701B Groundwater Phase I of the remedy approved by the Ohio EPA (i.e., oxidant treatment within the contaminated ground water plume area) was completed during calendar year (CY) 2005, and Phase II was initiated during the fall of CY 2006 and is scheduled for completion in FY 2009. Three of the five planned Phase II injection mobilizations were completed by September of FY 2007. The remedy for the X-701B Holding Pond/Retention Basins will be initiated upon successful completion of the ground water remedy.

- Decisions related to some of the remaining solid waste management units at the site have been deferred until final deactivation and decommissioning (D&D) of the site.

- Of the 21 Resource Conservation and Recovery Act (RCRA) units at the Portsmouth GDP site, 18 have been successfully closed.

- Seven interim actions have been completed. These interim actions include the installation of X-321B extraction wells; construction of the X-625 Passive Groundwater Treatment Facility, installation of the X-701B interceptor trenches, relocation of Big Run Creek at Peter Kiewit Landfill, construction of the X-749 ground water containment wall, and remediation of Well 6B.

- All six onsite landfills have been closed.

- More than 97.5 percent of legacy waste has been treated and disposed of. Offsite shipment of more than 949 cubic meters (m^3) of waste was completed in FY 2007.

- Removal and shipment of all 1,383 original centrifuge machines to the Nevada Test Site (NTS) for disposal was completed in June 2006.

- A total of 14 inactive, surplus facilities have been demolished at Portsmouth, which eliminated long-term surveillance and maintenance costs associated with these structures.

- A project was initiated in FY 2006, 3 years early, to dispose of 438 low-level waste converter shells.

DOE has undertaken an initiative to clean up the former GCEP buildings for United States Enrichment Corporation (USEC) to use as its Centrifuge Lead Cascade (CLC) uranium enrichment test facility. In FY 2006, all 1,383 of the original centrifuge machines were dismantled from the north half of the X-3001 Process Building and shipped to NTS for disposal. By ramping up shipments from 5 to as many as 29 truckloads per week, 478 shipments of old centrifuge equipment were made to the NTS. The project was completed in August 2006, 7 months ahead of the scheduled March 2007 completion date. In FY 2005, 113,192 square feet (ft^2) of permitted storage space in the X-7725 Hazardous Waste Storage Facility were emptied and cleaned to perform a partial closure to support the CLC requirements. Closure of another 170,013 ft^2 of permitted space in the X-7725 Facility was approved by Ohio EPA after the facility was emptied and cleaned in FY 2006 and FY 2007, thereby allowing the areas to be leased by DOE to USEC for the advanced centrifuge program. The estimated cost of this initiative, which is being funded over a 3- to 4-year period, is approximately $60 to $70 million.

By the end of 2007, DOE's remediation contractor, LATA/Parallax Portsmouth, LLC (LPP), had completed the removal of 14 inactive surplus facilities.

Under the current Portsmouth GDP cleanup strategy, environmental remediation will be complete by the end of FY 2011 (except those units deferred until final D&D of the plant), and disposition of all legacy waste will be complete by the end of FY 2007.

Environmental Safety and Health Initiatives

- DOE continues to store more than 20,000 depleted uranium hexafluoride (DUF_6) cylinders in the cylinder storage yards at the Portsmouth GDP, including 4,819 DUF_6 cylinders that were shipped from the East Tennessee Technology Park (ETTP) to Portsmouth. These cylinders are stored at Portsmouth to reduce the hazards of storage at ETTP and to consolidate these cylinders at the location of their eventual disposition by the Portsmouth DUF_6 Conversion Facility.

- Uranium Disposition Services (UDS), LLC, provided the draft documented safety analysis for the DUF_6 conversion facility currently under construction by UDS to DOE for initial review.

- As of September 30, 2007, UDS exceeded 1,243,809 hours (over 676,584 hours at the Portsmouth site) of work projectwide without a lost work time incident. This record has been sustained since the creation of UDS in 2002 and deployment to the Portsmouth and Paducah sites in 2004 to start construction of the DUF_6 conversion plants and operations of the DOE cylinder storage yards.

- As a result of its participation with the Ross County Safety Council/Bureau of Workers Compensation, UDS received a 100% Award from the Ohio Bureau of Workers Compensation for working an entire year without a lost time injury.

- UDS, LPP, and Theta Pro2Serve Management Company, LLC (TPMC), and their subcontractor personnel implemented 10 CFR 851, Worker Health and Safety Program.

- In 2007, LPP and TPMC received a 4-percent discount on worker's compensation insurance premiums for actively participating in the Ross County Safety Council each month.

- In 2007, LPP formed an LPP/United Steel Workers Safety Committee, which meets monthly to proactively resolve and eliminate safety issues.

- In 2007, LPP successfully developed and implemented a Safety Incentive Program for all LPP employees and subcontractors.

- In FY 2007, TPMC established a worker-based safety committee, the Worker Involvement Network.

Highly Enriched Uranium Suspension and Removal Program

The DOE highly enriched uranium (HEU) Suspension and Removal Program addresses the overall disposition of HEU at Portsmouth. This program is designed to accomplish the following: (1) safely suspend HEU operations and shut down HEU equipment in the X-326 Building (complete), (2) modify equipment and systems to preclude production of HEU and perform maintenance in X-326 that is necessary for continued LEU production ("legacy maintenance") (complete), (3) modify the configuration of shutdown equipment to minimize long-term surveillance and maintenance requirements (complete), and (4) remove stored HEU materials from Portsmouth, including uranyl nitrate hexahydrate-, uranium oxide-, and other HEU-bearing materials (ongoing). The removal of these HEU materials will reduce related ES&H risks, safeguards, and security operating costs at Portsmouth.

In September 2003, a subcontract was awarded to a commercial uranium processor for the characterization and testing of three types of HEU-bearing materials stored at the Portsmouth GDP. These materials included HEU-bearing oil-leak gunk, filter ash, and incinerator ash containing 12.5 kilogram (kg) of uranium-235 in 124 containers. After obtaining Ohio EPA concurrence with DOE's determination that two of these types of HEU materials were classified as "byproducts" under Ohio Administrative Code 3745-51-01(B)(3) and completing a DOE readiness assessment, the HEU oil-leak gunk and filter ash (a total of 11.3 kg of uranium in 98 containers) were overpacked into U.S. Department of Transportation specification shipping containers and shipped to the commercial uranium processor in March 2004. Following characterization and testing, the HEU materials will be processed to recover, purify, down-blend and convert the uranium for use as reactor fuel.

The incinerator ash (1.03 kg uranium-235) continues to be stored at Portsmouth pending the identification of an alternative disposition option. The incinerator ash cannot be designated as "byproduct" because it was generated via an incineration material recovery process. As such, the commercial processor cannot accept nor process this material. LPP initiated a project in 2007 to down-blend and ship the incinerator ash to an offsite hazardous waste disposal facility. Six batches of incinerator ash (0.50 kg) totaling 22 kg of material have been down-blended with 201 kg of lower assay materials as of June 30, 2007. A total of 223 kg of incinerator ash has been prepared for offsite disposition.

The Portsmouth GDP continues to store other HEU-bearing materials, the majority of which are classified as mixed waste, in two onsite facilities. A total of 146 containers (14.9 kg of uranium) of various HEU-bearing materials, including mixed acid and hydrocarbon oil, are stored. This material was down-blended and sampled and is currently awaiting laboratory

analysis to reclassify it as low-enriched uranium (LEU) and shipment as waste. The incinerator ash, alumina chemical trapping material, and miscellaneous scrap are presently stored at Portsmouth; planning for final disposition of these materials began in late FY 2000. The HEU Material Disposition Plan continues to be updated to reflect changes in HEU inventories and disposition options as the materials are further characterized. In the plan, disposition options identified for each HEU material stream are coordinated between the LPP Uranium Disposition Program and Waste Management (WM) Program.

Preparatory work began in May 2004 to repair/upgrade a glovebox at the Portsmouth GDP for future use in the disposition of the remaining HEU materials. Repairs were completed, and the glovebox became operational in early 2006. The glovebox is being used for the sampling, repackaging, and if necessary, batching of HEU materials remaining in inventory.

Waste Management

The mission of the Portsmouth WM program is to treat, store, and dispose of all legacy DOE waste in compliance with applicable Federal, State, and local regulations and in a manner that protects the health and safety of the public, the work force, and the environment. Disposal of Portsmouth legacy waste is the ultimate goal of the WM program. The WM program treats, ships, and disposes (or recycles) waste at offsite facilities throughout the year. In addition, Portsmouth has implemented programs that focus on recycling paper products and aluminum cans. Noteworthy waste management accomplishments include the following:

- Treated and/or disposed of 2,973 m^3 of mixed waste including mercury waste, mixed waste from laboratory operations, paint sludge, and other radiological hazardous waste that required significant treatment before disposal.

- Disposed of 16,925 m^3 of debris, soil, empty drums, and other radioactive low-level waste.

- Disposed of 8,769 m^3 of Toxic Substances Control Act and/or RCRA regulated waste. This waste included transformers, fluorescent light ballasts, and other polychlorinated biphenyls (PCB)-contaminated waste.

- Disposed of 255 m^3 of low-level waste stored in converter shells.

- Shipped 1,164 m^3 of special process waste (SPW) to Perma-Fix for treatment.

- Disposed of 747 m^3 of SPW at the NTS.

- Recycled or reused 6,516 metric tons of concrete and 3,486 metric tons of steel from the X-744 T&U D&D; 19,100 kg of lead; 8,200 kg of R-114 Freon; two electric forklifts; 568 liters of paint; 47,000 kg of alumina and soda lime; and 146,932 pounds of aluminum cans, toner cartridges, paper, batteries, light bulbs, cardboard, and scrap metal.

- Completed the following Site Treatment Plan milestones:

  – Milestone 3.1.6—Mercury waste treatment (MWIR W006 & W061) was completed in January 2007.

– Milestone 3.1.8—Complete shipment of mixed waste gas cylinders (MWIR W070).

– Milestone 3.2.3—Physical chemical treatment was completed in September 2007.

– Milestone 3.3—HEU Waste, W082 Filter Ash was completed in December 2007.

– Target 3.1.5—Complete additional cyanide destruction for mixed waste (MWIRS W014 & W076).

– Target 3.4.1—Thermal desorption treatment was completed in March 2008.

Environmental Safety and Health Status

The maximum annual average occupational total effective dose equivalent (TEDE) radiation exposure received by workers in the DOE radiation protection program at the Portsmouth GDP for CY 2003 through CY 2008 was 0.0460 mSv (4.60 mrem) in CY 2005. Average TEDE at the Portsmouth GDP was 0.0113 mSv (1.13 mrem) in CY 2003; 0.0417 mSv (4.17 mrem) in CY 2004; 0.0460 mSv (4.60 mrem) in CY 2005; 0.0291 mSv (2.91 mrem) in CY 2006; and 0.0314 mSv (3.14 mrem) in CY 2007. These exposure data indicate that occupational radiation exposures at the Portsmouth GDP are substantially less than the DOE occupational limit of 50 mSv (5000 mrem) per person per year, as specified in 10 CFR Part 835.

Available data show that from October 1, 2003 through June 30, 2008, DOE's contractors and subcontractors worked approximately 4.9 million man-hours and experienced 25 OSHA Reportable Illnesses or Injuries (RIIs). Of the RIIs, 15 were classified as "lost workday cases," based on lost workdays or medical restrictions limiting full work performance.

During the 5-year period of this report, 59 incidents occurred in the nonleased areas at Portsmouth that DOE classified as reportable ES&H occurrences. Of these incidents, 58 were classified as "off-normal," and one was classified as "unusual." All incidents classified as off-normal were entered into the DOE Occurrence Reporting Processing System which assigns scoring category (SC) levels for the occurrences to correspond with levels of investigation and analysis, corrective action development and tracking, and lessons-learned development requirements. The breakdown of the 58 off-normal incidents is as follows: 23 occurrences were categorized as SC 4 (occurrences that are not Operational Emergencies and that have "some impact" on safe facility operations, worker or public safety and health, or public/business interests); 22 occurrences were categorized as SC 3 (occurrences that are not Operational Emergencies and that have "minor impact" on safe facility operations, worker or public safety and health, regulatory compliance, or public/business interests); and 13 occurrences were categorized as SC 2 (occurrences that are not Operational Emergencies and that have "moderate impact" on safe facility operations, worker or public safety and health, regulatory compliance, or public/business interests).

INSPECTIONS AND INVESTIGATIONS COMMON TO PADUCAH AND PORTSMOUTH

(1) Regulated the Federal arming and arrest authority of the GDP protective forces under the Atomic Energy Act, as amended, and DOE's Regulatory Oversight Agreement with USEC. (FY 2004–FY 2008).

(2) Reviewed and approved revision of USEC's "Arming and Arrest Authority Security Plan for the Paducah and Portsmouth Gaseous Diffusion Plants" (Security Plan), including Revision 4, which incorporated clarifications/enhancements, including the addition of elective requirements related to the use of engagement simulation systems and a requirement to develop a random drug testing program in accordance with 10 CFR Part 707, "Workplace Substance Abuse Programs at DOE Sites." (FY 2007)

INSPECTION AND INVESTIGATION ACTIVITIES AT PADUCAH

(1) Conducted inspections of USEC's implementation of the Arming and Arrest Authority Security Plan. No NOVs were identified during the inspections. Eleven inspection followup Items and four unresolved items were identified as a result of the inspections. (FY 2004–FY 2008)

(2) Reviewed USEC's activities completed to resolve the NOVs issued as a result of an accidental discharge of a weapon. The NOVs were issued for failures to follow procedures regarding firearms handling, perform firearms risk analysis, and perform appraisals of the firearms safety program, which resulted in civil penalties totaling $41,250. The closure documentation provided was found to adequately resolve the NOVs. (FY 2004–FY 2005)

(3) Conducted a special review of USEC's Emergency Preparedness Program and participated in or observed a Full Participation Emergency Management exercise at the Paducah GDP. (FY 2008)

INSPECTION AND INVESTIGATION ACTIVITIES AT PORTSMOUTH

(1) Conducted inspections of USEC's implementation of the Security Plan. No violations were identified as a result of the inspections. Eighteen inspection followup items were established during the inspection activities. (FY 2004–FY 2008)

(2) Conducted a special review of USEC's Emergency Preparedness Program and participated in or observed Full Participation Emergency Management exercises at the Portsmouth GDP. (FY 2003, FY 2005, and FY 2007)

(3) Regulated potential activities associated with uranium enriched to greater than or equal to 10 percent assay ^{235}U discovered or made accessible in USEC-leased areas under the Lease Agreement/Regulatory Oversight Agreement. (FY 2004–FY 2008)

OVERALL STATUS OF THE PADUCAH AND PORTSMOUTH GASEOUS DIFFUSION PLANTS

During the 5-year period of this report, DOE PPPO continued to discharge its regulatory and oversight responsibilities at the Paducah and Portsmouth GDPs. DOE conducted its activities in a manner to enhance and improve ES&H conditions and achieve compliance with all applicable Federal and State laws and regulations. In those instances where potential violations of these laws and regulations were identified, actions were taken to notify appropriate authorities, identify the cause, and institute corrective measures.