URANIUM ENRICHMENT DECONTAMINATION & DECOMMISSIONING FUND

2007 Report to Congress

Prepared by
U.S. Department of Energy
Oak Ridge Office and
Portsmouth/Paducah Project Office

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ACRONYMS

ACP	American Centrifuge Plant
CAB	Citizens Advisory Board
CERCLA	Comprehensive Environmental Response Compensation and Liability Act of 1980
CSB	cold standby
CSD	cold shut down
CSOU	Comprehensive Site-wide Operable Unit
the Department	U.S. Department of Energy
D&D	decontamination and decommissioning
DNAPL	dense non-aqueous-phased liquid
DQO	data quality objective
DU	Deferred Units
EM	Office of Environmental Management
EPAct	Energy Policy Act of 1992
ETTP	East Tennessee Technology Park
FFA	Federal Facility Agreement
the Fund	Uranium Decontamination and Decommissioning Fund
FY	fiscal year
GAO	Government Accountability Office
GCEP	Gas Centrifuge Enrichment Plant
GDP	gaseous diffusion plant
GNEP	Global Nuclear Energy Partnership
KOW	Kentucky Ordnance Works
LTS	long-term stewardship
NAS	National Academy of Science
NPL	National Priorities List
OSWDF	on-site waste disposal facility
OU	operable unit
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act of 1976
ROD	record of decision
S&M	surveillance and maintenance
SWMU	solid waste management unit
TSCA	Toxic Substances Control Act of 1976

USACE	U.S. Army Corps of Engineers
USEC	United States Enrichment Corporation
USEPA	U.S. Environmental Protection Agency

EXECUTIVE SUMMARY

As required by the Energy Policy Act of 1992 (EPAct), the U.S. Department of Energy (the Department) is pleased to present to Congress the fifth triennial report providing recommendations regarding reauthorization and management of the Uranium Enrichment Decontamination and Decommissioning (UED&D) Fund (the Fund). The Fund's primary mission is to provide decontamination and decommissioning (D&D) and cleanup of the nation's three gaseous diffusion plants (GDPs) namely the GDP at East Tennessee Technology Park (ETTP) in Oak Ridge, Tennessee; the Paducah GDP in Paducah, Kentucky; and the Portsmouth GDP near Piketon, Ohio. Thus far, the Department has achieved measurable success at all three sites.

The task of completing decontamination, decommissioning, and remedial action projects involves a large complex of interconnected facilities contaminated with industrial, chemical, nuclear, and radiological hazardous materials. The primary beneficiaries are the public and workers who reside in the immediate areas surrounding each site. The Department looks forward to sustaining and completing this vital program.

To maximize the efficient use of the Fund's resources, the Department continues to:

- Ensure safe and compliant operations;
- Negotiate and institutionalize D&D and remedial action plans in partnership with regulators and stakeholders;
- Implement aggressive acquisition strategies at all three GDP sites, specifically, hiring best-in-class remediation and D&D contractors who have been competitively selected to execute performance-based contracts;
- Foster and promote intelligent and rigorous project management tools to effectively track, monitor, and adjust D&D and cleanup plans and progress; and
- Develop and implement innovative technologies, D&D and cleanup approaches, and end-state goals at each site consistent with future land-use planning.

Since the establishment of the Fund in 1992, the Department has completed the cleanup of three out of 12 massive process buildings, 242 of 523 support facility D&D projects, 116 of 231 planned remedial actions, and disposal of 12.8 million cubic feet of the expected 46 million cubic feet of waste materials.

Although cleanup and D&D progress has been significant at all three sites, and are nearing completion at ETTP, much work remains. The Portsmouth site full-scale D&D is anticipated to begin in fiscal year (FY) 2009, while the Paducah site is expected to commence D&D in FY 2017. The period of execution for the Portsmouth and the Paducah sites will likely continue into the decade 2040.

In order to analyze and produce an improved estimate of future costs, the Department has recently completed a significant revision to its previous cost estimates. Utilizing the data from this estimate, DOE has projected costs to illustrate several sensitivity perspectives and established a "Base Case" as the cornerstone of the Fund Analysis provided in section 7. This "Base Case" and subsequent sensitivity cases address a range of economic factors, scope, and schedule assumptions. The Department's conclusion is that the UED&D Fund would need, in addition to the current balance of $4.1 billion, between $8 billion to $21 billion more to complete the GDP cleanup activities. Based on the above cost projections and accounting for the remaining contributions from the Government into the Fund, the "Base Case" shows a shortfall of approximately $11 billion. Without additional deposits into the Fund (taking

accumulated interest into account), the current balance in the Fund is projected to be exhausted in 2020 timeframe.

This shortfall is comparable to the Initial Fund Assessment completed by the Government Accountability Office in November 1991, which concluded that the $7.2 billion in contributions to the Fund would not cover the estimated $19.1 billion liability, or the $11.9 billion shortfall (in 1992 dollars).

The Department recommends that the Fund be reauthorized so the Government can satisfy its original obligation to the Fund. In addition, the Department believes that the Fund's current structure for both remedial action and D&D has been key to the success to date. Accordingly, the Department recommends that remedial action funding should continue through the Fund to ensure continuity in project schedules and, inherently integrated D&D and remedial action activities.

1. INTRODUCTION

Gaseous diffusion is one of several uranium isotope separation technologies that were developed as part of the 1940s Manhattan Project. The gaseous diffusion process buildings, called "cascades," were some of the largest buildings ever constructed.

Large gaseous diffusion plants (GDPs) were constructed by the United States of America, the Soviet Union, the United Kingdom, France, and China. Most of the GDPs have long since shut down, unable to economically compete with newer enrichment techniques. Three GDP sites exist in the Unites States: 1) East Tennessee Technology Park (ETTP) in Oak Ridge, Tennessee; 2) Paducah in Paducah, Kentucky; and 3) Portsmouth in Piketon, Ohio. Of these three GDP sites, only Paducah is operating today.

In 1992, the U.S. Congress signed into law the Energy Policy Act (EPAct), which created the United States Enrichment Corporation (USEC), a Government corporation with the mission of restructuring the Government's uranium enrichment operations. EPAct also established the Uranium Enrichment Decontamination and Decommissioning (D&D) Fund (the Fund) to provide the necessary resources to clean up the environmental liability created through operations of gaseous diffusion facilities.

The gaseous diffusion enrichment process required the management of uranium in a gaseous state, which caused the release of contaminated gases. The preparation of uranium hexafluoride (*hex*) feedstock was the first application for commercially produced fluorine. Significant problems were encountered and technical solutions were subsequently developed in handling both fluorine and the corrosive *hex* gas. Also, during the course of operating and maintaining the GDPs, a large infrastructure of support facilities such as storage buildings, cleaning shops, and laboratories were required to handle other radioactive or hazardous materials. Lastly, since the earliest days of the Manhattan Project, an accepted waste management practice at these plants was the on-site disposal of waste generated by the GDPs in unlined trenches or bore holes. While protective of human health and the environment under standards in place at that time, far more stringent environmental standards currently require removal of most of this buried waste. The materials handled at the GDP's, the "learning curve" for handling them, and the waste management practices of the time contributed to the contamination of environmental media (i.e., soil, sediments, and groundwater) at these sites. This contamination is the focus of past, present, and future remedial actions that are facilitated by the D&D Fund.

The U.S. Department of Energy (the Department) is the lead agency managing D&D activities at all three sites under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The Oak Ridge Reservation and Paducah GDP are listed on the U.S. Environmental Protection Agency's (USEPA's) National Priorities List (NPL) and have negotiated Federal Facility Agreements with their State and Federal regulators. Portsmouth is regulated by the Ohio Environmental Protection Agency under the Resource Conservation and Recovery Act of 1976 (RCRA), and has negotiated a Consent Order with the State.

This introduction provides general background information on the scope of activities that the Fund finances. Subsequent sections provide the history, regulatory basis, cleanup plan summary, and challenges and uncertainties for each site. The remaining section addresses the status of the Fund's current resources and likely future resource needs. The report concludes with recommendations, followed by appendices that detail financial analyses and the results of these analyses.

1.1 BACKGROUND

In 1992, the United States Congress enacted EPAct, creating USEC and established the D&D Fund. Though privatization of the enrichment enterprise was an important feature of EPAct, one of its most challenging aspects of the law was its mandate to address the cleanup liability of past enrichment operations at Department facilities. The cleanup of these facilities remains the responsibility of the

Department. In an effort to address the liability issue, the Fund was established to provide for ultimate D&D of the three GDPs; remedial actions at the sites to the extent the Fund is sufficient; management of waste generated by historical operations and remedial action; uranium/thorium licensee reimbursements; and eventual disposition of the depleted uranium hexafluoride (DUF_6) cylinders.

The relevant portions of EPAct are shown in Figure 1 including the Department's fiscal and managerial responsibilities for cleanup activities.

Fund and Program Requirements Summary
Energy Policy Act of 1992

Section 1801(a)

There is established in the Treasury of the United States an account to be known as the Uranium Enrichment Decontamination and Decommissioning Fund (referred to in this chapter as the 'Fund'). The Fund, and any amounts deposited in it, including any interest earned thereon, shall be available to the Secretary subject to appropriations for the exclusive purpose of carrying out this chapter.

Section 1802

(a) The Fund shall consist of deposits in the amount of $480,000,000 per fiscal year (to be annually adjusted for inflation using the Consumer Price Index for all-urban consumers published by the Department of Labor) as provided in this section.

(b) SOURCE.-Deposits described in subsection (a) shall be from the following sources:
(1) Sums collected pursuant to subsection (c)… (2) Appropriations made pursuant to subsection (d).

(c) SPECIAL ASSESSMENT.-The Secretary shall collect a special assessment from domestic utilities.

(d) AUTHORIZATION OF APPROPRIATIONS.-There are authorized to be appropriated to the Fund, for the period encompassing 15 years after the date of the enactment of this title, such sums as are necessary to ensure that the amount required under subsection (a) is deposited for each fiscal year.

Section 1803

(b) PAYMENT OF DECONTAMINATION AND DECOMMISSIONING COSTS.-The costs of all decontamination and decommissioning activities of the Department shall be paid from the Fund until such time as the Secretary certifies and the Congress concurs, by law, that such activities are complete.

(c) PAYMENT OF REMEDIAL ACTION COSTS.-The annual cost of remedial action at the Department's gaseous diffusion facilities shall be paid from the Fund to the extent the amount available in the Fund is sufficient. To the extent the amount in the Fund is insufficient, the Department shall be responsible for the cost of remedial action.

Section 1804

Within 3 years after the date of the enactment of this title, and at least once every 3 years thereafter, the Secretary shall report to the Congress on progress under this chapter. The 5th report submitted under this section shall contain recommendations of the Secretary for the reauthorization of the program and Fund under this title.

Figure 1. Relevant portions of the Energy Policy Act of 1992.

1.1.1 Fund Revenues

The EPAct assigned the liability for past operations to the historical beneficiaries of the enrichment activities and provided direction for contributions that would be accumulated toward satisfying this liability. Historical beneficiaries of the enrichment process were United States utilities that purchased uranium from the Department's enrichment program and the Governments' defense enrichment mission. Therefore, the Fund was designed to include annual contributions from utilities and contributions from the Government to cover the entire liability of GDP D&D and cleanup programs. Utility contributions were based on historical purchases of enrichment services, which were measured in Separative Work

Units (SWU). The utility contributions accounted for approximately one-third of the annual contributions, while Government contributions accounted for the remaining two-thirds.

Originally, the EPAct authorized annual deposits to the D&D Fund of $330 million in Government contributions and $150 million in domestic nuclear utility contributions. These contributions were to be made for 15 years beginning in FY 1993 and adjusted annually for inflation. Total collections were to equal $2.25 billion from the utilities and $4.95 billion from the Department, also adjusted annually for inflation.

Fund balances in excess of current-year funding needs were to be managed and invested to earn interest from Government securities. The design of the Fund also included fiscal oversight and other accounting measures. EPAct required progress reports to Congress every three years and an annual audit by the Department's Office of the Inspector General. The original legislation also required that the fifth Triennial Report (i.e., this Report), contain recommendations from the Secretary for the reauthorization of the program and Fund.

The Department has managed the Fund as it was designed by Congress. The utilities have already made their contributions in full, while the Department plans to fulfill its original contribution obligation by FY 2012.

1.1.2 Fund Expenditures

The EPAct identified several steps of the uranium enrichment process where legacy liability was to be addressed by the Fund. When the Fund was originally established, it provided that owners of uranium and thorium mills that had provided ore to the government and had performed cleanup were to be reimbursed for a portion of their cleanup expenses. The Department has been making these uranium/thorium reimbursements throughout the life of the Fund with $534 million paid through FY 2006. The Department expects that future payments under this reimbursement program will total $20 million per year and are expected to continue until FY 2025. The Fund also included provisions for the D&D of the three GDPs and for remedial action cleanup to completely address the total cleanup scope. Substantial remedial action and waste disposition activities have been conducted at all three GDPs. The D&D of ETTP's gaseous diffusion facilities was initiated in 1994, and D&D of ETTP's enrichment production buildings were initiated in 1997. The ETTP D&D is scheduled to be completed in 2012. The Portsmouth D&D has been planned, approved, and scheduled to be underway in 2009. Although the Paducah site is still operating and enriching uranium, the Department has updated a D&D cost estimate that will be used for D&D planning when operations are concluded.

The Department, the Government Accountability Office (GAO), and other outside entities have provided numerous studies and cost estimates that stressed the need for continued funding analysis. The Department has implemented many recommendations of these previous studies and cost estimate reviews, and has made significant changes with the benefit of the experience gained from conducting D&D projects at the GDPs and across the Department's Environmental Management (EM) Program. More importantly, independent cost estimates for the Portsmouth and Paducah sites were developed in FY 2006 to address comprehensively the entire D&D and cleanup liability at those sites. The latest estimates, which have been incorporated into this Report, feature the following:

- Greater understanding of the depth and breadth of contamination within and beneath buildings;
- Implementation of aggressive but protective D&D and remedial action cleanup activities;
- Greater refinement and detail than estimates conducted in prior years;
- Cost estimates for Portsmouth and Paducah have been independently validated by the USACE; and
- A comprehensive strategy to reduce risk to human health and the environment.

1.1.3 Impact of Previous Reports and Estimates

In September 1991, prior to the passage of EPAct, the Department and GAO estimated it would cost $21 billion (FY 1992 dollars) and take more than 40 years to accomplish cleanup of the GDPs. Those preliminary estimates, mostly developed using parametric models, assumed cleanup to background levels and lacked the benefit of current characterization data. The amount of the preliminary estimates is comparable to the estimated costs reflected in the base case.

Using the original estimate, GAO estimated the cleanup would require $500 million per year, indexed to inflation, over the 40-year life of the cleanup. However, the EPAct authorized annual contributions of only $480 million (indexed to inflation) through 2007, for a total of $7.2 billion. Thus, when Congress established the Fund, there was a difference of $13.8 billion (FY 1992 dollars) between the estimated costs for D&D, remedial actions, and disposition of depleted uranium (a D&D activity under EPAct) and anticipated contributions to the Fund. Eliminating the cost for depleted uranium cleanup (now funded separately), there remained a difference of $11.9 billion between projected costs and funds authorized by EPAct.

As required by the EPAct, the National Academy of Science (NAS) conducted a study of the program and published their recommendations in their 1995 report *Affordable Cleanup*? *Opportunities for Cost Reduction in the Decontamination and Decommissioning of the Nation's Uranium Enrichment Facilities*. The purpose of the NAS report was to identify major cost reduction opportunities for the project. The GAO also issued a report in FY 2004 that investigated the adequacy of the Fund to cover authorized activities at the three GDPs. In its report, *Uranium Enrichment Decontamination and Decommissioning Fund is Insufficient to Cover Cleanup Costs* (GAO-04-692), GAO concluded that, despite the Department's efforts to reduce costs (including recommendations from the NAS study), and based on GAO's assumptions and projections of costs and revenues, the Fund would not be sufficient to cover the expected cleanup costs. Further, GAO estimated a shortfall of revenue between $3.5 and $5.7 billion (in 2004 dollars). GAO recommended Congress consider reauthorizing the Fund for an additional three years and that the Department reassess the Fund's sufficiency during that period to determine if additional extensions were necessary. Also, GAO recommended that the Department develop life-cycle cost and schedule plans to accomplish D&D at the Portsmouth and Paducah sites.

The Department issued triennial reports to Congress in 1995, 1998, and 2001. The 1995 report and estimate were prepared after evaluating the 1991 estimate and assumptions. Based on that analysis, the Department determined that the following two developments had a significant impact on the cost and strategy for D&D:

- The potential applicability of Nuclear Regulatory Commission (NRC) waste disposal criteria at 10 C.F.R. Part 61.
- The inclusion of cost savings from decontamination and recycling of metals from process equipment into the overall cost estimates for D&D.

The 1995 estimate included alternatives that made various assumptions about decontamination, land use, recycling, and waste disposal that differed substantially from the original estimates. The Department's 1995 proposed case was very aggressive and based on the alternative that maximized metal recycling. Under this alternative, most GDP building superstructures would be reduced to a rubble pile and covered with earth following equipment removal for recycling. The Department stated it believed this was the most appropriate D&D alternative for the sites because it minimized waste and addressed all building contamination in accordance with acceptable waste disposal standards.

In 1998, D&D plans were again revised to incorporate significant facility reindustrialization or the transitioning of formerly utilized Government-controlled GDP industrial facilities to the private sector for redevelopment. Facilities, materials, equipment, and other valued assets were identified and targeted for reindustrialization to support future commercial industrial operations. Further, whereas the

1995 approach involved reclaiming process equipment and other radioactive metals through the production of waste container products for use by DOE, the 1998 approach included recovering the scrap value of precious metals such as nickel, thereby reducing D&D costs by several billion dollars. In addition, remediation levels were modified from the 1995 "greenfield" approach to a "brownfield" cleanup standard supporting industrial use. Finally, cost savings were identified by replacing off-site waste disposal facilities with on-site disposal facilities and using private sector subcontracting through the management and integration (M&I) contracting approach, which aimed to subcontract nearly all work to best-in-class specialty subcontractors.

In 2001, a number of new requirements reflective of programmatic changes and decisions were included in the scope of D&D Fund activities. Examples included demolition of ETTP facilities that were previously planned to be reused, reduced recycling due to a moratorium on release of metals from radiologically contaminated areas, characterization and cleanup of material storage areas at Paducah, and litigation costs for lawsuits against the Department by workers and adjoining landowners in communities surrounding the GDPs. These items, after applying escalation and adding contingency, account for about $4 billion of new Fund expenditures not included in the 1998 triennial report.

In an April 26, 2007 letter to Congress, the Department notified the appropriations committees that significant changes were occurring coincident with the writing of the fourth Triennial Report to Congress (2004 Triennial Report), including the ongoing award of D&D and cleanup contracts at all three GDPs. After notifying Congress concerning these issues, it was decided that the fourth report would not be published, allowing the Department to focus its efforts on providing more accurate information in this fifth report.

In an effort to maximize the efficiency of the entire GDP D&D Program, the Department has implemented key recommendations from all of these past reports (e.g., NAS and GAO). For example, in 2006, DOE completed a comprehensive plan, schedule, and cost estimate for D&D at Portsmouth. Other implemented recommendations include stakeholder and regulator involvement as well as specific plans for acquisition of a D&D contractor through an open competitive procurement process. These elements, as well as updated strategies for cost and risk reduction are included in this report.

The Department has also taken the opportunity to benefit from lessons learned through past and ongoing D&D projects across the DOE complex (e.g., ETTP, Fernald Environmental Management Project, Mound, Rocky Flats, etc.). For example, in an effort to implement a new procurement process to improve the quality and timeliness of future procurements, the Department has chosen the Portsmouth D&D contract as the first acquisition project for this newly retooled procurement process. Under this process, DOE is implementing an acquisition improvement concept where an integrated acquisition team approach will be established to shepherd the D&D procurement throughout the entire process. The Department continues to pay particular attention to the experience gained from D&D of the Oak Ridge GDP, which has encountered and solved issues similar to those that will be encountered at the Portsmouth site.

2. PROGRAM ELEMENTS

The following sections detail program elements covered by the Fund.

2.1 DECONTAMINATION AND DECOMMISSIONING

The Department's facilities are designated for D&D when they are no longer needed for existing missions. Buildings and facilities are scheduled for demolition based on either the most cost-effective schedule or the need to address risk-based safety concerns. Typical site-related contaminants within the GDP buildings include:

- Radioisotopes stemming from the historical enrichment process;
- Hazardous chemicals (e.g., TCE, polychlorinated biphenyls (PCBs), beryllium, etc.);
- Uranium;
- Technetium;
- Asbestos; and
- Other hazards typical of industrial facilities.

Facilities determined to be suitable for commercial reuse are deferred in the demolition schedule and officially transferred to a third party to promote reindustrialization opportunities. However, if a tenant cannot be found or if the reindustrialization opportunity ceases for a time, the facility will undergo D&D. Irrespective of D&D timing, liability for the D&D and remedial action beneath and/or peripheral to the building (as required to meet end-use goals) is incorporated into the D&D Fund estimate presented in the Report. Also, the availability of valuable assets such as equipment or scrap metal is evaluated to determine if it can be used to offset the cost of facility decontamination on a case-by-case basis in accordance with the Secretary’s recycling policy issued in 2001.

2.2 REMEDIAL ACTION

Remedial actions involve assessment and cleanup of formerly used waste sites at the GDPs and subsurface media contaminated by historical GDP releases and/or operations. Burial grounds, disposal areas, holding ponds, pipeline leaks, and surface spill areas contribute the contamination of soil, sediment, surface water, and groundwater with organic compounds and radionuclides. Remedial actions address the sources of contamination as well as the contamination in these environmental media. Priority is given to mitigating potential risks to site workers, off-site receptors, and environmentally sensitive areas.

The regulatory strategies at Portsmouth, ETTP and Paducah integrate the D&D with remedial actions. Required investigations and remediation of slabs and subsurface media following D&D of contaminated structures are closely linked to and are part of agreements with state and Federal regulators. Separation of D&D and remedial action funding sources introduces program risk of failure to meet regulatory agreements.

Accordingly, for the purpose of analyzing the sufficiency of the Fund, along with D&D funding, it has been assumed that remedial action costs, about 10 percent of the total GDP cleanup liability, are also covered by the Fund.

2.3 WASTE MANAGEMENT

Waste management includes waste generated from day-to-day operations, legacy waste previously generated at the GDPs and stored on site, and waste from current remedial actions at all sites. Cleanup generates additional waste that requires safe, efficient, and cost-effective disposition, including treatment and disposal. Waste management activities include treatment, storage, transportation, and disposal of

transuranic and low-level radioactive waste, hazardous waste, mixed radioactive and hazardous waste, and sanitary waste in compliance with Federal, state, and local regulations and the Department's Orders.

2.4 SURVEILLANCE AND MAINTENANCE AND LANDLORD ACTIVITIES

Surveillance and maintenance (S&M) activities encompass all actions required to ensure material, facility, and personnel safety and security. Facilities, equipment, and other systems S&M is required to mitigate the spread of contamination and protect human health and the environment. The GDPs' landlord activities support performance of the EM mission, are a necessary prerequisite to future response actions, and maintain the physical integrity of general-use facilities and infrastructure.

2.5 URANIUM/THORIUM REIMBURSEMENTS

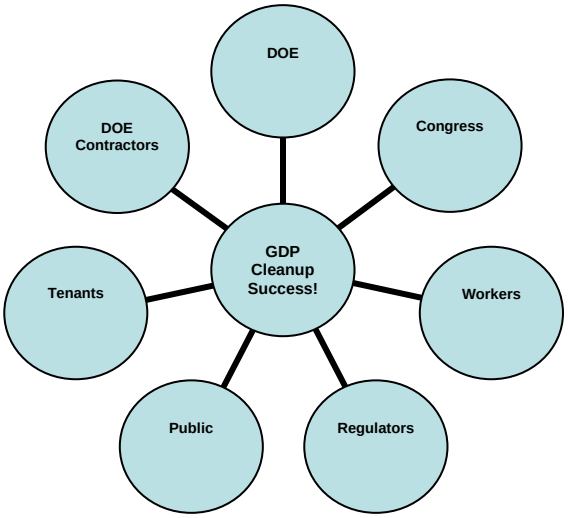
EPAct Title X provides guidance to the Department for use of Fund resources to reimburse licensees of active uranium and thorium processing sites for the portion of their remedial action costs attributable to federally-related byproduct material. Initial legislation directed a maximum reimbursement of $270 million for uranium licensees and $40 million for thorium licensees, plus adjustments for inflation.

Public Law 104-259, enacted October 9, 1996, increased maximum reimbursements to $350 million for uranium licensees and $65 million for the thorium licensee, totaling $415 million. Public Law 105-388, enacted November 15, 1998, increased the maximum reimbursements for the thorium licensee to $140 million, bringing reimbursement to a total of $490 million. On August 21, 2002, Public Law 107-222 further increased the maximum thorium licensee reimbursements to $365 million, for a total of $715 million. EPAct requires that annual payments be made to licensees. Through the FY 2007 payment, $554 million has been reimbursed.

3. STRATEGY

The Department is committed to cleaning up ETTP and the Paducah and Portsmouth GDPs using resources provided by Congress through the D&D Fund. As stewards of taxpayer dollars, the Department must perform cleanup in an efficient and cost-effective manner, with the specific goal of obtaining an end-state site condition acceptable to stakeholders. The Department intends to achieve this goal by establishing cleanup levels in partnership with regulators and site stakeholders that are commensurate with the future intended use of each GDP site and using best-in-class contractors to execute the Department's cleanup mission. Performing this work will be challenging and requires innovation and negotiation with open dialogue between all parties that are guided by the following primary tenets:

- Worker and public safety is the first responsibility and a zero-accident philosophy is the standard;
- Compliance with applicable laws and regulations; and
- Support to National defense, security, science, and/or energy missions at each of the GDPs is enhanced by the cleanup mission, not hindered.



The Department's intent is to manage the GDP sites in an integrated manner. Each GDP has its own set of unique interfaces and it is the Department's responsibility to ensure all parties are engaged. While many of the key GDP interfaces are independent, the Department is still accountable to Congress and the external customer to complete the cleanup work safely and efficiently. Specific to this report, planning and executing work funded by the D&D Fund requires open and direct dialogue with affected communities, state and Federal regulators, cleanup contractors, and the customers, including taxpayers and Congress.

The overall goal is to complete the GDP cleanup projects by 2044 which includes deactivation, waste management, S&M, D&D, and remedial actions. The Department is working off the overall cleanup liability at the GDPs in parallel; however, full-scale D&D of the GDP facilities will generally occur in the following sequence:

- ETTP D&D, started in 1994, will be complete in 2012;
- Portsmouth D&D will start in 2009 and be complete in 2044; and
- Paducah D&D will start in 2017 and be complete in 2040.

The Department has independent cost estimates to cover completion of all work scope covered by the D&D Fund. The D&D and remedial action schedules for each site, as well as the overall D&D Fund schedule, are tied to fundamental project management principles that include the following:

- Creating the *vision* of GDP cleanup;
- Developing the *strategy* necessary to achieve the vision;
- *Prioritizing* projects which assess high environmental or safety risk conditions as a top priority;

- *Sequencing* activities consistent with sound engineering logic;
- Creating *baseline* cost estimates and execution schedules based on bottom-up cost estimates and planning;
- Executing the scope fully consistent with the planning basis; and
- Using project management tools to monitor and adjust project performance as required.

Although a great deal of remediation and D&D has already been accomplished at the GDPs, significant challenges still exist. The Department is utilizing its risk management system to manage, mitigate, avoid, and/or eliminate the project risks (i.e., challenges) as well as control their potential impacts. The risk management system includes provisions for identifying, managing, and tracking risk elements. Key challenges include the following:

- In the past, the Department and its predecessors processed recycled fuel through the GDPs, which spread activation and fission products throughout the enrichment cascades. Isotopes such as technetium pose unique challenges in waste management.
- When the Department shut down the Oak Ridge ETTP K-25 building, uranium was not completely flushed from the system. As a result, *retention* of uranium is a risk in piping and process equipment that must be addressed prior to general D&D. Lessons learned from ETTP D&D work are being addressed proactively.
- Considering the potential magnitude of contamination at the GDPs, substantial characterization will be required to ensure that efficient and compliant disposal is performed while the defined end-state goals of each site are met. The Department and its contractors will develop data quality objectives (DQO) in partnership with the regulators to define and scope sampling campaigns to compliantly and efficiently disposition waste.
- Much of the GDP process equipment and enabling technology remains classified. The availability of trained, qualified workers with appropriate clearance levels is a challenge. As would be expected, the nuclear renaissance has increased the demand for nuclear industry workers. The Department and its contractors will continue to provide competitive wages and benefits to retain its workforce and attract skilled labor and management, but a successful outcome remains uncertain.

Assumptions

The cleanup strategy for the GDPs is based on the following general assumptions:

- Uranium enrichment mission-related activities will be accommodated as a priority;
- An engineered, on-site radioactive, hazardous, and mixed waste disposal facility will be available for waste generated by D&D and remedial actions;
- Off-site DOE and commercial disposal capacity will remain available;
- An adequate number of trained and skilled workers will be available to support the D&D Fund completion schedule;
- Availability of security cleared workers will not be a hindrance to project execution;
- Sites will be cleaned to appropriate risk levels commensurate with development of future commercial industrial reuse (limited land areas will require institutional controls following remediation);

- Initiation of D&D activities at Portsmouth and Paducah are tied to the proposed schedule for implementation of centrifuge technology and may change based on production capabilities and market demand; and

- Equipment and material removed from the buildings will be reused or recycled to the maximum extent practicable.

Most of these assumptions are already formalized and accepted. However some will need to be reviewed and approved by the Department, the appropriate regulatory agencies, and other stakeholders.

3.1 METHOD OF ACCOMPLISHMENT

All EM activities, with the exception of uranium/thorium reimbursements, are divided into manageable incremental projects through the use of work breakdown structures. Each incremental project has a well-defined end-point. Cost and schedule baselines are established and maintained through rigorous and formal change control procedures, and project funding requirements are derived from these baselines.

The Department, through its best-in-class contractors, will safely mitigate the liability posed by the GDPs in the following order of priority:

- Address and mitigate high risk buildings and/or remedial action projects;

- Remove legacy waste and/or materials stored in and around facilities;

- Deactivate facilities to ensure safety of future D&D;

- D&D facilities to slab;

- Remediate slabs and subsurface media as required;

- Remediate any other sources of radioactive and/or hazardous constituents;

- Remediate groundwater and any other contaminated subsurface media;

- Restore wetlands and/or perform any other appropriate resource conservation to meet end-state goals; and

- De-list facilities from U.S. EPA's NPL.

The Department continues to enhance a management approach that minimizes risk and maximizes cost savings and schedule control. The Department has pursued efficient types of contracts and pricing mechanisms to allocate risk appropriately between the contractor and the Government. In addition, cost, schedule, and performance goals will be controlled and monitored by an earned value management system. The current and future acquisition actions will provide the following:

- Demonstrate a risk analysis that minimizes technical complexity;

- Employ an acquisition strategy that appropriately and effectively uses competition, ties contract payments to accomplishments, and takes maximum advantage of commercial technology; and

- Monitor cost, schedule, and performance goals.

4. EAST TENNESSEE TECHNOLOGY PARK

4.1 HISTORY

ETTP is located on a 5000-acre tract of land adjacent to the Clinch River, approximately 10 miles west of Oak Ridge, Tennessee. It was built as part of the World War II Manhattan Project to enrich uranium isotopes for the first atomic bombs. By the mid-1950s, five large uranium enrichment buildings covering 114 acres were in operation: K-25, K-27, K-29, K-31, and K-33. Four electrical switchyards and eight cooling towers served these buildings. Numerous support facilities were built where machinery was fabricated, serviced, repaired, and cleaned. Enrichment of weapons-grade uranium ceased in the 1960s. The plant enriched uranium for civilian nuclear power reactors until 1985, when all production operations ceased.

Uranium enrichment at ETTP has left a legacy of radioactive and chemical contamination in buildings, soils, sediments, and groundwater. The Department has identified more than 100 known or suspected sources of environmental contamination and has found uranium and other radioactive elements from enrichment processes to be widespread in the surrounding environment. Buried uranium-contaminated equipment and low-level radiological contaminated building rubble exist at several locations. Workers used volatile organic compounds in large quantities to clean and degrease equipment, releasing these compounds, specifically TCE, into the environment.

These organic chemicals contaminated soil, surface water, and groundwater when they were spilled, burned in pits, discharged into holding ponds, or placed in trenches for disposal.

4.2 REGULATORY BASIS

In 1989, USEPA placed the Oak Ridge Reservation, including ETTP, on its NPL of contaminated sites. As a result, cleanup activities (some of which were initiated under RCRA) were to be completed as CERCLA remedial actions. In 1992, a Federal Facility Agreement (FFA) was executed among the Department, USEPA Region 4, and the State of Tennessee.

The FFA provides the framework for cleanup activities at ETTP, establishes enforceable milestones, and coordinates the requirements of CERCLA and RCRA. In 1995, the Department placed D&D activities under the FFA and CERCLA. Cooperative agency efforts and regulatory initiatives in conjunction with the involvement of community stakeholder groups (such as the Oak Ridge Site-Specific Advisory Board) help guide the process and ensure cost-effective implementation of selected remedies.

Management of PCB waste is addressed through the Toxic Substances Control Act of 1976 (TSCA) Federal Facility Compliance Agreement with USEPA.

The Department in Oak Ridge is working with the State of Tennessee and USEPA Region 4 on a CERCLA decision strategy aimed at identifying remedial action objectives, cleanup criteria, land-use

restrictions, and technologies to be used at ETTP. Initially, decisions were made on soils, subsurface infrastructure, and burial grounds. The Record of Decision (ROD) for these elements outside the fence, or Zone 1, was signed in November 2002. The ROD addressing these elements in Zone 2 was signed in April 2005. Zone 2 includes the area within the main fence of ETTP (approximately 800 acres). Remedial activities required for the Zone 1 and Zone 2 RODs are currently underway. Residual contamination in groundwater, surface water, and sediments will be addressed on a sitewide basis. A Remedial Investigation/Feasibility Study and Proposed Plan are being finalized in support of the final ROD and closure of the site.

4.3 CLEANUP PLAN, COST, AND SCHEDULE

Process equipment removal has been completed in Buildings K-29, K-31, and K-33, and building demolition is taking place throughout the main plant area of the site. In addition, process equipment removal and preliminary demolition is occurring in process buildings K-25 and K-27. The scope of the K-25/K-27 Buildings D&D subproject, which began in FY 2001, is to abate the hazardous materials, remove process equipment and excess materials, demolish building structures, and dispose of associated wastes.

Supporting activities include the D&D of about 500 buildings and facilities covering approximately 15 million ft^2 which are being addressed as CERCLA removal actions consistent with Departmental/USEPA policy guidance. To achieve the desired end-state for ETTP as a private industrial park, buildings and facilities are scheduled for demolition based on the most cost-effective order. Facilities that have been officially transferred to a third party (currently the Community Reuse Organization of East Tennessee) for commercial use before being demolished will be removed from the demolition schedule and EM program. The scope of other facilities' D&D includes planning, utilities deactivation, asbestos and hazardous material abatement, equipment disposal, structure demolition, and waste disposal.

Of the 5000-acre ETTP footprint, there are 2200 acres with the potential for unascertained amounts of contamination. There are known groundwater plumes from former burial grounds and contaminated soils. In addition, there are facilities, including 125 major buildings, requiring D&D or transfer to the private sector. The accelerated cleanup strategy is to complete targeted remedial actions in Zone 1 (1400 acres outside the fenced main plant area), including the groundwater plumes and potential contamination, facility decommissioning within the main plant area, and comprehensive remedial actions for the main plant subsurface area (Zone 2, which encompasses 800 acres inside the Main Plant area fence).

While planning continued on these decisions, ETTP implemented actions from earlier, site-specific decision documents to eliminate known risks, such as the excavation of the K-1070-A burial ground and K-1070-C/D G-Pit. Actions from these early decisions have been completed. Actions underway are provided in the approved RODs for Zone 1 outside the fence and Zone 2 within the fence. Future actions will be defined by the residual contamination ROD for the entire site, which will include the plumes and potential releases, as appropriate.

The estimate-to-complete ETTP is $1.56 billion. Appendix B includes a breakout of the required expenditures by FY and type of cost (D&D, remedial action, S&M, etc.). The current contract between the Department and Bechtel Jacobs Company, LLC includes incentives for completing all cleanup of ETTP, except the demolition of process buildings K-31 and K-33, which have already been cleaned and are anticipated to be transferred to commercial use. The cleanup of ETTP, except demolition of Bldgs. K-31 and K-33, is projected to be completed by FY 2012. However, the $1.56 billion estimate includes $55 million of demolition costs in FY 2012 in the event the transfer to commercial use does not occur. If this becomes the case, the actual demolition would be scheduled for sometime after FY 2012.

4.4 CHALLENGES AND UNCERTAINTIES

Although a great deal of remediation and D&D has been accomplished at ETTP, some uncertainties and challenges still exist through the completion of the cleanup. The Department is utilizing its risk management system to manage, mitigate, avoid, and/or eliminate the project risks as well as control potential project impacts. The risk management system includes provisions for identifying, managing, and tracking the risk elements. Key challenges and uncertainties specific to ETTP include the following.

- The Department and its predecessors processed recycled fuel through the GDPs, which spread activation and fission products throughout the enrichment cascades. Isotopes, such as technetium which is highly soluble in water and a mobile radionuclide, provide unique challenges in waste management, which DOE will address as appropriate.

- When the Department shut down the K-25 building, the uranium was not completely flushed from the system. Therefore, hold up of uranium in piping and process equipment is a risk that must be addressed prior to general D&D.

- Although the Department has learned a great deal about the extent and magnitude of contamination at ETTP, additional characterization is ongoing and will continue in the future. The Department and its contractors have developed data quality objectives (DQO) in partnership with the regulators to define and scope sampling campaigns necessary to compliantly and efficiently disposition waste.

- Much of the ETTP process equipment and enabling technology remains classified from a security perspective. The availability of trained and qualified security cleared workers is a challenge to ETTP. The Department and its contractors will continue to provide competitive wages and benefits to retain its workforce and attract skilled labor and management, but a successful outcome remains uncertain.

To clarify some of the uncertainties that will have an impact on cleanup plans, costs, and schedules, the following assumptions are key to the success of the ETTP cleanup mission:

- The site will be acceptable for private-sector industrial use following cleanup;

- Operation of the site and infrastructure will be commercialized;

- Costs for demolition of all buildings are estimated and planned, and buildings not transferred to the private sector for reuse will be demolished;

- Waste generated during cleanup that meets the waste acceptance criteria will be disposed of in the Oak Ridge on-site disposal cell;

- Some building slabs and infrastructure not contaminated above remediation levels may be left in place;

- Sediments and soil to 10 ft deep at some locations will require removal;

- Some in-situ groundwater treatment may be required to protect potential receptors;

- Slightly contaminated classified material will be left in place at one of the burial grounds; and

- Long-term institutional controls will be required to protect against residential use and control access to deeper soil contamination and contaminated groundwater.

4.5 ACCOMPLISHMENTS AT ETTP

4.5.1 Decontamination and Decommissioning

- Equipment removal and decontamination of the large process buildings, K 29, K-31, and K-33 are complete. All major components have been dismantled, removed, and disposed of, including 1,536 converters, 1,534 compressors, and 460 miles of piping. Over 13,100 waste shipments totaling approximately 320 million pounds were made to either the Nevada Test Site (NTS) or Envirocare of Utah, Inc. (Envirocare) disposal facilities.
- Approximately 250 facilities have been demolished and waste disposed. These include: seven buildings in the Main Plant Project, nineteen facilities in the K1064 Peninsula Area, and twenty-two facilities in the Laboratory Area. In addition, building demolition was completed on the K-29 Building, the first GDP to be demolished, as well as the largest equipment maintenance facilities at ETTP, the K-1420 and K-1401 Buildings and the K-1501 Steam Plant.
- Process equipment removal is underway in the K-25 and K-27 Buildings, as is the shipment of loose converters to the Nevada Test Site and the Environmental Management Waste Management Facility (EMWMF) for disposal. Continued activities include foaming, disassembly, and segmentation of process equipment. Excess materials consisting of non process items, such as laboratory equipment, laboratory samples, office equipment, tools, wooden pallets and crates, and drums of chemicals have been removed from the buildings and disposed in the EMWMF.
- K-25 Building demolition is in process. Approximately 117,000 ft2 of transite panels have been removed from the exterior of the building, filter houses have been demolished, and transite enclosures from interior stairways are being removed.

4.5.2 Remedial Actions

- Excavation of 26 trenches and 62 circular auger pits at the K 1070-A burial ground was completed which resulted in disposal of over 28,000 tons, or approximately 17,480 m3, of waste at the Oak Ridge on site disposal facility.
- Remediation was completed at the K 1070 C/D G-Pit. The pit was considered to be a primary source of organic contamination in area soils and groundwater. The G-Pit excavation resulted in approximately 175 m3 of contaminated soil that was treated by thermal desorption and disposed in the Oak Ridge Industrial Landfill located at the Y-12 Plant.
- More than 15,000 tons of contaminated soils and debris have been removed from Blair Quarry, a former waste disposal site adjacent to ETTP, with site restoration completed in 2005. The project served as a pilot for the strategy that was developed and approved for the characterization and verification of Zone 1 and Zone 2 areas at ETTP.
- More than 40,250 tons of scrap metal have been removed from the K-1064 and K-770 Scrap Yards and disposed in the Environmental Management Waste Management Facility (EMWMF).

5. PORTSMOUTH GASEOUS DIFFUSION PLANT

5.1 HISTORY

The 3714-acre Portsmouth site is located in south-central Ohio in rural Pike County, approximately 22 miles north of Portsmouth, Ohio. Construction of the site began in late 1952. The mission of the site was to increase the national production of enriched uranium and maintain the nation's superiority in the development and use of nuclear energy. The plant enriched uranium for commercial reactor fuel and military applications.

In the mid-1980s, the facilities and equipment required for the next generation of enrichment facilities technology, the Gas Centrifuge Enrichment Plant (GCEP), were constructed and installed at Portsmouth. However, the project was terminated in 1985 before going into full production because of a significant reduction in the worldwide demand for enriched material.

From 1991 until production ceased in 2001, the site produced only low-enriched uranium for commercial power plants. In 1993, uranium enrichment operations were turned over to the United States Enrichment Corporation (USEC) in accordance with the EPAct. USEC operated the plants to enrich uranium as a government corporation and leased the facilities from DOE. The regulation of nuclear safety during enrichment operations was transferred to the NRC in March 1997 and USEC completed the privatization process in July 1998.

In August 2000, USEC announced its intention to terminate enrichment operations at the Portsmouth GDP, and ceased these activities at the site in May 2001. At that time, DOE intervened and contracted with USEC to establish a Cold Standby (CSB) Program to maintain enrichment restart capability at the facility as a strategic hedge against disruption in the nation's supply of enriched uranium. The Department later re-evaluated the uranium market and terminated the CSB program at the end of FY 2005. Since that time, the GDP facilities have been maintained in cold shutdown status while D&D is being planned.

In December 2002, USEC announced the former centrifuge buildings at the Portsmouth site would be used for a lead cascade centrifuge demonstration plant. In January 2004, USEC announced that the Portsmouth site had been selected for a new advanced commercial plant, utilizing new centrifuge technology called the American Centrifuge Plant (ACP) that also will use former centrifuge facilities located at the site.

5.2 REGULATORY BASIS

Remedial actions at Portsmouth are currently the subject of a USEPA Administrative Consent Order issued on September 29, 1989 (amended in 1994 and 1997), and a Consent Decree with the State of Ohio, issued on September 1, 1989. These compliance agreements address the investigation and cleanup of releases of hazardous wastes pursuant to Sections 2002 (a)(1) and 3008 (h) of RCRA and State hazardous waste laws, and hazardous substances that are not hazardous wastes pursuant to Section 104 and 106(a) of CERCLA. The agreements define the roles and responsibilities of the Parties and require DOE to investigate Portsmouth for potential environmental impacts of past operations which resulted in releases of hazardous material and to provide groundwater and soil remediation plans as required. The investigation of the groundwater and soil has been conducted in a phased approach by dividing the site into four groundwater quadrants (a watershed approach) based primarily on the direction of groundwater and surface water flow.

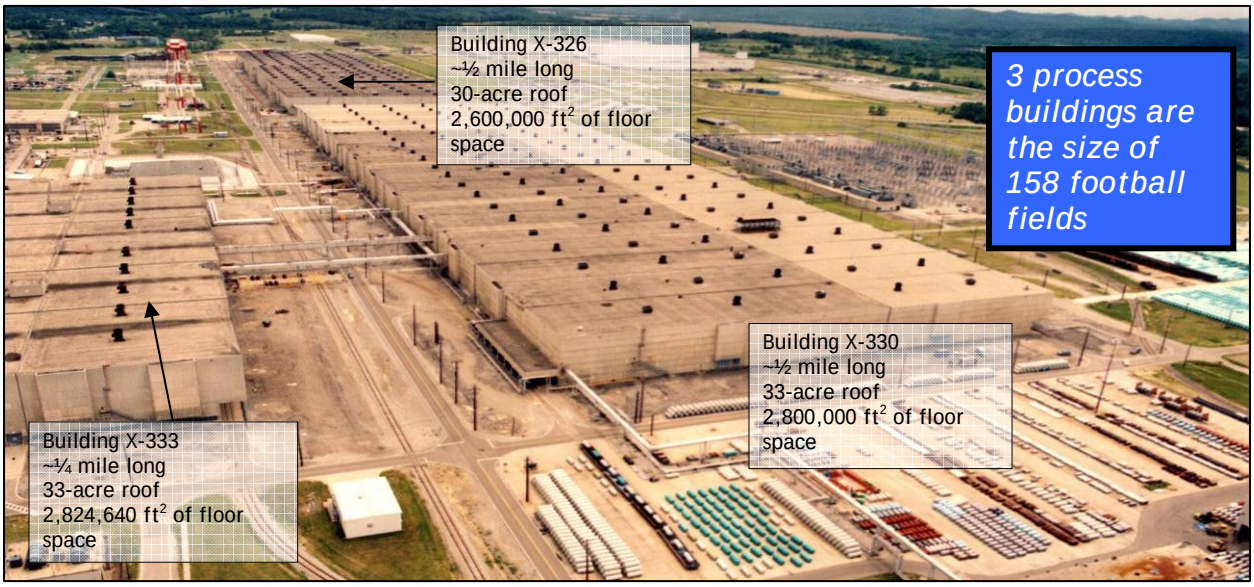
The Consent Order and its 1994 amendment were signed by DOE and USEPA. The Consent Decree was signed by DOE and Ohio EPA. The 1997 Consent Order amendment, which designated Ohio EPA responsible for day-to-day oversight of response action activities, was signed by DOE, USEPA, Ohio EPA.

Other agreements and permits have been negotiated for Portsmouth to ensure compliance with State and Federal laws and regulations (e.g., RCRA, TSCA, CWA, etc.). The Department is now working with the regulators to coordinate the regulatory activities associated with the D&D of the Portsmouth Gaseous Diffusion Plant with these existing compliance agreements and permits.

5.3 CLEANUP PLAN, COST, AND SCHEDULE

The Portsmouth D&D Project includes demolition and disposal of the GDP process equipment, process buildings, and other facilities auxiliary to the gaseous diffusion process. The project also will include remediation of contaminated soils and groundwater associated with gaseous diffusion operations. The objective of the project is to eliminate the potential for future contaminant releases from the GDP site in a manner that protects the worker, off-site human health, and the environment. The end-State vision is a cleanup that will allow industrial reuse of the majority of the site, but the Department, public, and regulators must work together to establish the specific completion criteria. A total of 134 facilities at the GDP will be addressed by the project, which includes nearly 10,600,000 ft^2 of floor space.

Nearly all of the Portsmouth GDP facilities are currently under lease to USEC and are projected to be returned to the Department in 2009. However, USEC may elect to continue leasing certain GDP facilities needed to support the ACP. These few facilities may need to be addressed in a secondary phase of the project after return to DOE by USEC.



As part of the planning process, the Department arranged with the U.S. Army Corps of Engineers (USACE) to prepare an independent, comprehensive cost estimate to complete D&D of the GDP facilities at both Portsmouth and Paducah. This cost estimate was developed for planning and budgeting purposes and is conceptual in nature. It was developed after on-site facility walkdowns and close evaluations of other completed or ongoing D&D work in Oak Ridge, Fernald, Rocky Flats, etc.

The planning process also included developing various technical alternatives for evaluation. Examples include on-site versus off-site waste disposal, environmental regulatory approaches, and consideration of the ongoing lease of GDP buildings to support the USEC American Centrifuge Plant (ACP). The specific regulatory process will be developed in consultation with the Ohio EPA and USEPA. The Department and regulators are in agreement that public involvement is a vital component of a successful cleanup project. Therefore, any regulatory approach will include provisions for substantive involvement of the public and other stakeholders.

The Portsmouth D&D Project is organized for descriptive purposes into nine distinct phases: (1) engineering and preplanning; (2) initial facilities S&M; (3) facility characterization; (4) hazardous materials abatement; (5) process equipment removal; (6) facility demolition; (7) characterization and remediation of soil and water from the deferred units (i.e., work related to Solid Waste Management Units (SWMUs) postponed until D&D); (8) disposition of process equipment, demolition debris, and contaminated soils; and (9) project closeout and transition to a long-term stewardship organization. While the phases are generally considered sequential for a particular facility or section of a facility, activities under each phase may be ongoing simultaneously in some facilities because of the massive size of some of the buildings. Additionally, a delay may be encountered for a few facilities needed to support the ACP project. While D&D plans accommodate a delay in the return of leased facilities through a second phase of D&D, the Department is working to reduce or eliminate the number of these potential facilities. D&D of the Portsmouth GDP is scheduled to be conducted from FY 2009 through 2044. The mission need for D&D of the Portsmouth GDP was approved in 2005 and an Alternative Selection and Cost Range was approved in August 2007. The Alternative Selection and Cost Range approval is referred to as "Critical Decision 1" in the Department's rigorous project management system. This approval is the formal Department decision to initiate the Portsmouth D&D project. Award of a contract to initiate physical D&D work is anticipated in FY 2009.

A comparison of the most recent estimates for D&D presented in this report against those included in the 2001 Triennial Report shows a significant increase in the costs of D&D. Changes in the assumed length of the D&D project schedule have resulted in cost changes for S&M, waste storage, groundwater treatment operations, and escalation. These changes at Portsmouth resulted primarily from accommodating the ACP lease. Further explanations of the changes in the 2007 D&D estimate are provided in the table below.

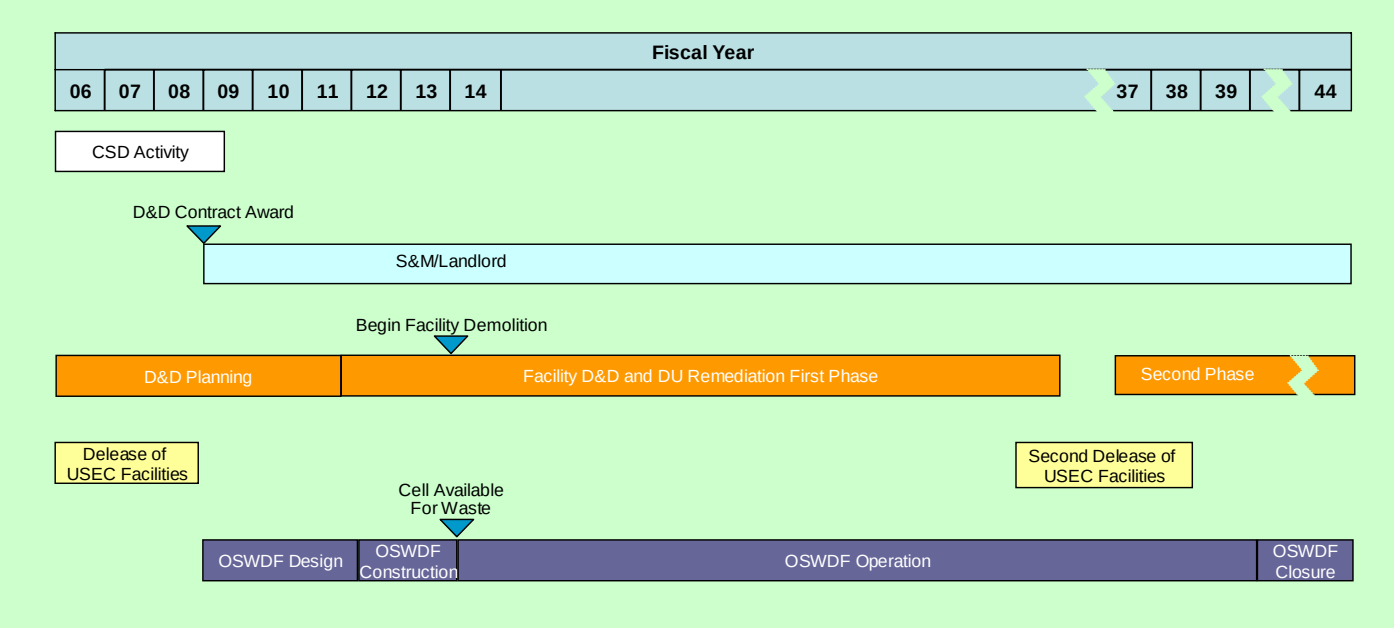
FACTORS AFFECTING THE D&D COST ESTIMATE INCREASE FROM 2001 TO 2007

Factor	Description	Impact
Scope	The 2007 estimate scope assumes comprehensive removal of GDP facilities, including underground utilities, tunnels, building slabs, etc. The 2000 estimate assumed that some facilities and utilities would be retained for a future industrial mission.	Estimating the full scope of D&D activities has resulted in increased schedule and cost.
Estimate range	The 2007 estimate is a conceptual estimate developed by the USACE.	Because of the conceptual nature of the current estimate, the estimate range is -30% to +30% greater than previous estimates

Schedule	The 2007 estimate reflects a pace of project activities that extends the duration of D&D activities.	Extending the project duration requires continued annual "hotel" costs (e.g., S&M, program management, landlord, etc.), which increases costs. Costs further increase due to escalation over the longer period of time.
S&M costs	Site S&M costs prior to initiation of D&D, which were not included in previous estimates, are now included in the estimate.	S&M costs preceding and during D&D are substantial.
Lessons learned	The 2007 estimate included numerous lessons learned gained from review of D&D activities at various DOE sites, including Oak Ridge, Fernald, Rocky Flats, etc., that were not available at the time of prior reports.	The incorporation of lessons learned from D&D at other sites has increased the D&D cost estimate.
Lease	The lease cost estimate assumes the use of GDP facilities to support the ACP project, making certain facilities unavailable for D&D until 2036.	Delays in the availability of GDP facilities for D&D result in extending project schedule and increasing "hotel" costs, with significant cost increases due to escalation.

The schedule for completion of the Portsmouth GDP work is now FY 2044, as shown in figure 5.1 below, and the preliminary cost range is approximately $5.4 to $11.6 billion (year of expenditure). The estimate for the project cost range includes project management, preparation of regulatory and other planning documents, facility characterization, utility reconfiguration, waste management, D&D/disposal of all GDP facilities, characterization and remediation of the deferred units, management and oversight, and project closeout. Long-term monitoring and oversight obligations are not included in this project. The cost estimates were developed for planning and budgeting purposes and is conceptual in nature. Appendix B Figure B.2 provides a detailed breakdown of the cost accounts supporting the estimate.

Figure 5.1 Portsmouth D&D/Remedial Projects Summary



5.4 CHALLENGES AND UNCERTAINTIES

A variety of risks and uncertainties exist for D&D efforts at Portsmouth. For example, the D&D plan assumes provisions for the construction and operation of an on-site waste disposal facility (OSWDF). The decision process to determine whether a CERCLA cell will actually be constructed has not been completed, and the outcome of that evaluation, along with public input, will affect the final decision. If an OSWDF is not developed, significant costs for off-site disposal will be incurred. In addition, the end-State objectives of the D&D efforts could change in response to stakeholder coordination. DOE has developed a risk management plan to actively track and mitigate these issues.

In keeping with the agency-wide emphasis on sound project and contract acquisition/management practices, the Portsmouth D&D Project will integrate lessons learned from other D&D sites. In addition, the proposed project schedule has been planned to allow the utilization of many members of the existing trained and cleared work force. With the approval of the alternative selection and cost range, the Department is poised to initiate D&D of the Portsmouth GDP.

5.5 ACCOMPLISHMENTS OF THE PORTSMOUTH CLEANUP TO DATE

Since the early 1990s, the Department has been conducting a comprehensive environmental cleanup program at the Portsmouth GDP. Significant actions initiated and completed to date are discussed in the following sections.

Demolition of the Inactive X-770 Mechanical Test Facility in early 2007

5.5.1 Decontamination and Decommissioning

Several major accomplishments achieved under the D&D efforts at the Portsmouth site include the following:

- Seven warehouses containing more than 187,000 drums of lithium hydroxide monohydrate were emptied and the material sold to private vendors;
- Fourteen surplus inactive facilities were removed from the site, eliminating long-term S&M costs associated with these structures.

5.5.2 Remedial Actions

- A total of five groundwater treatment facilities have been built on site to treat approximately 26 million gallons of groundwater per year.
- A large phytoremediation project was completed planting more than 3000 hybrid poplars to treat a TCE-contaminated groundwater plume on the south end of the Federal reservation.

- Groundwater treatment by oxidant injection was initiated at the X-701B groundwater plume, which contained the highest concentration of TCE at the site. Oxidant treatment will continue for approximately four years. Final remedy of the X-701B unit will include a soil cap over the entire area after treatment is completed. The project is expected to be completed in 2010.

- Four new extraction wells were installed to prevent further pollutant migration after one off-site well had detectable levels of TCE contamination (still, below the drinking water standard of 5 ppb).

- 8,400 tons of radioactively contaminated scrap metal that covered a seven-acre storage yard at the site was removed.

To date, a total of 37 remedial actions have been implemented, including 20 closure projects, five landfill caps, six interim remedial actions, and treatment at all five identified groundwater plume areas. Following initial investigations at the site, DOE, the Ohio EPA, and USEPA agreed to defer completion of 41 SWMUs in order to conduct further investigation and/or cleanup until plant D&D. These deferred units pose a relatively low-level risk to receptors. Additionally, cleanup of these units was deferred because remedial actions could interfere with ongoing operations or were proven ineffective because of the potential for recontamination. Nevertheless, one deferred unit, the X-342C Waste Hydrogen Fluoride Neutralization Pit, one of the 41 SWMUs was removed in FY 2006. There are 40 deferred units that remain to be addressed.

Remaining environmental remediation activities include the final Quadrant II remedy as well as further evaluation and remediation (as necessary) of the 41 deferred units.

6. PADUCAH GASEOUS DIFFUSION PLANT

6.1 HISTORY

The Paducah Gaseous Diffusion Plant (PGDP) is located in western McCracken County, Kentucky, approximately three miles south of the Ohio River and approximately 10 miles west of the city of Paducah. The Department-owned property encompasses 3556 acres. The primary industrial area is situated within a fenced security area consisting of approximately 748 acres. Within this area are numerous buildings, offices, support facilities, equipment storage areas, and active and inactive waste management units that comprise the Paducah GDP.

The Department property located outside the security fence consists of approximately 2808 acres. The Department controls 822 acres, while the remaining 1986 acres are leased to the Commonwealth of Kentucky as part of the West Kentucky Wildlife Management Area.

The site originally was known as the Kentucky Ordnance Works (KOW); a World War II munitions plant. In October 1950, the Atomic Energy Commission picked the KOW site for the second of three planned uranium enrichment plants. Operations began in 1952 and continue to produce low-assay enriched uranium (LEU) for nuclear reactor fuel. The EPAct transferred responsibility for uranium enrichment at Paducah to USEC. This newly created, wholly owned Government corporation was privatized in 1998. Since the shutdown of enrichment operations at the Portsmouth GDP, Paducah has been the sole domestic producer of enriched uranium hexafluoride product.

While USEC operates the enrichment facilities, the Department maintains ownership and acts as the site "landlord." USEC is responsible for the operation and maintenance of all primary process facilities and auxiliary facilities at the site. USEC facilities consist of process buildings, electrical switchyards, a steam plant, water treatment facility, chemical cleaning and decontamination facility, and maintenance and laboratory facilities. Although USEC is currently operating the Paducah GDP, the company has announced its intentions to transfer production operations to the new ACP when it becomes operational on the DOE Portsmouth reservation. USEC is currently projecting that the ACP will begin operations in 2010, with termination of Paducah GDP operations in 2012.

In addition to "landlord" activities, the Department oversees environmental restoration and waste management. Waste at this site is generated from remedial actions, former enrichment operations (i.e., legacy waste generated before USEC assumed responsibility), and D&D.

6.2 REGULATORY BASIS

PGDP is in an area of abundant surface water and groundwater resources. Bordering the east and west sides of the secure area are Little Bayou Creek and Bayou Creek, respectively. Both creeks flow north toward the Ohio River and much of their flow contains permitted effluent releases from PGDP. These effluents constitute the majority of normal flow in the creeks.

The major groundwater resource at PGDP is called the Regional Gravel Aquifer, which is considered the uppermost aquifer at PGDP and historically has served as a source of water to local residents. This aquifer originated near the southern boundary of PGDP, underlies nearly all of the secure area of the plant, and continues north to the Ohio River into which it drains.

Historic operations at Paducah have produced contaminated areas on-site and beyond site boundaries. Principal contaminants of concern include radionuclides, TCE, PCBs, metals, and other plant-related contaminants. Through spills and disposal operations, these contaminants have entered groundwater aquifers, formed groundwater plumes, and in some cases, migrated off-site and contaminating private drinking water wells. Off-site groundwater contamination was first discovered in residential wells in 1988. Initial investigation and implementation of response actions for the contaminated groundwater was addressed by an Administrative Consent Order issued by USEPA in 1988. In 1991, the Commonwealth of Kentucky and USEPA issued a RCRA permit for storage and treatment of hazardous wastes and a Hazardous and Solid Waste Amendments permit for corrective action of SWMUs. In May 1994, the Paducah site was placed on the EPA NPL under CERCLA. As a result, an FFA was signed by the Department, the Commonwealth of Kentucky, and USEPA Region 4, which establishes the framework for remedial action and D&D activities at Paducah, institutes enforceable milestones for key remedial action and D&D activities, and coordinates site-specific cleanup requirements under CERCLA and RCRA. Other compliance agreements, permits, and agreed orders have been negotiated for PGDP that establish the regulatory framework for addressing the inventory of legacy and newly generated waste at the site and to ensure compliance with Commonwealth of Kentucky and Federal laws and regulations (e.g., RCRA, TSCA, CWA, etc.).

6.3 CLEANUP PLAN, COST, AND SCHEDULE

Site cleanup at PGDP will be accomplished using a two-phased approach. The initial phase includes remediation of contaminated media, waste disposition, and D&D of current inactive facilities scheduled for completion by 2019. The second phase includes work scope associated with D&D of the GDP when operations cease. Paducah D&D is scheduled to begin in 2017. Remedial action and D&D activities for both phases will be completed under the Paducah FFA process in cooperation with the Commonwealth of Kentucky and USEPA.

The technical approach for remedial action includes a multi-phase process that incorporates mitigation of immediate risks (both on and off site); reduces further migration of the high concentration portion of off-site contamination; establishes a series of operable units (OUs) for on-site source areas with priority on areas contributing to off-site contamination; and evaluates a Comprehensive Sitewide Operable Unit (CSOU) that consists of a sitewide baseline risk assessment to evaluate any residual risk remaining at the site following remedial action and plant D&D. This risk assessment will serve as the basis for NPL delisting.

This approach is being implemented through an OU framework intended to maximize opportunities from regional approaches and economies of scale, reduce documentation costs, and provide a better process to evaluate cumulative effects in all media. Six major OUs established for evaluation of remedial actions include groundwater, surface water, burial ground, soils, D&D, and CSOU. Each OU is designed to aid in the remediation of contaminated media associated with PGDP. The groundwater, surface water, burial ground, and soils OU are scheduled to be completed by 2019. Although D&D activities for inactive PGDP facilities are underway, the D&D OU cannot be completed until plant operations cease.

The Paducah D&D scope includes the PGDP process buildings as well as the ancillary GDP facilities and supporting utilities and infrastructure, D&D scope therefore encompasses 532 structures, including 419 buildings with nearly 8,570,526 ft^2 of floor space and 113 ancillary facilities. The D&D activities are projected to include the removal of all building superstructures, concrete slabs on grade, and building foundations (removal of the slab and substructures to four feet below grade).

The PGDP D&D can be divided into the following seven steps: (1) S&M (preplanning activities); (2) Transition (securing D&D and pre-decisional contractors and preparing for plant changeover from S&M to D&D); (3) Planning and Preparation (contractor mobilization and pre-D&D work for utility and infrastructure modifications); (4) Process Facilities D&D; (5) Balance of Plant D&D (may coincide with Process Facilities D&D); (6) Deferred Units (addresses remediation of soils under and adjacent to the buildings/facilities as well as lagoons and other similar areas where soils that will be removed during D&D may be contaminated); and (7) Project Closeout.

Once the plant ceases operation and D&D of the currently operating GDP has been completed, the CSOU will be undertaken to include a sitewide baseline risk assessment to evaluate any residual risk remaining. If the risk assessment concludes that the actions taken collectively provide adequate protection to human health and the environment, a final proposed plan and ROD will be issued and a final remediation report declaring site remediation completed will be prepared. In the event the risk assessment determines additional actions are needed, a feasibility study will be developed with the preferred alternative documented in a proposed plan and ROD, followed by any necessary remedial actions. As part of the final CSOU evaluation, future land-use assumptions will be reassessed and modified, if necessary, to ensure consistency with the reasonably foreseeable land use.

Since the publication of the 2001 Triennial Report, various changes in the D&D basis-of-estimate (BOE) for the Paducah GDP has been incorporated into the D&D estimates. Changes in the project schedule have resulted in cost changes for S&M, waste storage, groundwater treatment operations, and escalation. Such changes at Paducah result primarily from accommodating other site missions. For additional information regarding factors affecting the increase in cost estimates from 2001 to 2007, refer to the table below.

FACTORS AFFECTING THE D&D COST ESTIMATE INCREASE FROM 2001 TO 2007

Factor	Description	Impact
Scope	The 2007 estimate scope assumes comprehensive removal of GDP facilities including underground infrastructure, building slabs, and contaminated soils. The 2001 estimate did not include certain remedial action activities (e.g., additional contaminated soil/construction spoils removal and disposal of storage areas).	Estimating the full scope for the Paducah site has resulted in increased schedule and cost.
Estimate Range	The 2007 estimate is a conceptual estimate developed by the USACE. Cost estimating guidelines for conceptual cost estimates include a range of -30% to +50%. Previous contingency estimates added only 20%.	Because of the conceptual nature of the current estimate the estimate range is -30% to +30% greater than previous estimates.
Schedule	The 2007 estimate assumes certain facilities will be needed for an extended period to support ongoing depleted uranium conversion operations.	Extending the project duration requires continued annual “hotel” costs (e.g., S&M, Program Management, landlord, etc.) and escalation.
Surveillance & Maintenance costs	Site S&M costs prior to initiation of D&D are now included in the 2007 estimate. In the 2001 estimate, these costs were not included because DOE assumed that D&D of the facilities immediately followed plant shutdown.	S&M costs preceding and during D&D are substantial.

Factor	Description	Impact
Lessons Learned	The 2007 estimate includes numerous lessons learned gained from review of D&D activities at various DOE D&D sites, including Oak Ridge, Fernald, Rocky Flats, etc. these lessons were not available at the time of prior reports.	By incorporating lessons learned, this estimate more accurately reflects the realistic costs of performing work at DOE facilities.

As part of the planning process, the Department arranged with the USACE to prepare an independent, comprehensive, cost estimate to complete D&D of the GDP facilities at both Portsmouth and Paducah. This cost estimate was developed for planning and budgeting purposes and is conceptual in nature. It was developed after on-site facility and close evaluations of other completed or ongoing D&D work in Oak Ridge, Fernald, Rocky Flats, etc.

The schedule for completion of the Paducah work is FY 2040, as shown in figure 6.1 below. The preliminary cost range for this project is approximately $5.8 to $12.5 billion (year of expenditure) [$8.3 billion (-30%+50%)]. The estimate for the project cost range includes project management, preparation of planning documents, facility characterization, utility reconfiguration, waste management and disposal of all facilities constructed to support the GDP, management and oversight, and project closeout (obligations are not included in this project). The cost estimates were developed for planning and budgeting purposes and is conceptual in nature. A detailed cost breakdown by cost account is contained in Appendix B Figure B.3.

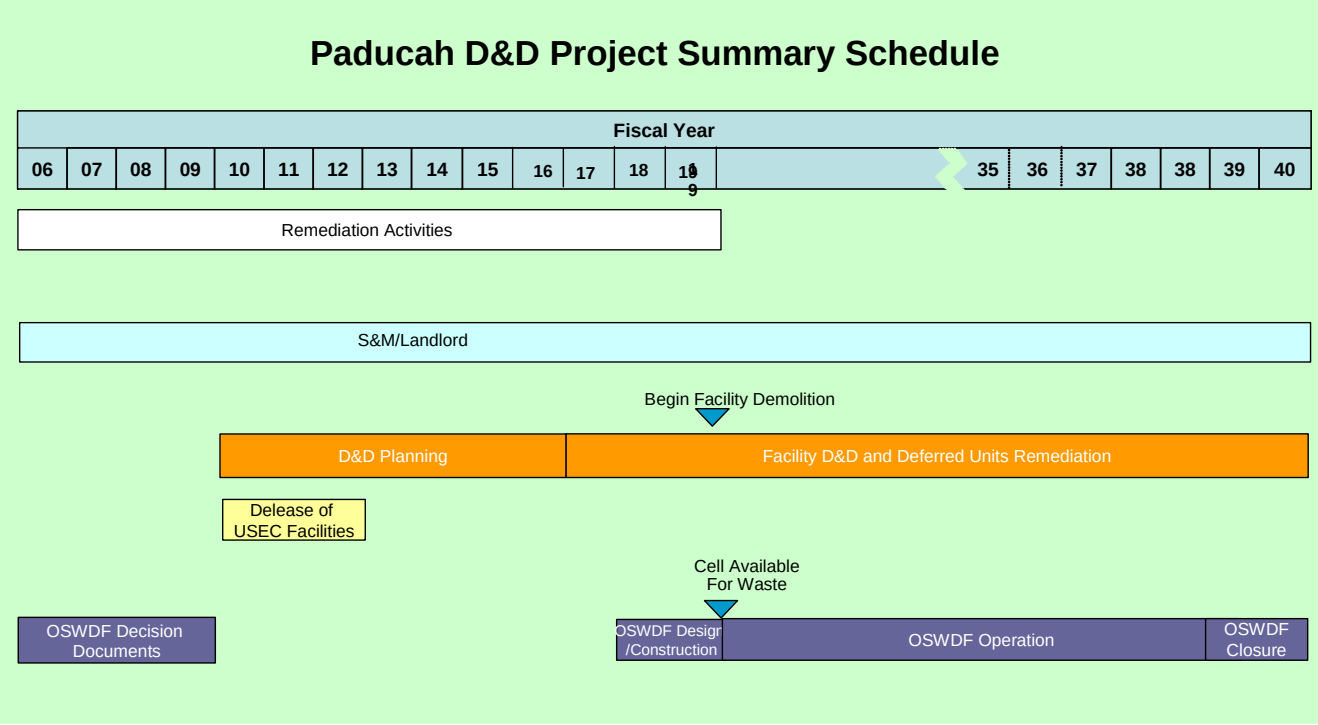


Figure 6.1 Paducah GDP D&D/Remedial Projects Summary

6.4 CHALLENGES AND UNCERTAINTIES

A variety of challenges remain to be overcome for the remedial action and D&D efforts at Paducah. Legacy waste (e.g., hazardous, nonhazardous, radioactive, PCB, and mixed wastes), DOE Material Storage Areas, various contaminants in creeks and soil, off-site groundwater plumes, burial grounds, and on-site sources of groundwater contamination continue to pose major problems. DOE is, however, actively addressing these issues.

Several key uncertainties associated with the Paducah D&D and remedial action estimate and projected implementation plan are as follows:

- Timing for GDP transfer to DOE—it is assumed USEC will be notifying the Department of its intent to return the Paducah GDP to DOE in 2009 or 2010. The time frame for this notification may change.
- Scope of remedial actions for Burial Ground and off-site groundwater plumes—estimates are based on assumptions that may be impacted once the CERCLA decision process is completed.
- Construction of CERCLA cell—current estimate assumes a CERCLA cell will be built. The decision process to determine whether a CERCLA cell will actually be constructed has not been completed, and the outcome of evaluation of site waste disposal options, along with public input, will affect the final decision.
- Level of contamination under the operating facilities—currently it is not known what level of contamination, if any, is present under the GDP operating facilities. Schedules and estimates may be impacted if significant contamination is found during the D&D of these buildings.

As part of the D&D planning process, the Department has included relevant recommendations from past reports (e.g., NAS study for reducing D&D costs for the three GDPs) and other applicable lessons learned in an effort to maximize the efficiency and cost effectiveness of remedial actions and D&D activities at the site.

Specific examples of plans developed in response to past recommendations include the following:

- Completion of a comprehensive plan, schedule, and cost estimate for remedial actions and D&D activities at Paducah;
- Ongoing prioritization of cost- and risk-reduction factors in remedial action and D&D planning;
- Stakeholder involvement to ensure meaningful participation in the remedial action and D&D process; and
- Coordination with State and Federal agencies to ensure consistency in the regulatory approach and implementation

Similar to incorporation of recommendations from past reports, the Department has evaluated and implemented lessons learned from other D&D projects (e.g., ETTP, Portsmouth GDP, and Savannah River). Communication and coordination with personnel from these and other DOE sites undergoing D&D will continue.

6.5 ACCOMPLISHMENTS OF THE PADUCAH CLEANUP TO DATE

Paducah continues to make considerable progress toward achieving the ultimate end-State of the plant. Significant actions initiated and completed to date are discussed in the following sections.

6.5.1 Decontamination and Decommissioning

- Completed D&D activities at the C-402 Lime House.
- Demolished and disposed of four buildings, twelve 25,000 gallon tanks and associated piping at the hydrogen fluoride tank farm.
- Completed demolition of six facilities at the nitrogen generation complex.

6.5.2 Remedial Actions

- Completed removal and disposal of approximately 31,000 tons of scrap metal to eliminate potential direct-contact risks to plant workers and a source of surface water contamination. This was the largest collection of scrap metal at any DOE facility.
- Removed and disposed of "Drum Mountain," a contaminated scrap pile potentially contributing to surface water contamination, to eliminate potential direct-contact risks to plant workers and reduce off-site migration.
- Initiated remedial action for TCE contamination in soil and groundwater at the C-400 Building.
- Completed disposal of 21,400 ft^3 of uranium tetrafluoride (UF4).
- Constructed and implemented groundwater treatment systems for both the northwest and northeast plumes to reduce contaminant migration.
- Extended municipal water lines as a permanent source of drinking water to affected residents to eliminate exposure to contaminated groundwater.
- Constructed hard-piping to reroute surface runoff around highly contaminated portions of the north-south diversion ditch to reduce potential migration of surface contamination; completed hard-piping and installation of a retention basin and excavation of the on-site portions of the north-south diversion ditch, removing a direct-contact risk to plant workers and surface water contamination.
- Excavated soil with high concentrations of PCBs at on-site areas to reduce off-site migration and potential direct-contact risks to plant workers.
- Applied in-situ treatment of TCE-contaminated soil at the cylinder drop test site using innovative technology (i.e., LASAGNA™ technology) to eliminate a potential source of groundwater contamination.
- Removed petroleum-contaminated soil from SWMU 193 to eliminate a potential source of groundwater contamination.
- Completed installation of a sediment control basin at Outfall 001 to control the potential migration of contamination during scrap removal.

6.5.3 Waste Management

- Completed disposal of all outside stored legacy low-level waste (approximately 32,000 ft^3).
- Designed and built a leachate treatment system for the C-746-U Landfill.

7. FUND ANALYSIS

The EPAct requires that the fifth triennial report contain recommendations from the Secretary of Energy regarding reauthorization of the program and the Fund. To make these recommendations, the Department must assess whether the Fund estimate is sufficient to cover the required cleanup scope. This section begins by discussing the Fund's historical financial data and its current financial status. After discussing future work to be completed under the Fund, the approach for assessing the Fund's sufficiency is discussed. The section then concludes with results of the sufficiency analysis and the Department's recommendations to Congress.

7.1 FUND RESOURCES

7.1.1 History and Status

Originally, the EPAct authorized annual deposits to the D&D Fund of $330 million from Government contributions and $150 million from domestic nuclear utility assessments. The contributions would be made for 15 years beginning in FY 1993, and be adjusted annually for inflation. Detailed calculations based upon historical production records and negotiations with the utilities, adjusted the annual utility contribution down to $148.6 million and increased the Government contribution to $331.4 million. Congress revised the Government contribution to $339.7 million annually (before inflation) beginning in FY 1999 and to $369.6 million annually (before inflation) beginning in FY 2002. Contributions in excess of current fiscal year funding requirements are invested in U.S. Treasury securities to earn interest.

The D&D fund history and status table below shows historical inflows and outflows for the Fund from FY 1993 through FY 2006, along with a mix of actuals and projections for FY 2007. With the FY 2007 amounts included, the table covers the entire 15-year contribution period established by EPAct. When this 15-year period is complete, the Fund will have amassed $9.5 billion in cumulative receipts from contributions and interest earnings. Approximately half of the receipts will have been used to pay for cleanup work with the remaining half invested to earn interest.

The table also displays the status of the utilities' contributions and Government's contributions to the Fund. The utilities are current on their payments as the amount paid equals the amount assessed. However, cumulative Government contributions were $918.6 million less than assessed through the FY 2007 assessment. Due to the delay in Government's contributions, the Fund has also lost potential interest earnings of approximately $670.3 million through FY 2007 (see Appendix A). These two combined amounts represent approximately $1.6 billion due from the Government (as of FY 2007) to satisfy the Government's original obligation to the Fund. Appendix A displays detailed calculations for the Government contribution deficit, the lost interest earnings, and how continuing contributions from beyond the original 15-year timeframe could eliminate the shortfalls. The amount due from the Government continues to incur inflation and accumulate additional lost interest. Therefore, total contributions needed from the Government are approximately $1.8 billion provided the government completes the makeup prior to 2012.

For assessing the Fund's sufficiency, the Department assumed the Government will be contributing $1.8 billion. Appendix A projects a possible illustrative scenario for a future contribution profile.

D&D Fund History and Status

(Dollars in Millions)

	Year	Utility Assessment	Utility Paid	Government Contribution Assessment	Government Contributions Paid	Interest Income (Accrual Basis) (A)	Total Annual Receipts	Annual Costs	Cumulative Book Value of Fund Investments (B)
Historical	1993	$149.7	$147.9	$331.4	$0.0	$0.1	$148.0	#N/A	$148.0
	1994	152.5	172.5	342.8	197.2	11.2	380.9	$226.0	304.0
	1995 (C)	160.0	160.4	348.2	133.7	23.8	317.9	352.7	266.5
	1996	159.9	160.5	357.3	350.0	31.5	542.0	326.0	483.7
	1997	164.5	164.9	367.6	386.6	49.1	600.6	207.5	884.2
	1998	168.2	160.5	375.8	398.0	73.1	631.6	210.4	1,289.6
	1999	170.9	158.8	391.4	398.1	92.5	649.4	219.0	1,715.2
	2000	174.8	174.8	400.3	420.0	123.0	717.8	254.3	2,181.1
	2001	180.6	180.6	414.0	419.1	141.7	741.4	309.7	2,591.4
	2002	185.6	185.8	462.7	420.0	141.3	747.1	320.6	3,017.2
	2003	188.9	188.9	471.0	432.7	135.5	757.1	357.2	3,447.3
	2004	193.1	193.1	481.2	449.3	131.1	773.5	379.8	3,755.4
	2005 (D)	197.4	197.4	493.9	459.3	144.6	801.3	546.4	4,027.4
	2006	205.3	205.3	511.9	446.4	165.2	816.9	498.5	4,336.7
	Through 2006	$2,451.4	$2,451.4	$5,749.5	$4,910.4	$1,263.7	$8,625.5	$4,208.1	$4,336.7 (B)
	Projected 2007 (E)	213.2	213.2	531.5	452.0	174.3	839.5	532.3	307.2
	Projected 15 Year Totals	$2,664.6	$2,664.6	$6,281.0	$5,362.4	$1,438.0	$9,465.0	$4,740.4	$4,643.9 (B)

Notes:

(A) Interest is reported on an accrual basis and agrees with the audited financial statements. The accrual basis includes amounts in interest that were earned during the period but may not be collected. In addition, discounts and premiums are reported as adjustments to income ratably over the life of the security.

(B) The Fund's $8.6 billion in cumulative receipts through FY 2006 have been used for: 1) $4.2 billion in cleanup costs as shown in the table and 2) $4.4 billion to acquire U.S. Treasury securities. This $4.4 billion purchase value of the securities exceeds the $4.3 billion book value shown in the table and on the balance sheet of the Fund's financial statements. This is a typical accrual value versus cash value difference that is ongoing and applicable to any year. More of the securities held by the Fund at FY 2006 yearend had been purchased at a premium price rather than a discounted price. Therefore, the actual cash outlays to purchase these securities are higher than the current book value that factors in amortization of premiums and discounts since the time of purchase (i.e. accrual based value).

(C) The FY 1995 utility assessment and payment reflect a $3.7 million acceleration of future assessments, because one utility paid the remaining assessments for one of its power plants that was no longer in service. The $3.7 million payment covered 12 future years (fiscal years 1996 through 2007).

(D) For FY 2005, utility assessments and payments were originally $198.2 million. The $197.4 million shown in the table reflects a reduction for approximately $0.8 million in refunds to two utilities. A June 2005 court decision determined that two utilities did not owe their assessments. DOE refunded their lifetime assessments from FY 1993 through FY 2005 and discontinued the billings for FY 2006 and forward.

(E) Utility and Government contributions were received early in FY 2007 and were known as the report was being prepared. Interest earnings, annual costs, and investment balances are estimates. Interest is based on the monthly average through the first 6 months of FY 2007. Costs are based on the EM baseline, and the book value of investments is the FY 2006 ending balance plus the net of projected FY 2007 receipts and costs.

7.1.2 Investment Strategy

Consistent with the EPAct, D&D Fund managers have predicated the investment strategy of the D&D Fund on the expected cash outlays and receipts to the D&D Fund. Funds not required for disbursement to the Department's contractors or uranium/thorium licensees are invested in U.S. Treasury

securities. An 18-month outlay schedule forecasts expected expenditures for D&D Fund-related work. This schedule is analyzed along with the maturities of currently held investments and additional receipts (such as interest earnings and contributions) to formulate a strategy for investments maturity to meet the outlay requirements. The investment strategy intends to maximize the investment return on funds that are not required for disbursement.

As noted previously in the D&D fund history and status table, the Fund had a book value of $4.3 billion at the end of FY 2006 (historical without FY 2007 projections). All but $32 million of the investments were in U.S. Treasury notes. The $32 million was invested in U.S. Treasury overnight securities to provide the necessary liquidity for ongoing disbursements. The Department issues audited D&D Fund financial statements each fiscal year.

7.2 FUND REQUIREMENTS

7.2.1 Remaining Work Scope

The Department has achieved several cleanup milestones with the $4.2 billion of costs incurred through FY 2006, but significant cleanup work remains. Cleanup estimates for future work are reflected in the following discussion.

East Tennessee Technology Park (ETTP): The estimate to complete ETTP is $1.56 billion in year of expenditure dollars. Appendix B includes a breakout of the required expenditures by fiscal year (FY) and type of cost (D&D, remedial action, S&M, etc.). The current Bechtel Jacobs Corporation (BJC) contract includes incentives for completing all the cleanup of ETTP, except the demolition of process buildings K-31 and K-33, which have already been cleaned. To complete ETTP closure, gaseous diffusion process equipment must be removed from the K-25 and K-27 buildings, and four GDP buildings must be demolished. In addition, over 300 other support facilities need to be demolished, soil cleanup inside the plant footprint needs be completed, and potential groundwater contamination needs to be addressed. There will be continuing post-closure, long-term stewardship activities that will be paid from funding sources other than the Fund. The cleanup of ETTP, except demolition of K-31 and K-33, is projected to be completed by FY 2012. The current assumption is that K-31 and K-33 will be transferred for commercial use. However, the $1.56 billion estimate includes $55 million of demolition costs in FY 2012 if the transfer to commercial use does not occur. The actual demolition then would be scheduled for sometime after FY 2012.

Portsmouth and Paducah: In support of D&D project planning in 2006, the Department arranged with the USACE to prepare a comprehensive, independent estimate to complete D&D of the GDP facilities at Portsmouth and Paducah. In addition, estimates for design, construction, operation, and closure of an OSWDF; S&M and landlord functions before and during D&D; and deferred unit remediation were provided separately by DOE contractors and combined with the USACE estimate. Development of these estimates used modeling, bottoms-up, and level-of-effort estimating.

The schedule for D&D work at Portsmouth is FY 2009 through FY 2044. The cost estimate for this project is conceptual and has a most probable value of $7.7 billion in year of expenditure dollars. However, the range on this estimate is -30%/+50%, which yields a cost range of approximately $5.4 to $11.6 billion. DOE Order 413.3A and Manual 413.3-1 require alternatives and cost ranges be established for Critical Decision-1 (CD-1) packages. A range of -30%/+50% is an acceptable range for a conceptual estimate of this nature per the Association for Advancement of Cost Engineering International Recommended Practices.

D&D work at of Paducah is scheduled to begin in FY 2017 and continue through FY 2040. The cost estimate for this project is also conceptual and has a most probable value of $8.3 billion in year of expenditure dollars. The range on this estimate is also -30%/+50%, which yields a cost range of approximately $5.8 to $12.5 billion.

The estimates for Portsmouth and Paducah D&D include project management; preparation of regulatory and other planning documents; facility characterization; utility reconfiguration; design, construction, operation, and closure of an OSWDF; removal and disposal of all facilities constructed to support the GDP; characterization and remediation of the deferred units; construction management and oversight; and project closeout. Long-term monitoring and oversight obligations resulting from the burial of classified waste or long-term care of the disposal site caps are not included in this project.

Other D&D Fund work totaling approximately $500 million in year of expenditure dollars is reflected in the current Portsmouth plan. This work includes various cold shutdown activities conducted by USEC, ongoing remediation, environmental monitoring, waste management, and S&M activities. With the exception of relatively minor long-term expenses (e.g., litigation support, retirement benefits, State grants), these activities are either absorbed by the D&D project or are concluded by FY 2011.

Other D&D Fund work totaling approximately $1.4 billion in year of expenditure dollars is in the current Paducah estimates and includes ongoing remediation activities, environmental monitoring, waste management, and landlord and S&M activities that are scheduled for completion in 2019.

Future cost profiles for Portsmouth and Paducah providing a complete cost account breakdown for the fund analysis are provided in Appendix B, Figures B.2 and B.3. These figures display the combined costs for each site of the project's most probable values plus the "Other Fund work" described previously.

Uranium/Thorium: The D&D Fund must also continue reimbursements to licensees of active uranium and thorium processing sites for the portion of their remedial action costs attributable to Federally related byproduct material. The Department's Office of Commercial Disposition Options oversees the uranium-thorium reimbursements. Through the FY 2007 payment, the Department has paid approximately $554 million to the licensees. Estimates for the Triennial Report conservatively assume reimbursements will reach the legislative ceiling established by Congress by 2025. Legislation enacted in 2002 (Public Law 107-222) was the last adjustment to the legislative ceiling and increased the maximum reimbursements to $715 million in FY 2002 dollars. This equates to $817 million when inflated to FY 2007 dollars. The Department is currently assuming a reimbursement level of $20 million per year. With the ceiling increasing each year for inflation, the Department could owe up to $374 million in year of expenditure dollars over the next several years. A future cost profile of uranium/thorium is provided in Appendix B, Figure B.4.

7.3 D&D FUND SUFFICIENCY

7.3.1 Uncertainties in Assessing Fund Sufficiency

Assessing the D&D Fund's sufficiency involves several uncertainties. Cleanup work covered by the D&D Fund involves large, complex projects, some of which will not be completed for almost 40 years. Many of the cost estimates are conceptual in nature, so actual costs could fall within a sizable range of the point estimates used to assess the Fund's sufficiency. Economic factors such as long-term inflation rates as well as the long-term rate of return on the Fund's investments can significantly impact Fund sufficiency.

In addition, projects such as the Paducah GDP D&D have tentative start and completion dates that are several years in the future. Any delays in the assumed schedule would affect the Fund's bottom line because expensive S&M costs continue until D&D begins. Finally, the exact scope to be covered by the Fund is uncertain. The EPAct includes language indicating the Fund can be used for remedial action costs to the extent the Fund is sufficient.

With an awareness of these uncertainties, the Department developed a "Base Case**"** of future assumptions to enable an analysis of Fund sufficiency. This Base Case reflects the most likely scenario for completing cleanup of the GDPs. It reflects the current programmatic assumptions about strategies,

schedules, expected costs, etc. that have been discussed throughout this report. It also assumes the status quo on work scope covered by the Fund so that future remedial action scope is included. Appendix C provides a future cost profile for the Base Case, which uses forecasts for interest and inflation rates as shown in Appendix D. This case assumes the payment into the fund to makeup the deficit of Government contributions, including lost interest earnings.

Given the uncertainties involved in analyzing the Fund's sufficiency, the Department also performed sensitivity analyses to evaluate the effects of changes in assumptions concerning rates, schedules, and scope. Appendix E provides a detailed discussion of these alternate scenarios, and Appendix F provides the cost results.

7.3.2 Forecasting Approach

To assess the Fund's sufficiency, the Department started with the existing Fund balance and added in projected annual inflows and outflows to get a projected annual running balance. Future cash outflows are based on projected annual spending from the Fund for FY 2007 and forward as cleanup work is performed and uranium/thorium licensees are reimbursed (see Appendix C for the Base Case and Appendix F for the alternate scenarios). Future cash inflows come from contributions and interest earnings for FY 2007 and forward. Projections include the final contribution for the utilities in FY 2007 of approximately $213 million as well as the Government contribution profile discussed earlier. Projections of annual interest earnings are calculated by multiplying the running balance in the Fund by the forecasted interest rates on Treasury notes. These projections vary with each case/scenario. Interest earnings are achieved as long as there is a positive balance in the Fund. As noted earlier, the Department calculated the cost estimates and interest earnings projections in year of expenditure dollars by using the rates presented in Appendix D.

Goals of the modeling were to determine: 1) the cost of remaining work in year of expenditure dollars; 2) the Fund's ending balance after all work is completed; 3) if a Fund shortfall is projected, the year the Fund balance will be exhausted; and 4) if a Fund shortfall is projected, the number of years an annual contribution of $450 million (for illustrative purposes only) would be needed to make the Fund sufficient. These same results were also generated for each of the alternate cases.

Annual contributions to eliminate a shortfall in the Fund were not considered to start until after the Government satisfied its original contribution requirements. Beginning in FY 2012, $450 million (for illustrative purposes only) in annual contributions would be targeted toward the projected shortfall in the Fund. The forecasting model assumes this contribution stream would begin in 2012 rather than waiting until the Fund's balance is exhausted. This approach is consistent with the EPAct and the accumulation of resources through the investment strategy.

7.4 RESULTS

Table 7.4.1 summarizes shortfall options of the Fund sufficiency analysis using for illustrative purposes an assumed $450 million a year in outyear contributions. As of September 30, 2006, the Fund had incurred $4.2 billion in historical costs. When combined with estimated future costs of $19.8 billion, a total life cycle cost of $24 billion is projected (see Appendix C). Based on these cost projections, modeling indicates the Fund will have an $11 billion shortfall, with the Fund's balance being exhausted in 2022 in the Base Case. For the Fund to remain sufficient, the Base Case assumed 13 years of annual contributions of $450 million starting in FY 2012. Likewise, the alternate scenarios evaluated for the sensitivity analyses also project a significant shortfall in the Fund, with the balance being exhausted within the 7-year window of 2021 to 2028. The shortfalls range from $8.2 to $20.9 billion. Detailed results of the sensitivity analysis are provided in Appendix F.

Scenario	Historical Costs (FY 1993 - FY 2006)	Future Costs (FY 2007 & Forward)	Lifecycle Costs	Fund Shortfall	Year the Fund's Balance Becomes Negative	Years of $450M Annual Contribution (beginning FY 2012) needed to make Fund Sufficient
BASE CASE	**$4.2**	**$19.8**	**$24.0**	**($10.9)**	**2022**	**13**
Alternate Scenarios						
Pessimistic Economics	$4.2	$29.4	$33.6	($20.9)	2021	31
ETTP Completion Delayed to 2014	$4.2	$19.9	$24.1	($11.0)	2022	13
Paducah Start Delayed to 2022	$4.2	$21.5	$25.7	($12.5)	2024	13
Paducah Start Delayed to 2030	$4.2	$24.7	$28.9	($15.7)	2025	13
Base Case Less Remedial Action	$4.2	$17.7	$21.9	($8.2)	2025	8
Paducah Delay to 2022 Less Remedial Action	$4.2	$19.2	$23.4	($9.6)	2027	9
Paducah Delay to 2030 Less Remedial Action	$4.2	$22.1	$26.3	($12.4)	2028	9

Table 7.4.1 **Results of Sufficiency Analysis**
(dollars in billions and in year of expenditure)

It should be noted that previous efforts to assess the adequacy of the Fund likewise yielded concerns about its sufficiency. In 1991 before the Fund was established, GAO used the Department's estimates to analyze the adequacy of several funding scenarios to support the GDP cleanup work anticipated under the proposed EPAct (see GAO Report RCED-92-77BR "Uranium Enrichment – Analysis of Decontamination and Decommissioning Scenarios"). At that time, the Department's estimate for cleaning up the three GDPs was $19.1 billion in 1992 constant dollars ($28.4 billion in FY 2007 constant dollars with DUF6 disposition excluded as it is today).

To provide the needed funding, GAO concluded that the Fund would require an annual contribution of $500 million indexed for inflation to be sufficient to cover all cleanup work. GAO assumed the annual contribution would continue for the life of the cleanup work, which was predicted to last perhaps to 2040. The EPAct set an annual contribution level of $480 million indexed for inflation for 15 years. The Department was to formally assess the Fund's sufficiency at the end of the 15 years of contributions and determine if the Fund should be reauthorized. The amount to be collected over these 15 years would total $7.2 billion in 1992 dollars, which is significantly less than the $19.1 billion cost estimate that existed at that time.

Similarly, previous Triennial reports related concerns that the Fund would be insufficient to cover the full scope of work. In addition, in 2004, GAO issued audit report GAO-04-692, "Uranium

Enrichment Decontamination and Decommissioning Fund is Insufficient to Cover Cleanup Costs" stating that the Fund is significantly insufficient under all the scenarios it assessed.

Accordingly, the scenarios analyzed with the current cost estimates used in this report (the most thorough estimates to date), confirms earlier concerns about Fund sufficiency despite the fact that the current lifecycle estimate of $18 billion (2007 dollars) is $10 billion less that the 1991 estimate of $28.4 billion (2007 dollars)

7.5 ADDITIONAL D&D FUND UNCERTAINTIES

In addition to the Fund's sufficiency there are additional uncertainties that could impact the demands on the D&D Fund.

First: collection of contributions from the Government through the FY 2007 contribution were $918.6 million less than assessed under the EPAct. This shortfall has led to a projected $670 million in lost interest earnings. Full payment of assessments and lost interest is required to fund planned activities and is assumed in this report when assessing the Fund's sufficiency. If Government contributions are not continued to match the full assessed amounts, additional annual contributions will be required.

Second: litigation costs for lawsuits filed against the Department by workers and adjoining landowners at Paducah and Portsmouth GDPs have been included in the current estimate. However, any settlements resulting from the lawsuits, if paid from the Fund, have not been estimated.

Third: there is an inherent uncertainty associated with planning for large complex projects. Estimates for D&D of the Portsmouth and Paducah GDPs used in this report reflect a single point estimate within a range of -30% to +50%. As the projects progress through their life cycle, the Department's goal is to reduce this uncertainty with higher quality cost estimates, good-faith regulatory negotiations, use of best available technologies, effective contract acquisition processes, and project management planning, oversight, and controls.

8. CONCLUSIONS AND RECOMMENDATIONS

Given that significant cleanup and D&D work remains to be completed and that the Fund balance is projected for a large shortfall, the Department recommends that Congress reauthorize the program and the Fund so that the Government can satisfy its original obligation to the Fund including lost interest.

The Department also recommends that funding for the continued remedial actions associated with the D&D of the GDPs continue to come from the Fund.

The Fund has historically funded both remedial action and D&D, which has proven key to the success of projects completed to date. Without project integration and the flexibility provided by a single unified funding source, the Fund and the projects will be vulnerable to disruptions that could impact schedule, costs and the workforce. The remedial actions involving soil removal surrounding the facilities are impossible to accurately forecast until the facilities are removed and the areas exposed. Management flexibility is essential to provide contractors the ability to mobilize and sequence the workforce without the inefficiencies of segregated project management and funding.

Experiences at recent major cleanup sites, Rocky Flats and Fernald, have proven this. Funding came via one appropriation which helped facilitate the timely and efficient closure of these former weapon production facilities. The Department, as well as State and Federal regulators, consider the D&D and remedial action projects to be not only physically integrated (e.g. environmental media cleanup under and around existing structures and facilities) but joined through negotiated cleanup agreements that incorporate an integrated D&D/remedial action approach. Consequently, the Department recommends continued funding of remedial action through the Fund.

APPENDIX A

DEFICIT ON GOVERNMENT CONTRIBUTIONS + LOST INTEREST

Deficit on Government Contributions + Lost Interest

All Dollars in Million $

Annual Contribution per Energy Policy Act of 1992	$480.0
Amount Recovered from Utilities	$148.6
Government Responsibility per year - Through FY 1998	$331.4
Increase to Annual Contribution -- FY 99 legislation (From $480M to $488.3M)	$8.3
Revised Government Responsibility per year- FY 1999 - FY 2001	$339.7
Increase to Annual Contribution -- FY 2002 legislation (From $488.3M to $518.2M)	$29.9
Revised Government Responsibility per year - FY 2002 - FY 2007	$369.6

Assumptions:

Inflation Rate: 2.71% (See Table on Page 2) Geometric mean of annual growth rate from FY 1993 - FY 2006

Interest Rate: 4.83% (See Table on Page 2) Geometric Mean of D&D Fund Portfolio return from FY 1993 - FY 2006

Calculation of Government Deficit and Lost Interest Earnings

Fiscal Year	*Government Responsibility (Oct 1992 Dollars)*	*Inflation Factor per CPI*	*Government Responsibility w/ Escalation*	*Contribution Received*	*Each FY's Responsibility vs. Contribution Received*	*Cumulative Running Surplus/(Deficit)*	*Number of Years of Compounding Until Deficit Payoff*	*Interest Rate Index*	*Lost Interest*
1993	$331.4	1.0000	$331.4	$0.0	($331.4)	($331.4)	15	2.0296	($341.2)
1994	331.4	1.0346	342.9	197.2	(145.7)	(477.1)	14	1.9361	(136.4)
1995	331.4	1.0508	348.2	133.7	(214.5)	(691.6)	13	1.8468	(181.6)
1996	331.4	1.0783	357.3	350.0	(7.3)	(698.9)	12	1.7617	(5.6)
1997	331.4	1.1093	367.6	386.6	19.0	(679.9)	11	1.6805	12.9
1998	331.4	1.1340	375.8	398.0	22.2	(657.7)	10	1.6030	13.4
1999	339.7	1.1523	391.4	398.1	6.7	(651.0)	9	1.5292	3.5
2000	339.7	1.1784	400.3	420.0	19.7	(631.3)	8	1.4587	9.0
2001	339.7	1.2186	414.0	419.1	5.1	(626.2)	7	1.3914	2.0
2002	369.6	1.2518	462.7	420.0	(42.7)	(668.9)	6	1.3273	(14.0)
2003	369.6	1.2743	471.0	432.7	(38.3)	(707.1)	5	1.2661	(10.2)
2004	369.6	1.3018	481.2	449.3	(31.9)	(739.0)	4	1.2078	(6.6)
2005	369.6	1.3364	493.9	459.3	(34.6)	(773.6)	3	1.1521	(5.3)
2006	369.6	1.3850	511.9	446.4	(65.5)	(839.1)	2	1.0990	(6.5)
2007	369.6	1.4379	531.5	452.0	(79.5)	(918.6)	1	1.0483	(3.8)
Total -- FY 1993 through FY 2007			**$6,281.0**	**$5,362.4**		**($918.6)**			**($670.3)**

Schedule for Repayment of Government Deficit and Lost Interest

	Beginning Outstanding Deficit with Lost Interest	*Inflation Rate*	*Government Responsibility w/ Escalation*	*Projected Contribution Received*	*Each FY's Responsibility vs. Contribution Received*	*Cumulative Running Surplus/(Deficit)*	*Number of Years of Compounding Until Deficit Payoff*	*Interest Rate Index*	*Lost Interest*
2008 - Projected --w/ 1 yr inflation on remaining deficit	($1,588.9)	1.0271	($1,631.9)	$463.0	N/A	($1,168.9)	1	1.0483	($56.5)
2009 - Projected --w/ 1 yr inflation on remaining deficit	(1,225.4)	1.0271	($1,258.5)	$463.0	N/A	(795.5)	1	1.0483	($38.4)
2010 - Projected --w/ 1 yr inflation on remaining deficit	(834.0)	1.0271	($856.6)	$463.0	N/A	(393.6)	1	1.0483	($19.0)
2011 - Projected --w/ 1 yr inflation on remaining deficit	(412.6)	1.0271	($423.7)	$423.7	N/A	0.0			
Total -- FY 2008 through FY 2011				**$1,812.7**					**($113.9)**

Total -- FY 1993 through FY 2011				**$7,175.1**					**($784.2)**

Deficit on Government Contributions + Lost Interest

Growth Rate -- Geometric Mean

Source: United States Bureau of Labor Statistics. Consumer Price Index - All Urban Consumers.Series ID: CUUR0000SA0. Not Seasonally Adjusted. www.bls.gov.

CPI-U as of October 1992	141.8		
Date of CPI		Growth Rate -- Geometric Mean	Inflation Factor (FY CPI divided by Oct '92 CPI)*
(August unless	CPI - U	Growth in CPI-U	
noted)	(1982-1984 = 100)	[(Yr 2 - Yr 1) / Year 1]+1	
1991	136.6		
1992	140.9	1.0315	
1993	144.8	1.0277	1.0000
1994	149.0	1.0290	1.0212
1995	152.9	1.0262	1.0508
1996	157.3	1.0288	1.0783
1997	160.8	1.0223	1.1093
1998	163.4	1.0162	1.1340
1999	167.1	1.0226	1.1523
2000	172.8	1.0341	1.1784
2001	177.5	1.0272	1.2186
2002	180.7	1.0180	1.2518
2003	184.6	1.0216	1.2743
2004	189.5	1.0265	1.3018
2005	196.4	1.0364	1.3364
2006	203.9	1.0382	1.3850
Total through FY 2006		1.0271	
	Growth Rate	2.71%	
Projected for 2007			1.4379

*Escalation factors are based on the CPI-U for August of each year. The August CPI-U is used to escalate the annual assessment on domestic utilities, because it is the last published CPI-U rate available when the assessments are billed at the beginning of each fiscal year. For example, August 1993 CPI-U was used for the FY 1994 calculation.

Interest Rate -- Geometric Mean

For 2007 Report

Fiscal Year	Rate of Return per audited financials	Rate of Return Plus 1.0
1994	0.0401	1.040100
1995	0.0603	1.060300
1996	0.0607	1.060700
1997	0.0465	1.046500
1998	0.0400	1.040000
1999	0.0600	1.060000
2000	0.0600	1.060000
2001	0.0594	1.059400
2002	0.0503	1.050300
2003	0.0419	1.041900
2004	0.0364	1.036400
2005	0.0354	1.035400
2006	0.0378	1.037800
Geometric Mean through FY 06		1.048322
		4.83%

APPENDIX B

GASEOUS DIFFUSION PLANTS FUTURE COSTS

	East Tennessee Technology Park								
Year	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	**Total**
Total	**$ -**	**$ -**	**$ 44,615**	**$ 1,250,785**	**$ 150,267**	**$ -**	**$ -**	**$ 109,405**	**$ 1,555,072**
FY 2007	$ -	$ -	$ 11,656	$ 200,359	$ 15,122	$ -	$ -	$ 15,500	**$ 242,637**
FY 2008	$ -	$ -	$ 9,288	$ 217,941	$ 33,051	$ -	$ -	$ 16,400	**$ 276,680**
FY 2009	$ -	$ -	$ 11,134	$ 253,076	$ 6,066	$ -	$ -	$ 18,170	**$ 288,445**
FY 2010	$ -	$ -	$ 9,613	$ 224,581	$ 2,143	$ -	$ -	$ 19,398	**$ 255,735**
FY 2011	$ -	$ -	$ 2,924	$ 206,853	$ 43,854	$ -	$ -	$ 19,756	**$ 273,387**
FY 2012	$ -	$ -	$ -	$ 147,975	$ 50,031	$ -	$ -	$ 20,181	**$ 218,187**

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Figure B.1. East Tennessee Technology Park site future costs
(dollars in thousands and in year of expenditure)

	Portsmouth								
Year	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	**Total**
Total	**$ 3,714,938**	**$ 745,548**	**$ 2,692,118**	**$ 6,422**	**$ 526,134**	**$ 164,099**	**$ 284,893**	**$ 53,584**	**$ 8,187,735**
FY 2007	$ 5,193	$ 803	$ -	$ 4,516	$ 14,038	$ 31,734	$ 112,115	$ 899	**$ 169,299**
FY 2008	$ 13,188	$ 11,620	$ -	$ 1,906	$ 13,359	$ 27,000	$ 112,019	$ 1,172	**$ 180,264**
FY 2009	$ 30,060	$ 10,827	$ 75,848	$ -	$ 18,610	$ 30,639	$ 43,957	$ 946	**$ 210,886**
FY 2010	$ 67,077	$ 13,747	$ 83,216	$ -	$ 6,410	$ 49,840	$ 12,168	$ 969	**$ 233,427**
FY 2011	$ 72,192	$ 15,062	$ 91,815	$ -	$ -	$ 24,886	$ 4,633	$ 992	**$ 209,580**
FY 2012	$ 118,197	$ 24,760	$ 69,774	$ -	$ -	$ -	$ -	$ 1,016	**$ 213,746**
FY 2013	$ 116,795	$ 24,139	$ 71,378	$ -	$ -	$ -	$ -	$ 1,038	**$ 213,350**
FY 2014	$ 123,457	$ 20,749	$ 73,020	$ -	$ -	$ -	$ -	$ 1,061	**$ 218,287**
FY 2015	$ 123,767	$ 23,755	$ 74,699	$ -	$ -	$ -	$ -	$ 1,084	**$ 223,306**
FY 2016	$ 126,420	$ 24,495	$ 76,417	$ -	$ -	$ -	$ -	$ 1,108	**$ 228,441**
FY 2017	$ 129,018	$ 25,369	$ 78,175	$ -	$ -	$ -	$ -	$ 1,132	**$ 233,694**
FY 2018	$ 132,958	$ 24,980	$ 79,973	$ -	$ -	$ -	$ -	$ 1,157	**$ 239,069**
FY 2019	$ 141,405	$ 20,166	$ 81,813	$ -	$ -	$ -	$ -	$ 1,183	**$ 244,567**
FY 2020	$ 136,389	$ 28,898	$ 83,695	$ -	$ -	$ -	$ -	$ 1,209	**$ 250,191**
FY 2021	$ 138,831	$ 30,258	$ 85,620	$ -	$ -	$ -	$ -	$ 1,236	**$ 255,945**
FY 2022	$ 144,136	$ 27,755	$ 87,590	$ -	$ 1,088	$ -	$ -	$ 1,263	**$ 261,831**
FY 2023	$ 133,541	$ 30,002	$ 89,604	$ -	$ 13,414	$ -	$ -	$ 1,291	**$ 267,853**
FY 2024	$ 136,069	$ 31,030	$ 91,665	$ -	$ 13,929	$ -	$ -	$ 1,319	**$ 274,013**
FY 2025	$ 139,160	$ 31,771	$ 93,774	$ -	$ 14,262	$ -	$ -	$ 1,348	**$ 280,314**
FY 2026	$ 143,986	$ 31,150	$ 95,931	$ -	$ 14,316	$ -	$ -	$ 1,378	**$ 286,761**
FY 2027	$ 150,509	$ 29,559	$ 98,138	$ -	$ 13,743	$ -	$ -	$ 1,408	**$ 293,356**
FY 2028	$ 159,240	$ 26,642	$ 100,395	$ -	$ 12,386	$ -	$ -	$ 1,439	**$ 300,102**
FY 2029	$ 161,881	$ 32,635	$ 102,704	$ -	$ 8,313	$ -	$ -	$ 1,471	**$ 307,004**
FY 2030	$ 189,838	$ 17,657	$ 105,067	$ -	$ -	$ -	$ -	$ 1,503	**$ 314,064**
FY 2031	$ 169,665	$ 14,021	$ 107,484	$ -	$ 28,581	$ -	$ -	$ 1,536	**$ 321,287**
FY 2032	$ 185,715	$ 14,787	$ 109,956	$ -	$ 16,647	$ -	$ -	$ 1,570	**$ 328,676**
FY 2033	$ 205,024	$ 17,121	$ 112,485	$ -	$ -	$ -	$ -	$ 1,605	**$ 336,235**
FY 2034	$ 85,308	$ 6,827	$ 69,911	$ -	$ 5,987	$ -	$ -	$ 1,640	**$ 169,674**
FY 2035	$ -	$ 14,779	$ 29,562	$ -	$ -	$ -	$ -	$ 1,677	**$ 46,017**
FY 2036	$ -	$ 10,174	$ 28,948	$ -	$ 60,662	$ -	$ -	$ 1,715	**$ 101,500**
FY 2037	$ 10,355	$ 10,325	$ 37,616	$ -	$ 66,853	$ -	$ -	$ 1,755	**$ 126,904**
FY 2038	$ 20,812	$ 13,552	$ 45,743	$ -	$ 48,632	$ -	$ -	$ 1,795	**$ 130,535**
FY 2039	$ 50,875	$ 13,746	$ 45,330	$ -	$ 58,788	$ -	$ -	$ 1,836	**$ 170,576**
FY 2040	$ 82,348	$ 13,939	$ 45,106	$ -	$ 58,739	$ -	$ -	$ 1,878	**$ 202,009**
FY 2041	$ 32,081	$ 14,130	$ 50,314	$ -	$ 37,375	$ -	$ -	$ 1,922	**$ 135,822**
FY 2042	$ 39,446	$ 28,051	$ 50,683	$ -	$ -	$ -	$ -	$ 1,966	**$ 120,145**
FY 2043	$ -	$ 16,267	$ 33,943	$ -	$ -	$ -	$ -	$ 2,011	**$ 52,221**
FY 2044	$ -	$ -	$ 34,724	$ -	$ -	$ -	$ -	$ 2,057	**$ 36,782**

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Figure B.2. Portsmouth site future costs
(dollars in thousands and in year of expenditure)

	Paducah								
Year	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	**Total**
Total	**$ 5,217,758**	**$ 1,105,760**	**$ 1,010,471**	**$ 169,140**	**$ 1,657,418**	**$ 136,998**	**$ 328,873**	**$ 49,915**	**$ 9,676,333**
FY 2007	$ -	$ 1,450	$ -	$ 14,713	$ 37,515	$ 21,647	$ 20,683	$ 4,603	**$ 100,611**
FY 2008	$ -	$ 1,063	$ -	$ 18,256	$ 42,130	$ 22,745	$ 23,647	$ 3,968	**$ 111,809**
FY 2009	$ -	$ 167	$ -	$ 7,406	$ 51,423	$ 13,218	$ 29,652	$ 4,480	**$ 106,347**
FY 2010	$ -	$ -	$ 23,183	$ 27,793	$ 10,282	$ 9,660	$ 23,953	$ 5,014	**$ 99,886**
FY 2011	$ -	$ -	$ 21,682	$ 23,486	$ 10,181	$ 8,270	$ 22,958	$ 5,052	**$ 91,628**
FY 2012	$ -	$ -	$ 85,907	$ 29,428	$ 28,234	$ 7,190	$ 22,694	$ 5,087	**$ 178,541**
FY 2013	$ -	$ -	$ 87,877	$ 15,068	$ 85,638	$ 6,921	$ 23,577	$ 4,125	**$ 223,206**
FY 2014	$ -	$ -	$ 89,889	$ 13,368	$ 106,859	$ 6,991	$ 33,421	$ 3,163	**$ 253,691**
FY 2015	$ -	$ -	$ 91,947	$ 8,667	$ 118,803	$ 7,129	$ 25,799	$ 2,779	**$ 255,125**
FY 2016	$ -	$ -	$ 94,103	$ 9,147	$ 114,854	$ 7,307	$ 24,315	$ 2,831	**$ 252,556**
FY 2017	$ 34,962	$ 69,193	$ 75,344	$ 1,807	$ 123,369	$ 7,515	$ 25,256	$ 2,883	**$ 340,330**
FY 2018	$ 150,413	$ 23,507	$ 76,195	$ -	$ 88,895	$ 8,009	$ 26,339	$ 2,938	**$ 376,295**
FY 2019	$ 184,808	$ 38,233	$ -	$ -	$ 50,354	$ 10,396	$ 26,579	$ 2,993	**$ 313,362**
FY 2020	$ 196,116	$ 39,803	$ 14,401	$ -	$ 70,442	$ -	$ -	$ -	**$ 320,763**
FY 2021	$ 202,781	$ 40,577	$ 14,732	$ -	$ 52,348	$ -	$ -	$ -	**$ 310,438**
FY 2022	$ 207,445	$ 41,511	$ 15,071	$ -	$ 35,094	$ -	$ -	$ -	**$ 299,121**
FY 2023	$ 211,318	$ 42,318	$ 15,418	$ -	$ 34,034	$ -	$ -	$ -	**$ 303,087**
FY 2024	$ 217,099	$ 43,442	$ 15,772	$ -	$ 31,295	$ -	$ -	$ -	**$ 307,608**
FY 2025	$ 222,092	$ 44,442	$ 16,135	$ -	$ 32,014	$ -	$ -	$ -	**$ 314,684**
FY 2026	$ 227,518	$ 46,573	$ 16,506	$ -	$ 32,751	$ -	$ -	$ -	**$ 323,348**
FY 2027	$ 233,075	$ 48,292	$ 16,886	$ -	$ 33,504	$ -	$ -	$ -	**$ 331,758**
FY 2028	$ 238,437	$ 49,403	$ 17,275	$ -	$ 34,275	$ -	$ -	$ -	**$ 339,389**
FY 2029	$ 248,591	$ 50,200	$ 17,672	$ -	$ 34,929	$ -	$ -	$ -	**$ 351,392**
FY 2030	$ 271,913	$ 51,702	$ 18,078	$ -	$ 35,870	$ -	$ -	$ -	**$ 377,563**
FY 2031	$ 278,168	$ 52,891	$ 18,494	$ -	$ 36,695	$ -	$ -	$ -	**$ 386,248**
FY 2032	$ 255,072	$ 54,108	$ 18,920	$ -	$ 37,683	$ -	$ -	$ -	**$ 365,783**
FY 2033	$ 245,095	$ 55,353	$ 19,355	$ -	$ 38,402	$ -	$ -	$ -	**$ 358,204**
FY 2034	$ 249,664	$ 56,246	$ 19,800	$ -	$ 39,135	$ -	$ -	$ -	**$ 364,845**
FY 2035	$ 254,271	$ 53,263	$ 20,255	$ -	$ 40,035	$ -	$ -	$ -	**$ 367,825**
FY 2036	$ 260,847	$ 50,312	$ 20,721	$ -	$ 41,271	$ -	$ -	$ -	**$ 373,151**
FY 2037	$ 265,901	$ 51,062	$ 21,198	$ -	$ 42,060	$ -	$ -	$ -	**$ 380,221**
FY 2038	$ 272,017	$ 52,237	$ 21,686	$ -	$ 43,027	$ -	$ -	$ -	**$ 388,967**
FY 2039	$ 263,918	$ 44,710	$ 22,184	$ -	$ 44,017	$ -	$ -	$ -	**$ 374,829**
FY 2040	$ 26,238	$ 3,703	$ 3,782	$ -	$ -	$ -	$ -	$ -	**$ 33,723**

Note 1: "Other Costs" capture miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Figure B.3. Paducah site future costs
(dollars in thousands and in year of expenditure)

Year	Uranium/ Thorium
	Total
	$ 373,817
FY 2007	$ 19,800
FY 2008	$ 20,000
FY 2009	$ 20,000
FY 2010	$ 20,000
FY 2011	$ 20,000
FY 2012	$ 20,000
FY 2013	$ 20,000
FY 2014	$ 20,000
FY 2015	$ 20,000
FY 2016	$ 20,000
FY 2017	$ 20,000
FY 2018	$ 20,000
FY 2019	$ 20,000
FY 2020	$ 20,000
FY 2021	$ 20,000
FY 2022	$ 20,000
FY 2023	$ 20,000
FY 2024	$ 20,000
FY 2025	$ 14,017

Figure B.4. Uranium/thorium future costs
(dollars in thousands and in year of expenditure)

APPENDIX C

BASE CASE COST PROFILE

		Base Case								
	Base Case	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	Uranium/Thorium Reimburse
Total	**$ 19,792,957**	**$ 8,932,696**	**$ 1,851,308**	**$ 3,747,204**	**$ 1,426,347**	**$ 2,333,819**	**$ 301,096**	**$ 613,766**	**$ 212,904**	**$ 373,817**
FY 2007	$ 532,347	$ 5,193	$ 2,253	$ 11,656	$ 219,588	$ 66,676	$ 53,381	$ 132,797	$ 21,002	$ 19,800
FY 2008	$ 588,754	$ 13,188	$ 12,683	$ 9,288	$ 238,103	$ 88,540	$ 49,745	$ 135,666	$ 21,540	$ 20,000
FY 2009	$ 625,679	$ 30,060	$ 10,994	$ 86,981	$ 260,482	$ 76,099	$ 43,857	$ 73,609	$ 23,596	$ 20,000
FY 2010	$ 609,048	$ 67,077	$ 13,747	$ 116,012	$ 252,374	$ 18,835	$ 59,499	$ 36,122	$ 25,382	$ 20,000
FY 2011	$ 594,596	$ 72,192	$ 15,062	$ 116,420	$ 230,340	$ 54,035	$ 33,156	$ 27,590	$ 25,800	$ 20,000
FY 2012	$ 630,473	$ 118,197	$ 24,760	$ 155,681	$ 177,404	$ 78,265	$ 7,190	$ 22,694	$ 26,283	$ 20,000
FY 2013	$ 456,556	$ 116,795	$ 24,139	$ 159,255	$ 15,068	$ 85,638	$ 6,921	$ 23,577	$ 5,163	$ 20,000
FY 2014	$ 491,977	$ 123,457	$ 20,749	$ 162,909	$ 13,368	$ 106,859	$ 6,991	$ 33,421	$ 4,223	$ 20,000
FY 2015	$ 498,431	$ 123,767	$ 23,755	$ 166,647	$ 8,667	$ 118,803	$ 7,129	$ 25,799	$ 3,863	$ 20,000
FY 2016	$ 500,997	$ 126,420	$ 24,495	$ 170,520	$ 9,147	$ 114,854	$ 7,307	$ 24,315	$ 3,939	$ 20,000
FY 2017	$ 594,025	$ 163,980	$ 94,561	$ 153,520	$ 1,807	$ 123,369	$ 7,515	$ 25,256	$ 4,016	$ 20,000
FY 2018	$ 635,364	$ 283,371	$ 48,487	$ 156,168	$ -	$ 88,895	$ 8,009	$ 26,339	$ 4,096	$ 20,000
FY 2019	$ 577,929	$ 326,213	$ 58,398	$ 81,813	$ -	$ 50,354	$ 10,396	$ 26,579	$ 4,175	$ 20,000
FY 2020	$ 590,954	$ 332,506	$ 68,701	$ 98,096	$ -	$ 70,442	$ -	$ -	$ 1,209	$ 20,000
FY 2021	$ 586,384	$ 341,612	$ 70,835	$ 100,352	$ -	$ 52,348	$ -	$ -	$ 1,236	$ 20,000
FY 2022	$ 580,953	$ 351,581	$ 69,266	$ 102,661	$ -	$ 36,182	$ -	$ -	$ 1,263	$ 20,000
FY 2023	$ 590,940	$ 344,859	$ 72,320	$ 105,022	$ -	$ 47,448	$ -	$ -	$ 1,291	$ 20,000
FY 2024	$ 601,621	$ 353,167	$ 74,473	$ 107,438	$ -	$ 45,224	$ -	$ -	$ 1,319	$ 20,000
FY 2025	$ 609,015	$ 361,252	$ 76,213	$ 109,909	$ -	$ 46,276	$ -	$ -	$ 1,348	$ 14,017
FY 2026	$ 610,109	$ 371,504	$ 77,723	$ 112,437	$ -	$ 47,067	$ -	$ -	$ 1,378	$ -
FY 2027	$ 625,114	$ 383,584	$ 77,851	$ 115,024	$ -	$ 47,247	$ -	$ -	$ 1,408	$ -
FY 2028	$ 639,492	$ 397,677	$ 76,045	$ 117,670	$ -	$ 46,661	$ -	$ -	$ 1,439	$ -
FY 2029	$ 658,396	$ 410,472	$ 82,835	$ 120,376	$ -	$ 43,242	$ -	$ -	$ 1,471	$ -
FY 2030	$ 691,628	$ 461,751	$ 69,359	$ 123,145	$ -	$ 35,870	$ -	$ -	$ 1,503	$ -
FY 2031	$ 707,535	$ 447,833	$ 66,912	$ 125,978	$ -	$ 65,276	$ -	$ -	$ 1,536	$ -
FY 2032	$ 694,459	$ 440,788	$ 68,895	$ 128,876	$ -	$ 54,330	$ -	$ -	$ 1,570	$ -
FY 2033	$ 694,439	$ 450,119	$ 72,473	$ 131,840	$ -	$ 38,402	$ -	$ -	$ 1,605	$ -
FY 2034	$ 534,519	$ 334,973	$ 63,073	$ 89,711	$ -	$ 45,122	$ -	$ -	$ 1,640	$ -
FY 2035	$ 413,842	$ 254,271	$ 68,042	$ 49,817	$ -	$ 40,035	$ -	$ -	$ 1,677	$ -
FY 2036	$ 474,651	$ 260,847	$ 60,486	$ 49,669	$ -	$ 101,934	$ -	$ -	$ 1,715	$ -
FY 2037	$ 507,125	$ 276,256	$ 61,388	$ 58,814	$ -	$ 108,913	$ -	$ -	$ 1,755	$ -
FY 2038	$ 519,502	$ 292,830	$ 65,789	$ 67,429	$ -	$ 91,659	$ -	$ -	$ 1,795	$ -
FY 2039	$ 545,404	$ 314,792	$ 58,456	$ 67,515	$ -	$ 102,805	$ -	$ -	$ 1,836	$ -
FY 2040	$ 235,732	$ 108,585	$ 17,642	$ 48,888	$ -	$ 58,739	$ -	$ -	$ 1,878	$ -
FY 2041	$ 135,822	$ 32,081	$ 14,130	$ 50,314	$ -	$ 37,375	$ -	$ -	$ 1,922	$ -
FY 2042	$ 120,145	$ 39,446	$ 28,051	$ 50,683	$ -	$ -	$ -	$ -	$ 1,966	$ -
FY 2043	$ 52,221	$ -	$ 16,267	$ 33,943	$ -	$ -	$ -	$ -	$ 2,011	$ -
FY 2044	$ 36,782	$ -	$ -	$ 34,724	$ -	$ -	$ -	$ -	$ 2,057	$ -

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

(dollars in thousands and in year of expenditure)

APPENDIX D

ECONOMIC RATES FOR BASE CASE

Economic Rates for Base Case

Economic data used for the base case is presented in the table below. Data for the last year of the forecast was used as the future rates for years beyond FY 2017. Forecasts of Consumer Price Index—Urban inflation rates reflect non-seasonally adjusted rates. Forecasts of U.S. Treasury Note interest rates reflect 10-year nominal Treasury Note interest rates. These inflation and interest rates were adjusted to real rates by subtracting inflation from the 10-year T-Note nominal interest rates. More specifically, real interest rates were calculated by the following equation:

Real Interest Rate = [(1+Nominal Interest Rate)/(1+Nominal Inflation Rate)] – 1.

Base Case Economic Data

	Consumer Price Index - Urban Inflation Rate	10-Year Nominal Treasury Note Rates	10-Year Real Rates
FY 2007	2.04%	4.88%	2.78%
FY 2008	2.60%	5.04%	2.38%
FY 2009	2.57%	5.20%	2.57%
FY 2010	2.46%	5.30%	2.77%
FY 2011	2.36%	5.29%	2.86%
FY 2012	2.30%	5.29%	2.92%
FY 2013	2.30%	5.29%	2.92%
FY 2014	2.30%	5.29%	2.92%
FY 2015	2.30%	5.29%	2.92%
FY 2016	2.30%	5.29%	2.92%
FY 2017	2.30%	5.29%	2.92%
Projections after 2017	**2.30%**	**5.29%**	**2.92%**

APPENDIX E

ALTERNATE SCENARIOS

Alternate Scenarios

The following narrative defines the Base Case used to assess the D&D Fund's sufficiency as well as alternate scenarios evaluated for sensitivity analysis. Appendix F contains a summary of the cost profiles for all alternate scenarios. More detailed cost profiles for each scenario are shown in Figures F.1 through F.9.

The Base Case:

The Base Case reflects the most likely scenario for completing cleanup of the GDPs, and reflects the current programmatic assumptions concerning strategies, schedules, expected costs, etc. that are discussed throughout the triennial report. So that the scope of future remedial action scope is included, the Base Case also assumes the status quo on work scope covered by the Fund. Appendix C provides a future cost profile for the Base Case, which uses forecasts for interest and inflation rates as shown in Appendix D. The Base Case assumes the Government contribution deficit in the Fund will be eliminated by FY 2011 because of ongoing Government contributions. It does not, however, assume contributions beyond FY 2011 to address any projected Fund insufficiency.

Alternate Scenario:

1) **Pessimistic Economics**—This scenario uses the same assumptions as the Base Case except for the economic forecast rates are far more much more pessimistic. The economic forecast in the Base Case is in the mid-range of the multiple forecasts examined. The forecast for the Pessimistic Economics Scenario this scenario is in the lower range of those economic forecasts, and illustrates the sensitivity of the Fund's sufficiency to a significant change in interest and inflation rates (see Fig. E.1).

   More specifically, the economic modeling was performed using real interest rates, which are calculated with a formula that considers both interest and inflation rates. In substance, the real interest rate represents the rate by which interest earnings exceed inflation. The Base Case has a real interest rate of 2.92% based on a 5.29% nominal interest rate and a 2.30% nominal inflation rate. This scenario has a real interest rate of 2.60% based on a 7.39% nominal interest rate and a 4.67% nominal inflation rate.

   Although the nominal interest rate is better in this scenario, the favorable change is outweighed by the large unfavorable increase in the inflation rate as compared to the Base Case. The inflation rate is more than double the rate assumed in the Base Case. This is because the pessimistic forecast used reflects historical averages in rates over the last 40 years, which were heavily influenced by the unusually high inflation rates that occurred from the early 1970s through early 1980s. Therefore, the Pessimistic Economics Scenario shows impacts on the Fund if the upcoming 40 years in which the project will be completed experience similar high rates of inflation. As part of the analysis for this scenario, incremental changes in rates were also examined.

2) **East Tennessee Technology Park (ETTP) Site Completion Delayed to 2014—**This scenario uses the same assumptions as the Base Case except for a delay in site completion due to ongoing project management and worker safety issues. This causes the date for completion to be delayed from 2012 to 2014 and shows the sensitivity of the Fund to delays in completing ETTP.

3) **Paducah GDP Site Start Delayed to 2022—**This scenario uses the same assumptions as the Base Case except it delays the start date for Paducah D&D from 2017 to 2022. Such a delay could occur if there are delays in the USEC schedule for completing the American Centrifuge Plant (ACP) that will replace the capabilities of the Paducah GDP. This shows the sensitivity of the Fund's sufficiency to these work schedule delays.

4) **Paducah GDP Site Start Delayed to 2030**—This scenario uses the same assumptions as the Base Case except it delays the assumed start date for Paducah D&D from 2017 to 2030. This scenario is

similar to the "Paducah GDP Site Start Delayed to 2022" scenario because it accounts for potential delays in the D&D schedule and shows the sensitivity of the Fund's sufficiency to delays in the work schedule. The date 2030 was merely chosen as an example of a longer-term delay.

5) **Base Case with Future Remedial Action Removed**—This scenario uses the same assumptions as the Base Case except it assumes that the future remedial action scope (starting with FY 2010) is assumed to be funded separate from the D&D Fund. The Energy Policy Act of 1992 includes language indicating that the Fund can be used for remedial action costs to the extent the Fund is sufficient. If the Fund's sufficiency is in question, remedial action costs may need to be funded separately from the D&D Fund. This scenario shows the impact on the Fund's sufficiency from removing a significant component of scope.

6) **Paducah Start Delayed to 2022 with Future Remedial Action Removed**—This scenario reflects two adjustments to the Base Case. First, it delays the initiation of D&D at the Paducah GDP from 2017 to 2022. Then it removes the remedial action scope (starting with FY 2010) from the Fund. This scenario combines two variables addressed individually by Scenarios #3 and #5.

7) **Paducah Start Delayed to 2030 with Future Remedial Action Removed**—This scenario also reflects two adjustments to the Base Case. It first delays the initiation of D&D at the Paducah from 2017 to 2030 and then it removes the remedial action scope (starting with FY 2010) from the Fund. This scenario combines two variables addressed individually by scenarios #4 and #5.

Economic Rates for Pessimistic Economics Scenario:

The historical economic case data provided by the Bureau of Labor Statistics (BLS) and the Federal Reserve is shown in the table below. The historical inflation rates are taken from the BLS CPI-U, which is calculated on a monthly basis, for 1966-2006. This data was adjusted to FY terms by averaging data from October of the year previous to the one being examined to September of the current year being examined. The average of this data was used for years 2007 and beyond.

The historical nominal rates for the 10-year T-note were obtained from the H.15 Federal Reserve Statistical Release on a monthly basis for 1966-2006. This data was adjusted to FY terms by averaging data from October of the previous year to September of the current year. The average of this data was used for years 2007 and beyond. These rates were adjusted to real rates by subtracting the inflation from the 10-year T-Note nominal interest rates. More specifically, real interest rates were calculated by the following equation:

$$\text{Real Interest Rate} = [(1+\text{Nominal Interest Rate})/(1+\text{Nominal Inflation Rate})] - 1.$$

Historical interest rates are the original interest rates charged by investors to the U.S. Treasury for 10-year notes. Thus, the interest rate of 4.21% on the 10-year T-note in 2005 would be the interest rate paid by the Treasury for borrowing this amount for 10 years. This rate does not demonstrate the actual returns gained by the investor but rather the anticipated rate of return that the investor will receive.

Historical economic data used in pessimistic economics scenario

	CPI-U Inflation Rate[a]	10-Year T-Note Nominal Rates[b]	10-Year T-Note Real Rates
FY 1966	2.55%	4.79%	2.18%
FY 1967	3.01%	4.91%	1.85%
FY 1968	3.77%	5.61%	1.77%
FY 1969	5.16%	6.29%	1.07%
FY 1970	5.92%	7.46%	1.45%
FY 1971	4.83%	6.40%	1.50%
FY 1972	3.26%	6.09%	2.74%
FY 1973	4.98%	6.75%	1.68%
FY 1974	10.07%	7.33%	-2.49%
FY 1975	10.38%	7.89%	-2.26%
FY 1976	6.29%	7.83%	1.45%
FY 1977	6.12%	7.32%	1.13%
FY 1978	7.04%	8.10%	0.99%
FY 1979	10.32%	9.04%	-1.17%
FY 1980	13.58%	10.97%	-2.30%
FY 1981	11.09%	13.50%	2.16%
FY 1982	7.38%	13.86%	6.03%
FY 1983	3.51%	10.85%	7.09%
FY 1984	4.11%	12.42%	7.99%
FY 1985	3.69%	11.12%	7.17%
FY 1986	2.45%	8.31%	5.71%
FY 1987	2.86%	7.92%	4.92%
FY 1988	4.12%	8.89%	4.58%
FY 1989	4.76%	8.76%	3.82%
FY 1990	4.99%	8.43%	3.27%
FY 1991	5.04%	8.12%	2.93%
FY 1992	3.01%	7.16%	4.03%
FY 1993	3.03%	6.16%	3.03%
FY 1994	2.63%	6.52%	3.80%
FY 1995	2.81%	7.07%	4.14%
FY 1996	2.80%	6.33%	3.43%
FY 1997	2.67%	6.46%	3.70%
FY 1998	1.63%	5.57%	3.88%
FY 1999	1.92%	5.27%	3.29%
FY 2000	3.18%	6.17%	2.90%
FY 2001	3.22%	5.22%	1.93%
FY 2002	1.50%	4.80%	3.25%
FY 2003	2.35%	3.95%	1.56%
FY 2004	2.32%	4.30%	1.94%
FY 2005	3.29%	4.21%	0.89%
FY 2006	3.68%	4.76%	1.04%
Projections after 2006	**4.67%**	**7.39%**	**2.60%**

[a]U.S. Bureau of Labor Statistics. Consumer Price Index—All Urban Consumers, Series ID: CUUR0000SA0. Not seasonally adjusted. www.bls.gov

[b]U.S. Department of Treasury. U.S. government securities/Treasury constant maturities/Nominal. Market yield on U.S. Treasury securities at 10-year constant maturity, quoted on investment basis. http://www.Federalreserve.gov/releases/h15/data/Monthly/H15_TCMNOM_Y10.txt.

APPENDIX F

SUMMARY OF COST PROFILES

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7
	Pessimistic Economics	ETTP 2014	Paducah 2022	Paducah 2030	Base Case less RA	Paducah 2022 less RA	Paducah 2030 less RA
Total	**$ 29,417,095**	**$ 19,892,403**	**$ 21,507,645**	**$ 24,658,613**	**$ 17,690,453**	**$ 19,244,405**	**$ 22,129,279**
FY 2007	$ 532,347	$ 532,347	$ 532,347	$ 532,347	$ 532,347	$ 532,347	$ 532,347
FY 2008	$ 600,481	$ 588,754	$ 588,754	$ 588,754	$ 588,754	$ 588,754	$ 588,754
FY 2009	$ 651,007	$ 364,009	$ 625,679	$ 625,679	$ 625,679	$ 625,679	$ 625,679
FY 2010	$ 646,740	$ 631,848	$ 609,048	$ 609,048	$ 590,212	$ 590,212	$ 590,212
FY 2011	$ 644,759	$ 622,584	$ 594,596	$ 594,596	$ 540,561	$ 540,561	$ 540,561
FY 2012	$ 698,656	$ 586,096	$ 630,473	$ 630,473	$ 552,209	$ 552,209	$ 552,209
FY 2013	$ 516,897	$ 599,043	$ 456,556	$ 456,556	$ 370,917	$ 370,917	$ 370,917
FY 2014	$ 569,643	$ 704,195	$ 491,977	$ 491,977	$ 385,118	$ 385,118	$ 385,118
FY 2015	$ 590,049	$ 498,431	$ 498,431	$ 498,431	$ 379,629	$ 379,629	$ 379,629
FY 2016	$ 606,365	$ 500,997	$ 500,997	$ 500,997	$ 386,143	$ 386,143	$ 386,143
FY 2017	$ 735,959	$ 594,025	$ 512,084	$ 512,084	$ 470,656	$ 388,715	$ 388,715
FY 2018	$ 805,274	$ 635,364	$ 487,552	$ 487,552	$ 546,469	$ 396,481	$ 396,481
FY 2019	$ 748,450	$ 577,929	$ 437,374	$ 437,374	$ 527,575	$ 407,478	$ 407,478
FY 2020	$ 782,699	$ 590,954	$ 428,240	$ 428,240	$ 520,512	$ 414,126	$ 414,126
FY 2021	$ 794,096	$ 586,384	$ 437,629	$ 437,629	$ 534,036	$ 424,438	$ 424,438
FY 2022	$ 804,407	$ 580,953	$ 540,490	$ 447,235	$ 544,771	$ 527,828	$ 434,573
FY 2023	$ 836,841	$ 590,940	$ 624,153	$ 453,900	$ 543,492	$ 600,975	$ 430,722
FY 2024	$ 871,370	$ 601,621	$ 624,594	$ 463,880	$ 556,397	$ 575,290	$ 440,419
FY 2025	$ 911,099	$ 609,015	$ 653,722	$ 468,105	$ 562,739	$ 560,535	$ 444,093
FY 2026	$ 954,866	$ 610,109	$ 634,584	$ 464,532	$ 563,042	$ 561,617	$ 440,242
FY 2027	$ 1,000,015	$ 625,114	$ 628,499	$ 475,216	$ 577,867	$ 575,436	$ 451,270
FY 2028	$ 1,045,746	$ 639,492	$ 639,689	$ 486,146	$ 592,830	$ 589,170	$ 463,321
FY 2029	$ 1,100,497	$ 658,396	$ 651,656	$ 497,327	$ 615,154	$ 608,280	$ 478,354
FY 2030	$ 1,176,146	$ 691,628	$ 666,644	$ 620,628	$ 655,758	$ 630,774	$ 609,704
FY 2031	$ 1,215,481	$ 707,535	$ 683,575	$ 724,691	$ 642,260	$ 618,299	$ 684,934
FY 2032	$ 1,220,614	$ 694,459	$ 700,386	$ 725,220	$ 640,129	$ 646,200	$ 666,129
FY 2033	$ 1,248,814	$ 694,439	$ 716,495	$ 767,337	$ 656,037	$ 678,093	$ 672,663
FY 2034	$ 983,463	$ 534,519	$ 563,382	$ 586,901	$ 489,397	$ 518,260	$ 510,558
FY 2035	$ 779,042	$ 413,842	$ 469,049	$ 448,033	$ 373,807	$ 428,859	$ 400,867
FY 2036	$ 914,182	$ 474,651	$ 534,262	$ 508,846	$ 372,717	$ 432,486	$ 402,442
FY 2037	$ 999,320	$ 507,125	$ 536,737	$ 540,326	$ 398,212	$ 427,662	$ 431,413
FY 2038	$ 1,047,390	$ 519,502	$ 531,877	$ 553,467	$ 427,843	$ 440,217	$ 461,808
FY 2039	$ 1,125,049	$ 545,404	$ 579,358	$ 605,152	$ 442,599	$ 476,721	$ 502,347
FY 2040	$ 497,512	$ 235,732	$ 614,130	$ 647,889	$ 176,993	$ 510,535	$ 544,121
FY 2041	$ 293,282	$ 135,822	$ 553,910	$ 591,958	$ 98,447	$ 470,294	$ 508,518
FY 2042	$ 265,433	$ 120,145	$ 546,155	$ 592,412	$ 120,145	$ 499,030	$ 545,468
FY 2043	$ 118,039	$ 52,221	$ 488,030	$ 559,663	$ 52,221	$ 439,822	$ 511,454
FY 2044	$ 85,063	$ 36,782	$ 456,749	$ 555,895	$ 36,782	$ 407,432	$ 506,578
FY 2045	$ -	$ -	$ 37,784	$ 491,609	$ -	$ 37,784	$ 440,963
FY 2046	$ -	$ -	$ -	$ 481,423	$ -	$ -	$ 429,811
FY 2047	$ -	$ -	$ -	$ 490,348	$ -	$ -	$ 437,751
FY 2048	$ -	$ -	$ -	$ 494,353	$ -	$ -	$ 440,546
FY 2049	$ -	$ -	$ -	$ 501,512	$ -	$ -	$ 446,044
FY 2050	$ -	$ -	$ -	$ 511,014	$ -	$ -	$ 454,486
FY 2051	$ -	$ -	$ -	$ 522,768	$ -	$ -	$ 464,940
FY 2052	$ -	$ -	$ -	$ 503,766	$ -	$ -	$ 444,608
FY 2053	$ -	$ -	$ -	$ 45,323	$ -	$ -	$ 45,323

Fig. F.1. Summary of cost profiles for Alternate Scenarios.
(dollars in thousands and in year of expenditure)

		Pessimistic Economics								
Fiscal Year	Total	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	Uranium/Thorium Reimburse
	$ 29,417,095	**$ 14,233,711**	**$ 2,946,307**	**$ 5,545,887**	**$ 1,506,903**	**$ 3,457,953**	**$ 323,692**	**$ 667,433**	**$ 260,554**	**$ 474,656**
FY 2007	$ 532,347	$ 5,193	$ 2,253	$ 11,656	$ 219,588	$ 66,676	$ 53,381	$ 132,797	$ 21,002	$ 19,800
FY 2008	$ 600,481	$ 13,454	$ 12,939	$ 9,484	$ 243,116	$ 90,355	$ 50,747	$ 138,397	$ 21,990	$ 20,000
FY 2009	$ 651,007	$ 31,292	$ 11,445	$ 90,566	$ 271,597	$ 79,230	$ 45,655	$ 76,627	$ 24,594	$ 20,000
FY 2010	$ 646,740	$ 71,329	$ 14,618	$ 123,380	$ 268,680	$ 20,032	$ 63,271	$ 38,412	$ 27,017	$ 20,000
FY 2011	$ 644,759	$ 78,497	$ 16,378	$ 126,587	$ 250,443	$ 58,751	$ 36,052	$ 30,000	$ 28,052	$ 20,000
FY 2012	$ 698,656	$ 131,493	$ 27,545	$ 173,193	$ 197,029	$ 86,957	$ 7,999	$ 25,247	$ 29,194	$ 20,000
FY 2013	$ 516,897	$ 132,938	$ 27,476	$ 181,268	$ 17,150	$ 97,476	$ 7,877	$ 26,836	$ 5,876	$ 20,000
FY 2014	$ 569,643	$ 143,772	$ 24,163	$ 189,717	$ 15,568	$ 124,443	$ 8,141	$ 38,920	$ 4,918	$ 20,000
FY 2015	$ 590,049	$ 147,468	$ 28,304	$ 198,559	$ 10,327	$ 141,553	$ 8,495	$ 30,740	$ 4,603	$ 20,000
FY 2016	$ 606,365	$ 154,114	$ 29,861	$ 207,875	$ 11,150	$ 140,015	$ 8,907	$ 29,641	$ 4,802	$ 20,000
FY 2017	$ 735,959	$ 204,526	$ 117,943	$ 191,479	$ 2,254	$ 153,873	$ 9,374	$ 31,501	$ 5,009	$ 20,000
FY 2018	$ 805,274	$ 361,613	$ 61,874	$ 199,288	$ -	$ 113,441	$ 10,220	$ 33,611	$ 5,226	$ 20,000
FY 2019	$ 748,450	$ 425,915	$ 76,247	$ 106,818	$ -	$ 65,744	$ 13,573	$ 34,703	$ 5,451	$ 20,000
FY 2020	$ 782,699	$ 444,172	$ 91,773	$ 131,040	$ -	$ 94,099	$ -	$ -	$ 1,615	$ 20,000
FY 2021	$ 794,096	$ 466,893	$ 96,813	$ 137,155	$ -	$ 71,546	$ -	$ -	$ 1,689	$ 20,000
FY 2022	$ 804,407	$ 491,634	$ 96,858	$ 143,555	$ -	$ 50,595	$ -	$ -	$ 1,766	$ 20,000
FY 2023	$ 836,841	$ 493,388	$ 103,468	$ 150,255	$ -	$ 67,884	$ -	$ -	$ 1,846	$ 20,000
FY 2024	$ 871,370	$ 516,963	$ 109,012	$ 157,267	$ -	$ 66,198	$ -	$ -	$ 1,931	$ 20,000
FY 2025	$ 911,099	$ 541,029	$ 114,140	$ 164,606	$ -	$ 69,305	$ -	$ -	$ 2,019	$ 20,000
FY 2026	$ 954,866	$ 569,254	$ 119,094	$ 172,287	$ -	$ 72,120	$ -	$ -	$ 2,111	$ 20,000
FY 2027	$ 1,000,015	$ 601,359	$ 122,050	$ 180,327	$ -	$ 74,070	$ -	$ -	$ 2,208	$ 20,000
FY 2028	$ 1,045,746	$ 637,874	$ 121,976	$ 188,742	$ -	$ 74,845	$ -	$ -	$ 2,308	$ 20,000
FY 2029	$ 1,100,497	$ 673,628	$ 135,941	$ 197,550	$ -	$ 70,964	$ -	$ -	$ 2,414	$ 20,000
FY 2030	$ 1,176,146	$ 775,311	$ 116,458	$ 206,769	$ -	$ 60,228	$ -	$ -	$ 2,524	$ 14,856
FY 2031	$ 1,215,481	$ 769,336	$ 114,950	$ 216,418	$ -	$ 112,138	$ -	$ -	$ 2,639	$ -
FY 2032	$ 1,220,614	$ 774,749	$ 121,093	$ 226,518	$ -	$ 95,493	$ -	$ -	$ 2,760	$ -
FY 2033	$ 1,248,814	$ 809,451	$ 130,329	$ 237,089	$ -	$ 69,059	$ -	$ -	$ 2,886	$ -
FY 2034	$ 983,463	$ 616,317	$ 116,048	$ 165,060	$ -	$ 83,021	$ -	$ -	$ 3,018	$ -
FY 2035	$ 779,042	$ 478,656	$ 128,086	$ 93,779	$ -	$ 75,365	$ -	$ -	$ 3,156	$ -
FY 2036	$ 914,182	$ 502,392	$ 116,497	$ 95,664	$ -	$ 196,325	$ -	$ -	$ 3,303	$ -
FY 2037	$ 999,320	$ 544,378	$ 120,968	$ 115,897	$ -	$ 214,620	$ -	$ -	$ 3,457	$ -
FY 2038	$ 1,047,390	$ 590,386	$ 132,641	$ 135,946	$ -	$ 184,798	$ -	$ -	$ 3,619	$ -
FY 2039	$ 1,125,049	$ 649,348	$ 120,581	$ 139,268	$ -	$ 212,064	$ -	$ -	$ 3,788	$ -
FY 2040	$ 497,512	$ 229,169	$ 37,232	$ 103,178	$ -	$ 123,968	$ -	$ -	$ 3,964	$ -
FY 2041	$ 293,282	$ 69,272	$ 30,512	$ 108,645	$ -	$ 80,704	$ -	$ -	$ 4,149	$ -
FY 2042	$ 265,433	$ 87,146	$ 61,971	$ 111,972	$ -	$ -	$ -	$ -	$ 4,343	$ -
FY 2043	$ 118,039	$ -	$ 36,769	$ 76,725	$ -	$ -	$ -	$ -	$ 4,546	$ -
FY 2044	$ 85,063	$ -	$ -	$ 80,305	$ -	$ -	$ -	$ -	$ 4,758	$ -

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Fig. F.2. Summary of cost profile for Pessimistic Economics.
(dollars in thousands and in year of expenditure)

		ETTP Completion Delayed to 2014								
Fiscal Year	Total	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	Uranium/Thorium Reimburse
	$ 19,892,403	**$ 8,932,696**	**$ 1,851,308**	**$ 3,754,133**	**$ 1,461,981**	**$ 2,348,814**	**$ 301,096**	**$ 613,766**	**$ 254,792**	**$ 373,817**
FY 2007	$ 532,347	$ 5,193	$ 2,253	$ 11,656	$ 219,588	$ 66,676	$ 53,381	$ 132,797	$ 21,002	$ 19,800
FY 2008	$ 588,754	$ 13,188	$ 12,683	$ 9,288	$ 238,103	$ 88,540	$ 49,745	$ 135,666	$ 21,540	$ 20,000
FY 2009	$ 364,009	$ 30,060	$ 10,994	$ 84,453	$ 7,406	$ 70,033	$ 43,857	$ 73,609	$ 23,596	$ 20,000
FY 2010	$ 631,848	$ 67,077	$ 13,747	$ 115,114	$ 273,018	$ 21,889	$ 59,499	$ 36,122	$ 25,382	$ 20,000
FY 2011	$ 622,584	$ 72,192	$ 15,062	$ 122,814	$ 293,717	$ 12,253	$ 33,156	$ 27,590	$ 25,800	$ 20,000
FY 2012	$ 586,096	$ 118,197	$ 24,760	$ 159,642	$ 173,803	$ 33,526	$ 7,190	$ 22,694	$ 26,283	$ 20,000
FY 2013	$ 599,043	$ 116,795	$ 24,139	$ 159,255	$ 84,721	$ 137,788	$ 6,921	$ 23,577	$ 25,848	$ 20,000
FY 2014	$ 704,195	$ 123,457	$ 20,749	$ 162,909	$ 152,003	$ 159,238	$ 6,991	$ 33,421	$ 25,426	$ 20,000
FY 2015	$ 498,431	$ 123,767	$ 23,755	$ 166,647	$ 8,667	$ 118,803	$ 7,129	$ 25,799	$ 3,863	$ 20,000
FY 2016	$ 500,997	$ 126,420	$ 24,495	$ 170,520	$ 9,147	$ 114,854	$ 7,307	$ 24,315	$ 3,939	$ 20,000
FY 2017	$ 594,025	$ 163,980	$ 94,561	$ 153,520	$ 1,807	$ 123,369	$ 7,515	$ 25,256	$ 4,016	$ 20,000
FY 2018	$ 635,364	$ 283,371	$ 48,487	$ 156,168	$ -	$ 88,895	$ 8,009	$ 26,339	$ 4,096	$ 20,000
FY 2019	$ 577,929	$ 326,213	$ 58,398	$ 81,813	$ -	$ 50,354	$ 10,396	$ 26,579	$ 4,175	$ 20,000
FY 2020	$ 590,954	$ 332,506	$ 68,701	$ 98,096	$ -	$ 70,442	$ -	$ -	$ 1,209	$ 20,000
FY 2021	$ 586,384	$ 341,612	$ 70,835	$ 100,352	$ -	$ 52,348	$ -	$ -	$ 1,236	$ 20,000
FY 2022	$ 580,953	$ 351,581	$ 69,266	$ 102,661	$ -	$ 36,182	$ -	$ -	$ 1,263	$ 20,000
FY 2023	$ 590,940	$ 344,859	$ 72,320	$ 105,022	$ -	$ 47,448	$ -	$ -	$ 1,291	$ 20,000
FY 2024	$ 601,621	$ 353,167	$ 74,473	$ 107,438	$ -	$ 45,224	$ -	$ -	$ 1,319	$ 20,000
FY 2025	$ 609,015	$ 361,252	$ 76,213	$ 109,909	$ -	$ 46,276	$ -	$ -	$ 1,348	$ 14,017
FY 2026	$ 610,109	$ 371,504	$ 77,723	$ 112,437	$ -	$ 47,067	$ -	$ -	$ 1,378	$ -
FY 2027	$ 625,114	$ 383,584	$ 77,851	$ 115,024	$ -	$ 47,247	$ -	$ -	$ 1,408	$ -
FY 2028	$ 639,492	$ 397,677	$ 76,045	$ 117,670	$ -	$ 46,661	$ -	$ -	$ 1,439	$ -
FY 2029	$ 658,396	$ 410,472	$ 82,835	$ 120,376	$ -	$ 43,242	$ -	$ -	$ 1,471	$ -
FY 2030	$ 691,628	$ 461,751	$ 69,359	$ 123,145	$ -	$ 35,870	$ -	$ -	$ 1,503	$ -
FY 2031	$ 707,535	$ 447,833	$ 66,912	$ 125,978	$ -	$ 65,276	$ -	$ -	$ 1,536	$ -
FY 2032	$ 694,459	$ 440,788	$ 68,895	$ 128,876	$ -	$ 54,330	$ -	$ -	$ 1,570	$ -
FY 2033	$ 694,439	$ 450,119	$ 72,473	$ 131,840	$ -	$ 38,402	$ -	$ -	$ 1,605	$ -
FY 2034	$ 534,519	$ 334,973	$ 63,073	$ 89,711	$ -	$ 45,122	$ -	$ -	$ 1,640	$ -
FY 2035	$ 413,842	$ 254,271	$ 68,042	$ 49,817	$ -	$ 40,035	$ -	$ -	$ 1,677	$ -
FY 2036	$ 474,651	$ 260,847	$ 60,486	$ 49,669	$ -	$ 101,934	$ -	$ -	$ 1,715	$ -
FY 2037	$ 507,125	$ 276,256	$ 61,388	$ 58,814	$ -	$ 108,913	$ -	$ -	$ 1,755	$ -
FY 2038	$ 519,502	$ 292,830	$ 65,789	$ 67,429	$ -	$ 91,659	$ -	$ -	$ 1,795	$ -
FY 2039	$ 545,404	$ 314,792	$ 58,456	$ 67,515	$ -	$ 102,805	$ -	$ -	$ 1,836	$ -
FY 2040	$ 235,732	$ 108,585	$ 17,642	$ 48,888	$ -	$ 58,739	$ -	$ -	$ 1,878	$ -
FY 2041	$ 135,822	$ 32,081	$ 14,130	$ 50,314	$ -	$ 37,375	$ -	$ -	$ 1,922	$ -
FY 2042	$ 120,145	$ 39,446	$ 28,051	$ 50,683	$ -	$ -	$ -	$ -	$ 1,966	$ -
FY 2043	$ 52,221	$ -	$ 16,267	$ 33,943	$ -	$ -	$ -	$ -	$ 2,011	$ -
FY 2044	$ 36,782	$ -	$ -	$ 34,724	$ -	$ -	$ -	$ -	$ 2,057	$ -

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Fig. F.3. Summary of cost profile ETTP Completion Delayed to 2014.
(dollars in thousands and in year of expenditure)

		Paducah 2022								
Fiscal Year	Total	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	Uranium/Thorium Reimburse
	$ 21,507,645	**$ 9,561,049**	**$ 1,984,148**	**$ 4,323,009**	**$ 1,426,347**	**$ 2,494,555**	**$ 343,572**	**$ 771,950**	**$ 229,199**	**$ 373,817**
FY 2007	$ 532,347	$ 5,193	$ 2,253	$ 11,656	$ 219,588	$ 66,676	$ 53,381	$ 132,797	$ 21,002	$ 19,800
FY 2008	$ 588,754	$ 13,188	$ 12,683	$ 9,288	$ 238,103	$ 88,540	$ 49,745	$ 135,666	$ 21,540	$ 20,000
FY 2009	$ 625,679	$ 30,060	$ 10,994	$ 86,981	$ 260,482	$ 76,099	$ 43,857	$ 73,609	$ 23,596	$ 20,000
FY 2010	$ 609,048	$ 67,077	$ 13,747	$ 116,012	$ 252,374	$ 18,835	$ 59,499	$ 36,122	$ 25,382	$ 20,000
FY 2011	$ 594,596	$ 72,192	$ 15,062	$ 116,420	$ 230,340	$ 54,035	$ 33,156	$ 27,590	$ 25,800	$ 20,000
FY 2012	$ 630,473	$ 118,197	$ 24,760	$ 155,681	$ 177,404	$ 78,265	$ 7,190	$ 22,694	$ 26,283	$ 20,000
FY 2013	$ 456,556	$ 116,795	$ 24,139	$ 159,255	$ 15,068	$ 85,638	$ 6,921	$ 23,577	$ 5,163	$ 20,000
FY 2014	$ 491,977	$ 123,457	$ 20,749	$ 162,909	$ 13,368	$ 106,859	$ 6,991	$ 33,421	$ 4,223	$ 20,000
FY 2015	$ 498,431	$ 123,767	$ 23,755	$ 166,647	$ 8,667	$ 118,803	$ 7,129	$ 25,799	$ 3,863	$ 20,000
FY 2016	$ 500,997	$ 126,420	$ 24,495	$ 170,520	$ 9,147	$ 114,854	$ 7,307	$ 24,315	$ 3,939	$ 20,000
FY 2017	$ 512,084	$ 129,018	$ 25,369	$ 175,733	$ 1,807	$ 123,369	$ 7,515	$ 25,256	$ 4,016	$ 20,000
FY 2018	$ 487,552	$ 132,958	$ 24,980	$ 179,776	$ -	$ 91,071	$ 7,688	$ 26,983	$ 4,096	$ 20,000
FY 2019	$ 437,374	$ 141,405	$ 20,166	$ 183,911	$ -	$ 29,896	$ 7,867	$ 29,903	$ 4,226	$ 20,000
FY 2020	$ 428,240	$ 136,389	$ 28,898	$ 188,141	$ -	$ 14,114	$ 8,048	$ 28,328	$ 4,323	$ 20,000
FY 2021	$ 437,629	$ 138,831	$ 30,258	$ 192,469	$ -	$ 13,191	$ 8,233	$ 30,226	$ 4,421	$ 20,000
FY 2022	$ 540,490	$ 183,308	$ 105,280	$ 173,454	$ -	$ 12,661	$ 8,422	$ 32,842	$ 4,521	$ 20,000
FY 2023	$ 624,153	$ 302,067	$ 56,340	$ 176,454	$ -	$ 23,178	$ 8,975	$ 32,514	$ 4,624	$ 20,000
FY 2024	$ 624,594	$ 343,133	$ 73,867	$ 91,665	$ -	$ 49,304	$ 11,648	$ 30,306	$ 4,672	$ 20,000
FY 2025	$ 653,722	$ 358,893	$ 76,368	$ 109,909	$ -	$ 93,187	$ -	$ -	$ 1,348	$ 14,017
FY 2026	$ 634,584	$ 371,187	$ 76,614	$ 112,437	$ -	$ 72,968	$ -	$ -	$ 1,378	$ -
FY 2027	$ 628,499	$ 382,936	$ 76,069	$ 115,024	$ -	$ 53,063	$ -	$ -	$ 1,408	$ -
FY 2028	$ 639,689	$ 396,006	$ 74,056	$ 117,670	$ -	$ 50,519	$ -	$ -	$ 1,439	$ -
FY 2029	$ 651,656	$ 405,124	$ 81,309	$ 120,376	$ -	$ 43,376	$ -	$ -	$ 1,471	$ -
FY 2030	$ 666,644	$ 438,676	$ 67,450	$ 123,145	$ -	$ 35,870	$ -	$ -	$ 1,503	$ -
FY 2031	$ 683,575	$ 424,582	$ 66,203	$ 125,978	$ -	$ 65,276	$ -	$ -	$ 1,536	$ -
FY 2032	$ 700,386	$ 446,859	$ 68,895	$ 128,876	$ -	$ 54,186	$ -	$ -	$ 1,570	$ -
FY 2033	$ 716,495	$ 472,175	$ 72,473	$ 131,840	$ -	$ 38,402	$ -	$ -	$ 1,605	$ -
FY 2034	$ 563,382	$ 363,836	$ 63,073	$ 89,711	$ -	$ 45,122	$ -	$ -	$ 1,640	$ -
FY 2035	$ 469,049	$ 304,658	$ 72,707	$ 49,817	$ -	$ 40,189	$ -	$ -	$ 1,677	$ -
FY 2036	$ 534,262	$ 311,666	$ 69,435	$ 49,669	$ -	$ 101,776	$ -	$ -	$ 1,715	$ -
FY 2037	$ 536,737	$ 296,144	$ 70,949	$ 58,814	$ -	$ 109,074	$ -	$ -	$ 1,755	$ -
FY 2038	$ 531,877	$ 295,423	$ 75,571	$ 67,429	$ -	$ 91,659	$ -	$ -	$ 1,795	$ -
FY 2039	$ 579,358	$ 330,605	$ 76,765	$ 67,515	$ -	$ 102,636	$ -	$ -	$ 1,836	$ -
FY 2040	$ 614,130	$ 367,240	$ 73,616	$ 67,800	$ -	$ 103,595	$ -	$ -	$ 1,878	$ -
FY 2041	$ 553,910	$ 324,340	$ 70,501	$ 73,531	$ -	$ 83,616	$ -	$ -	$ 1,922	$ -
FY 2042	$ 546,155	$ 337,368	$ 85,262	$ 74,434	$ -	$ 47,125	$ -	$ -	$ 1,966	$ -
FY 2043	$ 488,030	$ 304,775	$ 74,794	$ 58,241	$ -	$ 48,209	$ -	$ -	$ 2,011	$ -
FY 2044	$ 456,749	$ 295,700	$ 50,094	$ 59,580	$ -	$ 49,317	$ -	$ -	$ 2,057	$ -
FY 2045	$ 37,784	$ 29,397	$ 4,148	$ 4,238	$ -	$ -	$ -	$ -	$ -	$ -

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Fig. F.4. Summary of cost profile for Paducah Start Delayed to 2022.
(dollars in thousands and in year of expenditure)

		Paducah 2030								
Fiscal Year	Total	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	Uranium/Thorium Reimburse
	$ 24,658,613	**$ 10,727,555**	**$ 2,230,758**	**$ 5,387,113**	**$ 1,426,347**	**$ 2,760,649**	**$ 422,426**	**$ 1,070,499**	**$ 259,450**	**$ 373,817**
FY 2007	$ 532,347	$ 5,193	$ 2,253	$ 11,656	$ 219,588	$ 66,676	$ 53,381	$ 132,797	$ 21,002	$ 19,800
FY 2008	$ 588,754	$ 13,188	$ 12,683	$ 9,288	$ 238,103	$ 88,540	$ 49,745	$ 135,666	$ 21,540	$ 20,000
FY 2009	$ 625,679	$ 30,060	$ 10,994	$ 86,981	$ 260,482	$ 76,099	$ 43,857	$ 73,609	$ 23,596	$ 20,000
FY 2010	$ 609,048	$ 67,077	$ 13,747	$ 116,012	$ 252,374	$ 18,835	$ 59,499	$ 36,122	$ 25,382	$ 20,000
FY 2011	$ 594,596	$ 72,192	$ 15,062	$ 116,420	$ 230,340	$ 54,035	$ 33,156	$ 27,590	$ 25,800	$ 20,000
FY 2012	$ 630,473	$ 118,197	$ 24,760	$ 155,681	$ 177,404	$ 78,265	$ 7,190	$ 22,694	$ 26,283	$ 20,000
FY 2013	$ 456,556	$ 116,795	$ 24,139	$ 159,255	$ 15,068	$ 85,638	$ 6,921	$ 23,577	$ 5,163	$ 20,000
FY 2014	$ 491,977	$ 123,457	$ 20,749	$ 162,909	$ 13,368	$ 106,859	$ 6,991	$ 33,421	$ 4,223	$ 20,000
FY 2015	$ 498,431	$ 123,767	$ 23,755	$ 166,647	$ 8,667	$ 118,803	$ 7,129	$ 25,799	$ 3,863	$ 20,000
FY 2016	$ 500,997	$ 126,420	$ 24,495	$ 170,520	$ 9,147	$ 114,854	$ 7,307	$ 24,315	$ 3,939	$ 20,000
FY 2017	$ 512,084	$ 129,018	$ 25,369	$ 175,733	$ 1,807	$ 123,369	$ 7,515	$ 25,256	$ 4,016	$ 20,000
FY 2018	$ 487,552	$ 132,958	$ 24,980	$ 179,776	$ -	$ 91,071	$ 7,688	$ 26,983	$ 4,096	$ 20,000
FY 2019	$ 437,374	$ 141,405	$ 20,166	$ 183,911	$ -	$ 29,896	$ 7,867	$ 29,903	$ 4,226	$ 20,000
FY 2020	$ 428,240	$ 136,389	$ 28,898	$ 188,141	$ -	$ 14,114	$ 8,048	$ 28,328	$ 4,323	$ 20,000
FY 2021	$ 437,629	$ 138,831	$ 30,258	$ 192,469	$ -	$ 13,191	$ 8,233	$ 30,226	$ 4,421	$ 20,000
FY 2022	$ 447,235	$ 144,136	$ 27,755	$ 196,896	$ -	$ 12,661	$ 8,422	$ 32,842	$ 4,521	$ 20,000
FY 2023	$ 453,900	$ 133,541	$ 30,002	$ 201,425	$ -	$ 23,178	$ 8,616	$ 32,514	$ 4,624	$ 20,000
FY 2024	$ 463,880	$ 136,069	$ 31,030	$ 206,059	$ -	$ 23,460	$ 8,814	$ 33,719	$ 4,729	$ 20,000
FY 2025	$ 468,105	$ 139,160	$ 31,771	$ 210,798	$ -	$ 24,012	$ 9,017	$ 34,494	$ 4,837	$ 14,017
FY 2026	$ 464,532	$ 143,986	$ 31,150	$ 215,647	$ -	$ 24,290	$ 9,224	$ 35,288	$ 4,947	$ -
FY 2027	$ 475,216	$ 150,509	$ 29,559	$ 220,608	$ -	$ 23,947	$ 9,436	$ 36,099	$ 5,059	$ -
FY 2028	$ 486,146	$ 159,240	$ 26,642	$ 225,682	$ -	$ 22,825	$ 9,653	$ 36,930	$ 5,174	$ -
FY 2029	$ 497,327	$ 161,881	$ 32,635	$ 230,873	$ -	$ 18,973	$ 9,875	$ 37,798	$ 5,292	$ -
FY 2030	$ 620,628	$ 236,826	$ 110,651	$ 208,064	$ -	$ 10,924	$ 10,103	$ 38,648	$ 5,412	$ -
FY 2031	$ 724,691	$ 371,818	$ 45,614	$ 211,663	$ -	$ 39,757	$ 10,766	$ 39,537	$ 5,535	$ -
FY 2032	$ 725,220	$ 434,096	$ 66,172	$ 109,956	$ -	$ 59,091	$ 13,972	$ 36,342	$ 5,592	$ -
FY 2033	$ 767,337	$ 468,602	$ 70,616	$ 131,840	$ -	$ 94,674	$ -	$ -	$ 1,605	$ -
FY 2034	$ 586,901	$ 357,844	$ 61,363	$ 89,711	$ -	$ 76,342	$ -	$ -	$ 1,640	$ -
FY 2035	$ 448,033	$ 278,805	$ 70,569	$ 49,817	$ -	$ 47,166	$ -	$ -	$ 1,677	$ -
FY 2036	$ 508,846	$ 284,009	$ 67,049	$ 49,669	$ -	$ 106,403	$ -	$ -	$ 1,715	$ -
FY 2037	$ 540,326	$ 302,133	$ 68,711	$ 58,814	$ -	$ 108,913	$ -	$ -	$ 1,755	$ -
FY 2038	$ 553,467	$ 319,302	$ 73,282	$ 67,429	$ -	$ 91,659	$ -	$ -	$ 1,795	$ -
FY 2039	$ 605,152	$ 356,657	$ 76,340	$ 67,515	$ -	$ 102,805	$ -	$ -	$ 1,836	$ -
FY 2040	$ 647,889	$ 395,599	$ 78,843	$ 67,800	$ -	$ 103,768	$ -	$ -	$ 1,878	$ -
FY 2041	$ 591,958	$ 352,537	$ 80,528	$ 73,531	$ -	$ 83,440	$ -	$ -	$ 1,922	$ -
FY 2042	$ 592,412	$ 373,549	$ 95,519	$ 74,434	$ -	$ 46,944	$ -	$ -	$ 1,966	$ -
FY 2043	$ 559,663	$ 365,449	$ 85,754	$ 58,241	$ -	$ 48,209	$ -	$ -	$ 2,011	$ -
FY 2044	$ 555,895	$ 373,855	$ 71,085	$ 59,580	$ -	$ 49,317	$ -	$ -	$ 2,057	$ -
FY 2045	$ 491,609	$ 342,815	$ 72,721	$ 25,428	$ -	$ 50,645	$ -	$ -	$ -	$ -
FY 2046	$ 481,423	$ 329,405	$ 74,393	$ 26,013	$ -	$ 51,612	$ -	$ -	$ -	$ -
FY 2047	$ 490,348	$ 335,546	$ 75,594	$ 26,611	$ -	$ 52,597	$ -	$ -	$ -	$ -
FY 2048	$ 494,353	$ 341,738	$ 71,585	$ 27,223	$ -	$ 53,807	$ -	$ -	$ -	$ -
FY 2049	$ 501,512	$ 350,575	$ 67,619	$ 27,849	$ -	$ 55,468	$ -	$ -	$ -	$ -
FY 2050	$ 511,014	$ 357,369	$ 68,627	$ 28,490	$ -	$ 56,528	$ -	$ -	$ -	$ -
FY 2051	$ 522,768	$ 365,589	$ 70,206	$ 29,145	$ -	$ 57,828	$ -	$ -	$ -	$ -
FY 2052	$ 503,766	$ 354,703	$ 60,089	$ 29,816	$ -	$ 59,158	$ -	$ -	$ -	$ -
FY 2053	$ 45,323	$ 35,263	$ 4,976	$ 5,084	$ -	$ -	$ -	$ -	$ -	$ -

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Fig. F.5. Summary of cost profile for Paducah Start Delayed to 2030.
(dollars in thousands and in year of expenditure)

		Base Case Less RA								
Fiscal Year	Total	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	Uranium/Thorium Reimburse
	$ 17,690,453	**$ 8,932,696**	**$ 1,851,308**	**$ 3,747,204**	**$ 1,426,347**	**$ 231,315**	**$ 301,096**	**$ 613,766**	**$ 212,904**	**$ 373,817**
FY 2007	$ 532,347	$ 5,193	$ 2,253	$ 11,656	$ 219,588	$ 66,676	$ 53,381	$ 132,797	$ 21,002	$ 19,800
FY 2008	$ 588,754	$ 13,188	$ 12,683	$ 9,288	$ 238,103	$ 88,540	$ 49,745	$ 135,666	$ 21,540	$ 20,000
FY 2009	$ 625,679	$ 30,060	$ 10,994	$ 86,981	$ 260,482	$ 76,099	$ 43,857	$ 73,609	$ 23,596	$ 20,000
FY 2010	$ 590,212	$ 67,077	$ 13,747	$ 116,012	$ 252,374	$ -	$ 59,499	$ 36,122	$ 25,382	$ 20,000
FY 2011	$ 540,561	$ 72,192	$ 15,062	$ 116,420	$ 230,340	$ -	$ 33,156	$ 27,590	$ 25,800	$ 20,000
FY 2012	$ 552,209	$ 118,197	$ 24,760	$ 155,681	$ 177,404	$ -	$ 7,190	$ 22,694	$ 26,283	$ 20,000
FY 2013	$ 370,917	$ 116,795	$ 24,139	$ 159,255	$ 15,068	$ -	$ 6,921	$ 23,577	$ 5,163	$ 20,000
FY 2014	$ 385,118	$ 123,457	$ 20,749	$ 162,909	$ 13,368	$ -	$ 6,991	$ 33,421	$ 4,223	$ 20,000
FY 2015	$ 379,629	$ 123,767	$ 23,755	$ 166,647	$ 8,667	$ -	$ 7,129	$ 25,799	$ 3,863	$ 20,000
FY 2016	$ 386,143	$ 126,420	$ 24,495	$ 170,520	$ 9,147	$ -	$ 7,307	$ 24,315	$ 3,939	$ 20,000
FY 2017	$ 470,656	$ 163,980	$ 94,561	$ 153,520	$ 1,807	$ -	$ 7,515	$ 25,256	$ 4,016	$ 20,000
FY 2018	$ 546,469	$ 283,371	$ 48,487	$ 156,168	$ -	$ -	$ 8,009	$ 26,339	$ 4,096	$ 20,000
FY 2019	$ 527,575	$ 326,213	$ 58,398	$ 81,813	$ -	$ -	$ 10,396	$ 26,579	$ 4,175	$ 20,000
FY 2020	$ 520,512	$ 332,506	$ 68,701	$ 98,096	$ -	$ -	$ -	$ -	$ 1,209	$ 20,000
FY 2021	$ 534,036	$ 341,612	$ 70,835	$ 100,352	$ -	$ -	$ -	$ -	$ 1,236	$ 20,000
FY 2022	$ 544,771	$ 351,581	$ 69,266	$ 102,661	$ -	$ -	$ -	$ -	$ 1,263	$ 20,000
FY 2023	$ 543,492	$ 344,859	$ 72,320	$ 105,022	$ -	$ -	$ -	$ -	$ 1,291	$ 20,000
FY 2024	$ 556,397	$ 353,167	$ 74,473	$ 107,438	$ -	$ -	$ -	$ -	$ 1,319	$ 20,000
FY 2025	$ 562,739	$ 361,252	$ 76,213	$ 109,909	$ -	$ -	$ -	$ -	$ 1,348	$ 14,017
FY 2026	$ 563,042	$ 371,504	$ 77,723	$ 112,437	$ -	$ -	$ -	$ -	$ 1,378	$ -
FY 2027	$ 577,867	$ 383,584	$ 77,851	$ 115,024	$ -	$ -	$ -	$ -	$ 1,408	$ -
FY 2028	$ 592,830	$ 397,677	$ 76,045	$ 117,670	$ -	$ -	$ -	$ -	$ 1,439	$ -
FY 2029	$ 615,154	$ 410,472	$ 82,835	$ 120,376	$ -	$ -	$ -	$ -	$ 1,471	$ -
FY 2030	$ 655,758	$ 461,751	$ 69,359	$ 123,145	$ -	$ -	$ -	$ -	$ 1,503	$ -
FY 2031	$ 642,260	$ 447,833	$ 66,912	$ 125,978	$ -	$ -	$ -	$ -	$ 1,536	$ -
FY 2032	$ 640,129	$ 440,788	$ 68,895	$ 128,876	$ -	$ -	$ -	$ -	$ 1,570	$ -
FY 2033	$ 656,037	$ 450,119	$ 72,473	$ 131,840	$ -	$ -	$ -	$ -	$ 1,605	$ -
FY 2034	$ 489,397	$ 334,973	$ 63,073	$ 89,711	$ -	$ -	$ -	$ -	$ 1,640	$ -
FY 2035	$ 373,807	$ 254,271	$ 68,042	$ 49,817	$ -	$ -	$ -	$ -	$ 1,677	$ -
FY 2036	$ 372,717	$ 260,847	$ 60,486	$ 49,669	$ -	$ -	$ -	$ -	$ 1,715	$ -
FY 2037	$ 398,212	$ 276,256	$ 61,388	$ 58,814	$ -	$ -	$ -	$ -	$ 1,755	$ -
FY 2038	$ 427,843	$ 292,830	$ 65,789	$ 67,429	$ -	$ -	$ -	$ -	$ 1,795	$ -
FY 2039	$ 442,599	$ 314,792	$ 58,456	$ 67,515	$ -	$ -	$ -	$ -	$ 1,836	$ -
FY 2040	$ 176,993	$ 108,585	$ 17,642	$ 48,888	$ -	$ -	$ -	$ -	$ 1,878	$ -
FY 2041	$ 98,447	$ 32,081	$ 14,130	$ 50,314	$ -	$ -	$ -	$ -	$ 1,922	$ -
FY 2042	$ 120,145	$ 39,446	$ 28,051	$ 50,683	$ -	$ -	$ -	$ -	$ 1,966	$ -
FY 2043	$ 52,221	$ -	$ 16,267	$ 33,943	$ -	$ -	$ -	$ -	$ 2,011	$ -
FY 2044	$ 36,782	$ -	$ -	$ 34,724	$ -	$ -	$ -	$ -	$ 2,057	$ -

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Fig. F.6. Summary of cost profile for Base Case with Future Remedial Action Removed.
(dollars in thousands and in year of expenditure)

		Paducah 2022 Less RA								
Fiscal Year	Total	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	Uranium/Thorium Reimburse
	$ 19,244,405	**$ 9,561,049**	**$ 1,984,148**	**$ 4,323,009**	**$ 1,426,347**	**$ 231,315**	**$ 343,572**	**$ 771,950**	**$ 229,199**	**$ 373,817**
FY 2007	$ 532,347	$ 5,193	$ 2,253	$ 11,656	$ 219,588	$ 66,676	$ 53,381	$ 132,797	$ 21,002	$ 19,800
FY 2008	$ 588,754	$ 13,188	$ 12,683	$ 9,288	$ 238,103	$ 88,540	$ 49,745	$ 135,666	$ 21,540	$ 20,000
FY 2009	$ 625,679	$ 30,060	$ 10,994	$ 86,981	$ 260,482	$ 76,099	$ 43,857	$ 73,609	$ 23,596	$ 20,000
FY 2010	$ 590,212	$ 67,077	$ 13,747	$ 116,012	$ 252,374	$ -	$ 59,499	$ 36,122	$ 25,382	$ 20,000
FY 2011	$ 540,561	$ 72,192	$ 15,062	$ 116,420	$ 230,340	$ -	$ 33,156	$ 27,590	$ 25,800	$ 20,000
FY 2012	$ 552,209	$ 118,197	$ 24,760	$ 155,681	$ 177,404	$ -	$ 7,190	$ 22,694	$ 26,283	$ 20,000
FY 2013	$ 370,917	$ 116,795	$ 24,139	$ 159,255	$ 15,068	$ -	$ 6,921	$ 23,577	$ 5,163	$ 20,000
FY 2014	$ 385,118	$ 123,457	$ 20,749	$ 162,909	$ 13,368	$ -	$ 6,991	$ 33,421	$ 4,223	$ 20,000
FY 2015	$ 379,629	$ 123,767	$ 23,755	$ 166,647	$ 8,667	$ -	$ 7,129	$ 25,799	$ 3,863	$ 20,000
FY 2016	$ 386,143	$ 126,420	$ 24,495	$ 170,520	$ 9,147	$ -	$ 7,307	$ 24,315	$ 3,939	$ 20,000
FY 2017	$ 388,715	$ 129,018	$ 25,369	$ 175,733	$ 1,807	$ -	$ 7,515	$ 25,256	$ 4,016	$ 20,000
FY 2018	$ 396,481	$ 132,958	$ 24,980	$ 179,776	$ -	$ -	$ 7,688	$ 26,983	$ 4,096	$ 20,000
FY 2019	$ 407,478	$ 141,405	$ 20,166	$ 183,911	$ -	$ -	$ 7,867	$ 29,903	$ 4,226	$ 20,000
FY 2020	$ 414,126	$ 136,389	$ 28,898	$ 188,141	$ -	$ -	$ 8,048	$ 28,328	$ 4,323	$ 20,000
FY 2021	$ 424,438	$ 138,831	$ 30,258	$ 192,469	$ -	$ -	$ 8,233	$ 30,226	$ 4,421	$ 20,000
FY 2022	$ 527,828	$ 183,308	$ 105,280	$ 173,454	$ -	$ -	$ 8,422	$ 32,842	$ 4,521	$ 20,000
FY 2023	$ 600,975	$ 302,067	$ 56,340	$ 176,454	$ -	$ -	$ 8,975	$ 32,514	$ 4,624	$ 20,000
FY 2024	$ 575,290	$ 343,133	$ 73,867	$ 91,665	$ -	$ -	$ 11,648	$ 30,306	$ 4,672	$ 20,000
FY 2025	$ 560,535	$ 358,893	$ 76,368	$ 109,909	$ -	$ -	$ -	$ -	$ 1,348	$ 14,017
FY 2026	$ 561,617	$ 371,187	$ 76,614	$ 112,437	$ -	$ -	$ -	$ -	$ 1,378	$ -
FY 2027	$ 575,436	$ 382,936	$ 76,069	$ 115,024	$ -	$ -	$ -	$ -	$ 1,408	$ -
FY 2028	$ 589,170	$ 396,006	$ 74,056	$ 117,670	$ -	$ -	$ -	$ -	$ 1,439	$ -
FY 2029	$ 608,280	$ 405,124	$ 81,309	$ 120,376	$ -	$ -	$ -	$ -	$ 1,471	$ -
FY 2030	$ 630,774	$ 438,676	$ 67,450	$ 123,145	$ -	$ -	$ -	$ -	$ 1,503	$ -
FY 2031	$ 618,299	$ 424,582	$ 66,203	$ 125,978	$ -	$ -	$ -	$ -	$ 1,536	$ -
FY 2032	$ 646,200	$ 446,859	$ 68,895	$ 128,876	$ -	$ -	$ -	$ -	$ 1,570	$ -
FY 2033	$ 678,093	$ 472,175	$ 72,473	$ 131,840	$ -	$ -	$ -	$ -	$ 1,605	$ -
FY 2034	$ 518,260	$ 363,836	$ 63,073	$ 89,711	$ -	$ -	$ -	$ -	$ 1,640	$ -
FY 2035	$ 428,859	$ 304,658	$ 72,707	$ 49,817	$ -	$ -	$ -	$ -	$ 1,677	$ -
FY 2036	$ 432,486	$ 311,666	$ 69,435	$ 49,669	$ -	$ -	$ -	$ -	$ 1,715	$ -
FY 2037	$ 427,662	$ 296,144	$ 70,949	$ 58,814	$ -	$ -	$ -	$ -	$ 1,755	$ -
FY 2038	$ 440,217	$ 295,423	$ 75,571	$ 67,429	$ -	$ -	$ -	$ -	$ 1,795	$ -
FY 2039	$ 476,721	$ 330,605	$ 76,765	$ 67,515	$ -	$ -	$ -	$ -	$ 1,836	$ -
FY 2040	$ 510,535	$ 367,240	$ 73,616	$ 67,800	$ -	$ -	$ -	$ -	$ 1,878	$ -
FY 2041	$ 470,294	$ 324,340	$ 70,501	$ 73,531	$ -	$ -	$ -	$ -	$ 1,922	$ -
FY 2042	$ 499,030	$ 337,368	$ 85,262	$ 74,434	$ -	$ -	$ -	$ -	$ 1,966	$ -
FY 2043	$ 439,822	$ 304,775	$ 74,794	$ 58,241	$ -	$ -	$ -	$ -	$ 2,011	$ -
FY 2044	$ 407,432	$ 295,700	$ 50,094	$ 59,580	$ -	$ -	$ -	$ -	$ 2,057	$ -
FY 2045	$ 37,784	$ 29,397	$ 4,148	$ 4,238	$ -	$ -	$ -	$ -	$ -	$ -

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Fig. F.7. Summary of cost profile for Paducah Start Delayed to 2022 with Future Remedial Action Removed.
(dollars in thousands and in year of expenditure)

		Paducah 2030 Less RA								
Fiscal Year	Total	D&D of GDP Facilities	CERCLA Cell	S&M during D&D of GDP	D&D of Inactive Facilities	Remedial Actions	Waste Management	S&M/ Landlord	Other Costs (1)	Uranium/Thorium Reimburse
	$ 22,129,279	**$ 10,727,555**	**$ 2,230,758**	**$ 5,387,113**	**$ 1,426,347**	**$ 231,315**	**$ 422,426**	**$ 1,070,499**	**$ 259,450**	**$ 373,817**
FY 2007	$ 532,347	$ 5,193	$ 2,253	$ 11,656	$ 219,588	$ 66,676	$ 53,381	$ 132,797	$ 21,002	$ 19,800
FY 2008	$ 588,754	$ 13,188	$ 12,683	$ 9,288	$ 238,103	$ 88,540	$ 49,745	$ 135,666	$ 21,540	$ 20,000
FY 2009	$ 625,679	$ 30,060	$ 10,994	$ 86,981	$ 260,482	$ 76,099	$ 43,857	$ 73,609	$ 23,596	$ 20,000
FY 2010	$ 590,212	$ 67,077	$ 13,747	$ 116,012	$ 252,374	$ -	$ 59,499	$ 36,122	$ 25,382	$ 20,000
FY 2011	$ 540,561	$ 72,192	$ 15,062	$ 116,420	$ 230,340	$ -	$ 33,156	$ 27,590	$ 25,800	$ 20,000
FY 2012	$ 552,209	$ 118,197	$ 24,760	$ 155,681	$ 177,404	$ -	$ 7,190	$ 22,694	$ 26,283	$ 20,000
FY 2013	$ 370,917	$ 116,795	$ 24,139	$ 159,255	$ 15,068	$ -	$ 6,921	$ 23,577	$ 5,163	$ 20,000
FY 2014	$ 385,118	$ 123,457	$ 20,749	$ 162,909	$ 13,368	$ -	$ 6,991	$ 33,421	$ 4,223	$ 20,000
FY 2015	$ 379,629	$ 123,767	$ 23,755	$ 166,647	$ 8,667	$ -	$ 7,129	$ 25,799	$ 3,863	$ 20,000
FY 2016	$ 386,143	$ 126,420	$ 24,495	$ 170,520	$ 9,147	$ -	$ 7,307	$ 24,315	$ 3,939	$ 20,000
FY 2017	$ 388,715	$ 129,018	$ 25,369	$ 175,733	$ 1,807	$ -	$ 7,515	$ 25,256	$ 4,016	$ 20,000
FY 2018	$ 396,481	$ 132,958	$ 24,980	$ 179,776	$ -	$ -	$ 7,688	$ 26,983	$ 4,096	$ 20,000
FY 2019	$ 407,478	$ 141,405	$ 20,166	$ 183,911	$ -	$ -	$ 7,867	$ 29,903	$ 4,226	$ 20,000
FY 2020	$ 414,126	$ 136,389	$ 28,898	$ 188,141	$ -	$ -	$ 8,048	$ 28,328	$ 4,323	$ 20,000
FY 2021	$ 424,438	$ 138,831	$ 30,258	$ 192,469	$ -	$ -	$ 8,233	$ 30,226	$ 4,421	$ 20,000
FY 2022	$ 434,573	$ 144,136	$ 27,755	$ 196,896	$ -	$ -	$ 8,422	$ 32,842	$ 4,521	$ 20,000
FY 2023	$ 430,722	$ 133,541	$ 30,002	$ 201,425	$ -	$ -	$ 8,616	$ 32,514	$ 4,624	$ 20,000
FY 2024	$ 440,419	$ 136,069	$ 31,030	$ 206,059	$ -	$ -	$ 8,814	$ 33,719	$ 4,729	$ 20,000
FY 2025	$ 444,093	$ 139,160	$ 31,771	$ 210,798	$ -	$ -	$ 9,017	$ 34,494	$ 4,837	$ 14,017
FY 2026	$ 440,242	$ 143,986	$ 31,150	$ 215,647	$ -	$ -	$ 9,224	$ 35,288	$ 4,947	$ -
FY 2027	$ 451,270	$ 150,509	$ 29,559	$ 220,608	$ -	$ -	$ 9,436	$ 36,099	$ 5,059	$ -
FY 2028	$ 463,321	$ 159,240	$ 26,642	$ 225,682	$ -	$ -	$ 9,653	$ 36,930	$ 5,174	$ -
FY 2029	$ 478,354	$ 161,881	$ 32,635	$ 230,873	$ -	$ -	$ 9,875	$ 37,798	$ 5,292	$ -
FY 2030	$ 609,704	$ 236,826	$ 110,651	$ 208,064	$ -	$ -	$ 10,103	$ 38,648	$ 5,412	$ -
FY 2031	$ 684,934	$ 371,818	$ 45,614	$ 211,663	$ -	$ -	$ 10,766	$ 39,537	$ 5,535	$ -
FY 2032	$ 666,129	$ 434,096	$ 66,172	$ 109,956	$ -	$ -	$ 13,972	$ 36,342	$ 5,592	$ -
FY 2033	$ 672,663	$ 468,602	$ 70,616	$ 131,840	$ -	$ -	$ -	$ -	$ 1,605	$ -
FY 2034	$ 510,558	$ 357,844	$ 61,363	$ 89,711	$ -	$ -	$ -	$ -	$ 1,640	$ -
FY 2035	$ 400,867	$ 278,805	$ 70,569	$ 49,817	$ -	$ -	$ -	$ -	$ 1,677	$ -
FY 2036	$ 402,442	$ 284,009	$ 67,049	$ 49,669	$ -	$ -	$ -	$ -	$ 1,715	$ -
FY 2037	$ 431,413	$ 302,133	$ 68,711	$ 58,814	$ -	$ -	$ -	$ -	$ 1,755	$ -
FY 2038	$ 461,808	$ 319,302	$ 73,282	$ 67,429	$ -	$ -	$ -	$ -	$ 1,795	$ -
FY 2039	$ 502,347	$ 356,657	$ 76,340	$ 67,515	$ -	$ -	$ -	$ -	$ 1,836	$ -
FY 2040	$ 544,121	$ 395,599	$ 78,843	$ 67,800	$ -	$ -	$ -	$ -	$ 1,878	$ -
FY 2041	$ 508,518	$ 352,537	$ 80,528	$ 73,531	$ -	$ -	$ -	$ -	$ 1,922	$ -
FY 2042	$ 545,468	$ 373,549	$ 95,519	$ 74,434	$ -	$ -	$ -	$ -	$ 1,966	$ -
FY 2043	$ 511,454	$ 365,449	$ 85,754	$ 58,241	$ -	$ -	$ -	$ -	$ 2,011	$ -
FY 2044	$ 506,578	$ 373,855	$ 71,085	$ 59,580	$ -	$ -	$ -	$ -	$ 2,057	$ -
FY 2045	$ 440,963	$ 342,815	$ 72,721	$ 25,428	$ -	$ -	$ -	$ -	$ -	$ -
FY 2046	$ 429,811	$ 329,405	$ 74,393	$ 26,013	$ -	$ -	$ -	$ -	$ -	$ -
FY 2047	$ 437,751	$ 335,546	$ 75,594	$ 26,611	$ -	$ -	$ -	$ -	$ -	$ -
FY 2048	$ 440,546	$ 341,738	$ 71,585	$ 27,223	$ -	$ -	$ -	$ -	$ -	$ -
FY 2049	$ 446,044	$ 350,575	$ 67,619	$ 27,849	$ -	$ -	$ -	$ -	$ -	$ -
FY 2050	$ 454,486	$ 357,369	$ 68,627	$ 28,490	$ -	$ -	$ -	$ -	$ -	$ -
FY 2051	$ 464,940	$ 365,589	$ 70,206	$ 29,145	$ -	$ -	$ -	$ -	$ -	$ -
FY 2052	$ 444,608	$ 354,703	$ 60,089	$ 29,816	$ -	$ -	$ -	$ -	$ -	$ -
FY 2053	$ 45,323	$ 35,263	$ 4,976	$ 5,084	$ -	$ -	$ -	$ -	$ -	$ -

Note 1: "Other Costs" captures miscellaneous liabilities such as pension contributions, post retirement life and medical benefit expenses, litigation costs, funding of the Site Specific Advisory Board, etc.

Fig. F.8. Summary of cost profile for Paducah Start Delayed to 2030 with Future Remedial Action Removed.

(dollars in thousands and in year of expenditure)

Scenario	Historical Costs (FY 1993 - FY 2006)	Future Costs (FY 2007 & Forward)	Lifecycle Costs	Fund Shortfall	Year the Fund's Balance Becomes Negative	Years of $450M Annual Contribution (beginning FY 2012) needed to make Fund Sufficient
BASE CASE (for comparison purposes)	**$4.2**	**$19.8**	**$24.0**	**($10.9)**		**13**
Alternate Scenarios						
Pessimistic Economics	$4.2	$29.4	$33.6	($20.9)	2021	31
ETTP Completion Delayed to 2014	$4.2	$19.9	$24.1	($11.0)	2022	13
Paducah Start Delayed to 2022	$4.2	$21.5	$25.7	($12.5)	2024	13
Paducah Start Delayed to 2030	$4.2	$24.7	$28.9	($15.7)	2025	13
Base Case Less Remedial Action	$4.2	$17.7	$21.9	($8.2)	2025	8
Paducah Delay to 2022 Less Remedial Action	$4.2	$19.2	$23.4	($9.6)	2027	9
Paducah Delay to 2030 Less Remedial Action	$4.2	$22.1	$26.3	($12.4)	2028	9

Fig. F.9. Summary of cost profile Summary of Sufficiency Analysis for Alternate Scenarios.
(dollars in billions and in year of expenditure)

All the alternate scenarios evaluated for sensitivity analysis project a significant shortfall in the Fund, with the balance going negative within the 7-year window of 2021 to 2028. In the analyses, the shortfalls ranged from $8.2 to $20.9 billion. Key highlights are discussed below (in year of expenditure dollars).

Removing remedial action scope from the Fund would reduce the shortfall by about $2.7 billion (-25%). However, it should be noted the Department will still have to fund the cost of remedial action work even if this work is removed from the Fund. Although remedial action is a significant component of the cleanup work being covered by the Fund, much of the spending on remedial action scope has already occurred. With congressional approval, the Department has often pursued remedial action work due to risk rankings, and because most of the Portsmouth and Paducah GDP facilities were under lease to USEC and not available for D&D.

If Paducah D&D were delayed five years (until 2022) due to USACE operations, $1.6 billion (+15%) would be added to the $10.9 billion shortfall, for a total deficit of $12.5 billion. Similarly, if Paducah D&D were delayed until 2030, $4.8 billion (+44%) would be added to the shortfall, for a total deficit of $15.9 billion. These large impacts on future costs are due to additional years of surveillance and maintenance that would be necessary until work begins as well as general cost escalation from delaying the performance period for the work.

The Pessimistic Economics scenario illustrates that pessimistic economic conditions could add about $10 billion to the shortfall, which at $20.9 billion would almost double the deficit. The Pessimistic Economics scenario uses an economic forecast significantly worse than the forecast used in the Base

Case. However, the analysis shows that even small changes in the rates, such as a quarter of a point unfavorable change in the inflation rate, can impact the Fund's bottom line by over $800 million. With a long time frame for completing the cleanup work, interest and inflation rates will have a significant impact on the Fund's sufficiency.