

NIRS/PC Exh. #	Witness/ Panel	Description
279	Arjun Makhijani/ deconversion costs	California Health Care Foundation, Health Care Costs 101 (2004) Available at: www.chcf.org/documents/insurance/HealthCostsSnapshot04.pdf
280	Arjun Makhijani/ deconversion costs	Spreadsheet prepared by Dr. Makhijani, Oct. 26, 2005, as revised Dec. 2005. PROPRIETARY MATERIAL
281	Arjun Makhijani/ deconversion costs	Spreadsheet produced by counsel for LES, Dec. 22, 2005. PROPRIETARY MATERIAL
282	Arjun Makhijani/ deconversion costs	Department of Energy Programmatic Environmental Impact Statement (1999), Appendix F. Available at http://web.ead.anl.gov/uranium/documents/nepacomp/peis/parts/appendices.cfm
283	Arjun Makhijani/ deconversion costs	Department of Energy Final Plan for the conversion of depleted uranium hexafluoride (1999). Available at http://web.ead.anl.gov/uranium/pdf/finalplan.pdf

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 January 3, 2006 (1:35pm)

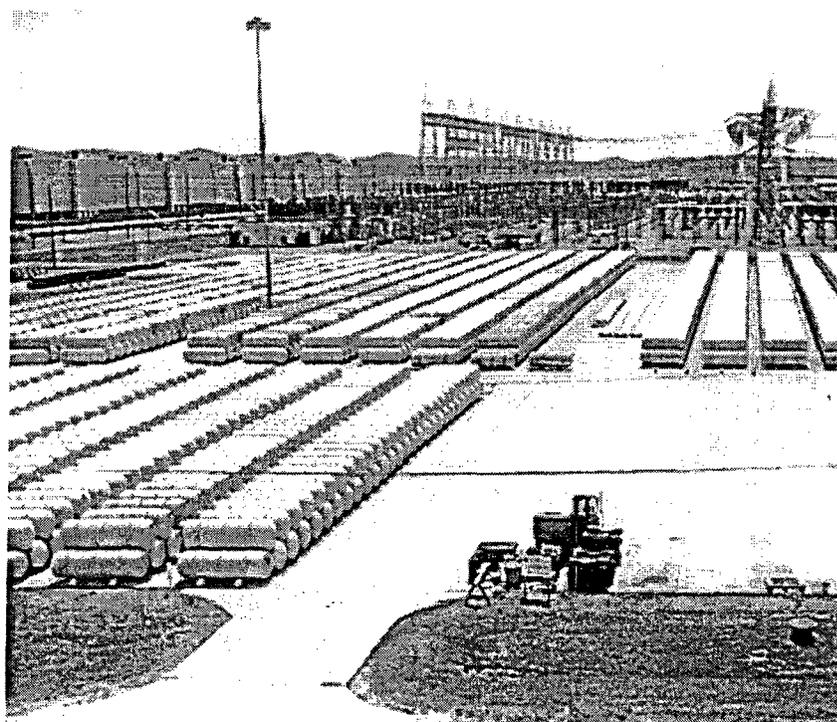
 OFFICE OF SECRETARY
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NIRS/PC EXHIBIT # 283

U.S. Department of Energy

Final Plan for the Conversion of Depleted Uranium Hexafluoride

As Required by Public Law 105-204



July 1999

Office of Nuclear Energy, Science and Technology

*Final Plan for the Conversion of
Depleted Uranium Hexafluoride*

EXECUTIVE SUMMARY

Over the last four decades, large quantities of uranium were processed using gaseous diffusion in order to produce enriched uranium for national defense and civilian purposes. Depleted uranium hexafluoride (DUF_6) was generated as a byproduct of the process and was stored at the three uranium enrichment sites. A relatively small portion was converted to metal or oxide for other uses.

A legacy of approximately 700,000 metric tons (MT) of depleted UF_6 , containing about 476,000 metric tons of uranium, is currently stored at the Paducah site in Kentucky, the Portsmouth site in Ohio, and the East Tennessee Technology Park (ETTP) in Tennessee (formerly known as the K-25 Site) in about 57,700 steel cylinders and includes about 11,200 cylinders of material that have been or will be transferred to the Department from the United States Enrichment Corporation (USEC) under two recent Memoranda of Agreement. This material is a stable but toxic, granular solid, much of which has been stored for decades.

The advanced age of some of the steel cylinders in which the DUF_6 is contained, and the way in which the cylinders were originally arranged (sometimes too close together to permit inspection, and sometimes in direct contact with the ground leading to enhanced cylinder corrosion) has created a potential environmental and safety hazard. This was underscored by Defense Nuclear Facilities Safety Board (DNFSB), which issued Recommendation 95-1, *Safety of Cylinders Containing Depleted Uranium*, in 1995, to improve storage and maintenance of the DUF_6 cylinders. While DUF_6 does not present as significant a radiological threat as other isotopes, it is a potential chemical hazard if not properly managed.

Since 1990, the Department (which fully accepted Recommendation 95-1) has conducted a focused program of cylinder inspections, recoatings, and

relocations to assure that DUF_6 is safely stored pending its ultimate disposition. The program has so far been largely focused on the ongoing surveillance and maintenance of the cylinders containing DUF_6 . The question, however, of the long-term management and eventual disposition of DUF_6 remains and is the subject of considerable interest within the Congress, the Department, and with concerned citizens and stakeholders.

Congress stated its intentions with regard to DUF_6 in Public Law (P. L.) 105-204, signed by the President in July 1998 (See Appendix A). This law directed the Secretary of Energy to prepare and submit to Congress a plan (herein referred to as the "Plan") to ensure that all funds accrued on the books of the USEC for the disposition of DUF_6 will be used for the construction and operation of plants to treat and recycle the DUF_6 , consistent with the National Environmental Policy Act (NEPA).

Approximately \$373 million was accrued by USEC for this purpose, however, P. L. 105-204 only set aside these funds but did not make them available to the Department. In order for the Department to award contracts to begin conversion these funds will need to be appropriated. Conversion of the Department's depleted uranium hexafluoride inventory would represent a major new undertaking and involve a significant investment of resources beyond amounts available in the fiscal year (FY) 2000 budget request. Decisions regarding the funding and execution of this plan will be made in the course of the budget process and may affect the nature and timing of the conversion program.

The FY 1999 budget only funds DUF_6 cylinder surveillance and maintenance at \$10.1 million. The FY 2000 budget request proposes funding this activity at \$10.9 million including funding for the design of over-packs needed for transportation of cylinders. An additional \$7.6 million for research and development for DU uses, NEPA activities

related to conversion, and preparation of the Request for Proposals is also part of the FY 2000 budget request. In addition, the Department will use a portion of the \$66 million received from USEC to accept and maintain DUF₆ cylinders transferred from USEC to the Department in FY 1999 through FY 2009.

Also, P. L. 105-204 required the Secretary of Energy to prepare proposed legislation for consideration by Congress. Other than funding legislation, the Department does not believe that additional legislation is necessary at this time. The Department will continue to consider whether additional legislation is necessary or advisable in light of future developments in the program.

The Department has responded to P. L. 105-204 by initiating a procurement action through release of a Request for Expressions of Interest on March 4, 1999 and issuing the *Initial Plan for the Conversion of Depleted Uranium Hexafluoride*, on March 12, 1999. The Department's *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*, (hereafter Final PEIS) issued April 16, 1999. The Final PEIS found that the environmental impacts of all the alternatives are relatively small and that the "no-action" alternative has the lowest environmental impact. The Department believes, however, that it is good management practice to proceed toward conversion in a cost effective manner, consistent with overall budget priorities.

The Final PEIS describes the preferred alternative for managing the depleted uranium hexafluoride: to begin conversion of the DUF₆ inventory as soon as possible, either to uranium oxide, uranium metal, or a combination of both, while allowing for future use of as much of this inventory as possible. Although conversion for long-term storage of depleted uranium metal was not analyzed in depth in the Final PEIS, recent information indicates that some elements of the private sector support such an activity and the Department remains open to exploring this option

further. If the successful bidder proposes to convert the DUF₆ to metal for long-term storage, the Department would need to consider whether to conduct additional programmatic NEPA analysis. A Record of Decision (ROD) concerning the Department's decision on the long-term management and use of DUF₆ is expected to be released in July 1999.

The first step — for either future use or disposition — is to convert the material by removing the fluorine component and transforming the material into a safer, more stable form. To do so, construction and long-term operation of conversion plants are essential. Conversion, then, is the centerpiece of an integrated approach for management of the Department's DUF₆ inventory.

The Department has developed a program that encompasses the following elements:

- cylinder surveillance and maintenance;
- conversion services that include the design, construction, operation, and decontamination and decommissioning of conversion facilities;
- storage of uranium conversion products to include design, construction, operation, and decontamination and decommissioning of storage facilities;
- use of conversion products; and
- disposal of products not used — uranium and fluorine compounds, and empty storage cylinders.

Conversion of the DUF₆ inventory will take place in plants on each of the Paducah and Portsmouth gaseous diffusion plant sites. The primary drivers for two conversion plants are the direction of Congress expressed in P. L. 105-204, the increased risk associated with transportation of large numbers of DUF₆ cylinders, increased transportation costs and potential issues with regulatory and stakeholder

acceptance of large quantities of new cylinders moving through or into their states. To meet the intent of the Consent Order with the State of Tennessee it is anticipated that the relatively small quantity of material in storage at the ETTP will be relocated to the Portsmouth site after conversion operations begin in cooperation with the State of Ohio.

The Department believes that the private sector is well equipped to provide the services needed for the conversion of the Department's DUF_6 inventory. Therefore, the Department desires to award one or more contracts to:

- manage the UF_6 cylinders pending conversion;
- convert the DUF_6 inventory to uranium metal or oxide; and
- store the conversion products pending use or disposal.

The Department intends to require the contractor(s) to obtain private financing for the conversion project. The Department may, however, finance the project as a normal construction project, or finance it through some combination thereof. The Department believes that private financing represents the best option and is proceeding on this basis. As the procurement process matures the Department will maintain the flexibility to seek the most efficient and cost effective financing method.

Economically recoverable conversion products will be sold and revenues may be used to offset a portion of the conversion costs. The uranium metal or oxide conversion products will remain the property of the Department until such time as the material is sold or transferred to a commercial user.

Reliable cost estimates will not be available until responses are received from the Department's Final Request for Proposals, though it is believed that the total life-cycle cost of the integrated approach for the conversion program, including operation

of the facilities for nearly 25 years, storage, and disposal of conversion products not used, is between \$3 - \$4 billion. Reliable estimates of revenues from the sale of conversion products are also not yet available, though the Department believes that sales would be about \$200 million. Further funding requirements will be determined by: the annual budget process; the specific form of the competitive procurement strategy, process, and schedule; and the underlying costs in proposals such as the technology used and the size of facilities.

This Plan describes the steps that would allow the Department to convert the DUF_6 inventory. It provides an aggressive schedule with the goal to award one or more integrated conversion and management services contracts in calendar year (CY) 2000 in order to begin construction of conversion facilities in CY 2002. Of course, the schedule is contingent on future budget requests and receipt of adequate appropriations.

This Plan incorporates information received from the private sector in response to the Department's Request for Expressions of Interest, ideas gained from members of the affected communities, Congress, and other interested stakeholders, as well as the results of the analyses for the Final PEIS. Although this Plan is presented in as definitive a form as possible, the Department recognizes that some aspects of the approach presented herein will evolve as the procurement process and interactions with the private sector and stakeholders continue. The Department looks forward to close coordination with affected State and local governments and local communities, stakeholders, and interested Congressional delegations as this program completes its planning phase and moves rapidly toward implementation.

*Final Plan for the Conversion of
Depleted Uranium Hexafluoride*

INTRODUCTION

Over the last four decades, large quantities of uranium were processed using gaseous diffusion in order to produce enriched uranium for national security and civilian purposes. Depleted uranium hexafluoride was generated as a byproduct of the process and was stored at the sites of existing and closed gaseous diffusion plants. A relatively small portion was converted to metal or oxide for other uses. In all, a legacy of approximately 700,000 MT of DUF_6 containing about 476,000 MT of uranium is currently stored at the Paducah site in Kentucky, the Portsmouth site in Ohio, and the East Tennessee Technology Park (ETTP) in Tennessee (formerly known as the K-25 Site) in about 57,700 steel cylinders. This includes 145,000 MT of DUF_6 , in approximately 11,200 cylinders, that has or will be generated by USEC.

Depleted Uranium is uranium that, through the enrichment process, has been stripped of a portion of the ^{235}U that it once contained, so that it has a lower proportion than the 0.711 weight-percent ^{235}U found in nature. Most of the DUF_6 discussed in this plan has between 0.2 to 0.4 weight-percent ^{235}U .

Several different cylinder types are in use, although the vast majority of cylinders have a 12 metric-ton capacity. The cylinders are typically 12 feet long by 4 feet in diameter, with most having a wall thickness of 5/16 inches of carbon steel. Similar, but slightly smaller, cylinders with a capacity of 9 metric-tons are also in use. During storage, a cylinder contains solid, granular DUF_6 at its bottom with a small percentage of DUF_6 gas resting on top.

This DUF_6 inventory is the result of over 40 years of uranium enrichment activities by the Federal Government. Most of the uranium enrichment activities conducted by the United States from the 1940's

through the 1960's was performed to create highly enriched uranium (HEU) for defense purposes. Most of the oldest cylinders in the inventory (generally located at the ETTP) are associated with defense materials production.

Since the mid-1960's the Federal enrichment enterprise began to devote its production to primarily commercial nuclear power customers — electric utilities that would ship "natural" uranium hexafluoride to the Department for "toll" enrichment services. After enrichment, these commercial customers received low enriched uranium hexafluoride (used to fabricate fuel for commercial nuclear power plants), leaving the Department with the associated depleted uranium hexafluoride.

These operations continued through July 1993, at which time the USEC took over responsibility for the enrichment of uranium from the Department. The Department, however, retained the responsibility to manage all the DUF_6 created up to that point. Subsequent law clarified that the Department would be responsible for all the material produced by USEC after its formation and up to its privatization in July 1998 (9,186 cylinders). In addition, USEC paid the Department to take ownership of an additional 2,026 cylinders generated by the privatized USEC, which have been or will be delivered over a six year period.

The advanced age of some of the steel cylinders in which the DUF_6 is contained, and the way in which the cylinders were originally arranged (sometimes too close together to permit inspection, and sometimes in direct contact with the ground leading to enhanced cylinder corrosion) have created a potential environmental and safety hazard. While DUF_6 does not present as significant a

radiological hazard as other isotopes, it is a potential chemical hazard if not properly managed.

In 1994, the Department began working on the draft *Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (Draft PEIS)¹. The Draft PEIS and supporting documents were published in December 1997.

The Draft PEIS included a "no-action" alternative and several additional alternatives for the long-term management of the DUF₆ stockpile. These additional alternatives included: long-term storage as DUF₆ at a new site(s), conversion of the DUF₆ and long-term storage as an oxide, conversion of the DUF₆ to an oxide for use as radiation shielding, conversion of the DUF₆ to uranium metal for use as radiation shielding, and conversion of the DUF₆ to an oxide for disposal.

Original plans for the management of depleted uranium hexafluoride were to continue safe storage of the cylinders and, if feasible alternative uses for the depleted uranium had not been found by about the year 2010, to take steps to initiate conversion of the DUF₆ to triuranium octaoxide (U₃O₈) in the year 2020. The U₃O₈ would be stored until there was a determination that the depleted uranium was no longer needed. At that point the material would be disposed of as low-level radioactive waste. Since then several factors have led the Department to change its original plans. Chief among these factors were:

- In recent years, the Department, State environmental agencies, and the public have become increasingly sensitized to the need for better management of the DUF₆ cylinders. This culminated in an Ohio Environmental Protection Agency Notice of Violation which recommended

that the Department improve storage and maintenance of the DUF₆ cylinders.

- DOE entered into a Consent Order with the Department of Environment and Conservation of the State of Tennessee with respect to the management of the depleted UF₆ stored at the K-25 site (ETTP). DOE agreed that if it chooses any action alternative as the outcome of the PEIS, it shall, subject to appropriate NEPA review, either remove all known DUF₆ cylinders from K-25 or complete the conversion of their contents by December 31, 2009.
- The Department held four public meetings in February and March 1998 as part of PEIS development process. Based on the comments received at those meetings, other discussions with stakeholders, and the over 600 comments received during the draft PEIS comment period, the preference of the public and involved industry is not to wait for uses to be developed, but rather to begin conversion of the DUF₆ promptly.
- Public Law 105-204 was signed by the President in July 1998 (See Appendix A). This law directed that the Secretary of Energy "...shall prepare, and the President shall include in the budget request for fiscal year 2000, a plan and proposed legislation to ensure that all amounts accrued on the books of the United States Enrichment Corporation for the disposition of depleted uranium hexafluoride will be used to commence construction of, not later than January 31, 2004, and to operate, an onsite facility at each of the gaseous diffusion plants at Paducah, Kentucky, and Portsmouth, Ohio, to treat and recycle depleted uranium hexafluoride consistent with the National Environmental Policy Act...."

The culmination of the Department's analysis, the factors described above, and incorporation of public comments was the *Final Programmatic*

*Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride,*² DOE/EIS-0269, issued on April 16, 1999. The Final PEIS found that the environmental impacts of all the alternatives are small and that the "no-action" alternative has the lowest impacts. The Department believes, however, that it is good management practice to proceed toward conversion in a cost-effective manner, consistent with overall budget priorities.

The Final PEIS identified a preferred alternative for long-term management of its DUF₆: to begin conversion of the UF₆ inventory as soon as possible, either to uranium oxide, uranium metal, or a combination of both, while allowing for future use of as much of this inventory as possible. A ROD concerning the Department's decision on the long-term management and use of DUF₆ is expected to be released in July 1999.

On March 4, 1999, the Department issued a notice seeking Expressions of Interest (EOI)³ from commercial entities for the conversion of the DOE's inventory of depleted uranium hexafluoride as part of its strategy to involve the private sector in developing solutions to this complex issue. The large majority of responses indicated that the Department's proposed procurement approach of using the private sector to convert the DUF₆ materials is not only possible, but in fact, preferable. Respondents also reacted favorably to the concept of a single integrated contract. The Department's inquiries regarding the availability of conversion technologies received many valuable responses. The responses stated that there is very little technical risk with respect to the conversion process. A number of respondents indicated available technologies and capabilities exist in

industry today, and little research is required with respect to conversion. However, there was a general consensus among the respondents that there is a significant financial risk which must be addressed in the Request for Proposals. Additionally, few potential innovative uses for the products of conversion were identified and a need was expressed for the Department to define a strategy for product development and final disposition.

The responses to the EOI indicated that some elements of the private sector would like to convert the DUF₆ to uranium metal and place it into long-term storage. Although conversion for long-term storage of depleted uranium metal was not analyzed in depth in the Final PEIS, the Department, in order to allow innovative commercial approaches for managing the material to be proposed, remains open to this option. If the successful bidder proposes to convert the DUF₆ to metal for long-term storage, the Department would need to consider whether to conduct additional programmatic NEPA analysis.

The Plan is divided into five main sections. The first section describes the overall program and provides a description of the underlying policy decisions made to vivify the program. The second section describes cylinder management. The third section discusses conversion and provides the key assumptions and program elements that will guide implementation of the conversion activity. Section four describes conversion product storage. The last section discusses near-term activities that will help reduce the overall costs of the program, answer key questions regarding the conversion program, and help retain experienced and skilled workers needed to support conversion operations.

Section One: PROGRAM OVERVIEW

The Department has developed a program with the following elements: cylinder management; conversion, including the design, construction, operation, and final decontamination and decommissioning of conversion facilities; storage, including design, construction, and operation of storage facilities; use of conversion products; disposal of products not used — uranium and fluorine compounds and empty storage cylinders; and certain near-term activities.

Program Goals

Under this Plan the Department would:

- Award one or more conversion and management services contracts no later than March 31, 2000;
- Begin construction of conversion facilities no later than March 31, 2002;
- Begin conversion operations no later than December 31, 2004;
- Transfer the cylinders at ETTP to Portsmouth as soon as practical after conversion operations begin in cooperation with the State of Ohio; and
- Safely, expeditiously, and efficiently convert all of the approximately 700,000 metric tons of depleted uranium hexafluoride.

Procurement Approach

The Department believes that the private sector is well equipped to provide the services needed for the efficient conversion of the Department's DUF_6 inventory. Therefore, the Department plans to engage the private sector in a series of interactive activities focused on the issuance of a Request for Proposals from the Department to the private sector for an integrated approach for DUF_6 cylinder

management, conversion services, and product storage. The Department will award one or more contracts to manage the cylinders pending conversion and design, construct, operate, and ultimately decontaminate and decommission the needed conversion plants and storage facilities. Development by the contractor of commercial uses of depleted uranium will be encouraged. Disposal of commercial products is presumed to be the responsibility of the product's owner and not the government's. Figure 1 shows the relationship of the program elements in a process flow diagram along with a depiction of those elements that would fall within the integrated contract scope. The other elements of the program, e.g., government use and disposal of unused DUF_6 products, will remain the responsibility of the Department.

This Plan describes the three primary aspects of the procurement strategy along with the near-term activities the Department will undertake to meet the management challenge of DUF_6 conversion. These will be described in detail in the four subsequent sections of this plan:

- ***The continued inspection and maintenance of the Department's UF_6 cylinders located in Kentucky, Ohio, and Tennessee.*** Until the inventory is completely converted, the Department's cylinder management program must continue;
- ***The establishment and implementation of the capability to convert the DUF_6 owned by the Department to either uranium oxide or uranium metal plus fluorine compounds;***
- ***Storage of conversion products.*** Storage of conversion products is required pending sale, use, or disposal; and

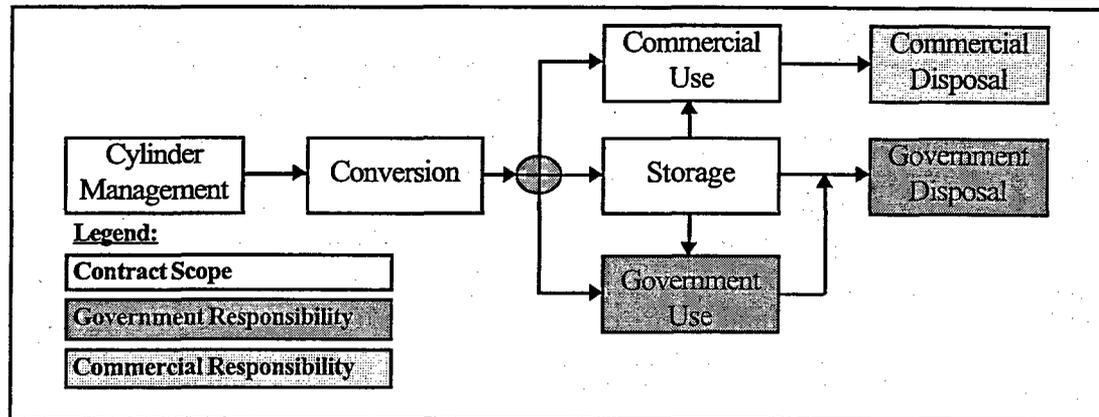


Figure 1. DUF₆ Management Program Elements

• **Near-term activities.** Certain activities that will help reduce the overall costs of the program, answer key questions and help retain experienced and skilled workers needed to support conversion operations are envisioned.

Under this Plan, conversion of depleted uranium hexafluoride will occur on an aggressive schedule. Meeting this schedule will require significant Congressional, Departmental, State and local government, and private sector involvement and cooperation. A summary schedule of activities needed within the next several years is provided in Table 1.

The following elements provide the programmatic basis by which to proceed with conversion:

• **Regulation.** Design, construction, operation, and decontaminating and decommissioning of conversion and storage facilities will be undertaken in a manner that ensures adequate protection of workers, the public, and the environment taking into account appropriate Nuclear Regulatory Commission, Department of Transportation, Occupational Safety and Health Administration, Environmental Protection Agency, and Department of Energy environment, safety and health requirements and standards. Environmental permits will be obtained from appropriate state authorities.

• **Cost Estimate.** Reliable cost estimates will not be available until responses are received from the Department's Final Request for Proposals, though it is believed that the total life-cycle cost of the integrated approach for the conversion program, including operation of the facilities for nearly 25 years, storage, and disposal of unused conversion products is between \$3 - \$4 billion. Reliable estimates of revenues from the sale of conversion products are also not yet available, though the Department believes that sales would be about \$200 million. Further funding requirements will be determined by: the annual budget process; the specific form of the competitive procurement strategy, process, and schedule; and the underlying costs in proposals such as the technology used and the size of facilities.

• **Funding.** Conversion of the Department's depleted uranium hexafluoride would represent a major new undertaking and involve a significant investment of resources beyond amounts available in the current budget. Thus, the schedule provided in this Final Plan is of course contingent upon future budget requests and the receipt of adequate appropriations. Decisions regarding the funding and execution of this plan will be made in the course of the budget process and may affect the nature and timing of the conversion program.

TABLE I DUF₆ CONVERSION SCHEDULE AND KEY MILESTONES <i>(contingent on appropriations and procurement strategy)</i>	
<i>Approximate Dates (Calendar Year)</i>	<i>Key Milestones</i>
July 1999	- Issue PEIS ROD - Issue Final Plan - Issue Draft RFP for integrated conversion and management services contract(s)
August 1999	- Hold pre-solicitation conference
September 1999	- Receive comment on Draft RFP - Issue Final RFP for integrated conversion and management services contract(s)
4 th Quarter 1999	- Site visits for potential proposers - Hold pre-proposal conference - Receive vendor proposals - Receive necessary appropriations
1 st Quarter 2000	- Evaluate vendor proposals - Award DUF ₆ integrated conversion and management services contract(s) - Commence project-specific NEPA Analyses
2 nd Quarter 2001	- Complete project-specific NEPA Analyses
1 st Quarter 2002	- Start construction of conversion facilities
4 th Quarter 2004	- Begin Conversion Operations

- Financing.** The Department intends to require the contractor(s) to obtain private financing for the conversion project. The Department may, however, finance the project as a normal construction project, or some combination thereof. The Department believes that private financing represents the best option and is proceeding on this basis. As the procurement process matures the Department will maintain the flexibility to seek the most efficient and cost effective financing method. Payments to the contractor(s) for cylinder management and conversion product storage services are expected to be provided on a fixed unit price basis. Payments for conversion services are also expected to be made on a fixed unit price basis that, during the base period of the contract, will include the capital costs of the conversion facilities amortized over the number of units of DUF₆ converted. The contractor(s) would be required to propose a base period that will maximize

the amount of conversion product per dollar of capital investment. The Department intends to provide advance payments to the contractor(s) for conversion services as indicated by P. L. 105-204. Guarantees of minimum conversion quantities and feedstock will also be provided. The final financing arrangements will be dependent on the outcome of the procurement process.

- NEPA.** The Final PEIS lays the foundation for the environmental analyses needed to proceed with conversion and provides the strategy and preferred alternative for the long-term management of the DUF₆ inventory: to begin conversion of the DUF₆ inventory as soon as possible, either to uranium oxide, uranium metal, or a combination of both, while allowing for future use of as much of this inventory as possible. Although conversion for long-term storage of depleted uranium metal was not analyzed in depth

in the Final PEIS, recent information indicates that some elements of the private sector support such an activity. If the successful bidder proposes to convert the DUF₆ to metal for long-term storage, the Department would need to consider whether to conduct additional programmatic NEPA analysis. Additional follow-on, project-specific NEPA reviews and supporting analyses will evaluate issues such as where to locate facilities, which specific technologies or processes to use, and what site-specific impacts might arise from conversion and storage activities.

- **Liability.** Consistent with the Price-Anderson Act, the Department intends to indemnify the contractor for any nuclear incident resulting from their contractual activity associated with the transportation and conversion of governmental depleted uranium. Non-nuclear aspects and any operations utilizing non-government depleted uranium will be the responsibility of the contractor.
- **Legislation.** Other than funding legislation, the Department does not believe that additional legislation is necessary at this time. The Department will continue to consider whether additional legislation is necessary or advisable in light of future developments in the program. Execution of this Plan is expected to require future appropriations to the Department to support the DUF₆ program in addition to the \$66 million obtained from USEC for the management of its material. In addition, P. L. 105-204 identified \$373 million for the conversion of these materials that would need to be made available.
- **Labor Strategy.** The Department will require the contractor to develop a comprehensive labor strategy for the entire life cycle of conversion operations that complies with the requirements and objectives of Section 3161 of the Fiscal Year 1993 National Defense Authorization Act. The labor strategy will identify appropriate participation by the building trades and workers represented by the industrial unions at Paducah and Portsmouth. A key element of the labor strategy will be to focus on ways to retain the skilled and experienced workforces at Paducah and Portsmouth. To this end, the Department commits to do all that it is able to do within its available resources to maintain as much of the existing workforce as possible to support conversion operations. This includes initiating near-term work that can be productively performed by the existing workforce and providing training and first offers of employment for potentially displaced current workers at these sites, where feasible and consistent with law.
- **Diversity.** The Department will also strive to promote diversity in all aspects of the conversion process and will work with the contractor, unions and appropriate stakeholders to promote diversity through (1) the contractor's workforce, (2) educational outreach, (3) community involvement and outreach, (4) subcontracting, and (5) economic development including technology transfer, as applicable.
- **Stakeholder Input.** The conversion of DUF₆ is seen as an opportunity to strengthen the historic relationship between the Department and the Paducah and Portsmouth sites and surrounding communities. Stakeholder input is valued. The Department intends to solicit and incorporate feedback on this program, from the local community, community reuse organizations, local and State governments, Congress, and interested citizens.

Section Two: CYLINDER MANAGEMENT

The first element of the Plan is to continue to maintain the DUF₆ inventory to assure safe storage in accordance with the *UF₆ Cylinder Program Management Plan*⁴ as appended to the Ohio Amended Consent Decree and the Tennessee Department of Environment and Conservation Agreement. Cylinder management involves the general maintenance and monitoring of the cylinders, including such activities as the construction and repair of cylinder storage yards, and the control of cylinder corrosion by surface cleaning and painting. Additionally, the collection and maintenance of information concerning the characteristics of the depleted uranium and cylinders is a function of this element.

Table 2 provides a view of the quantity and location of the cylinders to be managed pending conversion as well as the materials to be converted. The amounts represent the standard 48-inch cylinders at each site. Other non-standard cylinders exist and will be managed as part of any contract. An exact inventory of materials will be part of the request for proposals.

The day-to-day management of the cylinders includes actions designed to cost effectively improve the storage condition of cylinders. This work includes:

- Building new concrete cylinder storage yards to provide a suitable platform for long-term storage (cylinders allowed to rest on the ground tend to corrode faster);
- Repainting cylinders to arrest corrosion;
- Restacking cylinders to improve drainage and enable inspections;
- Inspecting cylinders to assure no degradation of their condition;
- General cylinder and yard maintenance; and
- Moving cylinders from the storage yards to the conversion plants as needed for conversion.

The Department recognizes that it will take decades to convert all of the DUF₆ in the inventory. As a result,

Table 2 Inventory of Standard 48-Inch DUF ₆ Cylinders				
Location	Original DOE Cylinders	Cylinders from USEC	Total Cylinders	Total DUF ₆ (metric tons)
Paducah, Kentucky	28,351	8,559	36,910	450,000
Portsmouth, Ohio	13,388	2,653	16,041	198,000
Oak Ridge, Tennessee	4,683	0	4,683	56,000
TOTAL	46,422	11,212	57,634	704,000

the long-term management of existing cylinders, the management of any future cylinders added to the inventory from USEC operations, and the continual effort to remediate and maintain the safe condition of the cylinders will remain a Departmental responsibility for many years into the future. As such, the Department will abide by all relevant Federal and state regulatory requirements and to keep all applicable commitments (such as those with the DNFSB, and the States of Ohio and Tennessee) associated with the safety of the inventory.

In addition, the Department intends to manage its inventory to:

- Assure effective conversion operations that minimize the handling and transport of the cylinders;
- Facilitate experimentation and demonstration with inventory material;
- Develop and foster potential industrial activity that employs DUF_6 -derived materials; and

- Relocate the relatively small quantity of material in storage at ETTP for conversion to the Portsmouth site as soon as practical after conversion operations begin in cooperation with the State of Ohio.

Cylinder management may be performed by a private vendor as part of the integrated conversion and management services contract. Management of the cylinders will become the responsibility of the conversion contractor as soon as practicable after contract award. The selected vendor would be responsible for transportation of the ETTP cylinders to Portsmouth. Cylinders that may contain transuranic constituents and/or low enriched uranium (> 0.711 weight-percent ^{235}U) will not be converted as part of the conversion contract. However, these cylinders will be included in the cylinder management scope of work. A fixed unit price for cylinder management is expected to be established in the contract.



A Typical Cylinder Storage Yard

Section Three: CONVERSION

The second, and most important, component of this Plan addresses the Department's effort to establish a DUF₆ conversion capability. Traditionally, a project like this might be the subject of a multi-year Federal government-managed project to build conversion plants. However, such projects require a significant outlay of Federal funds early on and require many years to complete. In comparison, the private sector is well-equipped to pursue plant projects expeditiously and economically as needed for the DUF₆ program. The Department believes that the private sector can and will be willing to take on the primary responsibility for designing, constructing, operating, and decontaminating and decommissioning the needed conversion plants and storage facilities.

Specifically, the Department believes:

- the private sector, rather than the Department, is well equipped to design, build, operate, and decontaminate and decommission needed DUF₆ conversion plants and storage facilities; and
- the private sector can complete the plants expeditiously and apply the most cost-effective technologies and methods.

This Plan includes an aggressive schedule of activities to enable the execution of conversion contracts in the first quarter of CY 2000.

Key Assumptions and Program Elements

Based on the inputs received from the EOI responses, comments received from the initial conversion plan, and the preferred alternative in the Final PEIS as supported by the Department's upcoming ROD, the program is proceeding with its procurement planning activities based on the following working assumptions:

- **Two Plants will be utilized.** Conversion of the DUF₆ inventory will take place in plants on each of the Paducah and Portsmouth gaseous diffusion plant sites. The primary drivers for two conversion plants are the direction of Congress expressed in P. L. 105-204, the increased risk associated with transportation of large numbers of DUF₆ cylinders, increased transportation costs and potential issues with regulatory and stakeholder acceptance of large quantities of new cylinders moving through or into their states. To meet the intent of the Consent Order with the State of Tennessee the relatively small quantity of material in storage at the ETTP will be relocated to the Portsmouth site after conversion operations begin.
- **Guaranteed Conversion Quantities.** The Department will guarantee a minimum total quantity of DUF₆ to be converted during the duration of the contract. In this way the contractor will be able to determine an equitable fixed unit price for conversion services.
- **Additional Processing.** The contractor may be allowed to process non-Department DUF₆ on a "not-to-interfere" basis. Liability for these operations will be the responsibility of the contractor.
- **Existing Facilities.** Certain facilities extant on the conversion sites will be made available to the contractor for reuse in conversion operations. It is not required that the contractor use these facilities; the decision to use existing facilities rests with the contractor. Proposers interested in using the facilities will have the opportunity to inspect them prior to submitting their proposal.
- **Pre-conceptual Design.** The Department has developed pre-conceptual designs and cost estimates based on generic processes to convert DUF₆ and manage the conversion products. These

designs are nonproprietary and will be made available to all potential proposers as a source of information. Use of these pre-conceptual designs is not required and their use is at the risk of the bidder. The pre-conceptual designs and cost estimates will be used by the Department as benchmarks to help evaluate contract proposals.

- **Decontamination and Decommissioning.** The contractor would be responsible to decontaminate and decommission the conversion and storage facilities to a condition agreed upon with the contracting parties and appropriate stakeholders.
- **Management of Wastes.** Consistent with applicable laws, regulations, Executive Orders, and Department Policy, pollution prevention and waste minimization will be required by the contract. Disposal of all wastes generated during all phases of the conversion project, including decontamination and decommissioning, will be the responsibility of the contractor. Access to Department waste management processes and disposal sites may be made available to the contractor if it is programmatically and economically beneficial to the Department.
- **Conversion Product Form.** Based on the Final PEIS and the responses received from the Requests for EOI, the Department anticipates that the conversion process will produce uranium oxide (U_3O_8 or UO_2) and fluorine or fluorine compounds. However, conversion to uranium metal will be considered for use or storage if it can be demonstrated that there is a safe, verifiable, and viable path to disposal. A viable disposal path is one for which the life-cycle cost, including regulation and disposal, is equivalent to that of the oxide form(s). The Department wants to allow for the opportunity of innovative commercial approaches for managing the depleted uranium as metal while ensuring that disposal of the material is possible if no use is found. If the

successful bidder proposes to convert the DUF_6 to metal for long-term storage, the Department would need to consider whether to conduct additional programmatic NEPA analysis.

- **Ownership of Uranium Conversion Products.** Uranium products of conversion will remain the property of the Federal government. The Department will make available the products of conversion to public and/or private sector parties for product development purposes. If products are developed, the existing contractor(s) or a new contractor(s) may be allowed to sell or transfer the material under conditions agreed to between the contracting parties as a means to incentivize product development by the private sector. As part of the Final RFP the Department would entertain proposals on product development incentives. If uranium metal is produced and commercially used the Department presumes that liability for the disposal of the product at the end of its useful life is the responsibility of the product's owner and not the government's.
- **Ownership of Fluorine Products.** Fluorine products of conversion may become the property of the conversion contractor. Net proceeds from any sales may be used to partially offset conversion costs in a manner agreed upon in the contract.
- **Direct Sale.** Direct sale or transfer, by the Department, of DUF_6 is permitted as long as the quantity sold or transferred does not affect the guaranteed quantities to be supplied to the contractor(s).
- **Duration of Conversion Services.** A maximum of 25 years will be allowed for the conversion of any DUF_6 . However, the contractor will be encouraged to design, construct, and operate the conversion processes and facilities for an optimal throughput to permit completion of conversion operations as soon as possible.

- ***Transportation of Conversion Products.*** Intra-site movement of the uranium conversion products to the storage location will be the responsibility of the contractor. Transportation of uranium conversion products to users or to a disposal site is outside the scope of the anticipated contract. However, the potential exists to modify the contract at a later date to allow the contractor to perform this service. Transportation of fluorine products to a user or disposal site will be the responsibility of the contractor.
- ***ETTP Cylinders.*** The cylinders located at the ETTP will be transported to Portsmouth as soon as practical after conversion operations begin. Transportation of the ETTP cylinders may require an over-pack in order to meet Department of Transportation requirements. The Department of Energy expects to design, certify, and procure any needed over-packs, however, the Department may require the integrated contractor(s) to perform these functions.

Section Four: STORAGE

The contractor(s) will be responsible for the design, construction, and operation of conversion product storage facilities. A maximum amount of uranium product to be stored and the duration of storage will be specified in the contract. A fixed unit price is expected to be established for the cost of design, construction, operation and decontamination and decommissioning of the converted DU storage facility for the specified duration. Interim storage of fluorine products will occur at the conversion site under the best available industry practices and for the least practical duration. Specific aspects related to conversion product storage are provided below.

Fluorine

- The fluorine recovered from the conversion process represents the greatest potential hazard to the workers and communities associated with the conversion program. As such, the storage and transportation of the fluorine conversion products will be conducted using best available technologies and industry safety practices.
- Established industry safety standards will be adhered to in the design, construction, and operation of equipment and facilities that house or process fluorine.
- The fluorine product will be stored on the Paducah and Portsmouth sites for a brief interim period pending use or disposal.
- While liability for any accidents involving fluorine rests with the contractor, the Department, acting in its oversight role, will ensure that safe operating practices are maintained and that all risks associated with the handling of fluorine are kept to the minimum possible.

Depleted Uranium

- Design, construction, operation, and decontaminating and decommissioning of all storage facilities will take into account appropriate Nuclear Regulatory Commission, Occupational Safety and Health Administration, Environmental Protection Agency, and Department of Energy environment, safety and health requirements and standards.
- The conversion products will be stored on the Paducah and Portsmouth sites pending use or disposal.
- The storage of the uranium conversion products may be in either an oxide or metal form.
- The Department will provide the requirements for storage as part of the request for proposals.
- The storage criteria will be consistent with the relevant low-level radioactive waste acceptance criteria and allow for ultimate disposal without further sampling or packaging if no use for the product is identified during the storage period.
- The conversion products will be stored for a period of up to 5 years after their conversion at which time, if no use is identified, a decision will be made on whether to continue storage or dispose of the material as low-level radioactive waste.
- Storage of other Department-owned depleted uranium is permitted provided that it meets the storage standard.
- An environmental review of storage activities will be completed as part of the project-specific NEPA analysis.

- A standard package for storing the uranium, e.g. bins, drums, may be employed to create efficiencies in storage, use, and disposal. The specification for the storage package would be part of the requirements for storage provided in the request for proposals.

Information needed to meet applicable requirements, e.g., waste acceptance criteria, future use specifications, safeguards and security requirements, will be collected by the contractor(s) during the conversion process and maintained in a database. The needed information will be maintained with the material until it is disposed of or is no longer the responsibility of the Department.

Section Five: NEAR-TERM ACTIVITIES

The final element of this conversion plan focuses on the Department's intent to carry out technology activities to reduce the overall costs of the DUF₆ program, to answer key questions, and to mitigate employment impacts at the Paducah and Portsmouth sites.

The Department had been willing to carry out demonstration activities on conversion technologies if these were necessary to support the overall program. Many responses to the EOI indicated that demonstrations of the conversion process are not needed and would not provide benefit commensurate with their costs.

In recent years the Department has gained valuable insight from industry about using materials derived from DUF₆ in various industrial processes. There are important barriers to many possible applications—such as regulatory uncertainties related to *de minimis* levels of radioactivity, but many potential applications hold considerable promise in the nuclear industry and to other Government programs. For example, the potential use of depleted uranium oxide derived from the DUF₆ to make DUCRETE™ (a concrete material containing depleted uranium) may provide significant benefits as a tool in the management and storage of spent nuclear fuel. Another potential nuclear industry application is the reuse of fluorine derived from the DUF₆ in the nuclear fuel industry. While these applications are unlikely to use all of the material available, they hold the potential for making a significant impact on the overall cost of this program, and the cost of the Department's programs as a whole. The Department has proposed, in its FY 2000 budget request, funding for technology activities that will develop the application of DUF₆-derived materials to governmental programs.

The Department will develop a *DUF₆ Materials Use Roadmap* to establish a corporate plan for the application of DUF₆ and DUF₆-derived materials that will focus on potential governmental uses of DUF₆, but will also incorporate limited analysis of established uses of DUF₆-derived materials in the private sector. The roadmap is planned to be released in September 1999.

To the extent that available DOE/USEC Memoranda of Agreement funding permits, innovative projects will be initiated to begin conversion-related activities that will answer key questions on potential handling and storage of conversion products. These activities are targeted to begin in late 1999 and will last up to the start of the construction of the conversion facilities. Examples include decontaminating and cleaning a portion of a building at Paducah and a facility at Portsmouth to provide information and experience with the storage of uranium conversion products and to demonstrate safe handling methods, optimize storage methods for inspection, and develop appropriate handling practices and procedures.

CONCLUSION

The Department is committed to the proper management of its inventories of DUF₆. These inventories have been maintained in their current form because the Department and its predecessor agencies believed that these materials represent an asset to the Nation. Execution of this plan would allow conversion of DUF₆ to uranium oxide, uranium metal, or a combination of both to begin as early as 2004.

Conversion of the Department's DUF₆ is a major new undertaking that will span several decades and involve a significant investment of resources beyond the amount requested in the FY 2000 budget. This program would require a significant commitment and investment for the Department and demands careful planning, skillful execution, and timely communication with stakeholders. This Plan provides an outline for such a program. Although this plan is presented in as definitive a form as possible, it must be recognized that some aspects of this approach will evolve as a result of the budget process and as interactions with the private sector and stakeholders continue.

Under this Plan the Department would:

- Award one or more conversion and management services contracts no later than March 31, 2000;
- Begin construction of conversion facilities no later than March 31, 2002;

- Begin conversion operations no later than December 31, 2004;
- Transfer the cylinders at ETTP to Portsmouth as soon as practical after conversion operations begin in cooperation with the State of Ohio; and
- Safely, expeditiously, and efficiently convert all of the approximately 700,000 metric tons of depleted uranium hexafluoride.

Converting the Nation's inventory of legacy DUF₆ is a daunting challenge, if for no other reason than the sheer magnitude of the task. Yet, it is also an opportunity to apply the imagination and initiative of the government and private sectors to transform what could be seen merely as the refuse of a bygone era to a resource providing a safe and productive future for the affected areas as well as the Nation. Working together with the workforces, local communities, local and state governments, Congress, and interested citizens the Department will do its utmost to quickly and creatively close this chapter of our Cold War history in a way that profits the Nation. This is our pledge.

We anticipate strengthening our relationships with the affected State and local governments, affected communities, stakeholders, and interested Congressional delegations as we move forward together.

*Final Plan for the Conversion of
Depleted Uranium Hexafluoride*

END NOTES

1. DOE/EIS-0269, *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and use of Depleted Uranium Hexafluoride*, U.S. Department of Energy, December 1997.
2. DOE/EIS-0269, *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and use of Depleted Uranium Hexafluoride*, U. S. Department of Energy, April 1999.
3. U. S. Department of Energy, *Request for Expressions of Interest for a Depleted Uranium Hexafluoride Integrated Solution Conversion Contract and Near-Term Demonstrations*, March 4, 1999.
4. Lockheed Martin Energy Systems, Inc., *UF₆ Cylinder Program Management Plan*, K/TSO-30, Rev. 2, prepared by the Project Support Organization, East Tennessee Technology Park, Oak Ridge, TN, for the U.S. Department of Energy, July 1997.

Appendix A

PUBLIC LAW 105-204
[[Page 112 STAT. 681]]
105th Congress

An Act

To require the Secretary of Energy to submit to Congress a plan to ensure that all amounts accrued on the books of the United States Enrichment Corporation for the disposition of depleted uranium hexafluoride will be used to treat and recycle depleted uranium hexafluoride.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. UNITED STATES ENRICHMENT CORPORATION

15. Plan.-- The Secretary of Energy shall prepare, and the President shall include in the budget request for fiscal year 2000, a plan and proposed legislation to ensure that all amounts accrued on the books of the United States Enrichment Corporation for the disposition of depleted uranium hexafluoride will be used to commence construction of, not later than January 31, 2004, and to operate, an onsite facility at each of the gaseous diffusion plants at Paducah, Kentucky, and Portsmouth, Ohio, to treat and recycle depleted uranium hexafluoride consistent with the National Environmental Policy Act.
- (b) Limitation.-- Notwithstanding the privatization of the United States Enrichment Corporation and notwithstanding any other provision of law (including the repeal of chapters 22 through 26 of the Atomic Energy Act of 1954 (42 U.S.C. 2297 et seq.) made by section 3116(a)(1) of the United States Enrichment Corporation Privatization Act (104 Stat. 1321-349), no amounts described in subsection (a) shall be withdrawn from the United States Enrichment Corporation Fund established by section 1308 of the Atomic Energy Act of 1954 (42 U.S.C. 2297b-7) or the Working Capital Account established under section 1316 of the Atomic Energy Act of 1954 (42 U.S.C. 2297b-15) until the date that is 1 year after the date on which the President submits to Congress the budget request for fiscal year 2000.
- (c) Sense of the Senate.--It is the sense of the Senate that Congress should authorize appropriations during fiscal year 2000 in an amount sufficient to fully fund the plan described in subsection (a).

Approved July 21, 1998.

Appendix B

**Request for Expressions of Interest for an
Depleted Uranium Hexafluoride Integrated Solution Conversion Contract
and Near-Term Demonstrations**

The U.S. Department of Energy through its Office of Nuclear Energy, Science and Technology is seeking expressions of interest (EOI) on the disposition of the Department's depleted uranium hexafluoride (DUF₆) inventory. The Department's objective is an integrated solution to eliminate or reduce the long-term liability, including potential environmental and safety concerns, to the Federal government for upkeep of the DUF₆ inventory. The Department will soon issue a final *Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* followed by a Record of Decision. This EOI request will likely provide information to implement the Department's preferred alternative, if selected in the Record of Decision, and formulate a viable procurement strategy for an integrated solution.

One of the most important policy statements made by the Government with regard to DUF₆ has been Public Law 105-204, signed by the President in July 1998. This law directed the Secretary of Energy to prepare and submit a plan to ensure that all funds accrued on the books of the United States Enrichment Corporation (USEC) for the disposition of DUF₆ will be used for the construction and operation of plants at Paducah and Portsmouth to treat and recycle the DUF₆, consistent with the National Environmental Policy Act (NEPA). The Law also stipulates that the plan should be structured for construction of the plants to begin by January 31, 2004.

"Treat and recycle," in this context, refers to the chemical processing of DUF₆ to remove the fluorine and create products that would present both a lower long-term storage hazard and provide materials that would be suitable for use or disposal. Importantly, this process would also allow the private and government sectors to explore the use of the products.

The Department remains concerned about the future potential displacement of workers and economic disruptions at the Gaseous Diffusion Plants in Kentucky and Ohio in the wake of USEC privatization. The Department plans to work with the existing bargaining units for the onsite workforce, and community reuse organizations to assist in this transition. The Department is willing to commit funds to cover worker wages during training and training support to local community colleges. Many of these workers represent important experience which may be valuable to the Department's DUF₆ disposition program.

One of the most significant legacies left with the Department after the privatization of USEC is approximately 700,000 metric tons of DUF₆ stored in approximately 57,700 cylinders (37,000 are in Paducah, Kentucky, 16,000 in Portsmouth, Ohio, and 4,700 in Oak Ridge, Tennessee).

DUF₆ is a stable but toxic, granular solid, much of which has been stored for long periods. The advanced age of some of the steel cylinders in which the DUF₆ is contained has highlighted a potential and significant environmental and safety hazard. This was underscored by Defense Nuclear Safety Board Recommendation

95-1 which recommended that the Department improve storage and maintenance of the DUF_6 cylinders. While DUF_6 is not as significant a radiological threat as other isotopes, it is a chemical hazard. Since 1990, the Department has conducted a focused program of cylinder inspections, recoatings, and relocations to assure that DUF_6 is safely contained until the Department arranges for its disposition.

The Department believes that the private sector, rather than the Government, may be better able to provide solutions for the management of the Department's DUF_6 inventory. A key Departmental objective is to fully integrate all elements of managing the Department's DUF_6 inventory into a single contracting arrangement. Management of the Department's DUF_6 inventory involves the following elements: cylinder surveillance and maintenance; the design, construction, operation, and final decommissioning of conversion facilities; storage or use of conversion end products; and disposition of end products not used — uranium and fluorine compounds and empty storage cylinders. The Department anticipates that required conversion facilities will be built, owned, and operated by the private sector.

The Department wishes to better understand the capability of the private sector to handle this significant challenge. The Department is considering a variety of activities including the construction of facilities ranging from demonstration size plants to full-scale conversion plants.

The Department solicits your organization's ideas, opinions, and interest in participating in all or part of the Department's management of the DUF_6 inventory. Information provided through this EOI request will assist the Department in determining the best procurement strategy. Responses should be structured specifically addressing the following:

1. Description of your organization, its capabilities, and its interest in the Department's DUF_6 program.
2. The feasibility of a single integrated contract approach which fully incorporates all or most of the Department's DUF_6 management elements.
3. Description of your organization's proposed approach to meet the Department's objective. Describe the process that would be used to convert the DUF_6 . Identify if this process is a proprietary process and is patented or has a patent pending. If this process is patented, identify who owns the patent and any licensing information. Identify and describe if the proposed process has been demonstrated or commercially applied and at what scale. Identify any challenges and risk in applying the proposed process in a full scale production plant. Identify how your organization would minimize these risks.
4. The necessity, in terms of technological and economic considerations, of near-term demonstration-scale facilities at Paducah and Portsmouth that will provide substantive information which benefits the overall DUF_6 Program. Include any information your organization considers relevant, but specifically address:
 - the purpose of the demonstrations with analyses that such demonstrations are safe and cost-effective;

- availability of equipment and buildings at the Paducah and Portsmouth sites that could support such demonstrations;
 - NEPA and regulatory oversight issues which would need to be addressed to conduct the demonstrations;
 - cost, schedule, safety considerations, and approximate numbers of personnel required to perform the demonstrations — including the decontamination and decommissioning (D&D) of the demonstrations;
 - transition to full-scale production.
5. Recommendations regarding the characteristics that should be reflected in full-scale plants. Include any information your organization considers relevant, but specifically address:
- product forms, throughput, waste streams, process chemical requirements, and general plant utility and other support requirements;
 - modularity of facility design — including advantages and disadvantages of modular approach;
 - availability of existing plant designs, equipment, and buildings that could help accelerate the construction of full-scale plants at the Paducah and Portsmouth sites;
 - NEPA and regulatory oversight issues which would need to be addressed to construct and operate the conversion plants;
 - cost, schedule, safety considerations, and approximate numbers of personnel required to construct and operate full-scale plants — including the eventual D&D of the conversion facilities.
6. Innovative approaches regarding the use of government land or facilities at Paducah and Portsmouth.
7. Private sector financing, construction, ownership and operation of conversion facilities that can be used to minimize cost, and begin conversion facilities construction as soon as possible before January 2004. Identify and justify the appropriate contract type(s) for each phase of the project.
8. Government actions that are needed to ensure successful implementation of respondent's concepts for this program.
9. Potential factors that should be considered by the government in selecting the proposed approach to implement this program.

10. Beneficial use or sale of DUF_6 and DUF_6 -derived materials for restricted end-uses in commercial and Federal nuclear programs that could reduce the government's life-cycle costs for conversion, storage and disposition of the material, and innovative approaches to establish such activities.
11. The safe transportation, conversion, and disposition of approximately 4,700 DUF_6 cylinders currently stored at the Oak Ridge site.
12. The establishment of worker training programs with respect to the handling of materials and operation of the conversion facilities.

Proprietary information provided in your organization's response should be marked appropriately. This information will be held in confidence by the Department.

Send 12 copies of your responses to Thomas E. Brown, Procurement Analyst, U.S. Department of Energy, MA-52, 1000 Independence Avenue, S.W., Washington, DC 20585 no later than April 5, 1999. Before submitting questions regarding this EOI, please review the "*frequently asked questions*" section on this web page.