



## URANIUM MANAGEMENT ACTIVITIES

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### Introduction

One of the missions of the Department of Energy's (DOE) Oak Ridge Office (ORO) has been the management of the Department's uranium materials. This mission has been accomplished through successful integration of ORO's uranium activities with the rest of the DOE complex. Beginning in the 1980's, several of the facilities in that complex have been shut down and are in the decommissioning process. With the end of the Cold War, the shutdown of many other facilities is planned. As a result, inventories of uranium need to be removed from the Department facilities. These inventories include highly enriched uranium (HEU), low enriched uranium (LEU), normal uranium (NU), and depleted uranium (DU). The uranium materials exist in different chemical forms, including metals, oxides, solutions, and gases. Much of the uranium in these inventories is not needed to support national priorities and programs.

During the past several decades, the Department of Energy has loaned nuclear material to a wide variety of private and governmental institutions for research and educational purposes. Changes in priorities for the use of uranium as well the creation of by-products of uranium use, have resulted in excess quantities of uranium, owned by the Department of Energy. This excess uranium is located at over one hundred sites within the United States and overseas, including universities and laboratories. The Uranium Management Group (UMG) was established within the Oak Ridge Operations Office of the U.S. Department of Energy to coordinate the functions necessary to safely and effectively manage the Department's uranium and to coordinate the transfer of some of this nuclear material to its Portsmouth, Ohio facility when the various institutions indicated a desire to return the material.

The availability of this excess uranium has created challenges for DOE in managing and storing it as well as identifying opportunities for its further use. Where feasible, excess LEU will be marketed to research and test reactors in other countries. In support of nuclear non-proliferation, programs are in place to shift civilian use of uranium from HEU to LEU.[2] Technology needed to minimize and eventually



eliminate use of HEU is being developed under the Reduced Enrichment for Research and Test Reactors (RERTR) program, which was “established in 1978 at the Argonne National Laboratory by the Department of Energy, [and] which continues to fund the program and to manage it in coordination with the Department of State and the Nuclear Regulatory Commission.” [3, p.3] Additionally, uranium in the form of spent fuel from foreign research reactors is being transported to DOE sites as part of a program to reduce the amount of high enriched uranium in civil nuclear activities, thus supporting worldwide nuclear nonproliferation. [1]

The Department of Energy has assumed a stewardship role in managing nuclear materials throughout their life cycle, from acquisition to storage. To support this effort, the UMG is preparing to coordinate common uranium management functions across the Department of Energy. This coordination will provide substantial value to DOE: an experienced staff with knowledge of uranium material; consolidated management and storage of uranium; improved security; technical support for all holding sites; a single point of contact for issues identification and resolution; reduction of operating costs; accelerated site closure; comprehensive uranium inventory information; better coordination with external agencies; coordination of interdepartmental programs functions such as packaging and transportation; reduction of risk through improved knowledge and coordination; and a central source of information for the public.

### **Strategic Management of Uranium at DOE**

The United States Department of Energy “launched a Nuclear Materials Stewardship Initiative in January 2000 as an element of the Secretary’s (Richardson) efforts to improve the Department’s operations management. Building on work started by the Office of Environmental Management in 1998, the Stewardship Initiative signals increased corporate focus through the Nuclear Materials Council that includes all secretarial officers and operations office managers with responsibility for nuclear materials” [2, transmittal letter].

Good stewardship of nuclear materials demands integration and coordination of activities, leadership, vigilance, and implementation of best management practices. The U.S. Department of Energy has begun implementation of its integrated stewardship strategy by centralizing information for decision making, examining disposition paths for surplus materials, implementing risk reduction actions, and identifying opportunities for program improvements and cost savings. This effort has already resulted in decisions that address immediate needs in a way that better supports the longer-term requirements of the DOE complex. For example, closure of the Fernald site is being expedited through the transfer of its uranium materials to upgraded facilities at the Portsmouth site for interim storage. UMG personnel are assisting Fernald staff with their waste declaration to ensure that only reusable uranium materials are shipped to Portsmouth.

By consolidating the storage of potentially reusable uranium materials into a smaller number of sites, DOE is better able to manage its near-term facility cleanup and closure while creating significant longer-term savings on surveillance, material accountability, maintenance, and other activities. In addition, consolidation of this uranium will facilitate the central processing and marketing of the materials for commercial use. The expense of closing down and cleaning up certain defense

production facilities can thus be offset by minimizing or eliminating costs and by generating revenue through the sale of reusable materials.

DOE also recognizes the benefits of establishing the Nuclear Materials Management Group to provide a corporate approach to managing its nuclear materials. The UMG was established at DOE-ORO to support management of legacy materials.

### Organization and Strategic Objectives of the UMG

The Uranium Management Division of DOE-ORO has line responsibility for both the UMG and Central Scrap Management Office (CSMO) (Figure 1). The CSMO for uranium, established earlier by DOE, now resides within the UMG at ORO. CSMO is responsible for the recovery, storage, and disposition of non-irradiated or slightly irradiated uranium scrap. This includes uranium from DOE programs such as naval reactors, university loans and leases, decontamination and decommissioning, and other production, research and development activities.

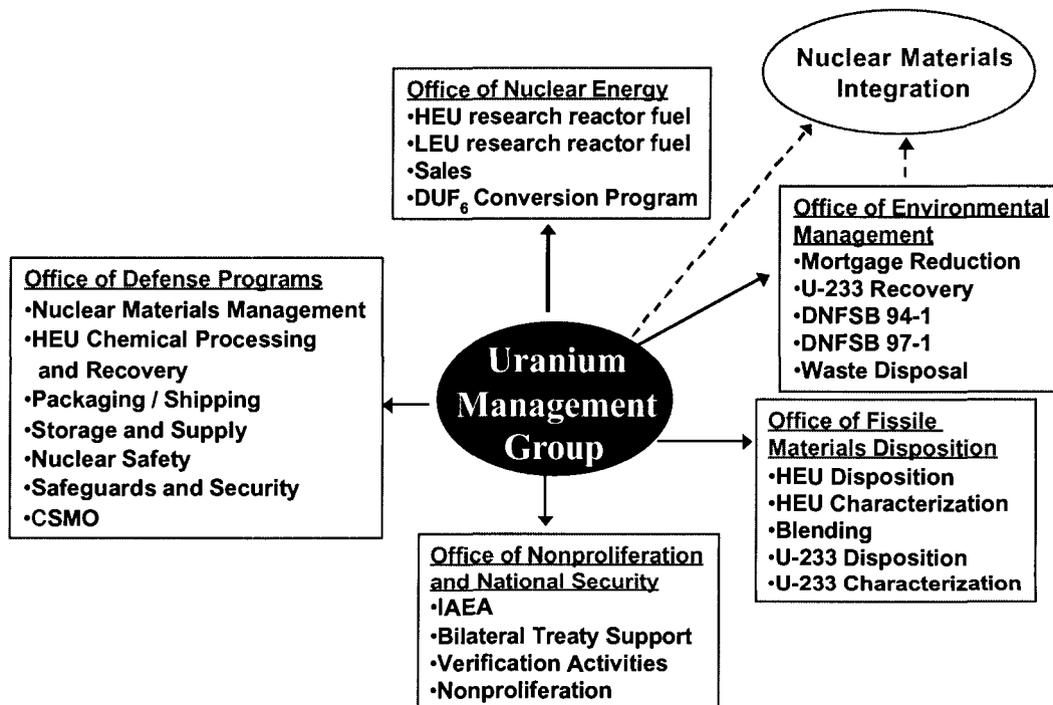


Figure 1. Department of Energy Program Offices and interfaces with the UMG. [4, p. 8]

The Division Director reports to the Assistant Manager for Uranium and Engineering Services. The Division Director directs and controls individual UMG projects and CSMO activities through ORO staff and contractors. The Division supports the program missions directly with managers at Department Program Offices, Operations/Field Offices, and other ORO divisions. The UMG will be the gatekeeper

of the uranium materials selected for storage and ultimate disposition. It will help facilitate the characterization of the materials to determine what is reusable and what should be handled as waste directly from the holding sites. It will have the lead responsibility for marketing, sales, and ultimate reuse of UMG-managed uranium. Other related functions within the Uranium Management Division include generating and implementing National Environmental Policy Act (NEPA) documentation, managing  $\text{DUF}_6$  conversion end-products, and coordinating activities related to cylinders containing uranium. The UMG intends to become the Department of Energy's "center of excellence" for uranium management. To achieve its mission and vision, the UMG has established the following strategic objectives:

- Institutionalize the UMG as the single point of contact for integrating all activities associated with the Department's excess uranium materials;
- Reduce declared waste by identifying material for resale (thereby retrieving some prior costs) and facilitate waste declaration and disposal activities at Department sites with uranium inventories;
- Provide Department leadership in managing cross-cutting uranium issues that have significant and/or complex-wide impacts;
- Provide a robust, modern, and technically flexible capability for processing and enriching uranium; and
- Develop world-class expertise and business practices in managing the Department's uranium.

Successful implementation of the UMG's strategy will provide the following benefits:

- Facilitate decisions on uranium reuse versus waste declaration,
- Create cost savings by sharing technical expertise among sites around a strong technical hub,
- Ensure technical expertise and facility infrastructure for uranium management and preserve this capability for future applications,
- Provide a mechanism for promoting improved coordination of facility operations,
- Improve security and safety by accelerating the reduction and disposition of inventory,
- Consolidate planning and management of uranium materials,
- Reduce operating costs through improved material planning,
- Accelerate site closure,
- Provide centralized, comprehensive uranium inventory information,
- Better coordinate crosscutting functions such as packaging and transportation, and
- Offer convenient sources of information for the interested public.

### **Current Efforts of DOE'S Uranium Management Group**

DOE's current strategy is to maintain uranium materials in safe storage, with stabilization actions and/or blend-down as needed, until the uranium is reused in research and development, commercial applications, or national defense. DOE has upgraded Building X-744G at Portsmouth to a first-class facility that is now an asset to the site and can play a long-term role in meeting the UMG mission. DOE intends to maximize reuse of surplus uranium materials to the extent that they meet, or can be processed to meet, specifications for commercial use.

Drawing on expertise from the DOE and the commercial sector, the UMG has already started to assist Department Program Offices and Operations/Field offices in determining which materials are waste and then consolidating and storing reusable portions of excess LEU, NU, and DU. An Environmental Impact Statement for consolidation of the Department's reusable uranium is under development. To date, approximately 2,500 metric tons of low enriched uranium, normal uranium, and depleted uranium have already been transferred to the Portsmouth site. Uranium from the Fernald Site, Seattle University, the University of Nebraska, Cornell University, and the University of Florida has been retrieved and is in interim storage at upgraded facilities located at the Portsmouth Site. Iowa State University has returned material to UMG through CSMO. Additional plans include the movement of reusable uranium materials from several universities including Purdue, California State University, Manhattan College, Pennsylvania State University, Massachusetts Institute of Technology, and the University of Virginia, as well as from other DOE sites. Costs for packaging, transportation, and retrieval support are paid for by DOE when DOE-owned materials are retrieved from universities and research laboratories.

### **Material Evaluation, Packaging, and Transportation**

On a day-to-day basis the UMG assists the Department's sites in determining which uranium materials are reusable and which should be declared as waste. Safe, secure interim storage of accepted materials is an on-going UMG responsibility that will continue until final disposition occurs. The following screening criteria are used to select the most effective course of action for a block of material.

1. Material Characterization and Economic Assessment to Determine Disposition as Waste versus Future Use—Are material characteristics sufficiently established, is there a reasonable probability for reuse, and is storage and reuse economically favorable?
2. Site Plans—What existing site plans and/or regulatory commitments exist for the material?
3. ES&H Compliance Impacts—Are additional NEPA actions, Safety Analysis Reports, etc., required?
4. Risk—What are the assessed environmental and safety risks of the proposed actions?
5. Impact of Repackaging, Transportation and Processing—What are the costs and technical maturity of the alternative material flow paths?

UMG engineers and technical personnel along with the personnel of the institution in custody of this material make the necessary evaluations and produce specifications for the handling, packaging and transportation of the material from its present location to the Portsmouth storage facility. The disposition path for nuclear fuel is presented in Figure 2. For universities and other research institutions that currently hold DOE nuclear material, costs for this transfer are paid by DOE. The transportation of nuclear materials within the United States is governed by the US Department of Transportation Title 49 Code of Federal Regulations Part 173.

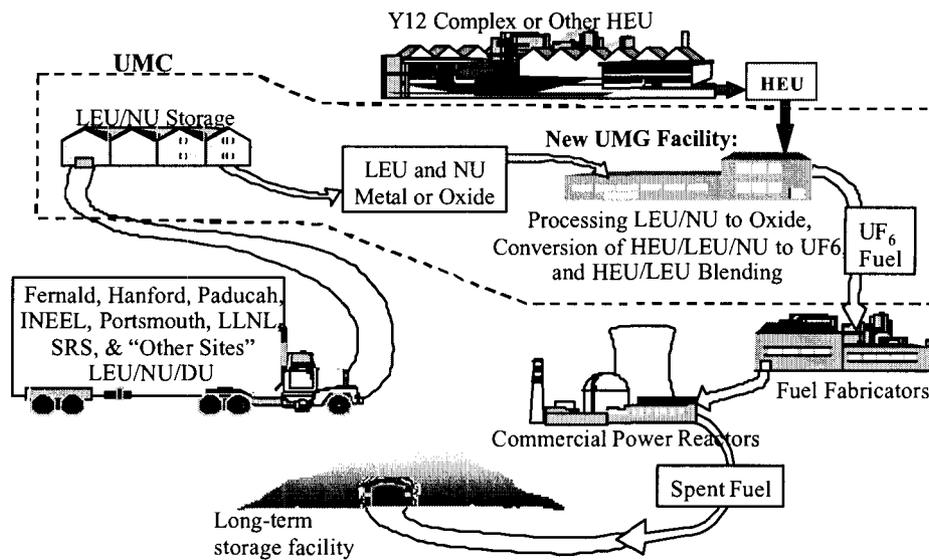


Figure 2. Commercial nuclear fuel disposition path for UMG-managed uranium. [4, p. 18]

UMG supports DOE missions in the strategic planning process for the Department's uranium, including the design of a new HEU storage facility at Y-12, the development of the Department's draft Integrated Nuclear Materials Management Plan, and the marketing of excess uranium to foreign reactors. The UMG has begun managing the Department's excess inventories of uranium. As a result of DOE's Nuclear Materials Stewardship Initiative, it is anticipated that management responsibilities of the Oak Ridge UMG will be broadened.

### Products and Services Provided by the UMG

The products and services provided by the UMG are presented in Table 1 below.

STRATEGIC PLANNING & POLICY DEVELOPMENT	<ul style="list-style-type: none"> <li>• Technical support addressing barriers and issues</li> <li>• Strategic plans</li> <li>• Policy support</li> <li>• Prioritization of activities and projects involving disposition opportunities</li> <li>• uranium enrichment</li> </ul>
INFORMATION MANAGEMENT	<ul style="list-style-type: none"> <li>• Material characterization data</li> <li>• Customer and marketing information</li> <li>• Web-based information</li> </ul>

MULTI-SITE COORDINATION & INTERNAL DEPARTMENT RELATIONS	<ul style="list-style-type: none"> <li>• Material life cycle management planning</li> <li>• Program Office and Operations Office integration</li> <li>• Multi-site activities including packaging, transporting, storing, etc.</li> <li>• CSMO</li> <li>• HEU Disposition Program Office</li> </ul>
EXTERNAL RELATIONS	<ul style="list-style-type: none"> <li>• Communications plans</li> <li>• Re-industrialization plans for facilities</li> <li>• Stakeholder briefings and workshops</li> </ul>
BUSINESS & CONTRACT MANAGEMENT	<ul style="list-style-type: none"> <li>• Business plans and business development</li> <li>• Costs and schedules</li> <li>• Commercial sector interfacing</li> <li>• Product definition and requirements</li> <li>• Contract administration</li> </ul>
MARKETING & SALES	<ul style="list-style-type: none"> <li>• Market analysis</li> <li>• Marketing plans</li> <li>• Sales/bartering</li> </ul>
TECHNICAL ANALYSIS & SUPPORT	<ul style="list-style-type: none"> <li>• Environmental Impact Statements</li> <li>• Environmental Assessments</li> <li>• NEPA scoping studies</li> <li>• Technical assessments, analyses, and recommendations</li> <li>• Criteria for acceptance, storage, end-use</li> <li>• Processing, chemical conversion, downblending analyses</li> <li>• New/alternate technologies</li> </ul>
COST-BENEFIT & ECONOMIC ANALYSIS	<ul style="list-style-type: none"> <li>• Cost-benefit analyses</li> <li>• Life cycle analyses</li> <li>• Economic evaluation of uranium disposition paths</li> <li>• Secretarial determinations</li> </ul>
NONPROLIFERATION SUPPORT	<ul style="list-style-type: none"> <li>• Treaty support</li> <li>• Nuclear Materials Control and Accountability interface</li> <li>• NSPO interface</li> <li>• Data analyses</li> <li>• Physical security</li> </ul>
LEGAL & REGULATORY AFFAIRS	<ul style="list-style-type: none"> <li>• Nuclear Regulatory Commission interface</li> <li>• Environmental Protection Agency interface</li> <li>• State regulatory interface</li> <li>• Identification and resolution of regulatory issues</li> <li>• <i>Department of Transportation container certification</i></li> </ul>
ES&H & RISK ASSESSMENT	<ul style="list-style-type: none"> <li>• Safety analyses</li> <li>• NEPA analyses</li> <li>• Risk assessment</li> </ul>
QUALITY ASSURANCE (QA)	<ul style="list-style-type: none"> <li>• QA program development</li> <li>• QA plans</li> </ul>
PROJECT DEFINITION & IMPLEMENTATION	<ul style="list-style-type: none"> <li>• Department-wide project guidelines</li> <li>• Project planning and execution</li> <li>• Project management</li> </ul>

Table 1. Products and services provided by the UMG. [4, pp. 10-11]

### Marketing Opportunities for Excess Uranium

UMG is currently marketing excess quantities of LEU, NU, and DU that are in interim storage at the Portsmouth Site. Approximately 35,000 metric tons of uranium may be usable for applications such as fuel for research reactors and commercial nuclear power plants as well as, armor, sensors, and penetrators. Short-term market opportunities exist for foreign research reactors. Longer-term market opportunities

may require processing some of the materials before they can be sold. Processing options include contracting with commercial companies for services or constructing/upgrading facilities at one or more Department sites.

UMG marketing practices will comply fully with all applicable laws, regulations, and DOE policies. For example, the United States Enrichment Privatization Act requires that the Department only make sales at fair market value. Under the same act, the sale of government-owned uranium for commercial power generation would first require a determination by the Secretary of Energy that the transaction would not have an adverse impact on the domestic uranium mining, conversion, or enrichment industries.

An important exception to the requirement for a determination by the Secretary involves the sale of enriched uranium to educational institutions for purposes other than generating electricity for commercial use. Under this exception, the Department is allowed to market uranium for research reactor fuel, which it has done in the past. With its readily available quantities of excess uranium, the Department will be able to participate more actively in this market. Because universities in the U.S. obtain uranium for their research reactors through grants administered by the Department, the primary research market will involve research reactors and medical isotope production in other countries. DOE is presently pursuing market opportunities in France, Japan, and Canada.

## **Conclusion**

DOE is implementing a stewardship approach to management of its uranium assets. This life-cycle approach to managing uranium addresses current needs in the context of a long-term strategy. Coordination of uranium management under the Uranium Management Group offers significant opportunities for savings through improved planning and efficiency and creates environmentally-sound approaches for storage and reuse of excess uranium.

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