



*U.S. Department of Energy*

# **Offsite Source Recovery Project Program Plan**

**December 2002**



*Albuquerque Operations Office*

## **1.0 INTRODUCTION AND BACKGROUND**

### **1.1 Introduction**

The Offsite Source Recovery (OSR) Project is a U.S. Department of Energy (DOE) activity with a mission to recover, store and dispose of radioactive sealed sources designated in Public Law (PL) 99-240, *The Low-Level Radioactive Waste Policy Amendments Act of 1985*. This Program Plan responds to new supplemental appropriations provided through Public Law 107-206, *Making Supplemental Appropriations for the Further Recovery from and Response to Terrorist Attacks on the United States for the Fiscal Year Ending September 30, 2002, and for other Purposes*. The Plan describes the current OSR Project mission and scope, required activities, management framework, lifecycle costs, and planned schedule and deliverables.

Public Law 107-206 placed the funding for the OSR Project in the National Nuclear Security Administration's (NNSA) Nuclear Non-Proliferation Budget. The OSR Project has been funded through the Office of Environmental Management up to this point. Additionally, the OSR Project is located at the Los Alamos National Laboratory, which is an NNSA site. Therefore, both the Office of Environmental Management and the NNSA are involved in the OSR Project.

Public Law 99-240 established DOE responsibility for disposing of radioactive sealed sources that exceed regulatory criteria for class C low-level radioactive waste (LLW), also known as Greater-than-Class-C (GTCC) waste. DOE instituted the OSR Project in the early 1990's because no suitable GTCC disposal site existed. The OSR Project recovered and stored individual radioactive sealed sources only on an emergency basis, at the request of regulatory agencies.

In 2000, OSR Project capability was expanded to include proactive recovery of GTCC sealed sources. The OSR Project priority is recovering the highest risk sealed sources for DOE-controlled safe and secure storage until a disposal site is available.

### **1.2 Background**

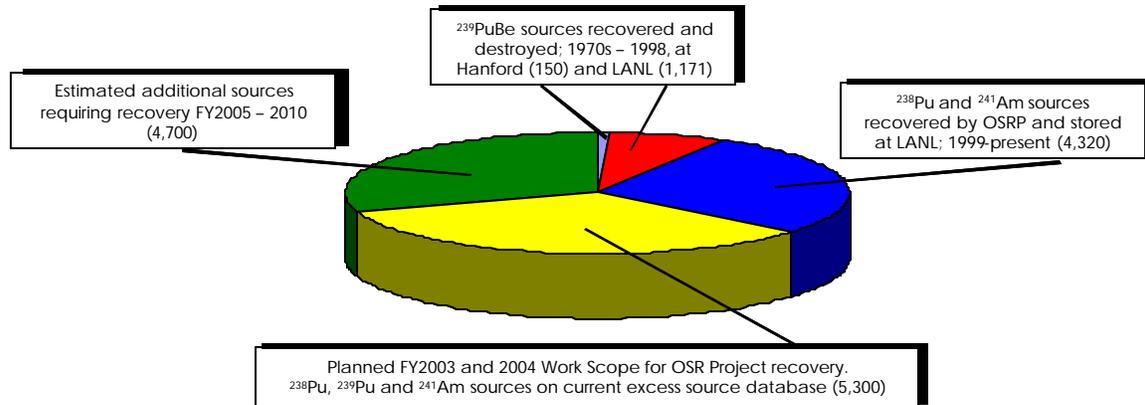
For many years, radioactive sealed sources have served a number of unique technical functions in commercial, academic, medical, and government applications. However, many sealed sources have become excess and unwanted. Thousands that are GTCC have no disposition path, and their owners face the dilemma of providing safe storage while they no longer have a useful purpose. Increasing numbers are orphaned, abandoned, or stored with inadequate safety and security measures. The DOE estimates that more than 14,000 excess and unwanted sealed sources will require OSR Project management through FY 2010, including sealed sources already recovered by DOE.

The long-lived nature of radionuclides involved requires planning for long-term management. Highly radioactive sources can present public health and safety hazards, including severe and fatal injuries if improperly handled. Recently, radioactive sealed sources have gained additional national attention because of security threats posed by terrorist use for radiological dispersal devices, or "dirty bombs."

Figure 1 indicates past and projected source recovery activities by types. The DOE initiated sealed source recovery activities during the 1970s, when it began recovering plutonium-239 neutron sources. These sources originated from an Atomic Energy Commission (AEC) loan/lease program promoting peaceful uses of nuclear technology. Approximately 1,320 plutonium-239 neutron sources returned to the DOE were destroyed through chemical processing and the plutonium materials were returned to government defense programs. The processing activity was discontinued after FY 1998, when the DOE established a strategy to store excess plutonium-239 neutron sources because of high processing costs, worker safety issues, and dwindling demand for the resulting low-grade plutonium materials.

**Offsite Source Recovery Project Program Plan**

In fiscal years 1999 through 2002, the OSR Project recovered another 4,320 sealed sources. However, the domestic excess and unwanted sealed source inventory is growing almost daily, as additional unwanted sources are identified. As of July 2002, the OSR Project database documented 5,300 additional excess and unwanted GTCC sealed sources requiring recovery. The owners vary from individuals and small firms having one source, to large petroleum exploration firms possessing hundreds of excess well logging neutron sources. The OSR Project baseline forecasts that the 5,300 currently identified sources can be recovered for secure storage in FY 2003 and 2004, with adequate funding. The baseline also estimates that an additional 4,700 sealed sources will become excess and unwanted through FY 2010, requiring recovery by the DOE.



**Figure 1: Domestic Excess and Unwanted GTCC Sealed Source Recovery Through FY 2002 and Planned Through FY 2010**

**2.0 PROJECT MISSION AND SCOPE**

DOE responsibility under PL 99-240 includes providing disposal for all GTCC. The DOE OSR Project mission is to recover sealed sources for secure storage, reducing the immediate risk posed by excess radioactive materials. This risk reduction strategy addresses not only public health and safety risks of accidental radiation exposures, but also national security risks associated with potential terrorist use of radioactive materials. The OSR Project mission includes:

- Recovering radioactive sealed sources from non-DOE facilities, based on health, safety, and security risk priority
- Recovering lower-risk sealed sources from DOE sites, with direct costs borne by the program benefiting from the activity
- Developing and maintaining short- and long-term secure storage capabilities
- Recycling and reusing sources and radioactive materials whenever appropriate
- Disposal of recovered sealed sources if an appropriate disposal site is available. However, developing and implementing new disposal capability is outside the scope of the OSR Project.

Most GTCC sealed sources are assumed to be in productive use. The sources are primarily:

- Americium-241/beryllium and plutonium-238/beryllium neutron well-logging sources
- Other americium-241 sources
- Plutonium-238 medical pacemakers and heat sources
- Plutonium-239 neutron sources
- Strontium-90 sources; and
- Cesium-137 sources.

The OSR Project capabilities focus upon storing sealed sources containing actinide materials like americium and plutonium at LANL. A strategy for storing large sources containing strontium-90 is likely to be implemented in FY 2003. For the moment, sources containing cesium-137 are largely recycled and reused in the commercial sector. Therefore, no recovery and storage capability is likely to be required for several years.

### **3.0 OFFSITE SOURCE RECOVERY PROJECT ACTIVITIES**

Sealed source recovery requires planning and managing work required for identifying, recovering, storing, and, if possible, disposing of excess public and private sector sealed sources. Project activities include maintaining a source database; packaging, transporting, and storing sources; complying with regulatory, health, and safety requirements; investigating recycle and reuse opportunities; and identifying potential disposal opportunities. These activities are executed within the project management framework summarized in the following sections.

#### **3.1 Data Collection**

The OSR Project updates inventory estimates and assesses project priorities through information collected from sealed source owners and regulatory agencies. The Los Alamos National Laboratory (LANL) developed and maintains the database for identifying and tracking excess sealed sources and planning recovery and storage. Data includes sealed source owner contacts, quantities, and physical and radiological specifications. The system facilitates recovery planning and prioritization, recycling and reuse, project reporting, and forecasting future project requirements.

Estimated sealed source quantities are based on data from existing manufacturers, personal communications with sealed source owners, and estimates from studies performed by DOE and Nuclear Regulatory Commission (NRC) contractors. Determining precise inventories (and, therefore, OSR Project scope) is difficult because many sealed source manufacturers no longer exist.

#### **3.2 Information Management**

OSR Project information management encompasses both archiving and tracking project specific technical data and coordinating and managing public information and involvement. LANL updates current sealed source inventory estimates, and the DOE assesses project priorities through information collected from private sources and government agencies. As the operating contractor, LANL also is responsible for preparing, maintaining, and auditing all internal administrative and operating procedures related to radioactive material management, handling, packaging, shipping, and storage.

The DOE facilitates communications by identifying information sources for involved parties, coordinating project activities with other government agencies, developing and implementing mechanisms for information dissemination, and ensuring feedback for owners and the general public. DOE and LANL use the following methods to manage information distribution and track inquiries:

- Brochures summarizing OSR Project scope and objectives, responsibilities, and contacts

- Items submitted for inclusion in DOE stakeholders newsletters, NRC newsletters, local stakeholder forums such as Citizens Advisory Boards, and articles published in appropriate trade journals
- Internet websites with general project information, contacts, and an electronic excess sealed source registry.

### **3.3 Sealed Source Recovery Operations**

OSR Project recovery operations require direct contact with owners and prioritizing recovery activities based on public safety, security risks, and project efficiency. The highest health and safety risk occurs from individually owned sealed sources, small commercial firms, and firms no longer actively using the sealed sources. Neutron sources generally present higher radiological safety risks than other sources.

#### **3.3.1 Routine Recovery**

Sealed source owners are provided specific recovery and transportation requirements and details. LANL manages most recovery efforts, including arranging packaging and transportation to an OSR Project-approved storage facility. Recovery procedures also include transferring legal ownership from the licensee to the DOE. Recovered sources are indexed in DOE excess material databases for potential recycling and reuse.

National vulnerabilities recognized after terrorist attacks in the United States require that recovery priorities be reassessed. Potential accidental radiological exposures must be evaluated in comparison with potential radiological exposures resulting from terrorist activities. The DOE and the U.S. Nuclear Regulatory Commission are establishing OSR Project priorities addressing both public health and safety risks and national vulnerabilities. Recovery prioritization is being conducted using objective criteria, and considers types of radioactive material, quantities in storage at each facility, and levels of security already existing at the those facilities. The OSR Project will recover sealed sources according to the prioritization, and will remain flexible to adjust to changes in priorities as they occur.

#### **3.3.2 Non-Routine Recovery**

The OSR Project maintains non-routine sealed source recovery capability. Non-routine recoveries are planned when regulatory agencies report situations requiring immediate recovery of radioactive material. These situations typically occur when regulators become aware of sealed source owners who can no longer adequately control the material for which they are responsible. These sources are scheduled for recovery ahead of the routine recovery priorities and schedule.

The project does not maintain an emergency response capability. Rather, the project provides support to handle materials from emergency situations if they meet the Project acceptance criteria after an emergency situation is stabilized by first-response organizations.

#### **3.3.3 Sealed Source Packaging**

The OSR Project staff only use containers and procedures meeting U.S. Department of Transportation requirements for transporting radioactive material. This typically involves various 55-gallon containers with internal payload components. Some of these drums are modified with appropriate radiation shielding, and are approved by NRC as a sealed source shipping and storage containers. The Project also employs special devices to re-encapsulate sealed sources in the field, if necessary.

#### **3.3.4 DOE-Owned Sealed Sources**

DOE sites employ sealed sources for uses similar to those in the licensed community. However, because DOE's sealed sources are used and stored at facilities subjected to rigorous safety and security

requirements, they are a lower priority for recovery. In cases where material disposition is crucial to DOE facility closure and decommissioning, the OSR Project provides recovery services on a case-by-case basis with cost reimbursement from the site or program benefiting from the activity.

### **3.4 Storage**

OSR Project success depends on developing and maintaining adequate safe and secure storage. Project priorities include maintaining long-term safe and secure storage capability at DOE facilities, principally at LANL. Short-term off-site commercial storage facilities are also used for field recovery, sealed source consolidation activities, and efficient short-term storage before sources are packaged and transported to a DOE facility.

Inventory data is entered into the LANL database to track sealed source storage inventories, including types, quantities, and locations. Internal audits are conducted to assess and document that storage operations meet regulatory and project requirements. Managing most recovered sealed sources as radioactive waste minimizes project costs. However, some sealed sources containing attractive special nuclear material require increased security, and require secure storage in accordance with DOE Orders.

### **3.5 Health and Safety**

Due to the substantial quantities of radioactive material managed by the project, DOE requires strict and ongoing reviews of safety, material accountability, National Environmental Protection Act compliance, DOE mission impacts, and other regulatory issues. Health and safety issues are addressed in specific health and safety plans prepared by LANL and reviewed by DOE.

### **3.6 Sealed Source Disposal**

PL 99-240 requires the DOE to provide disposal for all LLW exceeding class C criteria (GTCC waste). Currently, only similar transuranic (TRU) radioactive waste generated by DOE's defense program activities have a disposal path at the Waste Isolation Pilot Project (WIPP). Approximately 10 percent of the OSR Project inventory was generated from DOE defense program activities. Project baseline cost estimates include activities required to prepare the OSR Project waste stream for disposal.

The OSR Project will, whenever possible, dispose of recovered sealed sources if an appropriate disposal site is available. However, developing and implementing new disposal capability for GTCC waste is outside the scope of the OSR Project. The DOE will separately begin planning a GTCC waste disposal strategy, and site and technology selection process in FY 2003.

## **4.0 PROJECT ASSUMPTIONS AND RISK MANAGEMENT**

Pursuant to DOE Order 413.3, DOE's Baseline Management Guidance document, and good management practices, OSR Project planning includes a formal process for identifying, managing, and reporting project assumptions and risks.

### **4.1 Project Assumptions**

GTCC sealed sources do not have an approved disposition path. PL 99-240 created administrative barriers preventing the DOE from using existing radioactive waste disposal facilities. Therefore, the OSR Project only provides interim storage for recovered sealed sources. Project end dates and particular milestones cannot be ensured until a disposition path is determined. In the interim, however, DOE and operating contractors have established several key assumptions that substantiate the project baseline for planning and life cycle cost estimating purposes:

- Costs for GTCC sealed source storage are similar to costs for TRU waste management at LANL.
- DOE will develop a strategy for storing and/or disposing of plutonium-239 sealed sources in FY2003. Security issues involving receipt, storage, shipment and disposal of plutonium-239 sealed sources will not require substantial capital, maintenance, or labor expenditures.
- Receipt of plutonium-239 sealed sources at LANL will be based on a recovery strategy developed and approved by the NNSA and DOE.
- Actinide bearing sealed sources derived from government naval reactor programs and defense nuclear energy activities will be recovered by the Project and will be disposed of at WIPP.
- Defense and non-defense non-actinide sealed sources (principally strontium-90 radioisotope thermoelectric generators) will be accepted for storage at a DOE site, pending storage site selection.
- DOE will establish a GTCC disposal capability by FY 2007. This will result in accumulated sealed source waste streams being disposed of through 2010. The OSR Project will phase out proactive recovery activities from 2007 through 2010. Afterward, source owners will be required to arrange GTCC source disposition directly with disposal facilities.
- Disposal facility selection, design, construction, and operations will not be part of the OSR Project Baseline.

## **4.2 Project Risk Management**

The project risk management process includes identifying and analyzing risks. The OSR Project applies a qualitative approach to identify and manage risks associated with project planning and operations. This method enables independent assessment of probabilities and consequences of project impediments, and provides a basis for defining potential impacts. Risks are related to technical, programmatic, cost, or schedule impacts.

## **5.0 MANAGEMENT STRUCTURE AND RESPONSIBILITIES**

DOE's Office of Environmental Management (EM) provides OSR Project policy guidance and oversight. The DOE Albuquerque Operations Office (AL) provides Federal project management controls and contractor oversight and direction for OSR Project cost, scope and schedule. The Los Alamos National Laboratory (LANL) manages all the procedures and infrastructure necessary to recover and store excess sealed sources and plans and conducts all sealed source recovery activities.

Public Law 107-206 appropriated \$10 million in supplemental funding for the OSR Project to the NNSA's Nuclear Non-Proliferation program. The OSR Project has been funded through the EM up to this point. Additionally, the OSR Project is located at the LANL, which is an NNSA site. Therefore, both the EM and the NNSA are involved in the OSR Project.

### **5.1 Federal Oversight**

DOE /AL conducts the following project oversight responsibilities:

- Ensuring project direction and a viable framework to safely manage sealed sources
- Estimating and requesting budget authority to plan and implement project activities
- Providing planning direction and guidance
- Establishing and maintaining project priorities within the DOE budget
- Issuing required administrative work approvals
- Coordinating activities among DOE organizations
- Evaluating contractor performance
- Project reporting

## 5.2 Contracted Responsibilities

DOE authorizes the LANL management contractor to conduct work activities including sealed source recovery and storage operations and technical and integration activities as listed below.

- Establishing and monitoring safe and compliant field and facility operating procedures
- Developing and maintaining the overall project scope, cost and schedule baseline
- Developing and maintaining sealed source inventory database
- Procuring required containers and equipment
- Conducting recovery and storage operations, including subcontracted activity
- Meeting technical requirements of DOE Orders and other applicable regulations
- Implementing DOE requirements for project planning and progress reporting
- Coordinating project priorities and activities with DOE

## 6.0 PROJECT LIFECYCLE COST AND SCHEDULE BASELINE

### 6.1 Project Cost

The OSR Project life-cycle baseline includes projected scope, required activities, estimated costs, and a schedule for completion. Cost estimates are based on historical costs, industry averages, and DOE experience.

Figure 2 indicates OSR Project actual costs through FY 2002 and estimated costs from the project baseline. Fiscal Year 2002 actual cost includes the appropriated amount plus carryover spending from prior fiscal years. Fiscal year 2003 and 2004 activities are planned with relative certainty. The key milestone, which is consistent with the Project planned scope, is recovery of all 5,300 excess sealed sources currently in the Project database by mid-FY 2004. Budget authority required to meet this goal will be provided by DOE EM Program base funding and the FY 2002 \$10 million supplemental appropriation to the project. Estimated future costs reflect sealed source storage requirements and costs for sending waste to disposal.

	Actual thru FY01	Actual FY 2002	FY 2003	FY 2004 - 2011	Total at Completion
Project Cost	\$14,592	\$4,413	\$7,131	\$44,267	\$70,403

**Figure 2: Lifecycle Project Costs (\$000)**

### 6.2 Project Schedule

Primary contractors develop and maintain a resource loaded project schedule. The schedule addresses activities such as project management, procurement, regulatory and compliance requirements, information management, recovery and transportation, shipping container development/testing, recycle/reuse, and storage. The schedule has a comprehensive coding structure, identifies a critical path, and delineates milestones. DOE/AL's Baseline Management Guidance document provides guidance on schedule development and maintenance.

### 6.3 Milestones (Deliverables)

***Offsite Source Recovery Project Program Plan***

As the OSR Project contractor develops the schedule, the resulting activities and milestones form the basis for performance expectations. The OSR Project is an on-going operational activity. Therefore, the principal milestones indicated in Figure 3 are based on the number of sealed sources recovered each fiscal year. The only absolute certainty related to the OSR Project is the current number of excess and unwanted sources requiring recovery. The total number of GTCC sealed sources manufactured since the 1950's (which the government must ultimately dispose), the rate at which they will become excess and unwanted, and the timing of final disposal are not certain. The DOE directed a planning assumption that disposal will be available in FY 2007 and recovery and storage operations will be complete in FY 2010. These assumptions facilitate LANL's baseline preparation. The current project baseline forecasts recovering 14,000 sealed sources between 1999 and 2010. Through FY 2002, 4,320 sources were recovered (not including 1,320 sources recovered through 1998 from the AEC Loan/Lease Program). The inventory database includes an additional 5,300 excess and unwanted sealed sources.

<i>Date</i>	<i>Actuals</i>	<i>Baseline Milestones</i>
<b>Actuals</b>		
FY1999	Begin NRC Pilot Project Recoveries 69 Sealed Sources Recovered	
FY2000	Complete NRC Pilot Project Recoveries 31 Sealed Sources Recovered	
FY2001	Begin Proactive Recovery Operations 2,895 Sealed Sources Recovered	
FY2002	Recovered 1,325 Sealed Sources	
<b>Planning</b>		
FY2003	Recover 3,700 Sealed Sources Establish Strontium-90 Storage Facility Develop a strategy for storing and/or disposing of Plutonium-239 sealed sources	
FY2004	Recover 1,600 Sealed Sources	
FY2005	Recover 1,500 Sealed Sources Begin GTCC sealed source waste stream characterization and certification for disposal*	
FY2006	Recover 1,500 Sealed Sources	
FY2007	Recover 700 Sealed Sources Begin Sealed Source Waste Disposal*	
FY2008	Recover 500 Sealed Sources	
FY2009	Recover 350 Sealed Sources	
FY2010	Recover 150 Sealed Sources Complete Sealed Source Inventory Disposal*	
FY2011	Project Close Out*	
Total of 14,320 Sources Recovered		

\*Milestones are contingent on disposal availability in FY 2007.

**Figure 3: OSR Project Milestones**

**7.0 CONCLUSION**

The OSR Project is an on-going government project that recovers and stores excess and unwanted GTCC radioactive sealed sources. Since 1999, project activities have resulted in recovering over 4,300 sealed sources from the licensed sector. The sources are packaged as waste and stored at Los Alamos National Laboratory pending a disposition path. In FY 2003 and 2004, planned activities will enable recovering an additional 5,300 sealed sources currently on the project database. From FY 2005 through FY 2010, an additional 4,700 sealed sources are expected to become excess and unwanted, and will require government management. Assuming that a disposition path is established in FY 2007, sealed source disposal can commence, and recovery activities will be brought to a close by FY 2010. Source owners

***Offsite Source Recovery Project Program Plan***

---

---

will then arrange disposal directly with the disposal facility. The estimated project life-cycle cost is \$70.4 million.