

**K-27 Program & Project Implementation (Separating Operations Activities from Capital Asset Project) – 14098**

Daniel Macias, UCOR- LLC-ETTP

**ABSTRACT**

The Gaseous Diffusion facility, K-27, at the East Tennessee Technology Park in Oak Ridge, Tennessee is a category 2 nuclear facility that operated from 1945 to 1964 producing enriched uranium. It is a four story building with a 388,800 square feet footprint and 1.1M square feet of floor area. It has 9 operating units with 10 cells each and 6 converters and 12 compressors per cell. The facility is contaminated with uranium and technetium-99 (in some locations). UCOR has utilized the lessons learned from the D&D of the K-25 Gaseous Diffusion facility, which was considered a capital asset project, to develop a two phase integrated cleanup approach to complete the D&D of the K-27 facility. **Phase 1** is the deactivation phase to characterize and mitigate the radiological and chemical hazards and is considered an operations activity subject to the requirements of the EM protocol. Activities include sampling and analyzing process pipes, auxiliary systems, structures, converters, and compressors; abating hazardous material and stabilizing the equipment/facility; removing, segmenting, and mining equipment/pipes containing fissile uranium material; removing contaminated equipment and pipes that add unacceptable risk to open air demolition; declaring criticality incredible; achieving “cold & dark” and “demolition ready” status; and thus eliminating the highest levels of uncertainty for the capital asset work. Phase 2 is demolishing the facilities, disposing of the debris, removing support facilities, fences, equipment, demobilizing the project and submitting regulatory and completion documentation (CD-4). **Phase 2** is considered a capital asset project subject to the requirement of DOE O 413.3B. This two phase approach complies with both DOE Order 413.3B and the EM protocol; reduces the risks to workers, protects public safety and health, and the environment, reduces the capital asset uncertainties, is cost effective and efficient, and maximizes the work that can be accomplished safely using heavy equipment during demolition. The Portsmouth/Paducah Project Office (PPPO) is implementing a similar approach in the D&D of the Gaseous Diffusion facilities in Portsmouth. These approaches will serve as the model for future clean-up activities at ETTP in Oak Ridge.

**INTRODUCTION**

The U.S. Department of Energy (DOE) Oak Ridge Reservation (ORR) was created in 1943 as part of the World War II Manhattan Project and is comprised of three sites: (1) the Oak Ridge National Laboratory (ORNL); (2) the Y-12 National Security Complex (Y-12); and (3) the East Tennessee Technology Park (ETTP). Currently, ORNL is DOE's largest science, technology and energy national laboratory; Y-12 manufactures, stores, and disassembles nuclear weapon components; and ETTP is being environmentally restored for conversion into a private sector industrial park with some unique areas reserved for national historic preservation.

## **WM2014 Conference, March 2 – 6, 2014, Phoenix, Arizona, USA**

The K-27 Gaseous Diffusion facility at the East Tennessee Technology Park is a category 2 nuclear facility that operated from 1945 to 1964 producing enriched uranium. It is a four story building with a 388,800 square feet footprint and 1.1M square feet of floor area. It has 9 operating units with 10 cells each and 6 converters and 9 or 12 compressors per cell. The facility was shutdown without removing all source term and hazards and is contaminated with uranium and technetium-99 (in some locations) and is in poor condition.

On March 15, 2012 the Principal Deputy Assistant Secretary for Environmental Management issued the *“Policy and Protocol for Office of Environmental Management Operations Activities”* which provided the framework for identifying, managing, and separating Operations Activities from Capital Asset Projects and DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets* requirements. In addition, the draft *“Office of Environmental Management Portfolio Management Framework”* further defines the process of classifying and defining Capital Asset Projects and Operations Activities scopes of works. These documents had a significant impact on EM’s project management philosophy of classifying all scopes of work as Capital Asset Projects (CAPs) to “chunking” the scopes into smaller, easier to manage CAPs and operations activities.

These changes coupled with the lessons learned from the Deactivation & Demolition (D&D) of the K-25 Gaseous Diffusion facility lead to the K-27 program management approach or the two phased approach UCOR is implementing to D&D the K-27 facility. The UCOR project management philosophy has remained constant, in that all work will be managed as a project using proven project management principles, techniques, and tools appropriately tailored for the type of work being performed. Tailoring ensures a consistent alignment of the size, risk, and complexity of the activity with the UCOR management philosophy and principles. This approach will serve as the model for future clean-up activities at Oak Ridge and is consistent with the approach the Portsmouth/Paducah Project Office (PPPO) is implementing to D&D their Gaseous Diffusion facilities.

### **THE K-27 PROGRAM MANAGEMENT APPROACH**

**Phase 1** is the deactivation of the facility to characterize and mitigate radiological and chemical hazards remaining from facility operations. The deactivation activities are classified as an operating activity subject to the requirements of *EM Policy and Protocol for Operations Activities*.

**Phase 2** is the demolition of the facilities, disposing of the debris, stabilizing the site and meeting the regulatory closure requirements. The demolition activities are classified as a Capital Asset Project subject to the requirements of DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

This two phased approach complies with the principles, definitions, and requirements of DOE Order 413.3B, the EM Protocol, and the draft Portfolio Management Framework. Because this approach is a significant change in project management philosophy and requirements, the UCOR senior managers with agreement from the Federal Project Director and DOE Oak Ridge, briefed EM-HQs management. The approach has been endorsed by EM, and agrees with the EM Mission Units philosophy on scope classification. This provides UCOR the ability to clearly define scope, delineate activities, and establish end points for easy transition from operations activities to the capital asset project. It allows UCOR to characterize and remove significant nuclear safety and health hazards that were left during shutdown to minimize the workers safety and environmental risks and provides for a safe working condition during demolition. Finally, this approach provides UCOR and DOE the flexibility to align and adjust the operating activities scope of work with the annual funding appropriation through the fiscal year work plans; eliminate unknowns and reduce risks prior to establishing the CAP; establish a higher confidence level and definition of the CAP scope; improves the quality of the cost estimates and performance baseline; provides for efficient and effective execution of the work; and improves the opportunity for project success.

UCOR has developed a fully integrated system approach to complete the D&D of the K-27 facility. The “waterfall” chart shows the general, summary work sequence and the separation of the operational activities from the capital asset project scope. Phase 1 activities include sampling and analyzing process pipes, auxiliary systems, structures, converters, and compressors; abating hazardous material and stabilizing the equipment/facility; removing, segmenting, and mining equipment/pipes containing fissile uranium material; removing contaminated equipment and pipes that add unacceptable risk to open air demolition; declaring criticality incredible; achieving “cold & dark” and “demolition ready” status; and thus eliminating the highest levels of uncertainty for the capital asset work. This will enable the CAP to proceed as a less than Category 3 facility instead of a Category 2 nuclear facility. This lessens the risk of technical safety requirement (TSR) compliance issues, protects public safety and health, and supports the use of heavy equipment for open air demolition. This will maximize the use of on-site disposal for the demolition phase by removing items (small volumes), or clearly marking (painting pipes blue) piping and/or equipment identified during characterization that have to be disposed of off-site, and minimizes the risk of Tc-99 cross-contamination with building debris because Tc-99 is highly mobile.

The phase 2 demolition scope is classified as a capital asset project and will be managed in accordance with the requirements of DOE Order 413.3B, the UCOR Program and Project Management Manual, and the UCOR Project Categorization and Tailoring Procedure. This includes developing, reviewing, and approving critical decision documents, completing technical and baseline reviews, and obtaining the acquisition executive approval to proceed to the next phase of the project’s life cycle. The work scope includes demolishing, segregating, and size reducing building components; loading, hauling, and disposing of all building debris, waste, and equipment; removing support facilities, fences, equipment and demobilizing; and submitting regulatory and CD-4 completion documents.

## **CONCLUSION**

The UCOR path forward is to continue to follow the EM Policy and Protocol for Operations Activities requirements and develop the FY Work Plans for the deactivation activities as defined in the K-27 D&D Program Plan. Once criticality incredible is determined, and the facility is “cold & dark”, and “demolition ready”, UCOR will initiate the CAP process, and implement the requirements of DOE Order 413.3B in support of the demolition of the facility.

In summary, the K-27 two-phase cleanup approach supports the EM project management philosophy; complies with DOE O 413.3B and the EM Policy and Protocol for Operations Activities; and reduces the risks to workers, protects public safety and health, and the environment. It will also reduce the capital estimate uncertainties and is cost effective and efficient; maximizes the work that can be accomplished safely using heavy equipment; and better aligns the work with the future funding profiles.

## **ACRONYMS**

CAP	Capital Asset Project
D&D	Deactivation & Demolition
DOE	Department of Energy
ETTP	East Tennessee Technology Park
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PPPO	Portsmouth/Paducah Project Office
UCOR	URS/CH2M Oak Ridge LLC
Y-12	Y-12 National Security Complex