Project Name: OR-K-31 Demolition-D&D

Project Name (Expanded): Oak Ridge-K-31 Demolition-D&D [Demolition of a GDP building from which the uranium-contaminated equipment (converters, etc.) had been previously removed. The large transite structure contained fixed radiological contamination, tie lines, and some associated facilities.]

Project Type: Building / Facility D&D Project Type

FIMS Hazardous Category (replaces Building Type): 04 Radiological Facility (previous Building Type 2)

Project Type Detail: Generic Radiological Facility(ies)-Extensive Loose Contamination


Site Context:
This project falls under the Defense Remediial Action WBS (identified as OR-0040.C, Nuclear Facility D&D-ETTP in PARS); this work was associated with, but not included in, WBS elements from the American Recovery and Reinvestment Act of 2009 WBS (identified as OR-0040.R in PARS). The projects include and preparation for decontamination and decommissioning (D&D); D&D of buildings and associated structures to grade or slab; removal or stabilization of below grade structures; remediation of burial grounds, contaminated soils and below grade structures; as well as monitoring and treatment of groundwater. Supporting projects include surveillance and maintenance and waste operations including construction, reconfiguration and demolition of select waste management facilities.

ETTP (then K-25) began operations during World War II as part of the Manhattan Project. Its original mission was to produce enriched uranium for use in atomic weapons, but at the end of the war, the plant’s mission evolved. From 1945 to 1985, it produced enriched uranium for the commercial nuclear power industry and in 1987, it was permanently shut down. Restoration of the environment, decontamination and decommissioning of the facilities, and management of the legacy wastes have since been major activities. Major contaminants include uranium (various isotopes), mercury, beryllium, and organic constituents. The industrial, or “impacted” areas of the site is about 800 acres, with several large (>1M SF) GDP buildings, and several hundred associated laboratory, centrifuge, and support facilities. There were numerous environmental releases and on-site radioactive material burial grounds, some including classified materials. Certain areas require high levels of security (Protected Areas) based on centrifuge and GDP technology. The prime contractor, currently URS/CH2M Oak Ridge, manages or provides technical oversight for environmental projects, although some were contracted through a DOE IDIQ contract.

ECAS Level 4/Parent Project Context:
The actual parent project grouping would be to include all of the WBS components associated with the UCOR cleanup contract. For ECAS purposes the Parent Project group has been identified as those UCOR/ETTP projects that were identified as potential projects for this (2017) ECAS database.
addition. Note that the ECAS projects identified below are contained under several different higher-
level WBS elements.

- OR-Chromium Water Treatment System Install & Startup-WM
- OR-CNFS Closure-D&D
- OR-ETTP 26 Building Characterization (ORISE)-D&D
- OR-K-1065 RCRA Closure A, D & E-D&D
- OR-K-1070B BG-ER
- OR-K-27 Decommissioning-D&D
- **OR-K-31 Demolition-D&D**
- OR-K-31/K-33 Removal Action-D&D
- OR-K-33 Slab & Soils-D&D-R (renamed in 2017)
- OR-K-731 Building-D&D
- OR-K-732 Switchyard-D&D
- OR-K-892 Cooling Water Pumphouse and Sludge Softener -D&D
- OR-TSCA Incinerator RCRA Closure-D&D
- OR-Zone 2 Exposure Unit 28-ER

Two ETTP ECAS Projects were previously developed and included in the ECAS database under the
ECAS ARRA data collection program in 2011. These projects were conducted by both UCOR and
the previous contractor (BJC) and should properly be included under this Parent Project.

- OR-K-27 Pre-Demolition-D&D-R
- OR-K-33 Structure-D&D-R
The K-31 Complex has additional support facilities/structures which include Building K-761 (the Old Switch House), below-grade valve and blow-down vaults, and oil containment structures (skimmers), three office trailers, and a 300 ft tall, 400,000-gallon firewater tank. The below-grade vaults and skimmers were deferred for future remediation as part of the Zone 2 Remedial Action project (addressed in ECAS Project OR-K-31/K-33 Removal Action-D&D).

![Figure 1. K-31 Facility Location Map](image_url)
Building K-31 was a 1,659,628 SF two-story, steel-framed structure with transite siding. The floors of the cell and operations levels were poured reinforced concrete. The floor of the cell level had expansion joints throughout. There were multiple penetrations in the floor between cell and operations levels, including hatches, fire suppression lines, roof drains, sanitary sewer drains, cable trays, and electrical conduit. Between the two floors there are interior stairways housed inside concrete and transite enclosures on the cell floor level. All gaseous diffusion process equipment and the majority of the uranium contamination had been removed by a previous project prior to this project, and the building had been available as a warehouse with radioactive contamination either in inaccessible areas or fixed within structural components.

K-761 Facility

Building K-761 was a three-story facility with penthouses on each end, containing approximately 50,000 gross SF. The facility is constructed primarily of clay tile block with a brick façade on exterior and interior walls with reinforced concrete columns. The building contained a full (flooded) basement, two building “galleries” (high bays) and a control room gallery (mezzanine). The roof was built up tar and gravel on a concrete deck.

Facility Use:
Building K-31 was a 1,659,628 SF gaseous diffusion facility at the ETTP that has been shut down operationally since 1985. A subsequent British Nuclear Fuels Ltd. (BNFL) “Three-Building” project
had removed all process equipment and generally decontaminated the facility. This project performed demolition of the walls, roof, and minimal internal fire suppression pipe, and left the floor slab in place in a safe configuration.

Building K-761 was the Old Switch House. BNFL used this facility for nondestructive assay operations, office and training space, and storage during the three-building demolition project in the late 1990s. Most of the facility was void of equipment except for two air handling units, blowers, small motors and electrical disconnects/breakers. An asbestos-insulated pipe ran the length of the facility on the west and east ends of the building. There were polychlorinated biphenyl (PCB)-containing electrical cable and gaskets. Additional information and pictures of the buildings are available in the PCCR identified in the reference documents and available on the referenced web site.

Processes causing contamination:

K-31 Facility was a gaseous diffusion facility with substantial radiological contamination that has since been mitigated. In 1997, DOE contracted British Nuclear Fuels Limited, Inc. (BNFL) to execute deactivation and demolition activities of Building K-31 as part of a reindustrialization effort. All process equipment and associated components, including process lines, have been removed from the facility. The remaining components include inactive fire suppression lines, cable trays, and electrical wiring supporting all fluorescent and mercury vapor facility lighting. Concrete pedestals that supported large equipment have been removed.

Contaminants of concern (including extent of contamination by major contaminant):

<table>
<thead>
<tr>
<th>Building</th>
<th>Chemical Hazard</th>
<th>Location/Extent</th>
<th>Radiological Hazard</th>
<th>Location/Extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-31</td>
<td>Asbestos, Lead, PCBs</td>
<td>Multiple, including roofing material, panels, tiles &amp; insulation.; various areas, equipment.</td>
<td>Moderate LLW and treated MLLW</td>
<td>Inaccessible areas, fixed in concrete flooring, and structural members/siding; upper reaches of high-bay areas</td>
</tr>
<tr>
<td>K-761</td>
<td>Asbestos, Lead, PCBs</td>
<td>Multiple, including roofing material, panels, tiles &amp; insulation.; various areas, equipment, and hoods</td>
<td>Minimal</td>
<td>Levels were below the levels established in DOE Order 458.1</td>
</tr>
</tbody>
</table>

D&D Project Execution

Site WBS Organization within the ECAS Project Scope:

The K-31 Demolition (and Pre-Demolition) of the K-31 Facility was organized with the project management and waste management performed by UCOR (URS / CH2M Oak Ridge LLC), the characterization was performed by ORISE, and the hazardous material removal/asbestos abatement and facility demolition subcontracted.

K-31 Facility: The principal contaminant was asbestos along with universal waste, lead paint, lead flashing, and window frames. The facility construction debris was mostly low-level waste, which was transported in covered dump trucks on the dedicated haul road to the Environmental Management Waste Management Facility (EMWMF) landfill. Remaining packaged waste was sent to DOE-approved off-site treatment, storage, and disposal facilities (TSDFs) including Energy-Solutions in Clive, UT, Nevada National Security Site, and Clean Harbors.
K-761 Facility: Building K-761 basement water was pumped out and treated through a package treatment system and discharged to the storm sewer. PCB waste were treated, packaged, and disposed at an approved TSDF. Universal waste will be treated, packaged, and disposed at an approved TSDF. Mixed waste of various liquids e.g., petroleum, acetone, ammonia, and water. Treatments included Incineration and Macroencapsulation.

Methods of execution:

**Management:** The scope was planned, managed, and executed as 4 distinct elements:

- K-31 Deactivation
- K-31 Demolition
- K-761 Deactivation
- K-761 Demolition

The goal of the K-31 Facility Prep for Demolition activities, shown in the WBS provided in Table 1, is to place the facility in a low-cost, safe, and stable configuration in preparation for demolition.

**Table 1, K-31 Facility Preparation for Demolition**

<table>
<thead>
<tr>
<th>Corporate WBS Number</th>
<th>Project WBS Number</th>
<th>Project Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR-0040.A002.05.01</td>
<td>01.21.06.50.02.05.01</td>
<td>K-31 Facility Prep for Demolition</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-01</td>
<td>Planning Documents</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-02</td>
<td>Mobilization</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-03</td>
<td>Characterization</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-04</td>
<td>Deactivation</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-05</td>
<td>Hazard Abatement</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-06</td>
<td>Facility Demolition Industrial Hygiene Support</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-07</td>
<td>On-Site Waste Packaging, Transportation, and Disposal</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-08</td>
<td>Off-Site Waste Packaging, Transportation, and Disposal</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-09</td>
<td>Demobilization</td>
</tr>
<tr>
<td></td>
<td>01.21.06.50.02.05.01-11</td>
<td>Project Management</td>
</tr>
</tbody>
</table>

The scope for the K-31 Facility Demolition subproject involves the demolition of Building K-31 and ancillary facilities at ETTP, it performed demolition of the walls, roof, and minimal internal fire suppression pipe, and leave the floor slab in place in a safe configuration. All process equipment and associated components including process lines had previously been removed from the facility leaving Building K-31 unoccupied and inactive. Characterization activities were conducted and legacy materials removed under separate activities, prior to demolition. The K-31 Facility Demolition subproject WBS and scope activities are shown in Table 2.
Note: This demolition does not include the removal of the Slabs. K-31 Slab Removal was awarded as a contract modification August 2015, and is presented in a separate ECAS Project (OR-K-31K-33 Removal Action-D&D).

Regulatory:
The regulatory driver is the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) process in accordance with the approved Action Memorandum for the Remaining Facilities Demolition Project at East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2049&D2) as implemented through the ORR Federal Facility Agreement (FFA). Subcontractor developed integrated project review documents for an Independent Project Review (IPR) and Environmental Management Acquisition Advisory Board (EMAAB) approval. Preparation of appropriate CERCLA documentation required for disposal of waste at the EMWMF, including DQO sessions, Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), the Waste Handling Plan (WHP), and Characterization and waste profile(s).

Physical Approach:
The prime contractor initially removed, packaged, and dispositioned any legacy materials that had to be removed prior to demolition. ORISE performed the characterization to support the development of waste profiles. Subcontractors performed the asbestos abatement, removed transite panels, and removed any universal waste to allow the demolition waste to be dispositioned at the EMWMF. Construction contractors demolished the facilities and transported the demolition debris to the appropriate disposal location. The building slabs remained for follow-on project.

Technologies: The contractor used standard asbestos abatement and demolition technologies (e.g., glovebags/plastic/water sprays and excavators).

Activities self-performed:
- All management and key technical positions along with a portion of the technical staff
- Waste management
• Used significant professional services contracted (i.e., seconded) labor inter-mixed with prime contractor staff

Activities subcontracted:
• Characterization of surfaces prior to demolition
• Waste treatment of mixed wastes (on-site and off-site)
• Demolition of structures

Issues that impacted the project:
• None

Scope Growth:
No identified scope growth

Notes Regarding Use of Data

1. This project was preceded by a project awarded in 1997, DOE contracted British Nuclear Fuels Limited, Inc. (BNFL) to execute deactivation and demolition activities of Building K-31 as part of a reindustrialization effort. All process equipment and associated components, including process lines, have been removed from the facility. The remaining components include inactive fire suppression lines, cable trays, and electrical wiring supporting all fluorescent and mercury vapor facility lighting. Concrete pedestals that supported large equipment have been removed.


Remove from final Project Narrative

PCCR Waste Values
Waste management was performed in accordance with the Waste Handling Plan – Part 2 for Building K-31 at the East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2644&D2; DOE/OR/01-2644&D2/A1). The waste types, volumes, and disposal facilities are presented in Table 3.

<table>
<thead>
<tr>
<th>Waste type</th>
<th>Volume (CY)</th>
<th>Disposal Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition debris</td>
<td>48,221</td>
<td>EMWMF – WL 78.1</td>
</tr>
<tr>
<td>Demolition debris – asbestos-containing material</td>
<td>457</td>
<td>EMWMF – WL 78.2</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----</td>
<td>----------------</td>
</tr>
<tr>
<td>Demolition debris</td>
<td>22</td>
<td>EMWMF – WL 78.3</td>
</tr>
<tr>
<td>Demolition debris – sanitary/industrial</td>
<td>4</td>
<td>Oak Ridge Reservation Landfills</td>
</tr>
<tr>
<td>Liquids</td>
<td>1</td>
<td>Diversified Scientific Services, Inc.</td>
</tr>
<tr>
<td>Liquids</td>
<td>9</td>
<td>Energy Solutions</td>
</tr>
<tr>
<td>Demolition debris</td>
<td>43</td>
<td>Energy Solutions</td>
</tr>
<tr>
<td>Demolition debris</td>
<td>7</td>
<td>Perma-Fix of Florida, Inc.</td>
</tr>
<tr>
<td>Demolition debris</td>
<td>4</td>
<td>Veolia</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>48,768</strong></td>
<td></td>
</tr>
</tbody>
</table>

EMWMF = Environmental Management Waste Management Facility
WL = waste lot

Waste volumes in Table 3 disposed at the EMWMF are “as disposed,” and the volumes for all other sites are “as shipped.” The heavy equipment disposed as secondary waste is included in EMWMF Waste Lot (WL) 78.1.

A brief summary of EMWMF WLs used follows:

- **WL 78.1** – WL 78.1 is for Bldg. K-31 building structure.
- **WL 78.2** – WL 78.2 is for Bldg. K-31 exterior asbestos-containing material.
- **WL 78.3** – WL 78.3 is for Bldg. K-31 media above end point criteria (hotspots).

A description of the waste disposed at off-site locations follows:

- **Energy Solutions** – provides low-level/mixed low-level/radioactive waste treatment and disposal at Clive, Utah.
- **Diversified Scientific Services, Inc.** – provides thermal treatment/energy recover of PCBs and non-PCBs low-level radioactive waste organic liquids, aqueous liquid, and chemicals at Kingston, Tennessee.
- **Perma-Fix of Florida, Inc.** – provides thermal treatment/energy recovery/incineration of nonradioactive industrial, PCB, and hazardous liquids and chemicals and recycle/reclamation of universal waste, e.g., batteries and light bulbs, at Gainesville, Florida.
- **Veolia** – provides thermal treatment/energy recovery/incineration of non-radioactive industrial, PCB, and hazardous liquids and chemicals and recycle/reclamation of universal waste, e.g., batteries and light bulbs at Tallahassee, Florida.
All waste associated with this CERCLA non-time-critical removal action has been disposed in accordance with the Off-Site Rule.

The disposed waste in Table 3 is for demolition of Bldg. K-31 only and does not include the slab or underlying soil. The Bldg. K-31 slab will be removed immediately following demolition, and a Phased Construction Completion Report (PCCR) for EU Z2-06 under the *Record of Decision for Soil, Buried Waste, and Subsurface Structure Actions in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee* will be prepared to close out the slab and underlying soil. Disposal of the slab will be documented in the EU Z2-06 PCCR.
History and Background
Building K-781, K-31 Switch House, was a 14,640 ft² multi-story building that included a basement, first floor, mezzanine, and second floor. It measured approximately 308 ft by 57 ft and was of brick, tile, and reinforced concrete construction. The facility had a flat, tar and gravel built-up roof. It was designed in the early 1950s to support Building K-31, which came on-stream in 1952. K-781 was not used as a switch house after plant operations ceased in 1985. Until October 2005, K-781 was leased by British Nuclear Fuels Limited and used for office space, equipment storage, non-destructive assay testing, and training. Much of the original switch house equipment had been removed and to some extent the original interior layout of the rooms and equipment galleries had been modified by tenants.

Building Hazards/Contaminants
The building contained asbestos-containing material, oil, universal waste, and polychlorinated biphenyl (PCB) items.

Description of Demolition
The facility was demolished in accordance with the Standard Operating Protocol for the Remaining Facilities Demolition Project at East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/CR/61-21508/SD1).

End State
Radiological surveys and visual inspections/sampling for chemical contaminants were conducted in the basement of K-781 prior to demolition because the basement area would not be safe to enter after demolition was complete. Radiological surveys were below levels established in DOE Order 458.1 (formerly 5400.5). Oil stains were noted on the basement floor during the inspection and samples were collected. The data from the sampling event as well as the radiological surveys will be evaluated per the Record of Decision for Soil, Buried Waste and Subsurface Structure Actions in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/61-02).

Upon completion of demolition, the basement was filled with gravel, fill dirt, top soil, and then seeded.

Waste Management
The waste was disposed as follows (yd³): demolition debris, 7,327 yd³ to Oak Ridge Reservation landfill (ORR); 1 yd³ to ParmaFix (Gainesville, Florida); 3 yd³ to Veolia (Tallahassee, Florida); and 1 yd³ to Veolia (Port Arthur, Texas); demolition debris – asbestos containing material, 90 to ORR landfill. The total is approximately 7,382 yd³.

Land Use Controls
None required.