

Historical Artifact Collection at the East Tennessee Technology Park – 9196

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ABSTRACT

The East Tennessee Technology Park (ETTP) was originally built during World War II as part of the Manhattan Project. Known as the K-25 Site, its primary mission was to enrich uranium for use in atomic weapons. During the Cold War, the site's mission was changed to include the enrichment of uranium for nuclear reactor fuel elements and to recycle spent fuel. In the 1980s, a reduction in the demand for nuclear fuel resulted in the shutdown of the enrichment process and production ceased. The emphasis of the mission for the ETTP was then changed to environmental management and restoration operation. Beginning in the 1990s, reindustrialization (conversion of underutilized government facilities for use by the private sector) became a major mission at the ETTP. These activities involve cleaning and demolishing facilities.

Decommission and demolition (D&D) of facilities at the ETTP or Manhattan Project K-25 Gaseous Diffusion Plant on the U.S. Department of Energy's (DOE) Oak Ridge Reservation (ORR) presented significant challenges complying with the requirements of the National Historic Preservation Act (NHPA) Memorandum of Agreement (MOA) that was negotiated with the stakeholders. Development of a process to identify, record and preserve the artifacts and the cooperation of several agencies and contractors were critical to completing the collection of the artifacts without impacting the D&D project schedule. Additional challenges included contaminated and classified artifacts, entry to facilities with hazardous conditions, schedule pressures and funding for collection and permanent storage.

A process was developed to achieve compliance with the requirements of the NHPA. The NHPA requirements and implementing instruments at the ETTP as well as the process developed to preserve significant Manhattan Project era artifacts at the ETTP will be discussed. Implementation of the artifact collection process is also summarized.

BACKGROUND

The ETTP is one of three major complexes located on the DOE ORR in Oak Ridge, Tennessee. The ETTP consists of approximately 1500 acres (607.035 hectares), with 772 acres (312.421 hectares) within the security fence. Nearly sixty percent of the area inside the fence was pavement or building footprint. The ETTP contained 125 major buildings with more than 70 auxiliary and support facilities. An aerial view of the site is provided in Figure 1.

Because the site began operations as part of the Manhattan Project in 1945 and the K-25 Building at one time was the largest building under roof in the world, it has historical properties that must be evaluated and preserved. Even the construction of the K-25 Building, a U-shaped four-story building covering 44 acres (17.81 hectares) and measuring a mile (1.61 kilometers) from end to end, was historic. Innovative foundation techniques were required to avoid setting thousands of concrete piers to support load-bearing walls and keep the project on schedule. The K-25 Building was built on "compacted fill," which up until that time had not been used extensively in building construction. If the usual procedure of leveling the site had been employed, a great proportion of the filled areas would have been unsuitable for carrying the foundation loads. Within 18 months, K-25 Building was up



Fig. 1. East Tennessee Technology Park circa 1982.

and running, an astounding engineering achievement. The K-25 Building is recognized by the DOE as one of seven Manhattan Project Signature Facilities.

Also constructed on the K-25 Site was the K-25 power plant which generated much of the power consumed by the K-25 Site operations. The largest single steam-electric station ever built at the time, the power plant has a capacity of 238,000 kw. One of the features of the plant is the unusual re-circulating water system handling a quarter million gallons per minute (15,750 liters/second).

Section 106 of the NHPA requires that federal agencies take into account the effects of their undertakings on properties included in or eligible for inclusion in the *National Register of Historic Places* (National Park Service 2003). To comply with Section 106 of the NHPA and its implementing regulations at 36 CFR 800, DOE-Oak Ridge Operations entered into a programmatic agreement with the Tennessee state historic preservation officer and the Advisory Council on Historic Preservation concerned with the management of historical and cultural properties on the ORR. The programmatic agreement was ratified on May 6, 1994, and was incorporated into the approved *Cultural Resource Management Plan, DOE Oak Ridge Reservation*. The plan was completed in accordance with stipulations in the programmatic agreement, including historical surveys to identify significant historical properties on the ORR.

The ETTP was surveyed in 1994 to identify properties eligible for inclusion in the *National Register of Historic Places*. An archaeological survey was also completed at the ETTP in 1997. Eligible properties include facilities within the main plant that contains 120 contributing structures, 37 noncontributing structures and 11 structures that are not contiguous with the historic district. More detailed information on

the properties eligible for inclusion in the *National Register of Historic Places* is provided in the *Cultural Resource Management Plan*.

In August 2002, the DOE submitted a notification of adverse effect of a proposed undertaking for decontamination and decommissioning of properties located at the ETTP. The proposed project was to decontaminate and demolish or transfer all remaining properties located within the K-25 Site main plant. The Tennessee state historic preservation officer, the advisory council and other interested parties participated in the planning stages of the proposed undertaking and entered into the consultation process. These consultations developed a path forward, and several MOAs were negotiated among the consulting parties. In 2003, a MOA on the decontamination and decommissioning of the K-25 and K-27 buildings to determine actions to avoid, minimize or mitigate the adverse effects to these two historical properties was completed. Other ETTP projects were reviewed in accordance with the programmatic agreement or the *Cultural Resource Management Plan*, and a MOA was signed in 2004 for the demolition of 108 buildings/structures. Meetings were held in 2004 with the consulting parties to finalize a MOA for the historical interpretation of the K-25 Site. The agreement was signed in 2005. One stipulation of the MOAs was that a process would be developed to identify and collect historical items that would aid in the historical interpretation of the K-25 Site.

THE PROCESS

To comply with the stipulation of the MOA to develop a process to identify and collect for future historic interpretation of the activities at the K-25 Site from the Manhattan Project era, the DOE, through its management and operations contractor for the ETTP, Bechtel Jacobs Company LLC (BJC), contracted with CDM Federal Services Inc (CDM) to develop an artifact identification and collection process. A process was developed that identified historical buildings that contributed to the enrichment of uranium for the first atomic bomb. These buildings were walked down with the intent of identifying any items that would be helpful in telling the K-25 Site's story to future generations. The process had to account for the classification, hazardous and radiological issues associated with the collected items. Also, with the collection there had to be a sound method for the identification of era items and the cataloging and preservation of these items.

A collection strategy was developed that began with the identification of the facilities from which the items would be collected. From the list of properties/facilities that were eligible for inclusion in the *National Register of Historic Places*, 118 buildings were identified to be surveyed. These were divided into three categories: A) non-structures or previously demolished buildings; B) previously cleared (emptied) and renovated buildings; and C) operating or operations shutdown in place (items anticipated). No collections were attempted from category A facilities. Category B facilities received a cursory walk through by cultural resource staff and category C facilities received an extensive walk through.

Next, selection criteria were identified for items that would be representative of the Manhattan Project and the Cold War. These criteria included:

- Association with historically significant figures in Oak Ridge,
- Association with historically important events at Oak Ridge or within the national or international story,
- Represent significant science and technology,
- Reflect historical impact on 20th Century life in America, and
- Archives such as operation records, photographs, maps, manuals, engineering drawings, etc.

The necessity of a process to record and track the selected artifacts was recognized. A process was developed that included preprinted tags to be placed on items selected for collection, a database sheet to

standardize and ensure complete data collection during the walk downs, and a database that links pictures with data. An example of the tags used is presented in Figure 2. Both a front and back view of the tag are shown. The database sheet prompted entries for the following:

- item number (four digits)
- description
- dimensions (including units)
- location item was found (building and room number)
- storage location
- purpose or use of item
- manufacture name/model no. and ID number
- condition of item (excellent, good, fair, poor)
- photograph number (item number-alpha)
- contaminated area (Y/N)
- green tagged (Y/N)
- classified (Y/N)
- title of MOA
- additional comments
- collector
- date

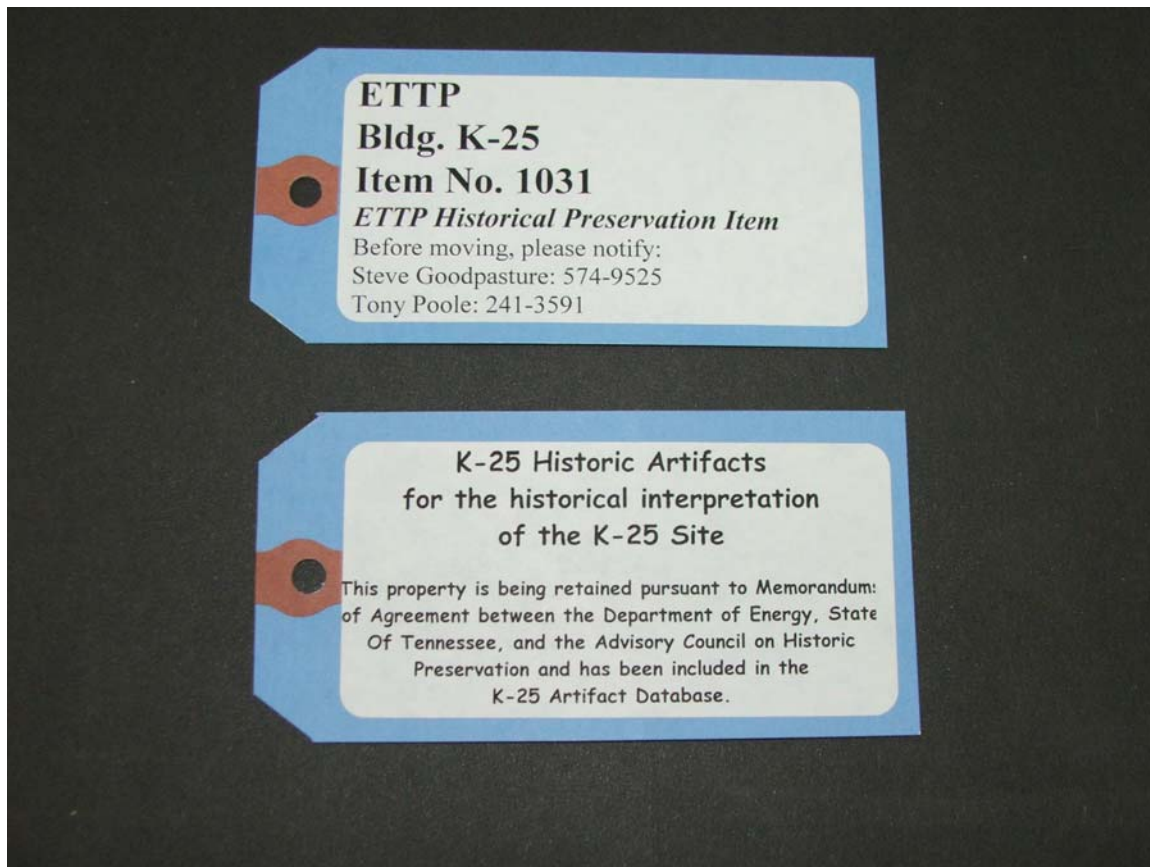


Fig. 2. ETTP historical artifact tag (front and back views).

IMPLEMENTATION

Once the selection criteria had been identified and a process developed to record and track the artifacts, each of the facilities was walked down by a team of notable individuals in search of items that met the selection criteria. These notable individuals included a facility manager, cultural resources staff member, DOE representative, process specialist (someone familiar with past operations of facility), curator/archivist, health physicist (if needed) and a derivative classifier (if needed).

As historical items were identified, each was labeled with a tag that identified it as a K-25 Historical Item with the unique item number, contact phone numbers and a warning not to move before notification was made to the contact person. An ETTP Artifact Collection Database Sheet was completed for each item. The database sheet contained fields for the unique item number, description of the item, location where found, whether the area is radiologically contaminated, whether the item was green tagged (i.e., determined radiological clean by health physics survey), whether the item was classified and the storage location of the item. Photographs of the items were also taken with a digital camera.

At the completion of each walk down, the artifact collection database sheets were combined into a document along with copies of the photographs and delivered to the ETTP Classification and Information Control Office (CICO) for review. Following release of the database sheets from the CICO, the information was entered into the Access database. The database links the record of each artifact with the corresponding digital photographs. The database is capable of providing various reports, such as listings of artifacts from a particular building, types of artifacts and artifacts from a specified date.

The artifact collection project was initiated in January 2005. Walk downs of 108 of category C facilities have been completed. Cursory walk downs of 78 of the category B facilities have been completed. As of the date of this paper, 707 artifacts have been identified, entered into the database and moved to storage. Artifacts collected ranged from logbooks, unique hand tools and instrumentation, 330 hp electric motors, criticality response unit (Figure 3) and light switch with security sign (Figure 4). Table 1 contains a summary of artifacts retained for historical interpretation. Occasionally during D&D operations, additional artifacts are identified, added to the database and moved to storage.

Table I. Typical Historical Items Retained for Historical Interpretation of the K-25 Site

Items	Description
100+ Signs	Signs used to identify building number or use of the building (i.e. ORGDP Medical Center, K-901 Raw Pumping Water Station)
Miscellaneous equipment and instrumentation	Chart recorders, Toledo scales (counter top and floor models), line recorder (for determining the condition of the process gas and assay of enriched uranium), air compressors, vacuum pumps, micrometers,
Smoking paraphernalia	Wall mounted ash trays, cigarette packages, pipes
Drink containers	Milk bottles, beverage cans, liquor bottles
Clarion horn	Used to alert personnel of a radiation release
Diagrams and drawings	5 Large wall-sized valving and piping diagrams of the process buildings. Cartoon characters painted on locker doors.
Books	Operating manuals for instruments, a dozen medial books
Telephones	Various types of telephones used in offices and process buildings
Pamphlets and notebooks	Personnel logbooks for denoting daily activities, instruction pamphlets for new employees and residences of the City of Oak

	Ridge, reservation traffic regulations.
Newspapers	Numerous newspapers from the 1940s in various condition from good to poor.
Process equipment	6 - Size 2 converters, 60 motors and compressors. These will be used to depict one of the 54 withdrawal alleys within the K-25 Bldg.

The database is updated as more items are found and as each item is collected and moved to a final storage location. A hardcopy catalog comprised of the completed artifact collection database sheets and photographs was also produced and annual updates to the hardcopy catalog are distributed.

Currently, there are two areas that have been designated as final storage areas for the items. One area is for radiologically contaminated items and is located at the ETTP within the K-25 Building limited access area. The other area is at a DOE facility that provides environmentally controlled areas of storage.



Fig. 3. Criticality response unit.



Fig. 4. Light switch with a reminder to secure files.

SUMMARY

The challenge of complying with the requirements of the MOA that was negotiated with the stakeholders while maintaining the decommissioning and demolition schedule has been met. DOE, BJC and CDM developed and implemented a process for the identification and collection of historic artifacts that was expeditious and compliant. Artifact identification walk downs of all 96 facilities have been completed. More than 707 artifacts have been identified, cataloged and moved to storage. Database sheets, photographs, and a database have been prepared and distributed to ensure that a record of the ETPP Manhattan Project and Cold War artifacts is available. Several agencies and contractors contributed to ensuring the timely collection and storage of the artifacts occurred.

References

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