

**The Weldon Spring Site Interpretive Center:
Lessons Learned from the First 10 Years – 11338**

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ABSTRACT

Remediation of the U.S. Department of Energy (DOE) Weldon Spring Site, a former ordnance production facility and uranium refinery, was accomplished with a significant amount of public involvement. After remediation was complete and as part of the long-term surveillance and maintenance program, the site was opened to the public. Several amenities were designed to be public information tools, including an Interpretive Center with exhibits relating to the site history and remediation activities. The original design of the Interpretive Center served the public well, but after several years of observing demographic and use trends of visitors, DOE undertook two efforts to redesign the facility to be more efficient and effective at conveying the intended message. These most recent efforts have resulted in changes that will serve the Center's visitors for many years to come.

SITE HISTORY

The Weldon Spring Site is located in St. Charles County, Missouri, about 30 miles west of St. Louis. The site comprises two geographically distinct properties: the Weldon Spring Chemical Plant and Raffinate Pit (Chemical Plant) and the Weldon Spring Quarry (Quarry). The U.S. Department of Energy (DOE) owns both properties. In 1941, the U.S. government acquired 17,232 acres of rural land in St. Charles County to establish the Weldon Spring Ordnance Works. In the process, the towns of Hamburg, Howell, and Toonerville and 576 citizens of the area were displaced. From 1941 to 1945, the Department of the Army manufactured trinitrotoluene (TNT) and dinitrotoluene (DNT) at the Ordnance Works Site. Four TNT production lines were situated on what was to be the Chemical Plant. These operations resulted in nitroaromatic contamination of soil, sediments, groundwater, and some off-site springs.

Following a considerable amount of explosives decontamination of the facility by the Army and the Atlas Powder Company, land from the former Ordnance Works property was transferred to the U.S. Atomic Energy Commission (AEC) in 1956 for construction of the Weldon Spring Uranium Feed Materials Plant, now referred to as the Weldon Spring Chemical Plant. The plant converted processed uranium ore concentrates to pure uranium trioxide, intermediate compounds, and uranium metal. A small amount of thorium was also processed. Wastes generated during these operations were stored in four raffinate pits located on the Chemical Plant property. Uranium-processing operations resulted in the radiological contamination of the same locations previously contaminated by former Army operations.

The Quarry, located only four miles (6 km) from the Chemical Plant, was mined for limestone aggregate used in the construction of the Ordnance Works. The Army also used the Quarry for

burning wastes from explosives manufacturing and disposal of TNT-contaminated rubble during Ordnance Works operations. These activities resulted in the nitroaromatic contamination of the soil and groundwater at the Quarry.

In 1960, the Army transferred the Quarry to the AEC, who used it from 1963 to 1969 as a disposal area for uranium and thorium residues (both drummed and uncontained), from the Chemical Plant and for disposal of contaminated building rubble, process equipment, and soils from demolition of a uranium-processing facility in St. Louis. Radiological contamination occurred in the same locations as the nitroaromatic contamination.

Uranium-processing operations ceased in 1966, and on December 31, 1967, AEC returned the facility to the Army for use as a defoliant-production plant. In preparation for the defoliant-production process, the Army removed equipment and materials from some of the buildings and disposed of them principally in Raffinate Pit 4. The defoliant project was canceled before any process equipment was installed. AEC was responsible for managing the site under caretaker status from 1968 through 1985. Caretaker activities included site security oversight, fence maintenance, grass cutting, and other incidental maintenance. In 1985, the Army transferred full custody of the Chemical Plant to DOE, at which time DOE designated the control and decontamination of the Chemical Plant, raffinate pits, and Quarry as a major project.

SITE REMEDIATION

The U.S. Environmental Protection Agency (EPA) placed the Quarry and Chemical Plant areas on the National Priorities List in 1987 and 1989, respectively, to be governed by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Initial remedial activities at the Chemical Plant consisted of a series of Interim Response Actions that involved the removal of electrical infrastructure, asbestos that presented an immediate threat to workers and the environment, contamination control activities, and building dismantlement.

A 1993 Record of Decision established the remedy for controlling contaminant sources at the Chemical Plant and associated off-site vicinity properties (except groundwater) and disposing of contaminated materials in an on-site disposal cell. Subsequent Records of Decision established remedies for contaminated materials in the Quarry and groundwater at the Chemical Plant area. Removal of bulk waste materials from the Quarry was completed in 1994, and restoration of this area was completed in 2002. Construction of the disposal cell started in 1997 and was completed in 2001. The approach for monitoring groundwater at the Chemical Plant was established in 2004.

As remediation of the site was nearing completion, much thought was given to its appropriate end state. It was known that groundwater and disposal cell monitoring would comprise the majority of site long-term surveillance and maintenance activities. The site Long-Term Surveillance and Maintenance Plan was drafted in the early-2000 time frame and was revised several times prior to regulator review and approval in December 2008. Throughout the cleanup process, community involvement drove many decisions, and stakeholders expressed a desire to transform the site into a public asset. Additionally, DOE desired a site configuration that would emphasize community education about the site as a type of institutional control. One of the goals

of the surveillance and maintenance program was to promote and facilitate public involvement. Active public involvement helps DOE address citizens' concerns and provides additional surveillance input to DOE.

PUBLIC AMENITIES

Several unique projects were designed to accomplish DOE's goal of promoting and facilitating public involvement and education by providing the public with amenities that would enhance visitors' experiences while at the site. By 2002, the site was cleaned up and safe for the public, so fences that impeded access to the site were removed. At this time, DOE invited the public to make use of these amenities.

Besides the disposal cell, the distinctive prairie landscape is one aspect of the site that is most noticed by the public. As part of site restoration activities, over 150 acres surrounding the disposal cell were planted with native Missouri prairie species to closely resemble the original prairie that was native to the area during pre-settlement times. Prairie species provided a vegetation cover that impeded erosion and protected the disposal cell. In 2004, DOE designed and installed a native plant educational garden, which provides the public an opportunity to learn how to identify many native Missouri plant species. Visitors can then walk to the prairie to use their new skills.

A staircase and viewing platform were constructed on the disposal cell; the viewing platform became the highest publically accessible point in the county. Visitors could hike along a trail through the prairie to gain access to the cell staircase, and then climb to the top to enjoy the view. Four informational plaques on the viewing platform provided visitors an opportunity to learn about the history of the site.

As part of a cooperative agreement between DOE, the Missouri Department of Conservation, and the Missouri Department of Natural Resources, a hiking and biking trail known as the Hamburg Trail was constructed on a former haul road that had been used during site remediation. The eight-mile (13 km) Hamburg Trail served to connect the site with the extensive trail network on the surrounding state-owned land (Fig. 1). A series of historical markers along the trail provided another way to communicate the site history to the public.



Fig. 1. The prairie, disposal cell staircase, and Hamburg Trail at the Weldon Spring Site.

These amenities worked well to accomplish DOE's goal of promoting and facilitating public involvement and education. However, the most significant project undertaken to accomplish DOE's goal at the site was the creation of the Weldon Spring Site Interpretive Center.

INTERPRETIVE CENTER—DESIGN AND GRAND OPENING

Stakeholders had a key role in the Interpretive Center design process. A team was assembled, and frequent planning meetings were held to capture not only the story the public wanted to tell, but also to convey technical information about the site cleanup process. The Center conceptual design team consisted of members of the Weldon Spring Citizens Commission, a volunteer citizen oversight group whose members were appointed by St. Charles County, members of the St. Charles Historical Society, representatives from St. Charles County government, the Missouri Department of Conservation, the Missouri Department of Natural Resources, and other interested parties. Overseeing the conceptual design team were DOE and contractor representatives. The initial philosophy was that the Interpretive Center could be a type of resting point for Hamburg Trail users and motorists traveling on the adjacent highway. The Center was envisioned to be an unmanned facility that would tell its story through text and picture displays and would complement the other site amenities.

One of the first questions to answer was what type of structure would house the Center. A decision was made to utilize an existing on-site building that had been constructed to support the cleanup effort. Recycling this existing structure was also considered an environmentally responsible decision. The former site equipment warehouse/Access Control was a 9,375 square foot metal-sided building with an interior that could be easily reconfigured for other purposes. Parallel efforts ensued to redesign the physical building structure as well as the new exhibits.

The building structure required electrical upgrades, a new HVAC system, changes to entrances and exits, removal of a large overhead door, installation of a security system, and installation of new interior treatments such as drywall, flooring, and paint. Design of the building upgrades was completed in 2000, and the construction work was finished the following year. For the Center exhibits, design was completed in 2001. Fabrication and installation of the exhibits began shortly thereafter, and the Center was opened to the public in August 2002 (Fig. 2).



Fig. 2. View of displays from the front entrance of the Interpretive Center.

INTERPRETIVE CENTER—LESSONS LEARNED

Since its original design and public opening in 2002, many lessons have been learned about how the Center can best serve the public as an informational tool about the site. Since it was not known what quantity of visitors to expect or what their demographics would be, attendance was closely tracked and evaluated.

Soon after opening, it was apparent that having the facility unmanned not only raised security concerns, but also limited visitor's ability to get questions answered. In 2003, personnel were assigned to the Center, and its hours of operation were modified. Weekend foot traffic was likely to be much higher than on weekdays, so a decision was made to have the Center open 7 days a week, excluding federal holidays. From November 1 to March 31, Saturday hours were reduced to take into account fewer visitors during the colder weather.

Also noted was the interest from teachers and other child educators in the overall educational message of the site. DOE received positive feedback from schools that the site and Center were able to provide a valuable "real-world" environmental science curriculum. Additionally, because

no fees were associated with visiting the site, schools were able to plan field trips more easily despite their increasingly restricted budgets. Educational programs aligned to Missouri K–12 curriculum standards were developed. These programs were designed to be educational but also to include interesting hands-on activities to keep students engaged. Each program related to some aspect of the site to ensure that the appropriate overall message was conveyed. These programs proved to be popular, and customized school field trips soon became a substantial portion of Interpretive Center visitors. By 2006, school field trips and other groups of visitors were scheduled nearly every weekday of the year.

INTERPRETIVE CENTER—REDESIGN

Because funding for school district field trips is usually limited, large groups (e.g., an entire grade level of 120–150 students) were often scheduled to visit the site all at once to take advantage of reserved busses. To more effectively manage this volume of visitors and ensure a more personal experience for each student, the group was divided into three subgroups, each rotating through a series of activities. In nearly every case, one of these activities would be a walking trip to the top of the disposal cell. With one meeting room and the display area as the only indoor locations for visitors, it was becoming clear that a redesign of the Center could provide an additional sheltered space as contingency for groups on days with poor weather conditions. This additional space could also provide a classroom where another activity could be conducted instead of having to cancel the group's visit. In 2007, a remodeling effort transformed an outdoor canopy on the back of the Interpretive Center into a new classroom. This cost-effective, 1,250 square foot addition allowed much more flexibility in dealing with the regular flow of visitors.

As popularity of the educational programs continued to grow, it became increasingly apparent that although the original design of the display area was very effective for the general public, it lacked appropriate displays for K–12 school groups. Additionally, DOE recognized that the existing displays did not adequately capture the current long-term surveillance and maintenance mission of the site... primarily due to fact that the long-term surveillance and maintenance mission was finalized well after design of the Center was complete. Other issues with the displays included the need to update out-of-date information, such as groundwater maps, and the desire to highlight important DOE initiatives, such as renewable energy programs. In 2010, an effort ensued to redesign the existing display area by addressing each of these issues in the most cost effective way possible.

A Request for Proposal was issued in early 2010 for the renovation of the Weldon Spring Site Interpretive Center that included developing new displays, removing outdated displays, and updating existing displays that were to be retained. While some of the existing displays were still relevant to the overall mission of the site and conveyed accurate information, numerous improvements were necessary to address informational content gaps and update out-of-date information. The main objective of the renovation was to design new displays, including multimedia pieces, in an interesting and educational manner so that they would blend seamlessly with the updated and existing displays to create a uniform, cohesive feel. The renovation also included repairing exhibits that had begun showing signs of wear and tear after eight years of continuous use.

Another key element to this renovation was improving the layout of the Interpretive Center such that it had a more logical flow for visitors. Current display placement lacked a logical sequence to guide the visitor through the Center while effectively communicating the overall site message. To be cost effective, the subcontract included a requirement that existing display kiosks were to be reused, and no new kiosks or walls were to be constructed.

Two unique approaches were used, based on lessons learned from the original Center display subcontract in 2001 and a similar project at the Fernald Preserve Visitors Center in 2008. First, this subcontract was issued as a “design-build” but had two notices to proceed: one for the design portion and one for the build portion. This phased approach gave DOE more control over the quality of the end product, as well as better control over project budget and schedule. The thought was that this type of subcontract would incentivize the subcontractor to meet or exceed expectations, because being awarded the design portion of the subcontract did not guarantee winning the fabrication/installation portion. It also meant that if the subcontractor did not meet or exceed expectations during the design portion, it would be relatively easy to not continue with the current subcontractor and instead issue another Request for Proposal for the fabrication/installation.

Second, as part of the 30 percent design, the subcontractor was asked to provide three conceptual designs for each new or updated display. The three submissions would represent one economical design, one moderate design, and one extensive design such that DOE could select which displays to showcase with the more detailed designs. Once DOE selected the design type for each display, the subcontractor would continue with that one design type through final design.

In March 2010, a subcontractor was selected, and the design process began with a kickoff meeting attended by DOE, the contractor, and the subcontractor. This kickoff meeting provided a forum for the subcontractor to ask questions and better understand DOE’s expectations for the remodeling effort. It also gave the subcontractor an opportunity to present ideas and concepts they had already developed as part of a preliminary design package. This open communication allowed for a very well developed 30 percent design package. Having three different design options for each display provided DOE flexibility on where to put more focus and a higher percentage of the budget. For example, the displays where multimedia and interactive items were thought best suited for visiting school groups were allotted more of the budget. In the end, the subcontractor provided innovative, timely, and cost-effective 30-, 60-, 90-, and 100-percent design packages. The final design was approved in June 2010, and fabrication began immediately. All fabrication was completed off-site at the subcontractor’s shop.

The installation phase of the project began in August 2010. During that time, the Interpretive Center display area was closed to the public. A meeting room adjacent to the display area was set up as a temporary display area. The room was populated with photos, handout materials, and the original artifact display cases that were relocated from the display area. The room was open to the public during normal hours of the operation, including weekends. Additionally, only smaller visiting groups were scheduled due to the limited space available within the two meeting rooms. Installation was substantially completed during the month of August, and with only punch-list items remaining, the Interpretive Center was reopened to the public on September 6, 2010. The

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new displays were created, and interactive exhibits for children were added with minimally invasive changes. The entire display area was transformed into a space that will serve the Center’s visitors for many years to come (Fig. 3 and 4).



Fig. 3. View of updated displays from the front entrance of the Interpretive Center.



Fig. 4. More updated displays in the Interpretive Center.