

Lessons Learned from Annual Inspection Process - 12329

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ABSTRACT

The U.S. Department of Energy (DOE) Office of Legacy Management's (LM) mission is to manage DOE's post-closure responsibilities and ensure the future protection of human health and the environment. LM has control and custody of legacy land, structures, and facilities and is responsible for maintaining them at levels suitable for their long-term use. As defined by the DOE guidance document *Long-Term Stewardship Planning Guidance for Closure Sites* [1], long-term stewardship refers to all activities necessary to ensure protection of human health and the environment. These activities include, but are not limited to, "all engineered and institutional controls (ICs) designed to contain or to prevent exposure to residual contamination and waste, such as surveillance activities, record-keeping activities, inspections, groundwater monitoring, maintenance of other barriers and contained structures, access control, and posting signs" [1]. The development and management of ICs have been, and continue to be, critical to the success of LM surveillance and maintenance activities.

INTRODUCTION

The inspection process is actively used at many LM sites to confirm that remedial action components, including associated ICs, remain in place and are effective. Inspections are also critical for determining if additional maintenance or monitoring is necessary. The inspection process at the Weldon Spring Site began in 2003 with close coordination between DOE and the contractor on the development of the process. The inspection procedures at the Weldon Spring Site included the following components:

- Establishing a notification process for the regulators and stakeholders.
- Preparing a detailed agenda.
- Preparing a detailed job safety analysis.
- Developing an inspection checklist to assist in documenting site conditions and notifying stakeholders and property owners.
- Physical inspection of engineered structures designed to contain or control waste materials.
- Reviewing completed maintenance work and determining maintenance needs.
- Inspecting the physical location of IC areas to ensure continued protection of human health and the environment.
- Contacting property owners to ensure continued awareness of ICs on their property.

- Inspecting the IC areas to ensure that any restrictions imposed by the ICs are not being violated, such as the drilling of wells in an area that has groundwater restrictions.
- Checking County records to verify that deed notices, easements, and other recorded instruments remain in place.
- Preparing a report documenting inspection proceedings and a schedule for completing corrective actions, if any.
- Using inspection reports and checklists from past years in preparation of the CERCLA Five-Year Review Report.
- Presenting the inspection results at an annual public meeting.

The inspection process is a successful mechanism for ensuring effectiveness of ICs that allow protection of human health and the environment. The process also provides a mechanism for regular communication with the stakeholders, surrounding property owners, and the community.

SITE DESCRIPTION

The Weldon Spring Site is located in St. Charles County, Missouri, about 30 miles (48 kilometers) west of St. Louis. The Site comprises two geographically distinct, DOE-owned properties: the Weldon Spring Chemical Plant and Raffinate Pit Sites (Chemical Plant) and the Weldon Spring Quarry (Quarry). The Quarry is about 4 miles (6.4 kilometers) southwest of the Chemical Plant.

During the early 1940s, the Department of the Army acquired 17,232 acres (6,974 hectares) of private land in St. Charles County for the construction of the Weldon Spring Ordnance Works facility. Current land use of the former Ordnance Works Site includes the Chemical Plant and Quarry, the U.S. Army Reserve Weldon Spring Training area, Missouri Department of Conservation (MDC), and Missouri Department of Natural Resources - Division of State Parks (MDNR-Parks), the Francis Howell High School, a Missouri Department of Transportation (MoDOT) maintenance facility, the Public Water Supply District #2 (formerly St. Charles County) water treatment facility and law enforcement training center, the village of Weldon Spring Heights, and a University of Missouri research park.

The Chemical Plant and Quarry areas total 228.16 acres (92.33 hectares). The Chemical Plant property is located on 219.50 acres (88.83 hectares); the Quarry occupies 8.66 acres (3.5 hectares).

SITE HISTORY

In 1941, the U.S. government acquired 17,232 acres (6,974 hectares) 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 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, 205 acres (83.0 hectares) of the former Ordnance Works property were 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. An additional 14.88 acres (6.02 hectares) were transferred to AEC in 1964. 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 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 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, and the Army transferred 50.65 acres (20.50 hectares) of land encompassing the raffinate pits back to AEC while retaining the Chemical Plant. AEC, and subsequently DOE, managed the Site, including the Army-owned Chemical Plant, under caretaker status from 1968 through 1985. Caretaker activities included site security oversight, fence maintenance, grass cutting, and other incidental maintenance. In 1984, the Army repaired several of the buildings at the Chemical Plant; decontaminated some of the floors, walls, and ceilings; and isolated some equipment. 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.

The U.S. Environmental Protection Agency (EPA) placed the Quarry and Chemical Plant areas on the National Priorities List in 1987 and 1989, respectively. Remediation of the Weldon Spring Site was administratively divided into four operable units (OUs): the Quarry Bulk Waste OU, the Quarry Residuals OU, the Chemical Plant OU, and the

Groundwater OU. The Southeast Drainage was remediated as a separate action through an Engineering Evaluation/Cost Analysis report. The major component of the Chemical Plant OU included disposal of wastes removed from the Chemical Plant and stored Quarry bulk wastes in an engineered on-site disposal facility. Construction of the engineered disposal cell on the Weldon Spring Chemical Plant property began in 1997, and disposal activities were completed in 2001. The Leachate Collection and Removal System (LCRS) collects leachate generated from the Weldon Spring Site disposal cell.

An important element of the remedy at the Weldon Spring Site included the establishment of ICs. The ICs included the negotiation of easements with surrounding affected State property landowners for implementing the use restrictions required on state properties. These State agencies include the MDC, MDNR-Parks, and MoDOT. An easement is a real property interest that conveys certain rights from the grantor (fee simple landowner) to the grantee. In the case of the Weldon Spring Site, the DOE requested easements for the purpose of restricting use of the contaminated groundwater and the hydraulic buffer zone, and also to restrict land use in the Southeast Drainage and at the Quarry reduction zone. The easements also assure DOE access to monitoring locations for sampling and maintenance and where applicable, provide that DOE is notified of use inconsistent with the terms of the easements.

METHOD

This section will detail the method used to accomplish each of the components of the inspection process listed in the Introduction:

Notification process for the regulators and stakeholders – The *Long-Term Surveillance and Maintenance Plan for the U.S. Department of Energy Weldon Spring, Missouri, Site* (LTS&M Plan) [2] requires that DOE notify the EPA and the MDNR at least 30 days before the scheduled inspection date. DOE currently sends the EPA and MDNR representatives a letter at least 30 days before the scheduled inspection and attaches a copy of the agenda. Other individuals, including other State and County agency representatives, are copied on the notification. The EPA and MDNR representatives attend each inspection along with representatives from the County and other State agencies.

Preparation of detailed agenda – A detailed agenda is prepared for the inspection. The inspectors are divided into two teams with a team leader assigned to each team. The agenda details the areas each team will inspect. The first day of the inspection generally includes inspections of the IC areas, such as surrounding properties on which DOE has obtained easements for groundwater and land use restrictions. The second day starts with an inspection of the disposal cell and continues with the inspection of the LCRS building, an inspection of the erosion area, and a review of paperwork.

Preparation of a detailed job safety analysis – A detailed job safety analysis is prepared. The job safety analysis details each task (such as the inspection of the disposal cell and

of the IC areas), lists the hazards associated with it, and describes the safety controls that should be taken to avoid those hazards. For example, to reduce the likelihood that inspectors will trip, the job safety analysis emphasizes that when inspectors walk the transects on the disposal cell, they should walk slowly, avoid distractions, ensure that their footing is secure, and be aware that rocks underfoot may move. Furthermore, the job safety analysis advises inspectors who will be working in the IC areas that brush and trees present a risk of eye injury and that uneven terrain can cause trips and falls.

Development of inspection checklist to assist in documenting site conditions and notifications of stakeholders and property owners – The inspection checklist was derived from EPA's *Comprehensive Five-Year Review Guidance* (Five-Year Review Guidance) [3]. It was tailored to address site-specific conditions, as recommended by the Five-Year Review Guidance. The checklist also gives contact information for the stakeholder and IC points of contact, and details each IC area that is being inspected and the restrictions that are in place to ensure that restrictions are not being violated.

Physical inspection of engineered structures designed to contain or control waste materials – During the annual inspection, the disposal cell is divided into 10 transects (Figure 1), and each of the two inspection groups walk 5 of them. Handheld global positioning system (GPS) equipment is used to navigate the 10 transects. The inspectors look for depressions, shifts of cell plan vertices, and other indications of settlement. Other items for inspection are vegetation, wet areas, apron drains, guardrail, and the stairs on the disposal cell.

Five areas of the cell that had been marked and located by GPS survey equipment during the 2003 annual inspection are located and observed for any signs of rock degradation. The inspectors take photographs of these areas and compare them to photographs from the previous inspection to observe if rock have degraded or any other changes have occurred. It was noted during the 2010 inspection that some rocks had been removed from Test Plot 5. Rocks had also been displaced along Transect 5 to make a small hole. It was recommended during the inspection that the site place signs on the disposal cell, stating that video surveillance are being conducted.

Review of completed maintenance work and determination of maintenance needs – Corrective actions from the previous year's inspection are reviewed and inspected. The main items inspected for maintenance are the monitoring wells. At least 10 percent of the monitoring wells are required to be inspected. The wells are inspected to ensure that they are secured and locked, properly identified, and in good condition. Other maintenance areas are inspection of site markers, erosion areas, roads, stairs on the disposal cell, and signs.

Contact of property owners to ensure continued awareness of ICs on their property – All property owners with ICs on their property are contacted to ensure that they remain aware of the ICs and to keep their contact information current. The checklist is revised to reflect updated contact information. The phone conversations are documented on forms that are provided in the Five-Year Review Guidance [3]. The completed forms are included in the annual inspection report.

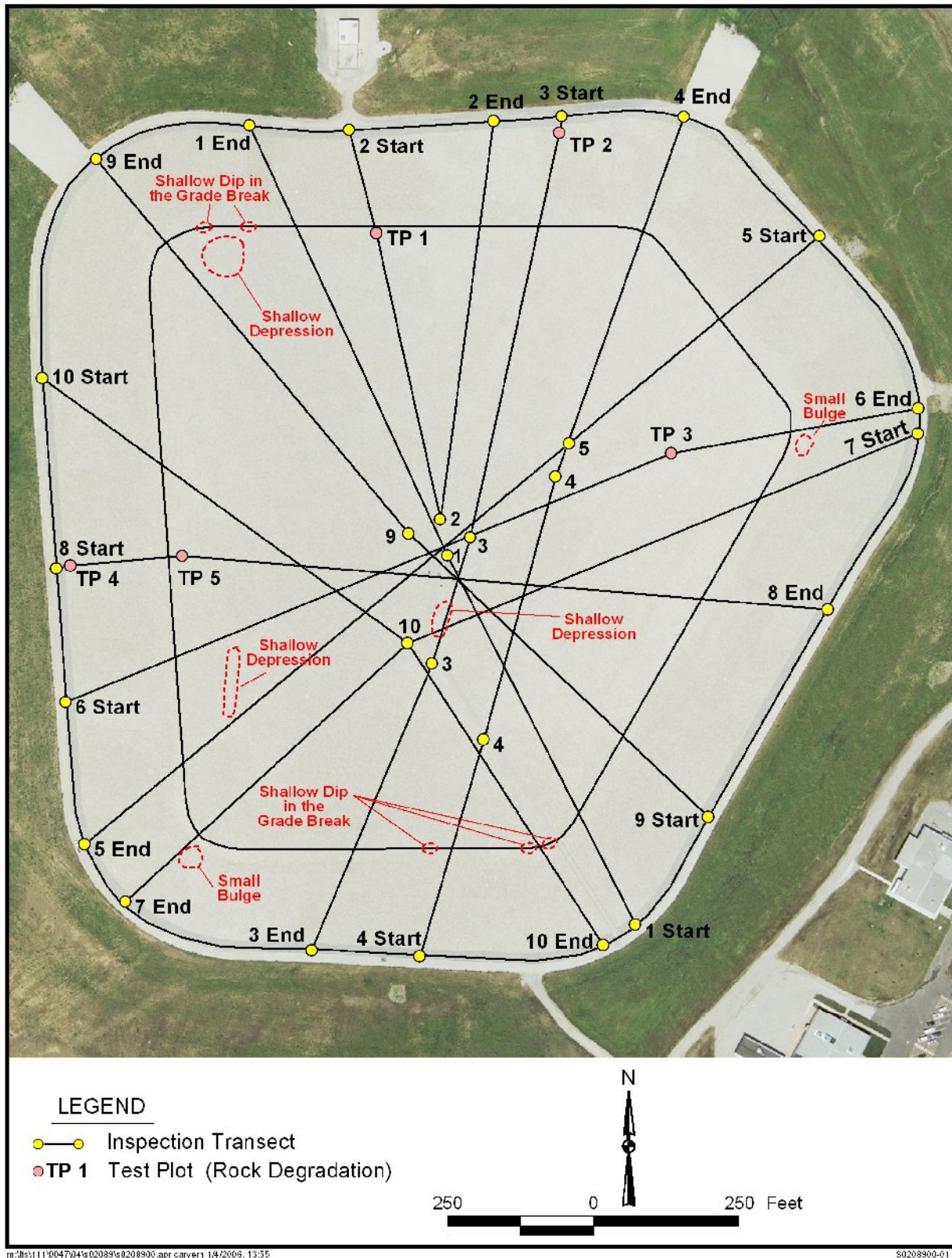


Figure 1. Disposal Cell Inspection Transects and Rock Test Plot Locations at the Weldon Spring, Missouri, Site

Contact of stakeholder to maintain communication and awareness of the site and to determine if there are any issues or concerns – Stakeholders are contacted each year before the annual inspection. These stakeholders include the local sheriff department, the fire department, and the neighboring high school.

Physical inspection of the IC areas to ensure that any restrictions imposed by the ICs are not being violated, such as drilling of wells in an area that has groundwater restrictions –The IC areas are actually surrounding properties that have had groundwater or land use restrictions placed on them in the form of easements. The IC areas include various areas owned by the MDC, including the Southeast Drainage and Busch Conservation Area. Other property owners include the Army and the MDNR Parks Division. Inspectors walk the IC areas to ensure that the restrictions imposed by ICs are not being violated. These restrictions include no drilling of wells, no soil disturbance, and no residential use or construction.

Check of County records to verify that deed notices, easements, and other recorded instruments remain in place – As a requirement of the inspection, inspectors verify that the recorded instruments are recorded with the County. During the first annual inspection, an inspector went to the County courthouse to verify the document's presence in person; during subsequent annual inspections, the County recorder of deed website has been used for this purpose.

Preparation of report documenting inspection proceedings and schedule for completion of corrective actions, if any – A formal report documenting the inspection is prepared. The report includes a detailed description of the inspection, the findings and corrective actions, a copy of the agenda, documentation for each phone contact, photos, maps, a copy of the inspection checklist, and LCRS data.

Use of inspection reports and checklists to prepare the CERCLA Five-Year Review report – The inspection reports and checklists from previous years are essential in preparing the Five-Year Review report, as they document the site conditions each year and any potential issues.

Presentation of inspection results at annual public meeting – DOE holds a public meeting every year and presents the results of the inspection there. This assists in good communication with the public and regulators. Other topics included in the presentation include environmental data, the status of ICs, and information about the Weldon Spring Interpretive Center and prairie.

RESULTS – LESSON LEARNED

The early notification to the regulators has resulted in the State and EPA attending all nine inspections with representatives from the state agencies who own the neighboring properties also participating. This annual process has resulted in good lines of communication with the regulators and neighboring property owners.

Using the detailed agenda, job safety analysis, and inspection checklist has greatly enhanced the inspection process. The detailed agenda organizes the inspection and communicates exactly what will occur. It is also made clear in the notification letter that the agenda is subject to change due to unforeseen circumstances such as weather. This was a lessons learned as weather, such as an ice storm on one occasion and rain on other occasions have impacted the sequence of the inspection. The job safety analysis with detailed task information and hazards has emphasized the importance of safety during the inspection process and no injuries have occurred during the annual inspections.

Making contact with the stakeholders annually has been a huge asset to the process. The stakeholders who are contacted include the Sheriff's office, the fire department, the neighboring high school, and several individuals who represent the owners of surrounding property where ICs apply.

Most stakeholder points of contact have served in that capacity for many years, allowing them to foster close relationships with DOE. For example, DOE has contacted the sheriff department's point of contact (who has been the point of contact during all nine annual inspections) and he has been consulted during these yearly contacts on such issues as vandalism and issues with high school students who had been parking at the site and driving dangerously through the parking lot. DOE followed his suggestions to resolve these issues, with success in these areas. The annual contact with the fire department has also resulted in a close relationship which has benefitted the site during such activities as prescribed burns and confined space entries. The contact with the school ensures that there are no issues that have developed with the high school or the students. The contacts with the stakeholders also provided DOE an opportunity to inform them of any changes to the site and to remind them of the availability of the Interpretive Center and other amenities at the Site.

By making contact with the owners of surrounding property regarding the ICs which are in effect on their property, DOE has kept the landowners' contact information up to date and, perhaps more importantly, stayed abreast of other issues that could affect DOE. For example, DOE left two contaminated culverts in place on Missouri Department of Transportation (MoDOT) property. During each annual inspection, at least one MoDOT representative is contacted, but usually four different individuals are contacted, including the environmental lead, local site foreman, County engineer, and assistant district engineer. Each year, the culverts are discussed, and DOE emphasizes that if any culvert were to undergo repair or be removed—or if work were to take place near a culvert—DOE would need to be contacted first. DOE has reported on the conditions of the culverts during each inspection and includes photos in the inspection reports. Issues with the culverts arose during the past 2 years and were discussed with DOE as a result of these annual contacts. MoDOT needed one of the contaminated culverts cut, which resulted in DOE performing the work. In the past year, it was decided to widen one of the roads that the culvert went under, and the culvert needed to be removed. MoDOT immediately contacted DOE when this became an issue, and DOE—working closely with MoDOT—removed the culvert.

The disposal cell transects, as discussed above, were surveyed and marked with flags to navigate the transects during the first few inspections. Handheld GPS units have been used in the most recent inspections to navigate the transects with much better success. The GPS units are also used to locate the rock degradation test plots on the disposal cell. The hand-held GPS units are used throughout the inspection. Data included in the GPS units include well locations, survey boundaries of groundwater restriction areas, buffer zone areas, and property boundaries. The property boundary survey monuments involve another lesson learned. The LTS&M Plan had emphasized the inspection of the survey monuments [2], but finding the actual monuments in wooded areas and on adjacent properties had been difficult. It was determined that with the advent of the use of GPS and hand-held units the survey monuments, are not critical to the project and will be removed from future inspections.

The physical inspection of the IC areas keeps DOE and regulators familiar with the area and with what changes are being made to the surrounding properties. The Army has changed their mission in the past few years and has constructed a new reserve center. The close contact with the Army during the inspection resulted in knowledge that the DOE discharge pipeline would be moved by the Army during construction of a storm water pond to support the new reserve center.

Vandalism is addressed during the inspections. Most of the vandalism has been minor vandalism, such as the movement of rocks on the disposal cell and vandalism to the monuments. The movement of rocks consists of individuals picking up the large rocks that cap the cell and moving them around on the disposal cell. Preventive measures were discussed during inspections, and a security company was hired to patrol on weekends and one random weekday. This patrol has curtailed vandalism to a large degree. However, the rock movement has continued with vandalism to one of the rock plots occurring. DOE decided to place signs on the disposal cell, stating that video surveillance is being conducted. The placement of these signs has reduced the movement of rocks.

The inspection process is a successful mechanism for ensuring the effectiveness of ICs that protect human health and the environment. It is also a learning process that DOE has used for regular communication with regulators, neighboring property owners and other stakeholders. Each inspection emphasizes the importance of different aspects of the process and the importance of focusing on any lessons that can be learned from the process.

REFERENCES

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