



Lessons Learned for Institutional Controls at the Weldon Spring Site



U.S. DEPARTMENT OF
ENERGY

Legacy
Management













Institutional Control Mechanisms

- Institutional control mechanisms are designed to
- Appropriately limit access to or uses of land, facilities, and other real and personal property;
- Protect cultural and natural resources;
- Maintain physical security of DOE facilities; and
- Prevent or limit inadvertent human and environmental exposure to residual contaminants.



Institutional controls include methods to preserve knowledge and to inform current and future generations of hazards and risks.



Institutional Controls

- Institutional controls in place prior to issuance of long-term surveillance and maintenance plan
 - Federal ownership
 - Interpretive Center
 - Notation of land ownership
 - Historical markers
 - Real estate licenses
 - Memorandum of Understanding with the U.S. Army
 - Federal Facility Agreement



Historical Marker

The Weldon Spring Site

Historical Marker 2

Weldon Spring Ordnance Works (WSOW)

The 37,230-acre Weldon Spring Ordnance Works began with groundbreaking on Thanksgiving Day, November 28, 1942. WSOW was said to be one of the largest plants of its kind in the world, having a production capacity of 1,200,000 pounds of TNT per day and 40,000 pounds of DNT per day. The TNT and DNT were used in explosives to benefit the war effort. There were more than 1,000 buildings and a post employment of 3,000 people in 1943. When production was terminated on U.S. Day, August 15, 1945, the Weldon Spring Ordnance Works had produced over 730 million pounds of TNT and 33 million pounds of DNT.



Weldon Spring Ordnance Works, 1940s

Weldon Spring Uranium Feed Materials Plant (WSUFMP)



Weldon Spring Uranium Feed Materials Plant, 1950s

In May 1950, some 500 acres of the former Weldon Spring Ordnance Works property was transferred to the U.S. Department of Army to the Atomic Energy Commission for construction of the WSUFMP, later referred to as the Weldon Spring Chemical Plant. From 1957 until 1968, the plant processed uranium ore concentrates and a small amount of thorium. The site was inactive and went through a period of deterioration from 1967 until 1980, when the U.S. Department of Energy proposed cleanup of the area. After passage of the nation's Comprehensive Environmental Response Compensation and Liability Act (CERCLA), also referred to as the "Superfund Law", the chemical plant was placed on the Environmental Protection Agency's National Priorities List in 1980. The U.S. Department of Energy began dismantling the facilities and decommissioning the site. Surface remediation activities concluded with construction of this disposal cell as a repository for 1.43 million cubic yards of waste. The disposal cell was completed in 2000.

The Disposal Cell



Cross Section of Disposal Cell



The main entrance to the site is the Weldon Spring Site Interpretive Center.

The disposal cell provides long-term isolation and management of waste from the former U.S. Atomic Energy Commission Uranium Feed Materials Plant and the former U.S. Department of the Army Ordnance Works.

The disposal cell constructed at the Weldon Spring Site has been designed by the expertise of contractors and to remain stable for 1,000 years. To achieve these goals the following factors were considered:

- Detailed surface engineering to resist long-term erosion potential and a precipitation event greater than has occurred in the recorded history of the region.
- Site design and waste placement methods designed to withstand a Maximum Credible Earthquake (MCE) that considered the base Modified Earthquake Spectra parameter.
- A geographic location about one mile from the nearest lowest ground trace of a credible fault; and a disposal cell with its flexible faults within a 50 mile radius according to have experienced movement in the past 1,000 years.
- Located in a geologically stable area with no significant potential for catastrophic collapse due to water in the soil or bedrock.
- Located within a designated 300-year flood plain.

The cell consists of:

1. The base layer with leachate collection and removal systems designed to prevent leachate migration from the surface of the cell.
2. The containment walls, consisting of chemically stabilized and solidified (CSIS) grout waste and structural waste, have been placed and produced within the cell in a controlled and engineered manner to reduce settling, seismic release, and prevent radon emission.
3. The cover (18) also, constructed of compacted clay soil material, surrounds the disposal facility in order to resist erosion, limit infiltration of moisture into the waste, minimize radon emission, and reduce long-term maintenance.
4. The cover system under the top of the cell generating it from erosion, infiltration, low permeation, etc. It consists of multiple layers including three layers to help an atmospheric-pressure barrier of clay, a geomembrane liner, a gravel drain, sand filters, and a source of stability.

The Weldon Spring Site Interpretive Center

The Weldon Spring area and its residents have made vital sacrifices and contributions to the national defense of our country. In recognition of this service, the U.S. Department of Energy established the Interpretive Center that offers 300 years of history about the Weldon Spring site, and the hopes and hardships that were dispensed for the construction and operation of the nation's largest explosive manufacturing plant and later a uranium ore processing plant.



View of the Interpretive Center

Howell Prairie

The U.S. Department of Energy is committed to revitalizing the Weldon Spring Site to a natural and native ecosystem. To help accomplish this goal, the 150 acres surrounding the disposal cell have been seeded with over 300 species of native prairie grasses and forbs. This restoring the pre-European settlement landscape. Howell Prairie and the Horner Plant Educational Garden located adjacent to the Interpretive Center will serve as a 200-acre classroom for those interested in the study of native prairie native plants and prairie ecosystems.



View of Howell Prairie

The main entrance to the site is the Weldon Spring Site Interpretive Center. © 2000 U.S. Department of Energy. All rights reserved.

Interpretive Center



Interpretive Center (continued)



Long-Term Surveillance and Maintenance Plan

- Process to obtain additional institutional controls included
- Special-use area (Special Use Area Well Drillers Rule);
- Easements with surrounding property owners; and
- Updated Memorandum of Understanding (MOU) with the U.S. Army.

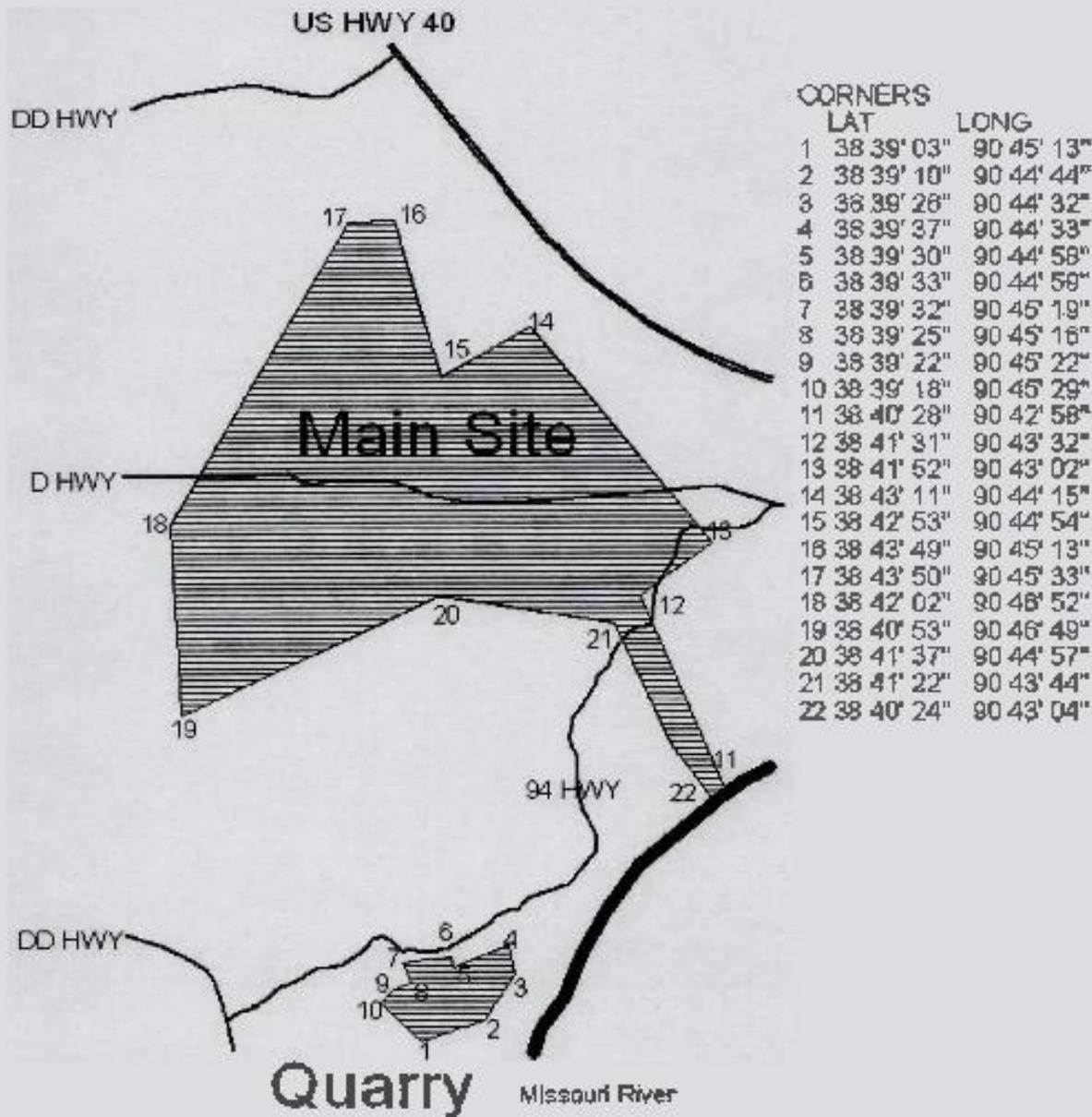


Special Use Area

- Special Use Area Well Drillers Rule was finalized in July 2007 for DOE and Army sites
- Designated the DOE and Army's groundwater-restricted areas as special areas in the Missouri Code of State Regulations
- Requires additional drilling protocols and construction specifications to be imposed by Missouri Department of Natural Resources (MDNR) on any future domestic wells installed in these areas



Special Area 4

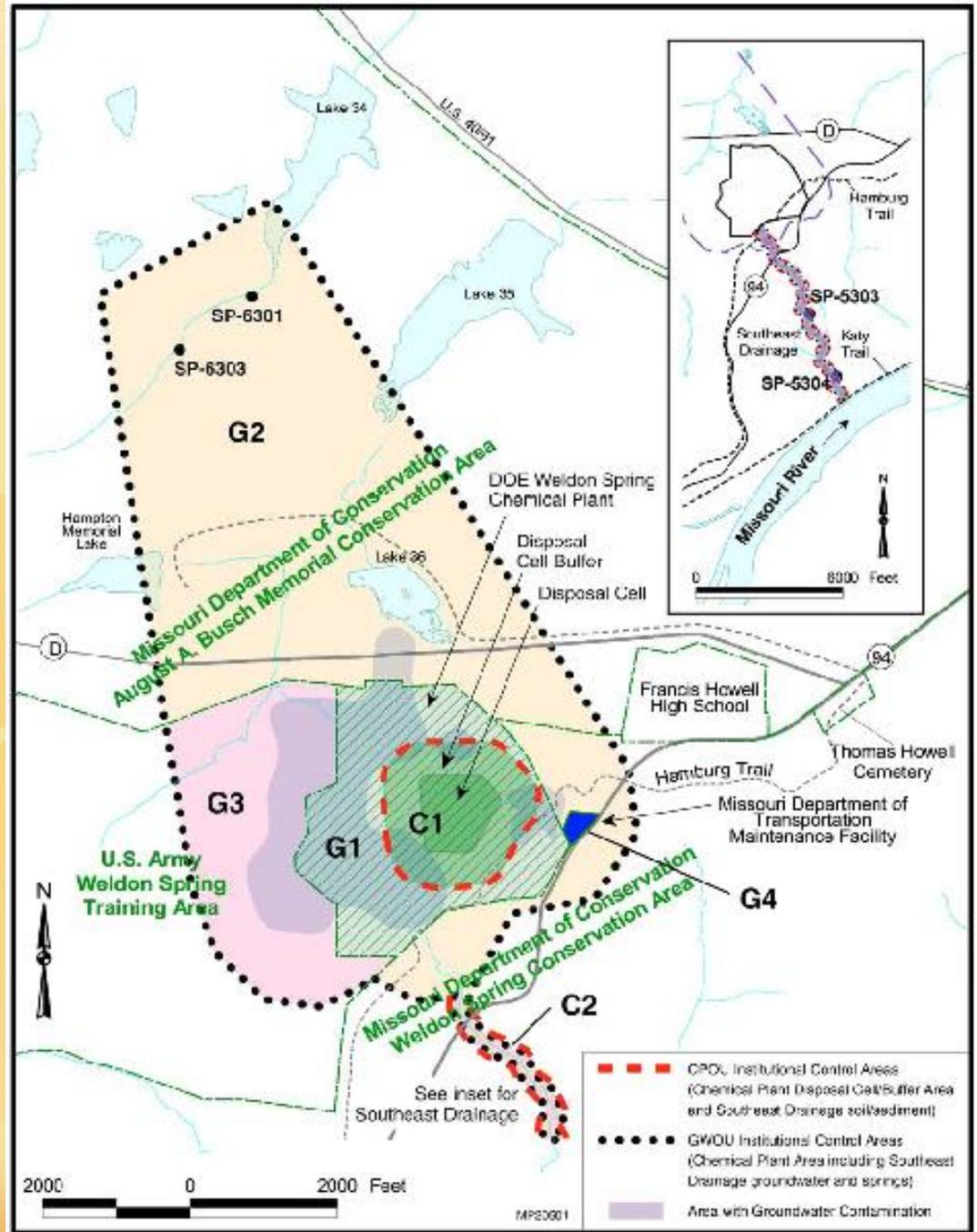


Easements with Surrounding Non-Federal Property Owners

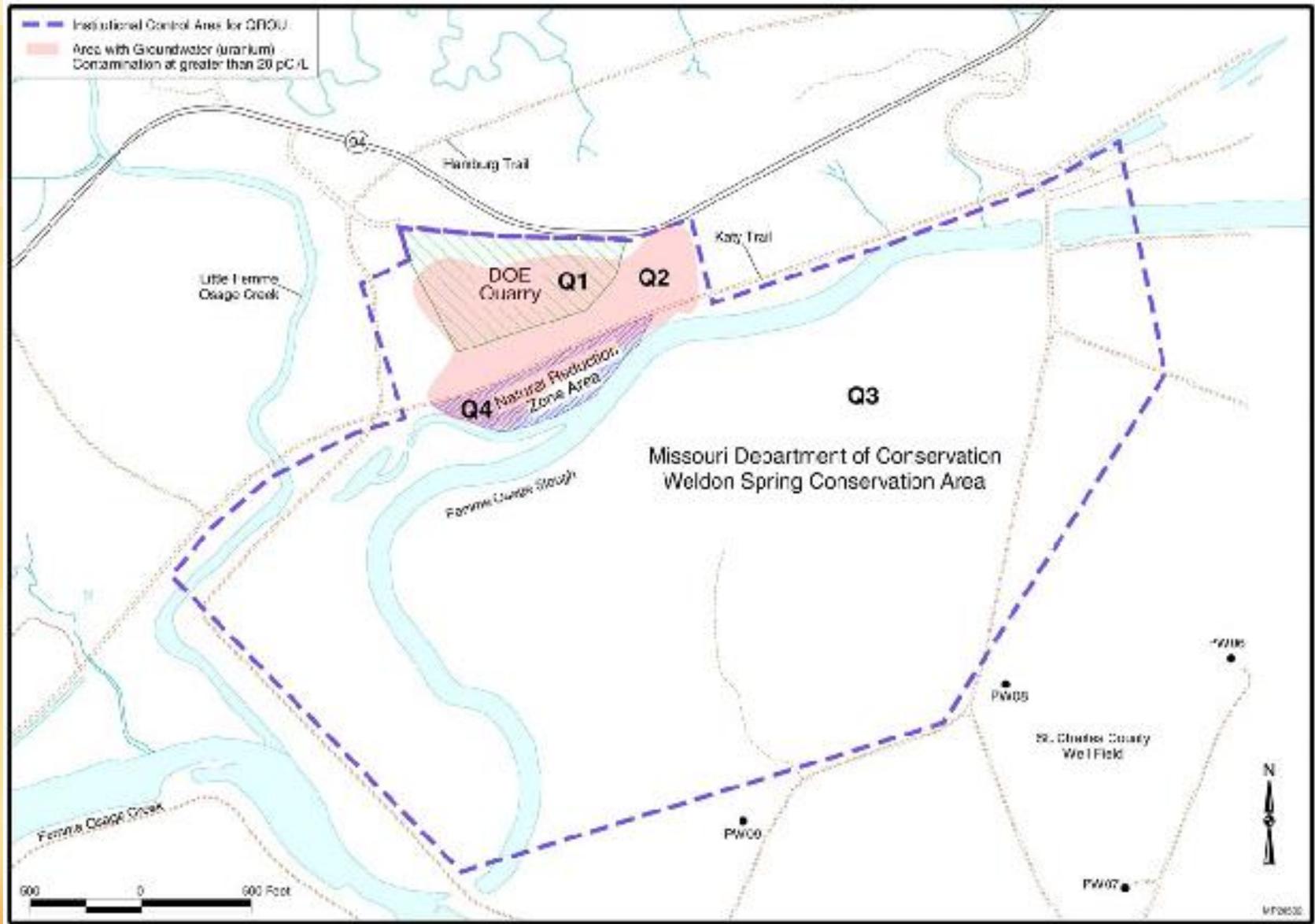
- MDNR – Division of State Parks
- Missouri Department of Conservation (DCD)
- Missouri Department of Transportation (MDOT)



Institutional Control Areas



Institutional Control Areas (continued)



Easements

- Seeking easements for the purpose of restricting the use of groundwater
- Restrict land use in the Southeast Drainage and Quarry Reduction Zone



Easements (continued)

- Long and unknown process
- The planned easements are another layer for long-term control in the future
- Currently have controls over the groundwater-restricted areas with State and Federal ownership of properties
- Special use area regulation
- Annual inspection



DOE Steps Toward Acquiring Easements

- Obtained legal descriptions and surveyed the affected properties
- Conducted a title search for the affected parties
- Obtained preliminary title commitment
- Obtained appraisal of affected areas
- Issued letters to property owners to initiate discussion regarding proposed easements
- Included a letter with a draft easement and offer letter
- Issued periodic reminder letters



Easements

- DOE and MDNR-Parks finalized and signed the easement in September 2009
- DOE continues to work closely with MDC and MDOT



Updated MOU with Army

- The MOU with the Army was finalized and signed by both parties in October 2009



Annual Inspection Process Includes Inspection of Current and Planned Institutional Control Areas



Bergermeister Spring



Southeast Drainage



Lessons Learned for Institutional Controls

- Institutional controls take time to develop and patience and persistence to obtain
- The process is best started well in advance
- It is a good practice to layer the institutional controls
- The Weldon Spring site has made good progress in obtaining necessary institutional controls

