



# Weldon Spring, Missouri, Site History

1940s

1950s

1960s

1970s

1980s

1990s

2000s

## 1940s

**April 1941** – The Department of the Army, under a state of emergency, acquired 17,232 acres of land in St. Charles County, Missouri, for the production of explosives to use in World War II.

**November 1941 through January 1944** – Atlas Powder Co., under contract with the Army, operated a trinitrotoluene (TNT) and dinitrotoluene (DNT) production plant. The plant was known as the Weldon Spring Ordnance Works.

**November 1941 through December 1943** – Wastewater was discharged into seven lagoons for temporary storage. In December 1943, the Army drained and earth-filled four of these lagoons. The remaining three were drained but not filled. During 1943, wastewater treatment plants were constructed and used to evaporate the wastewater into a sludge. The resulting sludge was hauled to open burning grounds for incineration.

**January 1944** – The ordnance works ceased operations for approximately 6 months before being reactivated by the Army. The Army continued to operate the ordnance works until the end of World War II.

**April 1946** – The Ordnance Review Board (ORB) declared the ordnance works surplus property.

**September 1946** – ORB transferred the ordnance works to the War Assets Administration (WAA) that had been organized to dispose of surplus U.S. government property.

**October 1946** – Atlas Powder Co. initiated the first effort to decontaminate the facility. However, in

fall 1946, the use of improperly decontaminated equipment caused several fatalities. As a result, ORB recommended that any processing equipment in direct contact with TNT, DNT, or intermediate materials be considered contaminated with hazardous materials. In addition, ORB recommended removal of all contaminated soil around processing buildings, catch tanks, and similar areas. In 1946, following these recommendations, the Kansas City District of the U.S. Army Corps of Engineers removed 3,512 cubic yards of soil and burned, in place, 113,005 pounds of handpicked TNT, 80,000 pounds of DNT, and other residues. In addition, many buildings were burned or otherwise destroyed.

**December 1946** – The Kansas City District of the U.S. Army Corps of Engineers published a report at the conclusion of the 1946 decontamination effort entitled *Survey Covering Salvageable Equipment and Buildings in TNT Area at Weldon Spring Ordnance Works*.

**January 1947 through December 1949** – As a result of WAA's efforts to dispose of surplus government property, much of the original ordnance works was conveyed to public entities. The University of Missouri received 7,920 acres for agricultural use. The Missouri Department of Conservation (MDC) subsequently purchased 7,200 acres and created the Weldon Spring Wildlife Area. MDC received an additional 6,944 acres of the original ordnance works property from the University of Missouri and created the August A. Busch Memorial Wildlife Area. The St. Charles County Public Schools received 37.9 acres, including the area where Francis Howell High School now stands.

## 1950s

**During 1955** – As a result of the U.S. Atomic Energy Commission's (AEC's) interest in using the area for the Weldon Spring Uranium Feed Materials Plant, the Army agreed to transfer approximately 205 acres to AEC. The land was partially decontaminated prior to the transfer, and construction of the feed materials plant was begun.

**August 6, 1956** – After decontamination, the Army officially transferred the land to AEC.

**June 1957** – Mallinckrodt Chemical Works, as contractor to AEC, began operations at the feed materials plant. Operations included assaying uranium ore concentrate (yellow cake). A portion of the yellow cake was processed to produce uranium metal. The original plant consisted of about 44 buildings and 2 waste (raffinate) pits measuring 1.2 acres each.

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## 1950s (continued)

**Before 1958** – The Army used the Weldon Spring Quarry, located 4 miles south of the feed materials plant, for disposal of TNT residues. The Quarry also was used as a dump for debris from cleanup prior to construction of the Weldon Spring Chemical Plant.

**During 1958** – A third raffinate pit, measuring 8.4 acres, was constructed for disposal of radioactive process waste from the feed materials plant.

**June 1959** – After the Army transferred 205 acres to AEC, the remaining land, 1,858 acres, was designated as the Weldon Spring U.S. Army Reserve Training Area.

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## 1960s

**January 1960 through December 1963** – Wastes from dismantling the Mallinckrodt Chemical Works Destrehan Street Refinery, a uranium processing plant, in St. Louis were deposited in the Quarry.

**January 1963 through December 1965** – Several thousand barrels of low-level radioactive waste containing uranium and thorium from the U.S. Army Granite City Arsenal, Granite City, Illinois, were dumped into the Quarry. Shortly thereafter, a local company purchased the entire quantity of waste for rare-earth mineral recovery. Further dumping was suspended, and the purchaser removed as much dumped material as practicable.

**July 1964** – A final 14.88 acres was transferred to AEC by the Army and the fourth raffinate pit was constructed. Total property transferred to the AEC was 228.16 acres, including the 8.66-acre Quarry.

**January 1965 through December 1966** – Thorium oxide was processed at the feed materials plant, and the wastes were deposited in Raffinate Pit 4.

**January 1965 through December 1966** – Thorium residues were brought to the Quarry by rail from various defense contractors' plants in the Cincinnati, Ohio, area. The material consisted of several hundred drums, constituting about 556 cubic yards of residue. During 1966, the Army covered the thorium residues from the Ohio plants with TNT-contaminated stone and soil.

**December 1966** – AEC closed the feed materials plant. Shutdown procedures included cleaning all points of material accumulation and removing as much of the contaminants as possible from the production

equipment. Cleanup wastes were dumped in Raffinate Pit 4.

**January 1967** – AEC transferred the feed materials plant back to the Army after the Army decided to use parts of the plant for production of a herbicide known as "Agent Orange." AEC kept control of Building 438 and a 50.6-acre tract that included the four raffinate pits.

**August 1967** – The Kansas City District of the Army Corps of Engineers contracted with the Thompson-Stearns-Rogers Corp. (TSR) to design and construct a herbicide production facility, to be known as the Weldon Spring Chemical Plant, on the land transferred from AEC back to the Army.

**January 1968** – TSR took occupancy of the Chemical Plant and began decontamination and removal of equipment from the former feed materials plant operations.

**January 1968 through December 1969** – Several buildings at the Chemical Plant were decontaminated, and 5,560 cubic yards of wastes contaminated with thorium and uranium were placed on the main Quarry floor and dumped over the northeast rim.

**February 1969** – Estimated costs for completing the Chemical Plant project had risen from \$10.5 million to more than \$30 million. In addition, military demands for Agent Orange were reduced. Consequently, the project was canceled, and no herbicides were delivered or produced. Following the cancellation, the Chemical Plant remained under Army control, and AEC administered the raffinate pits.

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## 1970s

**July 1970** – As a result of cancellation of the herbicide production project, the Army declared the property excess.

**August 1972** – St. Charles County acquired the well field and two water treatment plants that previously supplied water to the ordnance works. At the time, the well field consisted of 13 large-capacity wells on a 344-acre tract.

**August 1975** – The Army conducted a preliminary assessment of environmental conditions at the Chemical Plant. Its findings indicated the plant could

not be released for unrestricted use without decontaminating the land and buildings. However, insufficient data were available to decide what action was necessary to return the area to unrestricted use status. A recommendation was made that additional data be collected. AEC contracted with National Lead Company of Ohio to maintain and perform environmental monitoring at the raffinate pits and Quarry.

**January 1977 through December 1979** – Ryckman, Edgerly, Tomlinson and Associates studied the site for the Army Phase I and Phase II Installation Restoration Assessment.

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## 1980s

**October 1981** – Bechtel National, Inc., under contract to the U.S. Department of Energy (DOE), a successor to AEC, assumed management and maintenance responsibility for the Weldon Spring Quarry and raffinate pits.

**During 1984** – The Army repaired several buildings at the Chemical Plant; decontaminated some floors, walls, and ceilings; and isolated contaminated equipment.

**November 1984** – DOE was directed by the Office of Management and Budget to assume custody of, and accountability for, the Chemical Plant from the Army.

**During 1985** – Seventeen vicinity properties were identified by the Radiological Site Assessment Program at Oak Ridge Associated Universities. Three were verified as clean as of 1989.

**February 1985** – DOE proposed designating control and decontamination of the Chemical Plant and raffinate pits as a Major Project.

**May 1985** – The Chemical Plant and raffinate pits were designated as a Major Project by DOE Order 4240.1E, *Designation of Major System Acquisitions and Major Projects*.

**October 1985** – The Army transferred custody and accountability for the Chemical Plant to DOE.

**October 15, 1985** – The U.S. Environmental Protection Agency (EPA) proposed to include the Weldon Spring Quarry on the National Priorities List (NPL) as a Superfund site because of the threat that Quarry groundwater contamination could impact the well field, 0.25 mile away, that served 60,000 users. The Quarry's inclusion was effective July 30, 1987.

**February 1986** – MK-Ferguson Co., with Jacobs Engineering Group as an integrated subcontractor, was selected as the Project Management Contractor (PMC).

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## 1990s

**During 1990** – Building 434 was refurbished to become the Resource Conservation and Recovery Act (RCRA) storage area.

**September 1990** – The Remedial Investigation/Feasibility Study – Environmental Impact Statement process for the Quarry bulk waste was completed, paving the way for a Record of Decision (ROD) for management of this material.

**March 20, 1991** – The ROD for the management of bulk wastes in the Weldon Spring Quarry was approved. The ROD specified the cleanup actions for the Quarry, building waste removal, and related activities in accordance with EPA and state regulations. The ROD was one of the first in the nation signed by EPA for a DOE facility under the Comprehensive Environmental Response, Compensation, and Liability Act.

**July 1986** – A DOE project office was established onsite.

**October 1986** – The PMC assumed control of the Weldon Spring Site Remedial Action Project (WSSRAP) and initiated remedial investigation and site characterization work. PMC remedial investigation activities included chemical and radiological characterization of Chemical Plant buildings, chemical and radiological soil characterization, chemical and radiological characterization of the raffinate pit water and sludge, hydrogeologic investigations, geophysical and geotechnical investigations, and a biouptake study.

**June 24, 1988** – EPA proposed to expand the NPL designation to include the raffinate pits and Chemical Plant area. On March 30, 1989, these areas were included in the listing, and all areas were designated the Weldon Spring site.

**During 1988** – Additional cleanup investigations were initiated at the Chemical Plant and raffinate pits area. Remedial investigations, which were concluded by the end of 1988, identified the contaminants and the concentrations and quantities of the material. The investigations included chemical and radiological soil sampling, offsite lake and stream sediment sampling, biouptake studies of fish and wildlife, groundwater monitoring, raffinate pit sludge sampling, and numerous geological studies.

**During 1989** – The First Interim Response Action (IRA), the Ash Pond isolation dike, was completed. Other IRAs completed in 1989 included dismantling the steam plant and administration building, dismantling overhead piping and removing asbestos, and completing Phase 1 of the chemical inventory and consolidation.

**May 24, 1991** – With concurrence of the Missouri Department of Natural Resources (MDNR) and EPA, DOE approved the plan to decontaminate and dismantle 44 structures at the Weldon Spring Chemical Plant.

**June 1991** – Building dismantlement began, and the 44 structures were successfully dismantled by December 8, 1994. Structural materials, machinery, and debris were placed in temporary storage at the Material Staging Area (MSA), which was an engineered storage pad constructed during 1991. The MSA included a runoff collection basin.

**During 1991** – The Quarry water treatment plant was constructed.

**Fall 1992** – The Quarry water treatment plant became operational.

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## 1990s (continued)

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**September 4, 1992** – MDNR approved WSSRAP plans for construction of a pipeline for the site water treatment plant. Originally, the permit allowed for discharge of treated water only via a drainage ditch known as the Southeast Drainage.

**December 16, 1992** – EPA and DOE held a meeting to obtain public input on the Proposed Plan for treatment and final disposal of waste. Three options were discussed: (1) no action, which was not considered because it would not protect human health and the environment; (2) removal, treatment, and offsite disposal, which would involve transporting some 1.3 million cubic yards of contaminated material to waste storage in either Utah or Washington state; and (3) removal, treatment, and onsite disposal, including construction of an engineered disposal facility.

**January 7, 1993** – The first batch of water from the Weldon Spring Quarry was successfully treated and released.

**April 1993** – The Temporary Storage Area (TSA) for storage of Quarry bulk wastes was completed. The TSA was an engineered waste pile storage area designed to RCRA standards and included a liner and runoff collection basin. The collected water was treated at the site water treatment plant.

**May 1993** – The dedicated haul road from the Quarry to the Chemical Plant site was completed.

**May 1993** – The first batch of water from the site water treatment plant was treated. Both treatment plants used a batched system process. The treated water was analyzed and confirmed compliant with National Pollutant Discharge Elimination System (NPDES) permit requirements prior to discharge.

**May 27, 1993** – Removal of bulk waste from the Quarry began.

**July 8, 1993** – The site's most recognizable landmark, a 350,000-gallon, 185-foot water tower was brought down. The water tower was built in 1955 to support Chemical Plant operations. After the plant was closed in 1966, St. Charles County took possession of the water service system. In 1992, DOE provided St. Charles County with funds to construct a new tower 0.5 mile from the location of the original tower.

**September 1993** – The ROD for remedial action at the Chemical Plant was approved.

**During 1994** – In support of designing a full-scale chemical stabilization/solidification (CSS) facility for treating contaminated materials, a pilot-scale facility was constructed. Contaminated materials used for testing included sludge from site waste pits, selected soils, sludge resulting from treatment of water, and selected containerized wastes.

**January 1995** – St. Charles County Administration appointed seven St. Charles County residents to be the first members of the Weldon Spring Citizens Commission, which provides community volunteer monitoring and communications for WSSRAP.

**1995** – In the spring, the CSS pilot facility began operating according to a testing plan developed for collection of specific data. The data were used to confirm bench test results and to design the full-scale CSS treatment plant, which was constructed and became operational in mid-1998.

**June 9, 1995** – MDC approved a plan for removal of 2 million cubic yards of clay soil material from a borrow area east of Francis Howell High School to be used in construction of the disposal facility (the cell). The designated Borrow Area consists of more than 213 acres of land, including 150 acres for borrow development and operations. The remaining acreage was used as a dedicated haul road leading from the Borrow Area, under a relocated segment of Highway 94, and into the Chemical Plant at the northern edge of the site. The underpass eliminated a dangerous curve on Highway 94 and provided for safe crossing of Highway 94 by borrow operations traffic.

**August 13, 1995** – The WSSRAP water treatment team celebrated successful treatment of 100 million gallons of water. Train 2 of the site water treatment plant construction and operation began.

**September 1995 to July 1997** – Removal of 33 major structure foundations and contaminated soil from 54 acres was completed. During the project, approximately 0.5 million cubic yards of contaminated soil and concrete were removed, clearing the way for construction of the disposal facility. The soil and concrete were placed in temporary storage and eventually placed in the disposal cell.

**Summer/Fall 1995** – With excavation and removal of the contaminated bulk waste from the Quarry nearly complete, follow-up studies assessing the effectiveness of the cleanup and the possible need for further remediation began as part of the Quarry Residuals Operable Unit. The first step in the decision process for the Quarry residuals was the Remedial Investigation Report, which was made available to the public in early 1997.

**October 1995** – The Site Treatment Plan for Mixed Waste at the Weldon Spring Site was approved in accordance with the Federal Facility Compliance Act. The mixed waste inventory at the site included reactives, oxidizers, organic liquids and sludges, polychlorinated biphenyl (PCB) wastes, soils, wastewaters, liquid mercury, toxic-metal-contaminated wastes, aqueous liquids, and debris. These wastes were stored in the refurbished Building 434. Several

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## 1990s (continued)

different technologies were used to treat the wastes, including amalgamation, chemical precipitation, carbon absorption, neutralization, stabilization, chemical oxidation, macroencapsulation, and Solvated Electron Technology. The organic liquids were shipped offsite for incineration and other forms of thermal treatment.

**November 1995** – More than 144,000 cubic yards of contaminated waste was removed from Quarry bulk, significantly reducing the threat of potential contamination of the St. Charles County well field.

**May 14, 1996** – The last shipment of more than 20,000 gallons of incinerable organic and aqueous liquids stored at the Chemical Plant site left for the K-25 incinerator facility in Oak Ridge, Tennessee. Shipment of these wastes began January 10, 1996, when more than 4,000 gallons of tributyl phosphate waste was hauled to Oak Ridge by a licensed waste hauler.

**April 24, 1997** – Groundbreaking ceremonies were held celebrating the beginning of construction of the disposal cell. The ceremonies marked the "beginning of the end" of remediation activities required for environmental restoration of the 220-acre Uranium Feed Materials Plant site, nearby vicinity properties, and the 9-acre abandoned Quarry previously used as a dump site for chemical and radiological wastes.

**February 1998** – The Remedial Investigation for the Quarry Residuals Operable Unit was finalized.

**March 1998** – The Feasibility Study for the Quarry Residuals Operable Unit was finalized.

**March 5, 1998** – A significant milestone was achieved with the first placement of waste in the onsite disposal cell.

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## 2000s

**July 6, 2000** – Demolition of the site water treatment plant was completed.

**September 29, 2000** – An interim ROD was signed by DOE and EPA approving a plan to treat trichloroethylene in the groundwater and to conduct pilot studies for pumping and treating additional groundwater contaminants.

**December 2000** – Restoration of the Quarry begins with the start of backfilling operations. The first phase included hauling some 69,000 cubic yards of uncontaminated clay, fill dirt, and topsoil from a borrow area southeast of the Quarry.

**March 2001** – Confirmation of Chemical Plant soil was completed.

**May 2001** – Demolition of the Quarry water treatment plant was completed. A total of 276 million gallons of

**April 9, 1998** – WSSRAP received the DOE Merit award for safety, which is the preliminary step to become a Star site.

**September 30, 1998** – EPA and DOE signed the ROD for the Quarry Residuals Operable Unit.

**October 1998** – Treatment of the mixed waste inventory was completed.

**October 23, 1998** – The Weldon Spring site became the first major DOE site to complete treatment of its mixed-waste inventory. On this date, the final batch of mixed-waste-filled drums was macroencapsulated in the disposal cell.

**November 13, 1998** – The CSS plant completed dredging and processing the remaining sludge from Raffinate Pit 3. Sludge from the other three pits had been consolidated into pit 3. Approximately 122,000 cubic yards of sludge had been treated since the plant began operations in July 1998. The CSS plant was dismantled in 1999.

**February 26, 1999** – WSSRAP was verified as a DOE Integrated Safety Management System (ISMS) site, which was a directive for all DOE facilities.

**August 4, 1999** – Secretary of Energy Bill Richardson was onsite to present WSSRAP with the DOE Star award for safety. WSSRAP became the first DOE environmental remediation site to achieve the department's highest award for excellence in safety.

**September 10, 1999** – The Frog Pond Outlet was confirmed as clean, completing the remediation and restoration of the original 17 vicinity properties.

**September 30, 1999** – Dewatering of the four raffinate pits was completed, paving the way for removal of contaminated soil and placement in the cell.

water meeting NPDES discharge criteria was treated and released from the Quarry and site water treatment plants.

**June 3, 2001** – The last of the contaminated materials destined for disposal were placed in the cell. The final materials included the remnants of the Weldon Spring Quarry water treatment plant. In total, 1.48 million cubic yards of waste was placed in the cell.

**October 23, 2001** – The "last rock" was placed on the cap of the cell, and the Weldon Spring disposal cell was complete.

**Spring 2002** – Approximately 150 acres of soil surrounding the disposal cell and extending to the site boundary was prepared for the first planting of prairie grasses and forbs to begin establishment of Howell Prairie, one of the largest plantings of its kind in the metropolitan St. Louis area.

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## 2000s (continued)

**August 5, 2002** – A ribbon-cutting ceremony was held to commemorate the opening of the Weldon Spring Site Interpretive Center.

**October 1, 2002** – The Weldon Spring site transferred to the former DOE Long-Term Surveillance and Maintenance Program and to the Office of Legacy Management (LM) in December 2003.

**January 2003** – The second planting for the Howell Prairie occurred on one of the coldest days of winter and was led by Frank Oberle, owner of Pure Air Native Seed Company.

**October 28-29, 2003** – First annual long-term surveillance and maintenance inspection was completed.

**During 2003** – Attendance at the Interpretive Center was 1,786.

**January 30, 2004** – Remedial Action Reports for Chemical Plant and Quarry Residuals Operable Units were finalized.

**January 2004** – Development of Howell Prairie as an outdoor classroom continued with the planting of approximately 80 species of native forbs and prairie grasses, over-seeding activities, and measures to control invasive exotic weeds. A total of 7 pounds per acre of live seed was spread during the three plantings (2002–2004).

**February 20, 2004** – The ROD for the Groundwater Operable Unit was finalized. The remedial action selected for groundwater was monitored natural attenuation.

**April 2004** – Began development and promotion of Interpretive Center educational program. Local school involvement (primary, secondary, and college) rose sharply from expanded marketing and communication efforts of this program.

**May 2004** – Started planting the Native Plant Educational Garden located in front of the Interpretive Center. This garden consists of plants native to the state of Missouri. It contains an extensive planting of species from Howell Prairie as well as other perennials, shrubs, and trees. Walking paths, benches, and markers to identify the various plants are located throughout the 8-acre garden.

**October 2004** – The Weldon Spring site hosted the first annual "Howell Prairie Walk and Talk" open to the general public. Prairie establishment experts from the Howell Prairie Council gave walking tours through the prairie area and were available to answer questions from attendees.

**During 2004** – Attendance at the Interpretive Center was 3,573, which was a 100 percent increase over 2003.

**February 2005** – Explanation of Significant Differences for Institutional Controls was finalized.

**July 2005** – Long-Term Surveillance and Maintenance Plan was finalized.

## Contacts

Documents related to the Weldon Spring site are available on the LM website at <http://www.lm.doe.gov/weldon/Sites.aspx>.

For more information about LM activities at the Weldon Spring site, contact

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