

2003 Annual Inspection of the Weldon Spring Site St. Charles, Missouri

Summary

The Weldon Spring Site, located in St. Charles, Missouri, was inspected on October 28 and 29, 2003. This was the first annual surveillance and maintenance inspection at the Weldon Spring site and serves as a baseline for future inspections. The inspection was conducted in accordance with the draft *Long-Term Surveillance and Maintenance Plan for the Weldon Spring, Missouri, Site* (May 30, 2003), and associated inspection checklist. Representatives from the U.S. Environmental Protection Agency (EPA) and Missouri Department of Natural Resources (MDNR) participated in the inspection. A representative of the Missouri Department of Conservation (MDC) participated in a half-day portion of the inspection. The Weldon Spring Site is a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site.

The main areas inspected at the site were areas where future institutional controls will be established, the quarry, the disposal cell, Leachate Collection and Recovery System (LCRS), monitoring wells and assorted general features.

The Institutional Control areas were inspected to ensure that pending restrictions such as excavating soil, groundwater withdrawal, residential use, etc., were not being violated. Each area was inspected and no indications of violations of future restrictions were observed.

The disposal cell was inspected by walking ten transects over the cell and around the cell perimeter at the grade break and the base. No unusual settlement or other unusual observations were noted. Five areas of the cell were marked for annual observations of rock degradation. The LCRS also was inspected and found to be in good condition. Sixty-five of 120 groundwater monitoring wells were inspected and found to be in generally good condition. A few of the wells needed to be labeled with the proper identification numbers and/or repainted. Other site features including the prairie, site markers and roads also were inspected.

1.0 Introduction

The Weldon Spring Site is in southern St. Charles County, Missouri, approximately 30 miles west of St. Louis, as shown in Figure 1. The site consists of two main areas, the Weldon Spring Chemical Plant and the Weldon Spring Quarry, both located along Missouri State Route 94.

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. From 1941 to 1945, the U.S. Department of the Army (Army) manufactured trinitrotoluene (TNT) and dinitrotoluene (DNT) at the site. These operations resulted in nitroaromatic contamination of soil at the plant site, sediments in drainages originating at the site (Frog Pond Outlet and the Southeast Drainage), groundwater near the site, and some off-site springs.

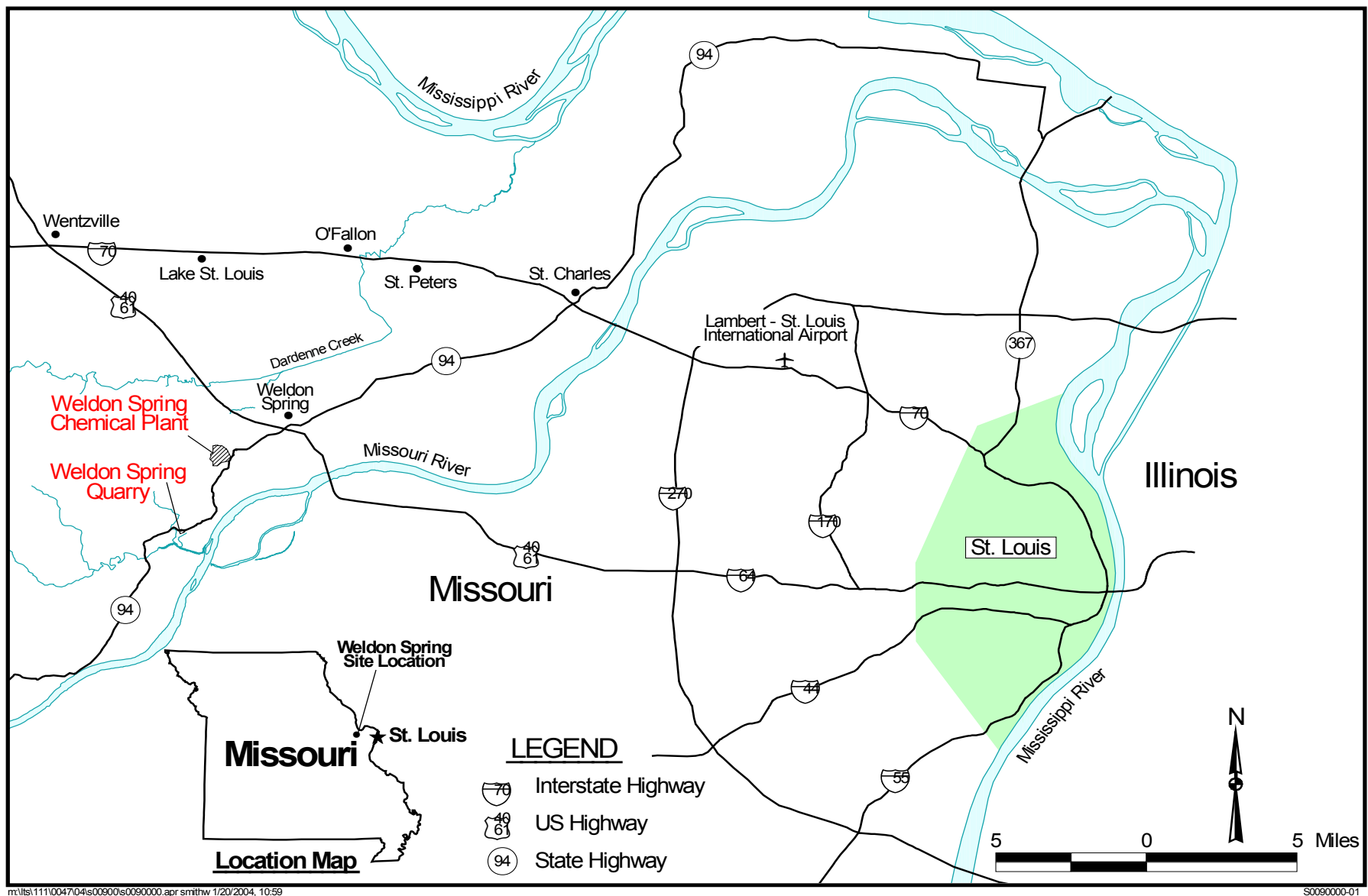


Figure 1. Location of the Weldon Spring, Missouri, Site

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 also was processed. Wastes generated during these operations were stored in four raffinate pits located on the plant property. Uranium processing operations resulted in radiological contamination of the same locations previously contaminated by former Army operations.

The Weldon Spring quarry was mined for limestone aggregate used in construction of the ordnance works. The Army used the quarry for burning wastes from explosives manufacturing and disposal of TNT-contaminated rubble during the operation of the ordnance works. These activities resulted in nitroaromatic contamination of the soil and in rock fractures at the quarry, in groundwater under the quarry and between the quarry and Femme Osage Slough.

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 from the Chemical Plant (both drummed and uncontained), 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 the Quarry and Chemical Plant areas were placed on the National Priorities List in 1987 and 1989, respectively. Remediation of the Weldon Spring site was administratively divided into four Operable Units (OUs): Quarry Bulk Waste OU, Chemical Plant OU, Quarry Residuals OU, and Groundwater OU. The Southeast Drainage was remediated as an interim response action through a separate engineering evaluation/cost analysis.

The remedy for the Quarry Bulk Waste OU consisted of excavating and removing bulk waste from the quarry and transporting it along a dedicated haul road to an engineered temporary storage area located at the chemical plant. The Chemical Plant OU remedy included removal of contaminated soils, sludge, and sediment, treatment of wastes as appropriate by chemical stabilization/solidification and disposal of the chemical plant and quarry bulk wastes in an engineered on-site disposal facility. The Quarry Residuals OU addressed residual soil contamination in the quarry proper, surface water and sediments in the Femme Osage Slough, and contaminated groundwater. The Groundwater OU addresses the groundwater at the chemical plant area and is pending a Record of Decision. The Southeast Drainage was remediated by removal of selected sediment in accessible areas of the drainage.

The final site conditions from the above remedial actions include the following:

- An on-site disposal cell contains 1.48 million cubic yards of contaminated material.
- Residual groundwater contamination remains in the shallow aquifer beneath both the Chemical Plant and Quarry.
- Several springs near the Chemical Plant area discharge residually contaminated groundwater.

- Residual soil and sediment contamination remain in the Southeast Drainage.
- Contamination remains at two culverts, one along Missouri State Route 94 and one along Highway D.
- Residual soil contamination remains at inaccessible locations within the Quarry.

The purposes of the annual inspection were to confirm the integrity of the visible features (such as disposal cell, LCRS, and monitoring wells) at the site, document the site condition subsequent to remediation and restoration, identify changes in conditions that may affect site integrity, determine if institutional controls are adequately implemented, and determine the need, if any, for maintenance or additional inspections and monitoring.

At the time of the inspection 12 personnel from S.M. Stoller Corporation (Stoller), the Technical Assistance Contractor at the U.S. Department of Energy (DOE) office in Grand Junction, Colorado, were employed full-time at the site. Also employed at the site were two DOE employees, two full-time subcontractor employees, and five part-time subcontractor employees.

This report presents the results of the DOE annual inspection of the Weldon Spring site. The following personnel from Stoller were the three lead inspectors during the inspection:

Dick Johnson, Grand Junction Office
 Terri Uhlmeier, Weldon Spring Office
 Marj Oaks, Weldon Spring Office

Dick Johnson was one of the lead inspectors for the institutional control areas and for the disposal cell inspection. He has been supporting long-term management activities for DOE low-level radioactive disposal sites for 3 years. Dick currently is serving as the DOE contractor site manager for ten disposal sites located in eight states, and as the inspection lead for 24 disposal sites and former processing sites. He inspects at least 15 sites annually and prepares the inspection reports for many of those inspections. He also prepares annual compliance reports, currently addressing 22 disposal sites, to comply with U.S. Nuclear Regulatory Commission general license requirements. Dick has 9 years experience working as a hydrogeologist and performing civil engineering design and construction inspection for an engineering and architectural consulting firm. During the past 14 years his responsibilities have included radiological characterization, engineering design, remediation, demolition, disposal, verification, long-term site management, and compliance documentation for various CERCLA, Uranium Mill Tailings Remedial Action (UMTRA), and Decontamination and Decommissioning projects for DOE contractors. Dick Johnson has a B.S. degree in geology and an M.S. degree in geomorphology, and is a Certified Professional Geologist.

Terri Uhlmeier was one of the lead inspectors for the institutional control areas and other miscellaneous areas during the inspection. She also coordinated the inspection and preparation of this report. Terri worked for the U.S. Environmental Protection Agency for 4 years as a Resource Conservation and Recovery Act (RCRA) inspector and compliance officer, and conducted numerous inspections during that time and attended several inspection training courses. She has worked at the Weldon Spring Site for 13 years, and

served as the Regulatory Compliance Manager for 10 years and was in charge of inspections at the site. She has also been involved in the CERCLA documentation, waste management, and safety aspects of the project and has prepared many reports and plans for the site. Terri Uhlmeier has a B.S. degree in Petroleum Engineering.

Marj Oaks was one of the lead inspectors for the disposal site inspection. She has worked for the last 16 years on the design and construction of disposal cells for the Weldon Spring Site and several UMTRA sites. Prior to working at the Weldon Spring Site, Marj was the lead design engineer for the UMTRA disposal cell at Durango, Colorado, and worked on several other designs for UMTRA sites in Colorado and New Mexico. Ms. Oaks began work at the Weldon Spring Site in 1991 as the Conceptual Design Manager, then transitioned to Engineering Design Manager, Cell Project Manager, and now Stoller Project Manager. She has written several papers on environmental cleanup and disposal cell design and construction, and has presented papers at DOE disposal cell cost workshops. Marj has participated in technology transfer workshops for other DOE sites such as Fernald, Ohio, Savannah River, South Carolina, and Paducah, Kentucky. Marj Oaks has a B.S. degree in chemistry and an M.S. degree in geological engineering.

The following support personnel from Stoller participated in the inspection:

Randy Thompson, Weldon Spring Office
Sam Marutzky, Grand Junction Office

The following support personnel from subcontractor companies participated in the inspection:

Tom Welton, Pangea
Greg Nadler, Graphic Engineering
Bruce Ballew, BHB, LLC

The following personnel observed the inspection and provided oversight:

Tom Pauling – DOE
Dan Wall – EPA, Region VII
Larry Erickson – MDNR
John Vogel – MDC

The inspection was conducted in accordance with the draft *Long-Term Surveillance and Maintenance Plan for the Weldon Spring, Missouri, Site* (LTS&M Plan), dated May 30, 2003.

2.0 Inspection Results

Following is a summary of the inspection results. The inspection base map, which includes the locations of the photographs, is included as Figures 2 and 3. The checklist is included as Appendix A.

2.1 Institutional Controls Inspection

Section 2.3.4 of the Draft LTS&M Plan states that “DOE will conduct a formal annual inspection of the physical locations addressed by institutional controls. DOE also will evaluate whether the institutional controls remain effective in protecting human health and the environment and will take appropriate action if evidence indicates controls are not effective, in coordination with EPA and MDNR.”

The status of the actual institutional controls at this time is that the majority of the instruments are still pending and not yet formally in place. The institutional controls that are in place include the interpretive center; a use-permit with Lindenwood University to use the administration building; a license granting DOE permission to abandon or install and operate groundwater wells and perform sampling; and a license granting DOE continuing operation and maintenance of the effluent discharge pipeline that runs from DOE property to the Missouri River and through the Katy Trail. During the inspection, the pending institutional control areas were inspected in accordance with the current information in the LTS&M Plan. The main purpose of this inspection of the institutional control areas was to provide a baseline for future inspections. Figures 4 and 5 are the institutional control location maps from the Draft LTS&M Plan.

The institutional control areas are listed below as they are stated in the inspection checklist:

2.1.1 Land and Shallow Groundwater Use Within the Site Proper Boundary (Outside Disposal Cell Buffer Zone)

Inspect for indications of excavations into soil or bedrock and groundwater withdrawal or use in restricted areas. If any party has been granted use of portions of the Chemical Plant area, inspect to ensure that land use is in compliance with the terms of the restrictions within the notation.

Inspection Results: This area was inspected and no indications of excavations into soil or bedrock or groundwater withdrawal or use were observed (Photo 1). MDC has been granted use and maintenance of the Hamburg Trail across DOE property. Lindenwood University has been granted use of the Administration Building. Current land use remains consistent with the planned institutional controls.

2.1.2 Land and Shallow Groundwater Use at DOE Site Proper Disposal Cell and Buffer Zone

Inspect for indications of excavations into soils and bedrock and for residential use of the shallow groundwater within the buffer zone. Inspect to ensure that the land use continues to be in compliance with the terms of the restrictions within the notation.

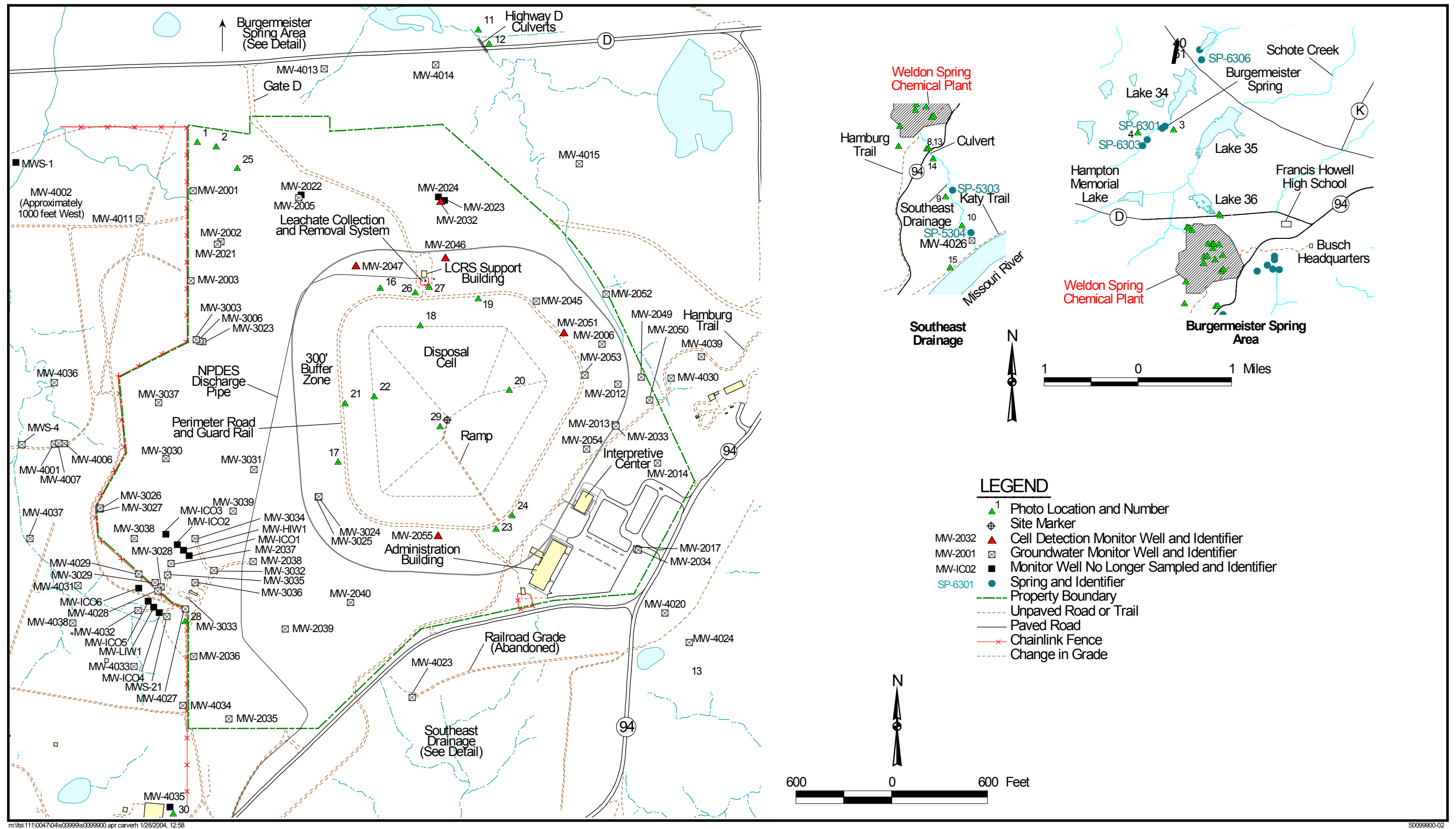


Figure 2. 2003 Inspection Map for the Chemical Plant Area of the Weldon Spring, Missouri, Site

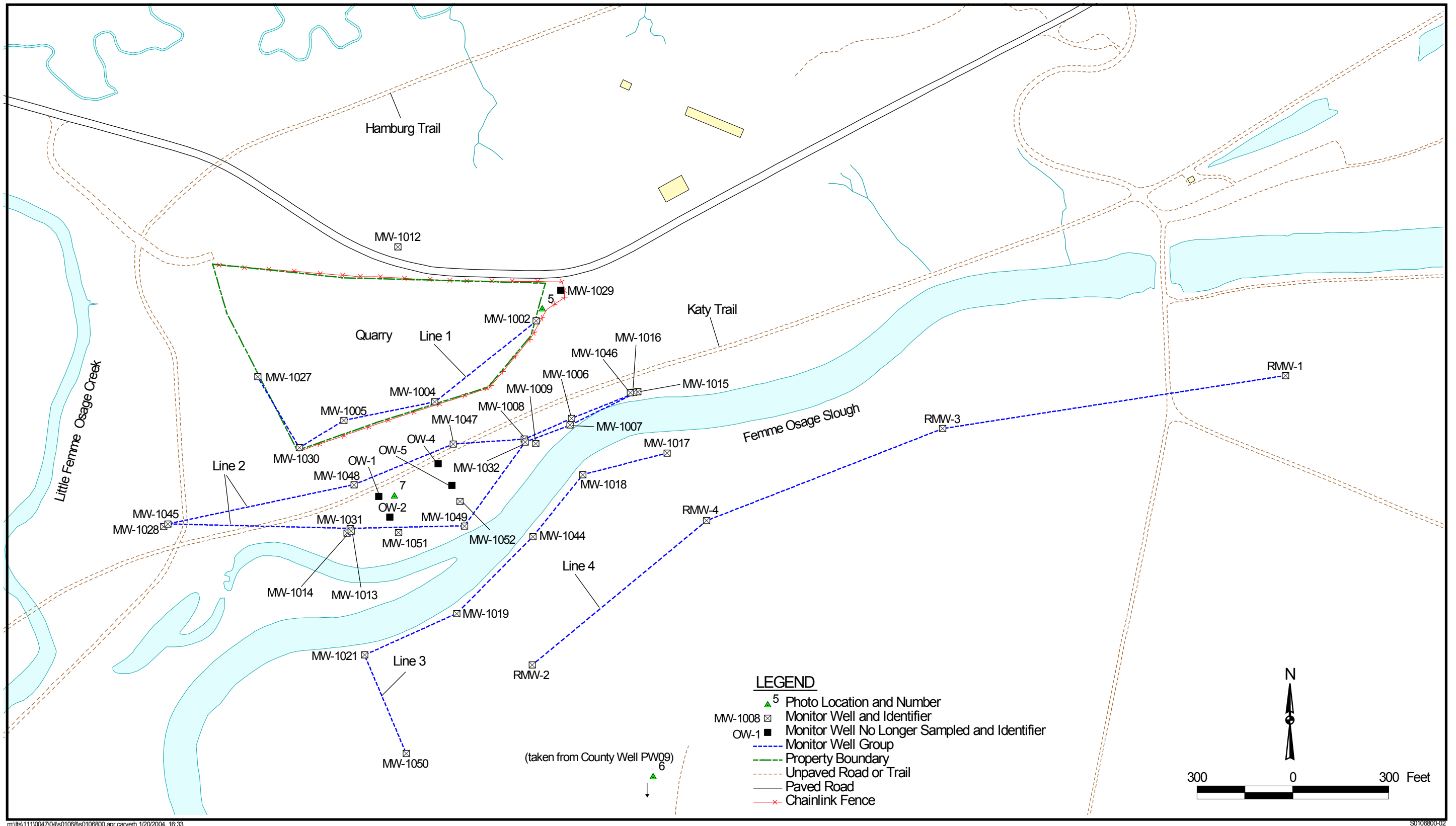


Figure 3. 2003 Inspection Map for the Quarry Area of the Weldon Spring, Missouri, Site

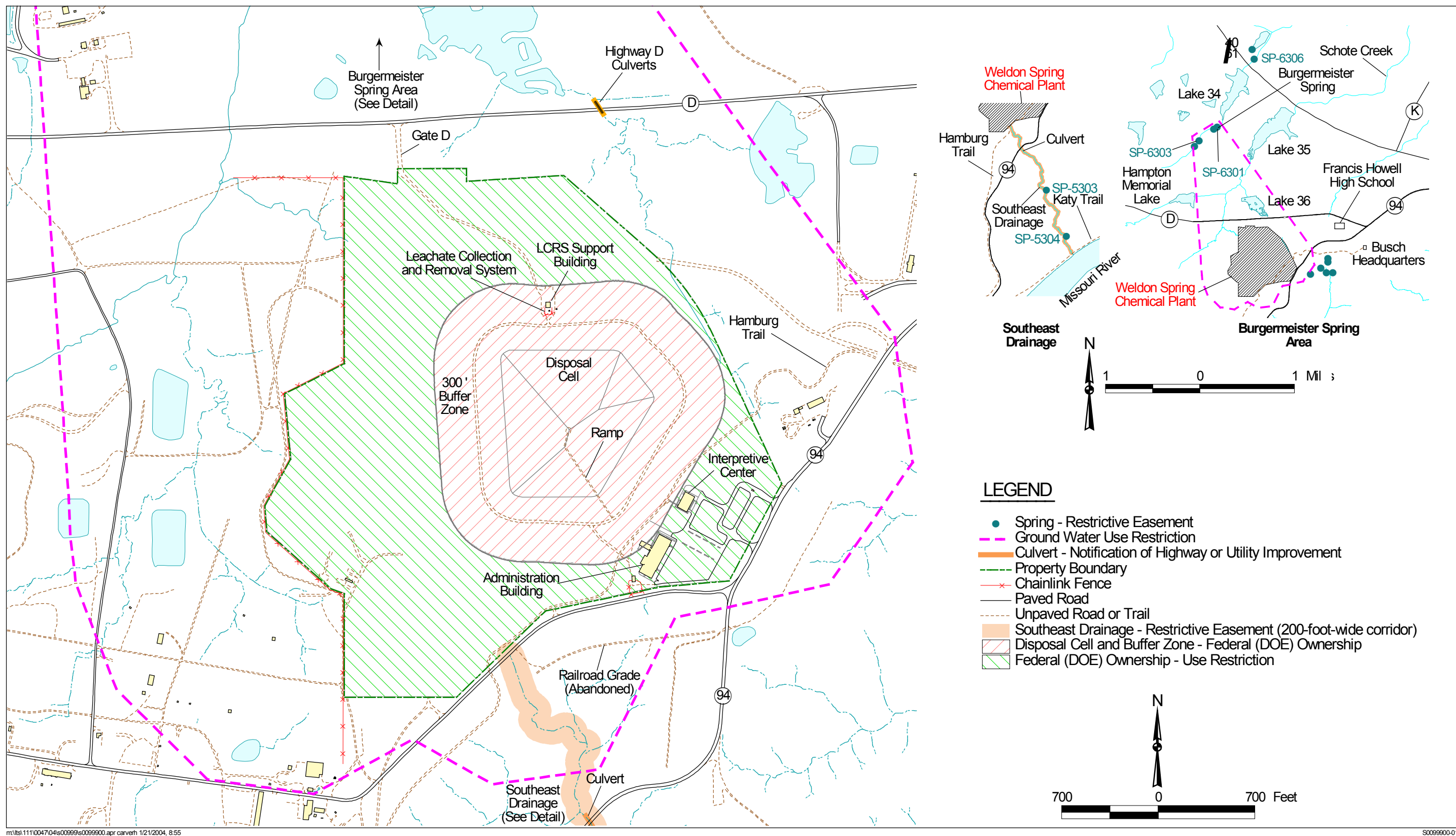


Figure 4. Institutional Controls Location Map for the Chemical Plant Area of the Weldon Spring, Missouri, Site

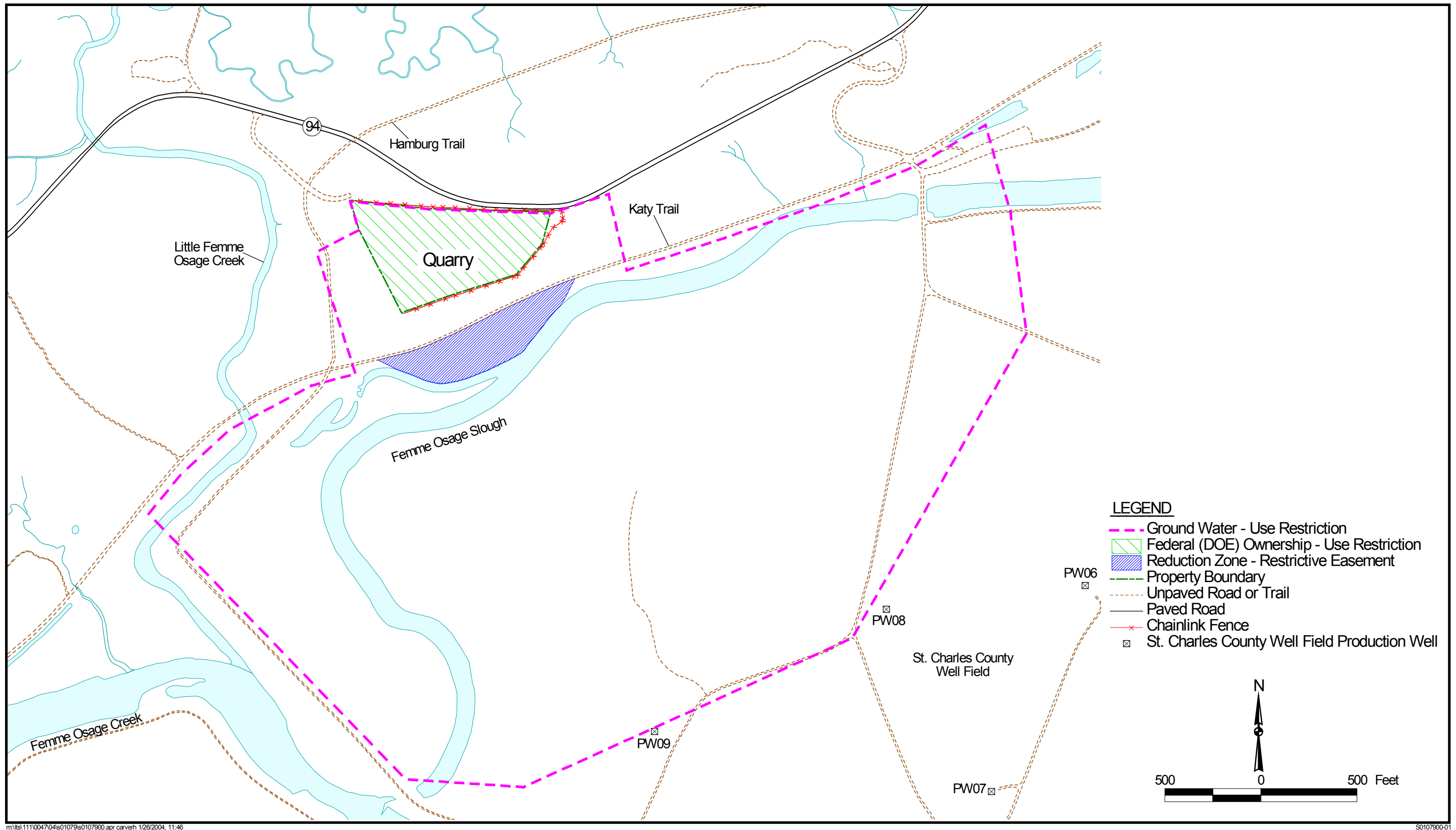


Figure 5. Institutional Controls Map for the Quarry Area of the Weldon Spring, Missouri, Site

Inspection Results: This area was inspected and no indications of excavations into soils and bedrock and no residential use of the shallow groundwater within the buffer zone were observed (Photo 2). Current land use remains consistent with planned institutional controls.

2.1.3 Groundwater Use in Areas Surrounding the Chemical Plant

Groundwater use will be restricted in this area. Inspect affected areas for evidence of groundwater or spring water use (Burgermeister Spring and Spring 6303). Inspect to ensure that land use continues to be in compliance with the terms of the license, easement, or permit and the restrictions contained therein.

Inspection Results: The surrounding area where groundwater use will be restricted was inspected. No evidence of groundwater use was observed. Burgermeister Spring and Spring 6303 were inspected and there were no indications of spring water use (Photos 3 and 4). Current land use remains consistent with planned institutional controls.

2.1.4 Land and Shallow Groundwater Use on the DOE Quarry Property

Inspect for indications of excavations into soil or bedrock and groundwater withdrawal or use in restricted areas. If any party had been granted use of portions of the Quarry area, inspect to ensure that land use is in compliance with the terms of the restrictions within the notation.

Inspection Results: The Quarry Property was inspected and no indications of excavation into soil or bedrock or groundwater withdrawal or use were observed. Also, no party has been granted use or portions of the Quarry area. Quarry backfill continues to provide positive drainage from the quarry to the Little Femme Osage Creek and vegetative cover remains well established (Photo 5). Current land use remains consistent with planned institutional controls.

2.1.5 Groundwater (Quarry)

Groundwater use is restricted in areas. Inspect affected areas for evidence of groundwater withdrawal or use in the area of impact. Inspect to ensure that land use continues to be in compliance with the terms of the license and the restrictions contained therein.

Inspection Results: The groundwater restricted area was inspected and no evidence of groundwater withdrawal or use in the area was observed (Photo 6). Several old wells owned by the county, used as test wells and which are not properly secured, were noted near and in the Quarry groundwater restriction area. Current land use remains consistent with planned institutional controls.

2.1.6 Land Use in Quarry Area Reduction Zone

A naturally occurring reduction zone exists in soil south of the Katy Trail and north of the Femme Osage Slough. Inspect for indications of excavations into soils and bedrock in the uranium reduction zone. Inspect to ensure that land use continues to be in compliance with the terms of the easement and the restrictions contained therein.

Inspection Results: The quarry reduction zone area was inspected and no indications of excavation into soils and bedrock were observed. Land use remains consistent with planned institutional controls (Photo 7).

2.1.7 Southeast Drainage

Check for indications of residential use or construction in the Southeast Drainage (200-foot-wide-corridor), or other activity that would indicate non-recreational use of the area. Check Springs 5303 and 5304 for residential, commercial, or agricultural use of spring water.

Inspection Results: The inspectors walked down the entire Southeast Drainage and no indications of residential use or construction or any other activity that would indicate non-recreational use of the area was observed. The springs also were inspected and no indication of residential, commercial, or agricultural use of the springs was observed (Photos 8, 9, and 10). Current land use remains consistent with planned institutional controls.

2.1.8 Highway D Culvert

Check for signs of disturbance of the affected region where the Frog Pond outlet culverts pass beneath Highway D and in the utility rights-of-way in the affected area.

Inspection Results: The Highway D culvert was inspected. The area where the culvert passes beneath the ditch between Highway D and the north end of the culvert was eroded on top, exposing the culverts. (This area had been brought to DOE's attention earlier by MDC, who later notified the Missouri Department of Transportation (MoDOT). The MoDOT stated that it was not a priority for them as long as the culverts are not compromised.) The inspectors concluded that the drainage in the ditch was entering the culverts at the joint between the 2 lengths of culvert and therefore not eroding soil or sediment beneath the culverts. This conclusion also was supported by a lack of erosion at the outlet ends of the culverts (Photos 11 and 12).

2.1.9 State Route 94 Culvert

Check for signs of disturbance of the affected region where the culvert passes beneath State Route 94 and in the utility rights-of-way in the affected area.

Inspection Results: The State Route 94 culvert was inspected and the upstream end was partially blocked with debris. Erosion was occurring on the embankment. The downstream end of the culvert was corroded on the bottom and the last section of pipe was partially separated from the rest of the culvert, causing runoff to leak through and erode beneath the final segment of culvert. MoDOT is adding pavement as a shoulder on State Route 94 and this construction activity could be contributing to additional erosion on the embankments (Photos 13 and 14).

2.1.10 Pipeline from LCRS to Missouri River

Inspect the entire length of the pipeline and outfall for any disturbance or maintenance needs.

Inspection Results: The pipeline area was inspected on June 17, 2003, prior to the annual inspection. It was noted in a memorandum to the file that there were no on-site disturbances of the pipeline and there were no apparent disturbances in the area of the pipeline or manholes in

the off-site areas. During the inspection it was observed that significant vegetative growth had covered the majority of the manhole locations and they could not be located. It was recommended in the memorandum to conduct another walkover in the fall or winter of 2003/2004 when the vegetation is not as dense and to use global positioning system (GPS) surveying equipment to establish the locations of the manholes and cleanouts (Photo 15).

2.2 Disposal Cell

The disposal cell was inspected in accordance with the Draft LTS&M Plan and the annual inspection checklist. The cell was divided into ten transects (Figure 6). The inspectors divided into two groups and walked five transects each; one group also walked along the grade break at the top of the side slopes and along the cell perimeter (Photos 16 and 17). The inspectors looked for depressions, shifts of cell plane vertices, or other indications of settlement. Other items for inspection were vegetation, wet areas, apron drains, guard rail, and the stairs. The inspectors marked five areas of the cell to inspect for rock degradation (Figure 6). These areas are shown in Photos 18 through 22. A GPS unit was used to map the areas chosen for rock degradation review. The GPS also was used to record pinned locations along the transects. The only area where an irregularity was observed was a previously identified area on the northwest corner of the cell. This has been determined to be an as-built condition of the cell and will be observed in the future. The surveys of the disposal cell were discussed prior to the inspection and this northwest corner had been identified as irregular. The survey map available at the inspection included topographic contours from a recent aerial survey which was flown in May 2003 and topographic contours from as-built surveys conducted following construction of the cell. The aerial survey topographic map is attached as Appendix B.

In accordance with the checklist the inspectors also checked for wet areas/water drainage and observed they were not present. The toe/apron drains were inspected and found to be functioning as designed. The guardrail and stairs were in good condition (Photos 23 and 24). There was no sign of slope instability. One item of vegetation was found on the disposal cell, a dandelion on the west side of the cell near the bottom. The condition of the 300-foot buffer zone was found to be good with vegetation established and the survey monuments were verified to be in place. A few areas of erosion were observed north and northwest of the disposal cell, which had been repaired (Photo 25). The condition of the prairie was good at this time. A section on prairie maintenance is included in Section 2.11.

2.3 Leachate Collection and Removal System (LCRS)

The LCRS was discussed and inspected (Photos 26 and 27). The fences and doors were locked and in good condition. The system was functioning as designed. The LCRS data and documentation were reviewed during the document review period of the inspection and the following information was checked and verified that it was available: sampling data, LCRS flow rates, action leakage rate information, “burrito” system flow rates, periodic alarm tests, and shipping records and data. As committed by the LTS&M Plan the leachate production rates, analytical results, and disposal information are provided in Appendix C.

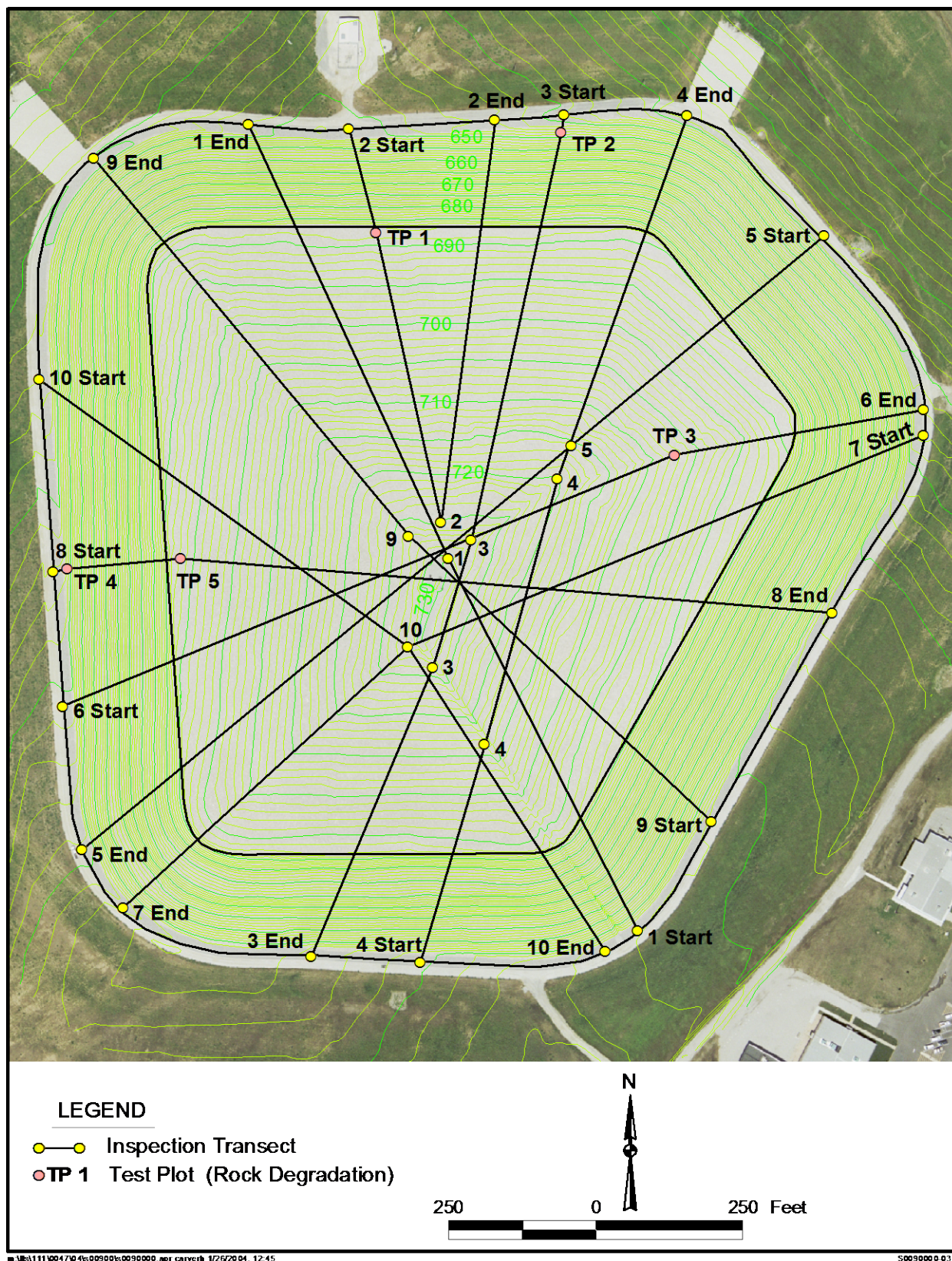


Figure 6. Disposal Cell Inspection Transects and Rock Test Plot Locations at the Weldon, Spring, Missouri, Site

2.4 Erosion

2.4.1 Chemical Plant Area

There were two areas of erosion identified at the chemical plant area. The first areas were north and northwest of the disposal cell (Photo 25). As demonstrated by the photograph, erosion repairs have been conducted in these areas. The second area of erosion was observed during the inspection of the monitoring wells on the Army property. The erosion is next to the riprap that was installed for outfall NP-0050. The erosion comes from the chemical plant property under the fence onto the Army property and has eroded out a gravel road used to travel around the Army property. The erosion has produced a ditch about 2 feet in depth (Photo 28). Repair of this area will be coordinated with the Army in order to assure good road access to monitoring wells. The eroded area does not impact the disposal cell.

2.4.2 Quarry Area

No visible erosion areas were observed during the inspection of the Quarry area.

2.5 General Site Conditions

General site conditions as listed in the checklist were inspected and are discussed below.

2.5.1 Roads

The roads consist of asphalt roads leading into the property and a gravel road that extends around the disposal cell and to Gate D. The roads were in good condition. Erosion repair near the DOE/Army property boundary was discussed in Section 2.4.1.

2.5.2 Vandalism

There were no signs of vandalism on the chemical plant or quarry properties.

2.5.3 Personal Injury Risks

No personal injury risks were observed.

2.5.4 Site Markers (Four Information Plaques on Top of Cell, Historical Markers, and Other Information Markers)

The four information plaques on top of the cell were in good condition (Photo 29). The historical markers planned for the site have not been installed yet.

The Draft LTS&M Plan states that a sign is posted at the interpretive center providing the LTS&M Program 24-hour and local contact phone numbers. It was noted during the inspection that a local number (636-926-7079) only is posted.

The plan also states that signs are posted on the LCRS fence to inform the public that trespassing is forbidden and that persons may call the DOE 24-hour security telephone number (970-248-6070 or 877-695-5322) for information. Signs were posted on the LCRS fence on all

three sides that stated “U.S. Property, No Trespassing.” There were no phone numbers posted at the LCRS.

The Draft LTS&M Plan also states that “Inspectors will verify that the phone numbers remain displayed at the Chemical Plant and quarry sites and are listed in local phone directories.” There were no phone numbers posted at the quarry. The only phone number posted at the chemical plant is the one described above at the interpretive center. The phone number listed in the local telephone number is under “United States Government, Energy Dept., Weldon Spring Site Office” and is a local number: 636-441-8978.

2.6 Monitoring Wells

The monitoring wells in the Disposal Cell Monitoring Well Network, Chemical Plant Monitoring Well Network, and Quarry Monitoring Well Network were inspected (Photo 30). The inspection checklist required all the disposal cell wells to be inspected and greater than 10 percent of the chemical plant and quarry wells to be inspected. The checklist required the wells to be inspected to ensure they are properly secured and locked, in good condition, and to check if they need maintenance and have the proper ID number on the well.

2.6.1 Disposal Cell Monitoring Well Network

Each well in the disposal cell network was inspected and is listed below with the inspection observations:

- MW-2032 – secure, not properly identified, good condition
- MW-2046 – secure, properly identified, paint peeling
- MW-2047 – secure, properly identified, good condition
- MW-2051 – secure, properly identified, good condition
- MW-2055 – secure, properly identified, good condition

2.6.2 Chemical Plant Area Monitoring Well Network

The inspection checklist requires at least 10 percent of the wells be inspected from the chemical plant monitoring well network. The monitoring well network consists of 81 monitoring wells. Thirty-five wells were inspected, which is 43 percent of the total network. A list of the inspected wells is included below with noted observations:

- MW-4035 – secure, properly identified, good condition
- MW-4011 – secure, properly identified, good condition
- MW-IC05 – secure, not properly identified, good condition
- MW-LIWI – secure, not properly identified, good condition
- MW-IC04 – secure, not properly identified, good condition
- MW-4027 – secure, properly identified, good condition
- MW-4028 – secure, properly identified, good condition
- MW-4029 – secure, properly identified, good condition
- MW-IC06 – secure, properly identified, good condition
- MW-4032 – secure, properly identified, good condition
- MW-4036 – secure, properly identified, good condition
- MW-4006 – secure, properly identified, good condition

MW-4001 – secure, properly identified, good condition
MW-4007 – secure, properly identified, good condition
MW-4033 – secure, properly identified, good condition
MW-2055 – secure, properly identified, good condition
MW-2023 – secure, properly identified, good condition
MW-2024 – secure, properly identified, good condition
MW-2022 – secure, properly identified, good condition
MW-2005 – secure, properly identified, good condition
MW-2001 – secure, properly identified, good condition
MW-2002 – secure, properly identified, good condition
MW-2021 – secure, properly identified, good condition
MW-2045 – secure, properly identified, good condition
MW-2053 – secure, properly identified, good condition
MW-2006 – secure, properly identified, good condition
MW-2052 – secure, properly identified, good condition
MW-2012 – secure, properly identified, good condition
MW-2049 – secure, properly identified, good condition
MW-2050 – secure, properly identified, good condition
MW-4039 – secure, not properly identified, good condition
MW-4030 – secure, not properly identified, good condition
MW-2033 – secure, properly identified, good condition
MW-2013 – secure, properly identified, good condition
MW-4026 – secure, properly identified, paint peeling

2.6.3 Quarry Monitoring Well Network

The inspection checklist requires greater than 10 percent of the wells in the quarry monitoring well network to be inspected. The monitoring well network consists of 34 wells. Twenty-five wells were inspected which is 76 percent of the total network at the quarry. The wells that were inspected are listed below, with noted observations.

MW-1029 – secure, properly identified, good condition
MW-1002 – secure, properly identified, good condition
MW-1004 – secure, properly identified, good condition
MW-1005 – secure, properly identified, good condition
MW-1030 – secure, properly identified, good condition
MW-1028 – secure, properly identified, good condition
MW-1045 – secure, properly identified, good condition
MW-1014 – secure, properly identified, good condition
MW-1013 – secure, properly identified, good condition
MW-1048 – secure, properly identified, good condition
MW-1051 – secure, not numbered correctly, good condition
MW-1052 – secure, not numbered correctly, good condition
MW-1049 – secure, properly identified, good condition
MW-1047 – secure, properly identified, good condition
MW-1032 – secure, properly identified, good condition
MW-1008 – secure, properly identified, good condition
MW-1009 – secure, properly identified, good condition
MW-1006 – secure, properly identified, good condition

MW-1007 – secure, properly identified, good condition
MW-1046 – secure, properly identified, good condition
MW-1015 – secure, not numbered correctly, good condition
MW-1016 – secure, not numbered correctly, good condition
MW-OW-1 – secure, properly identified, good condition
MW-OW-2 – secure, properly identified, good condition
MW-OW-4 – secure, properly identified, good condition
MW-OW-5 – secure, properly identified, good condition

2.7 On-site Document and Record Verification

The following on-site documents and records were verified:

- Surveillance and Maintenance Plan: (Long-Term Surveillance and Maintenance Plan for the Weldon Spring, Missouri, Site–DRAFT, May 30, 2003)
- As-Built Drawings: (disposal cell)
- Contingency Plan/Emergency Response Plan: (Weldon Spring Site Project Safety Plan, April 2003)
- NPDES permit(s): (#MO-0107701, revised October 3, 2003)
- Metropolitan St. Louis Sewer District (MSD) agreement and records
- Groundwater Monitoring records
- Leachate records
- Interpretive Center Sign-in Logs

2.8 Contacts

The majority of the contacts listed in the inspection checklist were not contacted for this annual inspection due to the fact that the project has an established work force still present at the site. The purpose of these contacts is to maintain annual contact when employees are no longer present at the site. The institutional control contacts, in general, were not contacted for this annual inspection because the institutional control instruments have not been finalized yet. Representatives from the Weldon Spring Site stay in regular contact with the majority of the contacts included in the checklist.

John Vogel of the MDC was notified of the inspection and he requested to participate in the inspection of the Southeast Drainage. Mr. Vogel lives on the MDC property off of Highway D and his residence is located just west of the groundwater restriction area. Based on this and his occupation as area manager of the Busch, Weldon Spring, and Howell Island Conservation areas, he was questioned about any changing land use or observed groundwater use that would affect the future institutional controls in the area. Mr. Vogel confirmed that land use had not changed in the area and that he was not aware of any type of groundwater use in the restricted areas.

Jerry Stubblefield of the Army Reserves was notified that the inspection was to take place and inspectors would be present on the Army property. He indicated that Adam Ross, Army Reserves, would be at the Training Area during the week of the inspection.

The Weldon Spring Citizens Commission was notified by email that the inspection was to take place. EPA and MDNR were provided a 30-day advance notice in order to participate in the inspection.

2.9 Operation and Maintenance (O&M) Costs

The O&M costs are not included in this inspection as the project has not yet entered the O&M phase. The estimate in the LTS&M Plan remains accurate for budget planning purposes.

2.10 Environmental Monitoring Data

The environmental data from the Weldon Spring Site are available on the following LTS&M Program website: www.gjo.doe.gov/programs/ltsm. A monthly internal report also is issued which includes validated environmental data results for each month. The report also includes a site summary, data trending, chain-of-custody information, adequacy of quality control sample results, data assessment summaries, information on data that are outside the range of historical concentrations, and data that merit explanation or follow-up action, sampling and analytical schedules, trip reports, and sampling location maps.

Results of all environmental monitoring data are summarized and included in the Annual Site Environmental Report. The report includes trending information on the data and also reports on other aspects of the project including status and regulatory information. The Annual Site Environmental Report for 2003 will be available in July 2004.

2.11 Prairie Maintenance

Section 2.6 of the Draft LTS&M Plan states that routine maintenance of the prairie completed during the previous 12 months will be summarized in the annual inspection report. This summary is as follows:

A variety of prairie maintenance activities have been completed throughout the previous 12 months. An extensive overseeding operation of approximately 300 pounds of prairie grass and forb seed was performed in January, 2003. Periodic mowing was performed throughout the year in order to limit weed establishment. Herbicide was applied in selective locations to limit encroachment of invasive exotic weed species from surrounding properties. Hand weeding also was performed throughout the prairie area. A comprehensive erosion control effort was completed that consisted of compacting composted material in erosion channels and then overseeding with annual cereal grains.

3.0 Findings and Recommendations

1. **Finding:** Some of the monitoring wells observed did not have identification numbers, or did not have the correct identification number.

Recommendation: Apply appropriate identification numbers to each well that does not have one.

Target Date: May 2004

2. **Finding:** A few monitoring wells and their ballards needed repainting.

Recommendation: Repair paint on cited wells.

Target Date: May 2004

3. **Finding:** Irregular surface on northwest corner of the disposal cell was identified as an as-built condition prior to the inspection.

Recommendation: Document this as a baseline condition with survey maps and review again at next annual inspection.

Target Date: February 2004 and October 2004

4. **Finding:** The Highway D culvert is exposed in the ditch between Highway D and the outlet end of the culverts.

Recommendation: Transmit a copy of this inspection report to MoDOT for consideration.

Target Date: February 2004

5. **Finding:** The downstream end of the State Route 94 culvert was corroded on the bottom and the last section of pipe has partially separated from the rest of the culvert causing runoff to leak through and erode beneath the final segment of culvert. MoDOT is adding pavement as a shoulder on State Route 94 and this construction activity could be contributing to additional erosion on the embankments.

Recommendation: Transmit a copy of this inspection report to MoDOT for consideration.

Target Date: February 2004

6. **Finding:** An area of erosion was observed which originates from the chemical plant and continues onto the Army property. The erosion is next to the riprap that was installed for Outfall NP-0050. The erosion has produced a ditch about 2 feet in depth and has eroded out a gravel road used to travel around the Army property. The eroded area does not impact the disposal cell.

Recommendation: Transmit a copy of this report to the local representative of the Army Reserves for consideration. Repair of this area will be coordinated with the Army.

Target Date: February 2004 and May 2004

7. **Finding:** Several old wells owned by the county, used as test wells and which are not secure, were noted near and in the Quarry groundwater restriction area.

Recommendation: Transmit a copy of the inspection report to the County, pointing out the unsecured wells.

Target Date: February 2004

8. **Finding:** Telephone numbers as stated in the Draft LTS&M Plan were not posted.

Recommendation: Determine which telephone numbers are to be posted and in what locations and ensure that this is implemented. Revise the Draft LTS&M Plan if necessary.

Target Date: March 2004 (for posting). Next Revision of LTS&M Plan expected later in 2004.

4.0 Photographs



Photo 1: Photo taken from northwest corner of the site boundary facing south. Shows portion of proposed institutional control area within site boundary outside the disposal cell buffer zone.



Photo 2: Shows area west of the disposal area, including portion of proposed institutional control area buffer zone.



Photo 3: Burgermeister Spring.



Photo 4: Spring 6303.



Photo 5: The Quarry proper.



Photo 6: The outer edge of the quarry groundwater restriction institutional control area.



Photo 7: Quarry Area Reduction Zone facing east just south of Katy Trail.



Photo 8: Fence across the Southeast Drainage upstream of Highway 94.



Photo 9: Spring 5303 in the Southeast Drainage.



Photo 10: Spring 5304 in the Southeast Drainage.



Photo 11: View of outlet side of twin culverts under Highway D.



Photo 12: Eroded area where culverts are exposed in ditch between Highway D and outlet end.



Photo 13: Inlet end of State Route 94 culvert.



Photo 14: Outlet end of State Route 94 culvert.



Photo 15: The weir that discharges from the LCRS Pipeline into the Missouri River.



Photo 16: Disposal Cell Inspection Team 1 ending Transect 1, accompanied by the State and EPA.



Photo 17: Disposal Cell Inspection Team 2 starting Transect 6.



Photo 18: Test Plot 1 location for rock degradation information.



Photo 19: Test Plot 2 location for rock degradation information.



Photo 20: Test Plot 3 location for rock degradation information.



Photo 21: Test Plot 4 location for rock degradation information.



Photo 22: Test Plot 5 location for rock degradation information.



Photo 23: Stairs leading to the top of the disposal cell.



Photo 24: Guard rail around disposal cell.



Photo 25: Erosion areas behind the disposal cell.



Photo 26: Outside of LCRS building.



Photo 27: LCRS sump area with manhole in center of photo.



Photo 28: Area of erosion onto the Army property.
The eroded ditch is to the left and outfall NP-0050 is to the right.



Photo 29: Information plaques on top of the disposal cell.



Photo 30: An example of a site groundwater monitoring well. This well is secured (locked), maintained, and properly identified.

Appendix A

Inspection Checklist

Purpose of the Checklist

I. SITE INFORMATION	
Site name: DOE Weldon Spring Site	Date(s) of inspection: 10/28-29/2003
Location: St. Charles, MO	EPA ID: MO6210022830
Agencies accompanying DOE for portions of the annual inspection: ☒ EPA, Region 7 ☒ MDNR ☒ Other (list) MDOC	Weather: Clear to Partly Cloudy Moderate Temperatures
Remedy Includes: Disposal Cell Institutional controls Monitored Natural Attenuation Long Term Monitoring Other _____	
Attachments: ☒ Inspection team roster attached (Report) ☒ Site map attached to report	
II. INTERVIEWS (Check all that apply)	
1. Local Site Manager <u>Mary Oaks</u> <u>Project Manager</u> <u>10/29/03</u> Name Title Date Interviewed ☒ at site ☐ at office ☐ by phone Phone no. <u>636-926-7022</u> Problems, suggestions; Report attached <u>N/A</u> <u>* Participated in inspection</u>	
2. Environmental Data Manager <u>Randy Thompson</u> <u>Env. Data Manager</u> <u>10/28/03</u> Name Title Date Interviewed ☒ at site ☐ at office ☐ by phone Phone no. <u>636-926-7040</u> Check to ensure that environmental data is reviewed and trended. Check for data and/or trend issues. Problems, suggestions; Report attached <u>N/A</u> <u>* Participated in inspection</u>	
3. Other Staff (as applicable) <u>Clark Oberlag</u> <u>Sampler</u> <u>10/29/03</u> Name Title Date Interviewed ☒ at site ☐ at office ☐ by phone Phone no. <u>636-926-7056</u> Problems, suggestions; Report attached <u>N/A</u>	

4. **Local response agencies:** Contact to notify of annual inspection and to determine if there are any concerns or issues.

Agency: St. Charles County Sheriff N/A
Contact _____
Name Title Date Phone no. 636-949-3005
Problems; suggestions; ☐ Report attached _____

Agency: Cottleville Fire Department N/A
Contact _____
Name Title Date Phone no. 636-447-6655
Problems; suggestions; ☐ Report attached _____

Agency: SimplexGrinnel (LCRS and Interpretive Center Alarm Company)
Contact Gail Allen 11/21/04 888-746-7539
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached NA Contacted Simplex and clarified contact names and phone numbers. They had the correct list

Agency: MDOC
Contact John Vogel Area Manager 10/21/03 636-300-1958
Name Title Date Phone no. X318
Problems; suggestions; ☒ Report attached Discussed in inspection report

Agency: Dept. of Army
Contact Jerry Stubblefield Facility Manager 10/24/03 636-329-1200
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached Contacted Mr. Stubblefield to inform him we would be inspecting wells on ~~the~~ ^{Army} property on 10/28-29. He stated he would not be in, but to contact Adam Ross.

5. **Stakeholders:** Contact to notify of annual inspection and to determine if there are any concerns or issues.

Agency: Francis Howell School District **Contact Name:** Dr. Susan J. Cobb, Exec. Dir. Of HR *N/A*

Contact Name Current ☐ yes ☐ no

Phone Number Current ☐ yes ☐ no _____ (new phone no. if applicable)

Contact _____ 636-441-0088
Name (if different than above) Title Date Phone no.

Problems; suggestions; ☐ Report attached _____

Agency: Weldon Spring Citizens Commission **Contact Name:** Helene Diller, Admin. Assistant

Contact Name Current ☒ yes ☐ no

Phone Number Current ☐ yes ☐ no _____ (new phone no. if applicable)

Contact _____ 636-926-7061
Name (if different than above) Title Date Phone no.

Problems; suggestions; ☐ Report attached Contacted by e mail to notify of inspection

Other: _____

Contact _____
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached _____

6. **Other interviews** (Prior to inspection, determine if any citizens or groups have expressed any concerns or interests in the site. Check site email and Grand Junction contact phone logs) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **Documents**

☒ Surveillance and Maintenance Plan

☒ Readily available

☒ Up to date

☐ N/A

☒ As-built drawings

☒ Readily available

☒ Up to date

☐ N/A

☐ Maintenance logs

☐ Readily available

☐ Up to date

☒ N/A

Remarks _____

2.	Site-Specific Health and Safety Plan ☐ Contingency plan/emergency response plan ☐ Confined Space Plan and Training for LCRS	☒ Readily available ☒ Readily available ☒ Readily available	☒ Up to date ☒ Up to date ☒ Up to date	☐ N/A ☐ N/A ☐ N/A
Remarks _____				
3.	Permits and Service Agreements ☐ NPDES Permits ☐ MSD agreement and records ☐ Other permits _____	☒ Readily available ☒ Readily available ☐ Readily available	☒ Up to date ☒ Up to date ☐ Up to date	☐ N/A ☐ N/A ☐ N/A
Remarks _____				
4.	Groundwater Monitoring Records	☒ Readily available	☒ Up to date	☐ N/A
Remarks _____				
5.	Leachate Records	☒ Readily available	☒ Up to date	☐ N/A
Remarks _____				
6.	Interpretative Center Sign-In Logs	☒ Readily available	☒ Up to date	☐ N/A
Remarks _____				
IV. O&M COSTS				
1.	Organization <i>N/A. Not currently in the O&M Phase of the project.</i> ☐ DOE ☐ Contractor for DOE ☐ Other participants (list organizations) _____			
2.	O&M Cost Records (This information may be reviewed and completed prior to the inspection) Original O&M cost estimate _____ ☐ Breakdown attached Total annual cost for prior federal fiscal year: From _____ To _____ ☐ Breakdown attached Date Date Total cost			
3.	Unanticipated or Unusually High O&M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ _____			

V. INSTITUTIONAL CONTROLS

Institutional Control (IC) Inspections

1. **Land and Shallow Groundwater Use within the Site Proper Boundary (Outside Disposal Cell Buffer Zone)**

Inspect for indications of excavations into soil or bedrock and groundwater withdrawal or use in restricted areas. If any party has been granted use of portions of the Chemical Plant area, inspect to ensure that land use is in compliance with the terms of the restrictions within the notation.

Note any observations: No indications of excavations into soil or bedrock. No indications of groundwater withdrawal or use in restricted area.

Erosion areas noted north and northwest of the cell that had been repaired. No land use changes.

2. **Land and Shallow Groundwater Use at DOE Site Proper Disposal Cell and Buffer Zone**

Inspect for indications of excavations into soils and bedrock and for residential use of the shallow groundwater within the buffer zone. Inspect to ensure that land use continues to be in compliance with the terms of the restrictions within the notation.

Note any observations: No indications of excavations into soils and bedrock. No indications of residential use of the shallow groundwater. No land use changes.

3. **Groundwater Use in Areas Surrounding the Chemical Plant**

Groundwater use is restricted in areas. Inspect affected areas for evidence of groundwater or spring water use (Burgermeister Spring and Spring 6303). Inspect to ensure that land use continues to be in compliance with the terms of the license, easement, or permit and the restrictions contained therein.

Note any observations: No evidence of groundwater or spring water use in the area. No land use changes.

4. **Land and Shallow Groundwater Use on the DOE Quarry Property**

Inspect for indications of excavations into soil or bedrock and groundwater withdrawal or use in restricted areas. If any party has been granted use of portions of the Quarry area, inspect to ensure that land use is in compliance with the terms of the restrictions within the notation.

Note any observations: No indications of excavations into soil or bedrock. No indications of groundwater use or withdrawal. No land use changes.

5. **Groundwater (Quarry)**

Groundwater use is restricted in areas. Inspect affected areas for evidence of groundwater withdrawal or use in the area of impact. Inspect to ensure that land use continues to be in compliance with the terms of the license and the restrictions contained therein.

Note any observations: No evidence of groundwater withdrawal or use. No land use changes.

6. **Land Use in Quarry Area Reduction Zone**

A naturally occurring reduction zone exists in soil south of the Katy Trail and north of the Femme Osage Slough. Inspect for indications of excavations into soils and bedrock in the uranium reduction zone. Inspect to ensure that land use continues to be in compliance with the terms of the easement and the restrictions contained therein.

Note any observations: No indications of excavations into soils or bedrock.
No land use changes.

7. **Southeast Drainage**

Check for indications of residential use or construction in the Southeast Drainage (200-foot-wide corridor), or other activity that would indicate nonrecreational use of the area. Check Springs 5303 and 5304 for residential, commercial, or agricultural use of spring water.

Note any observations: No indications of residential use or construction
in the SE Drainage or other activity that would indicate
nonrecreational use. No indications of residential, commercial,
or agricultural use of spring water.

8. **Highway D Culvert**

Check for signs of disturbance of the affected region where the Frog Pong outlet culverts pass beneath Highway D and in the utility rights-of-way in the affected area.

Note any observations: The area where the culvert passes
beneath the ditch between Highway D and the north
end of the culvert was eroded on top, exposing the culverts.

9. **State Route 94 Culvert**

Check for signs of disturbance of the affected region where the culvert passes beneath State Route 94 and in the utility rights-of-way in the affected area.

Note any observations: Upstream end partially blocked with debris
and erosion occurring on embankment. The downstream end of
the culvert is corroded on the bottom and the last section of
pipe has partially separated from the rest of the culvert
causing runoff to leak through and cause erosion of the embankment

10. **Pipeline from LCRS to Missouri River**

Inspect the entire length of the pipeline and outfall for any disturbances or maintenance needs.

Note any observations: The outfall appeared to be in good condition.

C. Institutional Control Annual Contact Log *N/A. The IC instruments are not in place*

In accordance with the LTS Plan, the following will be contacted to verify cognizance of institutional controls and real estate agreements. Fill in all that apply.

1. **Agency:** Missouri Department of Conservation **Contact Name:** Joel Porath, Wildlife Regional Supv.
Address: August A. Busch Memorial Conservation Area, 2360 Highway D, St. Charles, MO 63304
Institutional Control and Real Estate Licenses to Verify: Chemical Plant Groundwater Use Restriction, Quarry Area Groundwater Use Restriction, Quarry Reduction Zone Land Use Restriction, Southeast Drainage Residential Use Restriction, Missouri State Highway 94 Culvert, Hwy D Culverts, North Gate Access, Blanket Well Installation and Sampling Agreement, Effluent Discharge Pipeline, Hamburg Trail Use Agreement.
Contact Name Current ☐ yes ☐ no
Phone Number Current ☐ yes ☐ no _____ (new phone no. if applicable)

Contact _____
Name (if different than above) Title Date 636-441-4554
Phone no.

Problems; suggestions; ☐ Report attached _____

2. **Agency:** Missouri Department of Conservation **Contact Name:** Don Schulteheinrich, Realty Spec.
Address: P.O. Box 180, Jefferson City, MO 65102
Institutional Control and Real Estate Licenses to Verify: See No. 1
Contact Name Current ☐ yes ☐ no
Phone Number Current ☐ yes ☐ no _____ (new phone no. if applicable)

Contact _____
Name (if different than above) Title Date 573-751-4115
Phone no.

Problems; suggestions; ☐ Report attached _____

3. **Agency:** Missouri Department of Natural Resources **Contact Name:** Lori Huber, Parks Operation Off.
Address: P.O. Box 176, Jefferson City, MO 65102
Institutional Controls and Real Estate Licenses to Verify: Quarry Area Groundwater Use Restriction, Quarry Reduction Zone Land Use Restriction, Southeast Drainage Residential Use Restriction, Blanket Groundwater Well Sampling Access Agreement, Effluent Discharge Pipeline
Contact Name Current ☐ yes ☐ no
Phone Number Current ☐ yes ☐ no _____ (new phone no. if applicable)

Contact _____
Name (if different than above) Title Date 573-751-5374
Phone no.

Problems; suggestions; ☐ Report attached _____

4. **Agency:** Missouri Department of Transportation **Contact Name:** Ed Warhol, Bldg and Grounds Spec.
Address: 1590 Woodlake Dr., Chesterfield, MO 63017
Institutional Controls to and Real Estate Licenses to Verify: Chemical Plant Groundwater Use Restriction, Missouri State Highway 94 Culvert, Highway D Culverts
Contact Name Current ☐ yes ☐ no
Phone Number Current ☐ yes ☐ no _____ (new phone no. if applicable)

Contact _____
Name (if different than above) Title Date 314-340-4250
Phone no.

Problems; suggestions; ☐ Report attached _____

5. **Agency:** Missouri Department of Transportation **Contact Name:** Don Wichern, Asst. District Engineer
Address: 1590 Woodlake Dr., Chesterfield, MO 63017
Institutional Controls to and Real Estate Licenses to Verify: Chemical Plant Groundwater Use
Restriction, Missouri State Highway 94 Culvert, Highway D Culverts
Contact Name Current ☐ yes ☐ no
Phone Number Current ☐ yes ☐ no _____ (new phone no. if applicable)

Contact _____ 314-340-4202
Name (if different than above) Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

6. **Agency:** U.S. Dept. of Army **Contact Name:** Jerry Stubblefield, Facility Manager
Address: Weldon Spring Training Area, 7301 Hwy 94 S. St. Charles, MO 63304
Institutional Controls to and Real Estate Licenses to Verify: Chemical Plant Groundwater Use
Restriction, Effluent Discharge Pipeline, Blanket Groundwater Well Sampling Access Agreement
Contact Name Current ☐ yes ☐ no
Phone Number Current ☐ yes ☐ no _____ (new phone no. if applicable)

Contact _____ 636-329-1200x231
Name (if different than above) Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

7. **Agency:** St. Charles County Recorder of Deeds
Address: 201 N 2nd . St. Charles, MO 63301
Institutional Controls to and Real Estate Licenses to Verify: Deed Restrictions

Contact _____ 636-949-7505
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

8. **Agency:** St. Charles County Planning and Zoning Department
Address: 201 N 2nd . St. Charles, MO 63301
Institutional Controls to and Real Estate Licenses to Verify: Awareness of Restrictions

Contact _____ 636-949-7335
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

General	
1.	Land Use Changes On Site ☐ Yes ☒ No Remarks _____ _____ _____ _____
2.	Land Use Changes Off Site ☐ Yes ☒ No Remarks _____ _____ _____ _____
VI. GENERAL SITE CONDITIONS	
1.	Roads ☒ Location shown on site map <i>w/ report</i> ☒ Roads adequate Remarks _____ _____ _____ _____
2.	Vandalism ☐ Location shown on site map ☒ No vandalism noted Remarks _____ _____ _____ _____
3.	Personal Injury Risks ☒ Housekeeping maintained Remarks _____ _____ _____
4.	Site Markers (Four Information Plaques on Top of Cell, Historical Markers, and Other Information Markers) ☒ Location shown on site map <i>w/ report</i> ☒ Legible and Secure Remarks <i>The telephone numbers are not listed as discussed in the Draft LTS&M Plan</i> _____ _____
5.	Guard Rail Around Cell ☒ Location shown on site map <i>report</i> ☒ Secure Remarks _____ _____ _____

6. **Stairs to Top of Cell** ☒ Location shown on site map
☒ Stairs in good condition ☒ Handrail stable and in good condition

Remarks _____

7. **Other Site Conditions:**

Remarks _____

VII. EROSION

1. **Chemical Plant Areas** ☐ Location shown on site map ☐ Erosion not evident

Areal extent _____ Depth 6"

Remarks Some erosion present north and northwest of the disposal cell that had been repaired.

Erosion ditch from Chemical Plant onto Army property under the fence.

2. **Quarry Area** ☐ Location shown on site map ☒ Erosion not evident

Areal extent _____ Depth _____

Remarks _____

Area appears to be stable with good vegetative cover.

VIII. CHEMICAL PLANT DISPOSAL CELL

1. **Settlement/Bulges** ☐ Location shown on site map ☒ Settlement not evident
Areal extent _____ Depth _____

A. Annually: Walk along the grade break at the top of the side slopes, around the cell perimeter, and along 10 random transects across the cell surface. Inspect for local depressions, regional departures from planar surfaces, and shifts in intersections (vertices) of cell surface planes. Inspect for vertical shear of the cover layers indicated by sudden, abrupt steps that exceed an approximately 6-inch change of surface level over no more than 10 feet distance.

B. During 5-Year Review Inspections (Beginning 2005 and at 5-year Intervals): Conduct an aerial mapping survey with a vertical resolution not less precise than 0.5 feet. Produce and record maps and survey data for the cell surface represented by 1.0 foot contour intervals. Evaluate the data for indications of settlement. Consider the position and spacing of contour lines as indications of elevation change and possible settlement.

Remarks Inspectors walked 10 transects and around grade break
(See figure in report). Cell surface was in good condition.
Aerial survey which was flown in May 2003 was discussed.

2. **Rock Cover** ☐ Signs of degradation ☐ Signs of intrusion

A. Annually: During settlement monitoring inspection also visually inspect for departures from original rock conditions or from the previous inspection. Note observable discoloration on areas larger than 2,500 square feet, presence of finer materials at surface and apparent rock gradation changes. Document rock conditions annually with photographs.

B. During 5-Year Review Inspections (Beginning 2005 and at 5-year Intervals): Inspect cell cover for gradation changes by walking 10 randomly spaced transects across the cell. Concentrations of degraded, split, or weathered pieces of limestone will be mapped, photodocumented and visually assessed as a percentage of rock exposed within each mapped area. If degraded rock is evenly distributed, inspectors will estimate the overall percentage of degraded rock. If the amount of degraded rock appears to be increasing, based on a review of previous annual rock quality assessments, additional monitoring or gradation testing will be performed. If rock does not appear degraded, photodocumentation of several GPS located areas will establish rock conditions for future reference.

Remarks Inspectors walked 10 transects and marked 5 areas
to document annually for rock degradation (See figure in report).
Rock was in good condition. No evidence of post-construction
degradation.

3. **Vegetative Growth** ☒ Weeds ☐ Plants
☐ Trees/Shrubs

Remarks 1 claudia weed on west side of disposal cell towards
bottom of slope.

4.	Wet Areas/Water Damage ☐ Wet areas ☐ Ponding ☐ Seeps Remarks <u>N/A</u>	☐ Wet areas/water damage not evident ☐ Location shown on site map Areal extent _____ ☐ Location shown on site map Areal extent _____ ☐ Location shown on site map Areal extent _____
5.	Toe/Apron Drains Remarks _____	☒ Proper drainage ☐ Silting ☐ Evidence of erosion
6.	Slope Instability Areal extent _____ Remarks _____	☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
7.	Leachate Collection and Removal System ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition ☐ LCRS flow rates ☐ Flow rate issues ☒ Review data trending and Action Leakage Rate review ☒ Sump Containment System (Burrito) flow rates ☒ Burrito flow rate issues ☒ Alarm system functioning ☐ Methane Detection System functioning ☒ Compliance with MSD Agreement ☒ Review shipping records ☒ Check alarm records (note any issues) Remarks _____	
8.	Condition of 300 Ft. Buffer Zone ☐ Evidence of erosion (shown on map) ☒ Vegetative growth of woody species (show location) ☒ Check condition of survey monuments Remarks <u>Ho Good condition</u>	
9.	Condition of Prairie ☐ Evidence of erosion (shown on map) ☐ Vegetative growth of woody species (show location) Remarks <u>good condition</u>	

IX. GROUNDWATER MONITORING

1. **Disposal Cell Monitor Well Network**
☒ Properly secured/locked ☒ Functioning ☒ Sampled in accordance with LTS&M Plan
☒ Good condition ☐ Evidence of surface water infiltration at casing ☐ Needs maintenance
☒ Proper ID on each well ☒ Acceptable quality of data
☐ Any issues with data trends (See Section II.2)
 Remarks The following wells did not have a proper ID: MW-2032
Paint was peeling on MW-2046

2. **Chemical Plant Groundwater Monitor Well Network**
☒ Properly secured/locked ☒ Functioning ☒ Sampled in accordance with LTS&M Plan
☒ Good condition ☐ Evidence of surface water infiltration at casing ☐ Needs maintenance
☒ Acceptable quality of data ☐ Any issues with data trends (see Section II.2)
 List wells checked by number (> 10% of wells) 4035, 4011, 1C05, 1C1W1, 1C04, 4027, 4028, 4029, 1C04, 4032, 4036, 4006, 4001, 4007, 4033, 2055, 2023, 2024, 2022, 2005, 2001, 2002, 2021, 2045, 2053, 2006, 2052, 2012, 2049, 2050, 4039, 4030, 2033, 2013, 4026
 Remarks 1C05, 1C1W1, 1C04, 4039, 4030 were not properly identified
4026 had paint peeling

3. **Quarry Monitor Well Network**
☒ Properly secured/locked ☒ Functioning ☒ Sampled in accordance with LTS&M Plan
☒ Good condition ☐ Evidence of surface water infiltration at casing ☐ Needs maintenance
☒ Acceptable quality of data ☐ Any issues with data trends (see Section II.2)
 List wells checked by number (> 10% of wells) 1029, 1002, 1004, 1005, 1030, 1028, 1045, 1014, 1013, 1031, 1048, 1051 (numbered OW-3), 1052 (numbered OW-4), 1049, 1047, 1032, 1008, 1009, 1006, 1007, 1046, 1015 (numbered 1016 on map), 1016 (numbered 1015 on map) OW-1, 2, 4, 5
 Remarks 1051, 1052, 1015, 1016 are misnumbered.

X. OVERALL OBSERVATIONS

A. Implementation of the Remedies

Describe issues and observations relating to whether the remedies are effective and functioning as designed.

It was observed during the inspection that the current remedies are effective and functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedies.

C. Early Indicators of Potential Remedy Problems

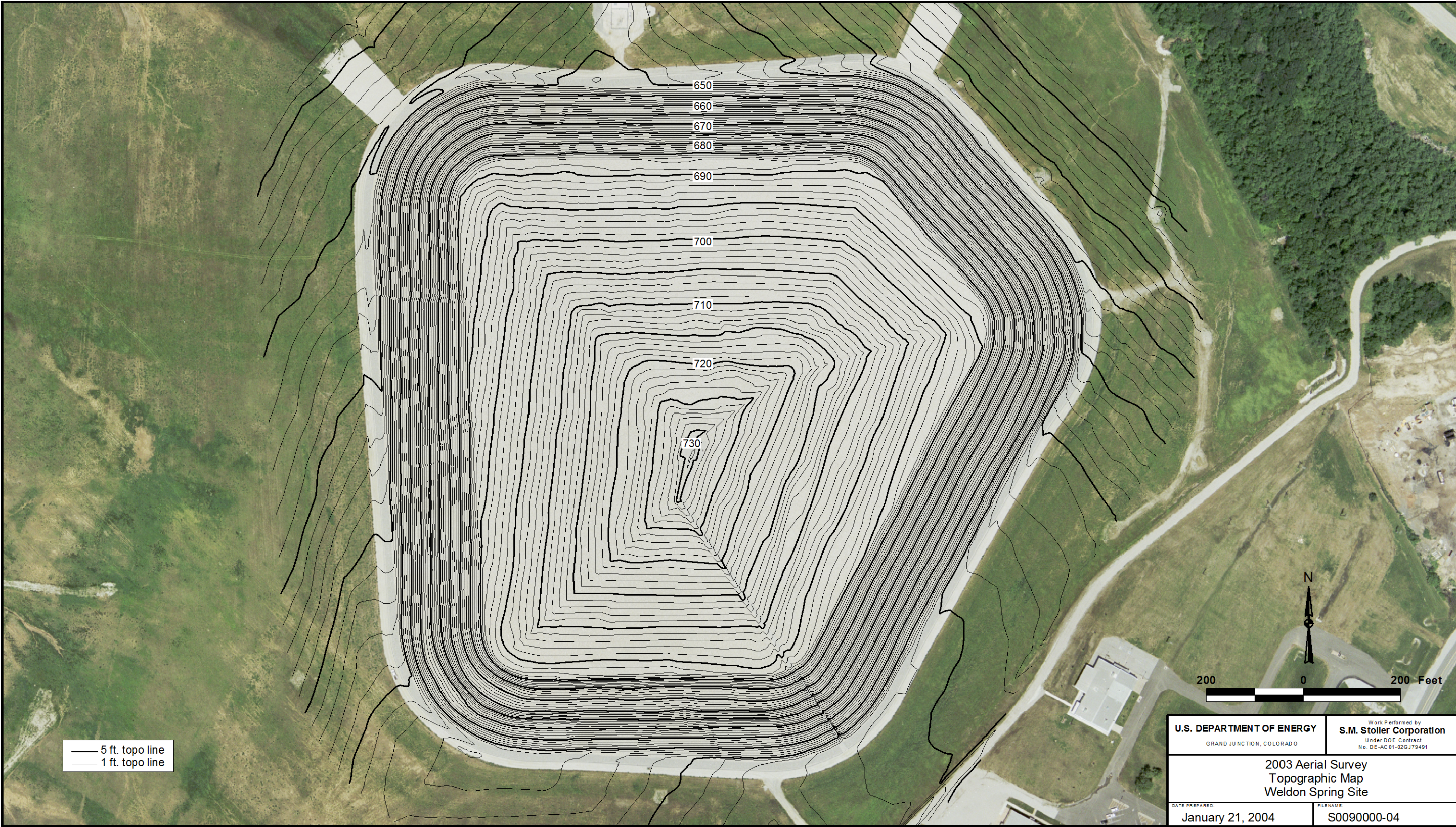
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of one or more of the remedies may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedies.

ASA = Asbestos Storage Area
CMSA = Construction Material Staging Area
GCL = Geosynthetic Clay Liner
MSA = Material Staging Area

Appendix B
Site Topographic Map



Appendix C

LCRS Data

MSD Hauled Leachate Data

		Reporting period												
		Batch #	L001	L002	L003	L004	L005	L006	L007	L008	L009	L010	L011	L012
		Date Hauled	04-Feb-02	08-Mar-02	05-Apr-02	08-May-02	17-Jun-02	16-Jul-02	06-Aug-02	06-Sep-02	03-Oct-02	31-Oct-02	14-Nov-02	13-Dec-02
Parameter	Units	MSD Limit												
Leachate Volume	gallons	15,000 gal/mo	10,000	11,168	8,557	10,981	11,387	8388	5601	9291	8524	7370	3004	9016
COD	mg/l	Monitor	27	34	26	24	15	26	36	36	28	25	25	33
TSS	mg/l	Monitor	45	28	16	12	45	53	47	68	48	50	47	12
Arsenic	mg/l	Monitor	0.0015	ND (0.0012)	ND (0.0024)	ND (0.010)	0.004	0.0032	0.0067	0.0086	0.0084	ND (0.0100)	ND (0.010)	ND (0.010)
Barium	mg/l	Monitor	0.592	0.509	0.554	0.511	0.815	0.844	0.407	1.09	1.03	1.03	1.07	0.743
Copper	mg/l	Monitor	ND (0.0054)	ND (0.0014)	ND (0.0019)	0.0074	0.0033	0.0048	ND (0.0077)	ND (0.0077)	ND (0.0077)	ND (0.0250)	ND (0.025)	ND (0.025)
Iron	mg/l	Monitor	14.1	10.1	5.68	5.01	19.4	13.2	17.3	27.9	21.7	23.8	21	4.54
Lead	mg/l	Monitor	ND (0.00099)	ND (0.00099)	ND (0.0021)	ND (0.003)	ND (0.0021)	ND (0.003)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0030)	ND (0.003)	ND (0.003)
Chromium	mg/l	Monitor	ND (0.00073)	ND (0.00073)	ND(0.0013)	ND (0.010)	ND (0.013)	ND (0.010)	ND (0.0020)	ND (0.0020)	ND (0.002)	ND (0.0100)	ND (0.010)	ND (0.010)
Mercury	mg/l	Monitor	ND (0.00010)	ND (0.000.10)	ND (0.00010)	ND (0.0002)	ND (0.00010)	0.00046	0.00018	ND (0.00010)	ND (0.0001)	ND (0.0020)	ND (0.0002)	ND (0.0002)
Nickel	mg/l	Monitor	0.0107	0.0104	0.0069	0.0087	0.0109	0.0094	ND (0.0120)	ND (0.0120)	ND (0.0120)	ND (0.0400)	ND (0.040)	ND (0.040)
Selenium	mg/l	Monitor	ND (0.0012)	ND (0.0012)	ND (0.0022)	ND (0.005)	ND (0.0022)	ND (0.005)	ND (0.0012)	ND (1.0012)	ND (0.0012)	ND (0.0050)	ND (0.005)	ND (0.0005)
Silver	mg/l	Monitor	ND (0.0070)	ND (0.0017)	ND (0.001)	ND (0.010)	ND (0.0010)	ND (0.0010)	ND (0.0060)	ND (0.0060)	ND (0.0060)	ND (1.0100)	ND (0.010)	ND (0.010)
Zinc	mg/l	Monitor	0.0277	0.0193	0.0126	0.0103	0.0109	0.0197	0.0054	0.0088	0.022	ND (0.0200)	ND (0.020)	ND (0.020)
VOA's	ug/l	Monitor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Gross Alpha	pCi/l	Monitor	57.2 + 10.0	55.8 + 5.50	66.7 + 5.84	64.9 + 7.69	34.6 + 4.70	37.7 + 4.75	62.3 + 11.2	28.1 + 3.46	25.8 + 2.91	16.8 + 2.16	30.0 + 3.17	39.9 + 3.7
Uranium, Total	pCi/l	3000	46.8 + 0.515	55.7 + 0.076	57.3	34.0 + 0.393	40.3 + 0.745	33.4 + 0.472	33.9 + 0.839	31.1 + 0.765	27.8 + 0.684	16.0 + 0.179	40.2 + 0.567	32.09 + 0.437
Uranium, Total Filtered	pCi/l	Monitor	47.5 + 0.525	53.5 + 0.562	56.3	38.9 + 4.5	40.9 + 0.751	35.5 + 0.435	34.3 + 0.846	31.0 + 0.765	29 + 0.724	18.4 + 0.203	41.0 + 0.578	30.3 + 0.391
Thorium - 228	pCi/l	2000	0.336 + 0.153	ND(0.291)	0.009 + 0.102	ND(0.263)	0.040 + 0.064	0.123 + 0.133	ND (0.178)	ND (0.146)	ND (0.202)	ND (0.425)	ND (0.132)	ND (0.203)
Thorium - 230	pCi/l	1000	ND(0.620)	0.081 + 0.113	0.326 + 0.183	0.269 + 0.150	ND(0.412)	0.148 + 0.186	ND (0.318)	ND (0.360)	ND (0.511)	ND (0.780)	ND (0.392)	ND (0.268)
Thorium - 232	pCi/l	250	0.246 + 0.122	0.051 + 0.087	0.068 + 0.085	ND(0.148)	0.060 + 0.067	0.170 + 0.129	ND (0.087)	ND (0.143)	ND (0.206)	ND (0.384)	ND (0.132)	ND (0.186)
Radium - 226	pCi/l	10	0.073 + 0.286	0.162 + 0.150	0.329 + 0.265	0.315 + 0.131	0.195 + 0127	0.112 + 0.095	0.454 + 0.138	0.497 + 0.201	0.511 + 0.169	0.506 + 0.136	0.430 + 0.198	0.248 + 0.132
Radium - 228	pCi/l	30	0.455 + 0.043	0.635 + 0.068	0.809 + 0.046	1.37 + 0.050	1.31 + 0.045	0.77 + 0.047	ND (0.469)	ND (0.469)	ND (0.469)	ND (0.133)	ND (0.133)	1.81 + 0.050
Americium - 241	pCi/l	150	ND (0.245)	ND(0.749)	ND(0.378)	0.223 + 0.123	0.063 + 0.166	0.105 + 0.093	0.231 + 0.152	ND (0.233)	ND (0.0879)	ND (0.259)	ND (0.389)	ND (0.332)
Neptunium - 237	pCi/l	150	0.035 + 0.109	0.755 + 0.246	0.131 + 0.098	ND(0.083)	0.157 + 0.083	0.007 + 0.075	ND (0.271)	1.01 + 0.285	ND (0.146)	ND (0.175)	0.882 + 0.321	0.728 + 0.202
Plutonium - 238	pCi/l	200	0.077 + 0.163	ND (0.171)	0.064 + 0.062	0.058 + 0.065	0.050 + 0.084	0.007 + 0.075	ND (0.343)	ND (0.213)	ND (0.273)	ND (0.645)	ND (0.232)	ND (0.445)
Plutonium - 239/240	pCi/l	150	0.086 + 0.101	0.975 + 0.454	0.157 + 0.073	0.058 + 0.053	0.054 + 0.050	0.029 + 0.054	ND (0.137)	ND (0.246)	ND (0.315)	ND (0.645)	ND (0.307)	ND (0.225)
Technetium - 99	pCi/l	6000	0.770 + 0.461	0.169 + 0.240	ND(0.626)	0.523 + 0.642	0.411 + 0.487	0.122 + 0.546	ND (1.42)	ND (1.83)	1.18 + 0.717	1.33 + 0.739	ND (1.66)	ND (1.77)

Total leachate volume during reporting period = 103,287 gallons.

MSD = Metropolitan St. Louis Sewer District

ND = Not Detected

() = Detection Limit

MSD Hauled Leachate Data

			Reporting period									
			Batch #	L013	L014	L015	L016	L017	L018	L019	L020	L021
			Date Hauled	21-Jan-03	03-Mar-03	01-Apr-03	05-May-03	11-Jun-03	16-Jul-03	26-Aug-03	06-Oct-03	13-Nov-03
Parameter	Units	MSD Limit										
Leachate Volume	gallons	15,000 gal/mo Combined Total	9,683	8,802	8,887	8,656	8,617	8897	9895	9000	8878	
Purge Water Volume	gallons		0	0	0	0	101	0	107	0	88.6	
COD	mg/l	Monitor	21	31	29	28	20	23	20	33	30	
TSS	mg/l	Monitor	16	38.8	22	21.2	15.7	32.8	25.5	39.5	42.5	
Arsenic	mg/l	Monitor	ND (0.010)	0.0043	0.0018	0.0024	0.0015	0.0038	0.0036	0.0075	0.004	
Barium	mg/l	Monitor	0.803	0.975	0.829	0.811	0.784	0.996	1	1.15	1.16	
Copper	mg/l	Monitor	ND (0.025)	0.0019	0.0373	0.0148	0.0013	0.0013	0.001	0..17	ND (0.000556)	
Iron	mg/l	Monitor	6.51	18.4	10	10.7	6.14	15.2	12.6	20.5	21.6	
Lead	mg/l	Monitor	ND (0.003)	ND (0.000111)	ND (0.000111)	0.00019	ND (0.000111)	0.00087	0.00013	0..0019	0.00048	
Chromium	mg/l	Monitor	ND (0.010)	ND (0.000889)	ND (0.000889)	ND (0.00089)	ND (0.00089)	ND (000889)	ND (0.000889)	ND (0.556)	ND (0.000556)	
Mercury	mg/l	Monitor	ND (0.0002)	ND (0002)	ND (0.0002)	ND (0.002)	ND (0.0002)	ND (0.001)	ND (0.0001)	ND (0.0001)	ND (0.0001)	
Nickel	mg/l	Monitor	ND (0.040)	0.0082	0.0074	0.0063	0.0055	0.0082	0.0057	0.0059	0.0072	
Selenium	mg/l	Monitor	ND (0.005)	0.00055	0.00067	0.00051	0.00057	0.00057	0.00042	0.00047	0.00056	
Silver	mg/l	Monitor	ND (0.010)	ND (0.000111)	0.00052	0.00011	ND (0.00011)	0.0002	0.0003	ND (0.00011)	ND (0.000111)	
Zinc	mg/l	Monitor	ND (0.020)	ND (0.00111)	0.0032	ND (0.00089)	ND (0.00089)	ND (0.000889)	0.0017	ND (0.00178)	ND (0.00178)	
VOA's	ug/l	Monitor	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Gross Alpha	pCi/l	Monitor	31 + 3.5	11.1 + 6.93	14.7 + 6.68	22.6 + 6.89	9.48 + 6.08	18.7 + 9.38	11.5 + 6.49	9.67 + 3.69	7.76 + 3.58	
Uranium, Total	pCi/l	3000	33.6 + 0.373	36.3	31.82	30.6	25.6	25.16	21.35	21.42	17.476	
Uranium, Total Filtered	pCi/l	Monitor	34.9 + 0.397	*	*	*	*	*	*	*	*	
Thorium - 228	pCi/l	2000	0.112 + 0.061	ND (0.16)	ND ((0.176)	ND (0.083)	ND (0.102)	ND (0.041)	ND (0.013)	ND (0.177)	ND (0.133)	
Thorium - 230	pCi/l	1000	ND(0.309)	0.205 + 0.075	0.199 + 0.077	0.148 + 0.054	0.144 + 0.054	0.181 + 0.07	0.13 + 0.059	0.161 + 0.072	0.294 + 0.083	
Thorium - 232	pCi/l	250	ND (0.161)	ND (0.056)	ND (0.042)	ND (0.024)	ND (0.037)	ND (0.041)	ND (0.058)	ND (0.048)	ND (0.039)	
Radium - 226	pCi/l	10	0.359 + 0.148	0.59 + 0.11	0.47 + 0.11	0.39 + 0.09	0.42 + 0.1	0.26 + 0.11	0.59 + 0.12	0.75 + 0.12	0.63 + 0.11	
Radium - 228	pCi/l	30	ND (0.133)	1.28 + 0.54	0.99 + 0.5	ND (0.89)	ND (0.87)	ND (0.84)	ND (0.92)	0.97 + 0.49	ND (0.78)	
Americium - 241	pCi/l	150	ND (0.544)	*	*	*	*	*	*	*	*	
Neptunium - 237	pCi/l	150	ND (0.248)	*	*	*	*	*	*	*	*	
Plutonium - 238	pCi/l	200	0.330 + 0.196	*	*	*	*	*	*	*	*	
Plutonium - 239/240	pCi/l	150	ND (0.219)	*	*	*	*	*	*	*	*	
Technetium - 99	pCi/l	6000	2.23 + 0.943	*	*	*	*	*	*	*	*	

Total leachate volume during reporting period = 81,315 gallons.

Total purge water volume during reporting period = 297 gallons.

MSD = Metropolitan St. Louis Sewer District

ND = Not Detected

() = Detection Limit

* = Batch Monitoring Requirement Revised to Annual Monitoring by MSD