Second Five-Year Review Report

South 8th Street Landfill Superfund Site
West Memphis, Crittenden County, Arkansas

June 2009

Superfund Division
U.S. Environmental Protection Agency
Region 6
Dallas, Texas

[This page intentionally left blank]

Second Five Year Review Memorandum
South 8th Street Landfill Superfund Site
EPA ID# ARD980496723
West Memphis, Crittenden County, Arkansas

This memorandum documents the United States Environmental Protection Agency's (EPA's) performance, determinations, and approval of the South 8th Street Landfill Superfund Site (Site) Second Five-Year Review under section 121(c) of the Comprehensive Environmental Response, Compensation & Liability Act (CERCLA), 42 United States Code (USC) §9621, as provided in the attached Second Five-Year Review Report.

Summary of the Second Five-Year Review Findings

The assessment of the Site during the second five-year review is that the remedy remains protective of human health and the environment, and the remedial action objectives and goals have been met for the Site. The remedial actions were completed as set forth in the 1994 Record of Decision (ROD) and the 1998 ROD Amendment. The remedial action for the source control operable unit was completed in August 2000, and consisted of in-situ stabilization/solidification of 19,376 cubic yards of oily sludge waste and 20,372 cubic yards of ancillary soil; the installation of a soil cover over the 4.28 acre area of treated waste material; and the installation of a soil cover over a 2.7 acre landfill area in Area 1. The remedial action for the ground water operable unit was completed in 2003 and consisted of monitored natural attenuation for the reduction of metal concentrations in ground water. The institutional control consists of a property easement implemented under the 2000 Consent Decree to prevent accidental exposure to the treated waste and landfill contents as well as the ground water. The final remedial action report and the final close-out report were completed in June 2004, and the Site was deleted from the National Priorities List in September 2004.

Issues affecting the short-term or long-term performance of the completed remedial action at the Site were not identified during the Site inspections. The limited property redevelopment completed to date is consistent with the land use restrictions outlined in the property easement. There are no scheduled operation and maintenance requirements for this Site.

Actions Needed

Annual inspections will be conducted by the EPA to monitor future property redevelopment activities and verify compliance with the land use restrictions specified in the Site institutional controls. Also, an independent assessment of the long-term effectiveness of cement-based stabilization/solidification treatment of contaminated sites is nearing completion by the international Performance Assessment of Solidified/Stabilized Waste-Forms project. The draft report is currently under review by the principal authors, and the findings are not available for inclusion in the Second Five-Year Review Report. The research effort included sampling and analysis of treated material of different ages and with different contaminants from existing treated sites, including samples from the South 8th Street Landfill site. The evaluation of the samples collected from the South 8th Street Site, as well as how the sample results compare with

other sites using a cement-based stabilization/solidification treatment process, will be used by the EPA to evaluate the long-term performance of the remedial action.

Determinations

I have determined that the remedy for the South 8th Street Landfill Superfund Site is protective of human health and the environment. The remedy will remain protective of human health provided future property redevelopment activities are consistent with the land use restrictions specified in the property easement.

Pam Phillips, Acting — 6/16/2009

Samuel Coleman, Director — Date
Superfund Division
U.S. Environmental Protection Agency, Region 6

Concurrence List
Second Five Year Review
South 8th Street Landfill Superfund Site
EPA CERCLIS ID No. ARD980496723

Vincent Malott, Remedial Project Manager
Superfund Remedial Branch

5/20/2009
Date

Carlos A. Sanchez, Chief
AR/TX Section, Superfund Remedial Branch

5/28/09
Date

for Donald H. Williams, Deputy Associate Director
Superfund Remedial Branch

5/28/09
Date

Charles Faultry, Associate Director
Superfund Remedial Branch

6/1/09
Date

Anne Foster, Assistant Regional Counsel
Superfund Branch, Office of Regional Counsel

6/11/09
Date

Mark A. Peycke, Chief
Superfund Branch, Office of Regional Counsel

06/15/09
Date

Pamela Phillips, Deputy Director
Superfund Division

6/16/09
Date

[This page intentionally left blank]

Contents

Section **Page**

List of Tables

List of Figures

Attachments

Acronyms

ADEQ	Arkansas Department of Environmental Quality
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
MCL	Maximum Contaminant Levels
mg/L	milligrams per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated biphenyls
PRP	Potentially Responsible Party
RA	Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
TBCs	To Be Considereds
UCS	Unconfined Compressive Strength
USC	United States Code
UCL	Upper Confidence Level
UAO	Unilateral Administrative Order
µg/L	micrograms per liter
USC	United States Code
VOC	Volatile Organic Compound

[This page intentionally left blank.]

Executive Summary

Pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation & Liability Act ("CERCLA" or "Superfund"), 42 United States Code (USC) §9621(c), the second five-year review of the remedial actions implemented at the South 8th Street Landfill Superfund Site (Site) in West Memphis, Crittenden County, Arkansas, was initiated in October 2008 and completed in February 2009. Since the remedy set forth in the 1994 Record of Decision (ROD) and the 1998 ROD Amendment resulted in hazardous substances, pollutants, or contaminants remaining onsite above levels that would allow for unlimited use or unrestricted exposure, a statutory review is required for this Site. The results of the second five-year review indicate the remedy remains protective of human health and the environment. No deficiencies were noted that impact the protectiveness of the remedy. The completed remedial actions are functioning as designed, and the land use activities remain consistent with the property use restrictions described in the institutional controls.

The Site consists of a source control and ground water operable units (OU). The source control OU consists of a 16 acre landfill which contained a 2.5 acre oily sludge pit and ancillary soils. The remedial action for the source control OU was completed in August 2000. The remedial action consisted of in-situ stabilization/solidification of 19,376 cubic yards of oily sludge waste and 20,372 cubic yards of ancillary soil, and the installation of a soil cover over the 4.28 acre area of treated material and an adjacent 2.7 acre area of the landfill in Area 1. Sampling during the remedial action confirmed that the in-situ stabilization/ solidification of the oily sludge pit and ancillary soils achieved the remedial goals and the chemical and physical performance standards specified in the 1998 ROD Amendment.

For the ground water OU, nine monitoring wells were sampled during eight sampling events in 2002 and the analytical results confirmed that the source area treatment and natural attenuation processes in the aquifer have reduced the metal concentrations below the remedial goals specified in the 1998 ROD Amendment. The nine ground water monitoring wells were plugged and abandoned in June 2003.

Institutional controls were implemented at the site to prevent exposure to ground water and the treated waste and landfill contents. The Consent Decree (Section V.9.a, Section IX.24.b) lodged in the U.S. District Court for the Eastern District of Arkansas in November 1999 and entered in December 2000, specified a property easement, running with the land, that (i) grants a right of access for the purpose of conducting any activity related to the Consent Decree or any other activity related to implementing the ROD, including but not limited to, monitoring; and (ii) grants the right to enforce the land and water use restrictions listed in the Consent Decree to the United States, the State of Arkansas and its representatives, the other settling defendants, and other appropriate grantees. The land and water use restrictions specified in the property easement included: 1) the prohibition on the installation of water wells in the alluvial aquifer until the remedial goals for the ground water operable unit were achieved (these remedial goals were met for the Site in 2002); 2) the prohibition on the removal of vegetation from the landfill cover if such removal may result in the subsequent erosion or removal of the soil cover over the landfill or treated material; and 3) the prohibition on the excavation or trenching into the treated material, landfill contents, or the associated soil cover with some exceptions. The property

easement was executed on March 6, 2001 by the William L. Johnson Co. The prohibition on further excavation into the treated material, landfill contents, or soil cover effectively prohibits further well installation at the site due to the site-wide presence of the landfill and the treated oily sludge pit. Inspection costs are funded through the cash-out payments made by a group of the settling Potentially Responsible Parties under the terms of the Consent Decree.

The final remedial action report and the final close-out report were completed in June 2004 and the Site was deleted from the National Priorities List in September 2004.

There are no scheduled operation and maintenance requirements for this Site other than annual site inspections to monitor future property redevelopment activities and verify compliance with the land use restrictions specified in the Site institutional controls. The stabilized/solidified waste in the former oily sludge pit does not require any maintenance and was designed to remain in-situ based on the stringent treatment standards. The soil cover on the landfill and treated oily sludge pit area does not require mowing or other vegetation control since the vegetation helps to reduce potential erosion during flooding events. The protective fence around the Site has been removed and a security gate at the entrance to the Site from South 8th Street was left in place at the request of the property owner to control access to the Site.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name: South 8th Street Landfill Superfund Site

EPA ID: ARD980496723

Region: EPA Region 6	**State:** Arkansas	**City/County:** West Memphis/Crittenden

SITE STATUS

NPL Status: Final x Deleted Other (specify):

Remediation status (choose all that apply): Under Construction Operating x Complete

Multiple OUs? Yes	**Construction completion date:** September 19, 2000

Has site been put into reuse? Yes x No

REVIEW STATUS

Reviewing agency: x EPA State Tribe Other Federal Agency:

Author Name: Vincent Malott

Author Title: Remedial Project Manager	**Author Affiliation:** U.S. EPA Region 6

Review period: October 2008 through February 2009

Date(s) of site inspection: November 18, 2008

Type of review:
- X Statutory
- Policy
- Post-SARA
- Non-NPL Remedial Action Site
- Regional Discretion
- Pre-SARA
- NPL-Removal only
- NPL State/Tribe-lead

Review number: 1 (first) x 2 (second) 3 (third) Other (specify):

Triggering action:
- Actual RA Onsite Construction
- Construction Completion
- Other (specify):
- Actual RA Start
- Recommendation of Previous
- x Five-Year Review Report

Triggering action date: June 17, 2004

Due date (five years after triggering action date): June 17, 2009

Five-Year Review Summary Form

Issues: Issues affecting the performance of the completed remedial action at the Site were not identified during the Site inspections. The limited redevelopment activities noted during the Site inspection are consistent with the property use restrictions identified for this Site.

Recommendations and Follow-up Actions: Annual inspections will be conducted by the EPA to monitor future property redevelopment activities and verify compliance with the land use restrictions specified in the Site institutional controls. Also, an independent assessment of the long-term effectiveness of cement-based stabilization/solidification treatment of contaminated sites is nearing completion by the international Performance Assessment of Solidified/Stabilized Waste-Forms project. The draft report is currently under review by the principal authors, and the findings are not available for inclusion in the Second Five-Year Review Report. The research effort included sampling and analysis of treated material of different ages and with different contaminants from existing treated sites, including samples from the South 8th Street Landfill site. The evaluation of the samples collected from the South 8th Street Site, as well as how the sample results compare with other sites using a cement-based stabilization/solidification treatment process, will be used by the EPA to evaluate the long-term performance of the remedial action.

Protectiveness Statement(s): The Site remains protective of human health and the environment because the remedial actions completed at the source and ground water operable units achieved the remedial action objectives and goals; there is no new current exposure pathway for the treated waste material in the former oily sludge pit or the landfill contents based on current land use; and, the site institutional controls are expected to prevent any future exposure pathway based on the prohibition on excavations and drilling within the specified landfill areas.

Other Comments: No other comments.

Second Five-Year Review Report
South 8th Street Landfill Superfund Site

The United States Environmental Protection Agency (EPA) Region 6 has conducted a second five-year review for all of the remedial actions completed at the South 8th Street Landfill Superfund Site (Site), for the period of June 2004 (when the first five-year review report was signed) to June 2009. This Second Five-Year Review Report documents the results of the review conducted in accordance with EPA guidance on five-year reviews. The purpose of this five-year review is to determine whether the remedial actions completed at this Site remain protective of human health and the environment, and to document the methods, findings, and conclusions of the five-year review in a Five-Year Review Report. In addition, Five-Year Review Reports identify issues found during the review, if any, and recommendations to address them.

The EPA guidance on conducting five-year reviews is the Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P, Comprehensive Five-Year Review Guidance (EPA, 2001) (replaces and supersedes all previous guidance on conducting five-year reviews).

1.0 Introduction

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) §§9601, et seq. and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) §§300, et seq., call for five-year reviews of certain CERCLA remedial actions. The statutory requirement to conduct a five-year review was added to CERCLA as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA), P.L. 99-499. The EPA may also conduct five-year reviews as a matter of policy for sites not addressed specifically by the statutory requirement. The EPA classifies each five-year review as either "statutory" or "policy" depending on whether it is being required by statute or is being conducted as a matter of policy. The second five-year review for the South 8th Street Site is being conducted as a statutory requirement.

As specified by CERCLA and the NCP, statutory reviews are required for sites where, after remedial actions are complete, hazardous substances, pollutants, or contaminants will remain onsite at levels that will not allow for unrestricted use or unrestricted exposure. Statutory reviews are required at such sites if the Record or Decision (ROD) was signed after the effective date of SARA. CERCLA §§121(c), as amended, 42 USC §§9621(c), states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The implementing provisions of the NCP, as set forth in the CFR, state at 40 CFR 300.430(f)(4)(ii):

> If a remedial action is selected that results in hazardous substances, pollutants, or

> contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The EPA five-year review guidance further states that a five-year review may be conducted as a matter of policy for the following types of actions:

- A pre-SARA remedial action that leaves hazardous substances, pollutants, or contaminants onsite above levels that allow for unlimited use and unrestricted exposure;
- A pre or post SARA remedial action that, once completed, will not leave hazardous substances, pollutants, or contaminants onsite above levels that allow for unlimited use and unrestricted exposure, but will require more than five years to complete; or,
- A removal-only site on the National Priorities List (NPL) where the removal action leaves hazardous substances, pollutants, or contaminants onsite above levels that allow for unlimited use and unrestricted exposure and no remedial action has or will be conducted (EPA, 2001).

The triggering action for this review is the completion date for the first five-year review on June 17, 2004, as shown in the EPA's CERCLIS database. The 1998 ROD Amendment for the Site specified that a statutory five-year review is required for the site since the remedial action for the source control operable unit (OU) treated hazardous substances through in-situ stabilization/solidification, and the treated waste still contains hazardous substances above levels that allow unlimited use and unrestricted exposure after completion of the remedial action. Pursuant to CERCLA Section 121(c) and as provided in the current guidance on Five Year Reviews [OSWER Directive 9355.7-03B-P, *Comprehensive Five-Year Review Guidance* (June 2001)], the EPA must conduct a statutory five-year review at this Site.

2.0 Site Chronology

A chronology of significant site events and dates is included in Table 1, provided at the end of the report text. Sources of this information are listed in Attachment 1, List of Principal Documents Reviewed.

3.0 Background

This section describes the physical setting of the site, including a description of the land use, resource use, and environmental setting. This section also describes the history of contamination associated with the site, the initial response actions taken at the site, and the basis for each of the initial response actions. Remedial actions performed subsequent to the initial response actions at the site are described in Section 4.

3.1 Physical Characteristics

The Site is a 16.3 acre landfill on the flood plain between the Mississippi River and the St. Francis Levee in West Memphis, Crittenden County, Arkansas (Figure 1). The Site is located at the southern end of 8th Street adjacent to the Tom Sawyer RV Park. Two barge terminals are located on the bank of the Mississippi River at the midpoint and south end of the Site (Figure 2).

Flooding of the Site is common between the months of November through June to a maximum depth of 15 feet. Aerial photographs indicate that the Site was excavated for gravel deposits resulting in a series of borrow pits that were subsequently used for the disposal of industrial and municipal wastes. The former unpermitted landfill area is subdivided into three separate disposal areas as shown on Figure 2. Area 1 (4.3 acres) consists primarily of a former municipal waste landfill. Area 2 (8.1 acres) is predominately an industrial waste landfill with a large oily sludge pit occupying 2.5 acres of the area. Area 3 (3.9 acres) consists of several smaller municipal and industrial waste disposal areas.

3.2 Land and Resource Use

The Site is flanked by bottom land forest along the western boundary and the Tom Sawyer RV Park to the north. The central area of the Site (Area 2), is now occupied by an elevated, flat-topped mound containing the treated waste material from the oily sludge pit with a soil cover (Figure 3). The initial property redevelopment efforts are currently centered on this elevated mound area as fill material has been brought in to raise the surrounding ground elevation consistent with the top of the mound. When completed, the central area of the Site is expected to be above the flood level of the Mississippi River and will provide an all-weather surface for barge unloading operations. A vehicle security gate restricts access to the Site from South 8th Street. A security fence has been erected around the southern barge terminal to further restrict access. Another vehicle security gate restricts access from South 8th Street to the elevated roadway connecting the barge terminal located at the mid-point of the Site. There are currently no residential or industrial populations within the Site boundaries.

Land use immediately west of the St. Francis Levee consists of industrial/petroleum storage facilities. Residential areas are located immediately west of the industrial/petroleum facilities, approximately ½ mile northwest of the Site. An estimated 30,000 people live within 4 miles of the Site.

The Site is located on a flood plain clay deposit ranging in thickness from 5 feet to 15 feet at the surface. Below this clay unit, the sediments consist of clayey silts with minor amounts of sand and gravel to an approximate depth of 20 feet to 30 feet below ground surface. The clayey silts grade downward into fine sands that continue to coarsen with depth into a basal gravel layer. The Jackson Clay is a local confining unit that underlies the alluvial aquifer and is present at an approximate depth of 120 to 150 feet beneath the ground surface.

Ground water levels, flow direction, and the hydraulic gradient in the unconfined alluvial aquifer fluctuate seasonally with the rise and fall of the adjacent Mississippi River. The ground water table varies between 5 feet and 30 feet below the ground surface. The ground water flows toward the river during the low river stage and the flow direction is reversed during seasonal flooding events at the Site. The ground water aquifer beneath the Site has not been used as a drinking water source. However, the aquifer has been used at the adjacent RV Park as a source of water for maintaining the water level in a number of surface ponds and for other non-potable uses.

3.3 History of Contamination

Aerial photographs indicate that the Site was used for the disposal of waste material after 1957. Most of the early disposal activities appear to have been conducted on a 2.61 acre parcel of land (Area 2) leased by Mr. W. M. Gurley from the W. L. Johnson Company. Apparently, Gurley Refining Company used the Site (Area 2) between approximately 1960 and 1970 for the disposal of waste sludge from its re-refining process located west of the St. Francis Levee. The sludge waste in the pit has physical and chemical properties similar to material typically identified at oil reclamation facilities.

The Site was first brought to the attention of the United States Government in 1979 in the Eckhardt Survey conducted by the House Congressional Sub-Committee on Interstate Commerce and Transportation. In this survey, the landfill was listed as the West Memphis Landfill Site, South 8th Street.

Between 1981 and 1988, the EPA conducted a series of soil boring investigations of the oily sludge pit and surrounding landfill areas. Polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), benzene, toluene, ethylbenzene, xylene, pesticides, and heavy metals were detected in the samples.

3.4 Initial Response

A Hazard Ranking System package was prepared in August 1991. The Site was proposed for listing on the National Priorities List (NPL) as the "West Memphis Landfill Site" on February 7, 1992 (57 Fed. Reg. 4,827). The Site was listed final on the NPL as the "South 8th Street Landfill Site" on October 14, 1992 (57 Fed. Reg. 47,184).

EPA issued a General Notice Letter/Information Request to 25 Potentially Responsible Parties (PRPs) on February 7, 1992. The EPA evaluated the responses received and subsequently issued Special Notice Letters to 26 PRPs on March 18, 1992. Additional PRPs were added to the initial list of PRPs based on information received from PRPs who responded to the February 7, 1992, Information Request.

The EPA issued a Unilateral Administrative Order (UAO) to the PRPs (with the exception of the City of West Memphis) on May 23, 1992. The UAO required the PRPs to construct a fence around the former disposal areas and to investigate the large oily sludge pit. Construction of the fence was completed in July 1992. Although the PRPs initially undertook the pit investigation on August 31, 1992, the EPA took over the pit investigation in September 1992 and performed the Remedial Investigation/Feasibility Study (RI/FS) for the Site.

The EPA constructed a 1600 linear foot berm around the oily sludge pit under the CERCLA time-critical removal authority to minimize the spread of contamination that could result from flooding of the Site. Construction of the berm was completed between October 19, 1992 and November 4, 1992. In May 1993, the EPA determined that the most efficient manner to address the oily sludge pit was to include the action as part of the remedial action for the entire Site.

3.5 Basis for Taking Action

The South 8th Street Landfill site was listed as a 30 acre site located on the floodplain of the Mississippi River. The site investigation identified a 2.5 acre oily sludge pit (waste was characteristically hazardous for pH and lead) within a 16 acre landfill area. The investigation did not locate waste material in the remaining portion of Areas 1 and 3 (Figure 2). The most significant threat to human health from the pit area was attributed to the low pH of the sludge which was corrosive and could have caused severe burns through accidental exposure. The oily sludge wastes also contained high concentrations of lead, PCBs, and PAHs. The surrounding landfill contained principally industrial debris and household trash. The landfill consists of separate excavations and disposal activity and was not an organized, permitted landfill or disposal site. No other hot spots were found within the landfill material. The source control operable unit contained the oily sludge pit, which was identified as a principal threat, and the surrounding landfill area, which was identified as a low-level threat.

Based on the baseline risk assessment, the primary contaminants of concern at the site are: carcinogenic PAHs, PCBs, and lead. The maximum concentration of these contaminants as detected in the oily sludge pit included total 109 mg/kg of total PAHs, 38 mg/kg of PCBs, and 33,600 mg/kg of lead. The oily sludge pit wastes were also tested for dioxin in the event wastes were transported offsite for disposal. The test results confirmed the presence of octa dioxin isomers in the waste. Since the octa isomer is less toxic than the tetra isomer, the results were adjusted to account for this difference and reported as 2, 3, 7, 8-Tetrachlorodibenzodioxin (TCDD) equivalents. The maximum equivalent concentration of TCDD was 0.651 ppb.

EPA evaluated the available land use data and determined that the baseline risk assessment should consider recreational and agricultural scenarios for the following reasons:

- The site is in the one year flood plain of the Mississippi River thereby precluding the construction of any residential or commercial facilities.
- The site was seriously considered as a possible location for a state park by the Arkansas Department of Parks and Recreation.
- There is currently a large RV Park that borders the Site on the north that is owned by the same landowner as the Site.
- The site was used as a parking lot for an annual local festival where attendance was as great as 30,000 people.
- Previous observations by EPA personnel noted that numerous people, including children, playing near the river in the vicinity of the Site before it was fenced.
- Aerial photography shows that the site was farmed as recently as 1986.

The receptors that were considered in the baseline risk assessment include: (1) current and future recreational visitors; (2) future recreational workers; and (3) current and future crop consumers. Current and future recreational visitors includes adults and children that visit the site for very short periods of time (14 days per year adult RME, 3 days AVG) to camp and engage in other recreational activities. The future recreational worker was based on the assumption that the site will either be turned into a state park, or the RV Park will be significantly expanded to include the entire site. The recreational worker may be engaged in park maintenance activities such as mowing the grass, pond cleanout, and repair of park facilities. The current and future crop

consumer scenario postulates that a family will grow vegetables and fruits at the site for private consumption and commercial sale.

EPA used the exposure assumptions developed in the baseline risk assessment to calculate the remedial goals. Overall, the crop consumer risks were judged to be too uncertain for the purpose of developing realistic remedial goals. The risk for the recreational visitors is within the acceptable risk range. Therefore, the future recreational worker scenario was used to develop the risk based remedial goals. In addition, the risk assessment assumed that subsurface soils are excavated and spread over the surface in the future in support of some recreational feature such as a pond. This was assumed primarily because a similar activity has actually occurred on one portion of the site. The landowner excavated a former disposal area (determined to be relatively clean during the RI) to prepare a fishing pond for the RV Park visitors. The landowner used the excavated material to facilitate the construction of an embankment around the pond and possibly to fill in low areas on the site.

The ecological risk assessment determined that the oily sludge pit presented an acute threat to the ecosystem due to the low pH and high oil and grease content of the waste. The waste characteristics reduced the available habitat resulting in adverse effects to the environment. In addition, seasonal flooding of the site would result in spreading of the contamination, potentially impacting plants and wildlife in the surrounding area. No other ecological risks were associated with the surrounding landfill area.

The ground water operable unit contained the impacted ground water from the waste disposal activities. Analyses of samples collected from the ground water monitoring well network (Figure 4) identified inorganic contamination, principally lead, arsenic, and manganese, during the 1993 sampling and the four RI sampling events in 1995 and 1996. Ground water sample analyses did not detect volatile organic contaminants, pesticides, or PCBs above detection limits. Semi-volatile organic contaminants detected during the sampling were considered attributable to laboratory contamination or were reported below the analytical method detection limit. Subsequent ground water samples collected in May and August of 1997 verified that only inorganic contaminants were present in the ground water. Arsenic contributed the primary carcinogenic risk to the future recreational worker. The contaminants of concern which contributed the primary non-carcinogenic threat to the future recreational worker and visitor (child) were arsenic and manganese.

4.0 Remedial Actions

This section provides a description of the remedy objectives, selection, and implementation at the site. The final remedial actions were completed at the site in 2002, and the Site was deleted from the NPL in 2004. There are no ongoing O&M activities at the Site.

4.1 Remedy Selection

The EPA issued a Proposed Plan for the Site on July 27, 1993, and the public comment period closed on September 24, 1993. The EPA signed a Record of Decision (ROD) on September 29, 1994, for the source control operable unit. The remedial action objectives for the oily sludge pit are:

- Prevent current and future direct contact with the highly corrosive wastes;
- Prevent current and future direct contact, ingestion, and inhalation of contaminants in the pit waste and ancillary contaminated soil and debris;
- Prevent the future migration of contaminants from the sludge pit area to other areas both on and off the site; and,
- Prevent the potential for future migration of contaminants to the ground water at concentrations above appropriate action levels.

The remedial goals for the oily sludge pit were established to meet the above remedial action objectives and are based on a recreational risk scenario developed in the baseline risk assessment (Table 2).

The remedial action objectives for the landfill area are:

- Prevent direct contact with and ingestion of the landfill contents; and,
- Ensure that contaminants present in the landfill areas that may migrate into the ground water will not constitute a threat to public health and the environment.

Remedial goals were not developed for the landfill area of the Site because the risk assessment indicated the landfill areas to be a low-level threat that will not require active remediation in order to meet the remedial action objectives.

In the 1993 Proposed Plan, the EPA identified seven remedial alternatives for the oily sludge pit and three remedial alternatives for the landfill area. The remedy selected in the 1994 ROD to address the oily sludge pit was different than the preferred remedy of organic treatment, stabilization, and off-site disposal identified in the Proposed Plan. The major remedy components in the 1994 ROD included:

- Excavation, stabilization, and off-site disposal of an estimated 22,000 cubic yards of contaminated sludge, soil, and debris exceeding the remedial action goals of 500 mg/kg lead, 10 mg/kg PCBs, and 3 mg/kg PAHs (as benzo(a) pyrene equivalents);
- The placement of a 2-foot thick soil cover over the remaining 16 acre landfill area;
- Placement of deed notifications or other institutional controls to ensure that any future landowners will be notified that the land was a former Superfund site and has been cleaned up in accordance with CERCLA; and
- Long-term operation and maintenance and ground water monitoring.

The 1994 ROD also divided the Site into a source control operable unit and a ground water operable unit and deferred the ground water remedy selection until additional site data had been collected.

On March 1, 1996, the EPA and a group of the generator PRPs known as the South 8th Street Group entered into an Administrative Order on Consent to conduct the remedial design for the remedy selected in the 1994 ROD. The PRP Group conducted field activities in 1996 and

submitted the remedial design reports in 1997. Based on additional data collected during the remedial design, the PRPs proposed an alternative in-situ treatment method that would also meet the remedial goals and objectives for the Site at a lower cost. Upon evaluation of this additional data, the EPA proposed an amended remedy in a January 1998 Proposed Plan. In this Proposed Plan, the EPA also identified three alternatives for the ground water contamination based on the results of the 1996 RI and 1997 FS completed by the EPA.

The EPA signed a ROD Amendment for the Site on July 22, 1998, amending the remedy for the source control operable unit and selecting a remedy for the ground water operable unit. The major components of the amended remedy for the source control operable unit included:

- In-situ stabilization/solidification of an estimated 23,500 cubic yards of contaminated sludge, soil, and debris exceeding the remedial action goals of 500 mg/kg lead, 10 mg/kg PCBs, and 3 mg/kg PAHs (as benzo(a) pyrene equivalents) and capable of meeting the more stringent performance standards for in-place management of the treated material and protection of the Site ground water;
- Installation of a 2-foot thick natural soil cover over part of Area 1 of the landfill and the treated oily sludge pit area in Area 2 of the landfill; and,
- Placement of deed notifications or other institutional controls to ensure that any future landowners will be notified that the land was a former Superfund site and waste has been treated and is being managed at the site.

The specific performance standards for the treated waste were established to ensure that the oily sludge pit wastes and ancillary soil and debris could be treated and managed on-Site without further degrading the ground water quality at the Site (Table 3).

An allowance was made for contaminant concentrations in a leachate extracted from a treated waste sample (following a 28 day curing period) using the Synthetic Precipitation Leaching Procedure (SPLP), SW-846 Method 1312, to exceed the corresponding ground water maximum contaminant levels (MCLs) or background ground water concentrations, whichever was higher. The SPLP leachate from 20 percent of the samples collected from the treated oily sludge material could exceed the SPLP performance standards by a factor of two times, and 10 percent of the leachate samples could exceed the SPLP standards by a factor of five times.

The remedial action objectives for the ground water operable unit at the Site are the following:

- Prevent exposure to Site contaminated ground water, above acceptable risk levels for potential receptors; and
- Restore the Site ground water to human health-based standards following remediation of the oily sludge pit.

For the ground water operable unit, monitored natural attenuation was the selected remedy for the hazardous substances in the ground water and institutional controls to prevent exposure to the ground water prior to achieving the remedial action goals (Table 4).

4.2 Remedy Implementation

The EPA issued a UAO on November 18, 1998, to the PRPs for implementation of the remedial action at the oily sludge pit. After further negotiations, the EPA and the settling PRPs signed a Consent Decree for implementation of the source control operable unit remedy. The Consent Decree was lodged with the U.S. District Court for the Eastern District of Arkansas on November 23, 1999, and entered by the Court on December 12, 2000. Since the Consent Decree had not been entered by the District Court prior to completing remediation of the oily sludge pit area, the remedial action was completed under the terms of the UAO.

The PRP's remedial construction contractor mobilized to the Site in June 1999 and initiated the first round of pilot tests in July 1999 to select a final reagent mix design for the in-situ stabilization/solidification. While pilot tests on the ancillary soils were completed in August 1999, final testing on the oily sludge wastes was not completed until November 1999. Pilot tests on the oily sludge wastes demonstrated that pretreatment with agricultural lime was necessary to neutralize the low pH waste prior to reagent mixing in order to achieve the performance standards.

Stabilization of the oily sludge pit began in December 1999 and was completed in April 2000. A total of 19,376 cubic yards of oily sludge was neutralized and treated in-situ with a crane auger, representing an increase of almost 100% compared with the remedial design. The volume increase resulted from an increased average treatment depth of 16.8 feet down to a native gray clay. Stabilization of the ancillary soils began in September 1999 and was completed in May 2000. A total of 20,372 cubic yards of soil was treated with a combination of excavators and a crane auger. Neutralization of 4,729 cubic yards of soil was required prior to treatment.

A limited number of confirmatory samples from the treated oily sludge and ancillary soils failed the performance standards. Rather than retreat the material and possibly create material with a higher permeability, a geocomposite liner was installed as a precaution between the treated waste and the soil cover to reduce possible infiltration. The liner was installed over an area of 6,233 square yards. Installation of the soil cover on the 4.28 acre area of treated material was completed by June 2000. The PRPs completed installation of the 2.7 acre soil cover on the adjacent landfill area in September 1999 (Figure 3).

An additional 2,000 cubic yards of oily sludge waste mixed with soil and debris were discovered in June 2000 during a monitoring well installation adjacent to the treated oily sludge pit. Treatment of the additional waste material was completed in August 2000 and a geocomposite liner and soil cover were installed over the treated area.

The borrow area in Area 3 that was used for the soil cover was graded and contoured so that repeated flooding by the Mississippi River and accumulation of silts and clay will establish a pond and surrounding wetland at the Site (Figure 3). Since 2000, the 1.58 acre borrow pit has accumulated water and vegetation due to flooding at the site. The water level in the borrow pit rises and falls in response to the water levels in the Mississippi River.

The PRPs conducted an air monitoring program as described in the Health and Safety and Air Monitoring Plan developed during the remedial design. The air monitoring program included both real-time and compound-specific air monitoring during the processes of sludge neutralization, stabilization, and excavation. The air quality on site was monitored within the breathing zone of the workers inside the exclusion zone and at locations inside the perimeter to protect the surrounding community. Specific chemical hazards monitored were hydrogen sulfide, sulfur dioxide, volatile organic compounds, and total suspended particulates.

While the activities associated with the ground water operable unit were not included in the UAO, the PRPs agreed to expand the scope of their work for the EPA and install two additional monitoring wells adjacent to the treated oily sludge pit area. In addition, the PRPs agreed to plug and abandon seven monitoring wells and six piezometers located elsewhere in the landfill that were not part of the long-term ground water monitoring scheme. Construction details on the two new monitoring wells and the abandonment of the monitoring wells and piezometers are included in the Remedial Action report for the source control operable unit. Construction details for the remaining monitoring wells, previous sample analyses, and ground water elevations are provided in the 1996 ground water RI report and the 1998 ROD Amendment.

The Site achieved construction completion status when the Preliminary Close-Out Report was signed by the EPA on September 19, 2000. The Remedial Action report was approved by the EPA on December 31, 2001.

Long-term remedial action for the ground water monitored natural attenuation remedy was implemented through a sampling and analysis program conducted between January and November 2003. The sampling and analysis for the ground water included eight sampling events of the nine monitoring wells surrounding the oily sludge pit (Figure 5). The initial ground water sampling event was conducted in January 2002 and the sampling data was below the remedial goals for all wells. The anticipated sampling program and associated costs to monitor the effectiveness of the natural attenuation remedy were projected over a 30-year period with sampling performed quarterly for the first two years, semi-annually for years 3 - 10, and semi-annually for years 15, 20, 25, and 30. As a result of the January 2002 data, the ground water monitoring program was changed to consecutive monthly sampling between April and November 2002 in an effort to determine if and to what extent the metals might become mobile in the ground water. Since past detections of elevated metals concentrations in the aquifer were influenced by the flood stage of the adjacent Mississippi River, the resulting fluctuating water table, and changing geochemical conditions in the aquifer, a monthly sampling program was more likely to detect elevated metal concentrations than the initial quarterly sampling program.

The ground water monitoring program demonstrated that the combination of source area treatment and natural attenuation processes were effective in achieving the cleanup goals for the ground water operable unit. Lead and arsenic concentrations were below the remedial goal in all wells during each of the eight sampling events. While barium and beryllium were both listed as contaminants of concern in the 1998 ROD Amendment, these two metals have remained below the remedial goals both before and after remediation of the oily sludge pit. Manganese concentrations were also below the remedial goal in all wells during each of the eight sampling events except for well MW-8S during the August sampling event. Monitoring well MW-8S,

which is located cross-gradient to the oily sludge pit, had a manganese concentration of 6,320 µg/l which exceeded the remedial goal of 4,088 µg/l. The EPA performed three separate statistical analyses of the manganese data from well MW-8S for the upper confidence level (UCL) of the mean. The calculated UCLs for each evaluation were less than the remedial goal of 4,088 µg/l

Treatment of the oily sludge pit has effectively reduced or eliminated further leaching of lead into the ground water both prior to and after the 2002 flooding event. The aquifer geochemistry has apparently also been modified following treatment of the acidic wastes preventing further mobilization of manganese and arsenic in the ground water. As a result of the completed remedial action for the oily sludge pit, the treated waste is no longer a source of the metals contamination previously detected in the ground water.

The nine ground water monitoring wells were plugged and abandoned on June 23 – 24, 2003 (Figure 5). The monitoring well abandonment activities included the following: site clearing, pressure grouting of each monitoring well with cement grout, removal of all bumper posts and above grade protective casings, removal of concrete well pads, placement of a concrete plug with a metal plate at each well location, and off-site disposal of all the well materials.

EPA issued the Final Remedial Action Report on June 9, 2003, following achievement of the remedial goals for the ground water operable unit. The Final Close-Out Report was issued on September 25, 2003.

4.3 Operations and Maintenance and Long-Term Monitoring

There are no scheduled operation and maintenance requirements for this Site other than annual site inspections to monitor future property redevelopment activities and verify compliance with the land use restrictions specified in the Site institutional controls. The stabilized/solidified waste in the former oily sludge pit does not require any maintenance and was designed to remain in-situ based on the stringent treatment standards. The soil cover on the landfill and treated oily sludge pit area does not require mowing or other vegetation control since the vegetation helps to reduce potential erosion during flooding events. The protective fence around the Site has been removed with the exception of the area within the hardwood wetlands that separates the Site from the St. Francis levee. Security gates installed by the property owners restrict vehicle traffic from entering the Site from South 8th Street. Inspection costs are funded through the cash-out payments made by the settling PRPs under the terms of the Consent Decree.

The ground water monitoring program demonstrated that the combination of source area treatment and natural attenuation processes were effective in achieving the cleanup goals for the ground water operable unit. As a result, routine ground water monitoring activities are not a part of the operation and maintenance activities at the Site. Further monitoring activities at the site are no longer necessary since: 1) the metals concentrations are below the remedial goals; 2) the institutional controls effectively prohibit any future well installation and possible exposure pathway within the landfill area; and, 3) ground water discharge to the adjacent Mississippi River was demonstrated to not have an adverse impact with the pre-remedial contaminant concentrations. Long-term protection of human health and the environment at this Site will not

require further ground water monitoring based on the completed remedial actions and the existing site institutional controls.

Institutional controls have been implemented at the site to prevent exposure to ground water and the treated waste and landfill contents (Figure 6). The Consent Decree (Section V.9.a, Section IX.24.b) lodged in the U.S. District Court for the Eastern District of Arkansas in November 1999 and entered in December 2000, specified a property easement, running with the land, that (i) grants a right of access for the purpose of conducting any activity related to the Consent Decree or any other activity related to implementing the ROD, including but not limited to, monitoring; and (ii) grants the right to enforce the land and water use restrictions listed in the Consent Decree to the United States, the State of Arkansas and its representatives, the other settling defendants, and other appropriate grantees (see Attachment 7). The land and water use restrictions specified in the property easement include: 1) the prohibition on the installation of water wells in the alluvial aquifer until the remedial goals for the ground water operable unit have been achieved; 2) the prohibition on the removal of vegetation from the landfill cover if such removal may result in the subsequent erosion or removal of the soil cover over the landfill or treated material; and 3) the prohibition on the excavation or trenching into the treated material, landfill contents, or the associated soil cover with some exceptions. The property easement was executed on March 6, 2001 by the William L. Johnson Co (see Attachment 8). The prohibition on further excavation into the treated material, landfill contents, or soil cover effectively prohibits further well installation at the site due to the site-wide presence of the landfill and the treated oily sludge pit.

5.0 Progress Since the Last Five-Year Review

This is the second five-year review conducted for the South 8th Street Site. No issues were identified during the first five-year review affecting the performance of the completed remedial action, or which required action by the EPA. The necessity of conducting periodic inspections during future site redevelopment was noted as a recommendation to verify compliance with the Site institutional controls. The following is the protectiveness statement from the First Five-Year Review Report:

> Because the remedial actions at all operable units are protective, the site is protective of human health and the environment. Sampling data has confirmed that the remedial actions for the source control and ground water operable units have achieved the remedial goals and objectives set forth in the 1994 ROD and 1998 ROD Amendment. An exposure pathway does not exist for the treated waste material in the former oily sludge pit or the landfill contents and the Site risks have been eliminated or reduced below acceptable levels. The site institutional controls are expected to prevent any future exposure pathway based on the prohibition on excavations within the landfill area.

6.0 Five-Year Review Process

This second five-year review for the Site has been conducted in accordance with EPA's Comprehensive Five-Year Review Guidance dated June 2001 (EPA, 2001).

6.1 Administrative Components

The EPA conducted the five-year review for this site and developed the Second Five-Year Review Report. The review process included interviews with relevant parties, a site inspection, and a review of the applicable data and reports covering the remedy implementation. The Arkansas Department of Environmental Quality participated in the site inspection. Technical support for the publication of the newspaper notices and postcards, and graphics support for the Second Five-Year Review Report was conducted by CH2M Hill under Contract No. EP-W-06-021, Task Order No. 0038-FRFE-06H8.

6.2 Community Involvement

A public notice announcing initiation of the second five-year review was published in the *Memphis Commercial Appeal* and *West Memphis Evening Times*, on December 1, 2008. Upon signature, the Second Five-Year Review Report will be placed in the local information repository for the site. A public notice will then be published in the *Memphis Commercial Appeal* and *West Memphis Evening Times* to summarize the findings of the review and announce the availability of the report at the information repositories. A copy of the public notice is provided in Attachment 6 to this report.

Concurrent with the publication of the newspaper notices, postcards were mailed to the legal representatives for the settling PRPs that had signed the December 2000 Consent Decree. A copy of the postcard notice is also included in Attachment 6.

6.3 Document Review

This five-year review for the site included a review of relevant site documents, including decision documents, remedial action report, the final closeout report, sampling and investigation reports, and related monitoring data. Documents reviewed are listed in Attachment 1.
The remedial goals and objectives are listed in the 1994 ROD and 1998 ROD Amendment.

6.4 Data Review

Since all remedial actions at the Site have been completed, and there are no required operation and maintenance activities that generate data, all relevant data concerning the completion of the remedial actions are contained in the 2001 and 2003 Remedial Action reports. Data on the nature and extent of contamination at the site is contained in the 1997 and 1993 Remedial Investigation Reports and the 1997 Remedial Design Reports.

A separate international collaborative project to verify the long-term effectiveness of cement-based stabilization/solidification treatment of contaminated sites is nearing completion. The Performance Assessment of Solidified/Stabilized Waste-Forms project involves universities, government agencies, and non-government organizations from the United States, the United Kingdom, and France. The research effort in the United States is being coordinated through the EPA's Office of Research and Development (ORD) in Cincinnati, Ohio. The evaluation process involves the sampling and analysis of treated material of different ages and with different contaminants from existing treated sites. Sampling activities in the U.S. focused primarily on Superfund sites with material treated through the stabilization/solidification process. Some

samples from this effort were provided to the University of New Hampshire for use in this international effort. Sampling was performed by contractor personnel and equipment under technical oversight of U.S. EPA ORD personnel. The findings of the project and the draft report are currently under review by the principal authors.

Core samples were collected at the South 8th Street Landfill Site from the treated oily sludge mound area, specifically the area treated through the in-situ auger method. Approximately four feet of core from three locations on the mound area were collected from the site using a rotosonic drilling method. Visual observation of the cores noted the material was dry and competent, but was fractured due to the coring process. The physical condition of the cored material is consistent with the physical performance standards for the in-situ stabilization/solidification process. The core holes were grouted with a cement mortar mix approved by the EPA oversight personnel. The final project report is expected to contain a summary of the data and interpretations related to the overall effectiveness of the technology.

6.5 Site Inspection

A site inspection was conducted on November 18, 2008, and consisted of a visual survey by walking and driving the Site. The completed site inspection checklist is provided in Attachment 3. Photographs taken during the site inspection are provided in Attachment 4. The purpose of the inspection was to assess the protectiveness of the remedy, including the condition of the soil cover and the effectiveness of the property easement in restricting Site activities.

The institutional controls implemented at the Site prevent exposure to the treated waste and landfill contents. The land use restrictions include: 1) the prohibition on the removal of vegetation from the landfill cover if such removal may result in the subsequent erosion or removal of the soil cover over the landfill or treated material; and 2) the prohibition on the excavation or trenching into the treated material, landfill contents, or the associated soil cover with some exceptions. The prohibition on further excavation into the treated material, landfill contents, or soil cover also effectively prohibits future water well installation at the Site due to the site-wide presence of the landfill and the treated oily sludge pit.

The condition of the soil cover on the treated oily sludge mound has not been an issue at any time since completion of the remedial action in August 2000. Examination of the soil cover over the treated oily sludge mound during the ground water sampling events in 2002 noted the presence of small-scale erosional rivulets that had formed along the flanks of the mound area. These erosional rivulets did not impact the protectiveness of the remedy since the treated material was not exposed at the surface. The erosional rivulets have since been completely covered with additional soil and fill material during the property redevelopment activity that began after June 2003.

There were no activities observed during the Site inspection that violated the institutional controls for the Site. Property redevelopment activities are proceeding in the area of the treated oily sludge mound (Area 2). The redevelopment activities consist of adding fill material to the flanks of the treated mound area and grading the fill to a gentle slope back to the bank of the Mississippi River. The addition of fill material has covered the flanks of the mound area and has

prevented any further erosional rivulets in the soil cover. In addition to the fill material along the flanks of the mound area, an elevated gravel road has been added along the northern flank of the mound area that connects South 8th Street directly with the barge terminal located on the Mississippi River at the mid-point of the Site. The road has been gated to restrict access to the barge terminal operation. An additional gravel road (non-elevated) has been added in Area 1 of the Site that connects South 8th Street with the barge terminal located at the southern end of the Site. The road through Area 1 has been fenced and gated to restrict access to the barge terminal operation.

In Area 1, the only change in site conditions since the first five-year review was the completion of a pipeline along the western perimeter of the Area 1 soil cover, which was then angled beneath Area 1 and the Mississippi River to a terminal on the eastern side of the river. A site plan with the pipeline layout and boring profile along with photographs of the pipeline installation process were provided by Fred Collier of Utility Solutions, LLC., and are provided in Attachment 5. The location of the pipeline routing can also be seen in Figure 7. EPA (Philip Allen, RPM) conducted a site inspection on March 21, 2007, as part of an on-site verification that the pipeline installation in Area 1 of the Site had not disturbed the landfill contents or soil cover. Photographs taken during the EPA inspection are also provided in Attachment 5. The pipeline installation and boring pit did not disturb the Area 1 soil cover or landfill contents.

The condition of the soil cover on the Area 3 landfill has remained unchanged since the first-five year review. The source control OU remedial action completed in 2000 did not alter the existing soil cover in Area 3.

6.6 Interviews

Interviews were connected via email with various parties connected to the Site: (1) Abbott Widicombe, owner of the adjacent Tom Sawyer RV Park and the current landowner for Areas 1 and 3 of the Site via the W. L. Johnson Co.; and, (2) the city attorney for West Memphis, David Peeples. Area 2, which was purchased by Razorback Concrete, provided access to the Site but did not complete an interview form. No issues were identified during the interviews. Interview Record Forms are provided in Attachment 2.

7.0 Technical Assessment

The five-year review must determine whether the remedy at a site is protective of human health and the environment. The EPA guidance describes three questions used to provide a framework for organizing and evaluating data and information and to ensure all relevant issues are considered when determining the protectiveness of a remedy. These questions are assessed for the site in the following paragraphs. At the end of the section is a summary of the technical assessment.

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The documents that detail the remedial decisions for the site are the September 1994 ROD and July 1998 ROD Amendment. This section discusses the RA performance, system O&M, costs,

institutional controls, monitoring activities, opportunities for optimization, and early indicators of potential remedy problems.

7.1.1 Remedial Action Performance. This Site met all of the site completion requirements as specified in OSWER Directive 9320-09-A-P, *Close Out Procedures for National Priorities List Sites*. For the source control operable unit, confirmatory sampling verified that the in-situ stabilization/solidification of the oily sludge pit wastes and ancillary soils achieved the chemical and physical performance standards specified in the 1998 ROD Amendment. The treated sludge pit and surrounding landfill areas are covered with 2 feet of clean soil to provide further assurance that there is no longer an exposure pathway. For the ground water operable unit, sampling of the monitoring wells has confirmed that treatment of the oily sludge pit and ancillary soils has prevented or substantially reduced further leaching of contaminants into the ground water. The ground water sampling has also confirmed that natural attenuation processes in the aquifer have reduced the metal concentrations below the remedial goals specified in the 1998 ROD Amendment. The Site institutional controls were implemented by the property owner through the filing of a property easement with the County Clerk. The property easement restricts any intrusive activity such as digging or trenching in the landfill or treated areas of the Site or the installation of any wells. The Site no longer poses a threat to human health or the environment as long as the institutional controls are maintained for the property.

There are no scheduled operation and maintenance requirements for this Site other than annual site inspections to monitor future property redevelopment activities and verify compliance with the land use restrictions specified in the Site institutional controls. The stabilized/solidified waste in the former oily sludge pit does not require any maintenance and was designed to remain in-situ based on the stringent treatment standards. The soil cover on the landfill and treated oily sludge pit area does not require mowing or other vegetation control since the vegetation helps to reduce potential erosion during flooding events. The protective fence around the Site has been removed with the exception of the area within the hardwood wetlands that separates the Site from the St. Francis levee. A security gate at the entrance to the Site from South 8th Street was left in place at the request of the property owner to control access to the Site.

The ground water monitoring program demonstrated that the combination of source area treatment and natural attenuation processes were effective in achieving the cleanup goals for the ground water operable unit. As a result, routine ground water monitoring activities are not a part of the operation and maintenance activities at the Site. Further monitoring activities at the site are no longer necessary since: 1) the metals concentrations are below the remedial goals; 2) the institutional controls effectively prohibit any future well installation and possible exposure pathway within the landfill area; and, 3) ground water discharge to the adjacent Mississippi River was demonstrated to not have an adverse impact with the pre-remedial contaminant concentrations. Long-term protection of human health and the environment at this Site will not require further ground water monitoring based on the completed remedial actions and the existing site institutional controls.

An independent assessment of the long-term effectiveness of cement-based stabilization/ solidification treatment of contaminated sites is nearing completion by the international Performance Assessment of Solidified/Stabilized Waste-Forms project. The draft report is

currently under review by the principal authors, and the findings are not available for inclusion this five-year review report. The research effort included sampling and analysis of treated material of different ages and with different contaminants from existing treated sites, including samples from the South 8th Street Landfill site. The evaluation of the samples collected from the South 8th Street Site, as well as how the sample results compare with other sites using a cement-based stabilization/solidification treatment process, can be used to evaluate the long-term performance of the remedial action.

7.1.2 System Operation and Maintenance. All remedial activities have been completed and there are no scheduled operation and maintenance requirements for this Site other than annual site inspections to monitor future property redevelopment activities and verify compliance with the land use restrictions specified in the Site institutional controls.

7.1.3 Costs of System Operation and Maintenance. All remedial activities have been completed and there are no annual or periodic O&M costs for this Site.

7.1.4 Implementation of Institutional Controls. Institutional Controls are generally defined as non-engineered instruments such as administrative and legal tools that do not involve construction or physically changing the site and that help minimize the potential for human exposure to contamination and/or protect the integrity of a remedy by limiting land and/or resource use (EPA, 2005). Institutional controls can be used for many purposes including restriction of site use, modifying behavior, and providing information to people (EPA, 2000). Institutional controls may include deed notices, easements, covenants, restrictions, or other conditions on deeds, and/or ground water and/or land use restriction documents (EPA, 2001).

Institutional controls have been implemented at the Site to prevent exposure to ground water and the treated waste and landfill contents. The Consent Decree (Section V.9.a, Section IX.24.b) lodged in the U.S. District Court for the Eastern District of Arkansas in November 1999 and entered in December 2000, specified a property easement, running with the land, that (i) grants a right of access for the purpose of conducting any activity related to the Consent Decree or any other activity related to implementing the ROD, including but not limited to, monitoring; and (ii) grants the right to enforce the land and water use restrictions listed in the Consent Decree to the United States, the State of Arkansas and its representatives, the other settling defendants, and other appropriate grantees. The land and water use restrictions specified in the property easement include: 1) the prohibition on the installation of water wells in the alluvial aquifer until the remedial goals for the ground water operable unit have been achieved; 2) the prohibition on the removal of vegetation from the landfill cover if such removal may result in the subsequent erosion or removal of the soil cover over the landfill or treated material; and 3) the prohibition on the excavation or trenching into the treated material, landfill contents, or the associated soil cover with some exceptions. The property easement was executed on March 6, 2001 by the William L. Johnson Co. The prohibition on further excavation into the treated material, landfill contents, or soil cover effectively prohibits further well installation at the site due to the site-wide presence of the landfill and the treated oily sludge pit.

7.1.5 Monitoring Activities. No sample collection and analysis activities were performed at the Site during this five-year review period.

7.1.6 Opportunities for Optimization. All remedial activities were previously completed for this Site.

7.1.7 Early Indicators for Potential Remedy Problems. No evidence of remedy failure was noted during the Site inspection.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Selection Still Valid?

This section addresses changes in environmental standards, newly promulgated standards, and To-Be-Considereds (TBCs), changes in exposure pathways, and changes in toxicity and other contaminant characteristics during the five-year review period, and progress toward meeting RAOs.

7.2.1 Changes in Environmental Standards, Newly Promulgated Standards, and To-Be-Considereds. Environmental standards (referred to as Applicable or Relevant and Appropriate Requirements [ARARs]) for this site were identified in the ROD and ROD Amendment. The five-year review for this site included identification of and evaluation of changes in the ROD-specified ARARs and TBCs to determine whether such changes may affect the protectiveness of the selected remedy. The ARARs and TBCs identified by the ROD for the site include chemical- and action-specific requirements for the remedy.

The ADEQ and Federal regulations have not been revised to the extent that the effectiveness of the remedy at the site would be called into question. The remedial goals for the ground water operable unit are based on maximum contaminant levels (MCLs) developed under the Safe Drinking Water Act. The MCL for arsenic was changed from 50 µg/L to 10 µg/L. A review of the data from the eight separate ground water sampling events in 2003 shows that all data except for one data point from well MW-3I and two data points for well MW-8S were below the new arsenic standard. Well 3I had an arsenic concentration of 16 µg/L in June 2002 while the other seven sampling events in 2002, and five sampling events between 1995 and 1997, were below the new 10 µg/L standard. Well 8S had an arsenic concentration of 15.6 µg/L and 21.9 µg/L in October and November 2002 while the other six sampling events in 2002 were all below the new 10 µg/L standard. The average arsenic concentration based on the eight sampling events in 2002 did not exceed the 10 µg/L standard. The arsenic concentration ranged from 27 µg/L to 227 µg/L between 1995 and 1997 in well 8S before the treatment of the oily sludge pit. Since there is no current usage of the Site ground water and the Site institutional controls effectively prohibit well installations within the landfill area, there is no projected usage of the ground water. The new arsenic standard does not call into question the protectiveness of the completed remedial action for the ground water operable unit.

Since the remedial action for the source control operable unit is complete, the Applicable or Relevant and Appropriate Requirements (ARARs) in the ROD cited for the landfill and oily sludge pit have been met and there are no new standards which call into question the protectiveness of the completed remedial action.

7.2.2 Changes in Exposure Pathways. There were no changes in the site conditions since the first five-year review. No new source areas or contaminants were identified as part of this second five-year review. The risk assessments conducted for the Site did not use either a residential or industrial exposure scenario because the flooding pattern at the site precludes the use of such typical scenarios (other than barge transfer operations). The remedial goals for the source control operable unit were developed for a recreational worker exposure scenario based on past considerations of the Site as a State park and the presence of the adjacent Tom Sawyer's Mississippi River RV Park. The remedial goals for the ground water operable unit are based on the corresponding MCLs or risk-based concentrations under the recreational user exposure scenario. The completed remedial actions for the two operable units have removed the potential exposure pathway through treatment of the oily sludge pit, completing the two-foot soil cover over the surrounding landfill and the treated oily sludge pit, and the reduction of metal concentrations below the remedial goals in the ground water.

The current landowner of Area 2 (treated oily sludge mound) has continued redevelopment of the property as a possible barge transfer operation. In addition to the 2 feet of existing soil cover on the treated area, the property owner has continued to bring in additional material (concrete debris and soil) on and around the treated oily sludge pit to raise the overall property elevation. While such land use was not considered in the original risk assessment, the potential exposure pathways for site industrial workers would not be complete due to the presence of the soil cover plus additional debris placed over the surrounding landfill. Since the site institutional controls specifically prohibit excavation into the treated material and landfill contents, there is no complete exposure pathway at the Site. The placement of additional material on top of the landfill cover has raised the elevation of the land surface and reduced the chance of flooding along the upper surface of the treated oily sludge pit.

7.2.3 Changes in Toxicity and Other Contaminant Characteristics. No changes have occurred to the toxicity factors that would affect the protectiveness of the remedy, with the exception of the arsenic standard as previously noted.

7.2.4 Changes in Risk Assessment Methods. No applicable changes to the standardized risk assessment methodologies have occurred that would affect the protectiveness of the remedy.

7.2.5 Progress Toward Meeting the RAOs. The remedial actions were completed for the source control and ground water operable units and the remedial action objectives and goals have been achieved for this Site.

7.3 Question C: Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No other information has been made available that would affect the protectiveness of the remedy.

7.4 Summary of the Technical Assessment

The remedy is functioning as intended in the 1994 ROD and 1998 ROD Amendment based on

the site inspection, the data reviewed, and the completed interviews. There were no observed changes in the surface expression for the solidified/stabilized treated waste and the surrounding landfill area. The institutional controls were implemented at the Site and there were no changes in the land use activities or physical conditions since the first five-year review that would affect the protectiveness of the remedy. No new laws or regulations have been promulgated or enacted that would call into question the effectiveness of the remedy to protect human health and the environment. No changes in contaminant toxicity or other contaminant characteristics were identified that affect the cleanup goals established for the site or the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

8.0 Issues

Issues affecting the performance of the completed remedial action at the Site were not identified during the Site inspections. The redevelopment activities completed to date are consistent with the property use restrictions identified for this Site.

9.0 Recommendations and Follow-up Actions

Annual inspections will be conducted by the EPA to monitor future property redevelopment activities and verify compliance with the land use restrictions specified in the Site institutional controls. Also, an independent assessment of the long-term effectiveness of cement-based stabilization/solidification treatment of contaminated sites is nearing completion by the international Performance Assessment of Solidified/Stabilized Waste-Forms project. The draft report is currently under review by the principal authors, and the findings are not available for inclusion in the Second Five-Year Review Report. The research effort included sampling and analysis of treated material of different ages and with different contaminants from existing treated sites, including samples from the South 8th Street Landfill site. The evaluation of the samples collected from the South 8th Street Site, as well as how the sample results compare with other sites using a cement-based stabilization/solidification treatment process, will be used by the EPA to evaluate the long-term performance of the remedial action.

10.0 Protectiveness Statement

The Site remains protective of human health and the environment because the remedial actions completed at the source and ground water operable units achieved the remedial action objectives and goals; there is no new current exposure pathway for the treated waste material in the former oil sludge pit or the landfill contents based on current land use; and, the site institutional controls are expected to prevent any future exposure pathway based on the prohibition on excavations and drilling within the specified landfill areas.

11.0 Next Review

The third five-year review for the site should be completed during or before June 2014, five years from the date of the second five-year review.