THIRD FIVE-YEAR REVIEW REPORT

FOR THE

HIGHLANDS ACID PIT SUPERFUND SITE
HIGHLANDS, HARRIS COUNTY, TEXAS

September 2007

PREPARED BY:

United States Environmental Protection Agency
Region 6
Dallas, Texas

THIRD FIVE-YEAR REVIEW REPORT
Highlands Acid Pit Superfund Site
EPA ID No. TXD980514996
Highlands, Harris County, Texas

This memorandum documents the United States Environmental Protection Agency's (EPA's) performance, determinations, and approval of the Highlands Acid Pit (HAP) Superfund Site Third Five-Year Review under Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 United States Code Section 9621(c), as contained in this Third Five-Year Review Report.

Summary of Third Five-Year Review Findings

The Third Five-Year Review for the HAP site was performed through a review of site documents and site-specific requirements; a site inspection performed on June 20, 2007; interviews with personnel from the Texas Commission on Environmental Quality (TCEQ) and Weston Solutions, Inc., (WESTON®), the TCEQ contractor for the HAP site; and a review of data collected for the site during the Third Five-Year Review period.

The source control soil remedy in the 1984 Record of Decision (ROD) (EPA 1984) for Operational Unit-01 (OU-01) called for extensive excavation within the surficial waste area and off site disposal of the waste material at a hazardous waste disposal facility. The area was then backfilled and contoured to achieve a three percent gradient to mitigate on-site flooding. In addition to the source control removal, ground water monitoring wells were installed to monitor the shallow and deeper aquifers at the site. Source Control remedial activities were completed in 1987. Operation and Maintenance activities were conducted starting in July 1988. Maintenance of the site includes mowing, gate and fence repairs or replacement, and appropriate follow up response to site theft, vandalism, and flooding events.

The site's groundwater remedy (OU-02), selected in a 1987 ROD (EPA 1987) called for a no action remedy with long term monitoring of the surface environment and ground water. Additional groundwater sampling was conducted by EPA from December 1997 to September 1999. The results of the sampling events were documented in the Operational and Functional Activities Report (O&FAR) (Tetra Tech 2000), and showed the concentrations for the site contaminants were above the Maximum Contaminant Levels (MCLs) in the middle and deep aquifers. The 1987 groundwater ROD identified MCLs as applicable or relevant and appropriate requirements for the middle and deep aquifers. While concentrations in the deep aquifer were reduced after two wells were removed due to integrity issues, concentrations in the upper and middle aquifers remains above MCLS.

A new Operations and Maintenance (O&M) Plan (TNRCC 2001) for the HAP site was developed by the TCEQ (formally known as the Texas Natural Resource Conservation Commission [TNRCC]), and approved by EPA in 2002. TCEQ selected WESTON® as the O&M contractor and issued a notice to proceed with the O&M activities. In January 2002, the selected TCEQ contractor prepared and submitted a Field Sampling Plan (WESTON® 2002a). WESTON® initiated O&M activities in February 2002. Additionally in 2002, TCEQ and the EPA identified monitoring wells MA-08 and DA-08 to be plugged and abandoned due to questions related to well integrity. The TCEQ and EPA selected wells to be plugged and abandoned. Field activities associated with the plugging and abandonment of MA-08 and DA-08 and the installation of replacement wells were conducted by Tetra Tech EM, Inc.(Tetra Tec) from October 2002 through December 2002. A letter report documenting these activities was submitted to EPA in February 2003 (Tetra Tech 2003). Since 2002, WESTON® has conducted semi-annual monitoring and maintenance of the HAP site.

The Third Five-Year Review found that the selected remedy will be protective of human health and the environment upon implementation of the recommendations in this Review.

Actions Recommended

The following actions are recommended as a result of the findings of this five-year review:

- Because the groundwater criteria set in the 1987 ROD have not been met in the upper and middle aquifers, additional studies are needed to assess the potential impact of the contamination in the middle aquifer, to determine whether the selected remedy is protective given the contamination in the site sediments, and to determine the impact of the change in the arsenic MCL.
- Sampling of the upper aquifer monitoring wells should be conducted during the next semi-annual monitoring event. Ground water monitoring activities for the upper aquifer wells should continue per the revised O&M Plan.
- It is recommended that surface water and sediment samples be compared to ecological benchmarks (TCEQ 2006), or equivalent, that have been established for surface water and soil in order to determine if further studies are needed.
- Vegetative growth and bushes were noted near and on the concrete pads of monitoring wells. The overgrowth should be cut and removed. Also, vegetative overgrowth should be removed from the perimeter fences, and the site grass should be maintained by regular mowing.
- New compression caps should be placed on all monitoring wells. The hinge on monitoring well UA-11 should be repaired. For security, missing metal well cap locking pins should be replaced. The top rail and barb wire at the cluster fence for UA-11 should be repaired. Warning signs should be placed on posts within the cluster fencing of the monitoring wells.
- The riser within MA-02 should be extended and surveyed during the next surveying event (O&M benchmark survey). Monitoring well metal protector casings should be repainted and reidentified, as necessary to inhibit rusting. Additionally, steps should be taken to eliminate burrowing animals in the vicinity of the monitoring wells.
- Due to known historical subsidence at the site and per TCEQ's O&M Plan, the site's benchmarks should be resurveyed as soon as possible, as well as prior to the next five-year review. General debris at the site should be disposed of in the same event as the purge water disposal.
- Potentiometric maps for the middle aquifer should be continued. Additionally, the O&M Plan should be updated to reflect current site conditions and the revisions made to the upper aquifer sampling.

Determinations

I have determined that the remedy for the Highlands Acid Pit Superfund Site will be protective upon implementation of the recommendations in this Review.

By: Pamela Phillips, Acting 9/28/07

Samuel A. Coleman, P.E. Date
Director, Superfund Division
U.S. Environmental Protection Agency, Region 6

CONCURRENCES:

THIRD FIVE-YEAR REVIEW REPORT
HIGHLANDS ACID PIT SUPERFUND SITE
EPA ID No. TXD980514996

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By: Date: 9/27/07
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By: Date: Sept 25, 2007
Gustavo Chavarria, U.S. EPA
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By: Date: 09/28/07
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CONTENTS

Section **Page**

Attachments

LIST OF TABLES

LIST OF ACRONYMS

ARAR	Applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of concern
CWA	Clean Water Act
HAP	Highlands Acid Pit
EA	EA Engineering, Science, and Technology, Inc.
EPA	U.S. Environmental Protection Agency Region 6
FS	Feasibility Study
FY	Fiscal year
IC	Institutional control
IDW	Investigation-derived waste
MCL	Maximum Contaminant Level
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&F	Operational and Functional
O&FAR	Operational and Functional Activities Report
O&M	Operation and Maintenance
OU	Operable unit
P&A	Plugged and abandoned
PCL	Protective Concentration Level
PVC	Polyvinyl chloride
RA	Remedial Action
RD	Remedial design
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
Tetra Tech	Tetra Tech EM Inc.
TRRP	Texas Risk Reduction Program
WESTON®	Weston Solutions, Inc.

EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA) Region 6 has conducted the Third Five-Year Review of the Remedial Action (RA) implemented at the Highlands Acid Pit Superfund Site (HAP site) in Highlands, Harris County, Texas. The purpose of this Third Five-Year Review was to determine whether the selected remedy for the site continues to protect human health and the environment. This review was conducted from May to August 2007 and its findings and conclusions are documented in this report. The Second Five-Year Review of the RA was signed on September 27, 2002.

Several documents were reviewed as part of this Third Five-Year Review, including those containing the following data: (1) ground water sampling summaries; (2) monitoring well water levels; (3) analytical sampling results; and (4) inspection summaries. The site history, RA objectives, selected remedy, and implementation status of the selected remedy are discussed in the following paragraphs.

The HAP site is located at the end of Clear Lake Road, west of North Main Street (also known as Crosby Lynchburg Road) in Harris County, approximately 16 miles east of Houston, Texas and 1.4 miles west of Highlands, Texas (Figure 1). The site is surrounded by a partially wooded area and a cleared area with two oil and gas production wells (not associated with the HAP site) to the north, flooded sand pits to the east-northeast, Clear Lake to the south, and Grennel Slough to the west (Figure 1). The site is a 3.3 acre peninsula within the 10-year flood plain of the San Jacinto River. A site layout map is provided as Figure 2.

During the early 1950's, the HAP site was used for the disposal of an unknown quantity of industrial waste sludge, which was believed to be spent sulfuric acid from oil/gas refining processes. In September 1983, the HAP site was placed on the National Priorities List. The Record of Decision (ROD) (EPA 1984) for source control (Operational Unit-01 [OU-01]) was signed in June 1984, with the remedy being extensive excavation with off-site disposal of the waste material. In addition, the proposed remedy of the OU-01 ROD included a ground water monitoring program. The ROD (EPA 1987) for the ground water remedy (OU-02), which was signed in June 1987, "selected a no-action remedy with long term monitoring of the surface environment and ground water." The 1987 ROD further states, "the ground water monitoring wells are currently in place due to the 1984 ROD requirements."

The source control RA contract was awarded to Chemical Waste Management in September 1986.

A post-closure report documenting the completion of the RA was finalized in December 1987.

Operation and Maintenance (O&M) was performed at the HAP site starting in July 1988 by the Texas Commission on Environmental Quality (TCEQ). In June 1993, TCEQ assumed all responsibility for continuing the 30 years of O&M at the HAP site.

In August 1994, ground water sampling of private water wells was performed. Based on that sampling effort, it was determined that the water quality was considered excellent when compared with drinking water standards (EPA 2002). The 1994 Operational and Functional Activities Report (O&FAR) determined ground water flow to be towards the west, away from the private wells that were sampled.

In 1997, EPA and TCEQ decided it was necessary to perform additional O&F activities to determine: (1) if ground water flow was in the same direction as when the ROD was written and, (2) if it was migrating laterally or vertically. EPA and TCEQ also concluded monitoring wells were needed outside of the plume and an aquifer pump test was necessary to evaluate vertical migration between distinct water-bearing units.

Based on these determinations, EPA conducted the necessary O&F activities including: a tidal study and aquifer testing, the installation of additional monitoring wells, and repairs to the site and cluster fencing resulting from damages that occurred during flooding of the site. Additionally, the site was contoured to minimize the flood damage in the future. Upon completion of the O&F activities, an O&FAR (Tetra Tech 2000) summarized the site activities and performance evaluation of the selected remedy and ground water monitoring system. The report documented eight sampling events and addressed the exposure pathways and direction of the ground water flow at the site. The report documented that site contaminants were identified in the middle and deep aquifers in concentrations above the MCLs (EPA 2003).

TCEQ developed an O&M Plan (TNRCC 2001) for the HAP site which was revised and approved by EPA in September 2001. In January 2002, the selected TCEQ contractor (Roy F. Weston, Inc. [WESTON®]) prepared and submitted a Field Sampling Plan (WESTON® 2002a). WESTON® initiated O&M activities in February 2002. TCEQ and EPA selected wells to be plugged and abandoned (P&A). Field activities associated with the monitoring wells P&A and the installation of replacement wells was conducted by EPA's contractor, Tetra Tech EM Inc., from October 2002 through December 2002. A letter report documenting these activities was submitted to EPA in February 2003 (Tetra Tech 2003).

Since 2002, WESTON® has been conducting semi-annual monitoring and maintenance of the HAP site.

Documents reviewed for this five-year review included, but were not limited to, the following documents: (1) 1984 OU-01 ROD (EPA 1984); (2) 1987 OU-02 ROD (EPA 1987); (3) 2001 Revised O&M Plan (TNRCC 2001); (4) 2002 Five-Year Review Report (EPA 2002); (5) 2001 Monitoring Well Plug & Abandon Activities letter report (Tetra Tech 2003); and (6) Annual Site Monitoring Reports – Fiscal Years 2002 through 2006 (WESTON® 2002, 2003, 2004, 2005, 2006). This five-year review included a site inspection and interviews with TCEQ's site contractor and State personnel.

Responses to the site interview questionnaires were generally favorable. No complaints or concerns were noted. All returned interview records are included in Attachment 5 of this report.

The Third Five-Year Review focused on the data obtained during routine inspections and sampling events conducted at the HAP site during the five-year review period. The following issues were noted:

1. **Sampling of Monitoring Well Network**–The Revised O&M Plan (TNRCC 2001) prepared by TCEQ and approved by EPA indicated that all existing wells, including the upper aquifer monitoring wells, should be sampled on a semi-annual basis. After reviewing the Annual Monitoring Reports from 2002 through 2006, it appears that the upper aquifer monitoring wells (UA-06, UA-10, UA-11, UA-14, and UA-15) have not been sampled since July 2002.

2. **Monitoring Well O&M**–During the site inspection, monitoring well compression caps were either missing or in need of replacement for all of the site wells. The hinge to the metal well protector for UA-11 was broken. The locking pins for the caps to the metal well protectors were missing for wells, DA-01, DA-02 and MA-02. Additionally, vegetative growth was covering some of the concrete monitoring well pads, with bushes (up to 5 inches in trunk diameter at MA-02) growing adjacent to the concrete pads. Photographs 8 (MA-02) and 10 show examples of the vegetative growth next to and on the concrete pads. Significant subsidence was noted under the concrete pad of MA-06 (see photograph 14), with animal burrowing activities noted around monitoring wells DA-02 and MA-05. The polyvinyl chloride (PVC) riser at MA-02 is extremely low within the metal protective casing, which may make it difficult to obtain accurate water level readings during sampling events. Several monitoring well metal protector casings were noted to be rusty and in need of repainting and reidentification.

3. **Fencing O&M**–Vegetation within and adjacent to the cluster fencing was noted at the time of the site visit. The perimeter and cluster fencing for the site generally appeared to be in good condition, with the exception of a bent top rail and broken barb wire at the UA-11 cluster fence (see photograph 13). The integrity of the fences could be compromised if the vegetative overgrowth continues. Warning signs were located on the main entry gates of the site's main entrance, but nowhere else on the HAP site.

4. **General Site O&M** – The Revised O&M Plan (TNRCC 2001) indicates that a resurvey of the site's benchmarks will be conducted in conjunction with each EPA five year review. At the time

of this report, this activity had not been conducted. General debris (i.e., visqueen, five-gallon buckets) was noted in various locations throughout the site. Minor difficulties were encountered while unlocking/locking deadbolts located at the gates of the cluster fencing and on the caps of the metal well protectors. Weathered 55-gallon drums, some lacking completed identification, were noted in several of the cluster fencing units on the north side of the site.

5. **O&M Reporting Requirements**–The development of potentiometric maps for the middle aquifer was conducted for years 2002, 2003, and 2004, but was discontinued and not conducted for years 2005 and 2006. These maps are necessary for making decisions on the condition and directional flow path of the ground water in the middle aquifer.

6. **Second Five-Year Review Report Follow Up Items–**EPA's Second Five-Year Review Report (EPA 2002) states in the 'Determinations' section and the 'Protectiveness Statements' section of the report, "… 2) model the movement of site-related contaminants in the middle and deep aquifers to determine the direction of plume movement and potential for exposure from future ground water use; and 3) address whether MCLs are applicable or relevant and appropriate requirements for the middle and deep aquifers and, if they are, whether a waiver is appropriate." Based on a review of the site-specific documents provided by TCEQ and WESTON®, it appears that these follow up items have not been addressed during the five years following the Second Five-Year Review Report.

   The Second Five-Year Review Report (EPA 2002) discussed that ecological risk assessment guidance was not available at the time the RI was conducted. "However, the EPA risk assessors have compared analytical data from the sediment samples collected in the area of the site to Region 6 contaminant screening levels for fresh water sediments established in June 2002…Screening levels are not regulatory standards or cleanup levels, but guidelines to be used to determine if further study of the sediments is warranted." This Five-Year Review identified that Texas Risk Reduction Program (TRRP) Tier 1 Industrial Ground Water and Soil Protective Concentration Levels (PCLs) are currently being used to evaluate surface water and sediment and not the ecological screening levels.

7. **Deep Aquifer-** Based on a review of analytical data over the last five years for the deep aquifer, only two wells indicated contaminant concentrations above MCLs and/or state PCLs. Lead was detected once in monitoring well DA-01 (0.087 milligram per liter [mg/L]) in March of 2003. Since then, no contaminants of concern have been detected in DA-01. At the end of 2002, well DA-08 was plugged and abandoned due to suspect communication between the contaminated upper and deep aquifer. A replacement well was installed (DA-08A) and sampled semi-annually during the five years since installation. Initially, DA-08A had detected benzene concentrations above the PLC of 0.005 mg/L, with the highest detection (0.018 mg/L) occurring in July 2002. In March 2005, the benzene concentration was below the MCL and continued to decrease based on a comparison with the concentration trend chart developed for DA-08A.

The following actions are recommended in response to these issues:

- Because the groundwater criteria set in the 1987 ROD have not been met in the upper and middle aquifers, additional studies are needed to asses the potential impact of the contamination in the middle aquifer, to determine whether the selected remedy is protective given the contamination in the site sediments, and to determine the impact of the change in the arsenic MCL.

- Sampling of the upper aquifer monitoring wells should be conducted during the next semi-annual monitoring event. Ground water monitoring activities for the upper aquifer wells should continue per the revised O&M Plan.
- It is recommended that surface water and sediment samples be compared to ecological benchmarks (TCEQ 2006), or equivalent, that have been established for surface water and soil in order to determine if further studies are needed.
- Vegetative growth and bushes were noted near and on the concrete pads of monitoring wells. The overgrowth should be cut and removed. Also, vegetative overgrowth should be removed from the perimeter fences, and the site grass should be maintained by regular mowing.
- New compression caps should be placed on all monitoring wells. The hinge on monitoring well UA-11 should be repaired. For security, missing metal well cap locking pins should be replaced. The top rail and barb wire at the cluster fence for UA-11 should be repaired. Warning signs should be placed on posts within the cluster fencing of the monitoring wells.
- The riser within MA-02 should be extended and surveyed during the next surveying event (O&M benchmark survey). Monitoring well metal protector casings should be repainted and reidentified, as necessary to inhibit rusting. Additionally, steps should be taken to eliminate burrowing animals in the vicinity of the monitoring wells.
- Due to known historical subsidence at the site and per TCEQ's O&M Plan, the site's benchmarks should be resurveyed as soon as possible, as well as prior to the next five-year review. General debris at the site should be disposed of in the same event as the purge water disposal.
- Potentiometric maps for the middle aquifer should be continued. Additionally, the O&M Plan should be updated to reflect current site conditions and the revisions made to the upper aquifer sampling.

Based on the information available during the Third Five-Year Review, the selected remedy will be protective of human health and the environment upon implementation of the recommendation in this Review.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site Name (from WasteLAN): Highlands Acid Pit Superfund Site

EPA ID (from WasteLAN): TXD980514996

Region: 6 | **State:** Texas | **City/County:** Highlands/Harris County

SITE STATUS

NPL Status: ☒ Final ☐ Deleted ☐ Other (specify) _____

Remediation Status (choose all that apply): ☐ Under Construction ☒ Operating ☒ Complete

Multiple OUs?* ☒ YES ☐ NO **Construction Completion Date:** July 1987

Has site been put into reuse? ☐ YES ☒ NO

REVIEW STATUS

Reviewing Agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____

Author Name: Mr. Ernest Franke

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

Review Period:** September 2002 to September 2007

Date(s) of Site Inspection: June 20, 2007

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

Review Number: ☐ 1 (first) ☐ 2 (second) ☒ 3 (third) ☐ Other (specify) _____

Triggering Action:
☐ Actual RA On-site Construction at OU ☐ Actual RA Start
☐ Construction Completion ☒ Previous Five-Year Review Report
☐ Other (specify) _____

Triggering Action Date (from WasteLAN): September 27, 2002

Due Date (Five Years After Triggering Action Date): September 27, 2007

* "OU" refers to operable unit.

** The review period refers to the period during which the five-year review was conducted.

Five-Year Review Summary Form (Continued)

Based on a review of the site-specific documents provided by TCEQ and WESTON®, it

appears that these follow up items have not been addressed during the five years following the Second Five-Year Review Report.

The Second Five-Year Review Report (EPA 2002) discussed that ecological risk assessment guidance was not available at the time the RI was conducted. "However, the EPA risk assessors have compared analytical data from the sediment samples collected in the area of the site to Region 6 contaminant screening levels for fresh water sediments established in June 2002…Screening levels are not regulatory standards or cleanup levels, but guidelines to be used to determine if further study of the sediments is warranted." This Five-Year Review identified that Texas Risk Reduction Program (TRRP) Tier 1 Industrial Ground Water and Soil Protective Concentration Levels (PCLs) are currently being used to evaluate surface water and sediment and not the ecological screening levels.

7. **Deep Aquifer-** Based on a review of analytical data over the last five years for the deep aquifer, only two wells indicated contaminant concentrations above MCLs and/or state PCLs. Lead was detected once in monitoring well DA-01 (0.087 milligram per liter [mg/L]) in March of 2003. Since then, no contaminants of concern have been detected in DA-01. At the end of 2002, well DA-08 was plugged and abandoned due to suspect communication between the contaminated upper and deep aquifer. A replacement well was installed (DA-08A) and sampled semi-annually during the five years since installation. Initially, DA-08A had detected benzene concentrations above the PLC of 0.005 mg/L, with the highest detection (0.018 mg/L) occurring in July 2002. In March 2005, the benzene concentration was below the MCL and continued to decrease Based on a comparison with the concentration trend chart developed for DA-08A.

The following actions are recommended in response to these issues:

- Because the groundwater criteria set in the 1987 ROD have not been met in the upper and middle aquifers, additional studies are needed.
- Sampling of the upper aquifer monitoring wells should be conducted during the next semi-annual monitoring event. Ground water monitoring activities for the upper aquifer wells should continue per the revised O&M Plan.
- It is recommended that surface water and sediment samples be compared to ecological benchmarks (TCEQ 2006), or equivalent, that have been established for surface water and soil in order to determine if further studies are needed.
- Vegetative growth and bushes were noted near and on the concrete pads of monitoring wells. The overgrowth should be cut and removed. Also, vegetative overgrowth should be removed from the perimeter fences, and the site grass should be maintained by regular mowing.
- New compression caps should be placed on all monitoring wells. The hinge on monitoring well UA-11 should be repaired. For security, missing metal well cap locking pins should be replaced. The top rail and barb wire at the cluster fence for UA-11 should be repaired. Warning signs should be placed on posts within the cluster fencing of the monitoring wells.
- The riser within MA-02 should be extended and surveyed during the next surveying event (O&M benchmark survey). Monitoring well metal protector casings should be repainted and reidentified, as necessary to inhibit rusting. Additionally, steps should be taken to eliminate burrowing animals in the vicinity of the monitoring wells.
- Due to known historical subsidence at the site and per TCEQ's O&M Plan, the site's benchmarks should be resurveyed as soon as possible, as well as prior to the next five-year review. General debris at the site should be disposed of in the same event as the purge water disposal.

- Potentiometric maps for the middle aquifer should be continued. Additionally, the O&M Plan should be updated to reflect current site conditions and the revisions made to the upper aquifer sampling.

Long-Term Protectiveness:

The Third Five-Year Review found that the selected remedy will be protective upon implementation of the recommendations in this Review.

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) Region 6 has conducted a Third Five-Year Review of the Remedial Action (RA) implemented at the Highlands Acid Pit (HAP) Superfund Site, located near Highlands, Harris County, Texas, for the period between the completion of the Second Five-Year Review in September 2002 through September 2007. The purpose of a five-year review is to determine whether the remedy at a site remains 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. Five-Year Review Reports identify issues found during each review, if any, and make recommendations to address the issues. This Third Five-Year Review Report documents the results of the review for the HAP site, conducted in accordance with EPA guidance (EPA 2001b) on five-year reviews.

The five-year review process is required by federal statute. EPA must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121(c), as amended, states the following:

> "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."

NCP Section 300.430(f)(4)(ii) states the following:

> "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 should be conducted as a matter of policy for the following types of actions:

- A pre-Superfund Amendments and Reauthorization Act (SARA) RA that leaves hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure

- A pre- or post-SARA RA that, once completed, will not leave hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure but will require more than five years to complete

- A removal-only site on the National Priorities List (NPL) where the removal action leaves hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure and no RA has or will be conducted.

Because hazardous substances, pollutants, or contaminants remain at the HAP site above levels that allow for unlimited use and unrestricted exposure, a five-year review is required.

This is the Third Five-Year Review for the HAP site. The period addressed by this five-year review for the HAP site extended from September 2002 to September 2007. The Third Five-Year Review was conducted from May 18 through August 31, 2007, and its methods, findings, conclusions, and recommendations are documented in this report.

This report documents the five-year review for the HAP site by providing the following information: site chronology (Section 2.0), background information (Section 3.0), an overview of the RAs (Section 4.0), progress since the Second Five-Year Review (Section 5.0), the five-year review process (Section 6.0), technical assessment of the site (Section 7.0), institutional controls (Section 8.0), issues (Section 9.0), recommendations and follow up activities (Section 10.0), protectiveness statement (Section 11.0), and discussion of the next review (Section 12.0). Attachment 1 provides the site location map and the site layout map. Attachment 2 provides a copy of the deed notice. Attachment 3 provides a list of documents reviewed. Attachment 4 provides the site inspection checklist. Attachment 5 provides the interview records. Attachment 6 provides the site inspection photographs. Attachment 7 provides the analytical results for the upper aquifer monitoring well. Attachment 8 provides analytical concentration tables for arsenic, benzene, lead, mercury, pyridine, and selenium, from March 2002 through June 2006.

2.0 SITE CHRONOLOGY

A chronology of site events for the HAP site is provided in Table 1. Additional historical information for the site is available online at http://www.epa.gov/earth1r6/6sf/pdffiles/0602505.pdf (EPA 2005b).

TABLE 1

CHRONOLOGY OF SITE EVENTS
HIGHLANDS ACID PIT SUPERFUND SITE

Date	Event
May 1978	TCEQ (formally known as TDWR) received a telephone complaint concerning the site
September 1978	Sludge, sediment, and storm water samples were analyzed, revealing low pH, concentrations of metals, high chemical oxygen demand, and high total organic carbon
October 1981	Ground water samples were analyzed, revealing VOCs and heavy metals
June 1982	The HAP site was proposed for the NPL with a Hazard Ranking Score of 37.77
September 1982	EPA and TCEQ entered into a Cooperative Agreement for a state-led RI/FS
September 1983	HAP site was included on the NPL
December 1983	A Site Investigation Report was submitted which indicated extensive contamination by heavy metals and VOCs
December 1983	The RI/FS was completed
June 1984	The ROD for the Source Control Operable Unit was signed
January 1985	The RA design and site-safety plan was completed
December 1985	The Source Control RD was approved
September 1986	The Source Control RA was awarded
June 1987	The ROD for the Ground Water Operable Unit was signed
November 1987	The Final Report Volumes I and II – Source Control Remedial Construction Report was submitted
December 1987	The Final Report of the Ground Water Sampling Event for Post Closure was submitted
July 1988 to July 1996	O&M was initiated at the HAP site
May 1989	The Post-Closure O&M Plan and subsequent sampling events and reports were submitted
June 1993	TCEQ assumed all responsibility for continuing the 30 years of O&M at the HAP site
August 1994	TCEQ collected ground water samples from the private well of the Baytown Boat Club and concluded that the water quality was excellent based on analyzed constituents
May 1996	EPA and TCEQ agreed on a revised well-development plan, which proposed 10 additional monitoring wells with a revised monitoring strategy, and an expansion of the sampling analysis program
June 1996	EPA completed the First Five-Year Review Report for the HAP site

TABLE 1

CHRONOLOGY OF SITE EVENTS
HIGHLANDS ACID PIT SUPERFUND SITE

Date	Event
April 1997 to December 1999	EPA contractor conducted O&F activities at the HAP site
November 2000	O&F Activities Report submitted to EPA
September 2001	Revised O&M Plan completed by TNRCC
January 2002	Field Sampling Plan completed for TNRCC
August 2002	Annual Site Monitoring Report for TNRCC Fiscal Year 2002 completed
February 2003	Monitoring Well Plug & Abandon Activities Report submitted
August 2003	Annual Site Monitoring Report for TNRCC Fiscal Year 2003 completed
August 2004	Annual Site Monitoring Report for TCEQ Fiscal Year 2004 completed
August 2005	Annual Site Monitoring Report for TCEQ Fiscal Year 2005 completed
June 5, 2007	Final Annual Monitoring Report Fiscal Year 2006
July 18, 2007	HAP deed notice was signed by EPA and recorded by a Public Notary

Notes:

EPA	U.S. Environmental Protection Agency
FS	Feasibility study
HAP	Highlands Acid Pit
TCEQ	Texas Commission on Environmental Quality
TDWR	Texas Division of Water Resources
TNRCC	Texas Natural Resource Conservation Commission
NPL	National Priorities List
O&F	Operational and Functional
O&M	Operation and Maintenance
RA	Remedial Action
RI	Remedial investigation
ROD	Record of Decision
VOC	Volatile organic compounds

3.0 BACKGROUND

This section discusses the site's physical characteristics, land and resource use near the site, history of site contamination, initial response to the site, and the basis for the response.

3.1 PHYSICAL CHARACTERISTICS

The HAP site is assumed to have been used for the disposal of an unknown quantity of industrial waste sludge, from oil and gas refining processes. The site is located near Highlands in Harris County, Texas (Attachment 1), at the end of Clear Lake Road, north of Interstate Highway 10. The site is fenced on the north and northeast side, with cluster fencing around all of the monitoring wells. The site consists of a 3.3 acre peninsula within the San Jacinto River 10-year flood plain. The site is bordered by two adjacent active oil/gas production wells and a petroleum distribution center north of the site, flooded sand pits to the east, Clear Lake to the south, and Grennel Slough to the west.

A majority of the site is currently clear of brush and trees, with the exception of vegetative overgrowth along the perimeter fencing and on some of the cluster fencing. No structures, except for the monitoring wells and the fencing are currently on the site.

3.2 LAND AND RESOURCE USE

The site lies within the Jessie White Survey A-83 of Harris County, Texas, within the Coast Prairie and East Texas Timberlands. Approximate latitude and longitude is 29 degrees, 48 minutes, 52 seconds north, and -95 degrees, 4 minutes, and 48 seconds west, respectively.

The HAP site lies within Federal/State Census Tract Number 25901 and is within the planning jurisdiction of the Baytown, Texas, Planning Commission. The census tract encompasses most of the City of Highlands and the adjacent unincorporated areas near the site. There are no known zoning or land use restriction ordinances in effect or planned within the jurisdiction of the Baytown Planning Commission. In addition, little development is foreseen in the area due to its location within the 10-year flood plain of the San Jacinto River. A site location map is provided in Attachment 1.

3.3 HISTORY OF CONTAMINATION

Early in the 1950's, the site received an unknown quantity of industrial waste sludge, believed to be spent sulfuric acid, from oil and gas refining processes. In September 1978, sludge, sediment and storm water sampling was conducted. In October 1981, ground water sampling was conducted. Based on the resulting information, the site was proposed for the NPL with a Hazard Ranking Score of 37.77; it was placed on the NPL in September 1983.

3.4 INITIAL RESPONSE

Once the site was placed on the NPL, a state-led Remedial Investigation/Feasibility Study (RI/FS) was conducted under a Cooperative Agreement between EPA and TCEQ. The RI/FS was completed in December 1983 and was soon followed by a Record of Decision (ROD) for the Source Control Operable Unit (OU-01). The Remedial Design (RD) for OU-01 was completed and approved in 1985, and the construction, consisting of extensive excavation and off-site disposal, was completed by November 1987. In June of 1987, a ROD was signed for the Ground Water Operable Unit (OU-02), consisting of long term monitoring and no action.

Starting July 1988, the State conducted Operational and Maintenance (O&M) activities at the site. In May 1996, EPA and TCEQ agreed to install 10 additional monitoring wells and implement a revised monitoring strategy, including the expansion of the sampling and analysis plan. These associated activities were considered Operational and Functional (O&F) activities and were completed in September 1999. TCEQ re-initiated O&M activities in February of 2002; and is scheduled to continue O&M activities.

4.0 REMEDIAL ACTIONS

This section discusses the selected remedy, remedy implementation, O&M activities and costs.

4.1 SELECTED REMEDY

The selected remedy for source control was extensive excavation and off-site disposal. The selected remedy included the following activities:

- Excavation of waste material to an approximate depth of eight feet
- Transportation of waste to a permitted Class I hazardous waste disposal facility

- Backfilling the excavated area with clean fill
- Constructing a temporary site perimeter fence with warning signs
- Installing a ground water monitoring system
- Performing ground water monitoring and site maintenance for a 30-year period

The EPA and TCEQ agreed that the selected remedy met the criteria outlined in Section 300.430(f) of the NCP. In addition, the Centers for Disease Control reviewed and concurred with the recommended remedy since it would adequately alleviate any public health threat that might result from the site (EPA 1984). The Source Control (OU-01) ROD was signed on June 25, 1984, and the RA was completed in July 1987.

The ground water (OU-02) ROD was signed on June 26, 1987. The selected remedy was no action, with a recommendation for monitoring the surface environment (surface water and sediment), and ground water. The 1987 ROD selected no action because sampling prior to the OU-02 ROD did not detect any contaminants of concern in the middle or deep aquifers.

4.2 REMEDY IMPLEMENTATION

Construction activities for the OU-01 (Source Control) remedy began in February 1987 and were complete by July 1987. These activities included excavating the contaminated soil, conveying the material to the Chemical Waste Management disposal site in Carlyss, Louisiana, and backfilling the excavated area with clean soil. The OU-02 ROD called for no action as well as long-term monitoring. During the RA and subsequently during the O&F period, monitoring wells were installed within and on the perimeter of the ground water plume. Currently, ground water from the middle and deep aquifers, surface water, and sediment is being sampled on a semi-annual basis. Ground water from the upper aquifer has not been sampled by TCEQ, as required by the approved O&M plan.

4.3 OPERATION AND MAINTENANCE

TCEQ contractors conducted O&M monitoring activities from July 21, 1988 to July 31, 1996. In 1997, EPA and TCEQ determined it was necessary to perform O&F activities to determine if the ground water was (1) traveling in the same direction as contemplated in the ROD, and (2) not migrating laterally or downward. In addition, since all of the monitoring wells were located within the contaminant plume, EPA and TCEQ concluded that additional monitoring wells needed to be installed outside of the plume

and that an aquifer pump test was necessary to determine the possibility of vertical migration between distinct water-bearing units.

EPA conducted O&F activities, including a tidal study and aquifer testing from December 1997 to September 1999. The final O&F Activities Report (O&FAR) was completed in November 2000. During these activities monitoring wells were added, and the site trends were also addressed. Also, since the site fencing had been damaged due to flooding, it was necessary to repair the site and cluster fencing during the O&F activities. The site was made more functional by landscaping the contours to minimize flood damage in the future. Finally, EPA evaluated analytical data and provided recommendations of delisting the site. The O&FAR summarized the site activities and performance evaluation of the selected remedy and ground water monitoring system. The report documented eight sampling events and addressed HAP exposure pathways and direction of ground water flow. The report documented that site contaminants had migrated to the middle and deep aquifers in concentrations above Maximum Contaminant Levels (MCLs).

The main requirements for the HAP site, as stated in the revised O&M Plan (TNRCC 2001), are as follows:

- The wells will be sampled on a semi-annual basis for the following parameters: benzene, toluene, ethylbenzene, xylenes, phenols/pyridines, sulfates, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, pH, temperature, total dissolved solids, specific conductance, and dissolved oxygen

- An annual report that summarizes the sampling, inspection, and repair activities will be prepared within 45 days of the second sampling event. The report shall contain the following:
    - Sampling and analytical results
    - Synopsis of data validation
    - Ground water flow parameters including gradient, direction, and velocity, as well as a potentiometric surface map
    - Inspection and maintenance efforts

- Inspection of the site will occur twice a year and will include:
    - Vegetative growth including excess, stressed, or dead spots
    - Cap settling and areas of ponding
    - Erosion
    - Unusual depressions or heaving of the cap
    - Cap breakout areas
    - Overall site drainage and runoff
    - Fences and gates
    - On-site access road
    - Ground water monitoring wells

- Statistical evaluation of ground water monitoring data
- Repairs to the bollards, pad, casing, etc. will be made on an as-needed basis
- The site's benchmarks will be resurveyed in conjunction with each EPA five-year review

Below is a summary of major milestones that have been conducted during the O&M activities for this five-year review period:

- **Monitoring Well Sampling, Fiscal Year (FY) 2002—**Operations and maintenance activities at the site were resumed by TCEQ with semi-annual sampling events occurring in February and July of 2002. All of the on-site wells were sampled, including nine upper aquifer wells (UA-03, UA-06, UA-10, UA-11, UA-12, UA-13, UA-14, UA-15, and UA-16); seven middle aquifer wells (MA02, MA-03, MA-04, MA-05, MA-06, MA-07, and MA-08); and four deep aquifer wells (DA-02, DA-05, DA-06, and DA-08). The only exception was a deep aquifer well, DA-01, which had an obstruction in it, making it inaccessible during the sampling events.

- **Plugging & Abandonment and Replacement of Monitoring Wells, FY 2002—**As mentioned in the O&M Plan (TNRCC 2001), it was suspected that middle aquifer monitoring well MA-08 and deep aquifer monitoring well DA-08 were creating communication pathways from the contaminated upper aquifer to the lower uncontaminated aquifers. The O&M Plan also mentioned there were redundant wells that were candidates for plugging and abandonment. Three potential candidates were located in the upper aquifer (UA-03, UA-12, and/or UA-13) and two were located in the middle aquifer (MA-04 or MA-05). In December 2002, five monitoring wells (UA-03, UA-13, MA-04, MA-08, and DA-08) were plugged and abandoned; while two replacement wells, MA-08A and DA-08A, were installed. The two replacement wells were surveyed to existing on-site survey markers upon completion of installation. In addition, monitoring well DA-01, which was inaccessible due to an obstruction, was repaired and redeveloped after a dedicated air-driven bladder pump and packer were removed.

- **Monitoring Well Sampling, FY 2003 through FY 2006—**From 2003 through 2006, monitoring well sampling has been conducted on a semi-annual basis with only the middle and deep aquifers wells being sampled.

- **Annual Reporting, FY 2005 and FY 2006—**Per TCEQ's FY 2005 Work Order (TCEQ 2004), six constituents (arsenic, benzene, lead, mercury, pyridine, selenium) were individually graphed for the six middle and five deep aquifer monitoring wells, the three surface water samples, and the three sediment samples. In addition, it was noted that the potentiometric maps were discontinued for the annual reports in FY 2005 and 2006.

4.4 OPERATION AND MAINTENANCE COST

TCEQ provided the Work Order budgets associated with the annual O&M costs for the HAP site since the last five-year review. The budget information provided covers FY 2002 through FY 2005, but an estimated cost provided by WESTON® was used for FY 2006. The costs include but are not limited to the following activities:

- Operation and maintenance of the site
- Ground water sampling and analysis
- Consulting and reporting activities

Table 2 below provides the approximate costs for the years stated.

TABLE 2

ANNUAL OPERATION AND MAINTENANCE COSTS
HIGHLANDS ACID PIT SUPERFUND SITE

Dates		Total Cost Rounded to Nearest $1,000
From	**To**	**Contractor Costs**
11/2001	8/2002	$128,000
9/2002	8/2003	$59,000
9/2003	8/2004	$62,000
9/2004	8/2005	$52,000
9/2005	8/2006	$60,000

5.0 PROGRESS SINCE THE SECOND FIVE-YEAR REVIEW

This is the Third Five-Year Review for the HAP site. The Second Five-Year Review was completed in September 2002. The site appears to have been properly maintained during the period between reports. The scheduled date for the third five-year report is September 2012.

5.1 PROTECTIVENESS STATEMENTS FROM SECOND FIVE-YEAR REVIEW

The Second Five-Year Review Report (EPA 2002) concluded that the remedy at the HAP site currently protects human health and the environment because: (1) the source control remedy has been implemented and is functioning as intended; (2) the contamination found in the middle and deep aquifers has not

affected nearby area water supply wells; and, (3) based on the comparison of field data to sediment screening levels, EPA concludes that the site related contaminants are not affecting sediments near the site. However, the Second Five-Year Review also recommended actions to maintain the protectiveness of the remedy which have not been implemented.

5.2 SECOND FIVE-YEAR REVIEW RECOMMENDATIONS AND FOLLOW UP ACTIONS

The Second Five-Year Review of the HAP site, completed in September 2002, recommended the following follow up actions:

- Complete the O&M Plan as soon as possible and resume ground water monitoring activities
- Set a regular maintenance schedule for grass mowing
- Plug and abandon MA-08 and DA-08
- Unplug monitoring well DA-01 or install a new replacement monitoring well

The Second Five-Year Review also recommended that site-related contaminants in the middle and deep aquifers be modeled to determine plume movement and the potential for exposure from future ground water use, and also recommended that EPA address whether the MCLs are applicable or relevant and appropriate requirements for the middle and deep aquifers, and if they are, whether a waiver is appropriate.

5.3 STATUS OF RECOMMENDED ACTIONS

This section describes the current status of implementation of the recommendations included in the Second Five-Year Review Report as follows:

- TCEQ revised it's O&M Plan in September 2001
- Regular maintenance has been scheduled for grass mowing
- MA-08 and DA-08 were plugged and abandoned in December 2002
- A dedicated air-driven bladder pump and packer were removed from DA-01, making the monitoring well accessible again.

The recommendations in the Second Five-Year Review related to additional groundwater studies and

analysis were not implemented.

6.0 FIVE-YEAR REVIEW PROCESS

This section presents the process and findings of the Third Five-Year Review. Specifically, this section presents the findings of site interviews, the site inspection, an applicable or relevant and appropriate requirements (ARARs) review, and a data review.

6.1 ADMINISTRATIVE COMPONENTS

The HAP site Third Five-Year Review team was lead by Mr. Ernest Franke of EPA, remedial project manager for the HAP site. Additional participants were Mr. Ruben Moya, EPA project manager; Ms. Denise Crawford, TCEQ project manager; Mr. Ben Shields, TCEQ project manager; Mr. Trey Rushing, TCEQ project manager; and Ms. Dawn Denham-Ewell, WESTON® project manager. Ms. April Ballweg, a representative from EA Engineering, Science, and Technology, Inc. (EA), assisted in the review process.

In June 2007, the review team established the review schedule, which included the following components:

- Site inspection
- Local interviews
- ARAR review
- Data review
- Five-Year Review Report development and review

6.2 DOCUMENT REVIEW

This Third Five-Year Review for the site included a review of relevant site documents, including decision documents, O&F reports, annual site monitoring reports, and related monitoring data.

The complete list of documents reviewed during this Third Five-Year Review is provided in Attachment 3.

6.3 DATA REVIEW

A review of the Annual Site Monitoring Reports (WESTON® 2002, 2003, 2004, 2005, 2006) indicates the TCEQ Work Orders are being followed. The following sections discuss the 2002 through 2006 data associated with O&M of the HAP site since the Second Five-Year Review.

2.3.1 Sampling Data Review

In 2001, the original ground water monitoring network at the HAP site consisted of 21 wells (TNRCC 2001). Nine wells were screened in the uppermost water-bearing zone, which is referred to as the upper aquifer, and seven in the middle zone, also known as the middle aquifer. The remaining five wells are screened in the deep sand below the second confining clay layer, which is referred to as the deep aquifer. In 2002, one middle aquifer monitoring well (MA-08) and one deep aquifer monitoring well (DA-08) were plugged and abandoned due to suspect cross contamination between the upper and the two deeper aquifers (Tetra Tech 2003). Replacement wells were installed (MA-08A and DA-08A) within 5 feet of the original wells. In addition, three wells (UA-03, UA-13, and MA-04), which were considered redundant by the state (TNRCC 2001), were plugged and abandoned in 2002.

The ROD (EPA 1987) states that the recommended alternative is "No Action with Ground Water/Surface Environment Monitoring" (EPA 1987). The O&M activities which consist of ground water, surface water and sediment monitoring, as well as maintenance of the site were discussed previously in section 4.3 of this report.

Ground Water in Upper Aquifer

In February/March 2002 and July 2002, the upper aquifer wells (UA-03, UA-06, UA-10, UA-11, UA-12, UA-13, UA-14, UA-15, and UA-16) were sampled. All ground water analytical results in the Annual Site Monitoring Reports (WESTON® 2002, 2003, 2004, 2005, 2006) were compared to action levels based on federal MCLs.

Analytical results indicated several constituents at concentrations greater than the site action levels including benzene, phenol, pyridine, arsenic, cadmium, lead, and mercury for the upper aquifer wells. Table 3-2 from the Annual Site Monitoring Report (WESTON® 2002b) provides all of the analytical results for the upper aquifer monitoring wells (see Attachment 7).

TCEQ determined that it was not necessary to sample the upper contaminated aquifer wells on a semi-annual basis, except sampling of the upper aquifer wells was scheduled by TCEQ for the year of and prior

to the five-year review. However, an additional round of sampling of the upper wells has yet to be conducted; therefore, no current further information concerning the upper aquifer is available for review.

Middle Aquifer Ground Water

The following information, obtained from the Annual Site Monitoring Reports (WESTON® 2002, 2003, 2004, 2005, and 2006), provides a summary of the analytical results of concentrations in middle aquifer wells that were above the site action levels (EPA MCLs/TCEQ PCLs) for fiscal years 2002 through 2006.

- 2002-Arsenic (MA-03, MA-05, MA-07, and MA-08A), benzene (MA-07 and MA-08A), and lead (MA-08A) were identified at concentrations greater than MCLs
- 2003-Arsenic (MA-03 and MA-05), benzene (MA-06, MA-07, and MA-08A), and cadmium (MA-03) were identified at concentrations greater than MCLs
- 2004-Arsenic (MA-03 and MA-05), and benzene (MA-06 and MA-07) were identified at concentrations greater than MCLs
- 2005-Arsenic (MA-03, MA-05, MA-06, and MA-08A), benzene (MA-07), and chromium (MA-08A) were identified at concentrations greater than MCLs
- 2006-Arsenic (MA-03, MA-05, and MA-06), and benzene (MA-06 and MA-07) were identified at concentrations greater than MCLs

Deep Aquifer Ground Water

The following provides a summary of the analytical results of concentrations in deep aquifer wells that were above the site action levels (MCLs) for fiscal years 2002 through 2006.

- 2002-Benzene (DA-08A) was identified at concentrations greater than MCLs
- 2003-Benzene (DA-08A), and lead (DA-01) were identified at concentrations greater than MCLs
- 2004-Benzene (DA-08A) was identified at concentrations greater than MCLs
- 2005-No analytical results were identified at concentrations greater than MCLs
- 2006-No analytical results were identified at concentrations greater than MCLs

Surface Water

The following provides a summary of the analytical results of concentrations in surface water samples that were above the site action levels (MCLs) for fiscal years 2002 through 2006.

- 2002-Benzene (SW-01 and SW-02) was identified at concentrations greater than MCLs
- 2003-Arsenic (SW-03), and selenium (SW-03) were identified at concentrations greater than MCLs
- 2004-No analytical results were identified at concentrations greater than MCLs
- 2005-Arsenic (SW-01, SW-02, and SW-03), and benzene (SW-02) were identified at concentrations greater than MCLs
- 2006-Benzene (SW-03) was identified at a concentration greater than the MCL

Sediment

The following provides a summary of the analytical results of concentrations in sediment samples that were above the site action levels (MCLs) for fiscal years 2002 through 2006.

- 2002-Lead (SD-01, SD-02, and SD-03), and mercury (SD-02 and SD-03) were identified at concentrations greater than MCLs
- 2003-Lead (SD-02 and SD-03), and mercury (SD-01, SD-02, and SD-03) were identified at concentrations greater than MCLs
- 2004-Lead (SD-01, SD-02, and SD-03), mercury (SD-02 and SD-03), and selenium (SD-01) were identified at concentrations greater than MCLs
- 2005-Lead (SD-01, SD-02, and SD-03), mercury (SD-02 and SD-03), and selenium (SD-01 and SD-03) were identified at concentrations greater than MCLs
- 2006-Lead (SD-01, SD-02, and SD-03), and mercury (SD-01 and SD-02) were identified at concentrations greater than MCLs

Analytical concentration tables for arsenic, benzene, lead, mercury, pyridine, and selenium, for the deep aquifer, middle aquifer, surface water, and sediment samples are provided in Attachments 8.

2.3.2 Data Review Summary

Data reviewed during the course of this five-year review revealed: (1) the net ground water flow continues to be to the west; (2) the pH environment in the upper aquifer continues to be low; therefore, limiting benzene bio-degradation; (3) benzene concentrations above MCLs continue to be detected in the middle aquifer monitoring wells, but have fallen to below MCLs within the deep aquifer wells; (4) arsenic continues to be detected in the middle aquifer above MCLs; (5) some samples showed lead, cadmium, and chromium above MCLs in the middle aquifer, and one sample of lead was noted above MCLs for the deep aquifer; (6) benzene and arsenic concentrations were detected above MCLs, with one detection of selenium above MCLs for the surface water samples; and (7) lead, mercury, and selenium have been detected in sediment samples.

6.4 ARAR REVIEW

ARARs for this site were identified in the HAP site RODs for OU-01 (EPA 1984) and OU-02 (EPA 1987). The First Five-Year Review Report (EPA 1996) was completed June 1996 and the Second Five-Year Review Report (EPA 2002) was completed and signed by EPA on September 27, 2002. No changes to ARARs were identified in either of the previous five-year reviews.

As part of this Third Five-Year Review, ARARs identified in the RODs (EPA 1984, 1987) were reviewed to determine if any newly promulgated or modified requirements of federal and state environmental laws have significantly changed the protectiveness of the remedies implemented at the HAP site since the last five-year review (EPA 2002) was conducted. The ARARs reviewed were those included in the site's

decision documents as they apply to the selected no action remedy with long term monitoring of the surface environment and ground water (EPA 1987).

For the ground water remediation, the chemical-specific ARARs cited in the ROD (EPA 1987) were:

- Maximum Contaminant Levels-used to evaluate deeper aquifers
- Water Quality Criteria-used to evaluate surface waters

Overall, no newly-promulgated ARARs were found during this review that would change the protectiveness of the remedies implemented at the HAP site. A modification to the arsenic MCL (EPA 2001a) was noted during the review process and is discussed below.

Applicable Requirements

Safe Drinking Water Act (SDWA): Establishes drinking water standards (40 Code Federal Regulations (CFR) 141.11). Under the federal SDWA, the current clean-up standards or MCLs established for COCs serve as the applicable regulatory treatment standard unless more stringent state or federal standards are promulgated.

On January 22, 2001, a new standard for arsenic in drinking water was established at 0.01 mg/L, replacing the old standard of 0.05 mg/L (EPA 2001a). The new standard, identified as the Arsenic Rule, became effective on February 22, 2002, and the date by which system must comply with the new 0.01 mg/L standard was January 23, 2006.

Relevant and Appropriate Requirements

Clean Water Act (CWA): Sets water quality standards (40 CFR 301, 307, 403) for discharges to surface waters. Under the federal CWA, the current clean-up standards for COCs are monitored under regulation set forth by the Texas Surface Water Quality Standards under Chapter 307 of the Texas Water Code (with the authority of Section 303(c) of the Clean Water Act).

As part of a Third Five-Year Review, ARARs identified in the RODs were reviewed to determine if any newly promulgated or modified requirements of federal and state environmental laws have significantly changed the protectiveness of the remedies implemented at the site since the last five-year review was conducted. Overall, no newly promulgated or modified ARARs, other than what was mentioned above,

were identified during this review that would change the protectiveness of the remedies implemented at the site.

6.5 SITE INSPECTION

A site inspection was conducted on June 20, 2007, to assess the condition of the site and the measures employed to protect human health and the environment from the COCs still present at the site. Attendees included: (1) Ernest Franke (EPA); (2) Ruben Moya (EPA); (3) Denise Crawford (TCEQ); (4) Benjamin Shields (TCEQ); (5) Trey Rushing (TCEQ); (6) Dawn Denham-Ewell (WESTON®); and (7) April Ballweg (EA). The site inspection checklist is included in Attachment 4. Completed interview records are provided in Attachment 5. A photographic log of the site inspection is included in Attachment 6.

No evidence of contamination was visible at the site. The site's general appearance is good. The freshly mowed grass and vegetation at the site appeared to be in good condition, with some overgrowth occurring on the perimeter fencing and on the cluster fencing. The inspection team investigated the site within the boundary of the fence and each cluster fencing area, as well as the area immediately adjacent to the site. In addition, the team inspected the seven upper aquifer monitoring wells (UA-06, UA-10, UA-11, UA-12, UA-14, UA-15, and UA-16); the six middle aquifer monitoring wells (MA-02, MA-03, MA-05, MA-06, MA-07, and MA-08A); and the five deep aquifer monitoring wells (DA-01, DA-02, DA-05, DA-06, and DA-08A).

The wells appeared to be in fair to good condition, with some wear indicating the need for repair, repainting, and replacement of compression caps. Site access appeared to be sufficiently restricted due to the cluster fencing. No vandalism was observed with the exception of pellet holes in the face of the SW-02 sign. The fence and gates were in good condition, with one area of minor damage to the top railing and the top strand of barb wire fence at monitoring well UA-11. One hinge was noted to be broken and in need of repair.

6.6 SITE INTERVIEWS

In accordance with the community involvement requirements of the five-year review process, key individuals to be interviewed were identified by EPA. Completed interview records for the following individuals are included in Attachment 5:

- Denise Crawford, Project Manager, TCEQ

- Benjamin Shields, Former Project Manager, TCEQ
- Dawn Denham-Ewell, Project Manager, WESTON®

Overall, the received responses were positive and no serious issues or concerns were identified by any of the responding interviewees. Comments that were brought up through the interview process are as follows.

Comments received from Ms. Denise Crawford (TCEQ) on June 19, 2007:

- What is your general impression of the work conducted at the site since the second five-year review period (since September 2002)? "Work has consisted of O&M monitoring on a semi-annual basis of ground water, surface water and sediments."

Comments received from Mr. Benjamin Shields (TCEQ) on June 18, 2007:

- What is your general impression of the work conducted at the site since the second five-year review period (since September 2002)? "Work has consists of routine O&M, namely sampling on-site monitoring wells, surface water and sediment."
- In the past five years, are you aware of any community concerns regarding the site or its operations and administration? If so, please provide details. "I am aware of no community concerns."
- Are you aware of any events, incidents, or activities at the site in the past five years such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details. "The only significant event I am aware of in the past five years is Hurricane Rita. After the hurricane EPA conducted an on-site inspection of the site to assess any damage."

Comments received from Ms. Dawn Denham-Ewell (WESTON®) on June 15, 2007:

- What is your general impression of the work conducted at the site since the second five-year review period (since September 2002)? "That the work has been completed as scoped by TCEQ. Each year we receive a work authorization from the TCEQ that describes the scope of work."
- What effect have site operations had on the surrounding community since the second five-year review? "I am not aware of any effects."
- In the past five years, are you aware of any community concerns regarding the site or its operations and administration? If so, please provide details. "I am not aware of any concerns the community may have regarding the site."
- Are you aware of any events, incidents, or activities at the site in the past five years such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details. "No. I have checked with my field team and they are not aware of any incidents at the site."

- Do you feel well informed about the site's activities and progress? "From a contractor standpoint, yes. Our scope has primarily been to conduct semiannual sampling each year, and prepare an annual ground water monitoring report to describe the sampling activities and results."

7.0 TECHNICAL ASSESSMENT

The conclusions presented in this section support the determination that the selected remedy for the HAP site is currently protective of human health and the environment. EPA Guidance indicates that to assess the protectiveness of a remedy, three questions (Questions A, B, and C) shall be answered.

7.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

- **RA Performance**—Based on review of documents, ARARs, the site inspection, and the selected remedies for the HAP site (EPA 1984, 1987), the remedy is not functioning as intended by the decision documents.

- **Cost of System and O&M**—O&M cost information for fiscal years 2002 through 2006 was an average of approximately $72,000 annually. Current O&M activities (as described in Section 4.3) appear sufficient to maintain the effectiveness of the current remedy.

- **Opportunities for Optimization**—The current monitoring well network should be reassessed to determine if additional monitoring wells (i.e., deep aquifer wells) could be plugged and abandoned to reduce the costs associated with annual sampling.

- **Early Indicators of Potential Issues**—There is an indication of remedy failure because the site ground water has concentrations of contaminants above the limits set in the ROD.

- **Implementation of ICs and Other Measures** – Implementation of the institutional controls (ICs) at the site includes a deed notice (see Attachment 2), as well as perimeter fence and cluster fencing, which remains in place, thereby limiting access to the site.

7.2 QUESTION B: ARE THE ASSUMPTIONS USED AT THE TIME OF REMEDY SELECTION STILL VALID?

- **Changes in Exposure Pathways**—There have been no changes that bear on the protectiveness of the selected remedy.

- **Changes in Standards, Newly Promulgated Standards, and To-Be-Considered**—No new laws or regulations have been promulgated or enacted that would call into question the effectiveness of the remedy at the site to protect human health and the environment.

- **Changes in Toxicity and Other Contaminant Characteristics**—There have been no changes during the past 5 years that bear on the protectiveness of the selected remedy, other than the lowering of the arsenic MCL which was promulgated on February 22, 2202 with a compliance date of January 23, 2006.

- **Changes in Land Use**—There have been no changes in land use at the site that bear on the protectiveness of the selected remedy.

- **New Contaminants and/or Contaminant Sources**—There have been no new contaminants or contaminant sources identified at the 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 come to light as part of this Third Five-Year Review for the site that would call into question the protectiveness of the site remedy.

7.4 TECHNICAL ASSESSMENT SUMMARY

After documents and data were reviewed, the site inspection, and interviews, the remedy is not functioning as intended by the RODs (EPA 1984, 1987). There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy, but the ARARs cited in the ROD have not been met.

8.0 INSTITUTIONAL CONTROLS

ICs 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 2005a). ICs can be used for many reasons including restriction of site use, modifying behavior, and providing information to individuals (EPA 2000). ICs may include easements, covenants, restrictions or other conditions on deeds, and/or ground water, and/or land use restriction documents (EPA 2001b). The following sections describe the ICs implemented at the site, the potential effect of future land use plans on ICs, and any plans for changes to site contamination status.

8.1 TYPES OF INSTITUTIONAL CONTROLS IN PLACE AT THE SITE

The type of IC established at the HAP site during this five-year review period includes the implementation of a deed notice (Deed File No. D489907; Abstract 83 J White) which was signed by the EPA and witnessed by Jacqueline Samuel, a Notary Public, on July 18, 2007. The deed notice has been transmitted by certified mail with green card return and cover letter, requesting each of the owners to file this with their respective original recorded deed document, as the official notice of record.

Although not of themselves considered ICs, the site is secured on the north-northeast side by a 6-foot, barb wire topped, chain link fence, with the entrance restricted by a locked gate, and warning signs visible on the gate. In addition, cluster fencing consisting of 6-foot, barb wire topped, chain link fence, with locked gates, surrounds each of the monitoring wells on site. The cluster fencing is a result of the lack of fencing along the shore of the San Jacinto river. Additional warning signs are needed for each of the cluster fenced areas on site.

8.2 EFFECT OF FUTURE LAND USE PLANS ON INSTITUTIONAL CONTOLS

No future land uses have been formally established for the site that would require an adjustment to the ICs currently being implemented.

8.3 PLANS FOR CHANGES TO SITE CONTAMINATION STATUS

No changes to the status of the contamination at the site are anticipated.

A summary table of issues identified, and if they currently affect the remedy protectiveness (Table 3) is provided below.

TABLE 3

ISSUES IDENTIFIED
HIGHLANDS ACID PIT SUPERFUND SITE

Issue	Currently Affects Remedy Protectiveness (Yes/No)
Sampling of Monitoring Well Network	No
Monitoring Well O&M	No
Fencing O&M	No
General Site O&M	No
O&M Reporting Requirements	No
Second Five-Year Review Report Follow Up Items	No

10.0 RECOMMENDATIONS AND FOLLOW UP ACTIONS

The following actions are recommended in response to these issues:

- Because the groundwater criteria set in the 1987 ROD have not been met in the upper and middle aquifers, additional studies are needed to assess the potential impact of the contamination in the middle aquifer, to determine whether the selected remedy is protective given the contamination in the site sediments, and to determine the impact of the change in the arsenic MCL.
- Sampling of the upper aquifer monitoring wells should be conducted during the next semi-annual monitoring event. Ground water monitoring activities for the upper aquifer wells should continue per the revised O&M Plan.
- It is recommended that surface water and sediment samples be compared to ecological benchmarks (TCEQ 2006), or equivalent, that has been established for surface water and soil in order to determine if further studies are needed.
- Vegetative growth and bushes were noted near and on the concrete pads of monitoring wells. The overgrowth should be cut and removed. Also, vegetative overgrowth should be removed from the perimeter fences, and the site grass should be maintained by regular mowing.
- New compression caps should be placed on all monitoring wells. The hinge on monitoring well UA-11 should be repaired. For security, missing metal well cap locking pins should be replaced. The top rail and barb wire at the cluster fence for UA-11 should be repaired. Warning signs should be placed on posts within the cluster fencing of the monitoring wells.
- The riser within MA-02 should be extended and surveyed during the next surveying event (O&M benchmark survey). Monitoring well metal protector casings should be repainted and reidentified, as necessary to inhibit rusting. Additionally, steps should be taken to eliminate burrowing animals in the vicinity of the monitoring wells.

- Due to known historical subsidence at the site and per TCEQ's O&M Plan, the site's benchmarks should be resurveyed as soon as possible, as well as prior to the next five-year review. General debris at the site should be disposed of in the same event as the purge water disposal.
- Potentiometric maps for the middle aquifer should be continued. Additionally, the O&M Plan should be updated to reflect current site conditions and the revisions made to the upper aquifer sampling.

At this time, based on the information available during the Third Five-Year Review, the selected remedy will be protective of human health and the environment in upon completion.

Table 4 summarizes the recommendations and follow up actions for the HAP site.

TABLE 4

RECOMMENDATIONS AND FOLLOW UP ACTIONS
HIGHLANDS ACID PIT SUPERFUND SITE

Issue	Recommendations and Follow Up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow Up Actions Affect Long-Term Remedy Protectiveness (Yes/No)
Sampling of Monitoring Well Network	Sampling of upper aquifer should be conducted during the next semi-annual monitoring event. Ground water monitoring activities for the upper aquifer wells should continue per the revised O&M Plan.	TCEQ	EPA	Immediate sampling @ next quarterly sampling event & there after by Revised Sampling Plan	Yes
Monitoring Well O&M	Conduct necessary repairs	TCEQ	EPA	Within 1 year of submittal of this report	No
Fencing O&M	Conduct necessary repairs and install signage	TCEQ	EPA	Within 1 year of submittal of this report	No
General Site O&M	Conduct necessary activities	TCEQ	EPA	Within 1 year of submittal of this report	No
O&M Reporting Requirements	Develop potentiometric maps	TCEQ	EPA	Within 1 year of submittal of this report	No
Second Five-Year Review Report Follow Up Items	The middle and deep aquifer items require immediate actions at this time; ecological benchmark (TCEQ 2006) or equivalent comparison is recommended	TCEQ	EPA	Next Quarterly Scheduled O&M Sampling Event in FY-08	No

Notes:

EPA U.S. Environmental Protection Agency
TCEQ Texas Commission on Environmental Quality
MW Monitoring well
N/A Not applicable
O&M Operation and Maintenance

11.0 PROTECTIVENESS STATEMENT

Based on the information available during the Third Five-Year Review, the selected remedy for the HAP site will be protective upon implemention.

12.0 NEXT REVIEW

The HAP site requires ongoing five-year reviews. The next review will be conducted within the next five years, but no later than September 2012.

Attachment 1

Site Location Map and Site Layout Map

Attachment 2

Deed Notice

Attachment 3

Documents Reviewed

DOCUMENTS REVIEWED

U.S. Environmental Protection Agency (EPA). 1984. EPA Superfund Record of Decision: Highlands Acid Pit, EPA ID: TXD980514996, OU 01, Highlands, TX. June 25.

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EPA. 2001a. Arsenic in Drinking Water, Arsenic Rule. EPA 816-F-01-004. January 22. Online address: http://www.epa.gov/safewater/arsenic/regulations.html. Accessed July 30, 2007.

EPA. 2001b. Comprehensive Five-Year Review Guidance. EPA 540-R-01-007. June.

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EPA. 2005a. Institutional Controls: A Citizen's Guide to Understanding Institutional Controls at Superfund, Brownfields, Federal Facilities, Underground Storage Tank, and Resource Conservation and Recovery Act Cleanups (OSWER 9255.0-98). EPA-540-R-04-003. February 1.

EPA. 2005b. Highlands Acid Pit, Texas, EPA ID# TXD980514996, Site ID: 0602505. Updated: September 20, 2005. EPA Region 6, Congressional District 25, Harris County. Online address: http://www.epa.gov/earth1r6/6sf/pdffiles/0602505.pdf. Accessed July 23, 2007.

Tetra Tech EM Inc. (Tetra Tech). 2000. Operational and Functional Activities Report, Highlands Acid Pit, Highlands, Harris County, Texas, EPA ID No. TXD900514996. November 30.

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Texas Natural Resources Conservation Commission (TNRCC). 2001. Operation and Maintenance Plan, Highlands Acid Pit, Federal Superfund Site. Revised September.

Weston Solutions, Inc. (WESTON®). 2002a. Field Sampling Plan, Highlands Acid Pit, State Superfund Site, TNRCC Contract No. 5829-24369-0020, Work Order No. 106-0020. January.

WESTON®. 2002b. Annual Site Monitoring Report for TNRCC Fiscal Year 2002, Highlands Acid Pit Superfund Site, Highlands Texas. August.

WESTON®. 2003. Annual Site Monitoring Report for TNRCC Fiscal Year 2003, Highlands Acid Pit Superfund Site, Highlands Texas. August.

WESTON®. 2004. Annual Site Monitoring Report for TCEQ Fiscal Year 2004, Highlands Acid Pit State Superfund Site, Highlands Texas. August.

WESTON®. 2005. Annual Site Monitoring Report for TCEQ Fiscal Year 2005, Highlands Acid Pit State Superfund Site, Highlands Texas. August.

WESTON®. 2007. Final Annual Monitoring Report FY06, Highlands Acid Pit Superfund Site, TCEQ Contract No. 5824-49197-0007, TCEQ Work Order No. 155-0007, WESTON® Work Order No. 02444.016.005. June 5.

Attachment 4

Site Inspection Checklist

FIVE-YEAR REVIEW SITE VISIT CHECKLIST

I. SITE INFORMATION

Site Name: Highlands Acid Pit Superfund Site	**Date of Inspection:** June 20, 2007
Location and Region: Highlands, Harris County, TX	**EPA ID:** TXD980514996
Agency leading the five-year review: EPA Region 6	**Weather/temperature:** Partly cloudy, 89°F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Ground water pump-and-treatment
- ☐ Surface water collection and treatment
- ☐ Other-Leachate collection and treatment

Attachments: ☒ Inspection team roster attached ☒ Site map attached to report

II. INTERVIEWS (Check all that apply)

1. O&M Site Manager Dawn Denham-Ewell (Name) Project Manager/WESTON® (Title) 6/20/2007 (Date)

Interviewed: ☒ by email ☐ at site ☐ by phone Phone no. 713-985-6610
Problems, suggestions: ☒ Report attached Interview Record attached to report

2. O&M Staff _____ (Name) _____ (Title) _____ (Date)

Interviewed: ☐ by mail ☐ at office ☐ by phone Phone no. _____
Problems, suggestions: ☐ Report attached

3. Local regulatory authorities and response agencies (i.e.; State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency Texas Commission on Environmental Quality (TCEQ)
Contact Denise Crawford (Name) Project Manager (Title) 6/19/2007 (Date) 512-239-6598 (Phone no.)
Problems, suggestions: ☒ Report attached Interview Record attached to report

Agency TCEQ
Contact Ben Shields (Name) Former Project Manager (Title) 6/18/2007 (Date) 512-239-5054 (Phone no.)
Problems, suggestions: ☒ Report attached Interview Record attached to report

4. Other interviews (optional): ☐ Report attached _____

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

1. O&M Documents

☒ O&M manual (long term monitoring plan)	☒ Readily available	☒ Up to date	☐ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs (current and cumulative monitoring reports)	☒ Readily available	☐ Up to date	☐ N/A

Remarks: Final Annual Monitoring Report FY06 submitted on June 5, 2007.

2. Site-Specific Health and Safety Plan	☐ Readily available	☐ Up to date	☒ N/A
☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A

Remarks: On-site health and safety meeting conducted at the site prior to the site inspection.

3. O&M and OSHA Training Records	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

4. Permits and Service Agreements

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
7. Ground Water Monitoring Records	☒ Readily available	☐ Up to date	☐ N/A
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A

9. Discharge Compliance Records

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

IV. O&M COSTS

1. O&M Organization

☐ State in-house ☒ Contractor for State ☐ PRP in-house

☐ Contractor for PRP ☐ Other _____

2. O&M Cost Records

☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place

☐ Original O&M cost estimate ☐ Breakdown attached

Total annual cost by year for review period, if available

	Date		Date	Total Cost		
From	11/01/2001	to	8/31/2002	$128,434	- ☐	Breakdown attached
From	01/23/2003	to	8/31/2003	$59,394	- ☐	Breakdown attached
From	10/31/2003	to	8/31/2004	$61,568	- ☐	Breakdown attached
From	12/09/2004	to	8/31/2005	$51,593	- ☐	Breakdown attached
From		to			- ☐	Breakdown attached
From		to			- ☐	Breakdown attached
From		to			- ☐	Breakdown attached
From		to			- ☐	Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: Vegetative growth on some of the cluster fencing;

B. Other Access Restrictions

1. Signs and other security measures ☐ Location shown on site map ☐ N/A

Remarks: State identification not at site; warning signs not located on cluster fencing

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by) Self-reporting; semi-annual ground water monitoring

Frequency Semi-annually with annual reports

Responsible party/agency TCEQ / EPA

Contact Denise Crawford Project Manager 512-239-6532
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

Deed notice provided as Attachment 1

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: Deed notice finalized for the site by EPA on July XX, 2007; TCEQ to contact owners for filing

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident

Remarks:

2. Land use changes on-site ☒ N/A

Remarks:

3. Land use changes off-site ☒ N/A

Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

Remarks:

B. Other Site Conditions ☐ Applicable ☒ N/A

Remarks: Discussed previously

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. Settlement (Low spots) ☐ Location shown on site map ☐ Settlement not evident

Areal extent Depth

Remarks: N/A

2. Cracks ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks: N/A

3. Erosion ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks: N/A

4. Holes ☐ Holes evident ☐ Holes not evident
Areal extent _____ Depth _____
Remarks: N/A

5. Vegetative Cover ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Bushes/Shrubs (indicate size and locations on a diagram) (None)
Remarks: N/A

6. Alternative Cover (armored rock, concrete, etc.) ☐ N/A
Remarks: N/A

7. Bulges ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Depth _____
Remarks: N/A

8. Wet Areas/Water Damage ☐ Wet areas/water damage not evident

☐ Wet areas	☐ Location shown on site map	☐ Areal extent _____
☐ Ponding	☐ Location shown on site map	☐ Areal extent _____
☐ Seeps	☐ Location shown on site map	☐ Areal extent _____
☐ Soft subgrade	☐ Location shown on site map	☐ Areal extent _____

Remarks: N/A

9. Slope Instability ☐ Slides ☐ Location shown on site map
☐ No evidence of slope instability Areal extent _____
Remarks: N/A

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. Flows Bypass Bench ☐ Location shown on site map ☒ N/A or okay
Remarks: _____

2. Bench Breached ☐ Location shown on site map ☒ N/A or okay
Remarks: _____

3. Bench Overtopped ☐ Location shown on site map ☒ N/A or okay
Remarks: _____

C. Letdown Channels ☐ Applicable ☒ N/A

1. Settlement ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks: N/A

2. Material Degradation ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks: N/A

3. Erosion ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks: N/A

4. Undercutting ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks: N/A

5. Obstructions Type _____
☐ No obstructions ☐ Location shown on site map
Areal extent _____ Size _____
Remarks: N/A

6. Excessive Vegetative Growth Type _____
☐ No evidence of excessive growth ☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks: N/A

D. Cover Penetrations ☐ Applicable ☒ N/A

1. Gas Vents ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs O&M ☒ N/A
Remarks: N/A

2. Gas Monitoring Probes
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs O&M ☒ N/A
Remarks: N/A

3. **Monitoring Wells** (within surface area of landfill)
☐ Evidence of leakage at penetration ☐ Needs O&M ☒ N/A
Remarks: _____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs O&M ☒ N/A
Remarks: _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs O&M
Remarks: N/A

2. **Gas Collection Wells, Manifolds, and Piping** ☐ Good condition ☐ Needs O&M
Remarks: N/A

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs O&M ☒ N/A
Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☒ N/A
Remarks: _____

2. **Outlet Rock Inspected** ☐ Functioning ☒ N/A
Remarks: _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Size _____
☒ N/A ☐ Siltation not evident
Remarks: _____

2. **Erosion** Areal extent _____ Depth _____
☐ Erosion not evident
Remarks: N/A

3. **Outlet Works** ☐ Functioning ☒ N/A
Remarks: _____

4. Dam ☐ Functioning ☒ N/A
Remarks: _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. Deformations ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks: N/A

2. Degradation ☐ Location shown on site map ☐ Degradation not evident
Remarks: N/A

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. Siltation ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks: N/A

2. Vegetative Growth ☐ Location shown on site map ☒ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks: _____

3. Erosion ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks: N/A

4. Discharge Structure ☐ Functioning ☐ N/A
Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. Settlement ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks: N/A

2. Performance Monitoring Type of monitoring _____
☐ Performance not monitored Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks: N/A

IX. GROUND WATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Ground water Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. Pumps, Wellhead Plumbing, and Electrical
☐ Good condition ☐ All required wells located ☐ Needs O&M ☒ N/A
Remarks: _____

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances
☐ Good condition ☐ Needs O&M
Remarks: N/A

3. Spare Parts and Equipment
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks: N/A

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs O&M
Remarks: N/A

2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances
☐ Good condition ☐ Needs O&M
Remarks: N/A

3. Spare Parts and Equipment
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks: N/A

C. Treatment System ☐ Applicable ☒ N/A

1. Treatment Train (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon absorbers
☐ Filters _____
☐ Additive (e.g., chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs O&M
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of ground water treated annually _____
☐ Quantity of surface water treated annually _____
Remarks: N/A

2. Electrical Enclosures and Panels (Properly rated and functional)
☒ N/A ☐ Good condition ☐ Needs O&M
Remarks: _____

3. Tanks, Vaults, Storage Vessels
☒ N/A ☐ Good condition ☐ Proper thirdary containment ☐ Needs O&M
Remarks: _____

4. Discharge Structure and Appurtenances
☒ N/A ☐ Good condition ☐ Needs O&M
Remarks: _____

5. Treatment Building(s)
☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks: _____

6. Monitoring Wells (Pump-and-treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs O&M ☒ N/A
Remarks: _____

D. Monitored Natural Attenuation ☒ Applicable ☐ N/A

1. Monitoring Wells (Natural attenuation remedy)
☐ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☒ All required wells located ☒ Needs O&M ☐ N/A
Remarks: Monitoring wells (MWs) in fair to good condition with all needing compression caps and replacement of security locks. Some MWs in need of paint for the exterior well casings. Monitoring well MA-02 requires the removal of 5-inch diameter bush which is directly adjacent to the well on the southeast side of the concrete well pad; subsidence under MA-06 and animal burrowing holes at DA-02 and MA-05 need to be repaired. The locking pins for DA-01, DA-02, and MA-02 need to be replaced, and vegetative growth over concrete well pads needs to be cleared.

X. OTHER REMEDIES

If there are remedies applied at the site that are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The monitored natural attenuation occurring at the site appears to be operating as designed. Warning signage needs to be placed within the cluster fencing to alert potential trespassers of the hazards on site. One side of the cluster fencing on MA-6 is in need of minor repairs to the top stabilization bar and the security barb-wire. Vegetation was noted within several of the clustered fencing areas, as well as, on the fencing itself which requires removal.

B. Adequacy of O&M

Current O&M activities appear to be sufficient with the exception of missing compression caps on the monitoring wells, missing warning signage within the cluster fencing, and the need for removing vegetative growth adjacent to the concrete well pads or around the cluster fencing (typically the monitoring wells located on the perimeter of the site).

C. Early Indicators of Potential Remedy Failure

There are no early indicators of potential remedy failure.

D. Opportunities for Optimization

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

Monitoring of the shallow aquifer needs to be sampled and the results provided the year of and prior to the the five-year review.

INSPECTION TEAM ROSTER

Name	Organization	Title
Ernest R. Franke	U.S. Environmental Protection Agency (EPA)	Remedial Project Manager
Ruben Moya	EPA	Project Manager
Denise Crawford	Texas Commission on Environmental Quality (TCEQ)	Project Manager
Ben Shields	TCEQ	Project Manager
Trey Rushing	TCEQ	Project Manager
Dawn Denham	Weston Solutions	Project Manager
April Ballweg	EA Engineering	Project Manager

Notes:

EPA = Environmental Protection Agency
TCEQ = Texas Department of Environmental Quality

Attachment 5

Five-Year Review Interview Records

FIVE-YEAR REVIEW INTERVIEW RECORD		
Site Name: Highlands Acid Pit Superfund Site		**EPA ID No.:** TXD980514996
Location: 611 Battlebell-Clear Lake Rd, Highlands, TX 77562		**Date:** June 19, 2007
Contact Made By:		
Name: Ernest Franke	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Telephone No.: (214) 665-8315 **E-Mail:** Franke.Ernest@epamail.epa.gov	**Street Address:** 1455 Ross Avenue, Suite 1200 **City, State, Zip:** Dallas, Texas 75202	
Name: April Ballweg	**Title:** Project Manager	**Organization:** EA Engineering
Telephone No.: (972) 459-5019 **E-Mail:** aballweg@eaest.com	**Street Address:** 405 S. Highway 121, Building C, Suite 100 **City, State, Zip:** Lewisville, Texas 75067	
Individual Contacted:		
Name: Denise Crawford	**Title:** Project Manager	**Organization:** TCEQ
Telephone No.: 512-239-6532 **E-Mail Address:**dcrawford@tceq.state.tx.us	**Street Address:** 12100 Park 35 Circle, Bldg. D, MC-136 **City, State, Zip:** Austin, Texas 78753	

Interview Questions

Purpose of the Five-Year Review: The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environmental continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the Third Five-Year Review for the Highlands Acid Pit Site. The period covered by this five-year review is from the completion of the second five-year review in September 2002 to the current completion of this review. Should you choose to respond, please return your interview form to April Ballweg at EA Engineering via email or postal service by June 18, 2007.

1. What is your general impression of the work conducted at the site since the second Five-Year Review period (since September 2002)?

   Work has consisted of O&M monitoring on a semi-annual basis of ground water, surface water, and sediments.

2. What effect have site operations had on the surrounding community since the second five-year review?

   None.

FIVE-YEAR REVIEW INTERVIEW RECORD (continued)	
Site Name: Highlands Acid Pit Superfund Site	**EPA ID No.:** TXD980514996
Location: 611 Battlebell-Clear Lake Rd, Highlands, TX 77562	**Date:** June 19, 2007

Interview Questions (continued)

3. In the past five years, are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details.

   No.

4. Are you aware of any events, incidents, or activities at the site in the past five years such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

   No.

5. Do you feel well informed about the site's activities and progress?

   Yes.

6. Do you have any comments, suggestions, or recommendations regarding the site's operation and maintenance (O&M)?

   No.

FIVE-YEAR REVIEW INTERVIEW RECORD		
Site Name: Highlands Acid Pit Superfund Site		**EPA ID No.:** TXD980514996
Location: 611 Battlebell-Clear Lake Rd, Highlands, TX 77562		**Date:** June 18, 2007
Contact Made By:		
Name: Mr. Ernest Franke	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Telephone No.: (214) 665-8315 **E-Mail:** Franke.Ernest@epamail.epa.gov	**Street Address:** 1455 Ross Avenue, Suite 1200 **City, State, Zip:** Dallas, Texas 75202	
Name: April Ballweg	**Title:** Project Manager	**Organization:** EA Engineering
Telephone No.: (972) 459-5019 **E-Mail:** aballweg@eaest.com	**Street Address:** 405 S. Highway 121, Building C, Suite 100 **City, State, Zip:** Lewisville, Texas 75067	
Individual Contacted:		
Name: Ben Shields	**Title:** Former Project Manager	**Organization:** TCEQ
Telephone No.: 512-239-5054 **E-mail Address:** bshields@tceq.state.tx.us	**Street Address:** 12100 Park 35 Circle, Bldg. D, MC-136 **City, State, Zip:** Austin, Texas 78753	

Interview Questions

Purpose of the Five-Year Review: The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environmental continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the Third Five-Year Review for the Highlands Acid Pit Site. The period covered by this five-year review is from the completion of the second five-year review in September 2002 to the current completion of this review. Should you choose to respond, please return your interview form to April Ballweg at EA Engineering via email or postal service by June 18, 2007.

1. What is your general impression of the work conducted at the site since the second five-year review period (since September 2002)?

   Work has consisted of routine O&M, namely sampling on-site monitoring wells, surface water and sediment.

2. What effect have site operations had on the surrounding community since the second five-year review?

   None that I know of.

FIVE-YEAR REVIEW INTERVIEW RECORD (continued)	
Site Name: Highlands Acid Pit Superfund Site	**EPA ID No.:** TXD980514996
Location: 611 Battlebell-Clear Lake Rd, Highlands, TX 77562	**Date:** June 18, 2007

Interview Questions (continued)

3. In the past five years, are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details.

   I am aware of no community concern.

4. Are you aware of any events, incidents, or activities at the site in the past five years such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

   The only significant event I am aware of in the past five years is Hurricane Rita. After the hurricane EPA conducted an on-site inspection of the site to assess any damage.

5. Do you feel well informed about the site's activities and progress?

   Yes

6. Do you have any comments, suggestions, or recommendations regarding the site's operation and maintenance (O&M)?

   No.

FIVE-YEAR REVIEW INTERVIEW RECORD		
Site Name: Highlands Acid Pit Superfund Site		**EPA ID No.:** TXD980514996
Location: Highlands, Harris County, Texas		**Date:** June 15, 2007
Contact Made By:		
Name: Ernest Franke	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Telephone No.: (214) 665-8315 **E-Mail:** Franke.Ernest@epamail.epa.gov	**Street Address:** 1455 Ross Avenue, Suite 1200 **City, State, Zip:** Dallas, Texas 75202	
Name: April Ballweg	**Title:** Project Manager	**Organization:** EA Engineering
Telephone No.: (972) 459-5019 **E-Mail:** aballweg@eaest.com	**Street Address:** 405 S. Highway 121, Building C, Suite 100 **City, State, Zip:** Lewisville, Texas 75067	
Individual Contacted:		
Name: Dawn Denham-Ewell, Project Manager		**Organization:** Weston Solutions, Inc.
Telephone No.: 713-985-6610 **E-Mail Address:** dawn.denham@westonsolutions.com	**Street Address:** 5599 San Felipe, Suite 700 **City, State, Zip:** Houston, Texas 77056	

Interview Questions

Purpose of the Five-Year Review: The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environmental continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the Third Five-Year Review for the Highlands Acid Pit Site. The period covered by this five-year review is from the completion of the second five-year review in September 2002 to the current completion of this review. Should you choose to respond, please return your interview form to April Ballweg at EA Engineering via email or postal service by June 18, 2007

1. What is your general impression of the work conducted at the site since the second Five-Year Review period (since September 2002)?

   That the work has been completed as scoped by TCEQ. Each year we receive a work authorization from the TCEQ that describes the scope of work.

2. What effect have site operations had on the surrounding community since the second Five-Year Review?

   I am not aware of any effects.

3. In the past five years, are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details.

   I am not aware of any concerns the community may have regarding the site.

FIVE-YEAR REVIEW INTERVIEW RECORD (continued)	
Site Name: Highlands Acid Pit Superfund Site	**EPA ID No.:** TXD980514996
Location: Highlands, Harris County, Texas	**Date:** June 15, 2007

Interview Questions (continued)

4. Are you aware of any events, incidents, or activities at the site in the past five years such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

   No. I have checked with my field team and they are not aware of any incidents at the site.

5. Do you feel well informed about the site's activities and progress?

   From a contractor standpoint, yes. Our scope has primarily been to conduct semiannual sampling each year, and prepare an annual ground water monitoring report to describe the sampling activities and results.

6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

   No.

Attachment 6

Site Inspection Photographs

Site Inspection Photographs
Highlands Acid Pit Five-Year Review

Photograph No. 1 Site: Highlands Acid Pit Superfund Site
Description: Entrance gate to site with warning signs Date: June 20, 2007

Photograph No. 2 Site: Highlands Acid Pit Superfund Site
Description: Overview of site, looking southeast Date: June 20, 2007

Site Inspection Photographs
Highlands Acid Pit Five-Year Review

Photograph No. 3 Site: Highlands Acid Pit Superfund Site
Description: DA-05 well within cluster fencing; note overgrowth of vegetation on and within fencing Date: June 20, 2007

Photograph No. 4 Site: Highlands Acid Pit Superfund Site
Description: Typical example of monitoring well in need of repainting Date: June 20, 2007

Site Inspection Photographs
Highlands Acid Pit Five-Year Review

Photograph No. 5 Site: Highlands Acid Pit Superfund Site
Description: UA-15 well-missing compression cap, in need of paint, removal of discarded 5-gallon buckets Date: June 20, 2007

Photograph No. 6 Site: Highlands Acid Pit Superfund Site
Description: Investigative derived water within 55-gallon drums, with discarded 5-gallon buckets in need of disposal Date: June 20, 2007

Site Inspection Photographs
Highlands Acid Pit Five-Year Review

Photograph No. 7 Site: Highlands Acid Pit Superfund Site
Description: Monitoring well in need of painting; missing locking security pin from cap of protective metal casing Date: June 20, 2007

Photograph No. 8 Site: Highlands Acid Pit Superfund Site
Description: Monitoring well MA-02-missing compression cap, note 5-inch diameter bush adjacent to well pad, in need of paint Date: June 20, 2007

Site Inspection Photographs
Highlands Acid Pit Five-Year Review

Photograph No. 9 Site: Highlands Acid Pit Superfund Site
Description: Sign indicating location for surface water and sediment sampling; note pellet holes in face of sign Date: June 20, 2007

Photograph No. 10 Site: Highlands Acid Pit Superfund Site
Description: Overgrown vegetation over well pad and well Date: June 20, 2007

Site Inspection Photographs
Highlands Acid Pit Five-Year Review

Photograph No. 11 Site: Highlands Acid Pit Superfund Site
Description: Vegetative overgrowth on cluster fencing; maintenance activities indicated it had been recently cut at the base Date: June 20, 2007

Photograph No. 12 Site: Highlands Acid Pit Superfund Site
Description: Monitoring well UA-11 with a broken hinge Date: June 20, 2007

Site Inspection Photographs
Highlands Acid Pit Five-Year Review

Photograph No. 13 Site: Highlands Acid Pit Superfund Site
Description: Cluster fencing with bent top rail and broken barb wire Date: June 20, 2007

Photograph No. 14 Site: Highlands Acid Pit Superfund Site
Description: Concrete pad to monitoring well MA-06 with subsidence occurring underneath Date: June 20, 2007

Site Inspection Photographs
Highlands Acid Pit Five-Year Review

Photograph No. 15 Site: Highlands Acid Pit Superfund Site
Description: Monitoring well MA-02 PVC riser is low and has an increased potential for surface water infiltration during flooding Date: June 20, 2007

Photograph No. 16 Site: Highlands Acid Pit Superfund Site
Description: Gas/oil well extraction equipment located on the adjacent Wayne Peace property located north of the site Date: June 20, 2007

Attachment 7

Table 3-2 Ground Water Analytical Results
(Upper Aquifer Monitoring Wells)

(Source: "Annual Site Monitoring Report for TNRCC Fiscal Year 2002", Highlands Acid Pit Superfund Site, Roy F. Weston, Inc., August 2002)

Attachment 8

Analytical Concentration Tables for
Arsenic, Benzene, Lead, Mercury, Pyridine, and Selenium
(March 2002 through June 2006-Eight (8) Sheets)

(Source: "Final Annual Monitoring Report FY06",
Highlands Acid Pit Superfund Site, Weston Solutions, Inc., 5 June 2007)