Five-Year Review Report

Second Five-Year Review Report
for the
Oklahoma Refining Company Superfund Site
Cyril, Caddo County, Oklahoma

PREPARED BY:

Region 6
United States Environmental Protection Agency
Dallas, Texas

August 2007

SECOND FIVE-YEAR REVIEW

Oklahoma Refining Company Superfund Site
EPA ID# OKD091598870
Cyril, Caddo County, Oklahoma

This memorandum documents the United States Environmental Protection Agency's (EPA's) performance, determinations, and approval of the second five-year review for the Oklahoma Refining Company Superfund Site performed under Section 121(c) of the Comprehensive Environmental Response, Compensation & Liability Act (CERCLA), 42 United States Code (USC) §9621(c), as described in the attached Second Five-Year Review Report.

Summary of Second Five-Year Review Findings

The second five-year review for the Oklahoma Refining Company (ORC) Superfund Site indicates that the remedial actions set forth in the decision documents for the site continue to be implemented as planned. Operations and Maintenance (O&M) activities of the south property soil remedy are performed by the Oklahoma Department of Environmental Quality (ODEQ). ODEQ also maintains the site ground water monitoring wells and performs semi-annual ground water sampling to support a future ground water remedy. Based on the second five-year review site inspection, data review, interviews, and technical assessment, it appears the remedy is generally functioning as intended by the decision documents.

To ensure continued protectiveness, ten issues are identified in this second five-year review for the site. These issues do not currently affect the protectiveness of the remedy, but need to be addressed to provide long-term protectiveness. For convenience, the ten issues have been divided into three categories (maintenance issues, monitoring issues, and remedy completion issues). These issues are:

Maintenance Issues

1. **Main Street access gate repair**. The gate to the northern portion of the ORC Site, located at the intersection of Main Street and Baskett Street, is no longer functional and access to the north side of the site is currently not restricted. Restricted access is suggested to minimize trespassing on potentially contaminated soil in this portion of the site and to help protect the integrity of site monitoring wells.

2. **Well maintenance.** ODEQ completed an inventory of all site monitoring wells in 2006 (presented in the Fourth Quarter 2006 LNAPL Monitoring Event Report and 2006 Well Survey Report [ODEQ, 2006a]). The inventory documents the condition of each well and identifies maintenance needs.

3. **Landfill cover maintenance**. The hazardous waste landfill cover is in need of repair to address animal burrow holes and erosion observed during the five-year review site inspection. Animal burrow holes were also observed in the cover of the non-hazardous waste landfill.

4. **Creek bank erosion maintenance.** The cut bank on the east side of Gladys Creek continues to erode due to natural flow in the creek. ODEQ has indicated that if erosion continues the perimeter fence will be affected and the cut bank could eventually erode into the neutralized acid material.

Monitoring Issues

5. **The MCL has changed since the ROD for arsenic, beryllium and copper.** The ROD specified that ground water and surface water RAOs were set at levels which would allow use of the water as a primary drinking water source, and MCLs were cited. In the time since the ROD was signed, the

MCL for arsenic was lowered from 50 µg/L to 10 µg/L, and the MCLs for beryllium and copper were raised to 4 µg/L and 1300 µg/L respectively.

6. **The Sampling and Analysis Plan (SAP) for collection of surface water and ground water samples needs to be updated**. ODEQ is currently performing containment well monitoring for the remedial action, targeted MNA monitoring to assess the efficacy of MNA as a remedy, and LNAPL and water level measurements. This work is being conducted under the November 2004 SAP and January 2007 QAPP prepared by ODEQ, and results of the sampling efforts are reported to EPA. Sample collection procedures for the MNA wells and containment wells previously included the use of bailers to purge and collect samples. High turbidity during sample collection in past sampling events may have impacted the results of total metals analysis, and low flow methods were employed in the last sampling event. This change should be incorporated into the site plans.

7. **Extent of LNAPL observed in SBB-2.** During the November 2006 sampling event performed by ODEQ, monitoring well SBB-2 was found to demonstrate 3.37 feet of LNAPL. This well is located offsite approximately 250 feet east of residential properties. LNAPL had not previously been observed in this well.

8. **Arsenic exceedances in Gladys Creek samples.** In three of six surface water samples collected from the Gladys Creek in the May 2006 sampling event, the arsenic concentrations exceeded the RAOs established by the ROD. In addition, one of six sediment samples collected exceeded the arsenic RAO. Gladys Creek is an environmental receptor of contaminated ground water from the site and based on analytical results and visible impacts from the site into the creek, it appears that contaminated ground water discharging into the creek may be impacting the surface water and sediment of the creek.

Remedy Completion Issues

9. **The nature and extent of contaminated soil beneath the former refinery in the northern portion of the site has not yet been confirmed.** Limited soil sampling was performed on the northern portion of the site during EPA's time-critical removal action for demolition of the above-ground refinery structures. This sampling effort is described in the September 2005 CERCLA Removal Assessment Report.

10. **A comprehensive site-wide remedial approach to ground water contamination has not yet been developed**. In the October 2003 ESD, the ground water remedy was deferred until completion of the surface or source remedy. Long-term ground water and surface water monitoring has continued as required by the 1996 ESD.

Actions Needed

To address the issues identified during the second five-year review, the following recommendations and follow-up actions have been identified for the ORC site:

Maintenance Issues

1. **The gate on the north side of the ORC site, at the intersection of Baskett Street and Main Street, should be repaired**. Repairs to the gate on the northwest portion of the site will help prevent access by trespassers and help protect the integrity of the monitoring wells located in this area.

2. **Implement the recommendations of the ODEQ well survey.** Recommendations included fixing or replacing items such as well caps, concrete pads on certain wells. The survey also recommends four wells for removal due to roots blocking the well or obvious structural problems. The inventory and

maintenance recommendations prepared by ODEQ are included as Table 5 to this five-year review report.

3. **Repair damage to the non-hazardous and hazardous waste landfill covers caused by animal burrowing and erosion.** Review of the hazardous and non-hazardous landfill specifications indicate that animal burrowing and erosion could potentially impact the top geotextile filter fabric placed 2 feet below the landfill top cover.

4. **Continue visual inspections of the Gladys Creek cut bank during each sampling event, and consider options to address the erosion.** If continued erosion of the cut bank is observed, then bank stabilization may be needed for this portion of the creek to protect the integrity of the neutralized acid material.

Monitoring Issues

5. **Incorporate the revised MCLs for arsenic, beryllium and copper into the evaluation of ground water contamination at the site.** The revised MCLs should be incorporated into any presentation or evaluation of ground water data collected at the site, and considered in the development of a comprehensive site-wide approach to ground water contamination.

6. **Update the site plans to incorporate current ground water monitoring procedures.** The SAP should be revised to describe the use of the low flow purge method for collection of samples from the MNA and containment wells.

7. **Further investigate the extent of LNAPL in the vicinity of SBB-2.** Installation of new monitoring wells may be needed to aid in delineation of the extent of LNAPL in this area.

8. **Evaluate arsenic concentration trends in Gladys Creek samples and update the monitoring program sample locations and/or frequency if needed to support decisions for further action.** The last sampling event was performed in February 2007, and sample results are pending. If exceedances continue, the impact on the surface water and sediment of the creek must be evaluated and addressed.

Remedy Completion Issues

9. **Finalize the determination of the nature and extent of soil contamination on the northern portion of the site and design appropriate remedial action.** Evaluate the nature and extent of soil contamination based on existing data collected during the removal action, and any data needs that may be identified, and develop an appropriate course of action for remediation, if needed.

10. **Develop a comprehensive site-wide approach to ground water contamination.** ODEQ and EPA are currently coordinating efforts to develop a revised feasibility study regarding the ground water remedy.

Determinations

I have determined that the remedy for the Oklahoma Refining Company Superfund Site is protective of human health and the environment in the short term, and will remain so provided the action items identified in this Five-Year Review Report are addressed as described above.

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

Pamela Phillips, Acting

Date

8/17/07

CONCURRENCES

FIVE-YEAR REVIEW
Oklahoma Refining Company Superfund Site
EPA ID# OKD091598870

By: Michael A. Hebert Date: 8-6-07
Michael Hebert, U.S. EPA
Remedial Project Manager

By: Joseph C. Compton, III Date: 8/9/07
Joseph Compton, U.S. EPA
Attorney, Superfund Branch, Office of Regional Counsel

By: Date: 08/17/07
Mark Peycke, U.S. EPA
Chief, Superfund Branch, Office of Regional Counsel

By: Date: 08/06/2007
Buddy Parr, U.S. EPA
Team Leader, Louisiana/New Mexico/Oklahoma Team

By: John R. Hepola, for Date: 8/7/07
Donald Williams, U.S. EPA
Deputy Associate Director, Remedial Branch

By: John R. Hepola Date: 8/7/07
John Hepola, U.S. EPA, ASSOCIATE
Director, Remedial Branch

By: Pam Phillips Date: 8/17/07
Pam Phillips, U.S. EPA
Deputy Director, Superfund Division

Contents

Section **Page**

List of Tables

List of Figures

List of Attachments

Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
CAA	Clean Air Act
CAFO	Consent Agreement and Final Order
CAP	Corrective Action Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm	centimeter
COCs	Chemicals of Concern
CPC	Cyril Petrochemical Corporation
CWA	Clean Water Act
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FR	Federal Register
LNAPL	Light Non-Aqueous Phase Liquid
LTU	Land Treatment Units
MCL	Maximum Contaminant Level
mg/l	milligrams per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
ODEQ	Oklahoma Department of Environmental Quality
O&M	Operation and Maintenance
ORC	Oklahoma Refining Company
OSDH	Oklahoma State Department of Health
OUs	Operable Units
OWRB	Oklahoma Water Resources Board
PAHs	Polycyclic Aromatic Hydrocarbons
ppb	parts per billion
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SVOC	Semi-Volatile Organic Compound
TBCs	To Be Considered Compounds
TDS	Total Dissolved Solids
VOC	Volatile Organic Compound

Executive Summary

Pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or "Superfund"), 42 United States Code (USC) §9621(c), the second five-year review of the remedy at the Oklahoma Refining Company (ORC) Superfund Site located in Cyril, Caddo County, Oklahoma was completed in August 2007. Five-year reviews for the ORC site are required by statute. The results of this second five-year review indicate that the remedy is currently protective of human health and the environment in the short term. Overall, the remedial actions performed appear to be functioning as designed, and the site has been maintained appropriately. No deficiencies were noted that currently impact the protectiveness of the remedy, although several issues were identified that require further action to ensure the continued protectiveness of the remedy.

The remedy for the ORC site was set by the Record of Decision signed in 1992, as amended by an Explanation of Significant Differences (ESD) dated March 27, 1996, and a second ESD dated October 2003. Activities at the site to-date include the source control remedy completed in the southern ("abandoned") portion of the site, the time-critical removal action completed in the northwest portion of the site (the former refinery area, or Cyril Petrochemical Corporation (CPC) property), and ongoing site-wide long-term ground water and surface water monitoring.

The source control remedy (completed in July 1997 for the southern portion of the site) is considered protective of human health and the environment in the short term because the waste has been removed or contained. Continued O&M of the constructed source control remedy will ensure that this portion of the remedy remains protective. The time-critical removal action (initiated by EPA in September 2003 and completed in February 2006) on the northwest portion of the site (the former refinery area, or CPC property) provided for demolition and removal of the remaining above-ground facilities associated with the former refinery. Long-term site-wide ground water and surface water monitoring will continue until a comprehensive approach to site-wide ground water contamination is developed. Institutional controls are in place to restrict use of the site. The EPA and ODEQ are currently coordinating efforts to investigate the former refinery area soil and further investigate and develop a comprehensive approach to site-wide ground water and Gladys Creek.

The original source control remedy was chosen to remove the principle risks to human health based on direct exposure to contaminated soils, sediments, and surface water, and to reduce contaminant migration into the ground water. This remedy included insitu bioremediation of organic-contaminated sediments, insitu stabilization and capping of inorganic-contaminated sediments, removal of all onsite surface water

from impoundments, treatment of all contaminated surface water taken from onsite impoundments in an onsite treatment facility, prepared-bed biotreatment of contaminated sediments and soil that could not be treated insitu followed by stabilization, if necessary, and containment of treated residuals, excavation and containment of contaminated sediments and soil that exceeded health-based levels, excavation and neutralization of low pH sediments, followed by placement of treated materials as fill in area of origin, and excavation and recycling of asphaltic materials. As part of the selected remedy, excavations involved removal of soil/sediment above target action levels set for the residential and commercial properties present in the area of the site. The 1996 ESD revised the remedy to replace excavation and recycling of the asphaltic materials with capping of those materials in place.

For ground water, the ROD specified removal and recycling of primarily petroleum-based light non-aqueous phase liquids (LNAPLs) mixed with hazardous waste from the ground water, containment of contaminated ground water using interceptor wells to prevent migration, and treatment of collected ground water in the onsite treatment facility with reinjection of all treated water (including both ground water and surface water) to contaminated portions of the aquifer to enhance any naturally-occurring in situ bioremediation of the ground water. The 1996 ESD acknowledged that water treated during the source control part of the remedy would be treated and discharged to Gladys Creek rather than injected into the aquifer, incorporated a trench as part of the source control remedy to collect LNAPL, and deferred the remedy for the dissolved plume until the source control portion of the remedy was complete. The 2003 ESD acknowledged minimal benefit to installing the LNAPL trench, indicating the dissolved plume appeared to be largely contained on the southern and eastern portions of the site by Gladys Creek and had not expanded beyond the site boundaries, and called for the development of a more comprehensive ground water remedy to address both LNAPL and the dissolved plume.

Currently, Operations and Maintenance (O&M) at the ORC Site includes; general site maintenance, landfill monitoring and maintenance, soil cover inspection and maintenance, security fence inspection and maintenance, photo documentation, and institutional controls maintenance. The ROD specifies that the O&M period is to last until contaminant concentrations in the ground water have decreased to below drinking water standards or the human health criteria defined in the ROD. O&M at the site is the responsibility of the Oklahoma Department of Environmental Quality (ODEQ). In addition to the soil remedy O&M activities, ODEQ also maintains the site ground water monitoring wells and performs semi-annual ground water sampling to support a future ground water remedy.

Under the statutory requirements of Section 121(c) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), P. L. 99-499, and the subordinate provisions of the

National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) 300.430(f) (4) (ii), five-year reviews are required for sites where hazardous substances remain onsite above levels that allow for unlimited use and unrestricted exposure. Five-year reviews may also be conducted as a matter of EPA policy for sites where a pre-SARA remedial action leaves hazardous substances onsite above levels that allow for unlimited use and unrestricted exposure. The first five-year review for the site was completed in August 2002.

As noted above, remedial actions performed at the site appear to be functioning as designed, and the site has been maintained appropriately. To ensure continued protectiveness, ten issues are identified in the second five-year review for this site. These issues do not affect the current protectiveness of the remedy, but must be addressed to ensure continued protectiveness. For convenience, the ten issues have been divided into three categories (maintenance issues, monitoring issues, and remedy completion issues). These issues are:

Maintenance Issues

1. **Main Street access gate repair**. The gate to the northern portion of the ORC Site, located at the intersection of Main Street and Baskett Street, is no longer functional and access to the north side of the site is currently not restricted. Restricted access is suggested to minimize trespassing on potentially contaminated soil in this portion of the site and to help protect the integrity of site monitoring wells.

2. **Well maintenance.** ODEQ completed an inventory of all site monitoring wells in 2006 (presented in the Fourth Quarter 2006 LNAPL Monitoring Event Report and 2006 Well Survey Report [ODEQ, 2006a]). The inventory documents the condition of each well and identifies maintenance needs.

3. **Landfill cover maintenance**. The hazardous waste landfill cover is in need of repair to address animal burrow holes and erosion observed during the five-year review site inspection. Animal burrow holes were also observed in the cover of the non-hazardous waste landfill.

4. **Creek bank erosion maintenance.** The cut bank on the east side of Gladys Creek continues to erode due to natural flow in the creek. ODEQ has indicated that if erosion continues the perimeter fence will be affected and the cut bank could eventually erode into the neutralized acid material.

Monitoring Issues

5. **The MCL has changed since the ROD for arsenic, beryllium and copper.** The ROD specified that ground water and surface water RAOs were set at levels which would allow use of the water as a

primary drinking water source, and MCLs were cited. In the time since the ROD was signed, the MCL for arsenic was lowered from 50 µg/L to 10 µg/L, and the MCLs for beryllium and copper were raised to 4 µg/L and 1300 µg/L respectively.

6. **The Sampling and Analysis Plan (SAP) for collection of surface water and ground water samples needs to be updated**. ODEQ is currently performing containment well monitoring for the remedial action, targeted MNA monitoring to assess the efficacy of MNA as a remedy, and LNAPL and water level measurements. This work is being conducted under the November 2004 SAP and January 2007 QAPP prepared by ODEQ, and results of the sampling efforts are reported to EPA. Sample collection procedures for the MNA wells and containment wells previously included the use of bailers to purge and collect samples. High turbidity during sample collection in past sampling events may have impacted the results of total metals analysis, and low flow methods were employed in the last sampling event. This change should be incorporated into the site plans.

7. **Extent of LNAPL observed in SBB-2.** During the November 2006 sampling event performed by ODEQ, monitoring well SBB-2 was found to demonstrate 3.37 feet of LNAPL. This well is located offsite approximately 250 feet east of residential properties. LNAPL had not previously been observed in this well.

8. **Arsenic exceedances in Gladys Creek samples.** In three of six surface water samples collected from the Gladys Creek in the May 2006 sampling event, the arsenic concentrations exceeded the RAOs established by the ROD. In addition, one of six sediment samples collected exceeded the arsenic RAO. Gladys Creek is an environmental receptor of contaminated ground water from the site and based on analytical results and visible impacts from the site into the creek, it appears that contaminated ground water discharging into the creek may be impacting the surface water and sediment of the creek.

Remedy Completion Issues

9. **The nature and extent of contaminated soil beneath the former refinery in the northern portion of the site has not yet been confirmed.** Limited soil sampling was performed on the northern portion of the site following completion of EPA's time-critical removal action to address demolition of the various refinery buildings. This sampling effort is described in the September 2005 CERCLA Removal Assessment Report.

10. **A comprehensive site-wide remedial approach to ground water contamination has not yet been developed**. In the October 2003 ESD, the ground water remedy was deferred until completion of the

surface or source remedy. Long-term ground water and surface water monitoring has continued during this period as required by the 1996 ESD.

To address these issues, the following recommendations and follow-up actions have been identified for the ORC site:

Maintenance Issues

1. **The gate on the north side of the ORC site, at the intersection of Baskett Street and Main Street, should be repaired**. Repairs to the gate on the northwest portion of the site will help prevent access by trespassers and help protect the integrity of the monitoring wells located in this area.

2. **Implement the recommendations of the ODEQ well survey.** Recommendations included fixing or replacing items such as well caps, concrete pads on certain wells. The survey also recommends four wells for removal due to roots blocking the well or obvious structural problems. The inventory and maintenance recommendations prepared by ODEQ are included as Table 5 to this five-year review report.

3. **Repair damage to the non-hazardous and hazardous waste landfill covers caused by animal burrowing and erosion.** Review of the hazardous and non-hazardous landfill specifications indicate that animal burrowing and erosion could potentially impact the top geotextile filter fabric placed 2 feet below the landfill top cover.

4. **Continue visual inspections of the Gladys Creek cut bank during each sampling event, and consider options to address the erosion.** If continued erosion of the cut bank is observed, then bank stabilization may be needed for this portion of the creek to protect the integrity of the neutralized acid material.

Monitoring Issues

5. **Incorporate the revised MCLs for arsenic, beryllium and copper into the evaluation of ground water contamination at the site.** The revised MCLs should be incorporated into any presentation or evaluation of ground water data collected at the site, and considered in the development of a comprehensive site-wide approach to ground water contamination.

6. **Update the site plans to incorporate current ground water monitoring procedures.** The SAP should be revised to describe the use of the low flow purge method for collection of samples from the MNA and containment wells.

7. **Further investigate the extent of LNAPL in the vicinity of SBB-2.** Installation of new monitoring wells may be needed to aid in delineation of the extent of LNAPL in this area.

8. **Evaluate arsenic concentration trends in Gladys Creek samples and update the monitoring program sample locations and/or frequency if needed to support decisions for further action.** The last sampling event was performed in February 2007, and sample results are pending. If exceedances continue, the impact on the surface water and sediment of the creek must be evaluated and addressed.

Remedy Completion Issues

9. **Finalize the determination of the nature and extent of soil contamination on the northern portion of the site and design appropriate remedial action.** Evaluate the nature and extent of soil contamination based on existing data collected during the removal action, and any data needs that may be identified, and develop an appropriate course of action for remediation, if needed.

10. **Develop a comprehensive site-wide approach to ground water contamination.** ODEQ and EPA are currently coordinating efforts to develop a revised feasibility study regarding the ground water remedy.

Because the actions implemented at the site currently prevent exposure to remaining site contamination, the remedy is considered protective of human health and the environment in the short-term, and will continue to be protective if the recommendations and follow-up actions described in this five-year review are addressed. Investigation of soil in the former refinery area and evaluation of site-wide ground water and surface water contamination must be completed and an appropriate approach to address remaining contamination must be developed to provide a comprehensive remedy and continued protectiveness in the long-term.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name (from WasteLAN): Oklahoma Refining Company Superfund Site

EPA ID (from WasteLAN): OKD091598870

Region: EPA Region 6 | **State:** Oklahoma | **City/County:** Cyril, Caddo County

SITE STATUS

NPL Status: X Final __ Deleted __ Other (specify):

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

Multiple OUs? __ Yes X No | **Construction completion date:** November 2, 2001 (for southern portion of the site)

Has site been put into reuse? X Yes (partially) __ No

REVIEW STATUS

Reviewing agency: X EPA __ State __ Tribe __ Other Federal Agency:

Author: EPA Region 6, with support from EPA contractor CH2M HILL

Review period: May 2002 through April 2007

Date(s) of site inspection: April 11, 2007

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

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

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

Triggering action date: August 13, 2002

Due date (five years after triggering action date): August 13, 2007

Five-Year Review Summary Form

Issues: The majority of the site is currently subject to long-term monitoring (LTM) and ongoing Operations and Maintenance (O&M); the former refinery portion of the site was addressed since the last five-year review through a time-critical removal action, and the status of the surface soil in that area is still subject to further investigation. Based on the data review, site inspection, interviews, and technical assessment, it appears the current remedy is functioning as intended by the decision documents in the short-term. To ensure continued protectiveness, ten issues were identified in the second five-year review for this site, as described in the following paragraphs. These issues do not currently affect the protectiveness of the remedy, although they must be addressed to ensure continued protectiveness.

For convenience, the ten issues have been divided into three categories (maintenance issues, monitoring issues, and remedy completion issues). These issues are:

Maintenance Issues

1. **Main Street access gate repair**. The gate to the northern portion of the ORC Site, located at the intersection of Main Street and Baskett Street, is no longer functional and access to the north side of the site is currently not restricted. Restricted access is suggested to minimize trespassing on potentially contaminated soil in this portion of the site and to help protect the integrity of site monitoring wells.

2. **Well maintenance.** ODEQ completed an inventory of all site monitoring wells in 2006 (presented in the Fourth Quarter 2006 LNAPL Monitoring Event Report and 2006 Well Survey Report [ODEQ, 2006a]). The inventory documents the condition of each well and identifies maintenance needs.

3. **Landfill cover maintenance**. The hazardous waste landfill cover is in need of repair to address animal burrow holes and erosion observed during the five-year review site inspection. Animal burrow holes were also observed in the cover of the non-hazardous waste landfill.

4. **Creek bank erosion maintenance.** The cut bank on the east side of Gladys Creek continues to erode due to natural flow in the creek. ODEQ has indicated that if erosion continues the perimeter fence will be affected and the cut bank could eventually erode into the neutralized acid material.

Monitoring Issues

5. **The MCL has changed since the ROD for arsenic, beryllium and copper.** The ROD specified that ground water and surface water RAOs were set at levels which would allow use of the water as a primary drinking water source, and MCLs were cited. In the time since the ROD was signed, the MCL for arsenic was lowered from 50 µg/L to 10 µg/L, and the MCLs for beryllium and copper were raised to 4 µg/L and 1300 µg/L respectively.

6. **The Sampling and Analysis Plan (SAP) for collection of surface water and ground water samples needs to be updated**. ODEQ is currently performing containment well monitoring for the remedial action, targeted MNA monitoring to assess the efficacy of MNA as a remedy, and LNAPL and water level measurements. This work is being conducted under the November 2004 SAP and January 2007 QAPP prepared by ODEQ, and results of the sampling efforts are reported to EPA. Sample collection procedures for the MNA wells and containment wells previously included the use of bailers to purge and collect samples. High turbidity during sample collection in past sampling events may have impacted the results of total metals analysis, and low flow methods were employed in the last sampling event. This change should be incorporated into the site plans.

7. **Extent of LNAPL observed in SBB-2.** During the November 2006 sampling event performed by ODEQ, monitoring well SBB-2 was found to demonstrate 3.37 feet of LNAPL. This well is located offsite approximately 250 feet east of residential properties. LNAPL had not previously been observed in this well.

8. **Arsenic exceedances in Gladys Creek samples.** In three of six surface water samples collected from the Gladys Creek in the May 2006 sampling event, the arsenic concentrations exceeded the RAOs established by

Five-Year Review Summary Form

the ROD. In addition, one of six sediment samples collected exceeded the arsenic RAO. Gladys Creek is an environmental receptor of contaminated ground water from the site and based on analytical results and visible impacts from the site into the creek, it appears that contaminated ground water discharging into the creek may be impacting the surface water and sediment of the creek.

Remedy Completion Issues

9. **The nature and extent of contaminated soil beneath the former refinery in the northern portion of the site has not yet been confirmed.** Limited soil sampling was performed on the northern portion of the site following completion of EPA's time-critical removal action to address demolition of the various refinery buildings. This sampling effort is described in the September 2005 CERCLA Removal Assessment Report.

10. **A comprehensive site-wide remedial approach to ground water contamination has not yet been developed**. In the October 2003 ESD, the ground water remedy was deferred until completion of the surface or source remedy. Long-term ground water and surface water monitoring has continued during this period as required by the 1996 ESD.

Recommendations and Follow-Up Actions: The following recommendations and follow-up actions have been defined for the site:

To address the issues identified during the second five-year review, the following recommendations and follow-up actions have been identified for the ORC site:

Maintenance Issues

1. **The gate on the north side of the ORC site, at the intersection of Baskett Street and Main Street, should be repaired**. Repairs to the gate on the northwest portion of the site will help prevent access by trespassers and help protect the integrity of the monitoring wells located in this area.

2. **Implement the recommendations of the ODEQ well survey.** Recommendations included fixing or replacing items such as well caps, concrete pads on certain wells. The survey also recommends four wells for removal due to roots blocking the well or obvious structural problems. The inventory and maintenance recommendations prepared by ODEQ are included as Table 5 to this five-year review report.

3. **Repair damage to the non-hazardous and hazardous waste landfill covers caused by animal burrowing and erosion.** Review of the hazardous and non-hazardous landfill specifications indicate that animal burrowing and erosion could potentially impact the top geotextile filter fabric placed 2 feet below the landfill top cover.

4. **Continue visual inspections of the Gladys Creek cut bank during each sampling event, and consider options to address the erosion.** If continued erosion of the cut bank is observed, then bank stabilization may be needed for this portion of the creek to protect the integrity of the neutralized acid material.

Monitoring Issues

5. **Incorporate the revised MCLs for arsenic, beryllium and copper into the evaluation of ground water contamination at the site.** The revised MCLs should be incorporated into any presentation or evaluation of ground water data collected at the site, and considered in the development of a comprehensive site-wide approach to ground water contamination.

6. **Update the site plans to incorporate current ground water monitoring procedures.** The SAP should be revised to describe the use of the low flow purge method for collection of samples from the MNA and containment wells.

7. **Further investigate the extent of LNAPL in the vicinity of SBB-2.** Installation of new monitoring wells may be needed to aid in delineation of the extent of LNAPL in this area.

Five-Year Review Summary Form

8. **Evaluate arsenic concentration trends in Gladys Creek samples and update the monitoring program sample locations and/or frequency if needed to support decisions for further action.** The last sampling event was performed in February 2007, and sample results are pending. If exceedances continue, the impact on the surface water and sediment of the creek must be evaluated and addressed.

Remedy Completion Issues

9. **Finalize the determination of the nature and extent of soil contamination on the northern portion of the site and design appropriate remedial action.** Evaluate the nature and extent of soil contamination based on existing data collected during the removal action, and any data needs that may be identified, and develop an appropriate course of action for remediation, if needed.

10. **Develop a comprehensive site-wide approach to ground water contamination.** ODEQ and EPA are currently coordinating efforts to develop a revised feasibility study regarding the ground water remedy.

Protectiveness Statement(s): The remedy implemented to-date at the Oklahoma Refining Company Superfund Site is considered to be protective of human health and the environment in the short-term.

Activities at the site to-date include the source control remedy completed in the southern ("abandoned") portion of the site, the time-critical removal action completed in the northwest portion of the site (the former refinery area, or CPC property), and ongoing site-wide long-term ground water and surface water monitoring. The source control remedy (completed in July 1997) is considered protective of human health and the environment in the short term because the waste has been removed or contained. Continued O&M of the constructed source control remedy will ensure that this portion of the remedy remains protective. The time-critical removal action (initiated by EPA in September 2003 and completed in February 2006) on the northwest portion of the site (the former refinery area, or CPC property) provided for demolition and removal of the remaining above-ground facilities associated with the former refinery. Long-term site-wide ground water and surface water monitoring will continue until a comprehensive approach to site-wide ground water contamination is developed. Institutional controls are in place to restrict use of the site. The EPA and ODEQ are currently coordinating efforts to investigate the former refinery area soil and further investigate and develop a comprehensive approach to site-wide ground water and Gladys Creek.

Because the actions implemented at the site currently prevent exposure to remaining site contamination, the remedy is considered protective of human health and the environment in the short-term, and will continue to be protective if the recommendations and follow-up actions described in this five-year review are addressed. Investigation of soil in the former refinery area and evaluation of site-wide ground water and surface water contamination must be completed and an appropriate approach to address remaining contamination must be developed to provide a comprehensive remedy and continued protectiveness in the long-term.

Other Comments: During the second five-year review period, the EPA time-critical removal action response in conjunction with ODEQ actions to implement the recommendations from the first five-year review have helped to ensure continued protectiveness of human health and the environment at the site.

Second Five-Year Review Report
Oklahoma Refining Company Superfund Site

The United States Environmental Protection Agency (EPA) Region 6 has performed a five-year review of the remedial actions implemented at the Oklahoma Refining Company (ORC) Superfund Site located in Cyril, Caddo County, Oklahoma. This is the second five-year review for the site, and covers the period since the first five-year review was completed in August 2002. 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 the review, if any, and make recommendations to address the issues. This Five Year Review Report documents the results of the review for the ORC site, performed in accordance with EPA guidance on five-year reviews.

EPA guidance on conducting five-year reviews is provided by Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P, *Comprehensive Five-Year Review Guidance* (**EPA, 2001a**) (replaces and supersedes all previous guidance on conducting five-year reviews). EPA followed the guidance provided in this OSWER directive in conducting the five-year review performed for the ORC site.

1.0 Introduction

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) call for five-year reviews of certain remedial actions. The statutory requirement to conduct five-year reviews was added to CERCLA as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA). EPA may also conduct five-year reviews as a matter of policy for sites not addressed specifically by the statutory requirement. EPA therefore classifies each five-year review as either "statutory" or "policy" depending on whether it is being required by statute or is being conducted as a matter of policy. The second five-year review for the ORC site is required by statute.

The EPA Five-Year Review guidance specifies that five-year reviews are required or appropriate whenever a Remedial Action (RA) results in hazardous substances, pollutants, or contaminants remaining onsite at levels that will not allow for unlimited use or unrestricted exposure. As specified by CERCLA and the NCP, statutory reviews for such sites are required if the Record of Decision (ROD) was signed on or after the effective date of SARA. CERCLA §121(c), as amended, 42 USC §9621(c), states:

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

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

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

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

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

The five year review for the ORC site is required by statute because the ROD was signed after the effective date of SARA in 1986, and because hazardous substances, pollutants, or contaminants were left onsite above levels that allow for unlimited use and unrestricted exposure. The triggering action for five-year reviews at the ORC site was the date of initiation of the remedial action for the southern or abandoned portion of the site in July 1997. The first five-year review was completed in August 2002, and this second five-year review is being completed five years from that date.

2.0 Site Chronology

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

3.0 Background

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

3.1 Physical Characteristics

The ORC site is located in Caddo County on the eastern edge of Cyril, Oklahoma, at the intersection of U.S. Highway 277 and State Highway 8. The site is bordered by Gladys Creek to the east, U.S. Highway 277 to the north, the City of Cyril to the west, and a tributary of Gladys Creek to the south. A map of the site is provided as **Figure 1**. In site documents, the site is informally divided into the "abandoned" portion of the site (offsite areas and the area south of the railroad tracks) and the northwest portion of the site (onsite areas northwest of the railroad tracks, or the former refinery facility area or Cyril Petrochemical Corporation (CPC) property). The southern portion of the site has been addressed under CERLCA since the site was added to the NPL in 1988. The northwestern portion of the site was addressed under the Resource Conservation and Recovery Act (RCRA) as an active facility until October 1997 when the northwest portion of the site was referred to EPA for consideration under CERCLA (CPC had ceased refining operations in 1994).

Gladys Creek adjoins the site along its northern and eastern borders (**Figure 1**). The 1988 Oklahoma Water Quality Standards (OWQS) designated the segment of Gladys Creek adjacent to and downgradient of the site as a habitat-limited fishery and for secondary body contact recreation. An unnamed tributary also flows continuously throughout the year and is approximately one-half the size of Gladys Creek. This tributary is assumed to be capable of supporting the beneficial uses of habitat limited fishery and secondary body contact recreation. Gladys Creek and its tributary provide habitat for many forms of aquatic wildlife. Gladys Creek in turn is a tributary of Chetonia Creek, located approximately one mile downstream of the site. Chetonia Creek empties into the Little Washita River 1.75 miles south of the ORC site.

Topography of the ORC site is basically flat, with a gentle slope to the east and south. A deeply incised creek system forms a steep embankment at the eastern and southern borders of the site. The highest elevation is at the northwest corner of the ORC site and is approximately 1,380 feet above mean sea level

(MSL). The lowest elevation found at the site, at the bottom of Gladys Creek in the southeast corner, is approximately 1,290 feet above MSL. The elevation of the site places it above the 100-year flood plain.

The ORC site covers approximately 160 acres and encompasses an area that was used for petroleum refining purposes for approximately 60 years. Approximately one-half of the ORC site formerly consisted of a refinery area and a tank farm area. The other one-half of the site, described previously as the abandoned portion of the site, formerly consisted of grasslands and approximately 40 randomly-sized pits and wastewater ponds containing varying amounts of sediment. Prior to remediation, this portion of the site was overgrown with weeds and grasses and provided habitat for many forms of terrestrial wildlife such as hawks, owls, coyotes, rabbits, rats and snakes. The sediment, soil, and surface water on this portion of the site have been remediated. This portion of the site now consists of two capped landfills covered with planted grasses and wheat. Both landfills are now fenced to prevent unauthorized access, and the remaining areas are used for cattle grazing.

The ORC site is underlain by Quaternary and Permian Age deposits. The Quaternary deposits, composed of clay, silt and sand, exist on top of the bedrock in many areas of the site. These deposits include thin layers of clay spread across much of the site and thick layers of clay, silt and sand deposited as channel fills. The Quaternary deposits are not used as a water source in the Cyril area and are not considered an aquifer of interest at the site.

The uppermost Permian stratum found at the site is the Weatherford Member of the Cloud Chief Formation. It is primarily composed of gypsum and underlies thin Quaternary clay deposits in the northwest portion of the site. In remaining areas of the site the Weatherford Member outcrops at the surface or is absent. The thickness and elevation of the top of the Weatherford Member varies because it is an erosional surface. The greatest measured thickness of the Weatherford Member at the site was 31.5 feet. Ground water was found to be present in the top few feet in the northwest portion of the site. The ROD indicated that the Weatherford Member acts as an aquitard in this area and as a partial barrier to infiltration from rainfall. The Weatherford Member is not used as a water source in the area and was also not identified as an aquifer of concern at the site in the ROD (**EPA, 1992**).

The Rush Springs Sandstone (RSS) Formation conformably underlies the Weatherford Member. The RSS Formation is approximately 250 feet thick in the Cyril area and consists of even-bedded to highly cross-bedded, reddish-brown, very fine grained, silty sandstone. The RSS Formation underlies the entire Cyril area and outcrops on the eastern side of the site. The RSS Formation contains ground water and is

best characterized as an unconfined water table aquifer. The RSS Formation aquifer is the affected aquifer of concern that is addressed in the ROD (**EPA, 1992**).

Recharge of the RSS Formation aquifer in the Cyril area occurs in the topographically high areas located west and north of the ORC Site, and discharge areas occur where Gladys Creek and its tributaries intercept the water table along the eastern and southern borders of the site. The general horizontal direction of ground water flow across the site is to the southeast, at a velocity of approximately 11 feet per year. Vertical flow potentials for ground water in the RSS Formation indicated that upward flow occurs in the area of Gladys creek and its tributaries. The vertical ground water flow direction is primarily horizontal over the rest of the site. Ground water from the RSS Formation flows into Gladys Creek and its tributaries above the stream level by visible seeps and below the stream level by discharge through the alluvial fill materials. In accordance with the EPA Ground Water Protection Strategy, the RSS Formation aquifer is classified as a IIA aquifer, a current source of drinking water in the Cyril area. However, there is no one currently using the portion of the RSS Formation aquifer that is contaminated from the site.

The Marlow Formation conformably underlies the RSS Formation. This formation consists mostly of even-bedded, brick-red sandy shale and fine grained sandstone. It is estimated to be 100 feet thick in the Cyril area. Beneath the Marlow Formation, in descending order, occur the Dog Creek Shale Formation, the Blaine Formation, and the Flowerpot Shale Formation. These are all primarily red shale with some interbedded gypsum, dolomite, siltstone, and sandstone beds. The combined thickness of these formations is approximately 500 feet. These formations are considered to perform as aquitards to vertical ground water flow in the Cyril area (**EPA, 1992**).

3.2 Land and Resource Use

The ORC site was operated continuously as a refinery from 1920 through 1984. Several attempts were made to resume refining operations through 1994. The refinery structures were located on the northwestern portion of the site until August 2003, when the EPA Emergency Response Branch demolished and removed the structures, tanks, and chemicals in a time-critical emergency response. Surface water, soil, and sediments in the southern portion of the site were remediated in an action completed in July 1997, and this portion of the site is currently used for grazing cattle. Surface and subsurface soil beneath the northwestern portion of the site were partially sampled during the removal action and a determination of the nature and extent of contamination and need for remedial action is

pending completion of a feasibility study. Site-wide ground water contamination is also still present and being evaluated (**EPA, 2005**).

The City of Cyril, with a current population of approximately 1,600 (**EPA, 2002a**), borders the western boundary of the ORC site. Cyril obtains its drinking water from a Rural Water District which obtains its water from ground water wells located approximately 20 miles northwest of Cyril (**EPA, 1992**). The ROD states that some residences near the ORC site obtain drinking water from the shallow RSS Formation aquifer. The ROD also indicates, however, that there is no one currently using the portion of the RSS Formation aquifer that is contaminated or that could become contaminated from the ORC site. Institutional controls currently in place for the site restrict drilling of new wells (**EPA, 1992**).

The area around Cyril is rural and consists of small farms and ranches. Typical land uses include wheat farming and cattle grazing. Gladys Creek is primarily used for fishing, wading, and cattle watering in the Cyril area. Gladys Creek ultimately flows into the Little Washita River approximately two miles south of the ORC Site (**EPA, 1992**). The site is zoned for industrial use. One residence is located on the site, and portions of the site are used for cattle grazing. These land and resource uses are expected to remain the same into the foreseeable future.

3.3 History of Contamination

Operations at the ORC site were begun by the Anderson Pritchard Company (APCO) in 1920. The ORC site was operated as a refinery, under several different owners, until 1994. The refining processes that were utilized included crude distillation, vacuum distillation, catalyst cracking, akylation, bimetallic reforming, and downstream processing. Wastes were placed in surface pits on the refinery property. Wastewater was sent through an oil-water separator to remove oils and then treated in a series of surface impoundments. Treated water from the surface impoundments was discharged into Gladys Creek. Leakage from crude oil tanks, product tanks, and surface impoundments occurred during the many years of production (**EPA, 1992**).

Site operations resulted in contamination of soil, sediment, surface water, and shallow ground water beneath the ORC site. The contaminants present at the ORC site included benzene, phenol, toluene, xylene, methyl phenol, naphthalene, ethylbenzene, polycyclic aromatic hydrocarbons, arsenic, cadmium, chromium, lead, mercury, nickel, and zinc as well as areas of low and high pH (**EPA, 2002b**).

The ORC site was added to the NPL in June 1988. The Oklahoma State Department of Health (OSDH) began a Remedial Investigation (RI) in 1989 and completed the RI in 1991. The focus of this RI was the

southern portion of the site. The OSDH found extensive surface and subsurface contamination by petroleum related organic compounds, heavy metals, and acidic and caustic materials. The uppermost aquifer at the ORC site, the Rush Springs Sandstone aquifer, was found to be contaminated by dissolved organic and inorganic compounds. The OSDH risk assessment, conducted as part of the RI, concluded that exposure to nearby residents and site intruders was within EPA's acceptable risk range, but that exposure to future potential residents on the ORC site and site workers was not at an acceptable level (**EPA, 1992**). The Feasibility Study (FS) was performed between 1989 and 1991. The FS identified soil, sediment, surface water and ground water that required remediation and identified the cleanup levels to be achieved during remediation (**EPA, 2002b**).

The RA defined by the ROD and the 1996 ESD for the southern portion of the site began in July 1997, and the RA construction was completed in October 2001. The completed remedy of the southern portion of the site included the bioremediation of approximately 93,000 cubic yards of contaminated soil, neutralization of 16,000 cubic yards of contaminated soil, stabilization of 14,000 cubic yards of contaminated soil, and removal of 19,771 cubic yards of soil contaminated with asphaltic waste and 18,260 cubic yards of soil contaminated with pitch. Two landfills were constructed for containment of site wastes. The EPA and ODEQ agree that all soil source remediation on the south portion of the site is complete. Remediation of the ground water is yet to be completed (**EPA, 2002a**), as is investigation of the soil in the northwestern portion of the site.

3.4 Initial Response

In 1984 the OSDH issued an order to ORC for corrective action of RCRA violations which included inadequate closure plans, failure to sample soil in the land treatment area, and failure to adequately sample ground water in the land treatment area. Also in 1984, ORC conducted an investigation of contamination problems on the ORC site and removed approximately 5,000 barrels of Light Non-Aqueous Phase Liquid (LNAPL) from the ground water (**EPA, 1992**).

An action memorandum prepared pursuant to Section 104 of CERCLA, authorizing an EPA removal action at the site, was signed on August 30, 1990. The scope of the removal action consisted of fencing the site, characterization of the contents and removal of drums, plugging wells in the acid pit area, and placing netting over several impoundments to protect wildlife. A Unilateral Administrative Order (UAO) was issued to CPC on January 25, 1991, ordering the company to perform the fencing on its portion of the property and the drum characterization. CPC responded to the order to undertake the actions requested; however, the work plan submitted by CPC to perform the work was not considered adequate for the drum characterization. CPC was allowed to proceed with the fencing of its property and EPA proceeded with

performance of the drum characterization, the well plugging, and installing the impoundment netting. The removal action on CPC's property and the abandoned property was completed in August 1991 (**EPA, 1992**).

3.5 Basis for Taking Action

The purpose of the response actions conducted at the ORC site were to protect public health and welfare and the environment from releases or threatened releases of hazardous substances from the ORC site. Contaminants of concern identified in the ROD for the ORC site are presented in **Table 2**. The major risks posed by the site were direct contact with soils, waste sediments, surface water and ground water. Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response actions selected in the ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. Exposures to the affected soil, ground water, surface water and sediment were determined to be associated with human health risks higher than the acceptable risk range (between $1x10^{-4}$ and $1x10^{-6}$).

4.0 Remedial Actions

The second five-year review specifically addresses actions taken at the site since completion of the first five-year review report, signed on August 13, 2002 (**EPA, 2002b**). Included in this section is an overview of the remedy objectives, selection, and implementation at the ORC site. It also describes the ongoing Operations and Maintenance (O&M) activities performed and the overall progress made at the site in the period since completion of the first five-year review. The ODEQ assumed responsibility for O&M of the source remedy on the southern portion of the site on July 3, 2006 (**ODEQ, 2007c**).

4.1 Remedy Objectives

The specific Remedial Action Objectives (RAOs) identified in the ROD for the ORC site RA were developed assuming that the site could be used for residential purposes. RAOs were developed for the ORC site to address contaminated sediments and surface soils, subsurface soils, surface water, and ground water.

The RAOs for surface water and ground water were developed assuming use of the water as a primary drinking water source. The RAOs were set at the Maximum Contaminant Levels (MCLs) where available; when not available, human health-based risk values were used. Surface water that exceeded the RAOs was to be treated to the RAOs and injected into the RSS aquifer. The ground water RAOs levels were also to be used as the treatment level.

The RAOs for surface soil and sediment were developed assuming that pathways of potential exposure could result from:

(1) ingestion by humans; and,

(2) contamination of ground water through leaching.

Acceptable risk-based exposure concentrations were generated for both of these exposure pathways and the more protective concentration used to determine the type of action necessary to address the contaminated media.

Subsurface soil RAOs were set by determining the contaminant concentrations that could leach from the soil and cause ground water to be contaminated at concentrations above the ground water RAO for each contaminant. The main goals of the selected sediment and soil remedial action was to prevent current or future exposure to the contaminated soils, sediments and surface water and to reduce contaminant migration into the ground water.

4.2 Remedy Selection

The ROD for the site was signed on June 9, 1992. The ROD addressed the risks posed by the site to human health and the environment. The selected remedy for the ORC Site would accomplish the RAOs by treating soil and sediment present at concentrations above the RAOs using bioremediation, stabilization, neutralization and containment and treatment of surface water and ground water to meet drinking water standards. The selected remedy defined by the ROD for contaminated surface water, sediment, surface soil, and ground water was comprised of the following components:

- In-situ bioremediation of organic-contaminated sediments.
- In-situ bioremediation of inorganic-contaminated sediments, followed by capping. Stabilized sediments and surface soils shall be capped with 2.5 feet of clay followed by 1 foot of subsoil followed by 0.5 feet of topsoil.
- Removal of all onsite surface water from impoundments.
- Treatment of all contaminated surface water taken from the surface impoundments in an onsite water treatment facility.
- Prepared-bed biotreatment of contaminated sediments and soil that could not be treated in situ, followed by stabilization, if necessary, and containment of treated residuals. Stabilized soils shall be disposed in the same onsite landfill used to dispose biotreatment residuals.

- Excavation and containment of contaminated sediments and soil that exceeded health-based levels.
- Excavation and neutralization of low pH sediment, followed by placement of treated material as fill in area of origin.
- Excavation and recycling of asphaltic materials.
- Removal and recycling of LNAPLs, primarily petroleum, floating on the ground water and co-mingled with hazardous waste.
- Containment of contaminated ground water using interceptor wells to prevent migration.
- Treatment of all collected water in an onsite water treatment facility. Treated water was to be injected into contaminated portions of the aquifer to enhance bioremediation of the contaminated ground water (**EPA, 1992**).

In March 1996 after approximately 60% completion of the remedial design, changes were identified during the preliminary stages of the ROD-specified remedy and an Explanation of Significant Differences (ESD) describing revisions to the ROD-specified remedy was signed. The significant differences between the selected remedy in the ROD and the implemented remedy were:

- Stabilization and onsite capping of asphaltic materials rather than recycling. No viable recycling option was identified during the preliminary stages of the remedial design. The ESD specified that stabilized asphaltic materials were to be placed on top of the pitch pits and capped.

- Postponement of the ground water portion of the remedy to a second construction phase. The ground water remedy selected in the ROD consisted of a line of containment wells to prevent the discharge of contaminated ground water to Gladys Creek, construction and operation of an onsite water treatment facility, and reinjection of all treated water (including surface water) to contaminated portions of the aquifer to enhance in situ bioremediation. Field investigations performed during the initial stages of the remedial design indicated that the ground water problems associated with LNAPL were less than originally defined. The ESD indicated that EPA and ODEQ believed the risk posed by contaminated ground water would be lessened by the source treatment and the construction of a subsurface LNAPL trench. The need for ground water treatment would be re-evaluated after completion of these activities.

- Construction of a temporary water treatment facility and discharge of treated water to Gladys Creek instead of to the aquifer. The ROD specified that onsite water (including ground water and surface water) would be treated in an onsite water treatment facility and the discharge injected

into the aquifer to enhance in situ bioremediation of the aquifer. The decision to postpone the ground water portion of the remedy, however, meant a permanent onsite water treatment facility would not be constructed during the surface remedy. However, treatment and discharge of treated water would still be necessary during performance of the surface remedy (for dewatering of surface impoundments and collection of storm water). The ESD specified the construction of a temporary water treatment facility and discharge to Gladys Creek. The ESD also set discharge limits for treated water into Gladys Creek. The temporary treatment facility and discharge line were to be removed at the completion of the surface remedy.

Remedial action for the surface water and source areas (sediments and soils) was completed in October 2001. During the implementation of the RA it became evident that several remedies selected in the ROD needed revision. A second ESD was prepared to document changes to the remedy incorporated during the implementation of the RA. The following is a summary of the changes to the implemented remedy indicated by the 2003 ESD:

- Further postponement of the ground water remedy, including the installation of the LNAPL trench specified by the 1996 ESD. The ESD specified the postponement largely because of the presence of a continuing contaminant source upgradient on the CPC portion of the site. Under the ESD, the ground water remedy was postponed until EPA Region 6 could complete negotiations with CPC and a decision could be made on remediation of the LNAPL plume under the CPC property. The ESD stipulated that the long term ground water and surface water monitoring called for in the 1996 ESD should continue until a more comprehensive ground water remedy was developed.

- Removal of two railroad areas and the Tank 177 area from the list of areas to be remediated. It was found during remediation activities that the railroad's northeast and southern loading areas and the Tank 177 area were included in the ROD in error. The ESD determined that an industrial use, as opposed to a residential use, was more appropriate for these areas. Data collected during the original investigation exceeded RAOs for residential use but did not exceed industrial RAOs as recommended by an ODEQ toxicologist. Therefore, RAOs for the two railroad loading areas and the Tank 177 area were changed from residential to industrial levels to reflect actual use of these areas.

- Approximately 19,771 cubic yards of soil contaminated with asphaltic waste and 18,260 cubic yards of soil contaminated with pitch were disposed of at an offsite permitted landfill. During

remediation activities it was determined that the pitch material would not support the intended cap material specified in the ROD, and the asphaltic waste was observed to have a propensity to flow. Addition of these materials to either of the onsite landfills would have compromised the structural integrity of the landfills. The asphaltic waste and pitch waste remedy of capping was changed to disposal of the wastes in an offsite permitted landfill.

- Approximately 21,000 cubic yards of metals-contaminated waste from AP-1 were unsuccessfully treated by stabilization. Evaluation of these wastes indicated that further stabilization would probably not be successful. The AP-1 waste material remedy was changed from stabilization to placement of the material in the site Hazardous Waste Landfill.

- The TCLP lead performance standard established in the ROD was 1.5 mg/L, based on an anticipated change in regulations. The rule change was never promulgated, and the regulatory limit for TCLP lead has remained at 5.0 mg/L. Consequently, The TCLP lead performance standard was increased from 1.5 mg/L to 5.0 mg/L to bring the remediation requirements in line with promulgated regulatory limits.

- The ROD required that bioremediated soils containing total metals concentrations exceeding the RAOs established for direct contact hazard and/or protection of ground water to undergo chemical stabilization prior to placement. The analysis and decision protocol presented in the ROD evaluated all soils, regardless of their final disposal location, in the same way: the ROD required soil to undergo chemical stabilization prior to final placement in the landfill if it exceeded the total metals RAO. While total metals analysis is appropriate for evaluating direct contact hazards and determining if the soil needed to be removed from direct contact, the final destination of the soil needed to be considered before deciding if chemical stabilization was necessary. If the soil was to be covered and removed from direct contact, chemical stabilization was only necessary if the TCLP results indicated the soil posed a risk to ground water. The use of TCLP analysis is a more appropriate and cost-effective method of determining if bio-treated soils required stabilization to immobilize metals. The ESD therefore modified the analysis protocol to TCLP for evaluating whether chemical stabilization was necessary prior to landfilling. The implemented protocol resulted in a more protective remedy for soils capped on the site but not in the site landfills themselves.

- The ROD specified a RAO for beryllium at its method detection limit of 1.0 ppm. The action RAO for beryllium in soil was raised from 1.0 ppm to 2.0 ppm to minimize the influence of false

positive and incorrect concentration results common at the method detection limit on decision making regarding the need to remediate soils due to beryllium concentrations. Based on toxicological review and the EPA Region 6 Soil Screening Tables, a beryllium concentration of 2.00 ppm or below has been determined to be protective of human health and the environment.

- Two of the ninety-eight process sewer junction boxes were not cleaned as part of the limited Superfund action on the CPC portion of the site because these boxes were found to be structurally unsound.

- Remediation of the Tank # 1 area, on the CPC property, was halted due to the discovery of unexpected phenol soil contamination during excavation. Migration of odors offsite could not be controlled, resulting in complaints from nearby residents. Excavation was discontinued and the area was covered with eight to twelve inches of clean soil, eliminating the further release of odors. No other remediation is planned by the ODEQ or EPA for this area. Under a Consent Order with the EPA, CPC is required to pursue additional investigation and/or remediation of this area.

- The remedy of bio treated soils containing total metals levels exceeding RAOs established for direct contact hazard and/or protection of ground water was changed from chemical stabilization prior to placement to the use of TCLP testing to determine the need for stabilization. The change resulted in a more protective remedy for soils capped outside the site landfills.

4.3 Remedy Implementation

The RA construction began in July 1997, when Philip Services Corporation (PSC) mobilized to the site on July 11, 1997, and began making site preparations for the RA activities. RA activities included biotreatment, stabilization, neutralization, and offsite disposal; monitoring well installation, upgrading, and abandonment; ground water/LNAPL monitoring; construction of a RCRA Subtitle C landfill, RCRA Subtitle D landfill, two temporary biotreatment areas, and an in-situ biotreatment area; haul road construction and maintenance; drainage structure construction; tank cleanout and demolition; API separator cleanout and in-place demolition; process sewer box cleanout, grading, vegetation, and other miscellaneous activities (**Clayton, 2003**).

During excavation of several waste areas, the anticipated volume of sediments and surface and subsurface soil above RAOs requiring prepared-bed biotreatment in the hazardous waste landfill or the non-hazardous waste landfill was exceeded. Two temporary biotreatment areas in the South Pond Area were

constructed to biotreat the additional waste in these areas, transport the biotreated material to the appropriate landfill following biotreatment, and remove these areas following all biotreatment activities (**Clayton, 2003**).

The hazardous waste landfill was constructed for the prepared bed exsitu biotreatment and containment of characteristically hazardous sediments and surface and subsurface soils with VOCs, SVOCs, and phenols above their respective RAOs. The hazardous waste landfill consisted of seven distinct layers: recompacted subgrade, secondary liner, geonet, primary liner, drainage system, geotextile filter fabric, and buffer soil. Each layer serves a different purpose and had its own specifications that dictated its construction. Four sumps were installed on the downslope side of the hazardous waste landfill along the inside toe (**Clayton, 2003**).

The non-hazardous waste landfill was constructed for the prepared bed exsitu biotreatment and containment of non-hazardous sediments and surface and subsurface soil with VOCs, SVOCs, and phenols above their respective RAOs. Stabilization, if necessary, was performed in the non-hazardous waste landfill. The non-hazardous waste landfill was constructed in eight distinct layers: general fill, sub-subgrade, construction fill, recompacted subgrade, primary liner, drainage system, geotextile filter fabric, and buffer soil. Each layer serves a different purpose and had its own specifications that dictated its construction. Three sumps were installed on the downslope side of the non-hazardous waste landfill along the inside toe (**Clayton, 2003**).

An In-situ Biotreatment Area was constructed within the waste areas with non-hazardous sediments and surface and subsurface soils with VOCs, SVOCs, and phenols above their respective RAOs for in-situ biotreatment. Stabilization, if necessary, would also be performed in the north pond Biotreatment Area following biotreatment (**Clayton, 2003**).

Monitoring well installation was performed at the start of RA activities to obtain the data necessary to monitor ground water flow and quality as well as the migration of LNAPL. Four monitoring well nests (RMW-1S and 1D, RMW-2S and 2D, RMW-3S and 3D, and RMW-4S and 4D), which consisted of one shallow well and one deep well 10 feet apart and three solo monitoring wells (RMW-6, RMW-9, and RMW-10) were installed. Monitoring well installation was performed according to RA specifications and Oklahoma Water Resources Board (OWRB) regulations: Oklahoma Administrative Code (OAC) Title 785, Subchapter 7; Section 785: 35-7-2; Minimum Standards for Construction of Wells. Fourteen existing monitoring wells were upgraded at the start of RA activities to obtain the data necessary to monitor ground water flow and quality as well as the migration of LNAPL. Monitoring wells DGR-03,

DOW-01, DOW-03, DOW-07, DOW-08, DLR-01 through DLR-07, DLR-10, and DLR-11 were upgraded with an outer protective cover with a locking hinged lid, a 3-foot by 3-foot by 3.5-inch concrete pad, and four 4-inch-diameter, 8.5-foot-long, concrete-filled steel protective poles. Well upgrades were performed according to RA specifications and OWRB regulations (**Clayton, 2003**).

The final inspection was conducted in October 30, 2001. The completed remedy of the abandoned portion of the site included the bioremediation of approximately 93,000 cubic yards of contaminated soil, neutralization of 16,000 cubic yards of contaminated soil, stabilization of 14,000 cubic yards of contaminated soil, and removal and offsite disposal of 19,771 cubic yards of soil contaminated with asphaltic waste and 18,260 cubic yards of soil contaminated with pitch. The cover was completed on both the non-hazardous and hazardous onsite landfills, and the ORC site was landscaped and seeded. A final report documenting the performance and completion of the RA at the ORC site was submitted by the contractors on March 21, 2003. EPA and ODEQ agree that source remediation of the abandoned or southern portion of the property is complete (**EPA, 2002a**). **Figures 2 and 3** illustrate the areas where the remedial actions were performed.

In accordance with the 2003 ESD, remediation of the ground water has not yet been conducted. The ODEQ currently performs surface water and ground water sampling activities at the ORC site in addition to O&M activities for the southern portion of the site. These activities are further discussed in **Section 4.5**.

4.4 Operations and Maintenance

Surface remediation of the southern portion of the ORC site has been completed. The ODEQ currently performs O&M of the implemented remedy. The ODEQ has developed an O&M plan for source remedy of the ORC site. The O&M plan only addresses the southern portion of the site and covers the following activities:

1. Landfill monitoring and maintenance
2. Soil cover inspection and maintenance
3. Security fence inspection and maintenance
4. Photo documentation
5. Institutional controls maintenance

The hazardous and non-hazardous landfills are inspected quarterly. Each inspection includes:

- Identification of areas with noticeable settlement and/or standing water

- Identification of areas of erosion and/or animal burrowing
- Identification of areas without vegetation
- Identification of damage to protection posts, settlement monuments, and underlying cap liner
- Check the condition of the let-down structures on the hazardous waste landfill
- Check the condition of the sumps
- Check the condition of the fence and gates
- Mowing is done a minimum of twice per year

Several locations onsite have subsurface soil remaining with concentrations of contaminants above RAOs. As part of the remedy implementation, each of the locations with contaminant concentrations above RAOs had a soil cover placed over the subsurface soil to eliminate potential exposure pathway. These areas are inspected quarterly, during the landfill inspections, for any evidence of erosion, noticeable settlement, signs of standing water, and absence of vegetation. Any areas with erosion, settlement, and standing water are to be backfilled, graded, and vegetated. Areas without vegetation are to be seeded and watered to establish vegetation (**ODEQ, 2007c**).

The ORC site fence and gates are inspected quarterly for signs of damage. Signs of unauthorized entry to the site, such as tire tracks, cut locks, and open gates are documented along with the condition of the locks on each gate. Any locks found cut, missing, or unusable are replaced. Photographs are taken during all landfill, soil cover, security fence inspections, and any maintenance activities performed at the site to document the progress of O&M (**ODEQ, 2007c**).

Institutional Controls (ICs) have been established for the south and north portions of the site. These notices list the land use restrictions for both the north and south portions of the site. The ICs are checked every 5 years to verify that they are still effective in restricting site use and effective at providing information to people (**ODEQ, 2007c**).

Several areas on the hazardous landfill embankments were eroded as a result of rainfall-runoff and required maintenance in order to properly function. In June 2005, the O&M phase for the source remedy on the southern portion of the site was postponed until repairs to erosion areas on the embankments of hazardous waste landfill could be completed. On, July 3, 2006, the final inspection of the hazardous waste landfill erosion repairs was conducted with EPA and ODEQ personnel. Currently, the landfill cap is functioning as designed and the operational and functional period is complete as a result of the repairs made on the hazardous landfill (**ODEQ, 2007c**).

The substantial inspection for the construction phase was performed on November 7, 2001. The EPA/DEQ cooperative agreement budget was $20,000,000. Costs for the project through December 31, 2001 were $14,771,094, based on ODEQ's quarterly updates (**EPA, 2002b**). Annual O&M costs for the site were estimated to be $88,480. Based on the O&M Plan for source remedy of the ORC site, annual O&M costs for the south portion of the site were estimated to be $19,200. The O&M plan contains detail cost estimates including salaries, equipment, maintenance contractor work (fertilizing, mowing, weed control), and site inspections. A break down of these costs is provided in the O&M plan (**ODEQ, 2007c**).

4.5 Ground Water Monitoring

Maintenance to wells located offsite north of Highway 277 has not yet occurred as recommended on the first five year review. However, the ODEQ conducted a survey of all monitoring wells associated with the site. The survey took place during the September 2006 containment well sampling event, October 2006 MNA and LNAPL sampling events, and in November 2006. The final inventory includes recommendations to fix wells that need repair, be abandoned, or replaced. The ODEQ expects to implement these recommendations in fall 2007. The well survey and recommendations are presented in **Table 3.**

Because hazardous materials remain on the north property, access to the ORC site and the ground water monitoring wells is restricted. Although not under a formal plan, ground water monitoring has been conducted at selected wells since remediation was initiated in 1997. During the RA there was a formal plan in place to monitor the LNAPL plume quarterly and sample ground water on an annual basis. A Sampling and Analysis Plan (SAP) for the ORC site was prepared on November 12, 2004, by the ODEQ to monitor contaminants of concern in ground water, both on and off site, assess the mobility of the LNAPL plume, and monitor surface water and sediments of Gladys Creek. The SAP established the timeframe for long-term ground water monitoring and identified the wells that were included in the sampling events. Data collected from these activities efforts was used to:

1) monitor the free phase and dissolved phase plume and their migration and/or attenuation,

2) help determine the extent and degree of contamination offsite and the associated risk to human health and/or the environment,

3) assess the effect of source removal on the overall ground water quality, and

4) establish the efficacy of monitored natural attenuation as a potential component of the eventual remedy for the ground water operable unit.

The SAP also included routine monitoring of the creek to determine the impacts of these discharges to both surface water and sediment since ground water form the site discharges directly to Gladys Creek (**ODEQ, 2004**).

The ODEQ is currently performing containment well monitoring for the RA, targeted MNA monitoring to assess the efficacy of MNA as a remedy, and LNAPL and water level measurements. Containment wells are offsite wells that serve as indicators of migration of the dissolved plume past Gladys Creek, the major receptor of the plume. As previously stated, this work is conducted under sampling plans prepared by the ODEQ, and the results of the sampling efforts are reported to EPA. However, since construction completion, a formal monitoring plan to evaluate the condition of ground water and surface water at the site has not been in place. LNAPL and water level measurements occurs quarterly, while MNA monitoring and containment well monitoring occurs semi-annually. Maintenance of site wells and structures has been performed on an as-needed basis by ODEQ (**ODEQ, 2007c**).

4.6 Progress Since Initiation of Remedial Action

The EPA and ODEQ agree that all source remediation in the southern portion of the site is complete (**EPA, 2002a**). As indicated by the 2003 ESD, remediation of ground water is being postponed and the long term ground water and surface water monitoring called for in the 1996 ESD should continue until a more comprehensive ground water remedy is developed or if site monitoring indicates the need for more immediate action (**EPA, 2003**). The ODEQ referred the CPC facility, the northern portion of the site, to the EPA RCRA program on October 30, 1997 because CPC defaulted on the Consent Agreement and Final Order (CAFO) and subsequent Resource Conservation and Recovery Act (RCRA) order. On August 6, 2002, the EPA RCRA program deferred the facility to the EPA Superfund program. With the 2002 transfer of the north property from RCRA to CERCLA authority, it is expected that a comprehensive site-wide remedial plan for onsite ground water can be developed (**EPA, 2003**). The source remedy for the south portion and some limited areas in the north portion of the site reached final completion in January 2002 (**ODEQ, 2007c**).

The First Five-Year Review Report was signed on August 13, 2002, and is further discussed in **Section 5.0**. Since the completion of the first five-year review, 14 quarterly sampling events of perimeter containment wells, 12 quarterly sampling events of LNAPL monitoring and 3 semi-annual MNA monitoring events have been conducted at the site by the ODEQ. The analytical data are further discussed in **Section 6.4**. The ODEQ continues to perform site O&M activities under the requirements specified in the O&M Plan for the site.

When the northern portion of the site was referred to the Superfund program in 2002, a number of drums of unknown chemicals were found to be improperly stored. In addition, an abandoned laboratory with several chemicals remained onsite. Tanks were found to be leaking unknown contents of liquids and deteriorated asbestos hung from vessels and littered the ground. The ODEQ requested assistance from EPA's Emergency Response Branch to address the immediate problems, based on an imminent risk to the health and safety of the community. EPA conducted an emergency removal action on the northern portion of the site in August 2003 (**ODEQ, 2004a**). This removal action included demolition of various process towers, vessels, buildings, cooling towers, above ground piping, sumps, above ground storage tanks, and asbestos containing materials from pipes and vessels. The emergency removal action removed the laboratory chemicals and the drums at the facility. This effort included a direct push investigation to document the presence of LNAPL and collection of surface and subsurface soil samples from direct push borings and trenches across the northern portion of the site (**EPA, 2005**).

The site is now fenced, all of the tanks in the tank farm were emptied and removed, the refinery superstructure was taken down, and debris from the demolition of the facility were disposed accordingly (**ODEQ, 2004a**). This removal action was completed in February 2006 (**EPA, 2007)**.

5.0 Progress Since the First Five-Year Review

The First Five-Year Review of the ORC site was completed in August 2002. The findings of the first five-year review, the status of recommendations and follow-up actions, the results of implemented actions, and the status of any other issues are described in the following sections.

5.1 Protectiveness Statements from First Five-Year Review

The First Five-Year Review Report concluded that the remedy for source control in the abandoned portion of the ORC site was considered protective of human health and the environment in the short term, because the wastes had been removed or contained and was protected from erosion. The five-year review stated that the ground water remedy for the site was postponed pending resolution of action for the CPC property to the north or identification via monitoring results of impact or potential impact to the surface water of Gladys Creek.

5.2 First Five-Year Review Recommendations and Follow-up Actions

The first five-year review of the ORC site, completed on August 13, 2002, recommended the following follow-up actions:

- Submit the RA construction completion report (for the southern portion of the site).

- Include review of the RA Construction Completion report in the Second Five Year Review Report.
- Prepare and implement the monitoring plan for long term ground water and surface water monitoring which should also include:
  - Sampling of discharge from observed seeps and the surface water of Gladys Creek.
  - Procedures to address maintenance of both on and offsite monitoring wells,
  - Annual review of the monitoring results.
  - Define monitoring criteria that will indicate the need for additional monitoring and/or further action, if necessary.
- Protective monitoring well casings for wells located offsite, north of Highway 277, were damaged by corrosion and needed to be repaired to restrict trespasser access to these wells. Alternatives for restricting trespasser access may need to be pursued (such as fencing around individual wells).

5.3 Status of Recommended Actions

This section describes the current status of implementation of the recommendations included in the First Five-Year Review Report. These are summarized in **Table 4**.

The Remedial Action Construction Completion Report was completed by ODEQ on March 21, 2003. The activities implemented as part of the RA construction are discussed in **Section 4.3**. The report demonstrates that all source remediation of the abandoned portion of the property is complete.

A sampling and analysis plan (SAP) for ground water, surface water, soil, and sediment sampling at the ORC site was prepared by ODEQ on November 12, 2004. The sampling and analysis plan established the long-term plan for ground water monitoring and identified the wells to be sampled. The plan indicates the information obtained from the sampling events will be used to:

- Continue to monitor the free phase and dissolved phase plume and their migration and/or attenuation.
- Help determine the extent and degree of contamination offsite and the associated risk to human health and/or the environment.
- Assess the effect of source removal on the overall ground water quality.

- Establish the efficacy of monitored natural attenuation as a potential component of the eventual remedy for the ground water operable unit.
- Ground water discharges directly to Gladys Creek. The creek will be routinely monitored and data obtained from the sampling efforts will be used to determine the impacts of these discharges to both surface water and sediment.

As previously mentioned in **Section 4.5**, maintenance to wells located offsite north of Highway 277 did not take place and repairs are still pending. The ODEQ performed an inventory of all the wells at the site to identify maintenance needs at each well. ODEQ expects to address the identified maintenance needs by the fall of 2007. **Table 3** provides ODEQ's inventory and list of recommendations.

6.0 Five-Year Review Process

This second five-year review for the ORC site has been conducted in accordance with EPA's Comprehensive Five-Year Review Guidance dated June 2001 (**EPA, 2001a**). Interviews were conducted with relevant parties; a site inspection was conducted; and applicable data and documentation covering the period of the review were evaluated. The activities conducted as part of this review are described in the following sections.

6.1 Administrative Components

The five-year review for this site was initiated by the EPA. The review team was led by the EPA Remedial Project Manager (RPM) for this site, Mr. Michael Hebert /EPA Region 6. Agency representatives assisting the review team included Meghan Lloyd and Amy Brittain, ODEQ, who provided information related to the ORC site and assistance during the ORC site inspection. The components of the review included community involvement, document review, data review, a site inspection, interviews, and development of this Second Five-Year Review Report.

6.2 Community Involvement

A public notice announcing initiation of the second five-year review was published in the Cyril News during April 2007. Upon final concurrence of the Second Five-Year Review Report, the report will be placed in the information repositories for the site, including Cyril City Hall at 112 West Main Street, Cyril, Oklahoma, the ODEQ office in Oklahoma City, and the EPA Region 6 office in Dallas, Texas. A public notice will be published in the Cyril News to summarize the findings of the review and announce

the report's availability at the information repositories. Copies of the two public notices are provided in **Attachment 6** to this report.

6.3 Document Review

This five-year review for the site included a review of relevant site documents, including decision documents, the O&M Plan, the Remedial Action Construction Completion Report, O&M reports and related monitoring data, and the First Five-Year Review Report. Documents that were reviewed are listed in **Attachment 1**.

6.4 Data Review

Data collected since the previous five-year review includes ground water sampling analytical results, surface water and sediment sampling analytical results, and LNAPL and water level measurements. Sampling of acid/caustic seeps along Gladys Creek took place on May 2006 and February 2007. The RAOs for ground water/surface water and sediments were established by the ROD and are provided in **Table 2**.

Arsenic concentrations in the May 2006 Gladys Creek sampling event exceeded the RAO in surface water and sediments samples. **Figure 4** shows the sample locations where the arsenic concentration was higher than the specified RAO. This was the first time that arsenic was found in the surface water of the main channel of Gladys Creek above the RAO. During the RI, arsenic was found in seep water but not in the creek water. No VOCs were detected in either the surface water or sediment samples (**ODEQ, 2007b**). Analytical results from the February 2007 sampling event had not yet been received as of the date of preparation of this five-year review report.

Although there was no formal long term ground water monitoring plan in place for the site until the 2004 SAP was prepared, selected containment monitoring wells were sampled by ODEQ quarterly between August 2002 and May 2005. The selected wells have been sampled semi-annually since May 2005. Containment wells that are currently being monitored are SBB-19, SBB-22, SBB-28, SBB-31, SBB-33 and SBB-34. **Table 5** provides the results from sampling events at containment monitoring wells. **Figure 5** shows the location of the containment monitoring wells.

The last onsite ground water sampling event was performed in September 2006. Contaminant concentrations in the latest events are generally consistent with levels detected in historical sampling events. Results from monitoring well SBB-22 show arsenic concentrations close to or above the RAO level (50 µg/L). Analytical results from September 2006 show an arsenic concentration of 73 µg/L at

well SBB-22. Note, the MCL has changed since the ROD was signed; the MCL for arsenic is now 10 µg/L.

Lead was detected in the November 2005 quarterly sampling event in well SBB-22 at a concentration of 134 µg/L. This was the highest lead concentration ever recorded at this well. Lead was also detected on September 2006, but at a concentration of only 5.3 µg/L (below the RAO). Historically, barium, carbon disulfide, 2-methylnaphthalene, selenium naphthalene, and xylenes have also been detected in well SBB-22 at concentrations below the RAOs. Lead was detected at monitoring well SBB-28 during four sampling events in December 2002, April 2003, June 2003 and December 2003 which had the highest lead concentration (30 µg/L) recorded for this well. Lead has been below the RAO's or not detected in the remaining sampling events. No other contaminants of concern were found in the remaining four wells sampled at concentrations close to or above the RAOs.

In the March 2006 sampling event, the analytical report shows that four metals (arsenic, cadmium, beryllium, and lead) had detection limits higher than the RAOs levels, and it was not possible to determine if the concentrations of these COCs were above the RAOs (**ODEQ, 2006**).

The ODEQ has been conducting LNAPL monitoring events on a quarterly basis since the last five year review. Wells that are being monitored include: DGR-03, DLR-01, DLR-02, DLR-03, DLR-04, DLR-05, DLR-06, DLR-07, DLR-10, DLR-11, DOW-03, DOW-07, DOW-08, RMW-1S, RMW-2S, RMW-3S RMW-4S, RMW-6, SBB-1, SBB-4, SBB-5, SBB-6, SBB-7, SBB-9, SBB-12, SBB-13, SBB-14, SBB-15, SBB-17, SBB-20, SBB-21, SBB-23, SBB-24, SBB-25, SBB-28, and SBB-37. **Figure 6** shows the location of these monitoring wells.

The results of the LNAPL monitoring events indicated the presence of LNAPL at wells: DGR-03, DLR-02, DLR-03, DLR-04 DLR-07, DLR-10, DLR-11, DOW-07, DOW-08, RMW-1S, SBB-4, SBB-5, SBB-15, SBB-15, SBB-23, SBB-24 and SBB-37. Since the last five year review, LNAPL thickness at monitor well SBB-37 has ranged from 16.62 ft to 22.04 ft. Historically, SBB-37 has recorded the greatest LNAPL thickness of all monitoring wells at the site and is located on the north side of the property just north of where the storage tanks from the refinery facility use to be. The LNAPL monitoring events also confirmed the presence of LNAPL in several monitoring wells located north of Highway 277. These wells are approximately 150 feet south of the north tributary to Gladys Creek.

At the EPA's request, the ODEQ performed a survey of LNAPL in all the existing wells at the ORC site during the fall 2006. The LNAPL plume at the site appeared to be relatively stable over the past fifteen years. However, during the LNAPL survey, the ODEQ detected LNAPL in well SBB-02, which is an

offsite well located approximately 250 feet to the east of residential homes. No LNAPL measurements had been previously reported in this well. The presence of LNAPL in well SBB-02 might be an indication that LNAPL is migrating offsite towards residences. The ODEQ also suspects that LNAPL might be migrating to well SBB-16. Although no LNAPL was found at this well, the interface probe used to measure the depth to water had a LNAPL residue and odor on it when taken out of the well. SBB-16 is located approximately 150 feet to the east of nearby residential homes. Currently, it is not known how far the LNAPL plume extends to the west of SBB-02 and SBB-16.

The ODEQ began monitoring fourteen wells on a semi-annual basis beginning April 2005 to evaluate the extent and degree of contamination, to evaluate the effectiveness of source removal, and to determine the efficacy of monitored natural attenuation (MNA) as a remedial alternative. There have been three semi-annual MNA sampling events which included sampling at wells DLR-6, RMW-1S, RMW-2S, RMW-6, RMW-9, RMW-10, SBB-6, SBB-13, SBB-16, SBB-17, SBB-20, SBB-21, SBB-25, and SBB-30. **Figure 5** shows the location of these fourteen MNA monitoring wells.

Sample collection procedures in the first two events utilized bailers to purge and collect samples. The ODEQ used the low flow sampling method during the third semi-annual event, on October 2006, to purge and collect samples in all wells except well RMW-9 (due to the depth to water at this well). The low flow purge method obtained lower turbidities during purging and sample collection, which had been a problem in the previous sampling events. High turbidity during sample collection effects the results of total metals analysis. Analytical results from these three sampling events indicate that several COCs (benzene, 1,2-dichloroethane, 2,4-dimethylphenol, 2-methylphenol, arsenic, beryllium, cadmium, and nickel) concentrations exceeded the RAOs at wells SBB-13, RMW-10, RMW-9, SBB-20, SBB-21, and SBB-25. Monitor wells SBB-20, SBB-21, and SBB-25 are located very close to Gladys Creek. The detection of COCs above the RAOs in these wells indicates that the creek might be impacted by the discharge of contaminated ground water to the creek.

ODEQ plans to continue monitoring the fourteen MNA wells on a semi-annual basis. Further evaluation of the data collected will be required to make a determination of the effectiveness of MNA and to assess whether or not MNA can be considered as a remedial alternative for this site (**ODEQ, 2007a**).

6.5 Interviews

ODEQ and the City of Cyril were invited to respond to questions about the site and provide their input regarding the site status. The interview record forms which document the responses are presented in **Attachment 2**.

Ms. Allyene Luna, Treasurer of the City of Cyril, participated in the interview on behalf of the City of Cyril. Ms. Luna was interviewed via phone and she indicated that demolition activities on the north side of the refinery went smoothly and people are happy with all that has been accomplished to date. She also mentioned that the cleanup at the site has had a positive effect and that it has been very beneficial to the community. She was not aware of any community concerns related to the site, although some inquiries have been made as to what the site will be used for when the cleanup is finished. She also indicated that the City understands from the EPA that more work will be done to cleanup the soil where the refinery was located, and the City is looking forward to that work being completed. Ms. Luna also mentioned that, speaking on behalf of the current board, they feel well-informed about the site's activities and progress. The primary community interest is that the site be kept clean since it is located at the end of Main Street and is visible to the community.

Kelly Dixon, Meghan Lloyd (Project Manager), and Amy Brittain (Site Hydrologist) from ODEQ provided their interview responses on April 11, 2007. The overall impression related by ODEQ staff was the remedy implementations on the south portion of the site have been good, and the demolition activities that removed hazards from the north side are protective of human health. Ongoing issues to be addressed include repairing the gate to the northern portion of the site at Main and Baskett (access to the northern portion of the site is currently not restricted), observed material west of the railroad tracks (to be addressed during the north property soil investigation), erosion of the cut bank of Gladys Creek, and LNAPL observed in well SBB-2. Due to the proximity of the well to residential homes, ODEQ representatives agree that delineation of the offsite LNAPL plume should be a priority. The ODEQ representatives pointed out that the ground water, north property soil, and Gladys Creek still need to be investigated and remediated if necessary. No incidents or activities such as dumping, vandalism, or fire have been reported at the site.

6.6 Site Inspection

A site inspection was conducted at the site on April 11, 2007. The completed site inspection checklist is provided in **Attachment 3**. Photographs taken during the site inspection are provided in **Attachment 4**. Photographs taken by the ODEQ during the sampling event are provided in **Attachment 5**

Based on the site inspection, the ORC site appears to be well maintained, and there was no visible evidence of vandalism. The main front gate to the south side property was found locked and in good condition (**Photograph No. 1**). Vegetative cover consists primarily of wheat with some other grasses such as bermuda grass (**Photograph Nos. 2, 4, 5, 7, and 8**). Small trees or bushes were found on the non-hazardous waste landfill embankment (**Photograph Nos. 3, 10**). The ODEQ representatives indicated

that they would be removed on the next schedule mowing. Erosion repairs to the hazardous waste landfill were visited and photographed and it appears that further repairs are needed (**Photograph Nos. 30, 31, 37, 39, and 42**). The non-hazardous and hazardous waste landfill covers are also in need of repair to address animal burrows; several holes were observed on the non-hazardous waste and hazardous waste landfills during the site inspection (**Photograph Nos. 8, 25, 26)**.

Most of the existing onsite and offsite ground water monitoring wells, except for wells located on the east side of Gladys Creek, were visited during the site inspection (**Photograph Nos. 10, 11, 13, 15, 16, 21, 28, 40, 47, 51, 57, 60, 61, 62, 63**). Several monitoring wells were observed to be in need of maintenance, replacement, or abandonment. The ODEQ representatives indicated that maintenance to these wells is expected to take place by fall 2007. The offsite wells located on the east side of Gladys Creek are difficult to access, but are visited by ODEQ personnel during each sampling event. For purposes of this five-year review, ODEQ provided copies of the most recent photographs of these wells, reproduced in **Attachment 5**.

7.0 Technical Assessment

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

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

The documents that detail the remedial decisions for the site are the ROD, the March 1996 ESD to the ROD, and the October 2003 ESD to the ROD. The Remedial Action Construction Completion Report for the abandoned portion of the property (south side) has been submitted. EPA and ODEQ have indicated that source remediation associated with surface water, soil, and sediment on the southern portion of the property is complete. The time-critical removal action performed on the northern portion of the site provided for the demolition of above ground structures. This effort included a direct push investigation to document the presence of LNAPL and collection of surface and subsurface soil samples from direct push borings and trenches across the northern portion of the site (**EPA, 2005**). The site is now fenced, all of the tanks in the tank farm were emptied and removed, the refinery superstructure was taken down, and debris from the demolition of the facility were disposed accordingly (**ODEQ, 2004a**). This removal

action was completed in February 2006 (**EPA, 2007**). The nature and extent of soil contamination remains to be evaluated based on existing data and any data needs that may be identified.

In accordance with the 2003 ESD, remediation of ground water is on hold pending resolution of the north property contamination, or until ground water monitoring indicates the contaminated ground water threatens Gladys Creek. The site is currently undergoing semi-annual containment well monitoring for the RA, semi-annual MNA monitoring to assess the efficacy of MNA as a remedy, and quarterly LNAPL and water level measurements, and O&M activities. Based on the data review, site inspection, and interviews, it appears that the ORC site remedy is functioning as intended by the ROD and the 2003 ESD. Opportunities for optimization, early indicators of potential remedy problems, and institutional controls are described below.

Opportunities for Optimization. Opportunities for optimization have been identified in the collection of ground water samples. Previously, samples were collected by purging three well volumes from the wells and then collecting ground water samples using a bailer. Samples collected using this method reported very high turbidity levels. In the last MNA sampling event in October 2006, the low flow purge method was used to collect samples. This method helped to lower turbidities to below 50 NTUs and to obtain more accurate/reliable data. The ODEQ will continue using the low flow purge method in future ground water sampling events.

Early Indicators of Potential Remedy Problems. There were no observed indicators of potential problems that would impact the protectiveness of the remedy on the southern portion of the site. However, the detection of LNAPL in offsite well SBB-02, near a residential area, might be an indication that LNAPL is migrating offsite towards residences. The ODEQ also suspects that LNAPL might be migrating to well SBB-16. This well is located within 150 ft east of nearby residential homes.

Institutional Controls. Two notices have been filed with the Caddo County Clerk for the ORC site. The first notice is a Notice of Federal Lien and was filed on August 14, 2001, for the south portion of the site. A DEQ Notice of Remediation or Related Action Taken Pursuant to the Federal CERCLA was filed on January 4, 2006 for the entire ORC site. The DEQ notice lists land use restrictions for both the north and south portions of the site (**ODEQ, 2007c**). Copies of the two notices are included in **Attachment 7**. Institutional controls are discussed further in **Section 8.0**.

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

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics. There have been no changes in human health exposure pathways for the site since completion of the first five-year review. In addition, no new contaminants or routes of human exposure have been identified for the site as part of this five-year review. Post-remediation site conditions have eliminated or reduced human health exposure pathways present at the site.

Changes in Applicable or Relevant and Appropriate Regulations (ARARs). ARARs for this site were identified in the ROD dated June 9, 1992. The five-year review for this site included identification of and evaluation of changes in the ROD-specified ARARs to determine whether such changes may affect the protectiveness of the selected remedy.

The ARARs identified by the ROD for the ORC site include chemical- and action-specific ARARs for soil and sediment, and chemical- and action-specific ARARs for ground water. The ROD identified the following ARARs as having an impact on the proposed remedy:

Chemical-Specific ARARs for Soil and Sediment

1. Identification and Listing of Hazardous Waste (40 CFR Part 261), Subpart C - Characteristics of Hazardous Waste, and Subpart D - Lists of Hazardous Waste.
2. Land Disposal Restrictions (40 CFR Part 268), Subpart A (268.4) - Treatment Surface Impoundment Exemption, and Subpart D - Treatment Standards.
3. National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61).
4. Air Pollution Permits (Oklahoma Air Pollution Control Rules, OAC 310:200-7).
5. Control of Emissions of Organic Materials (Oklahoma Air Pollution Control rules, OAC 310:200-37).
6. Control of Emissions of Hazardous and Toxic Air Contaminants (Oklahoma Air Pollution Control Rules, OAC 310:200-41).

Action-Specific ARARs for Soil and Sediment

1. Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR Part 264).
2. Treatment Surface Impoundment Exemption (40 CFR 268.4).

Chemical-Specific ARARs for Ground Water

1. Identification and Listing of Hazardous Waste (40 CFR Part 262), Subpart C - Characteristics of Hazardous Waste.
2. National Primary Drinking Water Regulations (40 CFR Part 141).
3. National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61).
4. Control of Emissions of Organic Materials (Oklahoma Air Pollution control Rules, OAC 310:200-37).
5. Control of Emissions of Hazardous and Toxic Air Contaminants (Oklahoma Air Pollution Control Rules, OAC 310:200-41).

Action-Specific ARARs for Ground Water

1. Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR Part 264).
2. Standards Applicable to Transporter of Hazardous Waste (40 CFR Part 263).

The Oklahoma Air Pollution Control Rules cited above under the chemical-specific ARARs for soil were revised and codified during the 2001 legislative session. The regulations that are relevant to activities conducted at the ORC site are now found as:

- *Control of Emission of Volatile Organic Compounds (VOCs) (Oklahoma Air Pollution Control Rules, OAC 252:100-37).*
- *Control of Emissions of Hazardous Air Pollutants and Toxic Air Contaminants (Oklahoma Air Pollution Control Rules, OAC 252:100-41).*

Activities relating to source remediation for the north side of the property have not yet started, the *National Emissions Standards for Hazardous Air Pollutants, Air Pollution Permits, Control of Emissions of Organic Materials, and Control of Emissions of Hazardous and Toxic Air Contaminants* regulations will apply for soil once remediation of the north refinery area begins.

The ROD specified that ground water and surface water RAOs were to be set at levels which would allow use of the water as a primary drinking water source. The MCL for arsenic, beryllium and copper have changed since the ROD was signed. The MCLs for the arsenic was revised as of January 23, 2006, from 50 µg/L to 10 µg/L. For beryllium and copper, the MCLs were set higher at 4 µg/L and 1300 µg/L, respectively. To ensure protectiveness of the remedy relative to the site ground water, the ground water RAOs should be set at the current MCL for each contaminant.

No significant changes have occurred to the remaining ARARs that would call into question the effectiveness of the remedy.

Regulations for worker health and safety have been promulgated at 29 CFR Part 1910. These regulatory requirements are specifically addressed in the ORC site-specific health and safety plan.

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

Examples of other information that might call into question the protectiveness of the remedy include potential future land use changes in the vicinity of the site or other expected changes in site conditions or exposure pathways; no such information has come to light as part of this second five-year review for the site.

7.4 Summary of the Technical Assessment

The technical assessment, based on the site interviews, site inspection, technical evaluation, and data review indicates that the remedial actions selected for the ORC site generally appear to have been implemented and are functioning as intended by the ROD and the 1996 and 2003 ESDs. The assumptions used at the time of remedy selection are still valid. There are no early indicators related to the remedy that would suggest potential remedy problems at the southern portion of the site. No changes in contaminant toxicity or other contaminant characteristics were identified that affect the cleanup levels originally established for the site, or affect the protectiveness of the remedy. No new laws or regulations have been promulgated or enacted that would call into question the effectiveness of the remedy to protect human health and the environment. No other information such as a potential future land use change in the vicinity of the site or other changes in site conditions have been identified as part of this five-year review that might call into question the protectiveness of the selected remedy.

As described in the data review (**Section 6.4**), during the November 2006 well survey event, monitoring well SBB-2 was found to have 3.37 feet of LNAPL. This well is located offsite and is located approximately 250 feet east of residential properties. Further investigation of the LNAPL plume near the residential areas will be required to determine if offsite contaminant migration is occurring (see **Section 9.0**).

Also, as determined during the site inspection, the gate on the north side of the ORC site, on Baskett Street, has been knocked down and access to the north side of the site is currently not restricted. The gate

should be repaired to prevent access by trespassers to the north side of the site and to protect the integrity of the monitoring wells located in this area.

As indicated in **Section 6.4,** sample collection procedures for the MNA wells and containment wells describe the use of bailers to purge and collect samples. High turbidity during sample collection has been a problem in past sampling events because it impacts the results of total metals analysis. In the last sampling event, low-flow purge methods were employed to improve the quality of results.

As indicated in the interview section (**Section 6.5**), soil on the north side of the site has yet to be investigated after EPA initiated the time-critical removal on the northern portion of the site to address demolition of the various refinery buildings. It is recommended that soil on the northern portion of the site should be investigated to identify areas of potential soil contamination.

The data review determined that in three of six surface water samples collected from the Gladys Creek in the May 2006 sampling event, the arsenic concentrations exceeded the RAOs established by the ROD. In addition, one of six sediment samples collected exceeded the arsenic RAO. Sampling of surface water and sediments at the Gladys Creek should continue to monitor the arsenic concentration in the creek.

As indicated in the interview section (**Section 6.5**), the cut bank on the east side of Gladys Creek has experienced continuous erosion due to the gain in stream of the creek. The ODEQ has indicated that if erosion continues, the perimeter fence will be affected and the cut bank could erode into the neutralized acid material. Visual inspection of the cut bank should be performed during sampling events to verify the integrity of the cut bank.

The ARARs review (**Section 7.2**) determined that MCLs for arsenic, beryllium and copper have changed since the ROD was signed. The ROD specified that ground water and surface water RAOs were to be set at levels which would allow use of the water as a primary drinking water source. The ground water RAOs should be set at the current MCL for these COCs.

As indicated in **Section 4.5,** several monitoring wells are in need of maintenance. The ODEQ completed a survey from September through November 2006 documenting the condition of each well and maintenance needs. It is recommended that appropriate maintenance to wells as recommended in ODEQ well inventory should be provided.

As determined during the site inspection (**Section 6.6**), the non-hazardous and hazardous waste landfill covers are in need of repair to address animal burrows and erosion observed during the site inspection. Review of the hazardous and non-hazardous landfill specifications indicate that animal burrowing can potentially impact the top geotextile filter fabric which is placed 2 feet below the landfill top cover.

8.0 Institutional Controls

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, 2005**). ICs can be used for many reasons including restriction of site use, modifying behavior, and providing information to people (**EPA, 2000**). ICs may include deed notices, easements, covenants, restrictions, or other conditions on deeds, and/or ground water and/or land use restriction documents (**EPA, 2001a**). The following paragraphs describe the ICs implemented at the site, the potential affect 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

Two notices describing the site hazards are in place for the site and were filed with the Caddo County Clerk. The first notice is a Notice of Federal Lien for the south portion of the site. A DEQ Notice of Remediation or Related Action Taken Pursuant to the Federal CERCLA was filed for the entire ORC site. The DEQ notice lists land use restrictions for both the north and south portions of the site (**ODEQ, 2007c)**. These restrictions include any activity that may affect the landfill caps, disturb the perimeter fence, or involve drilling of new wells. Copies of these notices are provided in **Attachment 6**.

8.2 Effect of Future Land Use Plans on Institutional Controls

No future land uses have been established or are anticipated for the site that would require an adjustment to the ICs currently put into place.

8.3 Plans for Changes to Site Contamination Status

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

9.0 Issues

The ground water sampling and O&M activities are ongoing at the site. EPA and the ODEQ are currently coordinating activities to investigate the north property soils, site-wide ground water, and Gladys Creek.

Based on the data review, site inspection, interviews, and technical assessment, it appears the remedy has been implemented as planned and is functioning as intended by the decision document in the short-term. To ensure continued protectiveness, ten issues are identified in the second five-year review for this site, as described in the following paragraphs. The issues are also summarized in **Table 6**. These issues do not currently affect the protectiveness of the remedy, although they need to be addressed to ensure continued protectiveness.

For convenience, the ten issues have been divided into three categories (maintenance issues, monitoring issues, and remedy completion issues). These issues are:

Maintenance Issues

1. **Main Street access gate repair**. The gate to the northern portion of the ORC Site, located at the intersection of Main Street and Baskett Street, is no longer functional and access to the north side of the site is currently not restricted. Restricted access is suggested to minimize trespassing on potentially contaminated soil in this portion of the site and to help protect the integrity of site monitoring wells.

2. **Well maintenance.** ODEQ completed an inventory of all site monitoring wells in 2006 (presented in the Fourth Quarter 2006 LNAPL Monitoring Event Report and 2006 Well Survey Report [ODEQ, 2006a]). The inventory documents the condition of each well and identifies maintenance needs.

3. **Landfill cover maintenance**. The hazardous waste landfill cover is in need of repair to address animal burrow holes and erosion observed during the five-year review site inspection. Animal burrow holes were also observed in the cover of the non-hazardous waste landfill.

4. **Creek bank erosion maintenance.** The cut bank on the east side of Gladys Creek continues to erode due to natural flow in the creek. ODEQ has indicated that if erosion continues the perimeter fence will be affected and the cut bank could eventually erode into the neutralized acid material.

Monitoring Issues

5. **The MCL has changed since the ROD for arsenic, beryllium and copper.** The ROD specified that ground water and surface water RAOs were set at levels which would allow use of the water as a primary drinking water source, and MCLs were cited. In the time since the ROD was signed, the MCL for arsenic was lowered from 50 µg/L to 10 µg/L, and the MCLs for beryllium and copper were raised to 4 µg/L and 1300 µg/L respectively.

6. **The SAP for collection of surface water and ground water samples needs to be updated**. ODEQ is currently performing containment well monitoring for the remedial action, targeted MNA monitoring to assess the efficacy of MNA as a remedy, and LNAPL and water level measurements. This work is being conducted under the November 2004 SAP and January 2007 QAPP prepared by ODEQ, and results of the sampling efforts are reported to EPA. Sample collection procedures for the MNA wells and containment wells previously included the use of bailers to purge and collect samples. High turbidity during sample collection in past sampling events may have impacted the results of total metals analysis, and low flow methods were employed in the last sampling event. This change should be incorporated into the site plans.

7. **Extent of LNAPL observed in SBB-2.** During the November 2006 sampling event performed by ODEQ, monitoring well SBB-2 was found to demonstrate 3.37 feet of LNAPL. This well is located offsite approximately 250 feet east of residential properties. LNAPL had not previously been observed in this well.

8. **Arsenic exceedances in Gladys Creek samples.** In three of six surface water samples collected from the Gladys Creek in the May 2006 sampling event, the arsenic concentrations exceeded the RAOs established by the ROD. In addition, one of six sediment samples collected exceeded the arsenic RAO. Gladys Creek is an environmental receptor of contaminated ground water from the site and based on analytical results and visible impacts from the site into the creek, it appears that contaminated ground water discharging into the creek may be impacting the surface water and sediment of the creek.

Remedy Completion Issues

9. **The nature and extent of contaminated soil beneath the former refinery in the northern portion of the site has not yet been confirmed.** Limited soil sampling was performed on the northern portion of the site following completion of EPA's time-critical removal action to address demolition of the various refinery buildings. This sampling effort is described in the September 2005 CERCLA Removal Assessment Report.

10. **A comprehensive site-wide remedial approach to ground water contamination has not yet been developed**. In the October 2003 ESD, the ground water remedy was deferred until completion of the surface or source remedy. Long-term ground water and surface water monitoring has continued during this period as required by the 1996 ESD.

10.0 Recommendations and Follow-up Actions

As described in the previous section, ten issues were identified during the second five-year review for this site. To address these issues, the following recommendations and follow-up actions have been defined. These recommendations and follow-up actions are also provided in **Table 6**.

Maintenance Issues

1. **The gate on the north side of the ORC site, at the intersection of Baskett Street and Main Street, should be repaired**. Repairs to the gate on the northwest portion of the site will help prevent access by trespassers and help protect the integrity of the monitoring wells located in this area.

2. **Implement the recommendations of the ODEQ well survey.** Recommendations included fixing or replacing items such as well caps, concrete pads on certain wells. The survey also recommends four wells for removal due to roots blocking the well or obvious structural problems. The inventory and maintenance recommendations prepared by ODEQ are included as Table 5 to this five-year review report.

3. **Repair damage to the non-hazardous and hazardous waste landfill covers caused by animal burrowing and erosion.** Review of the hazardous and non-hazardous landfill specifications indicate that animal burrowing and erosion could potentially impact the top geotextile filter fabric placed 2 feet below the landfill top cover.

4. **Continue visual inspections of the Gladys Creek cut bank during each sampling event, and consider options to address the erosion.** If continued erosion of the cut bank is observed, then bank stabilization may be needed for this portion of the creek to protect the integrity of the neutralized acid material.

Monitoring Issues

5. **Incorporate the revised MCLs for arsenic, beryllium and copper into the evaluation of ground water contamination at the site.** The revised MCLs should be incorporated into any presentation or evaluation of ground water data collected at the site, and considered in the development of a comprehensive site-wide approach to ground water contamination.

6. **Update the site plans to incorporate current ground water monitoring procedures.** The SAP should be revised to describe the use of the low flow purge method for collection of samples from the MNA and containment wells.

7. **Further investigate the extent of LNAPL in the vicinity of SBB-2.** Installation of new monitoring wells may be needed to aid in delineation of the extent of LNAPL in this area.

8. **Evaluate arsenic concentration trends in Gladys Creek samples and update the monitoring program sample locations and/or frequency if needed to support decisions for further action.** The last sampling event was performed in February 2007, and sample results are pending. If exceedances continue, the impact on the surface water and sediment of the creek must be evaluated and addressed.

Remedy Completion Issues

9. **Finalize the determination of the nature and extent of soil contamination on the northern portion of the site and design appropriate remedial action.** Evaluate the nature and extent of soil contamination based on existing data collected during the removal action, and any data needs that may be identified, and develop an appropriate course of action for remediation, if needed.

10. **Develop a comprehensive site-wide approach to ground water contamination.** ODEQ and EPA are currently coordinating efforts to develop a revised feasibility study regarding the ground water remedy.

11.0 Protectiveness Statement

The remedy implemented to-date at the ORC site is considered to be protective of human health and the environment in the short-term.

Activities at the site to-date include the source control remedy completed in the southern ("abandoned") portion of the site, the time-critical removal action completed in the northwest portion of the site (the former refinery area, or CPC property), and ongoing site-wide long-term ground water and surface water monitoring. The source control remedy (completed in July 1997) is considered protective of human health and the environment in the short term because the waste has been removed or contained. Continued O&M of the constructed source control remedy will ensure that this portion of the remedy remains protective. The time-critical removal action (initiated by EPA in September 2003 and completed in February 2006) on the northwest portion of the site (the former refinery area, or CPC property) provided for demolition and removal of the remaining above-ground facilities associated with the former refinery. Long-term site-wide ground water and surface water monitoring will continue until a comprehensive approach to site-wide ground water contamination is developed. Institutional controls are in place to restrict use of the site. The EPA and ODEQ are currently coordinating efforts to investigate

the former refinery area soil and further investigate and develop a comprehensive approach to site-wide ground water and Gladys Creek.

Because the actions implemented at the site currently prevent exposure to remaining site contamination, the remedy is considered protective of human health and the environment in the short-term, and will continue to be protective if the recommendations and follow-up actions described in this five-year review are addressed. Investigation of soil in the former refinery area and evaluation of site-wide ground water and surface water contamination must be completed and an appropriate approach to address remaining contamination must be developed to provide a comprehensive remedy and continued protectiveness in the long-term.

12.0 Next Review

Five-year reviews are required by statute for the ORC site. The next five-year review, the third for the site, should be completed during or before August 2012.

Table 1
Chronology of Site Events
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

Date	Event
1920	Anderson-Prichard Oil Corporation (APCO) was formed, and production of petroleum products began at the ORC site.
1974	EPA issued a NPDES permit to allow for discharge of wastewater from the facility.
1976	RCRA was enacted and the Oklahoma Controlled Industrial Waste Act (OCIDWA) brought hazardous wastes under the regulatory authority of the Oklahoma State Dept. of Health.
1977	Facility owner began application process for a OCIDWA waste disposal site operating permit with OSDH.
1978	The facility was purchased by the Oklahoma Refining Company (ORC). Maximum of 15,000 barrels of crude processed per day reached in 1983.
May 1981	The RCRA Part A application was submitted to address the characterization of contamination in Gladys Creek and onsite soil, sediments and ground water.
August 1981	A soil investigation report for the ORC site was prepared by Nova Engineering to gather background data for feature site evaluation.
April 1982	The USEPA prepared a Potential Hazardous Waste Site Inspection Report to document the locations of onsite contamination and to gather background data for feature site evaluation.
1983	The Oklahoma Water Resources Board (OWRB) issued a letter requiring ORC to correct various wastewater discharge violations.
1984	OSDH issued an order to ORC for corrective action of RCRA violations such as inadequate closure plans, failure to sample soil in the land treatment area and failure to adequately sample groundwater in the land treatment area.
1984	ORC conducted an investigation of contamination problems, and removed approximately 5,000 barrels of LNAPL from the ground water.
September 1984	ORC owners declared bankruptcy and ceased operations.
April 1985	OWRB, Water Quality Division, Inspection Report
August 1986	Stanley Engineering, Environmental Investigation
May 1986	Ecology and Environment, Inc. Memorandum, Sampling Inspection of ORC Refining Company.
1986	Bankruptcy Court allowed ORC to abandon the southern portion of the property which included the majority of surface wastes and ground water discharges into Gladys Creek.
1986	EPA investigated the ORC site for possible inclusion on EPA's National Priorities List (NPL). Investigation confirmed hydrocarbons and elevated levels of heavy metals in soil and ground water.

Table 1
Chronology of Site Events
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

Date	Event
1987	Cyril Petrochemical Corporation (CPC) purchased the northern portion of the ORC property with the intent of reactivating part of the refinery.
1987	Jacobs Engineering conducted a search for PRPs on behalf of the EPA for the southern portion of the property. CPC was identified as a PRP. CPC denied responsibility for the southern portion of the Superfund site. CPC declined to conduct or finance the RI/FS
June 1987	EPA completed the RCRA Facility Assessment Preliminary Review Report.
June 1988	EPA added the ORC site to the NPL.
1988	OSDH was awarded funding through a cooperative agreement with the EPA to perform a RI/FS at the southern portion of the site.
March 1989	EPA notified CPC that EPA (with assistance from OSDH) would proceed with RI/FS using CERCLA funds.
1989	OSDH began the RI and FS
August 1990	An action memorandum prepared pursuant to Section 104 of CERCLA authorized an EPA removal action at the site. The scope of the removal action consisted of fencing the site, characterization of contents and removal of drums, plugging wells in the acid pit area and placing netting over several impoundments to protect wildlife on the southern portion of the site and on CPC's property.
1991	Cayman Resources purchased CPC with the intention of reopening the refinery in the spring of 1992 to refine crude oil.
January 1991	A unilateral administrative order was issued to CPC, ordering the company to perform the fencing on the northern portion of the property and drum characterization.
August 1991	The removal action on CPC's property and the abandoned property was completed.
September 1991	OSDH completed the RI
December 1991	OSDH completed the FS
January 1992	OSDH entered into a Consent Agreement and Final Order (CAFO) with CPC in which CPC agreed to address ground water contamination, storm water drainage and above ground and below ground storage tanks.
June 1992	EPA signed the Record Of Decision (ROD) and OSDH began planning the RD.
July 1993	ODEQ assumed environmental responsibilities of the OSDH. ODEQ accepted the ORC project with no interruption in the Superfund process.
1993	CPC refurbished, and began renewed refining operations
1994	CPC ceased refining operations on the northern portion of the site.

Table 1
Chronology of Site Events
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

Date	Event
March 1996	EPA signed an Explanation of Significant Difference (ESD) to the ROD for the site that described the following changes: (1) onsite disposal of asphaltic materials instead of recycling (no viable option for recycling had been identified); (2) postponement of the ground water remedy until after completion of the source remedy (the need for a ground water remedy to be evaluated at that time); and (3) temporary treatment of surface water during implementation of the source remedy with discharge of treated water to Gladys Creek, instead of treatment and injection into the Rush Springs Aquifer associated with the ground water remedy (the postponement of the ground water remedy precluded the need for installation of a more permanent treatment unit).
July 1997	Philip Services Corporation (PSC) began the Remedial Action construction
October 1997	ODEQ referred the CPC portion of the facility to the EPA. The Consent Agreement and Final Order CAFO was not implemented.
January 2002	PSC completed the Remedial action construction on the southern property of the ORC site.
April 2002	EPA completes first five-year review of the ORC site.
August 2003	EPA initiated an emergency removal action to address drums, lab chemicals, and access controls.
September 2003	EPA initiated a time-critical removal on the northern portion of the site to address demolition of various process towers, vessels, buildings, cooling towers, above ground piping, sumps, above ground storage tanks, and asbestos containing materials from pipes and vessels. This effort included a direct push investigation to document the presence of LNAPL and collection of surface and subsurface soil samples from direct push borings and trenches across the northern portion of the site.
October 2003	A second Explanation of Significant Differences (ESD) was signed that: (1) further postponed the ground water remedy until a comprehensive approach to ground water contamination could be developed, (2) updated remediation requirements to current promulgated standards, and (3) established a higher cleanup level for beryllium in soil.
Present	The EPA is currently coordinating efforts with ODEQ to address the remaining contamination on the northern property under CERCLA.

Table 2

Remedial Action Objectives for Sediments, Surface and Subsurface Soils, Ground Water, and Surface Water

Oklahoma Refining Company Superfund Site

Cyril ,Caddo County, Oklahoma

Chemical of Concern	Sediments and Surface Soils		Subsurface Soils		Ground Water and Surface Water	
	RAOs (mg/kg)	Basis	RAOs (mg/kg)	Basis	RAOs (mg/L)	Basis
Arsenic	25 or 305	HBR or Groundwater Protection	305	Groundwater Protection	0.05*	MCL
Barium	13,500	HBR	NA	NA	1.00	MCL
Beryllium	0.50	Detection Limit	NA	NA	0.001*	MCL
Cadmium	135	HBR	NA	NA	0.005	MCL
Chromium	1350 or 770	HBR or Groundwater Protection	770	Groundwater Protection	0.10	MCL
Copper	351,000	HBR	NA	NA	1.00*	MCL
Lead	600 or 865	HBR or Groundwater Protection	865	Groundwater Protection	0.015	Action Level,1990
Mercury	81	HBR	NA	NA	NA	NA
Nickel	5400	HBR	NA	NA	0.10	MCL
Zinc	54,000	HBR	NA	NA	5	MCL
Acenaphthene	16,000 or 4,424	HBR or Groundwater Protection	NA	NA	NA	NA
Anthracene	81,000 or 55,752	HBR or Groundwater Protection	NA	NA	NA	NA
Benzene	22 or 0.20	HBR or Groundwater Protection	0.20	Groundwater Protection	0.005	MCL
Benzo(a)anthracene	4.1	HBR	NA	NA	NA	NA
Benzo(a)pyrene	0.33	Detection Limit	NA	NA	NA	NA
Benzo(b)fluoranthene	0.69	HBR	NA	NA	NA	NA
Benzo(g,h,i)perylene	1,080	HBR	NA	NA	NA	NA
Benzo(k)fluoranthene	13	HBR	NA	NA	NA	NA
Chrysene	46	HBR	NA	NA	NA	NA
Dibenzo(a,b)anthracene	0.33	Detection Limit	NA	NA	NA	NA
1,2–Dichloroethane	NA	NA	NA	NA	0.005	MCL
2,4 Dimethylphenol	5,400 or 66	HBR or Groundwater Protection	66	Groundwater Protection	0.73	HBR
Ethylbenzene	27,000 or 191	HBR or Groundwater Protection	NA	NA	0.70	MCL
Fluoranthene	10,800	HBR	NA	NA	NA	NA
Fluorene	10,800 or 8,888	HBR or Groundwater Protection	NA	NA	NA	NA
Indeno(1,2,3,cd)pyrene	3.2	HBR	NA	NA	NA	NA
2-Methylnaphthalene	1,080 or 510	HBR or Groundwater Protection	510	Groundwater Protection	0.15	HBR
2-Methylphenol	13,500 or 12	HBR or Groundwater Protection	12	Groundwater Protection	1.8	HBR
4-Methylphenol	13,500 or 14	HBR or Groundwater Protection	14	Groundwater Protection	1.8	HBR
Naphthalene	79	HBR or Groundwater Protection	79	Groundwater Protection	0.15	HBR
Phenanthrene	1,080	HBR	NA	NA	NA	NA
Phenol	162,000 or 125	HBR or Groundwater Protection	125	Groundwater Protection	22.00	HBR
Pyrene	8,100	HBR	NA	NA	NA	NA
Toluene	54,000 or 104	HBR or Groundwater Protection	NA	NA	1.00	MCL
Xylenes	540,000 or 2,828	HBR or Groundwater Protection	NA	NA	10.00	MCL

Notes:

* MCLs have changed

mg/L: milligrams per liter

HBR Health-Based Risk Values

NA Not applicable

RAOs: Remedial Action Objectives

Action Level - June 21, 1990 Memorandum from Henry L. Longest, Office of Emergency and Remedial Response of EPA

Note: Information presented on this table was obtained from the 1992 Oklahoma Refining Company Record of Decision.

Table 3

Well Survey

Oklahoma Refining Company Superfund Site

Cyril ,Caddo County,Oklahoma

Well Name	Location	Date of Inspection	Well Diameter (ft)	Security	Well Cap	Protective Cover	Flush Mount	Concrete Pad	Bumper Posts	Access	Photo Taken	Notes	Latitude	Longitude	Suggested Action
DGR-03	Offsite	10/31/2006	6	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.901058	-98.194891	
DLR-01	Onsite	10/31/2006	4	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.893905	-98.193008	
DLR-02	Onsite	10/31/2006	4	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.893189	-98.193094	
DLR-03	Onsite	10/31/2006	4	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.893241	-98.193810	
DLR-04	Onsite	10/31/2006	4	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.893296	-98.194666	
DLR-05	Onsite	10/31/2006	4	Secured	Present	Compromised		Intact	Intact	Vehicle	Yes	cap does not close	34.892871	-98.194629	Fix or Replace
DLR-06	Onsite	10/31/2006	4	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.892750	-98.193449	
DLR-07	Onsite	10/31/2006	4	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.893236	-98.195564	
DLR-10	Onsite	10/31/2006	4	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.892806	-98.197040	
DLR-11	Onsite	10/31/2006	4	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.894651	-98.196331	
DOW-03	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes	roots	34.891918	-98.195348	Fix
DOW-07	Offsite	10/31/2006	2	Secured	Present	Compromised		Intact	Intact	Vehicle	Yes	lid rusted off	34.901075	-98.194870	Fix or Replace
DOW-08	Offsite	10/31/2006	2	Secured	Present	Compromised		Intact	Intact	Vehicle	Yes	lid rusted off	34.900929	-98.194959	Fix or Replace
IBB-2	Offsite	11/9/2006	4	Secured	Present	Intact		Cracked	Missing	Foot	Yes	cap hard to open	34.902086	-98.198190	Fix
IBB-3	Onsite	11/14/2006	4	Secured	Present	Rusted		Not Present	Bent	Vehicle	Yes		34.896737	-98.189768	Paint
IBB-4	Onsite	11/9/2006	4	Secured	Present	Rusted		Intact	Intact	Vehicle	Yes	very rusty	34.891442	-98.192272	Paint
IBB-5	Onsite	11/9/2006	4	Secured	Present	Intact		Intact	Intact	Vehicle	Yes	casing bent on top	34.892165	-98.197373	Fix
RMW-1D	Onsite	11/14/2006	2	Secured	Present	Rusted		Intact	Intact	Vehicle	Yes	lid hard to close	34.894855	-98.197903	Paint
RMW-1S	Onsite	10/31/2006	2	Secured	Present	Rusted		Intact	Intact	Vehicle	Yes	cap hard to close	34.894869	-98.197878	Paint
RMW-2D	Onsite	11/9/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes	lid hard to close	34.891794	-98.194583	Paint
RMW-2S	Onsite	10/4/2006	2	Secured	Present	Rusted		Intact	Intact	Vehicle	Yes	rusted	34.891770	-98.194566	Paint
RMW-3D	Onsite	11/9/2006	2	Secured	Present	Rusted		Cracked	Intact	Vehicle	Yes	lid hard too open and close	34.891337	-98.193447	Fix
RMW-3S	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.891342	-98.193416	
RMW-4D	Onsite	11/14/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes	lid hard to close	34.897866	-98.191029	Fix
RMW-4S	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes	lid hard to close	34.897881	-98.191059	Fix
RMW-6	Onsite	10/4/2006	2	Secured	Present	Compromised		Intact	Intact	Vehicle	Yes	outside cap hinges broken	34.893488	-98.198395	Fix or Replace
RMW-9	Onsite	10/5/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.894941	-98.193364	
RMW-10	Onsite	10/5/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.894838	-98.191921	
SBB-1	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.895779	-98.198318	
SBB-2	Offsite	11/9/2006	2	Secured	Present	Intact		Cracked	Intact	Vehicle	Yes		34.901017	-98.197680	
SBB-3	Offsite	11/9/2006	2	Secured	Present	Intact		Intact	Missing	Foot	Yes		34.902082	-98.198245	
SBB-4	Offsite	10/31/2006	2	Secured	Present	Intact		Intact	Missing	Vehicle	Yes		34.901606	-98.196121	
SBB-5	Offsite	10/31/2006	2	Secured	Present	Intact		Intact	Missing	Vehicle	Yes		34.901018	-98.194549	
SBB-6	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.892148	-98.198314	
SBB-6	Onsite	10/3/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.892149	-98.198314	
SBB-7	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes	roots in well	34.892021	-98.196518	Fix
SBB-8	Onsite	11/9/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.892978	-98.191130	
SBB-9	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.891315	-98.193062	
SBB-10	Onsite	11/9/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.894807	-98.190347	
SBB-11	Onsite	11/14/2006	2	Secured	Present	Rusted		Not Present	Intact	Vehicle	Yes	rim broken	34.896709	-98.189757	Fix and Paint
SBB-12	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Missing	Vehicle	Yes	roots block well	34.898804	-98.191808	Remove
SBB-13	Onsite	10/5/2006	2	Secured	Present	Intact		Intact	Intact	Foot	Yes	dirt erroded under pad	34.892674	-98.195376	Fix or Replace
SBB-14	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.895014	-98.194255	
SBB-15	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.897294	-98.194160	
SBB-16	Onsite	10/3/2006	2	Secured	Present	Rusted		Intact	Missing	Vehicle	Yes	sediment in bottom of well	34.897871	-98.198884	Replace
SBB-17	Onsite	10/3/2006	2	Secured	Present	Compromised		Intact	Bent	Vehicle	Yes	outside cap broken	34.898388	-98.194914	Fix or Replace
SBB-18	Offsite	11/9/2006	2	Secured	Present		Intact			Vehicle	Yes		34.900139	-98.199673	
SBB-19	Offsite	9/26/2006	2	Secured	Present		Intact			Foot	Yes		34.892462	-98.198839	
SBB-20	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes	need to replace inside cap	34.891298	-98.192615	Fix

Note: Information presented on this table was obtained from the Fourth Quarter 2006 LNAPL Monitoring Event Report and 2006 Well Survey Report prepared by the ODEQ.

Table 3

Well Survey

Oklahoma Refining Company Superfund Site

Cyril ,Caddo County,Oklahoma

Well Name	Location	Date of Inspection	Well Diameter (ft)	Security	Well Cap	Protective Cover	Flush Mount	Concrete Pad	Bumper Posts	Access	Photo Taken	Notes	Latitude	Longitude	Suggested Action
SBB-20	Onsite	10/4/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.891301	-98.192616	Fix
SBB-21	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.894832	-98.190324	
SBB-21	Onsite	10/5/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.894835	-98.190319	
SBB-22	Offsite	9/25/2006	2	Secured	Present	Rusted		Intact		Vehicle	Yes		34.893983	-98.190054	Paint
SBB-23	Onsite	10/31/2006	2	Secured	Present	Rusted		Cracked	Intact	Vehicle	Yes		34.894822	-98.195309	Paint
SBB-24	Onsite	10/31/2006	2	Secured	Present	Intact		Cracked	Intact	Vehicle	Yes		34.898182	-98.197181	
SBB-25	Offsite	10/31/2006	2	Secured	Present	Intact		Cracked	Missing	Vehicle	Yes		34.900679	-98.193300	
SBB-25	Onsite	10/3/2006	2	Secured	Present	Intact		Cracked	Missing	Vehicle	Yes		34.900677	-98.193299	
SBB-27	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Missing	Vehicle	Yes	needs lable	34.891787	-98.195202	Label
SBB-28	Offsite	9/26/2006	2	Secured	Present	Intact		Intact	Missing	Vehicle	Yes		34.901396	-98.193548	
SBB-28	Offsite	9/26/2006	2	Secured	Present	Intact		Intact	Missing	Vehicle	Yes		34.901396	-98.193548	
SBB-29	Offsite	11/9/2006	2	Secured	Present		Intact			Vehicle	Yes	hard to open, PVC pipe pulls out of ground	34.900092	-98.199670	Remove
SBB-30	Offsite	10/3/2006	2	Secured	Present	Intact	Intact	Intact		Vehicle	Yes		34.901591	-98.200629	
SBB-31	Offsite	9/26/2006	2	Secured	Present	Intact	Intact	Intact		Vehicle	Yes		34.891432	-98.198326	
SBB-32	Offsite	11/14/2006	2	Secured	Present	Intact		Cracked	Intact	Vehicle	Yes	pad cracked and shifted	34.891282	-98.196023	Remove
SBB-33	Offsite	9/25/2006	2	Secured	Present	Compromised		Intact	Missing	Vehicle	Yes	can not lock outside cap	34.890405	-98.192538	Fix or Replace
SBB-34	Offsite	9/25/2006	2	Secured	Present	Rusted		Intact	Missing	Vehicle	Yes		34.890622	-98.191441	Paint
SBB-35	Onsite	11/9/2006	2	Secured	Present	Rusted		Not Present	Intact	Vehicle	Yes	water in area between outside casing & PVC	34.894776	-98.190345	Remove
SBB-36	Onsite	11/9/2006	2	Secured	Present	Intact		Intact	Intact	Vehicle	Yes		34.891429	-98.192313	
SBB-37	Onsite	10/31/2006	2	Secured	Present	Intact		Intact	Bent	Vehicle	Yes		34.898217	-98.197189	
SBB-38	Onsite	11/14/2006	2	Secured	Missing	Intact		Not Present	Intact	Vehicle	Yes	cap missing	34.894801	-98.194896	Fix

Note: Information presneted on this table was obtained from the Fourth Quarter 2006 LNAPL Monitoring Event Report and 2006 Well Survey Report prepared by the ODEQ.

Table 4
Actions Taken Since First Five-Year Review
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

Issue from First Five-Year Review	First Five-Year Review Recommendations/ Follow-up Actions	Party Responsible	Action Taken	Date of Action
The remedial action construction completion report has not been submitted.	Submit the RA construction completion report and review the RA Construction Completion report in the Second Five Year Review Report	ODEQ	The Remedial Action Construction Completion Report for the abandoned part of the Site (south side) has been completed by ODEQ.	March 2003
An operation and maintenance plan for the wastes remaining in place and a monitoring plan for long-term ground water and surface water monitoring has not been prepared and implemented.	Prepare and implement the monitoring plan for long term ground water and surface water monitoring which should also include: - Sampling of discharge from observed seeps and the surface water of Gladys Creek. - Procedures to address maintenance of both on and offsite monitoring wells, and at a minimum, annual review of the monitoring results. - Define monitoring criteria that will indicate the need for additional monitoring and/or further action, if necessary.	ODEQ	The ODEQ is currently implementing a ground water and surface water monitoring program to evaluate the condition of ground water at the site. This work is being conducted under plans prepared by ODEQ. These are a Sampling and Analysis Plan dated Nov. 12 2004, a Health and Safety Plan dated May, 9, 2006, and a Quality Assurance Project Plan dated Jan. 10, 2007. ODEQ also prepared an Operations and Maintenance Plan for the south side of the site dated March 2007.	November 2004 through current (??)
Protective monitoring well casing for wells located offsite north of Highway 277 appear damaged by corrosion.	Repair damaged well casings to restrict trespasser access to these wells and/or alternatives for restricting trespasser access should be pursued (such as fencing around individual wells).	ODEQ	The ODEQ conducted a well survey of all monitoring wells associated with the site. The survey took place during the Sept. 2006 containment well sampling event, Oct. 2006 MNA sampling event, Oct. 2006 LNAPL sampling event, and on November 9th and 14th, 2006. The inventory includes recommendations to fix wells that need repair, be abandoned, or replaced. The ODEQ expects to implement these recommendations during 2007.	Site-wide well inventory, including recommendations for repairs, completed in November 2006. Repairs are scheduled for Fall 2007.

Table 5
Containment Monitoring Well Analytical Results, 1990 to 2006
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

WELL ID	DATE	benzene (ug/l)	1,2-dichloroethane (ug/l)	ethyl benzene (ug/l)	2,4-dimethylphenol (ug/l)	2-methylnaphthalene (ug/l)	2-methylphenol (ug/l)	4-methylphenol (ug/l)	naphthalene (ug/l)	phenol (ug/l)	toluene (ug/l)	xylenes (ug/l)	arsenic (mg/l)	barium (mg/l)	beryllium (mg/l)	cadmium (mg/l)	chromium (mg/l	copper (mg/l)	lead (mg/l)	nickel (mg/l)	zinc (mg/l)
		RAO'S (mg/L)																			
		5	5	700	730	1800	1800	150	150	22000	1000	10000	50	1000	5	1	100	1000	15	100	5000
SBB19	12/04/90	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	**318**	10.0U	5.0U	**33**	**42**	4.5U	**20**	**75**
SBB19	06/20/97	<5.0	<5.0	<5.0	<10	<10	<10	<10	<10	<10	<5.0	<5.0	2U	**22**	10.0U	1.0U	**3**	**19**	**5**	**3**	**9**
SBB19	06/19/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	**79**	10.0U	5.0U	10.0U	10.0U	5.0U	2.50U	**30**
SBB19	09/24/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**97**	5.0U	5.0U	**9**	**14**	10.0U	**13**	**19**
SBB19	12/19/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**69**	5.0U	5.0U	5.0U	**7**	10.0U	10.0U	**19**
SBB19	03/27/03	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**31**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB19	06/18/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**18**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB19	09/17/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**116**	5.0U	5.0U	**9**	**15**	10.0U	**15**	**23**
SBB19	12/17/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**167**	5.0U	5.0U	**16**	**24**	**13**	**29**	**41**
SBB19	06/13/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	50.0U	**357**	5.0U	5.0U	**39**	**42**	50.0U	**84**	**88**
SBB19	05/11/05	2.0U	2.0U	2.0U	5.1U	2.0U	5.1U	5.1U	2.0U	5.1U	2.0U	2.0U	**2.6**	**16.7**	5.0U	5.0U	10U	20.0U	**4.1**	20.0U	20.0U
SBB19	11/09/05	2.0U	2.0U	2.0U	5.1U	2.0U	5.1U	5.1U	2.0U	5.1U	2.0U	2.0U	10.0U	200U	5.0U	5.0U	**4.0LJ**	**8.5LJ**	10.0U	**12.5LJ**	60.0U
SBB19	03/07/06	2.0U	2.0U	2.0U	5.1U	5.1U	5.1U	2.0U	2.0U	5.1U	2.0U	2.0U	100U	**24.8**	5.0U	5.0U	10.0U	20.0U	30.0U	**33.1**	**28.6**
SBB19	09/26/06	2.0U	2.0U	2.0U	5.6U	2.0U	2.2U	5.6U	5.6U	2.2U	5.6U	2.0U	17.0U	**129**	5.0U	5.0U	10.0U	20.0U	**6.4**	20.0U	20.0U
SBB22	12/03/90	**1**	<5	<5	<10	<10	<10	<10	<10	<10	<5	**1**	60.0U	**24**	10.0U	<0.0005	**27**	**35**	45.0U	25.0U	**69**
SBB22	08/27/98	**1.4(J)**	<5	**1.0J**	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	**1.1J**	**8.2J**	**97**	**381**	10.0U	5.0U	**54**	**65**	50.0U	**49**	**106**
SBB22	11/16/99	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	<1	**237**	<0.05	25.0U	50.0U	50.0U	<0.250	<0.125	**92**
SBB22	10/18/00	<5	<5	**1J**	<10	<10	<10	<10	<10	<10	**2J**	**12**	**57**	**46**	5.0U	5.0U	5.0U	**7**	10.0U	10.0U	**12**
SBB22	02/08/02	<25	<25	<25	<10	<10	<10	<10	<10	<10	**9J**	**8J**	**48**	**95**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	**28**
SBB22	06/21/02	<5	<5	<5	<10	**4J**	<10	<10	<10	<10	<5	**8**	**57**	**23**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	**5**
SBB22	09/25/02	<25	<25	<25	<10	**4J**	<10	<10	**3J**	<10	<25	**9J**	**62**	**26**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	**25**
SBB22	12/18/02	**1J**	<5	<5	<10	**4J**	<10	<10	**4J**	<10	<5	**9**	**58**	**22**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB22	03/26/03	<10	<5	<5	<10	<10	<10	<10	<10	<10	<5	**9**	**54**	**20**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB22	06/20/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**11**	**66**	**22**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB22	09/15/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**13**	**73**	**39**	5.0U	5.0U	5.0U	**7**	10.0U	10.0U	**8**
SBB22	12/18/03	<10	<10	<10	**8J**	**6J**	<10	<10	**5J**	<10	<10	**11**	**79**	**56**	5.0U	5.0U	**9**	**13**	**14**	**13**	**22**
SBB22	06/28/04	<20	<20	<20	<10	<10	<10	<10	<10	<10	<20	**12J**	**79**	<0.200	5.0U	5.0U	10.0U	25.0U	50.0U	40.0U	60.0U
SBB22	05/09/05	2.2	2.0U	2.0U	5.3U	**3.9**	5.3U	5.3U	**4.7**	5.3U	**2**	**2.6**	**44.8**	**25**	5.0U	5.0U	10U	20.0U	**6.2**	20.0U	20.0U
SBB22	11/08/05	2.0U	2.0U	2.0U	5.0U	**2**	5.0U	5.0U	5.4	5.0U	2.0U	2.0U	**37.9**	200U	5.0U	5.0U	**0.76LJ**	**5.4LJ**	**133**	**20.8LJ**	60.0U
SBB22	03/06/06	**2.1**	2.0U	2.0U	5.2U	5.2U	5.2U	**5.9**	**5.2**	5.2U	**2.4**	**2.9**	200U	**28.9**	10.0U	10.0U	20.0U	40.0U	60.0U	40.0U	40.0U
SBB22	09/25/06	2.0U	2.0U	2.0U	5.2U	2.0U	**6.2**	5.2U	5.2U	**6.4**	**5.3**	**2.1**	**73**	**22.7**	5.0U	5.0U	10.0U	20.0U	**5.3**	20.0U	20.0U
SBB28	03/27/91	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	**590**	10.0U	5.0U	0.04	**80**	**60**	**40**	**90**
SBB28	02/07/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**130**	5.0U	5.0U	0.01	**20**	10.0U	**10**	**30**
SBB28	06/19/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	**410**	10.0U	5.0U	0.04	**50**	50.0U	**30**	**80**

Table 5
Containment Monitoring Well Analytical Results, 1990 to 2006
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

WELL ID	DATE	benzene (ug/l)	1,2-dichloroethane (ug/l)	ethyl benzene (ug/l)	2,4-dimethylphenol (ug/l)	2-methylnaphthalene (ug/l)	2-methylphenol (ug/l)	4-methylphenol (ug/l)	naphthalene (ug/l)	phenol (ug/l)	toluene (ug/l)	xylenes (ug/l)	arsenic (mg/l)	barium (mg/l)	beryllium (mg/l)	cadmium (mg/l)	chromium (mg/l	copper (mg/l)	lead (mg/l)	nickel (mg/l)	zinc (mg/l)
		RAO'S (mg/L)																			
		5	5	700	730	1800	1800	150	150	22000	1000	10000	50	1000	5	1	100	1000	15	100	5000
SBB28	09/25/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**120**	5.0U	5.0U	0.01	**20**	10.0U	**10**	5.0U
SBB28	12/18/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**329**	5.0U	5.0U	0.029	**50**	**16**	**27**	**58**
SBB28	03/26/03	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	**13**	**364**	5.0U	5.0U	0.031	**59**	**20**	**29**	**53**
SBB28	06/20/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**13**	**377**	5.0U	5.0U	0.037	**52**	**27**	**26**	**80**
SBB28	*9/15/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**11**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB28	12/18/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**16**	**391**	5.0U	0.032	0.06	**22**	**30**	**65**	10.0U
SBB28	06/30/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	50.0U	**269**	5.0U	5.0U	0.07	**95**	50.0U	**47**	**135**
SBB28	05/09/05	2.0U	2.0U	2.0U	5.1U	2.0U	5.1U	5.1U	2.0U	5.1U	2.0U	2.0U	**3.6**	**16.3**	5.0U	5.0U	10U	20.0U	**7.9**	20.0U	20.0U
SBB28	11/09/05	2.0U	2.0U	2.0U	5.1U	2.0U	5.1U	5.1U	2.0U	5.1U	2.0U	2.0U	**4.3LJ**	**213J^**	5.0U	5.0U	**14.6**	**32.3**	**10.4Jv**	**15.2LJ**	60.0U
SBB28	03/07/06	2.0U	2.0U	2.0U	5.1U	5.1U	5.1U	2.0U	2.0U	5.1U	2.0U	2.0U	100U	**15.5**	5.0U	5.0U	10.0U	20.0U	30.0U	20.0U	20.0U
SBB28	09/26/06	2.0U	2.0U	2.0U	5.3U	2.0U	2.1U	5.3U	5.3U	2.1U	**8.2**	2.0U	17.0U	**21.9**	5.0U	5.0U	10.0U	20.0U	**9.4**	20.0U	20.0U
SBB31	03/27/91	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	**379**	10.0U	5.0U	**30**	**61**	45.0U	**33**	<0.070
SBB31	06/20/97	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	**3**	**38**	<0.001	<0.001	**28**	**5**	**4**	**6**	0.01
SBB31	02/07/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**81**	5.0U	5.0U	5.0U	**5**	10.0U	10.0U	**26**
SBB31	06/19/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	**134**	10.0U	5.0U	**12**	10.0U	50.0U	25.0U	**26**
SBB31	09/24/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**126**	5.0U	5.0U	**8**	**12**	10.0U	**22**	**16**
SBB31	12/19/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**63**	5.0U	5.0U	**6**	**8**	10.0U	10.0U	**14**
SBB31	03/27/03	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**57**	5.0U	5.0U	5.0U	**8**	10.0U	10.0U	5.0U
SBB31	06/18/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**64**	5.0U	5.0U	**6**	**7**	10.0U	10.0U	**17**
SBB31	09/17/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**146**	5.0U	5.0U	**13**	**20**	10.0U	**21**	**27**
SBB31	12/17/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**167**	5.0U	5.0U	**16**	**24**	**13**	**29**	**41**
SBB31	06/30/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	50.0U	**269**	5.0U	5.0U	**29**	**39**	50.0U	40.0U	**65**
SBB31	05/11/05	2.0U	2.0U	2.0U	5.1U	2.0U	5.1U	5.1U	2.0U	5.1U	2.0U	2.0U	**1.5**	**22.8**	5.0U	5.0U	10.0U	20.0U	**1.1**	20.0U	**20.9**
SBB31	03/06/06	2.0U	2.0U	2.0U	5.3U	5.3U	5.3U	2.1U	2.1U	5.3U	2.0U	2.0U	100U	**31**	5.0U	5.0U	10.0U	**24.9**	30.0U	**25.1**	**26.9**
SBB31	09/26/06	2.0U	2.0U	2.0U	5.0U	2.0U	2.0U	5.0U	5.0U	2.0U	5.0U	2.0U	17.0U	**35.4**	5.0U	5.0U	10.0U	20.0U	5.0U	20.0U	20.0U
SBB33	03/27/91	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	**24**	10.0U	5.0U	10.0U	10.0U	45.0U	25.0U	**39**
SBB33	08/27/98	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	**1.4(J)**	<0.06	**12**	10.0U	5.0U	10.0U	10.0U	50.0U	25.0U	**6**
SBB33	02/07/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**62**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	**11**
SBB33	06/19/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	10.0U	10.0U	5.0U	10.0U	10.0U	50.0U	25.0U	5.0U
SBB33	09/25/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**7**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB33	12/18/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**7**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB33	03/26/03	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**7**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U

Table 5
Containment Monitoring Well Analytical Results, 1990 to 2006
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

WELL ID	DATE	benzene (ug/l)	1,2-dichloroethane (ug/l)	ethyl benzene (ug/l)	2,4-dimethylphenol (ug/l)	2-methylnaphthalene (ug/l)	2-methylphenol (ug/l)	4-methylphenol (ug/l)	naphthalene (ug/l)	phenol (ug/l)	toluene (ug/l)	xylenes (ug/l)	arsenic (mg/l)	barium (mg/l)	beryllium (mg/l)	cadmium (mg/l)	chromium (mg/l	copper (mg/l)	lead (mg/l)	nickel (mg/l)	zinc (mg/l)
		RAO'S (mg/L)																			
		5	5	700	730	1800	1800	150	150	22000	1000	10000	50	1000	5	1	100	1000	15	100	5000
SBB33	06/20/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**7**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	**6**
SBB33	09/15/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**8**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB33	12/18/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**9**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
SBB33	06/28/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	50.0U	<0.200	5.0U	5.0U	10.0U	0.025	50.0U	40.0U	60.0U
SBB33	05/11/05	2.0U	2.0U	2.0U	5.2U	2.1U	5.2U	5.2U	2.1U	5.2U	2.0U	2.0U	**1**	10U	5.0U	5.0U	10U	20.0U	**1.4**	20.0U	20.0U
SBB33	03/06/06	2.0U	2.0U	2.0U	5.1U	5.1U	5.1U	2.0U	2.0U	5.1U	2.0U	2.0U	100U	10.0U	5.0U	5.0U	10.0U	20.0U	30.0U	20.0U	20.0U
SBB33	09/25/06	2.0U	2.0U	2.0U	5.2U	2.0U	2.1U	5.2U	5.2U	2.1U	5.2U	2.0U	17.0U	10.0U	5.0U	5.0U	10.0U	20.0U	5.0U	20.0U	20.0U
SBB34	03/28/91	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	**401**	10.0U	5.0U	**37**	**110**	45.0U	**49**	**119**
SBB34	08/27/98	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<5.0	<5.0	<0.06	**51**	10.0U	5.0U	10.0U	**13**	50.0U	25.0U	**20**
SBB34	02/08/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**105**	5.0U	5.0U	**5**	**14**	10.0U	10.0U	**18**
SBB34	06/21/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	60.0U	**88**	10.0U	5.0U	**11**	**27**	50.0U	25.0U	**28**
SBB34	09/25/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**26**	5.0U	5.0U	5.0U	**8**	10.0U	10.0U	5.0U
SBB34	12/18/02	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**43**	5.0U	5.0U	5.0U	**12**	10.0U	10.0U	**12**
SBB34	03/26/03	<5	<5	<5	<10	<10	<10	<10	<10	<10	<5	<5	10.0U	**27**	5.0U	5.0U	5.0U	**9**	10.0U	10.0U	5.0U
SBB34	06/20/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**24**	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	**14**
SBB34	09/15/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10.0U	**50**	5.0U	5.0U	**6**	**14**	10.0U	10.0U	**14**
SBB34	12/18/03	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**10**	**51**	5.0U	5.0U	**6**	**15**	10.0U	10.0U	**17**
SBB34	06/28/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	50.0U	<0.200	5.0U	5.0U	10.0U	25.0U	50.0U	40.0U	**60**
SBB34	05/09/05	2.0U	2.0U	2.0U	5.2U	2.1U	5.2U	5.2U	2.1U	5.2U	2.0U	2.0U	**1.5**	**15.4**	5.0U	5.0U	10U	20.0U	**3.5**	20.0U	20.0U
SBB34	11/08/05	2.0U	2.0U	2.0U	5.1U	2.0U	5.1U	5.1U	2.0U	5.1U	2.0U	2.0U	10.0U	200U	5.0U	5.0U	**16**	**11.4LJ**	10.0U	**4.8LJ**	60.0U
SBB34	03/06/06	2.0U	2.0U	2.0U	5.1U	5.1U	5.1U	2.0U	2.0U	5.1U	2.0U	2.0U	100U	**11.9**	5.0U	5.0U	10.0U	20.0U	30.0U	20.0U	20.0U
SBB34	09/25/06	2.0U	2.0U	2.0U	5.2U	2.0U	2.1U	5.2U	5.2U	2.1U	5.2U	2.0U	17.0U	**12.9**	5.0U	5.0U	10.0U	20.0U	5.0U	20.0U	20.0U

<: Indictes Not detected

U: Not detected

mg/L: milligrams per liter

J: Indicates and estimated concentration

RAOs: Remedial Action Objectives

30	Result of Analyte in exceedence of RAO/MCL
12.9	Analyte detected in associated sample

Note: Analytical results presented in this table was provided by ODEQ from quarterly and semi-annual Containment Well reports from June 2002 through December 2006

Table 6
Recommendations and Follow-up Actions
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

Issues	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Date Due	Follow-up Action Affects Protectiveness (Y/N)
Maintenance Issues					
1. **Main Street access gate repair**. The gate to the northern portion of the ORC Site, located at the intersection of Main Street and Baskett Street, is no longer functional and access to the north side of the site is currently not restricted. Restricted access is suggested to minimize trespassing on potentially contaminated soil in this portion of the site and to help protect the integrity of site monitor wells.	**Repair the gate on the north side of the ORC site, at the intersection of Main Street and Baskett Street.** Repairs to the gate on the northwest portion of the site will help prevent access by trespassers and help protect the integrity of the monitoring wells located in this area.	ODEQ	EPA	December 2007	N[1]
2. **Well maintenance.** ODEQ completed an inventory of all site monitoring wells in 2006 (presented in the Fourth Quarter 2006 LNAPL Monitoring Event Report and 2006 Well Survey Report [ODEQ, 2006a]). The inventory documents the condition of each well and identifies maintenance needs.	**Implement the recommendations of the ODEQ well survey.** Recommendations included fixing or replacing items such as well caps, concrete pads on certain wells. The survey also recommends four wells for removal due to roots blocking the well or obvious structural problems. The inventory and maintenance recommendations prepared by ODEQ are included as Table 5 to this five-year review report.	ODEQ	EPA	December 2007	N[1]

Table 6
Recommendations and Follow-up Actions
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

Issues	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Date Due	Follow-up Action Affects Protectiveness (Y/N)
3. **Landfill cover maintenance**. The hazardous waste landfill cover is in need of repair to address animal burrow holes and erosion observed during the five-year review site inspection. Animal burrow holes were also observed in the cover of the non-hazardous waste landfill.	**Repair damage to the non-hazardous and hazardous waste landfill covers caused by animal burrowing and erosion.** Review of the hazardous and non-hazardous landfill specifications indicate that animal burrowing and erosion could potentially impact the top geotextile filter fabric placed 2 feet below the landfill top cover.	ODEQ	EPA	December 2007	N
4. **Creek bank erosion maintenance.** The cut bank on the east side of Gladys Creek continues to erode due to natural flow in the creek. ODEQ has indicated that if erosion continues the perimeter fence will be affected and the cut bank could eventually erode into the neutralized acid material.	**Continue visual inspections of the Gladys Creek cut bank during each sampling event, and consider options to address the erosion.** If continued erosion of the cut bank is observed, then bank stabilization may be needed for this portion of the creek to protect the integrity of the neutralized acid material.	ODEQ	EPA	Ongoing	N[1]
Monitoring Issues					
5. **The MCL has changed since the ROD for arsenic, beryllium, and copper.** The ROD specified that ground water and surface water RAOs were set at levels, which would allow use of the water as a primary drinking water source, and MCLs were cited. In the time since the ROD was signed, the MCL for arsenic was lowered from 50 µg/L to 10 µg/L, and the MCLs for beryllium and copper were raised to 4 µg/L and 1300 µg/L respectively.	**Incorporate the revised MCLs for arsenic, beryllium, and copper into the evaluation of ground water contamination at the site.** The revised MCLs should be incorporated into any presentation or evaluation of ground water data collected at the site, and considered in the development of a comprehensive site-wide approach to ground water contamination.	ODEQ	EPA	Ongoing	N[1]

Table 6
Recommendations and Follow-up Actions
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

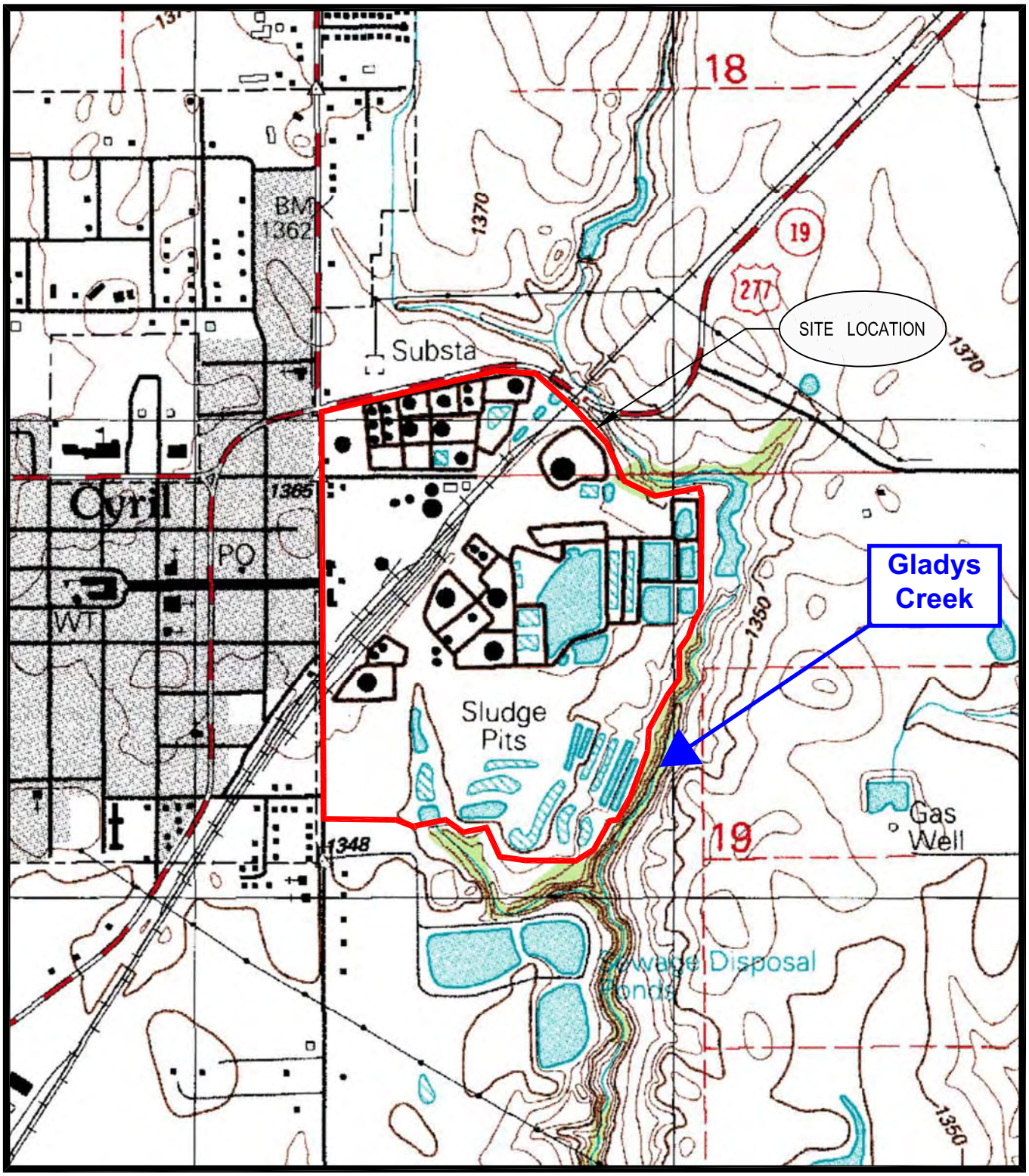
Issues	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Date Due	Follow-up Action Affects Protectiveness (Y/N)
6. **The SAP for collection of surface water and ground water samples needs to be updated**. ODEQ is currently performing containment well monitoring for the remedial action, targeted MNA monitoring to assess the efficacy of MNA as a remedy, and LNAPL and water level measurements. This work is being conducted under the November 2004 SAP and January 2007 QAPP prepared by ODEQ, and results of the sampling efforts are reported to EPA. Sample collection procedures for the MNA wells and containment wells previously included the use of bailers to purge and collect samples. High turbidity during sample collection in past sampling events may have impacted the results of total metals analysis, and low flow methods have been employed. This change should be incorporated into the site plans.	**Update the site plans to incorporate current ground water monitoring procedures.** The SAP should be revised to describe the use of the low flow purge method for collection of samples from the MNA and containment wells.	ODEQ	EPA	December 2007	N[1]
7. **LNAPL observed in SBB-2.** During the November 2006 sampling event performed by ODEQ, monitoring well SBB-2 was found to demonstrate 3.37 feet of LNAPL. This well is located offsite approximately 250 feet east of residential properties. LNAPL had not previously been observed in this well.	**Further investigate the extent of LNAPL in the vicinity of SBB-2.** Installation of new monitoring wells may be needed to aid in delineation of the extent of LNAPL in this area.	ODEQ	EPA	December 2008	N[1]

Table 6
Recommendations and Follow-up Actions
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

Issues	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Date Due	Follow-up Action Affects Protectiveness (Y/N)
8. **Arsenic exceedances in Gladys Creek samples.** In three of six surface water samples collected from the Gladys Creek in the May 2006 sampling event, the arsenic concentrations exceeded the RAOs established by the ROD. In addition, one of six sediment samples collected exceeded the arsenic RAO. Gladys Creek is an environmental receptor of contaminated ground water from the site and based on analytical results and visible impacts from the site into the creek, it appears that contaminated ground water discharging into the creek may be impacting the surface water and sediment of the creek.	**Evaluate arsenic concentration trends in Gladys Creek samples and update the monitoring program sample locations and/or frequency if needed to support decisions for further action.** The last sampling event was performed in February 2007, and sample results are pending. If exceedances continue, the impact on the surface water and sediment of the creek must be evaluated and addressed.	ODEQ	EPA	December 2008	N[1]
Remedy Completion Issues					
9. **Nature and extent of surface soil contamination beneath the former refinery in the northern portion of the site has not yet been confirmed.** Limited soil sampling was performed on the northern portion of the site following completion of EPA's time-critical removal action to address demolition of the various refinery structures. This sampling effort is described in the September 2005 CERCLA Removal Assessment Report.	**Finalize the determination of the nature and extent of soil contamination on the northern portion of the site and design an appropriate remedial action.** Evaluate the nature and extent of soil contamination based on existing data collected during the removal action, and any data needs that may be identified, and develop an appropriate course of action for remediation, if needed.	ODEQ	EPA	December 2008	N[1]

Table 6
Recommendations and Follow-up Actions
Oklahoma Refining Company Superfund Site
Cyril ,Caddo County, Oklahoma

Issues	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Date Due	Follow-up Action Affects Protectiveness (Y/N)
10. Comprehensive site-wide remedial approach to ground water contamination. In the October 2003 ESD, the ground water remedy was deferred until completion of the surface or source remedy. Long-term ground water and surface water monitoring has continued during this period as required by the 1996 ESD.	**Develop a comprehensive site-wide approach to ground water contamination.** ODEQ and EPA are currently coordinating efforts to develop a revised feasibility study regarding the ground water remedy.	ODEQ	EPA	December 2008	N[1]
[1]Although performance of these activities do not currently affect the protectiveness of the remedy in and/of themselves, they are required to provide long-term protectiveness.					



Scale 1:1200

0 1/4 1/2 MILE

500 0 500 1000 1500 FEET

QUADRANGLE LOCATION

FIGURE 1

SITE LOCATION MAP

ORC SUPERFUND SITE
CYRIL, OKLAHOMA

(SOURCE OF MAP IS USGS 7.5 MINUTE QUADRANGLE MAP, CYRIL, OKLAHOMA)

**Note: Reproduced from "The Oklahoma Refining Company Superfund Site Remedial Action Project Completion Report". March 2003 (Clayton, 2003)

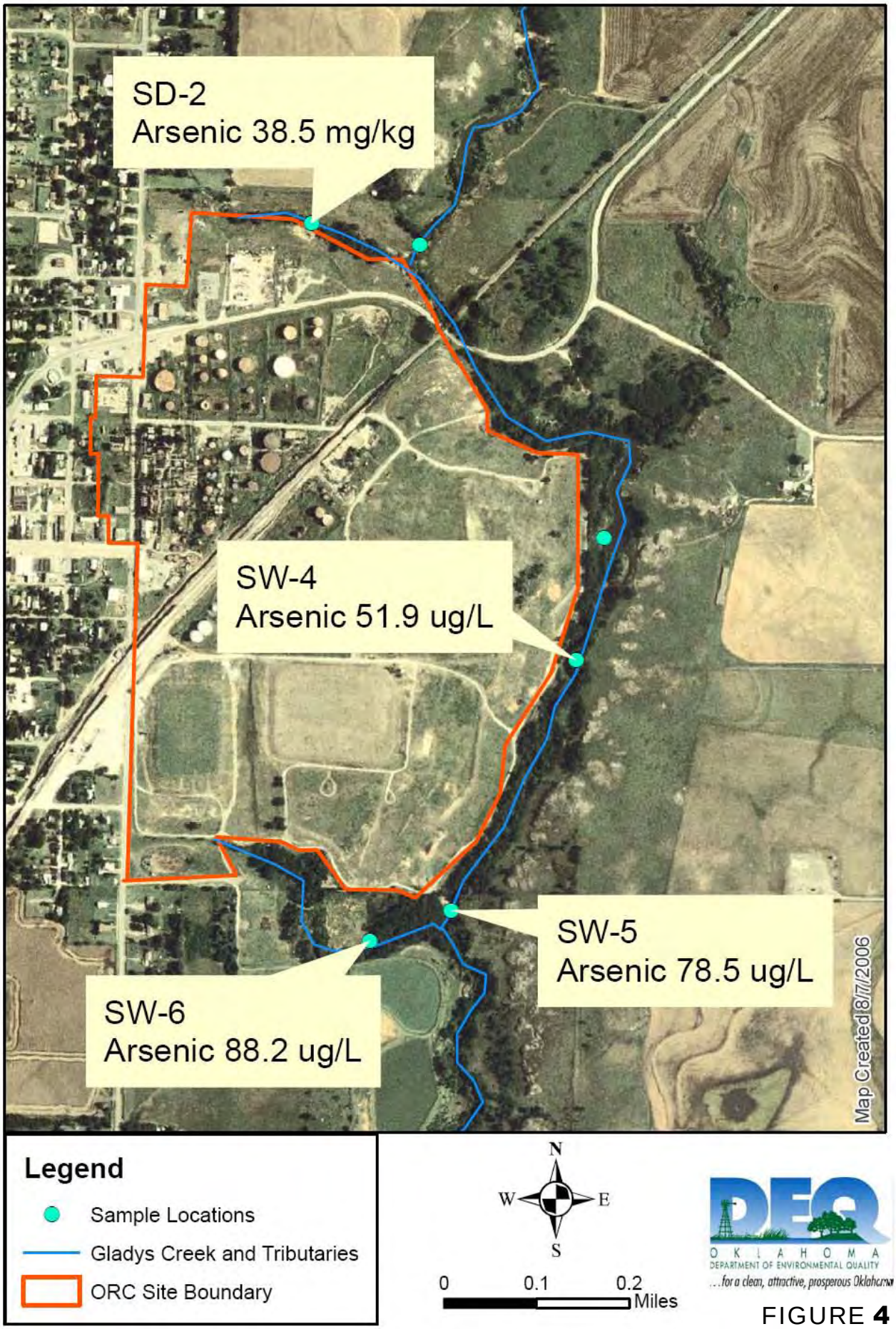


FIGURE **4**

Gladys Creek Sampling locations May 2006

**Note: Reproduced from May 2006, Gladys Creek Monitoring Event Report (ODEQ, 2006)

FIGURE 5
Location of ORC Containment and MNA Wells

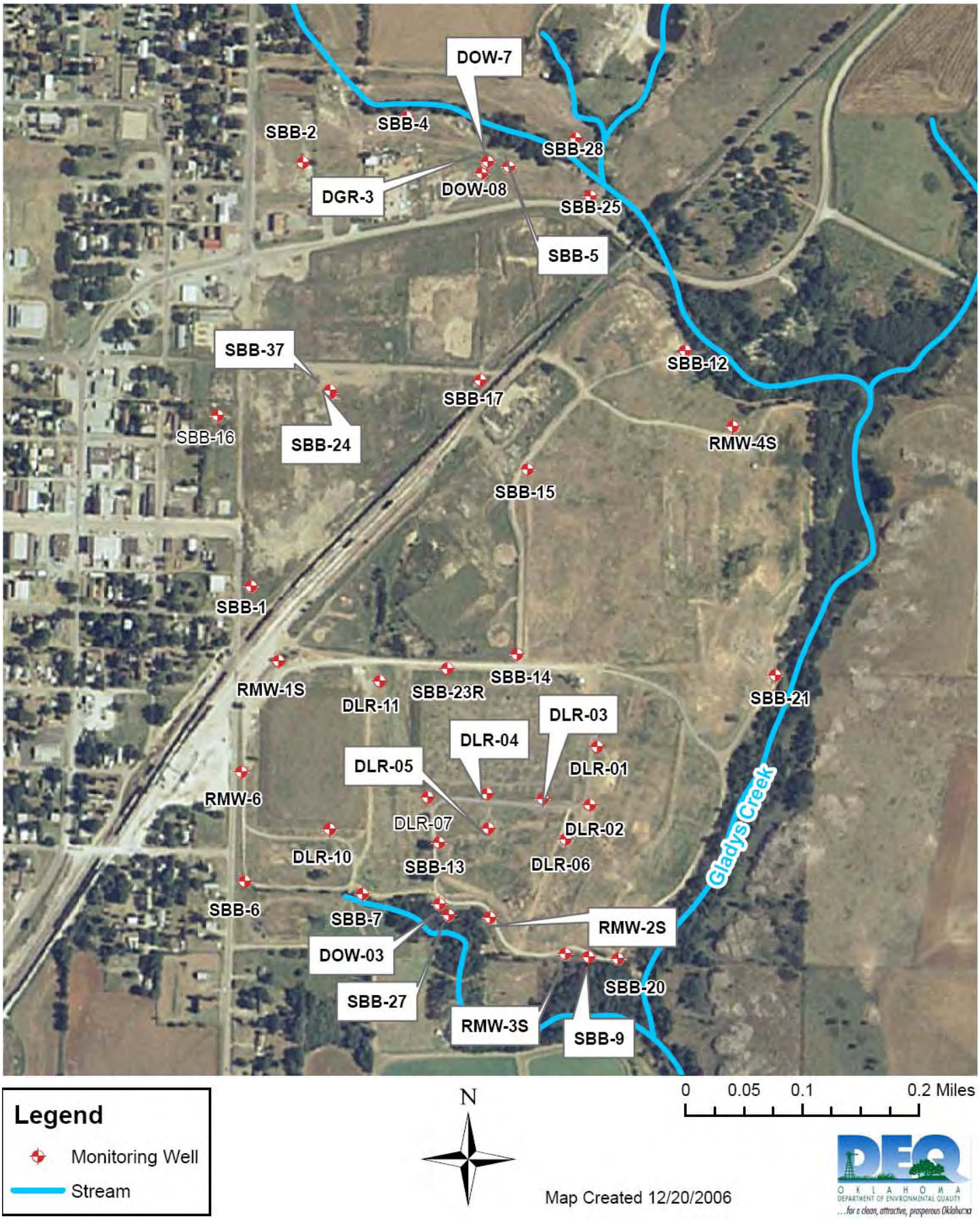


FIGURE 6
Location of LNAPL monitoring wells

**Note: Reproduced from:"Fourth Quarter 2006 LNAPL Monitoring Event Report and 2006 Well Survey Report "(ODEQ, 2006)

Attachment 1
Documents Reviewed

Attachment 1
Documents Reviewed

Clayton Group Services, 2001-2002. *The Oklahoma Refining Company Superfund Site Remedial Action Project Completion Report*. March 21, 2003.

Oklahoma Department of Environmental Quality (ODEQ), 2002-2006. Selected Quarterly Progress Memorandums. Included were memos for *Sampling of Perimeter Wells* from October 2002 through March 2005, *Semi-Annual Containment Well Monitoring Reports* from June 2006 through December 2006, *Semi-Annual Monitored Natural Attenuation Reports* April 2005 through October 2006, and *Quarterly LNAPL Monitoring Event Reports* form January 2003 thr0ugh December 2006.

Oklahoma Department of Environmental Quality (ODEQ), 2004. *Cooperative Agreement Amendment Site Sampling and Analysis Plan for the Oklahoma Refining Company, Cyril, Caddo County, Oklahoma, CA # V-006568*. November 12, 2004.

Oklahoma Department of Environmental Quality (ODEQ), 2004a. *The 2004 Land Report*. Revised January 11, 2005

Oklahoma Department of Environmental Quality (ODEQ), 2006. *3rd Semi-Annual Containment Well Monitoring Event Report for the Oklahoma Refining Company*. June 9, 2006

Oklahoma Department of Environmental Quality (ODEQ), 2006a. *4th Quarter LNAPL Monitoring Event Report and 2006 Well Survey Report for the Oklahoma Refining Company*. December 20, 2006

Oklahoma Department of Environmental Quality (ODEQ), 2007. *Quality Assurance Project Plan for the Oklahoma Refining Company, Cyril, Caddo County, Oklahoma, CA # V-006568*. January 10, 2007.

Oklahoma Department of Environmental Quality (ODEQ), 2007a. *3rd Semi-Annual Monitored Natural Attenuation Monitoring Event Report for the Oklahoma Refining Company*. January 9, 2007

Oklahoma Department of Environmental Quality (ODEQ), 2007b. *Memorandum: Observations during the ORC Gladys Creek Recon Refining Company*. January 29, 2007

Oklahoma Department of Environmental Quality (ODEQ), 2007c. *Operation and Maintenance Plan for the South Portion Source Remedy of the Oklahoma Refining Company Superfund Site.* March, 2007

U. S. Environmental Protection Agency (EPA), 1992. *Record of Decision, Oklahoma Refining Company Superfund Site, Caddo County, Oklahoma*. June 1992.

U. S. Environmental Protection Agency (EPA), 1996. *Explanation of Significant Difference to the Record of Decision, Oklahoma Refining Company Superfund Site, Cyril, Oklahoma*. March 27, 1996.

U. S. Environmental Protection Agency (EPA), 2001. *Comprehensive Five-Year Review Guidance*. OSWER No. 9355.7-03B-P. June 2001

U. S. Environmental Protection Agency (EPA), 2002a. *Site Status Summary, Oklahoma Refining Company Superfund Site, Caddo County, Oklahoma*. January 31, 2002.

U. S. Environmental Protection Agency (EPA), 2002b. *First Five-Year Review Report for the Oklahoma Refining Company Superfund Site Cyril, Caddo County, Oklahoma*. August 13, 2002.

U. S. Environmental Protection Agency (EPA), 2003. *Explanation of Significant Difference to the Record of Decision Oklahoma Refining Company Superfund Site, Cyril, Oklahoma*. October 2003.

U. S. Environmental Protection Agency (EPA), 2005. *CERCLA Removal Assessment Report for Oklahoma Refining Company Cyril, Caddo County, Oklahoma.* September 2005.

U. S. Environmental Protection Agency (EPA), 2007. *Fact Sheet, Oklahoma Refining Company Superfund Site, Cyril, Oklahoma*. March 6, 2007.

Attachment 2
Interview Record Forms

Five-Year Review Interview Record Oklahoma Refining Company Cyril, Caddo County, Oklahoma	Interviewee: Allyene Luna, Treasurer Affiliation: Town of Cyril, Oklahoma Telephone: 580-464-2411 Fax: 580-464-2205

Site Name	EPA ID Number	Date of Interview	Interview Method
Oklahoma Refining Company Superfund Site	EPA ID# OKD091598870	April 13, 2007	Verbal, by telephone

Interview Contacts

Name	Organization	Phone	Email	Address
Michael Hebert	EPA Region 6	214-665-8315	Hebert.Michael@epamail.epa.gov	1445 Ross Ave Dallas, Texas 75202
Margaret O'Hare	CH2M HILL, EPA contractor	972-980-2170 ext 52238	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251
Victor Martinez	CH2M HILL, EPA contractor	972-980-2170 ext 52207	vmartin1@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251

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 environment continue to be protected by the remedial actions performed. This interview is being conducted as a part of the second five-year review for the Oklahoma Refining Company Superfund Site. The period covered by this five-year review is from completion of the first five-year review (August 13, 2002) to current.

Interview Questions

1. What is your overall impression of the work conducted at the site since the first five-year review (August 13, 2002)?

Response:

The work completed has been fine. All went smoothly and people are happy with all that has been accomplished to-date.

2. From your perspective, what effects have continued remedial operations at the site had on the surrounding community?

Response:

The cleanup at the site has had a positive effect, very beneficial to the community.

3. Are you aware of any ongoing community concerns regarding the site in regard to its operation and maintenance or other issues?

Response:

No ongoing concerns. The City understands from EPA that more work will be done to cleanup the soil where the refinery was located and is looking forward to that being completed.

4. Are you aware of any unanticipated events, incidents, or activities that have occurred at the site, such as dumping, vandalism, fire, or anything that required emergency response from local authorities? If so, please give details.

Response:

No.

5. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by the City regarding the site? If so, please describe the purpose and results.

Response:

No routine communications led by the City, but EPA calls every so often and stays in touch.

6. Are you aware of any changes in land use at or near the site? Has your office had any inquiries regarding potential reuse of the property, and if so, what were they?

Response:

No changes in land use currently anticipated. Some inquiries have been made as to what the site will be used for when the cleanup is finished (some people would like to see it used for the City), but the response is that it is privately owned.

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

Response:

Yes, speaking on behalf of the current board (5 trustees, a clerk and treasurer). A new board is in place as of Monday April 16. New roles (Mayor, etc) will be assigned by Tuesday April 17.

8. Do you have any comments, suggestions, or recommendations regarding the site?

Response:

The main concern is that the site be kept clean. Being located at the end of Main Street, the site is visible to the community. Stormwater runoff has been a problem in the past, but when the refinery was demolished, the drainage issues were addressed and have not since been a problem.

Five-Year Review Interview Record Oklahoma Refining Company Cyril, Caddo County, Oklahoma	Interviewee: Amy Brittain Affiliation: ODEQ Telephone: 405-702-5133 Email address: Amy.Brittain@deq.state.ok.us

Site Name	EPA ID Number	Date of Interview	Interview Method
Oklahoma Refining Company Superfund Site	EPA ID# OKD091598870	4/6/07	Email

Interview Contacts

Name	Organization	Phone	Email	Address
Michael Hebert	EPA Region 6	214-665-8315	Hebert.Michael@epamail.epa.gov	1445 Ross Ave Dallas, Texas 75202
Margaret O'Hare	CH2M HILL, EPA contractor	972-980-2170 ext 52238	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251
Victor Martinez	CH2M HILL, EPA contractor	972-980-2170 ext 52207	vmartin1@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251

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 environment continue to be protected by the remedial actions performed. This interview is being conducted as a part of the second five-year review for the Oklahoma Refining Company Site. The period covered by this five-year review is from completion of the first five-year review (August 13, 2002) to current.

Interview Questions

1. What is your overall impression of the work conducted at the site since the first five-year review (August 13, 2002)?

Response:

Great progress has been made on the south side, but there is still a lot of work that will be required to clean up the site and reduce human health and ecological risk.

2. From your perspective, what effects have continued remedial operations at the site had on the surrounding community?

Response:

Community seams to understand what is going on. Some people have asked when the soil on the north side of the site will be cleaned up and are concerned about the ground water quality.

3. Are you aware of any ongoing community concerns regarding the site in regard to its operation and maintenance or other issues?

Response:

No

4. Are you aware of any unanticipated events, incidents, or activities that have occurred at the site, such as dumping, vandalism, fire, or anything that required emergency response from local authorities? If so, please give details.

Response:

EPA removal performed a time critical emergency response on the north side of the refinery in 2003.

5. Have there been any significant changes in the site status or maintenance requirements since completion of the first five-year review (August 13, 2002)? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

Response:

The north portion of the site was referred to Superfund from RCRA in August 2002. EPA removal demolished the structures on the north side of the site in 2003. The soils in the north side of the site still need to be investigated and cleaned up. The south side landfills entered into O&M in July 2006. The ground water is being monitored by the DEQ. The DEQ identified in November 2006 an off-site well (SBB-02) which now has LNAPL. This well is close to off-site residences and this is a big concern to the DEQ. The ground water remedy needs to established and implemented.

6. Have there been opportunities to optimize the operation, maintenance, or sampling efforts at the site since the last first five-year review (August 13, 2002)? Please describe changes and the resultant or desired cost savings or improved efficiency.

Response:

Have switched ground water sampling methods to a low flow perilstaltic pump, gives better analytical results. This decrease the cost of sampling wells by decreasing the amount of IDW generated and by using tubing that stays in the well and reused instead of using disposable bailers which have to be purchased for each sampling event.

7. What is the status of groundwater monitoring plan?

Response:

Will complete work plan with EPA in April 2007, the DEQ is negotiating with EPA what the next steps will be for ground water monitoring.

8. Do you have any comments, suggestions, or recommendations regarding the site?

Response:

The ground water, north side soils, and Gladys Creek still need to be investigated and remediated if necessary. Delineating the off-site LNAPL plume should be a priority.

Five-Year Review Interview Record Oklahoma Refining Company Cyril, Caddo County, Oklahoma	Interviewee: Kelly Dixon Affiliation: ODEQ Telephone: 405-702-5156 Email address: Kelly.Dixon@deq.state.ok.us

Site Name	EPA ID Number	Date of Interview	Interview Method
Oklahoma Refining Company Superfund Site	EPA ID# OKD091598870	4/10/2007	Email

Interview Contacts

Name	Organization	Phone	Email	Address
Michael Hebert	EPA Region 6	214-665-8315	Hebert.Michael@epamail.epa.gov	1445 Ross Ave Dallas, Texas 75202
Margaret O'Hare	CH2M HILL, EPA contractor	972-980-2170 ext 52238	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251
Victor Martinez	CH2M HILL, EPA contractor	972-980-2170 ext 52207	vmartin1@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251

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 environment continue to be protected by the remedial actions performed. This interview is being conducted as a part of the second five-year review for the Oklahoma Refining Company Site. The period covered by this five-year review is from completion of the first five-year review (August 13, 2002) to current.

Interview Questions

1. What is your overall impression of the work conducted at the site since the first five-year review (August 13, 2002)?

Response:

The RA on the south portion of the refinery and the EPA demolition activities removed hazards and are protective. The landfills appear to be functional. However, the ground water remedy and the LNAPL recovery were postponed and additional remedial work is required. Since 2002, the DEQ has performed ground water monitoring on wells and have discovered some problems and made proposals to EPA. DEQ has not yet been funded to implement these proposals.

DEQ is conduction O&M activities on the landfills.

2. Are you aware of any ongoing community concerns regarding the site in regard to its operation and maintenance or other issues?

Response:

The gate on Basket Street has been knocked down and no longer serves to limit access, especially vehicular traffic, to the North part of the site. Also, some in the community have expressed a desire to open the gates and allow traffic to go thru the North facility. DEQ has said "NO."

Gladys Creek is a gaining stream and the cut bank on the east side continues to erode land. The perimeter fence will soon be affected and ultimately, the cut bank could erode into the neutralized acid material. Bank stabilization may be needed.

3. Are you aware of any unanticipated events, incidents, or activities that have occurred at the site, such as dumping, vandalism, fire, or anything that required emergency response from local authorities? If so, please give details.

Response:

Not recently. The sheriff went on to search for stolen property at one point. I don't recall the year. There is a person or persons living in the shack on site and to my knowledge there is no running water to the building.

4. Have there been any significant changes in the site status or maintenance requirements since completion of the first five-year review (August 13, 2002)? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

Response:

No on the landfills. Yes on the ground water: LNAPL monitoring (gw remedy postponed) recently showed migration toward residential areas. Visual observation of hydrocarbon seeps to the North Tributary have also been recorded by DEQ staff. The caustic and acid seep areas do not appear to be attenuating following removal of the waste sources.

5. Have there been opportunities to optimize the operation, maintenance, or sampling efforts at the site since the last first five-year review (August 13, 2002)? Please describe changes and the resultant or desired cost savings or improved efficiency.

Response:

Not that I am aware of.

6. What is the status of groundwater monitoring plan?

Response:

This is a complicated question requiring a complex answer. The DEQ is performing containment well monitoring for the remedial action. The DEQ is also performing targeted MNA monitoring to assess the efficacy of MNA as a remedy. The DEQ is also performing LNAPL and water level measurements. The results of all these efforts are reported to EPA. Data indicates that LNAPL may be migrating and contaminants may be migrating. Funding for continued monitoring ends this year. DEQ believes additional funding needs to be provided to continue monitoring, and to fully delineate the LNAPL plume, and to conduct source removal as needed to prevent further migration offsite and to Gladys Creek.

7. Do you have any comments, suggestions, or recommendations regarding the site?

Response:

DEQ needs funding to continue ground water monitoring, to delineate LNAPL plume, to conduct source removal as needed, to perform treatability and pilot tests on LNAPL removal, to address bank stabilization, to address the caustic and acid seep areas, and to delineate and remediate soils on the North Refinery. The gate needs to be fixed and access restricted as possible. Monitoring wells need to be fixed and rehabbed.

Five-Year Review Interview Record Oklahoma Refining Company Cyril, Caddo County, Oklahoma	Interviewee: Meghan Lloyd Affiliation: ODEQ Telephone: 405-702-5135 Email address: Meghan.Lloyd@deq.state.ok.us

Site Name	EPA ID Number	Date of Interview	Interview Method
Oklahoma Refining Company Superfund Site	EPA ID# OKD091598870	4/6/2007	Email

Interview Contacts

Name	Organization	Phone	Email	Address
Michael Hebert	EPA Region 6	214-665-8315	Hebert.Michael@epamail.epa.gov	1445 Ross Ave Dallas, Texas 75202
Margaret O'Hare	CH2M HILL, EPA contractor	972-980-2170 ext 52238	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251
Victor Martinez	CH2M HILL, EPA contractor	972-980-2170 ext 52207	vmartin1@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251

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 environment continue to be protected by the remedial actions performed. This interview is being conducted as a part of the second five-year review for the Oklahoma Refining Company Site. The period covered by this five-year review is from completion of the first five-year review (August 13, 2002) to current.

Interview Questions

1. What is your overall impression of the work conducted at the site since the first five-year review (August 13, 2002)?

Response:

The work that has been conducted on the south side of the site is good, but there is still work that needs to be done to further address the risk to human health and the environment. The north side soils, site-wide groundwater, and Gladys Creek need further investigation to determine the best methods of cleanup.

2. From your perspective, what effects have continued remedial operations at the site had on the surrounding community?

Response:

The community seems aware of what is being done at the site and is concerned with when the north side soils will be cleaned up and the groundwater quality.

3. Are you aware of any ongoing community concerns regarding the site in regard to its operation and maintenance or other issues?

Response:

There was an anonymous complaint forwarded to DEQ in June 2006 concerning an area of roofing or asphaltic material in a ditch located on the west side of the railroad tracks between the site fence and railroad right of way. The DEQ investigated the area and determined the issue will be addressed with the north property soils project that is currently under negotiations with EPA.

4. Are you aware of any unanticipated events, incidents, or activities that have occurred at the site, such as dumping, vandalism, fire, or anything that required emergency response from local authorities? If so, please give details.

Response:

EPA Removal performed a time critical emergency response on the north side of the property in August 2003.

5. Have there been any significant changes in the site status or maintenance requirements since completion of the first five-year review (August 13, 2002)? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

Response:

In August 2002 the north property of the refinery was transferred to CERCLA. In August 2003, the EPA Emergency Response Branch demolished and removed the north side structures, tanks, and chemicals in a time critical emergency response. North side soil and groundwater contamination still exist on the site.

In June 2005, the operation and maintenance (O&M) phase for the source remedy on the south portion of the site was postponed until repairs to erosion areas on the hazardous landfill could be completed. In July 2006, the final inspection of the hazardous landfill erosion repairs was conducted with EPA and DEQ personnel. The responsibility of O&M for the source remedy on the south portion of the site was transferred from EPA to DEQ in July 2006. There have been no erosion problems since repairs.

Monitoring well SBB-2 was determined to have 3.37 feet of LNAPL in November 2006. This well is located off-site, northwest of the former refinery. EPA Removal contractors reportedly measured for LNAPL in the well in October 2003 and found none. The presence of LNAPL in this well is a concern because it is located off-site and approximately 250 feet east of residential properties. DEQ is in the process of submitting an application to EPA to install 4 new monitoring wells to further delineate the extent of the plume.

6. Have there been opportunities to optimize the operation, maintenance, or sampling efforts at the site since the last first five-year review (August 13, 2002)? Please describe changes and the resultant or desired cost savings or improved efficiency.

Response:

The groundwater has been monitored semi-annually for containment of COCs on-site and the possibility of natural attenuation. These sampling events have been improved over the years from using bailing methods for sampling to low-flow peristaltic pumping. The peristaltic pump has improved analytical results and lowered costs by decreasing the amount of IDW produced at each well and being able to designate tubing in each well rather than using disposable bailers.

7. What is the status of groundwater monitoring plan?

Response:

Groundwater is being monitored semi-annually by the DEQ. DEQ is currently in negotiations with EPA for further funding to investigate the north property soils, site-wide groundwater, and Gladys Creek.

8. Do you have any comments, suggestions, or recommendations regarding the site?

Response:

The north side soils, site-wide groundwater, and Gladys Creek need further investigation and remediation if necessary. Delineation of the off-site LNAPL plume should be a priority.

Attachment 3
Site Inspection Checklist

Oklahoma Refinery Company Superfund Site
Cyril, Caddo County, Oklahoma
Five-Year Review Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program. N/A means -"not applicable".

I. SITE INFORMATION	
Site Name: Oklahoma Refining Company Superfund Site	EPA ID: OKD091598870
City/State: Cyril, Caddo County, Oklahoma	Date of Inspection: 04/11 /2007
Agency Completing 5 Year Review: EPA	Weather/temperature:

Remedy Includes: (Check all that apply)
- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other: Only access to monitor wells is restricted

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. O&M site manager: N/A
   Name:
   Title:
   Date:
   Interviewed: ☐ at site ☐ at office ☐ by phone Phone Number:
   Problems, suggestions: ☐ Additional report attached (if additional space required).

2. O&M staff:
   Name:
   Title:
   Date:
   Interviewed: ☐ at site ☐ at office ☐ by phone Phone Number:
   Problems, suggestions: ☐ Additional report attached (if additional space required).

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: Oklahoma Department of Environmental Quality (ODEQ)
Contact:
Name: Meghan Lloyd
Title: ORC Project Manager
Date: 4/11/2007
Phone Number: 405-702-5135
Problems, suggestions: ☒ Additional report attached (if additional space required).

Agency: Oklahoma Department of Environmental Quality (ODEQ)
Contact:
Name: Amy Brittain
Title: Site Hydrologist
Date: 4/11/2007
Phone Number: 405-702-5133
Problems, suggestions: ☒ Additional report attached (if additional space required).

Agency:
Contact:
Name:
Title:
Date:
Phone Number:
Problems, suggestions: ☐ Additional report attached (if additional space required).

Agency:
Contact:
Name:
Title:
Date:
Phone Number:
Problems, suggestions: ☐ Additional report attached (if additional space required).

2. Other interviews (optional) ☒ N/A ☐ Additional report attached (if additional space required).

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. O&M Documents

☐ O&M Manuals	☐ Readily available	☐ Up to date	☒ N/A
☐ As-Built Drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance Logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks:

2. Health and Safety Plan Documents				
☒ 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:				
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	
Remarks:				
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A	
Remarks:				
7. Groundwater Monitoring Records	☒ Readily available	☒ Up to date	☐ N/A	
Remarks:				
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A	
Remarks:				
9. Discharge Compliance Records	☐ 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		☒ Applicable	☐ N/A	
1. O&M Organization				
☒ State in-house	☐ Contractor for State			
☐ PRP in-house	☐ Contractor for PRP			
☐ Other: Contractor				

2. O&M Cost Records

☒ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
Original O&M cost estimate: $15,121/year ☒ Breakdown attached

Total annual cost by year for review period if available

From (Date):	To (Date):	Total cost:	
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached

Remarks:

3. Unanticipated or Unusually High O&M Costs During Review Period ☐ N/A
Describe costs and reasons:

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

1. Fencing

1. Fencing damaged ☐ Location shown on site map ☐ Gates secured ☐ N/A
Remarks:
The gate on Basket St. has been knocked down and no longer serves to limit access, especially vehicular traffic, to the North part of the site.

2. Other Access Restrictions

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

3. 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):
Frequency:
Responsible party/agency: ODEQ
Contact:
Name: Todd Thibodeaux
Title: Project Manager
Date:

	Phone Number:		
	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: ☐ Additional report attached (if additional space required).		
2.	Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A Remarks:		
4.	General		
1.	Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident Remarks:		
2.	Land use changes onsite ☒ N/A Remarks:		
3.	Land use changes offsite ☒ N/A Remarks:		

VI. GENERAL SITE CONDITIONS

1.	Roads ☒ Applicable ☐ N/A		
1.	Roads damaged ☐ Location shown on site map ☒ Roads adequate ☐ N/A Remarks:		
2.	Other Site Conditions		
	Remarks:		

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

1.	Landfill Surface		
1.	Settlement (Low spots) Areal extent: Remarks:	☐ Location shown on site map Depth:	☒ Settlement not evident
2.	Cracks Lengths: Remarks:	☐ Location shown on site map Widths: Depths:	☒ Cracking not evident
3.	Erosion Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ Erosion not evident

4.	Holes Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ Holes not evident
5.	Vegetative Cover ☒ Cover properly established Remarks:	☒ No signs of stress	☐ Grass ☐ Trees/Shrubs
6.	Alternative Cover (armored rock, concrete, etc.) Remarks:		☒ N/A
7.	Bulges Areal extent: Remarks:	☐ Location shown on site map Height:	☒ Bulges not evident
8.	Wet Areas/Water Damage ☒ Wet areas ☐ Ponding ☐ Seeps ☐ Soft subgrade Remarks:	☐ Wet areas/water damage not evident ☐ Location shown on site map Areal extent: ☐ Location shown on site map Areal extent: ☐ Location shown on site map Areal extent: ☐ Location shown on site map Areal extent:	
	Wet areas were observed along the sides of the hazardous waste landfill but they appear to be runoff from a recent rainstorm event.		
9.	Slope Instability Areal extent: Remarks:	☐ Slides ☐ Location shown on site map	☒ No evidence of slope instability
2.	Benches (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	☒ Applicable ☐ N/A	
1.	Flows Bypass Bench Remarks:	☐ Location shown on site map	☒ N/A or okay
2.	Bench Breached Remarks:	☐ Location shown on site map	☒ N/A or okay
3.	Bench Overtopped Remarks:	☐ Location shown on site map	☒ N/A or okay
3.	Letdown Channels	☒ Applicable ☐ N/A	

1.	Settlement Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ No evidence of settlement
2.	Material Degradation Material type: Remarks:	☐ Location shown on site map Areal extent:	☐ No evidence of degradation
3.	Erosion Areal extent: Remarks:	☐ Location shown on site map Depth:	☒ No evidence of erosion
4.	Undercutting Areal extent: Remarks:	☐ Location shown on site map Depth:	☒ No evidence of undercutting
5.	Obstructions Type: Areal extent: Remarks:	☐ Location shown on site map Height:	☒ N/A
6.	Excessive Vegetative Growth ☐ Evidence of excessive growth ☐ Location shown on site map Remarks:	☒ No evidence of excessive growth ☐ Vegetation in channels but does not obstruct flow Areal extent:	

4.	Cover Penetrations	☐ Applicable	☐ N/A	
1.	Gas Vents ☐ Active ☐ Passive ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:		☐ Routinely sampled ☐ Functioning ☐ Needs O& M	☐ N/A ☐ Good condition
2.	Gas Monitoring Probes ☐ Routinely sampled ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:		☐ Functioning ☐ Needs O&M	☐ N/A ☐ Good condition
3.	Monitoring Wells (within surface area of landfill) ☐ Routinely sampled ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:		☐ Functioning ☐ Needs O&M	☐ N/A ☐ Good condition

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

5. Settlement Monuments ☒ Located ☐ Routinely surveyed ☐ N/A
Remarks:
Initially surveyed at completion of construction. Survey schedule will be included in monitoring plan to be submitted to EPA. Monuments will be surveyed every 5 years.

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

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

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

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

6. Cover Drainage Layer ☒ Applicable ☐ N/A

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

2. Outlet Rock Inspected ☒ Functioning ☐ N/A
Remarks:
Consists of sand layer daylight.

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

1. Siltation ☐ Siltation evident ☐ N/A
Areal extent: Depth:
Remarks:

2. Erosion ☐ Erosion evident ☐ N/A
Areal extent: Depth:
Remarks:

3. Outlet Works ☐ Functioning ☐ N/A
Remarks:

4.	Dam Remarks:	☐ Functioning	☐ N/A
8.	Retaining Walls	☐ Applicable ☒ N/A	
1.	Deformations Horizontal displacement: Remarks:	☐ Location shown on site map Vertical displacement:	☐ Deformation not evident Rotational displacement:
2.	Degradation Remarks:	☐ Location shown on site map	☐ Degradation not evident
1.	Perimeter Ditches/Off-site discharge	☒ Applicable ☐ N/A	
1.	Siltation Areal extent: Remarks:	☐ Location shown on site map Depth:	☒ Siltation not evident
2.	Vegetative Growth Areal extent: Remarks:	☐ Location shown on site map Type:	☐ Vegetation does not impede flow
3.	Erosion Areal extent: Remarks: *Area along the south perimeter fence line, east of the rodeo grounds, has been undercut by erosion, possibly causing the loss of a monitoring well. A hole approximately two feet in diameter and two feet deep was observed at approximately 250 feet south of monitoring well SBB-11 (along the east boundary fence line) at a drain pipe.*	☐ Location shown on site map Depth:	☐ Erosion not evident
4.	Discharge Structure ☒ Functioning Remarks:	☐ Location shown on site map ☒ Good Condition	☐ N/A
	VIII. VERTICAL BARRIER WALLS	☐ Applicable	☒ N/A
1.	Settlement Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ Settlement not evident
2.	Performance Monitoring ☐ Performance not monitored ☐ Performance monitored ☐ Evidence of breaching Remarks:	Frequency: Head differential:	☐ N/A
	IX. GROUNDWATER/SURFACE WATER REMEDIES	☒ Applicable	☐ N/A
1.	Groundwater Extraction Wells, Pumps, and Pipelines	☐ Applicable	☒ N/A

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

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

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

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

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

2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ N/A
   ☐ Good condition ☐ Needs O& M
   Remarks: Not observed.

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

3. Treatment System ☐ Applicable ☒ N/A

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

2. Electrical Enclosures and Panels (properly rated and functional) ☐ N/A
   ☐ Good condition ☐ Needs O& M
   Remarks: See Hurricane Katrina Response Technical Memorandum, February 2006

3. Tanks, Vaults, Storage Vessels ☐ N/A
☐ Good condition ☐ Proper secondary 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) ☐ N/A
☐ All required wells located ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled
☐ Good condition ☐ Needs O&M
Remarks:

4. Monitored Natural Attenuation ☒ Applicable ☐ N/A

1. Monitoring Wells (natural attenuation remedy) ☐ N/A
☒ All required wells located ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled
☐ Good condition ☒ Needs O&M
Remarks:
All CERCLA wells appeared to be in generally good condition, however, hinged above-grade protective covers for several monitoring wells located north of Highway 277 showed severe corrosion, possibly due to off-gassing of hydrogen sulfide in the water. Repair of these well covers needs to be conducted. The ground water monitoring plan which should address such repairs has not yet been submitted to EPA.

5. Long Term Monitoring ☒ Applicable ☐ N/A

1. Monitoring Wells ☐ N/A
☐ All required wells located ☐ Properly secured/locked ☒ Functioning ☐ Routinely sampled
☒ Good condition ☒ Needs O&M
Remarks:

X. OTHER REMEDIES ☐ Applicable ☒ N/A

If there are remedies applied at the site which 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

1. 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 remedy was selected to remediate the source areas at the abandoned portion of the Site. EPA and ODEQ agree that all source remediation at the abandoned portion of the Site is complete. In accordance with the 2003 ESD,

remediation of ground water is on hold pending resolution of CPC property contamination, or until ground water monitoring indicates the contaminated ground water threatens Gladys Creek. The site is currently undergoing semi-annual containment well monitoring for the remedial action, semi-annual MNA monitoring to assess the efficacy of MNA as a remedy, and quarterly LNAPL and water level measurements and O&M activities. Based on the data review, site inspection, and interviews, it appears that the ORC Superfund Site remedy is functioning as intended by the ROD and the 1996 and 2003 ESDs.

2. Adequacy of O&M

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

The gate on the North side of the ORC Site, at Basket Street, has been knocked down and access to the north side is currently not restricted. Repairs to the gate on the North side should be performed to protect the integrity of wells on the northern side of the site from potential vandalism. Several monitoring wells are in need of maintenance; need to be repaired, replaced or abandoned. Appropriate maintenance should be provided to wells as recommended in the well survey performed by the ODEQ. A formal monitoring plan to evaluate the condition of ground water and surface water should be prepared. The ODEQ is currently performing containment well monitoring for the remedial action, targeted MNA monitoring to assess the efficacy of MNA as a remedy, and LNAPL and water level measurements. This work is being conducted under plans prepared by ODEQ and results of the sampling efforts are reported to EPA.

3. Early Indicators of Potential Remedy Failure

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

There were no observed indicators of potential problems that would impact the protectiveness of the remedy on the south portion of the Site. However, the detection of LNAPL in off-site well SBB-02, near a residential area, might be an indication that LNAPL is migrating off-site towards residences. The ODEQ also suspects that LNAPL might be migrating to well SBB-16. Although no LNAPL was found at this well, the interphase probe used to measure the depth to water had a LNAPL residue and odor on the probe when it was taken out of the well. This well is located within 150 ft east of nearby residential homes.

4. Opportunities for Optimization

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

Opportunities for optimization have been identified in the collection of ground water samples. Previously, samples were collected by purging three well volumes from the wells and then collecting ground water samples using a bailer. Samples collected using this method reported very high turbidity levels. In the last MNA sampling event in October 2006, the low flow purge method was used to collect samples. This method helped to lower turbidities to below 50 NTUs and to obtain more accurate/reliable data. The ODEQ will continue using the low flow purge method in future ground water sampling events.

Inspection Team Roster
Date of Site Inspection –

Name	Organization	Title
Michael Hebert	USEPA	Remedial Project Manager
Meghan Lloyd	ODEQ	ORC Project Manager
Amy Brittain	ODEQ	Site Hydrologist
Margaret O'Hare	CH2M HILL	5-Year Review Project Manager
Victor Martinez	CH2M HILL	Staff Engineer

Attachment 4
Site Inspection Photographs

Attachment 5
ODEQ Photographs

Attachment 6
Deed Notices

033792

STATE OF OKLAHOMA, CADDO COUNTY
Filed for record on the 2nd day
of May, 2003, at 2:05 M.
Book 2441, at Page 75-78
Documentary Stamps. $
PATRICE DOLCH, County Clerk
Deputy

NOTICE OF FEDERAL LIEN

NOTICE IS HEREBY GIVEN by the United States of America to all parties of a lien on the property described below, situated in the State of Oklahoma, as provided by Section 107(L)(1) of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, 42 U.S.C. §9607(L)(1) (CERCLA), to secure payment to the United States of all costs and damages for which the Oklahoma Refining Company, an Oklahoma General Partnership, its successors or assigns are all liable to the United States under Section 107(a) of CERCLA. The purpose of this **NOTICE OF FEDERAL LIEN** is to notify all interested parties that, pursuant to CERCLA, Section 107(L)(1), 42 U.S.C. §9607(L)(1), which states in pertinent part: (1) All costs and damages for which a person is liable to the United States under subsection (a) of this section shall constitute a lien in favor of the United States upon all real property and rights to such property which (A) belong to such person; and (B) are subject to or affected by a removal or remedial action. The lien for which this instrument gives notice exists in favor of the United States upon all real property and rights to such property which belong to said person and are, have been or will be, subject to, or affected by removal or remedial actions as defined by federal law, at or near the Oklahoma Refining Company Superfund Site, also known by the legal description as follows:

1. Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 17, 18, 19, 20, 21, 22, 23, & 24 in Block One (1), Town of Cyril, Caddo County, State of Oklahoma, AND
2. Lots 1, 2, 3, 4, 5, 6, 19, 20, 21, 22, 23, and 24 in Block Eight (8), in the Original Townsite of Cyril, Caddo County, State of Oklahoma, And
3. Lots 15, 16, 17, 18, 19, and 20, in Block Nine (9), Town of Cyril, Caddo County, Oklahoma, And
4. A tract of land in the Southeast Quarter (SE/4) of Section 13, Township 5 North, Range 10 West of the Indian Meridian, Caddo County, State of Oklahoma, described as: Beginning at the SE/corner of the Southeast Quarter (SE/4); thence North 0°-01'-34" East 419.82 feet; thence South 77°-57'-34" West 212.70 feet; thence South 0°-01'-34" West 175.27 feet; thence North 89°-40'-26" West 125 feet; thence South 0°-01'-34" West 199 feet; thence South 89°-40'-26" East 333 feet to the Point of Beginning, And
5. The South Half (S/2) of the Southwest Quarter (SW/4) of Section 18, Township 5

North, Range 9 West of the Indian Meridian, Caddo County, State of Oklahoma, LESS AND EXCEPT any railroad right of way previously granted and LESS AND EXCEPT a tract described as : Beg. at a point 722.9 feet North of the SW/corner of Section 18; thence East 300 feet; thence North 497.8 feet; thence West 300 feet; thence South 497.8 feet to the Point of Beginning, AND OTHER LAND DESCRIBED below:

A tract of land in the Northwest Quarter (NW/4) of Section Nineteen (19), Township Five (5) North, Range Nine (9) West of the Indian Meridian, Caddo County, Oklahoma, described as follows: Beginning at the NW/corner of NW/4; thence North 89°-56'-30" East along the North line of said NW/4, a distance of 2625.79 feet to the NE/corner of said NW/4; thence South 00°-19'-15" West along the East line of said NW/4, a distance of 466.92 feet; thence North 84°-37'-20" West, a distance of 709.72 feet; thence North 17°-56'-30" East, a distance of 85.00 feet; thence South 86°-22'-20" West, a distance of 505.98 feet; thence South 34°-16'-37" West, a distance of 241.67 feet; thence South 01°-26'-21" East, a distance of 793.68 feet; thence North 89°-21'-33" West, a distance of 738.81 feet; thence North 75°-26'-34" West, a distance of 88.45 feet; thence North 84°-26'-31" West, a distance of 181.65 feet; thence South 73°-50'-54" West, a distance of 66.54 feet; thence Southwesterly on a curve to the left (radius being 5179.32 feet), said curve being 50 feet South and running parallel with the South right of way line of S.L. & S.F. Railway, a distance of 320.28 feet; thence North 90°-00'-00" West, a distance of 61.23 feet to the West line of said NW/4; thence North 00°-04'-12" East along the West line of NW/4, a distance of 1568.26 feet to the Point of Beginning, AND
Part of the Southeast Quarter (SE/4) of Section Thirteen (13), Township Five (5) North, Range Ten (10) West of the Indian Meridian, Caddo County, State of Oklahoma, described as Beginning 333 feet West and 199 feet North of the SE/corner of SE/4; thence East 125 feet; thence North 185 feet to the South line of HW #277, right of way; thence Southwesterly along the South right of way a distance of 130 feet; thence South 150 feet to the Point of Beginning.

Less and except:

A tract of land in the Southwest Quarter (SW/4), Section 18, Township 5 North,

Range 9 West, of the I. M., Caddo County, Oklahoma.

More particularly described as follows:

Commencing at the SW corner of said SW/4; thence N. 00°15'05" E. along the west line of said SW, a distance of 582.34 feet; thence S. 89°44'55" E., a distance of 522.00 feet to a point of the centerline of U. S. Hwy. #277, this being the Point of Beginning. From said Point of Beginning; thence N. 00°15'05" E., a distance of 384.00 feet; thence S. 85°44'55" E., a distance of 268.00 feet; thence S. 00°15'05" W., a distance of 326.71 feet to the centerline of said U. S. Hwy #277; thence S. 78°11'05" W. along said Hwy. centerline a distance of 274.05 feet to the Point of Beginning, containing 2.2 acres, more or less.

This statutory lien shall exist and continue until the liability for all costs and damages described in Section 107(a) of CERCLA, 42 U.S.C. §9607(a), or a judgment against the previously listed person arising out of such liability, has been satisfied or has become unenforceable through operation of the statute of limitations provided in Section 113 of CERCLA, 42 U.S.C. §9613. The amount of the lien will increase as additional costs are incurred in responding to conditions on the above described property. The United States of America has caused this instrument to be effected through the United States Environmental Protection Agency, as evidenced by my signature, in my official capacity as Director, Superfund Division, and by the seal of the United States Environmental Protection Agency.

Signed at Dallas, Texas, this 28 day of APRIL, 2003

By: Myron O. Knudson

Myron O. Knudson,
Director, Superfund Division

STATE OF TEXAS

COUNTY OF DALLAS

BEFORE ME, the undersigned authority, on this day personally appeared Myron O. Knudson, Director of the Superfund Division, United States Environmental Protection Agency, Region 6, known to me to be the person whose name is subscribed to the foregoing instrument and known to me to have the official capacity stated in the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office this 28 day of April, 2003.

Jacqueline Samuel

Notary Public in and for
Dallas County, Texas

JACQUELINE SAMUEL
MY COMMISSION EXPIRES
FEBRUARY 24, 2007

My Commission expires: February 24, 2007

FILE DATE: 05/02/2003 FILE TIME: 09:05 BOOK: 2441 PAGE: 78
CADDO COUNTY, OKLAHOMA, PATRICE DOLCH - COUNTY CLER DOC #: 2003 3792

Instrument Volume Page
200600000114 1 2557 189

200600000114
Filed for Record in
CADDO COUNTY, OKLAHOMA
PATRICE DOLCH
01-04-2006 At 12:26 pm.
NOTICE 29.00
1 Volume 2557 Page 189 - 197

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND PROTECTION DIVISION

In Re:	)	
	)	
Oklahoma Refining Company	)	**Case No: 05-410 DN**
Superfund Site	)	**EPA ID No. OKD091598870**
Caddo County, Oklahoma	)	**EPA Superfund Site ID 0601172**
	)	
Deed Notice	)	

NOTICE OF REMEDIATION OR RELATED ACTION TAKEN PURSUANT TO THE FEDERAL COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT

LEGAL BASIS FOR NOTICE: The Oklahoma Department of Environmental Quality ("DEQ") hereby files this NOTICE OF REMEDIATION OR RELATED ACTION TAKEN PURSUANT TO THE FEDERAL COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (hereinafter "Notice") pursuant to Oklahoma Statutes, 27A § 2-7-123 (B). This Notice does not grant any right to any person not already allowed by law. This Notice shall not be construed to authorize or encourage any person or other legal entity to cause or increase pollution, to avoid compliance with State or Federal laws and regulations regarding pollution or to in any manner escape responsibility for maintaining environmentally sound operations.

The DEQ may take administrative or civil action to recover costs or to compel compliance with the below described "Land Use Restrictions" and to prevent damage to, or interference with the below described "Engineering Controls" and "Continuing Operation, Maintenance and Monitoring." The Land Use Restrictions, Engineering Controls and Continuing Operation, Maintenance and Monitoring will apply to the Affected Property and to persons who own and/or use the Affected Property until such time as the DEQ files a subsequent Notice that changes or removes the Land Use Restrictions, Engineering Controls and Continuing Operation, Maintenance and Monitoring set forth below. Activities that cause or could cause damage to the Remedy or the Engineering Controls described herein below, or recontamination of soil or groundwater are prohibited.

REASON FOR NOTICE: This Notice applies to conditions that exist at the time the Notice is filed in the land records at the office of the Clerk of Caddo County, Oklahoma. It is anticipated that much of the information below will change as work at the Affected Property progresses. Subsequent notice by the DEQ will be filed when the conditions listed below have significantly changed. The restrictions contained in the Notice will remain fully effective until the DEQ files a new deed notice in the land records for the Affected Property.

The below described Affected Property was contaminated with materials that required remediation pursuant to State and Federal environmental laws and regulations. The entire

COUNTY CLERK CADDO COUNTY, OKLA.

RETURN TO:
Dept of Envir
POB 1677
OK City OK 73101

Affected Property was listed on the National Priorities List as a Superfund site. Surface remediation has been performed to risk based standards in certain areas; hazardous and solid waste landfills were created in certain areas. The Affected Property has been broken into two distinct areas – ORC – South and ORC – North. Both properties were operated as a petroleum refinery beginning in 1908. The facility produced gasoline, diesel, asphalt, and industrial solvents from crude oil and naphtha. The facility consisted of refinery processing areas, bulk storage tanks, wastewater treatment ponds, and a Land Treatment Area (LTA). Other facility areas consisted of bio-oxidation ponds (North and South), American Petroleum Institute (API) separator, oil/sludge traps, leaded gasoline storage tanks, caustic storage pits, pump pits, asphalt drums and pits, and slop oil ponds. Other areas at the facility consisted of lime soda storage pits, acid pits, a spent lime soda trap, slop oil tanks and bottoms, and an oil skimmer. ORC – North remained under Resource Conservation and Recovery Act (RCRA) authority due to the operational facility status until August 2002, when it was deferred to Superfund authority for remediation.

To date there have been limited remediation activities on ORC – North. ORC – South has undergone major remediation activities with groundwater remediation still remaining. Remediation activities are currently being planned for both properties.

AFFECTED PROPERTY: The following legal descriptions apply to ORC South and ORC North respectively:

Begin ORC South:

The Northwest Quarter (NW/4) of Section 19, Township 5 North, Range 9 West of the Indian Meridian, Caddo County, Oklahoma, LESS AND EXCEPT THE FOLLOWING DESCRIBED TRACTS:

Beginning at a point on the South Line of the said NW/4 of said Sec. 19 and 783 feet East of the SW/corner of said Quarter Section; thence East 350 feet; thence North 250 feet; thence West 350 feet; thence South 250 feet to the Point of Beginning,

and,

Beginning at the NW/corner of said NW/4 thence N 89°56'30" E along the North Line of said NW/4, a distance of 2625.79 feet to the NE/corner of said NW/4; thence S 00°19'15" W along the East Line of said NW/4, a distance of 466.92 feet; thence N 84°37'20" W, a distance of 709.72 feet; thence N 17°56'30" E, a distance of 85.00 feet; thence S 86°22'20" W, a distance of 505.98 feet; thence S 34°16'37" W, a distance of 241.67 feet; thence S 01°26'21" E, a distance of 793.68 feet; thence N 89°21'33" W, a distance of 738.81 feet; thence N 75°26'34" W, a distance of 88.45 feet; thence N 84°26'31" W, a distance of 181.65 feet; thence S 73°50'54" W, a distance of 66.54 feet; thence Southwesterly in a curve to the left (radius begin 5179.32 feet), said curve being 50 feet South and running parallel with the South Right-of-Way Line of S.L. and S.F Railway, a

distance of 320.28 feet; thence N 90° 00'00" W, a distance of 61.23 feet to the West Line of said NW/4; thence N 00°04'12" E along the West Line of said NW/4, a distance of 1568.26 feet to the Point of Beginning. **End ORC South.**

Begin ORC North:

1. Lots 1,2,3,4,5,6,7,8,9,17,18,19,20,21,22,23, & 24 in Block One (1), Town of Cyril, Caddo County, State of Oklahoma, and
2. Lots 1,2,3,4,5,6,19,20,21,22,23,and 24 in Block Eight (8), in the Original Town site of Cyril, Caddo County, State of Oklahoma, and
3. Lots 15,16,17,18,19, and 20, in Block Nine (9), Town of Cyril, Caddo County, Oklahoma, and
4. A tract of land in the Southeast Quarter (SE/4) of Section 13, Township 5 North, Range 10 West of the Indian Meridian, Caddo County, State of Oklahoma, described as: Beginning at the SE/corner of the Southeast Quarter (SE/4); thence North 0°-01'-34" East 419.82 feet; thence South 77°-57'-34" West 212.70 feet; thence South 0°-01'-34" West 175.27 feet; thence North 89°-40'-26" West 125 feet; thence South 0°-01'-34" West 199 feet; thence South 89°-40'-26" East 333 feet to the Point of Beginning, and
5. The South Half (S/2) of the Southwest Quarter (SW/4) of Section 18 Township 5. North, Range 9 West of the Indian Meridian, Caddo County, State of Oklahoma, Less AND EXCEPT any railroad right of way previously granted and LESS AND EXCEPT a tract described as: Beg. at a point 722.9 feet North of the SW/corner of Section 18; thence East 300 feet; thence North 497.8 feet; thence West 300 feet: thence South 497.8 feet to the Point of Beginning, AND OTHER LAND DESCRIBED below:

A tract of land in the Northwest Quarter (NW/4) of Section Nineteen (19), Township Five (5) North, Range Nine (9) West of the Indian Meridian, Caddo County, Oklahoma, described as follows: Beginning at the NW/corner of NW/4; thence North 89°-56'-30" East along the North line of said NW/4, a distance of 2625.79 feet to the NE/corner of said NW/4; thence South 00°-19'-15" West along the East line of said NW/4, a distance of 466.92 feet; thence North 84°-37'-20" West a distance of 709.72 feet; thence North 17°-56'-30" East, a distance of 85.00 feet; thence South 86°-22'-20" West, a distance of 505.98 feet; thence South 34°-16'-37" West a distance of 241.67 feet; thence South 01°-26'-21" East, a distance of 793.68 feet; thence North 89°-21'-33" West, a distance of 738.81 feet; thence North 75°-26'-34" West, a distance of 88.45 feet; thence North 84°-26'-31" West, a distance of 181.65 feet; thence South 73°-50'-54" West, a distance of 66.54 feet; thence Southwesterly on a curve to the left (radius being 5179.32 feet), said curve being 50 feet South and running parallel with the South right of way line of S.L. & S.F. Railway, a distance 320.28 feet; thence North 90°-00'-00" West, a distance of 61.23 feet to the West line of said NW/4; thence North 00°-04'-12" East along the West line of NW/4, a distance of 1568.26 feet to the Point of Beginning, AND Part of the Southeast Quarter (SE/4) of Section Thirteen (13), Township Five (5) North, Range Ten (10) West of the Indian Meridian, Caddo County, State of Oklahoma, described as Beginning 333 feet West and 199 feet North of the SE/corner of SE/4; thence East 125 feet; thence North 185 feet to the South line of HW #277. right of way; thence Southwesterly along the South right of way a distance of 130 feet; thence South 150 feet to the Point of Beginning.

Less and except: A tract of land in the Southwest Quarter (SW/4), Section 18, Township 5 North, Range 9 West, of the I.M., Caddo County, Oklahoma, more particularly described as follows:

Commencing at the SW corner of said SW/4; thence N. 00°15'05"E. along the west line of said SW, a distance of 582.34 feet; thence S. 89°44'55" E., a distance of 522.00 feet to a point of the centerline of U.S. Hwy. #277, this being the Point of Beginning. From said Point of Beginning: thence N. 00°15'05" E., a distance of 384.00 feet; thence S. 85°44'55" E., a distance of 268.00 feet thence S. 00°15'05" W. a distance of 326.71feet to the centerline of said U.S. Hwy #277; thence S. 78°11'05" W. along said Hwy. Centerline. a distance of 274.05 feet to the Point of Beginning, containing 2.2 acres, more or less. **End ORC North.**

REMEDIATION ACTIVITIES (Remedy):

ORC South:

Remediation activities, also referred to as the remedy, as listed in the Record of Decision, dated June 1992, which is on file at the DEQ, included:

On-site biotreatment; On-site Stabilization; On-site Neutralization; On-site and Offsite Disposal; Monitoring Well Installation, Upgrading, and Abandonment; Groundwater/LNAPL Monitoring; Construction of a RCRA Subtitle C Landfill, RCRA Subtitle D Landfill, two temporary Biotreatment Areas, and an In-Situ Biotreatment Area; Haul Road Construction and Maintenance; Drainage Structure Construction; Tank Cleanout and Demolition; API Separator Cleanout and In-Place Demolition; Process Sewer Box Cleanout; Grading; and Vegetation. Remedial construction activities were completed on November 7, 2001. The selected remedy for treatment of contaminated groundwater was postponed. The ORC Completion Report of March 2003, which is on file at DEQ, provides a detailed account of remediation activities.

Groundwater monitoring, landfill operations and maintenance, and other activities continue at the site. The map attached hereto as "Attachment A" demonstrates the Affected Property where Remediation Activities were performed. However, if any of these items are not marked on Attachment A, the unmarked item is still applicable.

ORC North:

ORC North had limited remediation activities as listed in the Record of Decision, dated June 1992, which is on file at the DEQ. Limited remediation activities are detailed in the ORC Completion Report of March 2003, which is on file at DEQ. Additional site surface and groundwater investigation, characterization, remedial design, and remedial action are planned for the North area.

Completed work includes: Monitoring Well Installation, Upgrading, and Abandonment; Groundwater/LNAPL Monitoring; Haul Road Construction and Maintenance; Tank Cleanout and Demolition; API Separator Cleanout and In-Place Demolition; Process Sewer Box Cleanout; Grading. Remedial construction activities were completed for this phase on November 7, 2001.

ENGINEERING CONTROLS:

ORC South:

The Engineering Controls at ORC South, as listed in the ORC Completion Report of March 2003, which are on file at DEQ, are: RCRA Subtitle C Landfill, RCRA Subtitle D Landfill; fencing around landfills; settlement monuments on the landfills; site drainage structures; soil capped areas of bioremediation to 90% reduction of total organic compounds, groundwater monitoring wells; vegetation of site and landfills. The map attached hereto as "Attachment A" demonstrates the ORC South Affected Property where the Engineering Controls are placed. However, if any of these items are not marked on Attachment A, the control regarding the unmarked item is still applicable.

ORC North:

The current Engineering Controls at ORC North currently include a site fence and groundwater monitoring wells.

CONTINUING OPERATION, MAINTENANCE AND MONITORING:

ORC South:

The Continuing Operation, Maintenance and Monitoring at ORC South is listed in the ORC Completion Report of March 2003, which is on file at DEQ. Activities include: monitoring and maintaining viable vegetation to prevent erosion of the landfill caps, including but not limited to mowing the cap and site as needed and repair of erosion; groundwater sampling as needed; and maintaining the monitoring wells. The map attached hereto as "Attachment A" demonstrates the the Affected Property where Continuing Operation, Maintenance and Monitoring are required. However, if any of these items are not marked on Attachment A, the unmarked item is still applicable.

ORC North:

The Continuing Operation, Maintenance and Monitoring at ORC North are listed in the ORC Completion Report of March 2003, which is on file at DEQ. Activities include: groundwater sampling as needed and maintaining the monitoring wells and fence.

LAND USE RESTRICTIONS:

a. Except as approved by the DEQ or the EPA for site characterization and/or site remediation, all activities that interfere with, cause delay of, cause damage to, or otherwise negatively affect and/or impact the implementation or performance of the:

i. Remediation Activities;
ii. Engineering Controls; or
iii. Continuing Operation, Maintenance and Monitoring,

described herein for ORC South and ORC North are strictly prohibited.

b. **For ORC South:**

Specific landfills, landfill and/or soil caps, monitoring wells, drainage pipes, appurtenances, fence(s), and structures described herein below are designated as such on the map attached hereto as Attachment A. However, if any of these items are not marked on Attachment A, the restriction regarding the unmarked item is still applicable and shall not render the restriction ineffective. Except as approved by the DEQ or the EPA for site characterization and/or site remediation, in addition to, and in conjunction with the restrictions described in subparagraph (a) of this section, the Land Use Restrictions that apply specifically at ORC South are:

i. no digging, boring or any other activity that would disturb or impact the landfills or the landfill caps;
ii. no disturbing the drainage pipes and appurtenances located in, and/or associated with the landfill cap;
iii. no drilling any type of wells through the landfill cap or into the landfill,
iv. no disturbing the fence around the landfills;
v. no building on or over the landfill cap;
vi. no placing anything on the landfill cap other than materials to maintain the cap;
vii. no disturbing the monitoring wells;
viii. no drilling of any new wells;
ix. no disturbing the drainage structures;
x. no disturbing the soil caps in place at the landfills;
xi. no use of groundwater for any purpose;
xii. no removing any soil or waste from ORC South;
xiii. no disturbing any waste located, stored or disposed at ORC South;
xiv. no depositing any waste at ORC South;
xv. no activities that will cause soil erosion, including but not limited to destruction of vegetation; and
xvi. no livestock may be allowed to graze on the landfill.

c. **For ORC North:**

Except as approved by the DEQ or the EPA for site characterization and/or site remediation, in addition to the restrictions described in paragraph (a) of this section, the Land Use Restrictions that apply specifically at ORC North are:

i. no digging or soil borings into soil or waste;
ii. no disturbing monitoring wells;
iii. no drilling of any new wells;
iv. no use of groundwater;

v. no removing any soil or waste from ORC North;
vi. no disturbing any waste located, stored or disposed at ORC North;
vii. no depositing any waste at ORC North; and
viii. no activities that will cause soil erosion, including but not limited to destruction of vegetation.

Soil caps and landfills are designated as such on the map attached hereto as Attachment A, and monitoring wells, drainage pipes, appurtenances, fence(s), and structures described herein are within the boundaries of the real property represented on the map attached hereto as Attachment A. If any of these items are not marked on Attachment A, the restriction regarding the unmarked item is still applicable and shall not render the restriction ineffective.

d. Changes to the Land Use Restrictions may be accomplished at either ORC South or ORC North in the following manner:

i. A Work Plan, including a schedule for completion of tasks, may be submitted to the DEQ to conduct further site characterization, remediation, modify existing engineering controls, or install new engineering controls at the Site. The DEQ may require oversight costs and public participation as a part of the Work Plan. If the DEQ approves the Work Plan, the person requesting the change in land use must complete the tasks set forth therein. Upon completion of the tasks set forth in the Work Plan, the person requesting the change in land use must certify to the DEQ that the Work Plan has been completed. The DEQ at its discretion may determine that completion of the Work Plan will achieve levels protective of human health and the environment for the new land use being requested. Upon making this determination, the DEQ will file a recordable notice of remediation pursuant to 27A O.S. 2-7-123 in the land records in the office of the county clerk where the Site is located designating the new land use; or,

ii. Information may be submitted to the DEQ that demonstrates the levels of contaminants at the site are appropriate for the proposed new land use and that further remediation is not necessary. The person requesting the change in land use must demonstrate to the DEQ's satisfaction that the contamination at the site is present at levels appropriate for the proposed new land use. The DEQ may require oversight costs and public participation as a part of its review of the new information to support the requested change in land use. The DEQ at its discretion may determine, based on the new information submitted, that contaminants are present at the Site at levels that will not pose a risk to human health or the environment if the new land use being requested is allowed. Upon making this determination, the DEQ will file a recordable notice of remediation pursuant to 27A O.S. 2-7-123 in the land records in the office of the county clerk where the site is located designating the new land use.

e. The land use may not be changed until after the DEQ has filed a recordable notice of remediation pursuant to 27A O.S. 2-7-123 in the land records in the office of the county clerk where the Affected Property is located designating the new land use.

Proposals to change the Land Use Restrictions for the Affected Property, and questions regarding this Notice should be addressed to: Department of Environmental Quality, Office of the General Counsel, P.O. Box 1677, Oklahoma City, Oklahoma 73101-1677. The DEQ's Office of General Counsel is located on the 7th floor, 707 North Robinson, Oklahoma City, Oklahoma.

This Notice and the Land Use Restrictions contained herein run with the land and no change of ownership of the Affected Property will change the Land Use Restrictions described herein above. This Notice and the Land Use Restrictions contained herein are effective upon the date of signature by the Executive Director of the DEQ.

Steven A. Thompson, Executive Director
Oklahoma Department of Environmental Quality

December 1, 2005
Date

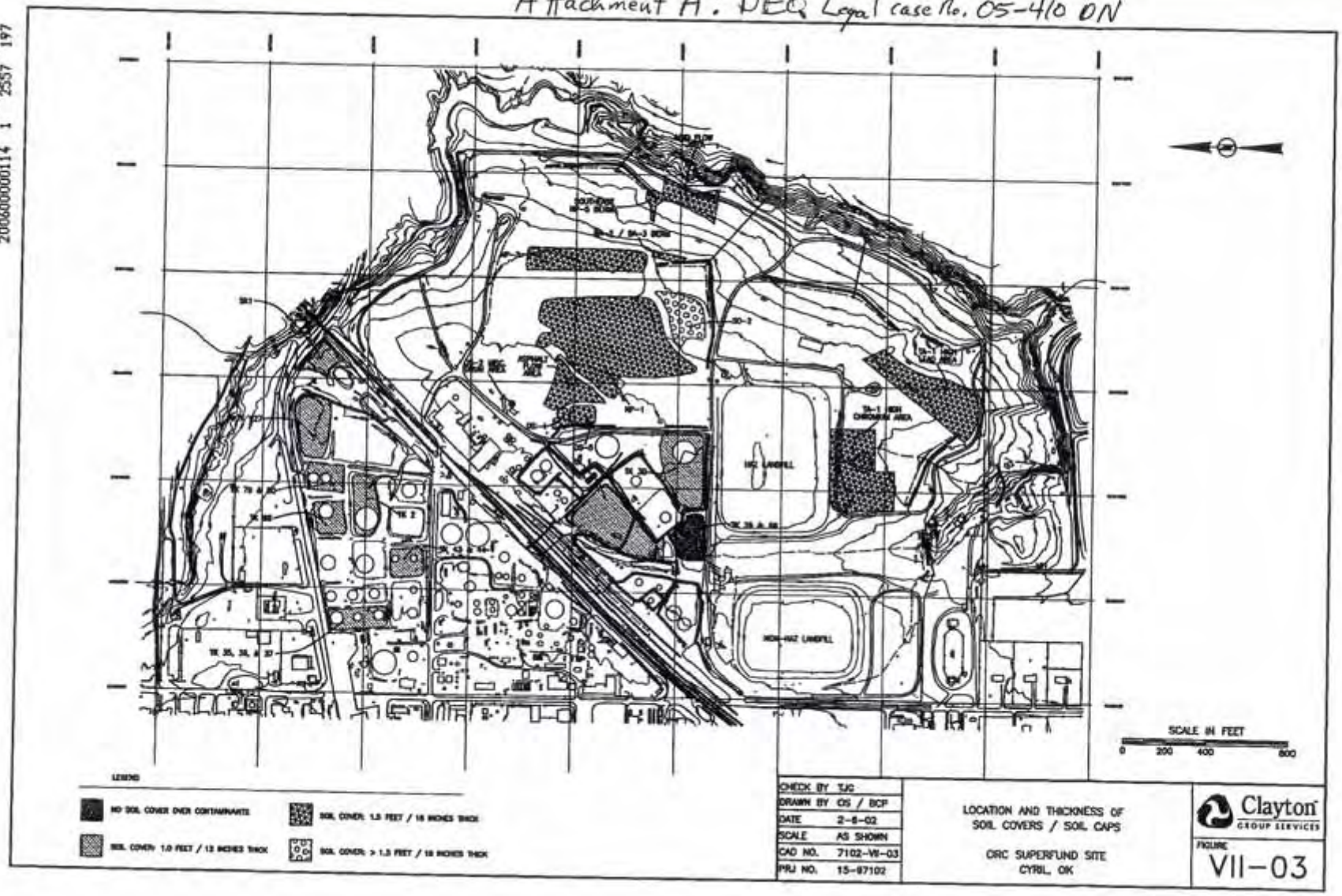
Subscribed and sworn to before me this 1ST day of December, 20 05.

Notary Public
Oklahoma County, OK

AMBER M. DOWNS NOTARY PUBLIC #04005003 EXP 07/08 IN AND FOR STATE OF OKLAHOMA CLEVELAND COUNTY

My Commission Expires: _____, 20__.

Attachment A: DEQ Legal case No. 05-410 ON



CHECK BY	TJC
DRAWN BY	CS / BCP
DATE	2-8-02
SCALE	AS SHOWN
CAD NO.	7102-W-03
PRJ NO.	15-97102

LOCATION AND THICKNESS OF SOIL COVERS / SOIL CAPS

ORC SUPERFUND SITE
CYRIL, OK

Clayton GROUP SERVICES

FIGURE
VII-03

Attachment 7

Notices to the Public Regarding the Five-Year Review

BERNARD HODES GROUP
220 East 42nd Street, 15th Floor, New York, NY 10017

PROOF OF INSERTION

Client: CH2MHILL
Publication: CRYRIL NEWS
Insertion Dates: Wed, Mar 21,

AT11469

11469

OKLAHOMA REFINING COMPANY SUPERFUND SITE PUBLIC NOTICE

U.S. EPA Region 6 Begins Second Five-Year Review of Site Remedy

March 2007

The U.S. Environmental Protection Agency Region 6 (EPA) has begun the second Five-Year Review of the remedy for the Oklahoma Refining Company Superfund Site in Cyril, Oklahoma. The review will evaluate the ability of the remedy to continue to correct contamination problems and protect public health and the environment. The site is located on South Baskett Street in Cyril.

Once completed, the results of the second Five-Year Review will be made available to the public at the following information repositories:

Cyril City Hall
112 West Main Street
Cyril, Oklahoma 73029

Oklahoma Department of Environmental Quality
707 N. Robinson
6th Floor Central Records
Oklahoma City, Oklahoma 73102

Information about the Oklahoma Refining Company Site also is available on the Internet at www.epa.gov/earth1r6/6sf/pdffiles/0601172.pdf.

For more information about the Oklahoma Refining Company Site contact Michael Hebert, Remedial Project Manager, at (214) 665-8315 or 1-800-533-3508 (toll-free) or by e-mail at hebert.michael@epa.gov.