United States
Environmental Protection
Agency

First Five-Year Review Report

City of Perryton Well No. 2 Superfund Site
Perryton, Ochiltree County, Texas

August 2008

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

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FIRST FIVE-YEAR REVIEW

City of Perryton Well No. 2 Superfund Site
EPA ID# TX0001399435
Perryton, Ochiltree County, Texas

This memorandum documents the United States Environmental Protection Agency's (EPA's) performance, determinations, and approval of the City of Perryton Well No. 2 Superfund Site (Site) First Five-Year Review under section 121(c) of the Comprehensive Environmental Response, Compensation & Liability Act (CERCLA), 42 United States Code (USC) §§9621, *et seq.* as provided in the attached First Five-Year Review Report.

Summary of First Five-Year Review Findings

The assessment of the Site during this first five-year review is that the remedy is functioning as designed, and the extraction, treatment, and monitoring of the ground water is being conducted as required under the 2002 Record of Decision (ROD). The remedy was implemented to prevent further migration of a carbon tetrachloride (CTC) plume in the Ogallala aquifer and restore the aquifer to its beneficial use as a drinking water supply. The implemented remedy consisted of two ground water extraction wells, an Air Stripper Treatment Plant, and beneficial reuse of the treated water by the City of Perryton. The pump and treat system (P&T) has achieved cleanup of the primary ground water producing zone in the Ogallala aquifer. The remedy has not achieved cleanup of the upper zone in the Ogallala aquifer, which is not considered to be a primary production zone for the City of Perryton.

The following issues identified during this five-year review affect the long-term protectiveness of the remedy.

1. **The contamination present in the Upper Zone and Lower Unit 2 is not currently addressed by the P&T system.** The ground water contamination currently exceeds the site cleanup goals for CTC in the Upper Zone and Lower Unit 2 and for nitrate in the Upper Zone. Due to the overall heterogeneous nature and low permeability of the Upper Zone and Lower Unit 2, contaminated ground water in these zones cannot be effectively remediated using P&T technology. These zones are considered to be perched zones, and the primary ground water production zone in the Perryton area is Unit 3. Site data collected since October 2002 demonstrates that the existing P&T system, which pumps ground water from Unit 3, has had little or no effect on the contamination present in these perched zones.

2. **The annulus of Well No. 2 is constructed such that it acts as a contaminant migration pathway.** The vertical hydraulic gradient at the site is downward, from the Upper Zone and Lower Unit 2 into Unit 3. Well No. 2 was constructed such that the gravel pack in the well annulus extends from its total depth up to 15 feet below ground surface. This gravel pack allows for the preferential flow of contaminated ground water from the Upper Zone and Lower Unit 2 into Unit 3. Contaminant rebound sampling performed during October and November 2007, when the P&T system was shut down, confirmed that CTC migrates down the annulus at Well No. 2.

   CTC concentrations have declined below the MCL in Unit 3, and Well No. 2 is only pumped now to capture any contamination that migrates down the annulus of the well. Since the monthly CTC mass removal rate peaked in January 2004 at 2.12 pounds, the current monthly CTC mass removal rate has decreased to 0.12 pounds in May 2008. As the amount of CTC mass removed by the ASTP levels off at low monthly rates, continued operation of the ASTP becomes less cost

effective. Until the annulus of Well No. 2 is sealed between Unit 3 and Units 1 and 2, the well will continue to have to be pumped to capture contaminated ground water that migrates down the annulus of the well.

3. **The ROD did not include the use of institutional controls to protect the remedy effectiveness because the remedy was anticipated to achieve the cleanup goals throughout the Ogallala aquifer.** Since ground water standards will likely not be achieved in the Upper Zone and Lower Unit 2, the use of institutional controls may be necessary to prevent the installation of a private well that would create a migration pathway between the contaminated Upper Zone and the remediated Lower Unit 3. While the presence of City personnel, along with the periodic presence of remediation personnel, make it unlikely that the installation of ground water well for drinking or irrigation would go undetected, such institutional controls are necessary for the long-term protection of public health.

4. **During the site inspection, several monitor wells were found to be in need of minor repairs.** Most of the locks on the monitor wells were rusted to the point that they no longer function properly. The expansion plugs and polyvinyl chloride (PVC) caps on some monitor wells are worn and may not provide an effective long-term seal against surface water intrusion into the monitor wells, and the well vaults on some monitor wells need new O-rings to prevent surface water intrusion into the well vaults. The well pads, skirts, and lids were all in good condition.

5. **The Southwestern Railroad tracks have been abandoned, and there is a potential for future land use changes along the railroad easement next to the Perryton Equity Exchange (PEX) grain silos, as well as at the PEX property.** The source of the ground water contamination originated at the grain silos through the past use of carbon tetrachloride as a fumigant. Soil vapor sample data collected during the RI did not indicate the presence of an ongoing release of carbon tetrachloride from the PEX grain silos or along the railroad easement. However, shallow subsurface data for purposes of assessing the vapor intrusion pathway were not collected on the PEX property near the grain silos or storage bins. While a decision regarding future land use along the railroad easement has not been made, the risk of vapor intrusion from soil vapor to indoor air would need to be determined if buildings are constructed for human occupancy.

Actions Needed

To address these issues, the following recommendations and follow-up actions have been defined.

1. The EPA is currently assessing whether it is technically impracticable from an engineering perspective to achieve the cleanup goals (MCLs) and address the contamination present in the Upper Zone and Lower Unit 2 within a reasonable timeframe. If it is deemed technically impracticable to achieve the MCLs for CTC and nitrate in these zones, then a Technical Impracticability (TI) Waiver may be prepared that waives the MCLs as Applicable or Relevant and Appropriate Requirements (ARARs) for the Upper Zone and Lower Unit 2. The TI Waiver and ROD Amendment would be required for the MCLs to be waived as ARARs for the Upper Zone and Lower Unit 2. Since contamination would remain in place above levels that allow for unrestricted use and unlimited exposure to ground water in the affected portion of the aquifer, statutory five-year reviews would be required so long as CTC and nitrate concentrations remain above the MCLs.

2. Options to address the annulus of Well No. 2 should be evaluated. Unless this migration pathway is addressed, contamination will continue to migrate from the overlying perched portions of the

aquifer into the primary ground water production zone at the site in Unit 3. The existence of this migration pathway necessitates operation of Well No. 2 to remove contamination that is migrating down the annulus. The EPA is currently evaluating options to address the Well No. 2 annulus as part of the overall site strategy assessment for the future of the LTRA. If the annulus is sealed, then a decision can be made regarding the necessity of continued operation of the ASTP.

3. Identify available institutional controls to protect the remedy effectiveness and prevent re-contamination of the Lower Zone Unit 3 via private wells installed through the contaminated portion of the Upper Zone and Lower Unit 2.

4. Perform maintenance and repair work on the site monitor wells. The locks should be replaced on all conventional monitor wells in order to prevent unauthorized access to the wells. The expansion plugs and PVC well caps should be replaced where necessary to prevent surface water infiltration into the monitor wells. The O-rings on the well vault lids should be replaced where necessary to prevent surface water infiltration into the well vaults.

5. The railroad easement and PEX property overlying the ground water plume between Main Street and SW Third Avenue should continue to be monitored for future land use changes. If plans are identified that include the construction of occupied buildings within this area, an assessment of potential exposure to CTC through the vapor intrusion to indoor air pathway should be performed prior to construction. The EPA may decide to perform this assessment prior to any changes in land use on these properties.

Determinations

I have determined that the selected remedy for the City of Perryton Well No. 2 Superfund Site is performing as intended, and is currently protective of human health and the environment. The remedy will attain long-term remedy protectiveness provided the issues and resulting recommendations provided in the First Five-Year Review Report are addressed.

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

9/9/08
Date

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Concurrence List
First Five Year Review
City of Perryton Well No. 2 Ground Water Plume Superfund Site
EPA CERCLIS ID No. TX0001399435

Vincent Malott, Remedial Project Manager
Superfund Remedial Branch

8-22-2008
Date

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

8/29/08
Date

Donald H. Williams, Deputy Associate Director
Superfund Remedial Branch

9/3/08
Date

Charles Faultry, Associate Director
Superfund Remedial Branch

9/2/08
Date

I-Jung Chiang, Assistant Regional Counsel
Superfund Branch, Office of Regional Counsel

8-22-08
Date

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

09/04/08
Date

Pamela Phillips, Deputy Director
Superfund Division

9/9/08
Date

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Contents

Section **Page**

List of Tables

List of Figures

Attachments

Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
ASTP	Air Stripper Treatment Plant
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CTC	Carbon Tetrachloride
EPA	United States Environmental Protection Agency
FS	Feasibility Study
ft	feet
gpm	Gallons per minute
HDPE	High Density Polyethylene
LTRA	Long-Term Remedial Action
MCL	Maximum Contaminant Level
mg/L	milligram per liter
MPMW	Multiport Monitor Wells
MTBE	Methyl Tertiary Butyl Ether
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NGST	North Ground Storage Tank
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
P&T	Pump and Treat
PEX	Perryton Equity Exchange
PVC	Polyvinyl chloride
RA	Remedial Action
RAO	Remedial Action Objectives
RD	Remedial Design
RI	Remedial Investigation
RO	Reverse Osmosis
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SGST	South Ground Storage Tank
TBCs	To Be Considereds
TCEQ	Texas Commission on Environmental Quality
TDOH	Texas Department of Health
TI	Technical Impracticability
TNRCC	Texas National Resource Conservation Commission
TWC	Texas Water Commission
µg/L	micrograms per liter
USC	United States Code
VOC	Volatile Organic Compound

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Executive Summary

Pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation & Liability Act ("CERCLA" or "Superfund"), 42 United States Code (USC) §§9621(c), the first five-year review of the remedy in place at the City of Perryton Well No. 2 Superfund Site (site) located in Perryton, Ochiltree County, Texas, was completed in June 2008. The Record of Decision (ROD) for the site selected a remedy that would not result in hazardous substances, pollutants, or contaminants remaining onsite above levels that would allow for unlimited use or unrestricted exposure. However, the ROD states that since the remedy would take more than five years to attain the Remedial Action Objectives (RAOs) and cleanup goals, a policy review would be performed within five years after construction completion for the site (**EPA, 2002**). The results of the 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 City of Perryton Well No. 2 Site consists of a ground water plume of dissolved carbon tetrachloride (CTC) and nitrate. The ground water plume exists within a portion of the Ogallala Aquifer and has impacted the City of Perryton municipal supply Well No. 2. CTC was first discovered in Well No. 2 in 1989. Well No. 2 was removed from service in 1989 due to this discovery. Other contaminants detected in ground water at the site include chloroform, atrazine, and propazine. Investigations of the site were performed during the 1990s, culminating in the United States Environmental Protection Agency's (EPA) issuance of an Interim ROD in 1999 and a Final ROD in 2002 (**EPA, 2002**).

The Interim ROD provided for the installation of an Air Stripper Treatment Plant (ASTP) at the Well No. 2 Site to remove CTC from water pumped from Well No. 2 and provide limited control on further contaminant migration. The final remedy for the site, described by the Final ROD signed in September 2002, included the installation of a second extraction well, increased pumping at Well No. 2, and the construction of a Reverse Osmosis (RO) facility to remove nitrate from water pumped from the extraction wells (**EPA, 2002**).

In accordance with the ROD, activities at the site to-date have included construction and Operation and Maintenance (O&M) of a ground water Pump and Treat (P&T) system and long-term ground water monitoring. The P&T system consists of the ASTP, an RO facility, and two extraction wells (Well No. 2

and MW-17-EX). The original P&T system extracted ground water from a portion the Ogallala Aquifer contaminated with CTC and nitrate. The extracted water was treated in the ASTP to remove CTC contamination, piped to the RO facility to treat nitrate contamination, and then discharged to the City of Perryton's municipal water supply. Due to decreases in contaminant concentrations, operation of the RO facility was discontinued in 2004 and operation of MW-17-EX was discontinued in 2007 (**CH2M HILL, 2007e)**.

Remediation of the site is being performed as a Long-Term Remedial Action (LTRA). The RAOs established in the Final ROD for the site are: 1) prevent or minimize further migration of the plume; and 2) restore ground water throughout the contaminant plume to its expected beneficial use wherever practicable. Current site activities under the LTRA include O&M of the ASTP and long-term ground water monitoring. The ground water monitoring is performed annually. Although Well No. 2 is part of the P&T system, the well is owned and operated by the City of Perryton.

Through implementation of the remedy, the RAOs and cleanup goals (set as the maximum contaminant levels [MCLs] established under the Federal Safe Drinking Water Act) have been met within the lower portion of the Ogallala Aquifer, referred to as Unit 3. Unit 3 is the primary ground water production zone within the Ogallala Aquifer in the Perryton area. The cleanup goals have not yet been met for the upper portions of the Ogallala Aquifer. However, ground water monitoring data indicate that the remaining contaminant plume is stable in size (**CH2M HILL, 2007e)**.

The O&M at the site is currently the responsibility of EPA, and O&M activities are performed by EPA contractor CH2M HILL, Inc. The remedy for the site appears to be well maintained and operating and functioning appropriately and as designed.

The following issues identified during this five-year review affect the long-term protectiveness of the remedy:

1. **The contamination present in the Upper Zone and Lower Unit 2 is not currently addressed by the P&T system.** The ground water contamination currently exceeds the site cleanup goals for CTC in the Upper Zone and Lower Unit 2 and for nitrate in the Upper Zone. Due to the overall heterogeneous nature and low permeability of the Upper Zone and Lower Unit 2, contaminated ground water in these zones cannot be effectively remediated using P&T technology. These zones are considered to be perched zones, and the primary ground water production zone in the Perryton

area is Unit 3. Site data collected since October 2002 demonstrates that the existing P&T system, which pumps ground water from Unit 3, has had little or no effect on the contamination present in these perched zones.

2. **The annulus of Well No. 2 is constructed such that it acts as a contaminant migration pathway.** The vertical hydraulic gradient at the site is downward, from the Upper Zone and Lower Unit 2 into Unit 3. Well No. 2 was constructed such that the gravel pack in the well annulus extends from its total depth up to 15 feet below ground surface. This gravel pack allows for the preferential flow of contaminated ground water from the Upper Zone and Lower Unit 2 into Unit 3. Contaminant rebound sampling performed during October and November 2007, when the P&T system was shut down, confirmed that CTC migrates down the annulus at Well No. 2.

   CTC concentrations have declined below the MCL in Unit 3, and Well No. 2 is only pumped now to capture any contamination that migrates down the annulus of the well. Since the monthly CTC mass removal rate peaked in January 2004 at 2.12 pounds, the current monthly CTC mass removal rate has decreased to 0.12 pounds in May 2008. As the amount of CTC mass removed by the ASTP levels off at low monthly rates, continued operation of the ASTP becomes less cost effective. Until the annulus of Well No. 2 is sealed between Unit 3 and Units 1 and 2, the well will continue to have to be pumped to capture contaminated ground water that migrates down the annulus of the well.

3. **The ROD did not include the use of institutional controls to protect the remedy effectiveness because the remedy was anticipated to achieve the cleanup goals throughout the Ogallala aquifer.** Since ground water standards will likely not be achieved in the Upper Zone and Lower Unit 2, the use of institutional controls may be necessary to prevent the installation of a private well that would create a migration pathway between the contaminated Upper Zone and the remediated Lower Unit 3. While the presence of City personnel, along with the periodic presence of remediation personnel, make it unlikely that the installation of ground water well for drinking or irrigation would go undetected, such institutional controls are necessary for the long-term protection of public health.

4. **During the site inspection, several monitor wells were found to be in need of minor repairs.** Most of the locks on the monitor wells were rusted to the point that they no longer function properly. The expansion plugs and polyvinyl chloride PVC caps on some monitor wells are worn and may not provide an effective long-term seal against surface water intrusion into the monitor wells, and the

well vaults on some monitor wells need new O-rings to prevent surface water intrusion into the well vaults. The well pads, skirts, and lids were all in good condition.

5. **The Southwestern Railroad tracks have been abandoned, and there is a potential for future land use changes along the railroad easement next to the Perryton Equity Exchange (PEX) grain silos, as well as at the PEX property.** The source of the ground water contamination originated at the grain silos through the past use of carbon tetrachloride as a fumigant. Soil vapor sample data collected during the Remedial Investigation did not indicate the presence of an ongoing release of carbon tetrachloride from the PEX grain silos or along the railroad easement. However, shallow subsurface data for purposes of assessing the vapor intrusion pathway were not collected on the PEX property near the grain silos or storage bins. While a decision regarding future land use along the railroad easement has not been made, the risk of vapor intrusion from soil vapor to indoor air would need to be determined if buildings are constructed for human occupancy.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name: City of Perryton Well No. 2 Superfund Site

EPA ID: TX0001399435

Region: EPA Region 6	**State:** Texas	**City/County:** Perryton/Ochiltree

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:** September 30, 2003

Has site been put into reuse? Yes x No

REVIEW STATUS

Reviewing agency: x EPA State Tribe Other Federal Agency:

Author Name: Vincent Malott

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

Review period: April 2008 through June 2008

Date(s) of site inspection: May 12, 2008

Type of review:

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

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

Triggering action:

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

Triggering action date: September 30, 2003

Due date (five years after triggering action date): September 30, 2008

Five-Year Review Summary Form

Issues: Operations and Maintenance (O&M) associated with the Long-Term Remedial Action (LTRA) is ongoing at the site, and based on the data review, site inspection, interviews, and technical assessment, it appears the remedy is functioning as intended by the decision documents. The following issues identified during this five-year review affect the long-term protectiveness of the remedy.

1. **The contamination present in the Upper Zone and Lower Unit 2 is not currently addressed by the Pump and Treat (P&T) system.** The ground water contamination currently exceeds the site cleanup goals for carbon tetrachloride (CTC) in the Upper Zone and Lower Unit 2 and for nitrate in the Upper Zone. Due to the overall heterogeneous nature and low permeability of the Upper Zone and Lower Unit 2, contaminated ground water in these zones cannot be effectively remediated using P&T technology. These zones are considered to be perched zones, and the primary ground water production zone in the Perryton area is Unit 3. Site data collected since October 2002 demonstrates that the existing P&T system, which pumps ground water from Unit 3, has had little or no effect on the contamination present in these perched zones.
2. **The annulus of Well No. 2 is constructed such that it acts as a contaminant migration pathway.** The vertical hydraulic gradient at the site is downward, from the Upper Zone and Lower Unit 2 into Unit 3. Well No. 2 was constructed such that the gravel pack in the well annulus extends from its total depth up to 15 feet below ground surface. This gravel pack allows for the preferential flow of contaminated ground water from the Upper Zone and Lower Unit 2 into Unit 3. Contaminant rebound sampling performed during October and November 2007, when the P&T system was shut down, confirmed that CTC migrates down the annulus at Well No. 2.

   CTC concentrations have declined below the Maximum Contaminant Level (MCL) in Unit 3, and Well No. 2 is only pumped now to capture any contamination that migrates down the annulus of the well. Since the monthly CTC mass removal rate peaked in January 2004 at 2.12 pounds, the current monthly CTC mass removal rate has decreased to 0.12 pounds in May 2008. As the amount of CTC mass removed by the Air Stripper Treatment Plant (ASTP) levels off at low monthly rates, continued operation of the ASTP becomes less cost effective. Until the annulus of Well No. 2 is sealed between Unit 3 and Units 1 and 2, the well will continue to have to be pumped to capture contaminated ground water that migrates down the annulus of the well.
3. **The Record of Decision (ROD) did not include the use of institutional controls to protect the remedy effectiveness because the remedy was anticipated to achieve the cleanup goals throughout the Ogallala aquifer.** Since ground water standards will likely not be achieved in the Upper Zone and Lower Unit 2, the use of institutional controls may be necessary to prevent the installation of a private well that would create a migration pathway between the contaminated Upper Zone and the remediated Lower Unit 3. While the presence of City personnel, along with the periodic presence of remediation personnel, make it unlikely that the installation of ground water well for drinking or irrigation would go undetected, such institutional controls are necessary for the long-term protection of public health.
4. **During the site inspection, several monitor wells were found to be in need of minor repairs.** Most of the locks on the monitor wells were rusted to the point that they no longer function properly. The expansion plugs and polyvinyl chloride (PVC) caps on some monitor wells are worn and may not provide an effective long-term seal against surface water intrusion into the monitor wells, and the well vaults on some monitor wells need new O-rings to prevent surface water intrusion into the well vaults. The well pads, skirts, and lids were all in good condition.
5. **The Southwestern Railroad tracks have been abandoned, and there is a potential for future land use changes along the railroad easement next to the Perryton Equity Exchange (PEX) grain silos, as well as at the PEX property.** The source of the ground water contamination originated at the grain silos through the past use of carbon tetrachloride as a fumigant. Soil vapor sample data collected during the Remedial Investigation (RI) did not indicate the presence of an ongoing release of carbon tetrachloride from the PEX grain silos or along the railroad easement. However, shallow subsurface data for purposes of assessing the vapor intrusion pathway were not collected on the PEX property near the grain silos or storage bins. While a decision regarding future land use along the railroad easement has not been made, the risk of vapor intrusion from soil vapor to indoor air would need to be determined if buildings are constructed for human occupancy.

Five-Year Review Summary Form

Recommendations and Follow-up Actions: To address these issues, the following recommendations and follow-up actions have been defined:

1. **The EPA is currently assessing whether it is technically impracticable from an engineering perspective to achieve the cleanup goals (MCLs) and address the contamination present in the Upper Zone and Lower Unit 2 within a reasonable timeframe.** If it is deemed technically impracticable to achieve the MCLs for CTC and nitrate in these zones, then a Technical Impracticability (TI) Waiver may be prepared that waives the MCLs as Applicable or Relevant and Appropriate (ARARs) for the Upper Zone and Lower Unit 2. The TI Waiver and ROD Amendment would be required for the MCLs to be waived as ARARs for the Upper Zone and Lower Unit 2. Since contamination would remain in place above levels that allow for unrestricted use and unlimited exposure to ground water in the affected portion of the aquifer, statutory five-year reviews would be required so long as CTC and nitrate concentrations remain above the MCLs.

2. **Options to address the annulus of Well No. 2 should be evaluated.** Unless this migration pathway is addressed, contamination will continue to migrate from the overlying perched portions of the aquifer into the primary ground water production zone at the site in Unit 3. The existence of this migration pathway necessitates operation of Well No. 2 to remove contamination that is migrating down the annulus. The EPA is currently evaluating options to address the Well No. 2 annulus as part of the overall site strategy assessment for the future of the LTRA. If the annulus is sealed, then a decision can be made regarding the necessity of continued operation of the ASTP.

3. **Identify and implement institutional controls.** Identify available institutional controls to protect the remedy effectiveness and prevent re-contamination of the Lower Zone Unit 3 via private wells installed through the contaminated portion of the Upper Zone and Lower Unit 2.

4. **Perform maintenance and repair work on the site monitor wells.** The locks should be replaced on all conventional monitor wells in order to prevent unauthorized access to the wells. The expansion plugs and PVC well caps should be replaced where necessary to prevent surface water infiltration into the monitor wells. The O-rings on the well vault lids should be replaced where necessary to prevent surface water infiltration into the well vaults.

5. **The railroad easement and PEX property overlying the ground water plume between Main Street and SW Third Avenue should continue to be monitored for future land use changes.** If plans are identified that include the construction of occupied buildings within this area, an assessment of potential exposure to CTC through the vapor intrusion to indoor air pathway should be performed prior to construction. The EPA may decide to perform this assessment prior to any changes in land use on these properties.

Protectiveness Statement(s): The remedy implemented at the City of Perryton Well No. 2 Site currently protects human health and the environment. The ground water extraction system has achieved the cleanup goals for the contaminated ground water in the Lower Zone Unit 3 of the Ogallala aquifer, which is the primary production zone for the Perryton municipal water supply wells. CTC concentrations in the extraction wells, Well No. 2 and MW-17-EX, have fluctuated above and below the MCL since 2006 and have remained below the MCL since January 2008. Nitrate concentrations have been below the MCL in the two extraction wells since March 2004. CTC and nitrate concentrations in the monitoring wells screened in Unit 3 are also below the MCLs. The extracted ground water is successfully treated to meet drinking water standards (MCLs) and discharged to the City of Perryton's municipal water supply system. Continued O&M and long-term monitoring will ensure that the remedy continues to be protective in the short term.

The remedy is not considered to be protective in the long-term since the ground water extraction system is not able to achieve the cleanup goals for the Upper Zone and Lower Unit 2 of the Ogallala aquifer. While the Upper Zone and Lower Unit 2 are considered perched zones that do not produce significant quantities of ground water, this perched zone will continue to act as a potential source area to re-contaminate the Lower Zone Unit 3. Long-

Five-Year Review Summary Form

term protectiveness will be achieved by taking the necessary actions to address issues 1, 2, 3, 4, and 5 as discussed above. These actions are estimated to take approximately 24 months to complete. While the ground water remedy continues to operate and/or is modified, a vapor intrusion evaluation will be performed within the former source area at the PEX grain silos. Currently, vapor intrusion is not a complete exposure pathway at the site but may be complete in the future if buildings are constructed in the source area for human occupancy.

Other Comments: The site is generally well maintained and operated.

First Five-Year Review Report
City of Perryton Well No. 2 Superfund Site

The United States Environmental Protection Agency (EPA) Region 6 has conducted a first five-year review of the remedial actions implemented at the City of Perryton Well No. 2 Superfund Site (site), for the period between September 2003 (when the Preliminary Closeout Report was signed) to September 2008. The site is located in the City of Perryton, Ochiltree County, Texas. 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 recommendations to address them. This First Five-Year Review Report documents the results of the review for the City of Perryton Well No. 2 Site, conducted in accordance with EPA guidance on five-year reviews.

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

1.0 Introduction

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) §§9601, *et seq*. and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) §§300, *et seq*., call for five-year reviews of certain CERCLA remedial actions. The statutory requirement to conduct a five-year review was added to CERCLA as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA), P.L. 99-499. The EPA may also conduct five-year reviews as a matter of policy for sites not addressed specifically by the statutory requirement. The EPA classifies each five-year review as either "statutory" or "policy" depending on whether it is being required by statute or is being conducted as a matter of policy. The first five-year review for the City of Perryton Well No. 2 Site is being conducted as a matter of EPA policy.

As specified by CERCLA and the NCP, statutory reviews are required for sites where, after remedial actions are complete, hazardous substances, pollutants, or contaminants will remain onsite at levels that will not allow for unrestricted use or unrestricted exposure. Statutory reviews are required at such sites if

the Record or Decision (ROD) was signed after the effective date of SARA. CERCLA §§121(c), as amended, 42 USC §§9621(c), states:

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

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

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

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

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

The second type of action described above (item 2) corresponds to the remedy selected for the City of Perryton Well No. 2 Site; therefore, this five-year review is being conducted as a matter of policy. The ROD for the site, signed on September 26, 2002, specified that a policy five-year review is required for the site because, although the remedy would not leave hazardous substances, pollutants, or contaminants onsite above levels that allow for unlimited use and unrestricted exposure, the remedy would take more than five years to attain the Remedial Action Objectives (RAOs) and cleanup goals. The ROD stipulated that the policy review would be conducted within five years of construction completion for the site (**EPA,**

2002). This is the first five-year review for the site. The triggering action for this policy review is the site construction completion date of September 30, 2003.

2.0 Site Chronology

A chronology of significant site events and dates is included in **Table 1**, provided at the end of the report text. Sources of this information are listed in **Attachment 1, 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 City of Perryton Well No. 2 Superfund Site is located in the City of Perryton, Ochiltree County, Texas, in the far northern panhandle portion of the state (see **Figure 1** for a site map). The City of Perryton has a population of approximately 7,500 residents. Well No. 2 is located on a 1.7 acre, city-owned maintenance yard (the City of Perryton Warehouse) at the intersection of North Amherst Street and Santa Fe Avenue. This maintenance yard is used by the City of Perryton Utility Department. An elevated steel water storage tank is located directly south of the well. The maintenance yard is bordered to the south by the Southwestern Railroad tracks and the Perryton Equity Exchange (PEX), which is a grain storage facility. An electrical substation is located along the east side of the maintenance yard, the Southwestern Electric Public Supply is located to the north, and private residences are located to the west of the maintenance yard. An above ground storage tank (the North Ground Storage Tank [NGST]), used to store water as part of the City's municipal supply system, is located north of the Southwestern Electric Public Supply (**EPA, 2002**).

The site is a ground water plume of dissolved carbon tetrachloride (CTC) and nitrate. Low concentrations of chloroform, atrazine, and propazine are also detected in the site ground water. The ground water plume occurs within the Ogallala Aquifer, which is the source of drinking water for the City of Perryton. Portions of the site remedy, including an Air Stripper Treatment Plant (ASTP) and Reverse Osmosis (RO)

facility are located near Well No. 2 at the City of Perryton Warehouse. A second extraction well (MW-17-EX) is located in front of Perryton City Hall on SE Second Avenue (see **Figure 1**).

The Ogallala aquifer supplies drinking water for the City of Perryton as well as water for irrigation and other agricultural uses in the surrounding areas. The water table is present at a depth of 265 feet (ft) below ground surface (bgs). The aquifer at the site is heterogeneous in nature, being composed of interbedded sand, silt, and clay layers. The aquifer is divided into an Upper and Lower Zone based on observed differences in water level elevations. The site hydrogeology is further subdivided into five hydrogeologic units, designated as Unit 1, Upper Unit 2, Lower Unit 2, Unit 3, and Unit 4. The Upper Zone is composed of Unit 1 and Upper Unit 2, and the Lower Zone is composed of Lower Unit 2, Unit 3, and Unit 4. The Upper and Lower Zones are separated by the primarily low permeability silt and clay layers that occur within Upper and Lower Unit 2. These lower permeability strata prevent or reduce the vertical movement of ground water between the Upper and Lower Zones. Water levels in the Upper Zone are approximately 30 to 40 ft higher than water levels in the Lower Zone, and a downward vertical flow gradient exists at the site between the two zones (**CH2M HILL, 2007e**). A cross-section presenting the site hydrogeology is provided on **Figure 2**.

Principal ground water production in the Perryton area occurs in the Lower Zone, primarily in Unit 3, which behaves as a confined aquifer. Unit 3 is the most permeable hydrogeologic unit at the site. Ground water in the Upper Zone behaves as a perched aquifer with limited lateral and vertical ground water flow. Ground water is unconfined within Unit 1 and Upper Unit 2. Lateral and vertical ground water flow within Upper and Lower Unit 2 is limited due to the heterogeneous nature and overall low permeability of the strata present within these units. Ground water flows towards Well No. 2 in the Upper Zone and towards the south-southeast in the Lower Zone (water level flow direction maps can be found on **Figures 2** and **3** in **Attachment 6**) (**CH2M HILL, 2007b**).

Well No. 2 was constructed in 1946 to a total depth of 420 ft and is screened from 330 ft to 415 ft in the Ogallala aquifer. The annular space between the well casing and borehole is filled with gravel from the total depth of the well to approximately 15 ft bgs. A cement grout seal was placed from 15 ft to ground surface with a 6 ft by 6 ft concrete pad at the surface (**EPA, 2002**). The annulus of Well No. 2 is likely the primary contaminant migration pathway between the Upper and Lower Zones at the site (**CH2M HILL, 2007e**, and **Attachment 6**).

3.2 Land and Resource Use

Land use in the site area includes agricultural, residential, industrial, commercial, and recreational uses. Agricultural uses occur primarily to the north of the site. Well No. 2 is surrounded by residential neighborhoods to the north and west, with the closest residence located 200 ft from Well No. 2. The Southwestern Railroad tracks and the PEX are located directly south of Well No. 2. Commercial businesses are located along Main Street east of the site, and the downtown commercial district of Perryton is located south of the railroad tracks and PEX and southeast of Well No. 2 (**CH2M HILL, 2001a**).

The City of Perryton is located within the High Plains geographic region, which forms a southeast sloping plateau consisting of level to gently rolling prairie. The topographic relief at the site is relatively flat and dips gently towards the southeast. Local relief does occur along shallow drainage ditches and intermittent lakes, commonly called playa lakes. The area is poorly drained due to the flat topography and low infiltration rate of area soils. Surface water resources in the area are limited due to the limited amount of rainfall and high evaporation rates (**CH2M HILL, 2001a**).

The City of Perryton is solely dependent on the Ogallala Aquifer for its drinking water supply. Well No. 2 is one of 11 municipal wells used by the City of Perryton to provide drinking water. The other supply wells located near the site include Wells No. 1, 3, and 4 (see **Figure 1**). The Ogallala Aquifer's future beneficial use will continue as a drinking water supply since there are no other reasonably anticipated alternatives for a drinking water supply.

3.3 History of Contamination

The primary contaminants in ground water at the site include CTC and nitrate. Low concentrations of chloroform, atrazine, and propazine have also been detected in the site ground water (**EPA, 2002**).

The PEX facility historically used an 80/20 fumigant mixture within the grain storage bins and silos located south of the site. The fumigant consisted of 80 percent CTC and 20 percent carbon disulfide. The fumigant was applied at the top of the silos from 1 to 5 gallon storage containers. CTC and chloroform (which can occur as a breakdown product of CTC) are both chlorinated volatile organic compounds (VOCs) that have a tendency to partition from a liquid to a vapor phase. The CTC vapors are denser than ambient air and are one reason why CTC can be applied at the top of grain storage bins as a fumigant. The fumigant was available prior to the 1960's, and its use was discontinued by 1985. The rate of

application was generally 5 to 10 pounds per 1,000 bushels of grain. The active grain silos are constructed of concrete while the inactive storage bins are constructed of wood and metal. Contamination of ground water from grain storage facilities such as that observed in Perryton has also been observed at sites in EPA Region 7, including the Hastings Ground Water Superfund Site in Nebraska, the Farmer's Mutual Cooperative Superfund Site in Iowa, and the Waverly Ground Water Superfund Site in Nebraska.

The City maintenance yard had previously been considered another potential source of CTC contamination at the site based on allegations of CTC storage and use at the maintenance shops and Well No. 2. However, soil vapor test results during the Remedial Investigation (RI) eliminated the city maintenance yard as source area for the CTC contamination (**EPA, 2002**). Therefore, the primary source of the ground water contamination is the past usage of CTC as a fumigant at the PEX.

Although specific sources of CTC contamination within the grain storage facility could not be identified during the RI, residual CTC vapors were detected near the grain silos. The presence of a mobile or residual-phase dense non-aqueous phase liquid has not been identified at the site in the vadose zone or in the ground water with either direct or indirect data. There are no known continuing sources of CTC contamination at the site (**CH2M HILL, 2007e)**.

Nitrate is a primary source of nitrogen for plants and is a compound found in nature. Nitrates are also commonly found in fertilizers, animal wastes, and sewage. Nitrate is highly soluble and mobile in the soil and ground water. Bulk fertilizer storage at the PEX facility was previously considered a potential source for the nitrates observed in ground water at the site, but ground water samples analyzed for nitrogen isotopes during the RI confirmed that the nitrates were from human or animal waste rather than fertilizer. The City of Perryton conducted a survey of the three sewer lines which join together at a manhole located 75 ft south of Well No. 2 and confirmed the clay tile pipes were leaking. The City completed repairs to the lines in February 2002 (**EPA, 2002**).

Atrazine has been classified as a "Restricted Use Pesticide" because of its potential for ground water contamination. Atrazine has been used as an herbicide for controlling broadleaf and grassy weeds in a variety of crops. While the use or storage of atrazine or propazine at the PEX could not be confirmed, their occurrence with CTC in the ground water is an indirect link to the PEX facility (**EPA, 2002**).

3.4 Initial Response

The Texas Department of Health (TDOH) collected an initial round of ground water samples in 1989 after the City of Perryton entered the Wellhead Protection Program. The samples indicated concentrations of benzene were present. Wells No. 1 and 2 and the elevated storage tank were re-sampled. Well No. 1 was not contaminated; however Well No. 2 and the storage tank did have some detections of contaminants and were taken off line and flushed/rinsed respectively (**EPA, 2002**).

The City of Perryton completed a Plan of Action in September 1990 after a flushing exercise did not reduce the amount of CTC in Well No. 2. The Plan recommended that an air stripper be installed to remove the CTC from water pumped by Well No. 2 and the well be placed back in service. The TDOH concurred with the recommendation in October 1990 (**EPA, 2002**).

In November 1990, the Texas Water Commission (TWC, a predecessor agency of the Texas Commission on Environmental Quality [TCEQ]) collected ground water samples from Well No. 2 and soil samples from the area around the well house based on reports that CTC was historically stored there. The ground water samples contained 40 micrograms per liter (µg/L) of CTC. No CTC was detected in the soil samples. The Texas National Resource Conservation Commission (TNRCC, a successor agency to the TWC and predecessor agency to the TCEQ) investigated the site and nearby properties to determine potential sources of the CTC in May 1991. The use of CTC as a fumigant at the PEX was identified. However, after reviewing the information gathered, the TNRCC did not have enough information to prove that any of the potential sources released CTC to the ground water. In August 1992, the TNRCC forwarded the site to EPA for further evaluation under Superfund (**EPA, 2002**).

In February 1993, EPA completed a Site Inspection Prioritization which determined the site could be eligible for further investigation under CERCLA. The site was reassigned for an Expanded Site Investigation in December 1995 by EPA. Additional sampling of Well No. 2 and selected areas of surrounding soil was conducted in April 1996 and a report was submitted in November 1996. Contaminants detected in Well No. 2 included CTC, lead, chloroform, and the herbicides atrazine and propazine. The sampling did not attribute the contaminants detected in Well No. 2 to a specific source. It did determine that the other wells on site (Well No. 1 and Wells No. 3 through 11) were not affected by the contamination observed in Well No. 2 (**EPA, 2002**).

The EPA proposed the site be placed on the NPL on September 29, 1998. The site was placed on the NPL on February 18, 1999. With this, the site could be investigated further and a remedial plan could be put in place with assistance from the Superfund program (**EPA, 2002**).

After additional sampling events and completion of an Engineering Evaluation/Cost Analysis, EPA signed an Interim ROD in 1999. The Interim ROD was signed in order to implement an interim remedy to address water supply problems for the City of Perryton by returning Well No. 2 to service and provide limited hydraulic control of the contaminant plume until the final remedy could be selected and implemented. The Interim ROD selected the installation and operation of an air stripper to treat CTC in ground water pumped from Well No. 2 as an interim remedy. Treated water from the Air Stripper ASTP was blended with water from Well No. 1 in the NGST to reduce nitrate concentrations below the maximum contaminant level (MCL) of 10 milligrams per liter (mg/L) prior to entering the water supply system (**EPA, 1999**). The Remedial Design (RD) of the ASTP was completed by EPA in May 2001. The ASTP was constructed adjacent to Well No. 2 at the City of Perryton Warehouse. Well No. 2 was plumbed directly into the influent lines for the ASTP. Construction of the ASTP was completed in February 2002, and the interim remedy began operation in November 2002 (**CH2M HILL, 2003d**).

3.5 Basis for Taking Action

The purpose of the response actions conducted at the site was to protect public health and welfare and the environment from releases or threatened releases of hazardous substances from the site. Remedial actions taken at the site were deemed necessary based on the results of the TDOH, TWC and the TNRCC sampling events and results of the RI. Due to the land use surrounding the site at the time of the RI, EPA concluded that a residential use scenario was most appropriate for estimating risks posed by the site. Because there were no CTC detections above 70 ft bgs, human exposure to contaminated soil vapor was deemed unlikely (**CH2M HILL, 2001a**). Since operation of Well No. 2 had ceased in 1989, the contaminated ground water was not being used and there were no known existing potential receptors. Ingestion of, inhalation of, and contact with contaminated ground water resulted in an excess cancer risk of 1×10^{-4} (exceeds the upper limit of EPA's target risk range of 1×10^{-6} to 1×10^{-4}) and an estimated non-cancer chronic hazard index of 5.5 (well above EPA's recommended index of 1). The primary threats that the City of Perryton Site posed to public health were direct contact with and ingestion of contaminated site ground water by potential future residents (**EPA, 2002**). A Feasibility Study (FS) to evaluate remedial options for addressing these risks was completed in 2002 (**CH2M HILL, 2002**).

4.0 Remedial Actions

This first five-year review specifically addresses actions taken at the site since construction completion in September 2003 (**EPA, 2003**). This section provides a description of the remedy objectives, selection, and implementation at the site. It also describes the ongoing operations and maintenance (O&M) activities performed and overall progress made at the site in the period since construction completion. The EPA manages the site O&M activities. The site is currently considered a Long-Term Remedial Action (LTRA).

4.1 Remedy Objectives

The specific remedial objectives for the City of Perryton Site LTRA were:

- Prevent or minimize further migration of the contaminant plume
- Restoration of the ground water throughout the contaminant plume to its expected beneficial uses wherever practical (**EPA, 2002**).

In order to achieve the remedial objectives, the ROD established the following remediation goals for the City of Perryton Well No. 2 Site, which were set as the MCLs established under the Federal Safe Drinking Water Act (SDWA):

- CTC - 5 µg/L;
- Chloroform - 100 µg/L;
- Nitrate -10,000 µg/L or 10 mg/L; and,
- Atrazine - 3 µg/L (**EPA 2002**).

4.2 Remedy Selection

Two RODs have been issued by EPA for the City of Perryton Site. An Interim ROD for the site was signed on September 29, 1999. The Interim ROD addressed only the contamination present in Well No. 2 and the resulting loss of water supply to the City of Perryton. The purpose of the Interim ROD was to provide a limited control of ground water contamination until a full-scale remedy was implemented (**EPA, 1999**). The Interim ROD and interim remedy are described in **Section 3.4**. The Final ROD for the site was signed on September 26, 2002. The Final ROD addressed fully the threats to human health and the environment posed by conditions at the site. These threats were determined to be ingestion of contaminated site ground water by future residents. The ROD states that the selected remedy is the final

remedy for the site, and that the remedy addresses remediation of the site's contaminants to below drinking water standards (**EPA, 2002**).

The remedy described in the 2002 Final ROD for the site consisted of the following elements:

- Operation of Well No. 2 at a projected continuous rate of 120 gallons per minute (gpm) to pump contaminated ground water to the ASTP that was constructed as part of the interim remedy.
- Installation of a second extraction well to an approximate depth of 400 ft with a screen interval across the saturated thickness of the Ogallala aquifer. The well will be operated at a projected continuous rate of 120 gpm.
- Installation of underground piping to convey the extracted ground water from the second extraction well to the ASTP.
- Operation of the ASTP to remove VOCs from the extracted ground water. There were no predicted remedy refinements to the ASTP since the ASTP had a 400 gpm capacity, which was deemed sufficient to handle the projected rate of 240 gpm. The ASTP emissions were below the State of Texas limits for such treatment systems, and no further treatment of air emissions was necessary.
- The ROD included 3 options for the removal of nitrates from the extracted ground water, including the use of an ion exchange system, blending with water from other municipal supply wells, or disposal via the sanitary sewer. The ROD selected installation of a 6 inch pipeline to convey the treated water from the ASTP to the South Ground Storage Tank (SGST) for blending with water from other municipal supply wells. The SGST is approximately 1 mile south of Well No. 2, and has a higher dilution capacity than the NGST. The nitrate concentration would be reduced to below the 10 mg/L drinking water standard with a maximum target concentration of 7 mg/L.
- Implementation of a ground water monitoring program to track the plume migration and evaluate the effectiveness of the system to ensure that there is no exposure to contaminants above the drinking water limits.
- Use the existing City of Perryton ordinance already in place requiring issuance of a permit to install new wells to provide notice to EPA of any changes in the exposure scenario at the site. The ROD stipulated that EPA would provide updated plume maps to the City of Perryton to assist in the review of any permits.

- Perform an annual remedy evaluation using O&M and ground water monitoring data, as well as ground water modeling. The evaluation would be used to refine the estimated cleanup timeframe for the site, determine the need for remedy refinements, and evaluate contaminants in the Upper Zone to determine if further investigation or remedial action would be necessary to prevent delays in achieving cleanup of the ground water (**EPA, 2002**).

The ROD stated that the remedy would require 10 to 20 years to complete. The Pump and Treat (P&T) system performance would be monitored and adjusted as warranted based on the operational and monitoring data collected. Remedy refinements could include adjusting pumping rates, discontinuing pumping from one of the extraction wells, or utilizing one of the other disposal options for the water treated in the ASTP. The ROD stated that modeling predicted Well No. 2 would have to operate for 10-20 years to achieve the remediation goals, and the second extraction well would have to operate for 6-10 years (**EPA, 2002**).

The ROD stated that, during implementation and operation of the P&T system, it may become apparent that contaminant concentrations cease to decline and are constant at levels higher than the remediation goals over some portion of the ground water plume. The ROD states that the P&T system performance standards and/or the remedy may be reevaluated at that point. A contingency was included in the ROD to use natural attenuation (and specifically stated as dilution and dispersion) over selected areas of the plume. Natural attenuation would be implemented if further pumping did not produce significant or consistent declines in contaminant concentrations. Implementation of this contingency would be based on data from the monitoring program and updated ground water modeling that demonstrates that the remaining ground water contamination would not impact existing receptors. The ROD also included the contingency that operation of the P&T system would discontinue if the remediation goal for CTC was achieved before the remediation goal for nitrate. The ROD states that sampling at Well No. 2 only would be performed in this case to verify that the requirements of the SDWA and Texas State Water Hygiene Code were being met (**EPA, 2002**).

4.3 Remedy Implementation

The RD for the final remedy at the site was completed by EPA between March and May 2003. During the RD, the disposal option for the treated water from the ASTP required reevaluation. Based on water demand investigations performed for the City of Perryton, it was determined that the City did not have sufficient demand during the winter months to provide the quantity of water required for blending to treat

nitrate. The next best option described in the FS was nitrate treatment via ion exchange; however, the resulting waste stream that would be produced by this option was deemed to not be suitable to the site. Therefore, water blending was replaced with RO treatment of the ground water for nitrate removal (**CH2M HILL, 2003d**).

The scope of the final Remedial Action (RA) construction included the following activities:

- Mobilization and site preparation
- Installation of a new monitor well
- Extraction well and vault construction
- RO building construction
- RO system fabrication and installation
- Conveyance piping construction
- RO startup and testing to ensure treatment goals are met prior to discharge to the NGST.

Construction of the final remedy for the site was completed by EPA. Construction activities began in June 2003 and were completed in August 2003. The second extraction well, identified as MW-17-EX, and a new monitor well were installed and tested in June and July 2003. The new extraction well was installed in front of City Hall at the corner of Ash Street and SE 2nd Avenue.

Extracted water from MW-17-EX is carried through high density polyethylene (HDPE) double-walled pipe to the ASTP. The pipeline was installed via horizontal borings beneath the Southwestern Railroad tracks and City streets. The pipeline was pressure tested to ensure integrity of the welds in the joints of the HDPE.

The RO facility was constructed at the City of Perryton Warehouse just south of Well No. 2 and adjacent to the ASTP. The RO system underwent start-up and performance testing in September and October 2003. The final remedy was constructed such that the treated water could be discharged to the City's sanitary sewer system, a storm drain, or to the City's municipal water supply via the NGST. Discharge to the NGST would allow the City to reuse the treated water instead of the water being wasted to the sewer or storm drain (**EPA, 2003**).

The pre-final inspection of the final remedy was performed on August 25, 2003. The EPA issued a Preliminary Closeout Report, documenting construction completion, in September 2003 (**EPA, 2003**). As

constructed, the final remedy included a P&T system that utilized two extraction wells (Well No. 2 and MW-17-EX) to extract contaminated ground water. The extracted water was then piped to the ASTP, where the flows were combined and treated in an air stripper to remove VOC contamination. The water was then piped to the RO facility where nitrate contamination was treated and removed in an RO unit. The treated effluent was then discharged to the NGST for use as part of the City's municipal water supply. The RO facility concentrate water, containing the concentrated nitrate, was discharged to the sanitary sewer and ultimately to the City's wastewater treatment facility. Well No. 2 operated at a flow rate of approximately 140 gpm, and MW-17-EX at operated at a flow rate of approximately 80 gpm. Both wells extract ground water primarily from Unit 3, the primary ground water producing zone at the site. The long-term ground water monitoring network included 5 multi-port monitor wells (MPMW) and 14 conventional monitor wells to monitor the ground water plume and track remedy performance. Ground water monitoring was initially performed on a quarterly basis. The final remedy began operation in November 2003. In October 2004 (one year after construction completion), the site entered the LTRA phase (**CH2M HILL, 2006a**). Since entering the LTRA phase, the remedy has undergone numerous changes and adjustments as the remedy has progressed. Changes in the remedy are further discussed in **Section 4.4**.

4.4 Operations and Maintenance and Long-Term Monitoring

The ROD for the site stipulates that an annual remedy evaluation be performed. As stated in the ROD, EPA is responsible for conducting O&M activities at the site. The EPA has contracted with CH2M HILL to perform O&M at the site. CH2M HILL also works with the City of Perryton to ensure the ASTP is working properly to supply water to the City. Specific O&M requirements for various components of the remedy are contained in various O&M Manuals developed for the site (**CH2M HILL, 2004** and **CH2M HILL, 2004b**). Copies of these manuals are stored at the site for use by the O&M staff.

The P&T system is designed to operate continuously. The system is controlled and monitored through the City of Perryton's Supervisory Control and Data Acquisition (SCADA) system. The system is designed with interlocks such that a shut down to any component of the ASTP or Well No. 2 will shut down the entire system. The system is also designed so that the ASTP and Well No. 2 can operate independently of the RO facility and/or MW-17-EX. O&M and long-term monitoring activities performed at the site since 2003 are described in the Annual O&M Progress Reports for each operational year beginning with the period October 2003 to September 2004 (**CH2M HILL, 2005a, 2006a, 2007, 2007e**). General O&M activities are summarized in the following paragraphs.

O&M activities at the site have evolved as the conditions at the site have changed and experience with the operation and reliability of the P&T system operation has improved with time. O&M of the P&T system has included various tasks that occurred on a weekly, biweekly, monthly, quarterly, and yearly basis. O&M activities originally included continued operation and upkeep of the ASTP, RO facility, and MW-17-EX (Well No. 2 is owned, operated, and maintained by the City of Perryton), routine sampling of the ASTP, RO facility, and extraction wells to ensure that treatment criteria were being met and system components were functioning properly, making repairs when necessary, and routine ground water monitoring. Sampling of the ASTP was conducted on a monthly basis (October 2003 – March 2004) and a quarterly basis (March 2004 through present). Sampling of the RO facility was conducted on a monthly basis (October 2003 – March 2004) and a quarterly basis (March 2004 – August 2004). There is not a daily onsite presence at the site.

Since operations began, the system has been monitored remotely twice per week via the City's SCADA system. Onsite inspections and maintenance of the P&T system have been performed at a varying frequency as the remedy has progressed. Onsite inspections were conducted weekly between October 2003 and September 2004, biweekly between October 2004 and September 2006, and monthly since October 2006. System alarms are initially responded to by City personnel, who then contact EPA's O&M contractor to resolve the alarm (**CH2M HILL, 2007e**).

Long-term ground water monitoring at the site includes collection of ground water samples and water levels from the monitor well network at the site. The sampling program for the site is examined on a yearly basis to determine if wells and/or analyses can be eliminated from the sampling program. The long-term ground water monitoring program has been adjusted in terms of numbers of wells sampled and sampling frequency as the overall data set for the site has increased, and the data set has shown that the contaminant plume is not increasing in size or migrating. Nitrate sampling has been discontinued as part of the long-term monitoring program and as part of O&M monitoring for the P&T system. Long-term monitoring was conducted on a quarterly basis from October 2003 through September 2005 and semi-annually through August 2007 (**CH2M HILL 2007e**). Beginning in 2008, long-term ground water monitoring will occur on an annual basis.

On August 12, 2004, the RO facility shut down due to biofouling of the RO membranes. Since March 2004, the nitrate concentration from both the Well No. 2 and MW-17-EX had been consistently below the MCL of 10 mg/L (data from the extraction wells is provided in **Table 2**). Therefore, a decision was made

to bypass the RO facility and not restart the RO facility. As a result, the RO facility was only operated for system flushing and performance of system checks during onsite inspections (approximately 1 hour per week) from October 1 through December 17, 2004. The RO unit was preserved on December 17, 2004, and the RO facility has not operated since that time. The EPA is currently evaluating options to decommission the RO facility (**CH2M HILL, 2006a,** and **CH2M HILL, 2007e**).

Due to decreasing CTC concentrations in the extraction wells and Unit 3 monitor wells, the P&T system was shut down in late September 2007 to begin a 6 month period of contaminant rebound monitoring in the two extraction wells. The results of this monitoring are presented in **Attachment 6** and further discussed in **Section 6.4**. Samples collected since October 2007 have demonstrated that CTC concentrations in MW-17-EX continued to decline after the well was shut down. As a result, MW-17-EX has not been operated since it was shut down on September 29, 2007. The well may be operated in the future during periods of peak water demand in the summer months.

Current routine onsite inspections for the P&T system include the monitoring and recording of operational data including bag filter inlet and outlet pressure, treated water pump discharge pressure, blower pressure, sump pump pressure, blower discharge rate, extraction well flow rates, and ASTP discharge flow rates . The ASTP is examined for leaks, proper equipment operations and other issues during each inspection. Routine maintenance activities for the ASTP include cleaning the bag filter and air intake screen, examining the air stripper trays for scaling and cleaning of trays if necessary (**CH2M HILL, 2007e**). The locations of each component of the P&T system including extraction wells and monitoring wells are shown on **Figure 1.**

4.5 Progress Since Initiation of Remedial Action

The data indicate that both the short-term and long-term objectives of plume containment and ground water restoration are being achieved in Unit 3 by the remedy. The nitrate concentration has remained below the MCL of 10 mg/L since November 2003 at Well No. 2 and since March 2004 at MW-17-EX (see **Table 2**). Nitrate sampling of the ASTP influent and effluent, Well No.2, and MW-17-EX has been discontinued as of operational year October 2006 – September 2007. Nitrate concentrations in all Unit 3 monitor wells have been below the MCL since the November 2004 sampling event (ground water monitoring results are provided in **Table 3**). The decrease in nitrate concentrations in Unit 3 is a result of the operation of the P&T system. Nitrate has not exceeded the MCL in Lower Unit 2 since long-term monitoring began in October 2002. The nitrate concentration remains at or just above the MCL in the

Upper Zone at monitor wells MPMW02, MPMW03, and MWCL-11S. Sampling for nitrates was last performed in September 2005 (**CH2M HILL, 2007e**).

The CTC concentrations in Unit 3 have continued to decrease since long-term monitoring began in October 2002. The decrease in CTC concentrations in Unit 3 is a result of the continued operation of the P&T system (**CH2M HILL, 2007e**). During the April 2008 sampling event, CTC was not detected in any Unit 3 well in excess of the MCL. The CTC concentration remains above the MCL in portions of the Upper Zone and Lower Unit 2 (see **Table 2** and **Figures 4** and **5** in **Attachment 6**).

During the ASTP operations from November 2002 through May 2008, approximately 507,600,000 gallons of ground water have been extracted by the P&T system, and approximately 45.4 pounds of CTC have been treated and removed in the ASTP. ASTP operational data, including design criteria, flow rates, and CTC removal rates, are provided in **Table 4**. During operation of the RO facility, the RO system treated and removed approximately 1,500 pounds of nitrate from site ground water (**CH2M HILL, 2005a**). Since operations began, the CTC concentrations in the ASTP treated water have been non-detect at method detection limits between 0.48 µg/L and 2 µg/L (see **Table 5** for the influent and treated water concentrations at the ASTP).

5.0 Progress Since the Last Five-Year Review

This is the first five-year review conducted for the City of Perryton Well No. 2 Site.

6.0 Five-Year Review Process

This first five-year review for the City of Perryton Site has been conducted in accordance with EPA's Comprehensive Five-Year Review Guidance dated June 2001 (**EPA, 2001**). The review process included interviews with relevant parties, a site inspection, and a review of the applicable data and reports covering the remedy implementation, performance monitoring, and operation and maintenance. The activities conducted as part of this review and specific findings are described in the following sections.

6.1 Administrative Components

The five-year review for this site was initiated by EPA. The review team was led by the EPA Remedial Project Manager (RPM) for this site, Mr. Vincent Malott/ EPA Region 6. The components of the review

included community involvement, document review, data review, a site inspection, interviews, and development of this First Five-Year Review Report.

6.2 Community Involvement

A public notice announcing initiation of the first five-year review was published in the *Perryton Herald* and the *Amarillo Globe News* on May 7, 2008. Upon signature, the First Five-Year Review Report will be placed in the information repositories for the site, including the Perry Memorial Library in Perryton, Texas, the TCEQ office in Austin, Texas, and the EPA Region 6 office in Dallas, Texas. A public notice will then be published in the *Perryton Herald* and the *Amarillo Globe News* to summarize the findings of the review and announce the availability of the report at the information repositories. Copies of the two public notices are provided as **Attachment 5** 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 interim remedial action report, the preliminary closeout report, O&M plans, sampling and investigation reports, annual O&M reports, and related monitoring data. Documents reviewed are listed in **Attachment 1**.

6.4 Data Review

The data reviewed as part of this first five-year review included ASTP influent and treated water analytical data, extraction well analytical data, and ground water monitoring analytical and water level data collected at the site since October 2002. ASTP operational data, such as flow rates, volumes of ground water extracted and treated, and mass removal data were also reviewed as part of this first five-year review. The results of this data review are discussed in the following paragraphs.

Water level data have been collected at the site since October 2002. Ground water elevation contours from April 2008 are provided on **Figures 2** and **3** in **Attachment 6** for the Upper Zone and Unit 3, respectively. Ground water flow within the Upper Zone is converging toward Well No.2 across most of the site (see **Figure 2** in **Attachment 6**). The Upper Zone is a perched aquifer with limited lateral movement of ground water. An apparent ground water flow divide exists in the area between wells MPMW01, MPMW04, and MWCL-07S, as evidenced by the lower water level elevation in MWCL-07S than in MPMW01 and MPMW04. The convergent flow pattern observed in the Upper Zone differs from the regional ground water flow direction present in the Lower Zone which is generally to the south-

southeast. The annulus at Well No. 2 connects the Upper and Lower Zone and is the only known cause of the ground water flow pattern observed in the Upper Zone. The ground water in the Upper Zone drains down the annulus into the Lower Zone (**CH2M HILL, 2007e**).

Water level elevations in Lower Unit 2 do not correlate well between monitor wells. As a result, water level elevation maps are not prepared for Lower Unit 2. Ground water flow in Lower Unit 2 is limited due to the lower permeability sediments present, which results in the poor correlation of water level elevations between individual wells.

Ground water flow within Unit 3 is towards the south-southeast. As shown in **Figure 3** in **Attachment 6**, a ground water depression exists in Unit 3 that is centered on Well No. 2. This depression has formed in response to the pumping of Well No.2. When MW-17-EX was in operation, the capture zone of the P&T system and the resulting cone-of-depression around Well No.2 in Unit 3 was larger (**CH2M HILL, 2007e**). Capture zone modeling was performed at the site in 2005 and 2007. The results of the capture zone modeling completed in 2007 (**CH2M HILL, 2007**) indicated that the predicted P&T system capture zone, based on average pumping conditions present at the site, water level data, and the decrease in the size of the contaminant plume in Unit 3, sufficiently captured the CTC plume in Unit 3 (**CH2M HILL, 2007e**). Based on this data, the P&T system has achieved the objective set in the ROD of containing and preventing further migration of the ground water contamination in the Lower Zone, Unit 3.

Water level trend analyses have been performed as part of the annual O&M reporting for each operational year. The water level trend analyses have demonstrated that the water levels in the Upper Zone do not appear to be influenced by the operation of the P&T system. Water levels in Lower Unit 2 show some influence related to pumping of the P&T system, while water levels in Unit 3 are directly influenced by pumping of the P&T system (**CH2M HILL, 2007e**).

Nitrate analytical results from Well No. 2 and MW-17-EX are provided in **Table 2**. As previously stated, the nitrate concentrations in Well No. 2 and MW-17-EX have been below the MCL since March 2004. It was recommended in the 2005-2006 annual O&M report that nitrate sampling at the ASTP influent, ASTP effluent, Well No. 2, and MW-17-EX be discontinued since nitrate was no longer detected above the MCL in the O&M process monitoring samples. Nitrate analytical results from the site monitor wells are provided in **Table 3**. Nitrate concentrations in the Unit 3 monitor wells decreased to below the MCL at all monitor well locations during the November/December 2004 sampling event. Sampling for nitrates from the monitor wells was last performed in September 2005. Based on the last samples collected, the

nitrate concentration was at or slightly above the MCL in the Upper Zone at monitor wells MPMW02, MPMW03, and MWCL-11S, based on the nitrate results from the previous sampling periods. Nitrate concentrations in the Upper Zone are stable around the MCL for nitrate (**CH2M HILL, 2007e**).

CTC concentration data have been collected at the site since October 2002. CTC analytical results from Well No. 2 and MW-17-EX are provided in **Table 2**, and CTC analytical results from site monitor wells are provided in **Table 3**. The extent of CTC detections from April 2008 are provided on **Figures 4, 5,** and **6** in **Attachment 6** for the Upper Zone, Lower Unit 2, and Unit 3, respectively. The CTC plume in the Upper Zone, as determined by wells where the concentration exceeds the MCL, is geographically centered on Well No. 2 (see **Figure 4** in **Attachment 6**). The majority of the plume is located beneath the PEX facility, the Southwestern Railroad right-of-way, and the City of Perryton Warehouse. The CTC plume in Lower Unit 2 is geographically centered on monitor well MPMW02 (see **Figure 5** in **Attachment 6**). The majority of the plume is located beneath the City of Perryton Warehouse and the city block immediately to the west. The CTC detections in Unit 3 are shown on **Figure 6** in **Attachment 6**. As of April 2008, the CTC concentration no longer exceeds the MCL at any monitoring location in Unit 3.

Plots showing the CTC concentration trends in selected Upper Zone, Lower Unit 2, and Unit 3 monitor wells are provided on **Figures 7**, **8**, and **9** in **Attachment 6**, respectively. The CTC concentration trends in the Upper Zone and Lower Unit 2 have been variable since monitoring began in October 2002 (see **Figures 7** and **8** in **Attachment 6**). CTC concentrations in ground water are highest in Unit 1 and Upper Unit 2 monitor wells. The CTC concentration trends in Unit 3 have been decreasing, to concentrations below the MCL, since late 2003 (see **Figure 9** in **Attachment 6**). CTC concentration trend analyses have been performed as part of the annual O&M reporting for each operational year. The CTC trend analyses have demonstrated that the CTC concentrations in the Upper Zone do not appear to be influenced by the operation of the P&T system. CTC concentrations in Lower Unit 2 show minimal influence related to operations of the P&T system, while CTC concentrations in Unit 3 have decreased as a direct result of pumping by the P&T system (**CH2M HILL, 2007e**).

The ASTP became operational in November 2002. From November 2002 through October 2003, the ASTP treated ground water extracted from Well No. 2 only. Ground water extraction from MW-17-EX began in November 2003. The CTC concentration measured in the two extraction wells as part of O&M process monitoring is provided in **Table 2**. O&M process monitoring has also included sampling of the ASTP influent (combined flow from the two extraction wells) and treated water. The CTC concentrations

in the ASTP influent and treated water are provided in **Table 5**. The CTC concentration in the extraction wells and ASTP influent have decreased over time to levels below the MCL (5 µg/L) in April 2008. CTC has never been detected in the ASTP treated water since the system has been operational (**Table 5**). As a result of the decreasing CTC concentrations in site ground water, the amount of CTC mass removed (also referred to as the mass loading) monthly by the ASTP has decreased over time as well. Operational data for the ASTP, including the monthly flow rate, influent CTC concentration, and monthly and cumulative mass loading rates are provided in **Table 4**. The CTC monthly mass removal rate reached a peak in January 2004 when 2.12 pounds of CTC was treated by the ASTP in one month (see **Table 4**). The monthly CTC mass removal has been declining since that time, and was only 0.12 pounds for the month of May 2008. The monthly and cumulative CTC mass loading in the ASTP is shown graphically on **Figure 3**. **Figure 3** demonstrates that the rate at which CTC is being removed from ground water and treated by the ASTP has declined significantly on a monthly basis, and the cumulative mass removal is beginning to level out. Mass removal rates have declined significantly as the CTC concentrations in the Unit 3 have declined.

As a result of the declining CTC concentrations in Unit 3, the P&T system was shut down on September 28, 2007 to evaluate potential CTC concentration rebound in Well No. 2 and MW-17-EX. The initial plan was to leave the P&T system shut down for a period of 6 months and sample both wells monthly. Samples were collected from both wells on October 29, 2007, November 28, 2007, and January 9, 2008. The results of this sampling are presented in the attached technical memorandum which discusses the April 2008 annual ground water monitoring event and the rebound analysis (**Attachment 6**). After the system was turned off, the CTC concentration in Well No. 2 rebounded to a concentration of 27.9 µg/L during the October 29, 2007 sampling event, which was almost to the pre-pumping concentration (see **Table 2** in **Attachment 6**). The CTC concentration in Well No. 2 remained elevated during the November 28, 2007 sampling event. The CTC concentration in MW-17-EX did not rebound during the same period. As a result of the significant CTC concentration detected during the first sampling event in Well No. 2, the P&T system was restarted on November 29, 2007 to return Well No. 2 to operation. MW-17-EX was left off. Samples were collected again on January 9, 2008 to determine if the CTC concentration in Well No. 2 had decreased and to verify that the concentration in MW-17-EX remained below the MCL. The result of the contaminant rebound sample confirmed that the CTC was migrating from the Upper Zone to Unit 3 along the annulus of Well No. 2. The CTC concentrations detected in both wells in April 2008 continued to be below the MCL (see **Table 2**).

During late 2006 and early 2007, new wells were installed in the Upper Zone (MW-19-EX) and Lower Unit 2 (MW-18-EX). The wells were installed to determine the feasibility of utilizing conventional P&T technology to address the CTC contamination remaining in these portions of the aquifer. These wells were constructed as extraction wells. Aquifer properties were evaluated during testing performed after the wells were installed. Due to low ground water yields to both wells, it was determined that P&T technology was not feasible to address the CTC contamination present in the Upper Zone and Lower Unit 2 (**CH2M HILL, 2007**).

The P&T system has been operating at the site since November 2002, during which time the P&T system has successfully remediated the contaminant plume in Unit 3. The Final ROD estimated that the remedy would attain the remediation goals in approximately 6-10 years at MW-17-EX and 10 to 20 years at Well No. 2 (**EPA, 2002**). The remedy has successfully achieved the RAOs and cleanup goals for ground water in Unit 3, which is the primary ground water producing zone at the site, ahead of the timeframe that was stipulated in the ROD. However, CTC and nitrate contamination in the Upper Zone and CTC contamination in Lower Unit 2 appears to have not been affected to any significant extent by operation of the P&T system after over 5 years of operation. The EPA is currently evaluating the overall strategy for the LTRA at the site. This evaluation includes assessment of options for future P&T system operations and addressing the annulus of Well No. 2. The EPA is also currently assessing whether it is technically impracticable, from an engineering perspective, to address the contamination present in the Upper Zone and Lower Unit 2 (**EPA, 2008**, and **CH2M HILL, 2007g**).

6.5 Interviews

During the course of the five-year review, interviews were conducted with several parties involved with the site: (1) Mr. Shawn Hughes, General Manager of PEX; (2) Mr. David Landis, City Manager of the City of Perryton and Mr. Richard Collins, Water Supervisor of the City of Perryton; and (3) Ms. April Palmie of the TCEQ. Interview Record Forms which document the issues discussed during these interviews are provided in **Attachment 2**. Ms. Judy Headlee of the TCEQ was also present during the interview conducted with Mr. Landis and Mr. Collins.

6.6 Site Inspection

An inspection was conducted at the site on May 12, 2008. The completed site inspection checklist is provided in **Attachment 3**. Photographs taken during the site inspection are provided in **Attachment 4**.

A security fence surrounds the City Warehouse facility, and the entrance is controlled through a gate located on Amherst Street. A sign is posted on the fence by the gate and another is posted on the south side of the ASTP building (**Photograph 1**). The site fence and gate appeared in good condition and to be well maintained. No obvious signs of vandalism were apparent during the site inspection. The ASTP building (**Photographs 1 - 4, 12-21**), the RO Facility building (**Photographs 5-11**), Well No. 2 (**Photograph 3**), and three monitor wells (**Photographs 22 and 25**) are located at the City Warehouse facility. The buildings appeared to be in good condition and appropriately maintained. The RO Unit and associated equipment appeared to be in good condition (**Photographs 6-11**). The equipment inside the ASTP appeared to generally be in good condition (**Photographs 12 - 21**). The inspection did reveal that sulfuric acid (used to prevent scale in the air stripper) had been spilled around the acid tank, and there was some acid standing in the secondary containment (**Photographs 14, 15, and 21**). The acid spill is under investigation and plans to prevent future spills are under development. The water pipes which fed the safety shower were also leaking (**Photograph 16**). This leak was repaired during the May 2008 onsite O&M inspection.

The remaining monitor wells are located throughout the City of Perryton (**Photographs 26, 28 - 41**). The site inspection revealed that the locks on most of the monitor wells were either rusted shut or missing. Some of the expansion plugs on the wells were worn and no longer provided an effective seal. Finally, the O-rings on some of the well vault covers were missing. All of the well pads, well aprons, and well casings appeared to be in good shape. MW-17-EX is located in front of the Perryton City Hall on SE 2nd Avenue. The well and well vault appeared to be in good condition (**Photograph 36**).

The Southwestern Railroad tracks were removed and the rail line abandoned. The easement was still present, and no new structures had been constructed on the easement. There were no other land use changes noted during the site inspection (see **Attachment 3**).

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 document that details the remedial decisions for the site is the September 2002 Final ROD. The LTRA is currently on-going. This section discusses the RA performance, system O&M, costs, institutional controls, monitoring activities, opportunities for optimization, and early indicators of potential remedy problems.

Remedial Action Performance. The LTRA currently involves operation of the ASTP and Well No. 2 and long-term ground water monitoring. The RAOs and cleanup goals for Unit 3, the primary ground water production zone at the site, have been achieved. However, as stated in **Section 6.4**, the RAOs and cleanup goals for the Upper Zone and Lower Unit 2 have not been met.

The existing P&T system has had little or no impact on the ground water contamination present in the Upper Zone and Lower Unit 2. While contaminant concentrations in the Upper Zone and Lower Unit 2 appear to be stable, likely due to low permeability in these zones, data collected during the rebound sampling indicate that the annulus of Well No. 2 is acting as a pathway for ground water contamination to migrate between the Upper Zone and Lower Unit 2 into Unit 3. Well No. 2 is currently operated to prevent contamination that migrates down the annulus from entering Unit 3.

Based on the data review and site inspection, it appears that the City of Perryton Well No. 2 Site remedy is functioning as intended by the ROD with respect to achievement of the RAOs and cleanup goals in Unit 3. Since the Upper Zone and Lower Unit 2 have not been affected by operation of the P&T system, the remedy is not functioning as intended by the ROD with respect to achievement of the RAOs and cleanup goals in these upper portions of the Ogallala Aquifer.

System Operation and Maintenance. O&M activities at the site have evolved as the conditions at the site have changed and experience with the operation and reliability of the P&T system operation has improved with time. Since O&M began in November 2002, site operations have undergone various improvements to optimize operations. Operation of the RO facility was discontinued after approximately one year due to the decrease in nitrate concentration to below the MCL in the two extraction wells and Unit 3 as a whole. Operation of MW-17-EX was discontinued in September 2007, and monitoring data collected since that time have demonstrated that the CTC concentration in this well remains below the MCL. At this point in the LTRA, the O&M of the P&T system consists of the continuous operation of

the ASTP and Well No. 2 and monthly onsite inspection and routine maintenance. Current O&M is adequate to ensure the P&T system continues to operate as intended.

Costs of System Operation and Maintenance. The ROD estimated the monthly O&M costs for the system would decline from an average of $34,000 per month to $19,000 per month from year 1 to year 5 of the system operation. Actual O&M costs for years three through five are estimated at around $20,000 per month, which is slightly higher than the costs estimated in the ROD.

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

The ROD did not designate a formal institutional control that controls risks posed through the ground water exposure pathway. The City of Perryton does have an Ordinance that requires the issuance of a permit to install new wells within the city limits. The ROD stipulates that this permitting process would act as a mechanism to alert EPA to any changes in the exposure scenario that currently exists at the site. A copy of the City Ordinance is provided in **Attachment 7**. Mr. Landis, Perryton City Manager, indicated during the interview that no permits had been applied for since the remedy was constructed. The Annual O&M Reports, which contain the updated plume maps for each year, are provided to the City to assist in reviewing any permit applications that may be received.

There is the potential for land use changes along the railroad easement. It is possible that land use in the future could include the construction of occupied buildings on these properties. Because occupied buildings did not exist at the time of the ROD, soil vapor intrusion as a pathway to indoor air was not assessed at the site. This issue is discussed further in **Sections 7.2** and **7.3**. Finally, if a Technical Impracticability (TI) Waiver (discussed further in **Section 7.4**) for the cleanup goals (MCLs) is approved for the site, contamination would be left in place in the Upper Zone and Lower Unit 2 at concentrations

exceeding the MCLs. Additional institutional controls may be required in the future to address vapor intrusion issues and the TI Waiver for ground water.

Monitoring Activities. The long-term monitoring program is examined on a yearly basis to determine if wells and/or analyses can be eliminated from the sampling program. Adjustments to the long-term monitoring program are documented in the Annual O&M Reports. The long-term monitoring program has been adjusted in terms of numbers of wells sampled and sampling frequency as the overall data set for the site has increased, and the data set has shown that the contaminant plume is not increasing in size or migrating. The frequency of P&T system monitoring has decreased from monthly to quarterly. Nitrate sampling has been discontinued as part of the long-term monitoring program and as part of O&M monitoring for the P&T system. Long-term ground water monitoring has been reduced to occur on an annual basis starting in 2008. The current monitoring activities are adequate to monitor the ground water plume and ensure that the P&T system is functioning properly.

Opportunities for Optimization. Influent CTC concentrations into the ASTP are currently below the MCL. In addition, as discussed in **Section 6.4**, the mass of CTC treated and removed by the ASTP on a monthly basis has decreased considerably over the last year and is beginning to level off at amounts of less than 0.20 pounds per month. Use of the air stripper is not currently necessary to meet the CTC MCL in water extracted from Well No. 2. The remedy could be further optimized by discontinuing use of the ASTP to treat the CTC in ground water extracted by Well No. 2. Well No. 2 is operated and maintained by the City of Perryton. Continued operation of the well, which is necessary to prevent migration of contamination into Unit 3 along the well's annulus, would not affect the cost of the remedy.

Early Indicators for Potential Remedy Problems. As noted in **Section 6.4**, the recent rebound analysis sampling has confirmed that contaminant migration from the Upper Zone and Lower Unit 2 into Unit 3 occurs along the Well No. 2 annulus. Contaminant concentrations in ground water at the site are highest in Upper Zone and Lower Unit 2 monitor wells. Ground water flow in the Upper Zone and Lower Unit 2 is limited due to the low permeability and heterogeneous nature of the sediments present. Testing data obtained during the installation of wells MW-18-EX and MW-19-EX has confirmed that conventional P&T technology is not feasible to address the contamination present in the Upper Zone or Lower Unit 2. The ground water flow direction in the Upper Zone is convergent toward Well No. 2 and is most likely influenced by natural seepage down the annulus of Well No. 2. In addition, the contaminant plume in the Upper Zone and Lower Unit 2 appears to be geographically centered in the area of the PEX and Well No. 2. Contaminant concentrations in the Upper Zone and Lower Unit 2 are not anticipated to attenuate to

concentrations below the MCLs in the near future. The gravel packed annulus of Well No. 2 necessitates operation of the well to prevent the migration of contaminants into Unit 3 from the overlying contaminated ground water. Unless the annulus of Well No. 2 is addressed, the migration pathway will remain and pose a long-term risk to Unit 3, the primary ground water production zone at the site.

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

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

Changes in Environmental Standards, Newly Promulgated Standards, and To-Be-Considereds. Environmental standards (referred to as Applicable or Relevant and Appropriate Requirements [ARARs]) for this site were identified in the ROD signed on September 26, 2002. The five-year review for this site included identification of and evaluation of changes in the ROD-specified ARARs and TBCs to determine whether such changes may affect the protectiveness of the selected remedy. The ARARs and TBCs identified by the ROD for the site include chemical- and action-specific requirements for the remedy.

The TCEQ and Federal regulations have not been revised to the extent that the effectiveness of the remedy at the site would be called into question. The MCLs applicable to the ground water contamination at the site have not been revised since the ROD was signed. No new regulations have been issued by the State of Texas or the Federal government that would call into question the effectiveness of the remedy. The remedy selected for the site followed EPA's presumptive remedy guidance. Ground water modeling and sampling data have been used to demonstrate achievement of the RAOs and cleanup goals in Unit 3, and continued monitoring will be performed to verify that contaminant concentrations remain below the cleanup goals.

Changes in Exposure Pathways. There have been no changes in existing human health exposure pathways for the City of Perryton Well No. 2 Site since the commencement of the LTRA. The operation of the P&T system has eliminated or reduced the existing human health exposure pathways present at the site. However, vapor intrusion has become a newly identified pathway that is being evaluated for sites that have VOC contamination either in the soil or ground water. Vapor intrusion was not evaluated as a

pathway at the time of the ROD in 2002 because it was incomplete. Vapor intrusion is the movement of VOCs from contaminated ground water or soil into existing buildings, or the potential migration of the VOCs into future buildings overlaying or near contaminated ground water or soil. If occupied buildings are constructed along the railroad easement or at the PEX between Main Street and SW Third Avenue in the future, vapor intrusion will need to be considered as a potentially completed exposure pathway. Vapor intrusion is further discussed in **Section 7.3**.

Land use changes in the future would present possible changes in human exposure pathways. The Southwest Railroad tracks have now been removed from the easement between the PEX and the maintenance yard, and the railroad easement is now open and undeveloped land. As a result, the land use along the easement may change in the future. It is also possible that the land use of the adjacent land containing the PEX grain silos may change in the future. There are currently no occupied buildings along the railroad easement or on the adjacent land containing the PEX grain silos. Potential future land use changes are further discussed in **Section 7.3**.

No new source areas have been identified as part of this five-year review. However, methyl-tertiary-butyl-ether (MTBE) has been detected in one site monitor well and in Well No. 2. MTBE has historically been used as a fuel additive in gasoline and is commonly associated with leaking petroleum storage tanks. MTBE has been detected in Upper Zone monitor well MWCL-13S at concentrations up to 100 µg/L since December 2004. MTBE has been occasionally detected in Well No. 2 at concentrations less than 2 µg/L since February 2006 (**CH2M HILL, 2006a**, and **CH2M HILL, 2007e**). Due to its use as a fuel additive and association with leaking petroleum storage tanks, MTBE is not considered to be a site related contaminant.

Changes in Toxicity and Other Contaminant Characteristics. No changes to the toxicity of identified contaminants have been identified for the site as part of this five-year review.

Progress Toward Meeting the RAOs. CTC and nitrate concentrations are less than the MCLs in Unit 3, and the LTRA has met the RAOs and restored the ground water in Unit 3 to its expected beneficial use as a source of drinking water. Monitoring data show that the contaminant plume in the Upper Zone and Lower Unit 2 is not expanding or migrating. As discussed previously, this is likely due to the low permeability in these zones, combined with the fact that the annulus at Well No. 2 allows some of the contaminated ground water in these zones to drain down to Unit 3, where it is intercepted by pumping at Well No. 2. There are no data to indicate that pumping of the P&T system impacts CTC or nitrate

concentrations in the Upper Zone or Lower Unit 2, or impacts the rate of migration down the Well No. 2 annulus. Contaminant concentrations in the Upper Zone and Lower Unit 2 have remained stable above the MCLs, and the concentrations are not anticipated to attenuate significantly in the short-term.

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

As introduced in **Section 7.2**, vapor intrusion has become a newly identified pathway that was not considered at the time of the ROD in 2002. A soil vapor investigation was performed in the area of the PEX grain silos during the RI to evaluate the potential source areas for the ground water contamination. CTC was not detected in the shallowest depths sampled during this investigation (between 17 and 40 ft bgs). However, the focus of the investigation was not to evaluate the potential for exposure to CTC through vapor intrusion into indoor air, and samples were not collected from near surface depths (less than 5 ft bgs). Therefore, the risks posed through this exposure route cannot be assessed using existing data.

There are no buildings with human occupancy present on either the railroad easement or along the adjacent land containing the PEX grain silos. Since the Southwest Railroad tracks have now been removed, the railroad easement is open and undeveloped land which could lead to a land use change in the future. Mr. Shawn Hughes (general manager of the PEX) indicated in his interview that there was no current land use changes planned along the adjacent PEX property. If land use changes were to occur and buildings were constructed for human occupancy, the potential for soil vapor intrusion would need to be evaluated. Additional sampling for CTC in near-surface soil vapor, designed to address the potential for vapor intrusion, would be necessary to assess the potential risks posed through this exposure pathway. However, since there are no current receptors and it does not appear that there will be in the near future, the vapor intrusion pathway is not currently complete. The depth to ground water is approximately 245 ft bgs at this site, so the movement of VOCs from ground water to indoor air is not considered a completed exposure pathway. Therefore, at this time, vapor intrusion is not an issue at this site.

Institutional controls (legal restrictions that protect a remedy and prevent human exposure) are an issue that is being evaluated at Superfund sites. In 2002 when the ROD was issued for the site, vapor intrusion was not assessed as a potential exposure pathway, and institutional controls were not considered to be a necessary remedy component. As a result, the remedy described in the ROD did not include institutional controls. In order to address this issue, institutional controls may need to be evaluated and implemented if

unacceptable risks are determined to be present through the vapor intrusion pathway in order to prevent exposure.

7.4 Summary of the Technical Assessment

The technical assessment, based on the data review, site inspection, technical evaluation, and interviews indicates that the remedial actions selected for the City of Perryton Well No. 2 Site generally appear to have been implemented as intended by the decision documents. The assumptions used at the time the remedy was selected are still valid. The LTRA has been adjusted over time based on changes in contaminant concentrations in Unit 3. No changes in contaminant toxicity or other contaminant characteristics were identified that affect the cleanup goals established for the site or the protectiveness of the remedy. 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. The site inspection revealed that all components of the remedy are in working order and have been appropriately maintained.

As determined during the site inspection (**Section 6.6**), many site monitor wells require maintenance to replace the locks, well plugs, and/or O-rings on the well vaults. The measures are required to prevent surface water intrusion into the wells and well vaults and to maintain the security of the wells.

The site inspection (**Section 6.6**) also determined that the Southwestern Railroad tracks have been removed and the rail line abandoned. Based on the interview with Mr. Shawn Hughes, potential future land use along the railroad easement or adjacent PEX property has not been determined at this time. Because no buildings are currently present on either property, and the soil vapor to indoor air pathway is currently incomplete, these two properties have not been assessed for exposure to CTC through vapor intrusion into indoor air.

The RAOs and remediation goals for Unit 3 have been achieved at the site. However, contaminant concentrations in the Upper Zone and Lower Unit 2 remain above the MCLs. Monitoring data collected during the LTRA indicate that the ground water contamination concentrations in the Upper Zone and Lower Unit 2 are stable, but the concentrations are not anticipated to attenuate significantly in the short-term. The ground water plume in the Upper Zone and Lower Unit 2 is not affected to any significant degree by operation of the P&T system. Testing at the site has determined that P&T technology is not feasible to address the remaining contaminant plume. The EPA is assessing the technical practicability, from an engineering perspective, of addressing the contamination remaining in the Upper Zone and

Lower Unit 2. This assessment may lead to the development of a Technical Impracticability (TI) Waiver, which will seek to waive the MCLs as ARARs for the CTC and nitrate contamination in the Upper Zone and Lower Unit 2 (**EPA, 2008**, and **CH2M HILL, 2007g)**.

Based on the data review (**Section 6.4**), the monthly CTC mass removal by the ASTP has declined and is beginning to level off at a low rate of approximately 0.20 pounds per month. This decrease coincides with the decline in the CTC concentration in Unit 3 as a whole, and specifically with the CTC concentration decrease in the two extraction wells. As the amount of CTC mass removed by the ASTP levels off at low monthly rates, continued operation of the ASTP becomes less cost effective. The CTC concentration in Well No. 2 (the only operating well) is currently less than the MCL, but operation of the well is currently necessary to prevent recontamination of Unit 3.

The rebound sampling (**Section 6.4**) indicates that the annulus of Well No. 2 is a contaminant migration pathway between the Upper Zone and Lower Unit 2 into Unit 3. Until either the contaminant concentrations in the Upper Zone and Lower Unit 2 are reduced, or the annulus of Well No. 2 is sealed to prevent downward flow, Well No. 2 will continue to have to be pumped to capture contaminated ground water that migrates down the annulus of the well. This poses a long-term risk at the site. If the pump in Well No. 2 failed, contamination would migrate into Unit 3 until the well could be returned to operation.

As stated in **Section 7.3**, Institutional controls were not considered to be a necessary remedy component at the time of the ROD. As a result, the remedy described in the ROD did not include institutional controls. In order to address the issue, institutional controls to prevent private well installation will need to be evaluated and implemented in order to protect the lower flow zone in the Ogallala aquifer and prevent accidental exposure. Institutional controls may also need to be evaluated and implemented to address risks posed through the vapor intrusion pathway.

The EPA is currently evaluating the overall strategy for continued P&T system operations as part of the LTRA at the site. The options that may be considered would include discontinued operation of the P&T system, reducing the time-of-operation of the system, or reduced pumping rates (**CH2M HILL, 2007g**).

8.0 Issues

The following issues identified during this five-year review affect the long-term protectiveness of the remedy. The identified issues are also summarized in **Table 6**.

1. **The contamination present in the Upper Zone and Lower Unit 2 is not currently addressed by the P&T system.** The ground water contamination currently exceeds the site cleanup goals for CTC in the Upper Zone and Lower Unit 2 and for nitrate in the Upper Zone. Due to the overall heterogeneous nature and low permeability of the Upper Zone and Lower Unit 2, contaminated ground water in these zones cannot be effectively remediated using P&T technology. These zones are considered to be perched zones, and the primary ground water production zone in the Perryton area is Unit 3. Site data collected since October 2002 demonstrates that the existing P&T system, which pumps ground water from Unit 3, has had little or no effect on the contamination present in these perched zones.

2. **The annulus of Well No. 2 is constructed such that it acts as a contaminant migration pathway.** The vertical hydraulic gradient at the site is downward, from the Upper Zone and Lower Unit 2 into Unit 3. Well No. 2 was constructed such that the gravel pack in the well annulus extends from its total depth up to 15 ft bgs. This gravel pack allows for the preferential flow of contaminated ground water from the Upper Zone and Lower Unit 2 into Unit 3. Contaminant rebound sampling performed during October and November 2007, when the P&T system was shut down, confirmed that CTC migrates down the annulus at Well No. 2.

   CTC concentrations have declined below the MCL in Unit 3, and Well No. 2 is only pumped now to capture any contamination that migrates down the annulus of the well. Since the monthly CTC mass removal rate peaked in January 2004 at 2.12 pounds, the current monthly CTC mass removal rate has decreased to 0.12 pounds in May 2008. As the amount of CTC mass removed by the ASTP levels off at low monthly rates, continued operation of the ASTP becomes less cost effective. Until the annulus of Well No. 2 is sealed between Unit 3 and Units 1 and 2, the well will continue to have to be pumped to capture contaminated ground water that migrates down the annulus of the well.

3. **The ROD did not include the use of institutional controls to protect the remedy effectiveness because the remedy was anticipated to achieve the cleanup goals throughout the Ogallala aquifer.** Since ground water standards will likely not be achieved in the Upper Zone and Lower Unit

2, the use of institutional controls may be necessary to prevent the installation of a private well that would create a migration pathway between the contaminated Upper Zone and the remediated Lower Unit 3. While the presence of City personnel, along with the periodic presence of remediation personnel, make it unlikely that the installation of ground water well for drinking or irrigation would go undetected, such institutional controls are necessary for the long-term protection of public health.

4. **During the site inspection, several monitor wells were found to be in need of minor repairs.** Most of the locks on the monitor wells were rusted to the point that they no longer function properly. The expansion plugs and polyvinyl chloride (PVC) caps on some monitor wells are worn and may not provide an effective long-term seal against surface water intrusion into the monitor wells, and the well vaults on some monitor wells need new O-rings to prevent surface water intrusion into the well vaults. The well pads, skirts, and lids were all in good condition.

5. **The Southwestern Railroad tracks have been abandoned, and there is a potential for future land use changes along the railroad easement next to the PEX grain silos, as well as at the PEX property.** The source of the ground water contamination originated at the grain silos through the past use of CTC as a fumigant. Soil vapor sample data collected during the RI did not indicate the presence of an ongoing release of CTC from the PEX grain silos or along the railroad easement. However, shallow subsurface data for purposes of assessing the vapor intrusion pathway were not collected on the PEX property near the grain silos or storage bins. While a decision regarding future land use along the railroad easement has not been made, the risk of vapor intrusion from soil vapor to indoor air would need to be determined if buildings are constructed for human occupancy.

9.0 Recommendations and Follow-up Actions

To address these issues, the following recommendations and follow-up actions have been defined. The recommendations and follow-up actions are also summarized in **Table 7**.

1. The EPA is currently assessing whether it is technically impracticable from an engineering perspective to achieve the cleanup goals (MCLs) and address the contamination present in the Upper Zone and Lower Unit 2 within a reasonable timeframe. If it is deemed technically impracticable to achieve the MCLs for CTC and nitrate in these zones, then a TI Waiver may be prepared that waives the MCLs as ARARs for the Upper Zone and Lower Unit 2. The TI Waiver and ROD Amendment would be required for the MCLs to be waived as ARARs for the Upper Zone and Lower Unit 2.

Since contamination would remain in place above levels that allow for unrestricted use and unlimited exposure to ground water in the affected portion of the aquifer, statutory five-year reviews would be required so long as CTC and nitrate concentrations remain above the MCLs.

2. Options to address the annulus of Well No. 2 should be evaluated. Unless this migration pathway is addressed, contamination will continue to migrate from the overlying perched portions of the aquifer into the primary ground water production zone at the site in Unit 3. The existence of this migration pathway necessitates operation of Well No. 2 to remove contamination that is migrating down the annulus. The EPA is currently evaluating options to address the Well No. 2 annulus as part of the overall site strategy assessment for the future of the LTRA. If the annulus is sealed, then a decision can be made regarding the necessity of continued operation of the ASTP.

3. Identify available institutional controls to protect the remedy effectiveness and prevent re-contamination of the Lower Zone Unit 3 via private wells installed through the contaminated portion of the Upper Zone and Lower Unit 2.

4. Perform maintenance and repair work on the site monitor wells. The locks should be replaced on all conventional monitor wells in order to prevent unauthorized access to the wells. The expansion plugs and PVC well caps should be replaced where necessary to prevent surface water infiltration into the monitor wells. The O-rings on the well vault lids should be replaced where necessary to prevent surface water infiltration into the well vaults.

5. The railroad easement and PEX property overlying the ground water plume between Main Street and SW Third Avenue should continue to be monitored for future land use changes. If plans are identified that include the construction of occupied buildings within this area, an assessment of potential exposure to CTC through the vapor intrusion to indoor air pathway should be performed prior to construction. The EPA may decide to perform this assessment prior to any changes in land use on these properties.

10.0 Protectiveness Statement

The remedy implemented at the City of Perryton Well No. 2 Site currently protects human health and the environment. The ground water extraction system has achieved the cleanup goals for the contaminated ground water in the Lower Zone Unit 3 of the Ogallala aquifer, which is the primary production zone for

the Perryton municipal water supply wells. CTC concentrations in the extraction wells, Well No. 2 and MW-17-EX, have fluctuated above and below the MCL since 2006 and have remained below the MCL since January 2008. Nitrate concentrations have been below the MCL in the two extraction wells since March 2004. CTC and nitrate concentrations in the monitoring wells screened in Unit 3 are also below the MCLs. The extracted ground water is successfully treated to meet drinking water standards (MCLs) and discharged to the City of Perryton's municipal water supply system. Continued O&M and long-term monitoring will ensure that the remedy continues to be protective in the short term.

The remedy is not considered to be protective in the long-term since the ground water extraction system is not able to achieve the cleanup goals for the Upper Zone and Lower Unit 2 of the Ogallala aquifer. While the Upper Zone and Lower Unit 2 are considered perched zones that do not produce significant quantities of ground water, this perched zone will continue to act as a potential source area to re-contaminate the Lower Zone Unit 3. Long-term protectiveness will be achieved by taking the necessary actions to address issues 1, 2, 3, 4, and 5 as discussed above. These actions are estimated to take approximately 24 months to complete. While the ground water remedy continues to operate and/or is modified, a vapor intrusion evaluation will be performed within the former source area at the PEX grain silos. Currently, vapor intrusion is not a complete exposure pathway at the site but may be complete in the future if buildings are constructed in the source area for human occupancy.

11.0 Next Review

The next five-year review, the second for the site, should be completed during or before September 2013.

Tables

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Table 1
Chronology of Site Events
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Date	Event
1988	City of Perryton began participation in the Texas Water Commission (TWC) Wellhead Protection Program.
1989	Texas Department of Health water samples revealed a concentration of benzene at 1 microgram per liter (ug/L) in the northern supply system of the city.
1989	Resampling took place and revealed Well No. 2 was contaminated with carbon tetrachloride (CTC) (25 ug/L) and chloroform (1 ug/L). Well No. 2 was taken off-line in June 1989. A 75,000 gallon storage tank was contaminated with 11 ug/L of carbon tetrachloride and was immediately flushed.
September 1990	The City of Perryton completed a Plan of Action recommending the installation of an air stripper to remove the CTC from water pumped by Well No.2.
October 1990	The Texas Department of Health concurred with the City of Perryton's recommendation.
November 1990	The TWC sampled Well No. 2 and documented CTC contamination at 40 ug/L.
May 1991	Texas Natural Resource Conservation Commission (TNRCC) investigated the potential sources of CTC in the ground water. The Perryton Equity Exchange (PEX) used CTC as a fumigant to control insects in the grain silos for 25 years. CTC use by the PEX was discontinued when CTC was banned in 1985.
August 1992	The TNRCC forwarded the site to EPA for further investigation under Superfund.
February 1993	The EPA completed a Site Inspection Prioritization indicating that the site was eligible for further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
December 1995	The EPA reassigned the site for an Exanded Site Investigation.
April 1996	An investigation of Well No. 2 and surrounding soil was conducted. CTC, lead, chloroform, atrazine and propazine were detected. Soil was not contaminated by CTC to a depth of 67 feet. The other City wells were not found to be affected by Well No. 2 contamination.
September 29, 1998	The EPA proposed the site to the National Priorities List (NPL) of Superfund sites.
February 18, 1999	The site was placed on the NPL.
April 1999	The EPA initiated an Engineering Evaluation/Cost Analysis to collect additional samples from Well No. 2 and evaluate interim remedial action alternatives.
June 7, 1999	The TNRCC sampled the remaining municipal supply wells to determine the extend of nitrate conmatination. Nitrate was not detected above the maximum contaminant level (MCL) during this sampling event.
September 29, 1999	The EPA signed an Interim Record of Decision (ROD) which selected the installation and operation of an air stripper to treat CTC in ground water pumped from Well No.2 as an interim remedy.
2001	The Remedial Design (RD) of the air stripper system was completed.
July 2001	The Final Remedial Investigation (RI) Report was completed.
February 2002	Construction of the air stripper system was completed.
June 2002	The Final Feasibility Study (FS) Report was completed.
July 31, 2002	The RI/FS reports and Proposed Plan for the site were made available to the public.
August 14, 2002	A formal public meeting was held at the Perryton City Hall to present the Proposed Plan and answer questions on the remedial alternatives.
September 26, 2002	The Final ROD was signed which approved the final remedy to include the expanded operation of the air stripper treatment plant (ASTP), the addition of a second extraction well (MW-17-EX), and construcation of a Reverse Osmosis (RO) treatment facility to treat the nitrate contamination.
October 21-31, 2002	The first quarterly long-term ground water sampling event was performed.
November 2002	The ASTP became fully operational.
May 2003	The Final (100%) RD for the Final ROD selected remedy was completed.
June 2003	The new extraction well, MW-17-EX, was installed.
August 2003	RO facility construction was completed and start-up testing initiated; The Pre-final inspection was completed by EPA.
September 2003	Start of testing; ASTP/RO systems running full-time and discharging to the storm ditch
September 30, 2003	The Preliminary Closeout Report (PCOR) was signed.
October 2003	The EPA, Texas Commission on Environmental Quality (TCEQ), and CH2M HILL perform the final inspection for the RA. The completed RA, including the ASTP and RO, began full-time operation.

Table 1
Chronology of Site Events
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Date	Event
November 2003	MW-17-EX became fully operational
March 2004	Nitrate concentration in both extraction wells is first reported at concentrations less than the MCL.
August 2004	The RO facility was shut down due to concentrations of nitrate in both Well No. 2 and MW-17-EX remaining below the MCL.
December 17, 2004	Preservation of the RO system was performed.
February 2005	The 1st Annual Operations and Maintenance Progress Report October 1, 2003 through September 30, 2004 submitted.
March 2006	Annual Operations and Maintenance Progress Report October 1, 2004 through Septemner 30, 2005 submitted. Year 1 of the Long-Term Remedial Action (LTRA) is completed.
December 2006	Two additional extraction wells were installed adjacent to Well No. 2 in an attempt to determine the feasiblity of remediating the upper portion of the aquifer using conventional pump and treat technology. Testing on the two new wells (MW-18-EX and MW-19-EX) demonstrated that the wells could not sustain pumping rates feasible for use as pumping wells.
March 2007	Annual Operations and Maintenance Progress Report October 1, 2005 through September 30, 2006 submitted. Year 2 of the LTRA is completed.
September 29, 2007	The Pump and Treat System was shut down to begin 6 month CTC rebound monitoring period in Well No.2 and MW-17-EX.
October 29, 2007	The first monthly rebound sampling event performed.
November 28, 2007	The second monthly rebound sampling event performed. The ASTP and Well No. 2 were restarted on November 29, 2007, based on high CTC concentrations detected in Well No. 2 during the October sampling event.
December 2007	Annual Operations and Maintenance Progress Report October 1, 2006 through September 30, 2007 submitted. Year 3 of the LTRA is completed.
January 7, 2008	Conducted the third rebound sampling event. CTC concentration in Well No. 2 returned to less than the MCL, and the CTC concentration in MW-17-EX remained less than the MCL.
April 2008	First Five-Year Review for the site begins.

Table 2
Extraction Well Average Monthly Pumping Rates,
CTC, and Nitrate Concentrations, November 2002 - May 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Month	Average Pumping Rate (gpm)			CTC Concentration (ug/L)		Nitrate Concentration (mg/L)	
	Well No. 2	MW-17-EX	Total	Well No. 2	MW-17-EX	Well No. 2	MW-17-EX
Nov-02	46		46			20.0	
Dec-02	48		48	30.0		16.0	
Jan-03	54		54	36.0		16.0	
Feb-03	64		64	8.6		14.0	
Mar-03	85		85	23.0		14.0	
Apr-03	86		86	15.0		11.1	
May-03	85		85	5.2		12.0	
Jun-03	127		127	4.9		9.5	
Jul-03	127		127	41.0		13.0	
Aug-03	113		113	20.0		9.4	4.6
Sep-03	123		123	22.0		12.0	
Oct-03	104		104			16.0	13.0
Nov-03	147	87	234	9.7	17.0	7.2	12.0
Dec-03	154	87	241	8.1	25.0	6.3	11.0
Jan-04	156	87	243	8.8	17.0	9.0	11.0
Feb-04	150	83	233	10.0	19.0	7.0	10.0
Mar-04	126	85	211	12.0	25.0	6.6	9.4
Apr-04	131	85	216			6.8	9.4
May-04	138	85	223				
Jun-04	134	86	220	6.7	20.0	6.4	9.1
Jul-04	142	83	225				
Aug-04	135	86	221				
Sep-04	144	80	224				
Oct-04	140	79	219	6.9	21.0	6.7	9.4
Nov-04	148	78	226	8.2	21.0	5.7	8.9
Dec-04	143	83	226				
Jan-05	139	82	221				
Feb-05	140	81	221	6.7	23.0	5.4	8.4
Mar-05	133	80	213				
Apr-05	119	75	194				
May-05	142	83	225				
Jun-05	138	82	220	6.8	16.7	4.9	6.8
Jul-05	118	79	197				
Aug-05	95	83	177				
Sep-05	129	80	209	6.9	14	5.7	6.7
Oct-05	136	81	217				
Nov-05	152	80	232				
Dec-05	153	80	233				
Jan-06	145	78	224	5.5	5.5	4.7	4.4
Feb-06	123	80	203				
Mar-06	135	82	217	7.2	13	4.4	5.1
Apr-06	146	81	227				
May-06	138	78	216				
Jun-06	133	81	214	5.7	7.7	4.1	4.3
Jul-06	147	79	226				
Aug-06	139	79	218				
Sep-06	134	76	210				
Oct-06	139	80	218	4.4	5.8	5.1	4.6
Nov-06	132	77	209				
Dec-06	131	81	212				
Jan-07	152	80	232	5.9	7.4		
Feb-07	106	74	180	5.6	6.5		

Table 2
Extraction Well Average Monthly Pumping Rates,
CTC, and Nitrate Concentrations, November 2002 - May 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Month	Average Pumping Rate (gpm)			CTC Concentration (ug/L)		Nitrate Concentration (mg/L)	
	Well No. 2	MW-17-EX	Total	Well No. 2	MW-17-EX	Well No. 2	MW-17-EX
Mar-07	138	79	217				
Apr-07	171	80	252				
May-07	182	82	263	4.1	4.5		
Jun-07	114	60	174				
Jul-07	163	73	236				
Aug-07	164	83	247	6.3	3.6		
Sep-07	149	47	196				
Oct-07	0	0	0	27.9	4.8		
Nov-07	0	0	0	19.8	2.7		
Dec-07	157	0	157				
Jan-08	168	0	168	3.6	1.0		
Feb-08	167	0	167				
Mar-08	168	0	168				
Apr-08	168	0	168	3.6	< 1.0		
May-08	163	0	163				

Notes:
CTC - Carbon Tetrachloride
gpm - gallons per minute
ug/L - micrograms per liter
mg/L - milligrams per liter
System was shut down from 9/28/07 to 11/29/07 to assses potential contaminant rebound in Well No. 2 and MW-17-EX.
MW-17-EX has remained shut down since 9/28/07.

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Well ID (Hydrologic Zone and Hydrogeologic Unit Monitored)	Date Collected	CARBON TETRACHLORIDE			NITRATE-NITRITE		
		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MPMW-01-1 (Upper Zone, Unit 1)	30-Oct-02	6	=	UG/L	2.9	J	MG/L
	19-Feb-03	5.1	=	UG/L	2.9	=	MG/L
	21-May-03	5.2	=	UG/L	4	=	MG/L
	19-Aug-03	17	=	UG/L	3.1	=	MG/L
	17-Nov-03	16	=	UG/L	3.3	=	MG/L
	16-Mar-04	25	D	UG/L	3.6	=	MG/L
	22-Jun-04	23	=	UG/L	3.7	=	MG/L
	30-Nov-04	15	=	UG/L	*		MG/L
	1-Mar-05	14	=	UG/L	*		MG/L
	7-Sep-05	39	=	UG/L	*		MG/L
	1-Mar-06	15	=	UG/L	*		MG/L
	25-Oct-06	19	=	UG/L	*		MG/L
	1-Aug-07	29.1	=	UG/L	*		MG/L
	8-Apr-08	24	=	UG/L	*		MG/L
MPMW-01-2 (Upper Zone, Upper Unit 2)	30-Oct-02	6.2	=	UG/L	2.9	J	MG/L
	19-Feb-03	5.7	=	UG/L	3.2	=	MG/L
	21-May-03	6.6	=	UG/L	4	=	MG/L
	19-Aug-03	6.6	=	UG/L	3.4	=	MG/L
	17-Nov-03	7	J	UG/L	3.5	=	MG/L
	16-Mar-04	7.6	=	UG/L	3.5	=	MG/L
	22-Jun-04	5.2	=	UG/L	3.3	=	MG/L
	30-Nov-04	9.8	=	UG/L	*		MG/L
	1-Mar-05	6.5	=	UG/L	*		MG/L
	7-Sep-05	5.8	=	UG/L	*		MG/L
	1-Mar-06	6.7	=	UG/L	*		MG/L
	25-Oct-06	6.9	=	UG/L	*		MG/L
	8-Apr-08	4.8	=	UG/L	*		MG/L
MPMW-01-3 (Lower Zone, Lower Unit 2)	30-Oct-02	6	=	UG/L	3.6	J	MG/L
	19-Feb-03	3.9	=	UG/L	3	=	MG/L
	21-May-03	7.7	=	UG/L	4	=	MG/L
	19-Aug-03	5.8	=	UG/L	3.4	=	MG/L
	17-Nov-03	0.25	U	UG/L	0.032	B	MG/L
	16-Mar-04	6.4	=	UG/L	3.7	=	MG/L
	22-Jun-04	4.9	=	UG/L	3.3	=	MG/L
	30-Nov-04	6.8	=	UG/L	*		MG/L
	1-Mar-05	5.4	=	UG/L	*		MG/L
	7-Sep-05	5.3	=	UG/L	*		MG/L
	1-Mar-06	5.3	=	UG/L	*		MG/L
	25-Oct-06	6.2	=	UG/L	*		MG/L
	8-Apr-08	4.5	=	UG/L	*		MG/L
MPMW-01-4 (Lower Zone, Unit 3)	30-Oct-02	0.24	LJ	UG/L	3	J	MG/L
	19-Feb-03	0.18	LJ	UG/L	2.5	=	MG/L
	21-May-03	0.36	LJ	UG/L	3.4	=	MG/L
	19-Aug-03	0.24	LJ	UG/L	2.7	=	MG/L
	17-Nov-03	0.31	LJ	UG/L	2.7	=	MG/L
	30-Nov-04	0.37	LJ	UG/L	*		MG/L
	7-Sep-05	0.21	LJ	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
	1-Aug-07	1	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Well ID (Hydrologic Zone and Hydrogeologic Unit Monitored)	Date Collected	CARBON TETRACHLORIDE			NITRATE-NITRITE		
		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MPMW-01-5 (Lower Zone, Unit 4)	30-Oct-02	0.5	U	UG/L	2.4	J	MG/L
	19-Feb-03	0.5	U	UG/L	1.7	=	MG/L
	21-May-03	0.5	U	UG/L	2.3	=	MG/L
	19-Aug-03	0.5	U	UG/L	1.8	=	MG/L
	17-Nov-03	0.5	U	UG/L	1.7	=	MG/L
	30-Nov-04	0.5	U	UG/L	*		MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MPMW-02-1 (Upper Zone, Upper Unit 2)	23-Oct-02	35	J	UG/L	12	=	MG/L
	18-Feb-03	58	Jv	UG/L	11	=	MG/L
	20-May-03	47	D	UG/L	13	=	MG/L
	19-Aug-03	91	D	UG/L	10	=	MG/L
	19-Nov-03	100	D	UG/L	11	=	MG/L
	16-Mar-04	110	D	UG/L	12	=	MG/L
	22-Jun-04	74	D	UG/L	12	=	MG/L
	29-Nov-04	82	=	UG/L	12	=	MG/L
	1-Mar-05	62	D	UG/L	*		MG/L
	7-Sep-05	65	=	UG/L	11	=	MG/L
	28-Feb-06	75	=	UG/L	*		MG/L
	24-Oct-06	61	=	UG/L	*		MG/L
	27-Feb-07	91	=	UG/L	*		MG/L
	2-Aug-07	60.7	=	UG/L	*		MG/L
	8-Apr-08	91.2	=	UG/L	*		MG/L
MPMW-02-2 (Lower Zone, Lower Unit 2)	23-Oct-02	20	=	UG/L	6.1	=	MG/L
	18-Feb-03	25	=	UG/L	5.3	=	MG/L
	20-May-03	2.2	=	UG/L	5.7	=	MG/L
	19-Aug-03	41	D	UG/L	4.5	=	MG/L
	19-Nov-03	22	=	UG/L	4.2	=	MG/L
	16-Mar-04	19	D	UG/L	4.2	=	MG/L
	22-Jun-04	17	=	UG/L	4.1	=	MG/L
	29-Nov-04	25	=	UG/L	4.4	=	MG/L
	1-Mar-05	22	=	UG/L	*		MG/L
	7-Sep-05	16	=	UG/L	4.1	=	MG/L
	28-Feb-06	29	J	UG/L	*		MG/L
	25-Oct-06	20	=	UG/L	*		MG/L
	27-Feb-07	25.5	=	UG/L	*		MG/L
	2-Aug-07	30.7	=	UG/L	*		MG/L
	8-Apr-08	16.4	=	UG/L	*		MG/L
MPMW-02-3 (Lower Zone, Unit 3)	23-Oct-02	27	D	UG/L	18	=	MG/L
	18-Feb-03	25	Jv	UG/L	14	=	MG/L
	20-May-03	6.1	=	UG/L	3.6	=	MG/L
	19-Aug-03	0.72	=	UG/L	2.2	=	MG/L
	19-Nov-03	0.47	LJ	UG/L	2	=	MG/L
	16-Mar-04	0.27	LJ	UG/L	2	=	MG/L
	22-Jun-04	0.5	U	UG/L	2	=	MG/L
	29-Nov-04	0.5	U	UG/L	2.3	=	MG/L
	1-Mar-05	0.5	U	UG/L	*		MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	28-Feb-06	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
	2-Aug-07	1	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Well ID (Hydrologic Zone and Hydrogeologic Unit Monitored)	Date Collected	CARBON TETRACHLORIDE			NITRATE-NITRITE		
		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MPMW-02-4 (Lower Zone, Unit 4)	23-Oct-02	0.5	0.25	UG/L	1.7	=	MG/L
	18-Feb-03	0.24	LJv	UG/L	1.8	=	MG/L
	20-May-03	0.5	U	UG/L	2.1	=	MG/L
	19-Aug-03	0.13	LJ	UG/L	1.7	=	MG/L
	19-Nov-03	0.25	U	UG/L	1.6	=	MG/L
	16-Mar-04	0.5	U	UG/L	2	=	MG/L
	22-Jun-04	0.5	U	UG/L	1.6	=	MG/L
	29-Nov-04	0.5	U	UG/L	2	=	MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
MPMW-03-1 (Upper Zone, Unit 1)	30-Oct-02	13	=	UG/L	11	=	MG/L
	18-Feb-03	3.1	Jv	UG/L	8.1	=	MG/L
	20-May-03	4.1	=	UG/L	9	=	MG/L
	20-Aug-03	19	=	UG/L	9	=	MG/L
	18-Nov-03	17	=	UG/L	11	=	MG/L
	16-Mar-04	13	=	UG/L	11	=	MG/L
	22-Jun-04	12	=	UG/L	11	=	MG/L
	1-Dec-04	17	=	UG/L	10	=	MG/L
	1-Mar-03	18	=	UG/L	*		MG/L
	8-Sep-05	7.1	=	UG/L	*		MG/L
	28-Feb-06	19	=	UG/L	*		MG/L
	25-Oct-06	12	=	UG/L	*		MG/L
	1-Aug-07	4	=	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MPMW-03-2 (Upper Zone, Upper Unit 2)	30-Oct-02	12	=	UG/L	9.5	J	MG/L
	18-Feb-03	9	Jv	UG/L	8.2	=	MG/L
	20-May-03	0.2	LJ	UG/L	9.5	=	MG/L
	20-Aug-03	19	=	UG/L	8.8	=	MG/L
	18-Nov-03	18	=	UG/L	10	=	MG/L
	16-Mar-04	12	=	UG/L	11	=	MG/L
	22-Jun-04	11	=	UG/L	11	=	MG/L
	1-Dec-04	11	=	UG/L	10	=	MG/L
	1-Mar-05	12	=	UG/L	*		MG/L
	8-Sep-05	12	=	UG/L	10	=	MG/L
	28-Feb-06	22	J	UG/L	*		MG/L
	25-Oct-06	10	=	UG/L	*		MG/L
	1-Aug-07	4.5	=	UG/L	*		MG/L
	8-Apr-08	1.2	=	UG/L	*		MG/L
MPMW-03-3 (Lower Zone, Lower Unit 2)	30-Oct-02	6.5	=	UG/L	9	J	MG/L
	18-Feb-03	8.6	Jv	UG/L	7.4	=	MG/L
	20-May-03	12	=	UG/L	8.4	=	MG/L
	20-Aug-03	15	=	UG/L	7.6	=	MG/L
	18-Nov-03	9.7	=	UG/L	8.3	=	MG/L
	16-Mar-04	10	=	UG/L	9.3	=	MG/L
	22-Jun-04	9	=	UG/L	8.9	=	MG/L
	1-Dec-04	13	Jv	UG/L	8.6	=	MG/L
	1-Mar-05	9.4	=	UG/L	*		MG/L
	8-Sep-05	11	=	UG/L	*		MG/L
	28-Feb-06	14	=	UG/L	*		MG/L
	25-Oct-06	9.8	=	UG/L	*		MG/L
	1-Aug-07	5.5	=	UG/L	*		MG/L
	8-Apr-08	2.8	=	UG/L	*		MG/L

Table 3
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October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Well ID (Hydrologic Zone and Hydrogeologic Unit Monitored)	Date Collected	CARBON TETRACHLORIDE			NITRATE-NITRITE		
		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MPMW-03-4 (Lower Zone, Unit 3)	30-Oct-02	6.6	=	UG/L	4.3	J	MG/L
	18-Feb-03	12	Jv	UG/L	5.3	=	MG/L
	20-May-03	10	=	UG/L	5.2	=	MG/L
	20-Aug-03	12	=	UG/L	3.8	=	MG/L
	18-Nov-03	5.7	=	UG/L	2.9	=	MG/L
	16-Mar-04	2.1	=	UG/L	2.3	=	MG/L
	22-Jun-04	1	=	UG/L	2.3	=	MG/L
	1-Dec-04	0.52	=	UG/L	*		MG/L
	8-Sep-05	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.31	LJ	UG/L	*		MG/L
	1-Aug-07	1	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MPMW-03-5 (Lower Zone, Unit 4)	30-Oct-02	0.5	U	UG/L	0.2	U	MG/L
	18-Feb-03	0.5	U	UG/L	0.05	U	MG/L
	20-May-03	0.5	U	UG/L	0.05	U	MG/L
	20-Aug-03	0.5	U	UG/L	0.05	U	MG/L
	18-Nov-03	0.5	U	UG/L	0.05	U	MG/L
	1-Dec-04	0.5	U	UG/L	*		MG/L
	8-Sep-05	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
MPMW-04-1 (Upper Zone, Unit 1)	23-Oct-02	1.8	J	UG/L	3.4	=	MG/L
	18-Feb-03	9.4	=	UG/L	3.6	=	MG/L
	21-May-03	3.1	=	UG/L	3.5	=	MG/L
	19-Aug-03	4.7	=	UG/L	2.8	=	MG/L
	18-Nov-03	5.1	=	UG/L	2.3	=	MG/L
	16-Mar-04	3.9	=	UG/L	2.1	=	MG/L
	22-Jun-04	2.6	=	UG/L	2.5	=	MG/L
	30-Nov-04	3.4	=	UG/L	*		MG/L
	1-Mar-05	2.2	=	UG/L	*		MG/L
	8-Sep-05	1.3	=	UG/L	*		MG/L
	25-Oct-06	1.4	=	UG/L	*		MG/L
	1-Aug-07	1	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MPMW-04-2 (Upper Zone, Upper Unit 2)	23-Oct-02	0.5	U	UG/L	2.4	=	MG/L
	18-Feb-03	0.5	U	UG/L	2.6	=	MG/L
	21-May-03	0.5	U	UG/L	3	=	MG/L
	19-Aug-03	0.5	U	UG/L	2.3	=	MG/L
	18-Nov-03	0.5	U	UG/L	2.3	=	MG/L
	30-Nov-04	0.5	U	UG/L	*		MG/L
	8-Sep-05	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
MPMW-04-3 (Lower Zone, Lower Unit 2)	23-Oct-02	0.5	U	UG/L	2.8	=	MG/L
	18-Feb-03	0.5	U	UG/L	3.1	=	MG/L
	21-May-03	0.5	U	UG/L	3.2	=	MG/L
	19-Aug-03	0.5	U	UG/L	2.8	=	MG/L
	18-Nov-03	0.5	U	UG/L	2.7	=	MG/L
	30-Nov-04	0.5	U	UG/L	*		MG/L
	8-Sep-05	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

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		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MPMW-04-4 (Lower Zone, Unit 3)	23-Oct-02	39	J	UG/L	19	=	MG/L
	18-Feb-03	28	D	UG/L	21	=	MG/L
	21-May-03	26	D	UG/L	22	=	MG/L
	19-Aug-03	41	D	UG/L	17	=	MG/L
	18-Nov-03	39	D	UG/L	15	=	MG/L
	16-Mar-04	39	D	UG/L	23	=	MG/L
	22-Jun-04	25	=	UG/L	9.3	=	MG/L
	30-Nov-04	14	=	UG/L	7.5	=	MG/L
	1-Mar-05	20	=	UG/L	*		MG/L
	8-Sep-05	19	=	UG/L	*		MG/L
	28-Feb-06	18	=	UG/L	*		MG/L
	25-Oct-06	6.2	=	UG/L	*		MG/L
	27-Feb-07	6.2	=	UG/L	*		MG/L
	1-Aug-07	4	=	UG/L	*		MG/L
	8-Apr-08	2.3	=	UG/L	*		MG/L
MPMW-04-5 (Lower Zone, Unit 4)	23-Oct-02	30	J	UG/L	2.6	=	MG/L
	18-Feb-03	0.5	U	UG/L	2.5	=	MG/L
	21-May-03	0.5	U	UG/L	2.6	=	MG/L
	19-Aug-03	0.5	U	UG/L	2.2	=	MG/L
	18-Nov-03	0.5	U	UG/L	0.05	U	MG/L
	16-Mar-04	0.5	U	UG/L	3.2	=	MG/L
	22-Jun-04	0.5	U	UG/L	2	=	MG/L
	30-Nov-04	0.5	U	UG/L	*		MG/L
	8-Sep-05	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
MPMW-06-1 (Upper Zone, Unit 1 and Upper Unit 2)	29-Oct-02	21	=	UG/L	4.5	J	MG/L
	19-Feb-03	12	=	UG/L	3.9	=	MG/L
	20-May-03	1.9	=	UG/L	5.1	=	MG/L
	20-Aug-03	21	=	UG/L	5	=	MG/L
	18-Nov-03	21	=	UG/L	4.5	=	MG/L
	16-Mar-04	15	=	UG/L	5.2	=	MG/L
	22-Jun-04	16	=	UG/L	4.5	=	MG/L
	29-Nov-04	16	=	UG/L	*		MG/L
	1-Mar-05	17	=	UG/L	*		MG/L
	7-Sep-05	19	=	UG/L	5.5	=	MG/L
	28-Feb-06	0.5	U	UG/L	*		MG/L
	24-Oct-06	15	=	UG/L	*		MG/L
	1-Aug-07	15	=	UG/L	*		MG/L
	8-Apr-08	12.9	=	UG/L	*		MG/L
MPMW-06-2 (Lower Zone, Lower Unit 2)	29-Oct-02	0.076	LJ	UG/L	2.5	J	MG/L
	19-Feb-03	0.5	U	UG/L	2.7	=	MG/L
	20-May-03	0.5	U	UG/L	3.3	=	MG/L
	20-Aug-03	0.5	U	UG/L	2.9	=	MG/L
	18-Nov-03	0.5	U	UG/L	2.8	=	MG/L
	29-Nov-04	0.5	U	UG/L	*		MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	24-Oct-06	0.5	U	UG/L	*		MG/L

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

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		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MPMW-06-3 (Lower Zone, Unit 3)	29-Oct-02	23	D	UG/L	20	J	MG/L
	19-Feb-03	13	=	UG/L	15	=	MG/L
	20-May-03	2.9	=	UG/L	20	=	MG/L
	20-Aug-03	15	D	UG/L	14	=	MG/L
	18-Nov-03	30	D	UG/L	16	=	MG/L
	16-Mar-04	26	D	UG/L	24	=	MG/L
	22-Jun-04	20	=	UG/L	12	=	MG/L
	29-Nov-04	19	=	UG/L	7.4	=	MG/L
	1-Mar-05	7.6	=	UG/L	*		MG/L
	7-Sep-05	4.2	=	UG/L	*		MG/L
	28-Feb-06	5.2	=	UG/L	*		MG/L
	24-Oct-06	2.9	=	UG/L	*		MG/L
	27-Feb-07	3.5	=	UG/L	*		MG/L
	1-Aug-07	2.7	=	UG/L	*		MG/L
	8-Apr-08	1.9	=	UG/L	*		MG/L
MW-05S (Upper Zone, Lower Unit 2)	28-Oct-02	0.25	U	UG/L	3.3	J	MG/L
	17-Feb-03	0.2	LJv	UG/L	2.8	=	MG/L
	19-May-03	0.28	LJ	UG/L	1.7	U	MG/L
	18-Aug-03	0.25	U	UG/L	2.8	=	MG/L
	17-Nov-03	0.25	U	UG/L	2.8	=	MG/L
	30-Nov-04	0.5	U	UG/L	*		MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
MW-05D (Lower Zone, Unit 3)	28-Oct-02	10	=	UG/L	4	J	MG/L
	17-Feb-03	3.9	=	UG/L	3.1	=	MG/L
	19-May-03	4.6	=	UG/L	1.9	U	MG/L
	18-Aug-03	11	=	UG/L	2.9	=	MG/L
	17-Nov-03	11	=	UG/L	2.7	=	MG/L
	16-Mar-04	6.2	=	UG/L	*		MG/L
	22-Jun-04	2.5	=	UG/L	*		MG/L
	30-Nov-04	2.7	=	UG/L	*		MG/L
	1-Mar-05	1.1	=	UG/L	*		MG/L
	7-Sep-05	0.45	LJ	UG/L	*		MG/L
	25-Oct-06	0.19	LJ	UG/L	*		MG/L
MWCL-07S (Upper Zone, Lower Unit 2)	30-Oct-02	0.5	U	UG/L	3.3	J	MG/L
	19-Feb-03	0.5	U	UG/L	2.7	=	MG/L
	21-May-03	0.5	U	UG/L	3.5	U	MG/L
	20-Aug-03	0.5	U	UG/L	2.7	=	MG/L
	19-Nov-03	0.5	U	UG/L	2.7	=	MG/L
	1-Mar-06	0.5	U	UG/L	*		MG/L
	26-Oct-06	0.5	U	UG/L	*		MG/L
	1-Aug-07	1	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Well ID (Hydrologic Zone and Hydrogeologic Unit Monitored)	Date Collected	CARBON TETRACHLORIDE			NITRATE-NITRITE		
		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MWCL-07D (Lower Zone, Unit 3)	30-Oct-02	0.5	U	UG/L	2.5	J	MG/L
	19-Feb-03	0.5	U	UG/L	1.8	=	MG/L
	21-May-03	0.5	U	UG/L	2.6	U	MG/L
	20-Aug-03	0.5	U	UG/L	2.1	=	MG/L
	19-Nov-03	0.5	U	UG/L	2.1	=	MG/L
	1-Mar-06	0.5	U	UG/L	*		MG/L
	26-Oct-06	0.5	U	UG/L	*		MG/L
MW-08 (Lower Zone, Unit 3)	30-Oct-02	0.12	LJ	UG/L	1.7	J	MG/L
	18-Aug-03	14	=	UG/L	3.9	=	MG/L
	17-Nov-03	13	=	UG/L	3.5	=	MG/L
	16-Mar-04	9.2	=	UG/L	*		MG/L
	22-Jun-04	2.9	=	UG/L	*		MG/L
	1-Dec-04	3.4	=	UG/L	2.8	=	MG/L
	1-Mar-05	0.7	=	UG/L	*		MG/L
	8-Sep-05	0.57	=	UG/L	*		MG/L
	28-Feb-06	0.5	=	UG/L	*		MG/L
	25-Oct-06	0.32	LJ	UG/L	*		MG/L
	1-Aug-07	1	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MW-09 (Lower Zone, Unit 3)	29-Oct-02	4.1	=	UG/L	4.4	J	MG/L
	18-Feb-03	0.25	U	UG/L	3.6	=	MG/L
	20-May-03	0.43	LJ	UG/L	4.5	=	MG/L
	19-Aug-03	5.3	=	UG/L	4.3	=	MG/L
	18-Nov-03	5.1	J	UG/L	4.6	=	MG/L
	16-Mar-04	0.35	LJ	UG/L	*		MG/L
	22-Jun-04	0.37	J	UG/L	*		MG/L
	1-Dec-04	2.5	=	UG/L	3.6	=	MG/L
	7-Sep-05	5	=	UG/L	*		MG/L
	28-Feb-06	0.24	LJ	UG/L	*		MG/L
	26-Oct-06	0.14	LJ	UG/L	*		MG/L
	1-Aug-07	1	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MW-10 (Lower Zone, Unit 3)	29-Oct-02	7.9	=	UG/L	4	J	MG/L
	18-Feb-03	4.1	=	UG/L	3.9	=	MG/L
	19-May-03	2.9	=	UG/L	3.4	U	MG/L
	19-Aug-03	6.2	=	UG/L	3.5	=	MG/L
	18-Nov-03	2.4	=	UG/L	2.8	=	MG/L
	16-Mar-04	0.96	=	UG/L	*		MG/L
	22-Jun-04	0.61	=	UG/L	*		MG/L
	2-Dec-04	0.44	LJ	UG/L	2.2	=	MG/L
	1-Mar-05	0.2	LJ	UG/L	*		MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	26-Oct-06	0.5	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

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		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MWCL-11D (Lower Zone, Unit 3)	28-Oct-02	1.7	=	UG/L	1.4	J	MG/L
	17-Feb-03	1.1	=	UG/L	2.7	=	MG/L
	19-May-03	0.58	=	UG/L	1.6	U	MG/L
	18-Aug-03	8.4	=	UG/L	2.6	=	MG/L
	17-Nov-03	0.92	J	UG/L	2.6	=	MG/L
	2-Dec-04	4.7	=	UG/L	2.6	=	MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L
	1-Aug-07	1	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MWCL-11S (Upper Zone, Unit 1)	28-Oct-02	42	D	UG/L	19	J	MG/L
	17-Feb-03	81	Jv	UG/L	16	=	MG/L
	19-May-03	11	=	UG/L	8.5	U	MG/L
	18-Aug-03	67	D	UG/L	14	=	MG/L
	17-Nov-03	70	D	UG/L	14	=	MG/L
	16-Mar-04	72	D	UG/L	*		MG/L
	22-Jun-04	69	D	UG/L	*		MG/L
	2-Dec-04	76	=	UG/L	13	=	MG/L
	1-Mar-05	46	D	UG/L	*		MG/L
	7-Sep-05	90	=	UG/L	*		MG/L
	28-Feb-06	120	J	UG/L	*		MG/L
	25-Oct-06	71	=	UG/L	*		MG/L
	1-Aug-07	59.2	=	UG/L	*		MG/L
	8-Apr-08	51.8	=	UG/L	*		MG/L
MWCL-13S (Upper Zone, Unit 1 and Upper Unit 2)	29-Oct-02	0.36	LJ	UG/L	3.7	J	MG/L
	19-Feb-03	0.5	U	UG/L	2.6	=	MG/L
	20-May-03	0.5	U	UG/L	3.1	=	MG/L
	20-Aug-03	0.3	LJ	UG/L	2.4	=	MG/L
	19-Nov-03	0.25	LJ	UG/L	2.2	=	MG/L
	2-Dec-04	0.39	LJ	UG/L	*		MG/L
	28-Feb-05	0.21	LJ	UG/L	*		MG/L
	8-Sep-05	0.28	LJ	UG/L	*		MG/L
	1-Mar-06	1.1	=	UG/L	*		MG/L
	24-Oct-06	1.4	LJ	UG/L	*		MG/L
MWCL-13D (Lower Zone, Unit 3)	29-Oct-02	0.055	LJ	UG/L	2.9	J	MG/L
	19-Feb-03	0.5	U	UG/L	2.4	=	MG/L
	20-May-03	0.5	U	UG/L	3.1	=	MG/L
	20-Aug-03	0.5	U	UG/L	2.6	=	MG/L
	19-Nov-03	0.5	U	UG/L	2.8	=	MG/L
	2-Dec-04	0.5	U	UG/L	*		MG/L
	8-Sep-05	0.5	U	UG/L	*		MG/L
	1-Mar-06	0.5	U	UG/L	*		MG/L
	25-Oct-06	0.5	U	UG/L	*		MG/L

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Well ID (Hydrologic Zone and Hydrogeologic Unit Monitored)	Date Collected	CARBON TETRACHLORIDE			NITRATE-NITRITE		
		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MW-14 (Lower Zone, Unit 3)	29-Oct-02	3.7	=	UG/L	4	J	MG/L
	18-Feb-03	4.9	=	UG/L	4.5	=	MG/L
	20-May-03	1	=	UG/L	4.8	=	MG/L
	19-Aug-03	2.5	=	UG/L	3.3	=	MG/L
	18-Nov-03	4.9	=	UG/L	3.9	=	MG/L
	16-Mar-04	0.81	=	UG/L	*		MG/L
	22-Jun-04	0.66	=	UG/L	*		MG/L
	1-Dec-04	0.88	=	UG/L	*		MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	26-Oct-06	0.5	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MW-15 (Lower Zone, Unit 3)	29-Oct-02	0.89	=	UG/L	2.8	J	MG/L
	18-Feb-03	0.94	=	UG/L	2.5	=	MG/L
	20-May-03	0.31	LJ	UG/L	3.1	=	MG/L
	19-Aug-03	0.24	LJ	UG/L	2.4	=	MG/L
	18-Nov-03	0.19	LJ	UG/L	2.3	=	MG/L
	17-Mar-04	0.5	U	UG/L	*		MG/L
	22-Jun-04	0.5	U	UG/L	*		MG/L
	30-Nov-04	0.5	U	UG/L	*		MG/L
	7-Sep-05	0.5	U	UG/L	*		MG/L
	26-Oct-06	0.5	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MW-16 (Lower Zone, Unit 3)	19-Aug-03	1.7	=	UG/L	3	=	MG/L
	18-Nov-03	2	=	UG/L	3	=	MG/L
	16-Mar-04	0.5	U	UG/L	*		MG/L
	22-Jun-04	0.5	U	UG/L	*		MG/L
	1-Dec-04	0.5	U	UG/L	2.8	=	MG/L
	1-Mar-05	0.5	U	UG/L	*		MG/L
	8-Sep-05	0.5	U	UG/L	*		MG/L
	26-Oct-06	0.5	U	UG/L	*		MG/L
	1-Aug-07	1	U	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L
MW-17-EX (Extraction Well) (Lower Zone, Unit 3)	20-Aug-03	5.5	=	UG/L	4.6	=	MG/L
	17-Nov-03	17	J	UG/L	12	=	MG/L
	17-Mar-04	25	D	UG/L	9.4	=	MG/L
	21-Jun-04	20	=	UG/L	9.1	=	MG/L
	29-Nov-04	21	=	UG/L	8.9	=	MG/L
	28-Feb-05	23	=	UG/L	8.4	=	MG/L
	6-Sep-05	14	=	UG/L	6.7	=	MG/L
	28-Feb-06	13	=	UG/L	5.1	=	MG/L
	24-Oct-06	5.8	=	UG/L	4.6	=	MG/L
	22-Jan-07	7.4	=	UG/L	3.6	=	MG/L
	27-Feb-07	6.5	=	UG/L	*		MG/L
	21-May-07	4.5	=	UG/L	*		MG/L
	3-Aug-07	3.6	=	UG/L	*		MG/L
	29-Oct-07	4.8	=	UG/L	*		MG/L
	28-Nov-07	2.7	=	UG/L	*		MG/L
	9-Jan-08	1	=	UG/L	*		MG/L
	8-Apr-08	1	U	UG/L	*		MG/L

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Well ID (Hydrologic Zone and Hydrogeologic Unit Monitored)	Date Collected	CARBON TETRACHLORIDE			NITRATE-NITRITE		
		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
MW-18-EX (Lower Zone, Lower Unit 2)	27-Feb-07	2.3	=	UG/L	*		MG/L
	1-Aug-07	3.4	=	UG/L	*		MG/L
	8-Apr-08	4.9	=	UG/L	*		MG/L
MW-19-EX (Upper Zone, Unit 1 and Upper Unit 2)	27-Feb-07	10.9	=	UG/L	*		MG/L
	2-Aug-07	14.6	=	UG/L	*		MG/L
	8-Apr-08	27.1	=	UG/L	*		MG/L
GW-01 (Well No. 1) (Lower Zone)	22-Oct-01	0.5	U	UG/L	2.1	=	MG/L
	17-Feb-03	0.5	UJv	UG/L	5.4	=	MG/L
	21-May-03	0.5	U	UG/L	2.5	=	MG/L
	19-Aug-03	0.5	U	UG/L	2.3	=	MG/L
	17-Mar-04	0.5	U	UG/L	2	=	MG/L
	29-Nov-04	0.5	U	UG/L	5	=	MG/L
GW-02 (Well No. 2) (Lower Zone, Upper Unit 2 and Unit 3)	22-Oct-02	23	=	UG/L	22	=	MG/L
	17-Feb-03	8.6	=	UG/L	*		MG/L
	21-May-03	1.1	Jv	UG/L	12	=	MG/L
	19-Aug-03	20	=	UG/L	9.4	=	MG/L
	17-Nov-03	9.7	J	UG/L	7.2	=	MG/L
	17-Mar-04	12	=	UG/L	6.6	=	MG/L
	22-Jun-04	6.7	=	UG/L	6.4	=	MG/L
	29-Nov-04	8.2	=	UG/L	5.7	=	MG/L
	28-Feb-05	6.7	=	UG/L	5.4	=	MG/L
	6-Sep-05	6.9	=	UG/L	5.7	=	MG/L
	28-Feb-06	7.2	=	UG/L	4.4	=	MG/L
	24-Oct-06	4.4	=	UG/L	5.1	=	MG/L
	22-Jan-07	5.9	=	UG/L	4.4	=	MG/L
	27-Feb-07	5.6	=	UG/L	*		MG/L
	21-May-07	4.1	=	UG/L	*		MG/L
	3-Aug-07	6.3	=	UG/L	*		MG/L
	29-Oct-07	27.9	=	UG/L	*		MG/L
	28-Nov-07	19.8	=	UG/L	*		MG/L
	28-Nov-07	17.5	=	UG/L	*		MG/L
	28-Nov-07	19.7	=	UG/L	*		MG/L
	9-Jan-08	3.6	=	UG/L	*		MG/L
	8-Apr-08	3.6	=	UG/L	*		MG/L

Table 3
Historical CTC and Nitrate Concentrations During Ground Water Sampling Events
October 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Well ID (Hydrologic Zone and Hydrogeologic Unit Monitored)	Date Collected	CARBON TETRACHLORIDE			NITRATE-NITRITE		
		Concentration	Qualifier	Unit	Concentration	Qualifier	Unit
GW-03 (Well No. 3) (Lower Zone)	17-Mar-04	0.5	U	UG/L	3	=	MG/L
	21-Jun-04	0.5	U	UG/L	*		MG/L
	29-Nov-04	0.5	U	UG/L	*		MG/L
SVMWN-10-6 (Upper Zone, Unit 1)	30-Oct-02	18	=	UG/L	*		MG/L
	20-Feb-03	17	=	UG/L	15	=	MG/L
	22-May-03	0.56	J	UG/L	*		MG/L

Notes:

* - Nitrate Sample Not Collected
CTC - Carbon Tetrachloride
U = Not Detected
J = Estimated Value
"=" = Detected Value
v = Low Biased; actual concentration may be
higher than the concentration reported
L = Reported concentration is below the Contract Required Quantitation Limit
D = Result is from a diluted sample analysis
UG/L - micrograms per liter
MG/L - milligrams per liter
SVMWN-10-6 was abandoned during June 2003
During most sampling events, multiple samples were collected at several monitor wells. The
highest results from each event are reported.

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Table 4
ASTP System Flow Rate, CTC Influent Concentrations, and CTC Mass Loading
November 2002 - May 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Month	Average Flow Rate (gpm)	Maximum Design Flow Rate (gpm)	Water Production for Month (gal)	Influent CTC Concentration (ug/L)	Design Influent CTC Concentration at 400 gpm (ug/L)	CTC Mass Loading for Month (lbs)	Maximum Design CTC Mass Loading per Month (lbs)	Cumulative CTC Mass Loading (lbs)
Nov-02	46		271500					
Dec-02	48	400	1202200	30	40	0.30	5.76	0.30
Jan-03	54	400	2453500	36	40	0.73	5.76	1.03
Feb-03	61	400	3191800	8.6	40	0.22	5.76	1.25
Mar-03	85	400	3313000	23	40	0.63	5.76	1.88
Apr-03	86	400	4438900	15	40	0.55	5.76	2.43
May-03	85	400	3279400	5.2	40	0.14	5.76	2.57
Jun-03	129	400	5140900	4.9	40	0.20	5.76	2.77
Jul-03	125	400	4435600	41	40	1.51	5.76	4.28
Aug-03	115	400	5353800	20	40	0.88	5.76	5.16
Sep-03	123	400	4795800	22	40	0.87	5.76	6.03
Oct-03	104	400	4350400	21	40	0.75	5.76	6.78
Nov-03[1]	234	400	5068800	21 [2]	40	0.88	5.76	7.66
Dec-03	241	400	5540600	22	40	1.00	5.76	8.66
Jan-04	243	400	14315000	18	40	2.12	5.76	10.78
Feb-04	233	400	8422100	23	40	1.60	5.76	12.38
Mar-04	211	400	5530000	18	40	0.82	5.76	13.20
Apr-04	217	400	10194200	13 [2]	40	1.08	5.76	14.28
May-04	223	400	7054000	13 [2]	40	0.75	5.76	15.03
Jun-04	220	400	2263900	13	40	0.24	5.76	15.27
Jul-04	225	400	12089000	14 [2]	40	1.38	5.76	16.65
Aug-04	221	400	10897300	14 [2]	40	1.25	5.76	17.90
Sep-04	224	400	9313900	14	40	1.07	5.76	18.97
Oct-04	219	400	8980500	14	40	1.03	5.76	19.97
Nov-04	226	400	9275500	20	40	1.53	5.76	21.49
Dec-04	227	400	9109700	15 [2]	40	1.12	5.76	22.61
Jan-05	221	400	10755600	15 [2]	40	1.32	5.76	23.93
Feb-05	221	400	9549700	15	40	1.17	5.76	25.11
Mar-05	213	400	8569100	15 [2]	40	1.05	5.76	26.16
Apr-05	194	400	8669200	15 [2]	40	1.06	5.76	27.22
May-05	225	400	9739000	15 [2]	40	1.20	5.76	28.42
Jun-05	220	400	9820200	15 [2]	40	1.21	5.76	29.63
Jul-05	197	400	8501600	13.6	40	0.95	5.76	30.57
Aug-05	177	400	7648400	13.6 [2]	40	0.85	5.76	31.42
Sep-05	209	400	9622600	7.3	40	0.56	5.76	31.99
Oct-05	217	400	9666100	7.3 [2]	40	0.57	5.76	32.56
Nov-05	232	400	10362000	7.3 [2]	40	0.61	5.76	33.16
Dec-05	233	400	10068600	7.3 [2]	40	0.59	5.76	33.76
Jan-06	224	400	9974500	6.6	40	0.47	5.76	34.22
Feb-06	203	400	9062600	6.6 [2]	40	0.42	5.76	34.64
Mar-06	217	400	8732100	10	40	0.71	5.76	35.35
Apr-06	227	400	10082100	10 [2]	40	0.82	5.76	36.17
May-06	234	400	9024300	10 [2]	40	0.73	5.76	36.90
Jun-06	214	400	9569400	7.8	40	0.54	5.76	37.45
Jul-06	226	400	9743700	7.8 [2]	40	0.55	5.76	38.00
Aug-06	218	400	9707200	7.8 [2]	40	0.55	5.76	38.55
Sep-06	210	400	9368900	7.8 [2]	40	0.53	5.76	39.08
Oct-06	218	400	9427600	6	40	0.39	5.76	39.47
Nov-06	209	400	9345500	6 [2]	40	0.39	5.76	39.86
Dec-06	212	400	8491100	6 [2]	40	0.35	5.76	40.21
Jan-07	233	400	11016900	6.8	40	0.53	5.76	40.74
Feb-07	180	400	7504300	6.6	40	0.38	5.76	41.13
Mar-07	217	400	8435900	6.6 [2]	40	0.43	5.76	41.55
Apr-07	252	400	12320900	6.6 [2]	40	0.63	5.76	42.18
May-07	263	400	10665600	5.5	40	0.40	5.76	42.58
Jun-07	174	400	8633200	5.5 [2]	40	0.32	5.76	42.90

Table 4
ASTP System Flow Rate, CTC Influent Concentrations, and CTC Mass Loading
November 2002 - May 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Month	Average Flow Rate (gpm)	Maximum Design Flow Rate (gpm)	Water Production for Month (gal)	Influent CTC Concentration (ug/L)	Design Influent CTC Concentration at 400 gpm (ug/L)	CTC Mass Loading for Month (lbs)	Maximum Design CTC Mass Loading per Month (lbs)	Cumulative CTC Mass Loading (lbs)
Jul-07	236	400	7760400	5.5 [2]	40	0.29	5.76	43.19
Aug-07	247	400	9671400	5.6	40	0.41	5.76	43.60
Sep-07	196	400	10813000	5.6 [2]	40	0.46	5.76	44.06
Oct-07	0	400	0	NA	40	0.00	5.76	44.06
Nov-07	0	400	0	NA	40	0.00	5.76	44.06
Dec-07	157	400	3497900	19.7 [3]	40	0.56	5.76	44.62
Jan-08	168	400	6798800	3.6	40	0.18	5.76	44.80
Feb-08	167	400	3247500	3.6 [2]	40	0.08	5.76	44.88
Mar-08	168	400	7006500	3.6 [2]	40	0.18	5.76	45.06
Apr-08	168	400	7731700	3.6 [2]	40	0.20	5.76	45.26
May-08	163	400	6744200	2.6	40	0.12	5.76	45.38

Total Production (November 2002 - September 2003)	37876400	gallons
Total Production (October 2003 - September 2004)	95039200	gallons
Total Production (October 2004 - September 2005)	110241100	gallons
Total Production (October 2005 - September 2006)	115361500	gallons
Total Production (October 2006 - September 2007)	114085800	gallons
Total Production (October 2007 - May 2008)	35026600	gallons
Total Cummulative Production	507,630,600	gallons

Notes:
ASTP - Air Stripper Treatment Plant
CTC - Carbon Tetrachloride
gpm - gallons per minute
gal - gallons
ug/l - micrograms per liter
lbs - pounds
1 - First month where Well No. 2 and MW-17-EX were both operational
2 - No Influent sample collected for month. Sample result for sampling event preceeding that month used as influent concentration when calculating mass loading.
3 - Based on Well No. 2 sample collected on 11/28/07
System was shut down from 9/28/07 to 11/29/07 to assses potential contaminant rebound in Well No. 2 and MW-17-EX.
MW-17-EX has been shut down since 9/28/07.

Table 5
ASTP System CTC Influent/Treated Water Concentrations
November 2002 - April 2008
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Sampling Point	ASTP Influent (ug/L)	ASTP Effluent (ug/L)*
Month	**CTC Remediation Goal - 5 ug/L**	
Dec-02	30	0.5 U
Jan-03	36	0.5 U
Feb-03	8.6	0.5 U
Mar-03	23	0.5 U
Apr-03	15	0.5 U
May-03	5.2	0.5 U
Jun-03	4.9	0.5 U
Jul-03	41	0.5 U
Aug-03	20	0.5 U
Sep-03	22	0.5 U
Nov-03	21	0.5 U
Dec-03	22	0.5 U
Jan-04	18	0.5 U
Feb-04	23	0.5 U
Mar-04	18	0.5 U
Jun-04	13	0.5 U
Oct-04	14	0.5 U
Nov-04	20	0.5 U
Feb-05	15	0.5 U
Jun-05	13.6	0.48 U
Sep-05	7.3	0.5 U
Jan-06	6.6	2 U
Feb-06	10	0.5 U
Jun-06	7.8	2 U
Oct-08	6.0	0.5 U
Jan-07	7.3	0.5 U
Feb-07	6.6	0.5 U
May-07	5.5	0.5 U
Aug-07	5.6	0.5 U
Apr-08	2.6	1.0 U

Notes:
CTC - Carbon Tetrachloride
ASTP - Air Stripper Treatment Plant
U = Not Detected
ug/L - micrograms per liter
* - A value of 1/2 the CTC detection limit used to report the ASTP effluent CTC concentration. All ASTP effluent CTC concentrations have been not detected. The effluent is the treated water exiting the ASTP. The ASTP influent is the combined flow from Well No. 2 and MW-17-EX.

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Table 6
Issues Identified During the First Five-Year Review
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Issues	Affects Protectiveness (Y/N)	
	Current	Future
The contamination present in the Upper Zone and Lower Unit 2 is not currently addressed by the P&T system. The ground water contamination currently exceeds the site cleanup goals for CTC in the Upper Zone and Lower Unit 2 and for nitrate in the Upper Zone. Due to the overall heterogeneous nature and low permeability of the Upper Zone and Lower Unit 2, contaminated ground water in these zones cannot be effectively remediated using P&T technology. These zones are considered to be perched zones, and the primary ground water production zone in the Perryton area is Unit 3. Site data collected since October 2002 demonstrates that the existing P&T system, which pumps ground water from Unit 3, has had little or no effect on the contamination present in these perched zones.	N	Y
The annulus of Well No. 2 is constructed such that it acts as a contaminant migration pathway. The vertical hydraulic gradient at the site is downward, from the Upper Zone and Lower Unit 2 into Unit 3. Well No. 2 was constructed such that the gravel pack in the well annulus extends from its total depth up to 15 ft bgs. This gravel pack allows for the preferential flow of contaminated ground water from the Upper Zone and Lower Unit 2 into Unit 3. Contaminant rebound sampling performed during October and November 2007, when the P&T system was shut down, confirmed that CTC migrates down the annulus at Well No. 2. CTC concentrations have declined below the MCL in Unit 3, and Well No. 2 is only pumped now to capture any contamination that migrates down the annulus of the well. Since the monthly CTC mass removal rate peaked in January 2004 at 2.12 pounds, the current monthly CTC mass removal rate has decreased to 0.12 pounds in May 2008. As the amount of CTC mass removed by the ASTP levels off at low monthly rates, continued operation of the ASTP becomes less cost effective. Until the annulus of Well No. 2 is sealed between Unit 3 and Units 1 and 2, the well will continue to have to be pumped to capture contaminated ground water that migrates down the annulus of the well.	N	Y
The ROD did not include the use of institutional controls to protect the remedy effectiveness because the remedy was anticipated to achieve the cleanup goals throughout the Ogallala aquifer. Since ground water standards will likely not be achieved in the Upper Zone and Lower Unit 2, the use of institutional controls may be necessary to prevent the installation of a private well that would create a migration pathway between the contaminated Upper Zone and the remediated Lower Unit 3. While the presence of City personnel, along with the periodic presence of remediation personnel, make it unlikely that the installation of ground water well for drinking or irrigation would go undetected, such institutional controls are necessary for the long-term protection of public health	N	Y

Table 6
Issues Identified During the First Five-Year Review
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Issues	Affects Protectiveness (Y/N)	
	Current	Future
During the site inspection, several monitor wells were found to be in need of minor repairs. Most of the locks on the monitor wells were rusted to the point that they no longer function properly. The expansion plugs and PVC caps on some monitor wells are worn and may not provide an effective long-term seal against surface water intrusion into the monitor wells, and the well vaults on some monitor wells need new O-rings to prevent surface water intrusion into the well vaults. The well pads, skirts, and lids were all in good condition.	N	Y
The Southwestern Railroad tracks have been abandoned, and there is a potential for future land use changes along the railroad easement next to the Perryton Equity Exchange (PEX) grain silos, as well as at the PEX property. The source of the ground water contamination originated at the grain silos through the past use of CTC as a fumigant. Soil vapor sample data collected during the Remedial Investigation (RI) did not indicate the presence of an ongoing release of CTC from the PEX grain silos or along the railroad easement. However, shallow subsurface data for purposes of assessing the vapor intrusion pathway were not collected on the PEX property near the grain silos or storage bins. While a decision regarding future land use along the railroad easement has not been made, the risk of vapor intrusion from soil vapor to indoor air would need to be determined if buildings are constructed for human occupancy.	N	Y

Table 7
Recommendations and Follow-Up Actions
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Recommendations/Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-Up Actions: Affects Protectiveness (Y/N)	
				Current	Future
The EPA is currently assessing whether it is technically impracticable from an engineering perspective to achieve the cleanup goals (MCLs) and address the contamination present in the Upper Zone and Lower Unit 2 within a reasonable timeframe. If it is deemed technically impracticable to achieve the MCLs for CTC and nitrate in these zones, then a TI Waiver may be prepared that waives the MCLs as ARARs for the Upper Zone and Lower Unit 2. The TI Waiver and ROD Amendment would be required for the MCLs to be waived as ARARs for the Upper Zone and Lower Unit 2. Since contamination would remain in place above levels that allow for unrestricted use and unlimited exposure to ground water in the affected portion of the aquifer, statutory five-year reviews would be required so long as CTC and nitrate concentrations remain above the MCLs.	EPA	EPA	September 2010	N	Y
Options to address the annulus of Well No. 2 should be evaluated. Unless this migration pathway is addressed, contamination will continue to migrate from the overlying perched portions of the aquifer into the primary ground water production zone at the site in Unit 3. The existence of this migration pathway necessitates operation of Well No. 2 to remove contamination that is migrating down the annulus. The EPA is currently evaluating options to address the Well No. 2 annulus as part of the overall site strategy assessment for the future of the LTRA. If the annulus is sealed, then a decision can be made regarding the necessity of continued operation of the ASTP.	EPA	EPA	September 2010	N	Y
Identify available institutional controls to protect the remedy effectiveness and prevent re-contamination of the Lower Zone Unit 3 via private wells installed through the contaminated portion of the Upper Zone and Lower Unit 2	EPA	EPA	September 2010	N	Y

Table 7
Recommendations and Follow-Up Actions
First Five-Year Review
City of Perryton Well No. 2 Superfund Site
Perryton, Texas

Recommendations/Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-Up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Perform maintenance and repair work on the site monitor wells. The locks should be replaced on all conventional monitor wells in order to prevent unauthorized access to the wells. The expansion plugs and PVC well caps should be replaced where necessary to prevent surface water infiltration into the monitor wells. The O-rings on the well vault lids should be replaced where necessary to prevent surface water infiltration into the well vaults.	EPA	EPA	April 2009	N	Y
The railroad easement and PEX property overlying the ground water plume between Main Street and SW Third Avenue should continue to be monitored for future land use changes. If plans are identified that include the construction of occupied buildings within this area, an assessment of potential exposure to CTC through the vapor intrusion to indoor air pathway should be performed prior to construction. The EPA may decide to perform this assessment prior to any changes in land use on these properties.	EPA	EPA	September 2010	N	Y

Figures

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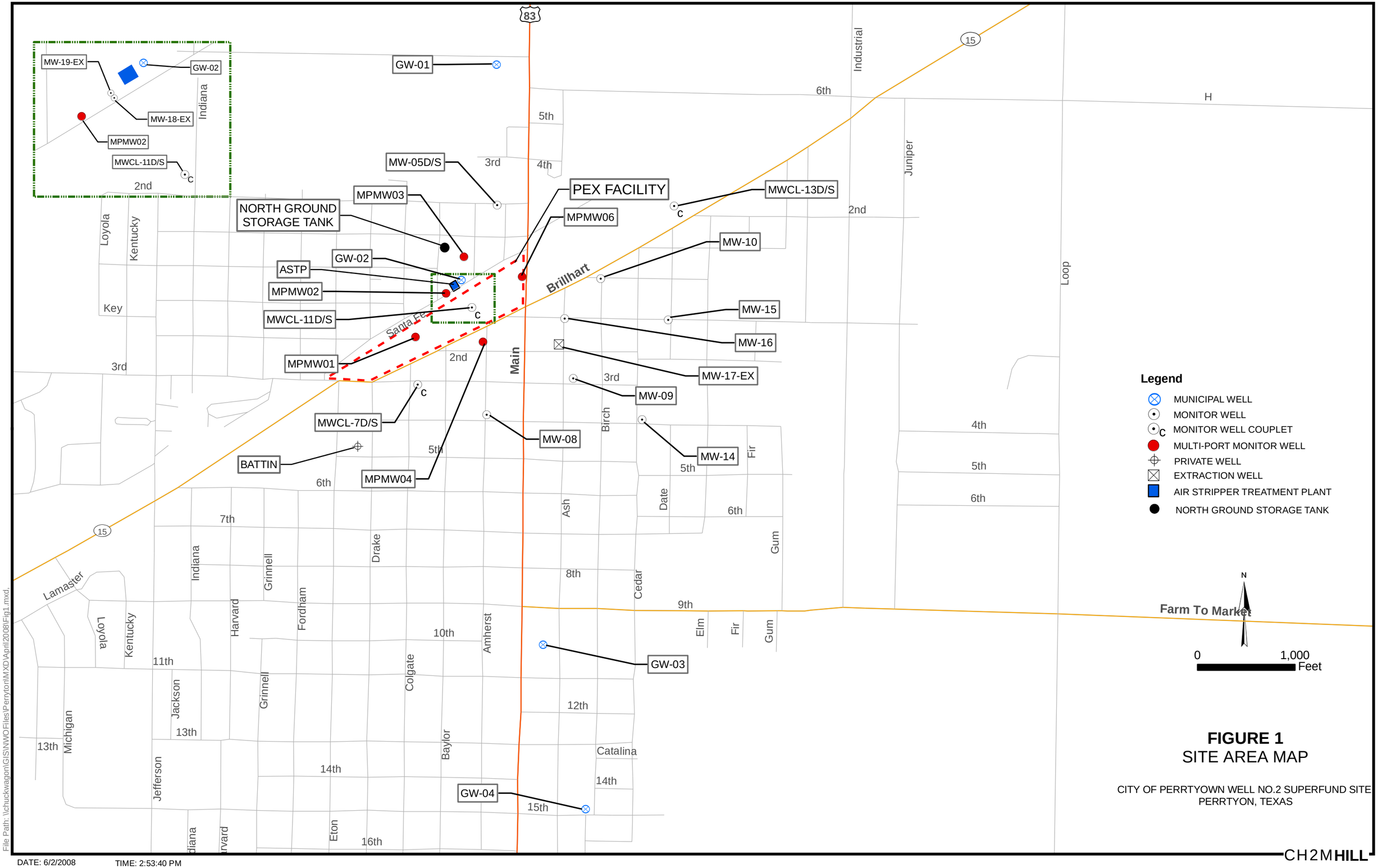

FIGURE 1
SITE AREA MAP

CITY OF PERRTYOWN WELL NO.2 SUPERFUND SITE
PERRTYON, TEXAS

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CH2MHILL

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Southwest

Northeast

MW-18-EX
(Location Projected onto Cross-Section)

MW-19-EX
(Location Projected onto Cross-Section)

Well No. 2
(Location Projected onto Cross-Section)

MWCL-11 S/D

MPMW01 MPMW04 MW-17-EX MW-16 MW-10 MWCL-13 S/D

Elevation Above Mean Sea Level

Depth Below Ground Surface

Port 1 24
Port 2 4.8
Port 3 4.5
Port 4 1.0 U
Port 5 1.0 U

27.1 51.8 4.8 3.6 1.0 U 2.3 1.4 LJ 0.5 U

Unit 1
Upper Unit 2
Lower Unit 2
Unit 3
Unit 4

Upper Zone
Lower Zone

Distance Away From MPMW01 Along Cross Section (see Figure 3)

Legend

- High Resistivity Units (Fine - Medium Sand)
- Medium Resistivity Units (Silty-Clayey Fine Sand)
- Low Resistivity Units (Silts and Clays)
- Port 1 — Screened Interval, Port Number (For Multi-Port Monitor Wells and Monitor Well Clusters)
- Lithologic Contact (Dashed where inferred)
- 19 — Carbon Tetrachloride Concentration (Most Recent Sample - Oct 2006 or April 2008)
- 1 — Water Level and Port Number (Collected April 2008)

GEOPHYSICAL LOGS

16" Resistivity (ohm/M) 1" = 135

Natural Gamma (API-GR) 1" = 100

- Well No. 2 - Location of Screened Interval of 10-inch Casing Installed Inside of Original 16-inch Casing
- Well No. 2 - Original Screened Interval

SCALE:

Horizontal: 1" = 267'
Vertical: 1" = 57'
Vertical Exageration = 4.7:1

P:\USEPA\349064\Task08_CV\Cross-Sections\Cross-SectionE-E'.grf

Figure 2
Hydro-Geophysical Cross-Section
City of Perryton Well No. 2 Superfund Site
Perryton, Texas
June 2008

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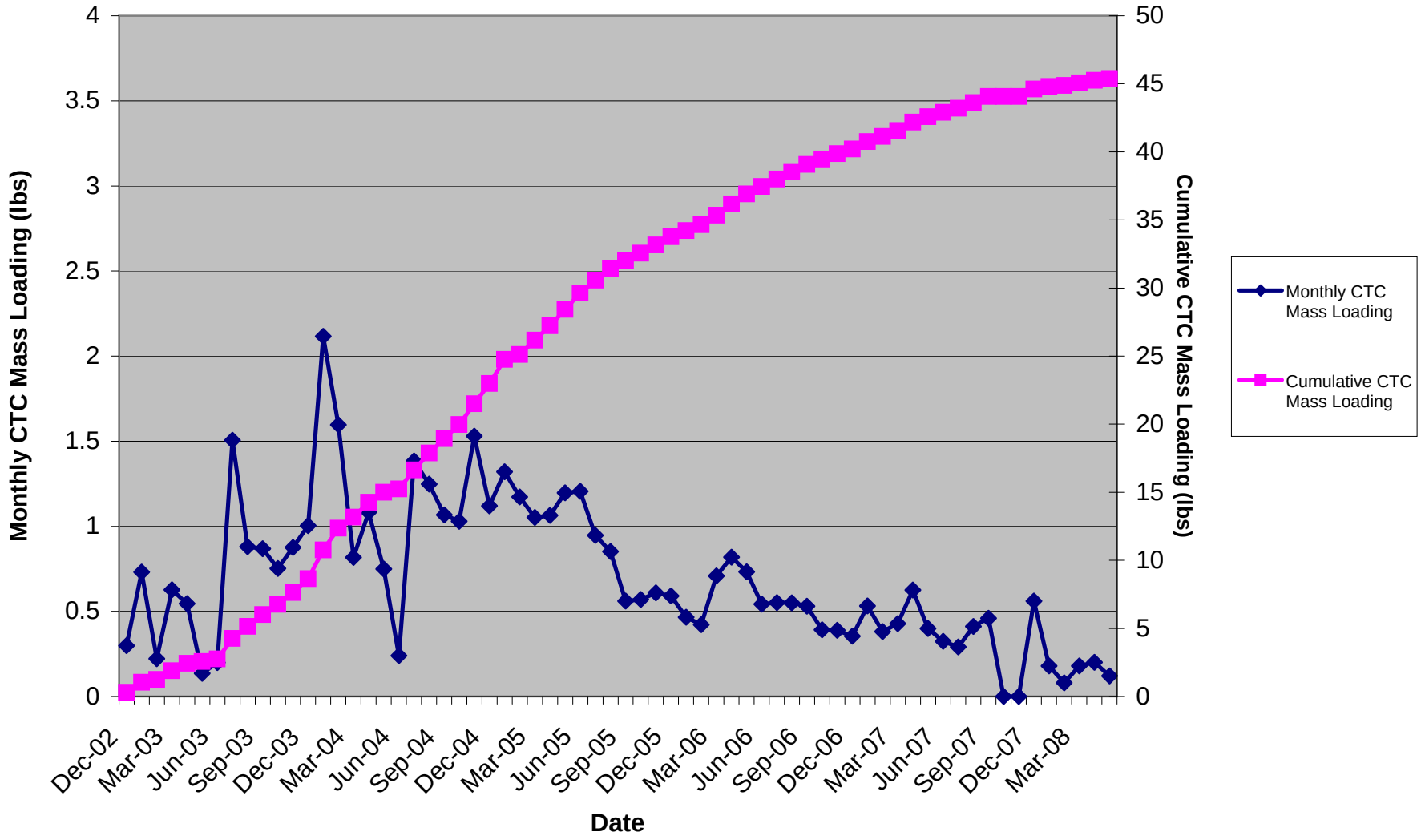
Figure 3
ASTP Monthly CTC Mass Loading and Cumulative CTC Mass Loading
City of Perryton Well No. 2 Superfund Site, Perryton, Texas



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Attachments

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Attachment 1
Documents Reviewed

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Attachment 1

Documents Reviewed

CH2M HILL, 2001. *Final Basis of Design Report for Well No. 2 Remedial Design, Perryton, TX*. January.

CH2M HILL, 2001a. *Final Remedial Investigation Report, Volume 1 of 3, City of Perryton Well No. 2 Site*. July.

CH2M HILL, 2002. *Final Feasibility Study Report, City of Perryton Well No. 2 Site*. June.

CH2M HILL, 2003. *Technical Memorandum: 1st Quarterly Groundwater Sampling Event Summary Perryton Well No. 2 Superfund Site/Remedial Action*. February.

CH2M HILL, 2003a. *Technical Memorandum: 2nd Quarterly Groundwater Sampling Event Summary Perryton Well No. 2 Superfund Site.* April.

CH2M HILL, 2003b. *100% Design Deliverables, City of Perryton Well No. 2 Superfund Site, Remedial Design.* May.

CH2M HILL, 2003c. *Technical Memorandum: 3rd Quarterly Groundwater Sampling Event Summary Ver. 1.0 Perryton Well No. 2 Superfund Site.* November.

CH2M HILL, 2003d. *Interim Remedial Action Completion Report, City of Perryton Well No. 2 Site*. December.

CH2M HILL, 2004. *Air Stripper Treatment Plant Remedial Action O&M Manual Version 1.0, City of Perryton Well No. 2*. January.

CH2M HILL, 2004a. *Technical Memorandum: 4th Quarterly Groundwater Sampling Event Summary Perryton Well No. 2 Superfund Site.* February.

CH2M HILL, 2004b. *Reverse Osmosis Remedial Action O&M Manual Version 1.0, City of Perryton Well No. 2*. February.

CH2M HILL, 2004c. *Technical Memorandum: First Quarter 2004 Ground Water Sampling Event Perryton Well No. 2 Superfund Site.* May.

CH2M HILL, 2004d. *Technical Memorandum: Second Quarter 2004 Ground Water Sampling Event Perryton Well No. 2 Superfund Site.* August.

CH2M HILL, 2005. *Technical Memorandum: Fourth Quarter 2004 Ground Water Sampling Event Perryton Well No. 2 Superfund Site.* February.

CH2M HILL, 2005a. *Annual Operations and Maintenance Progress Report: October 1, 2003 to September 30, 2004, City of Perryton Well No. 2*. February.

CH2M HILL, 2005b. *Technical Memorandum: City of Perryton Well No. 2 RA: Capture Zone Analysis for Well No. 2 and the Extraction Well.* February.

CH2M HILL, 2005c. *Technical Memorandum: City of Perryton Well No. 2 Superfund Site – Evaluation of Alternatives to Address CTC Contamination in the Upper Ground Water Zone.* April.

CH2M HILL, 2005d. *Technical Memorandum: First Semiannual Ground Water Sampling Event 2005 Perryton Well No. 2 Superfund Site.* May.

CH2M HILL, 2006. *Technical Memorandum: Second Semiannual Ground Water Sampling Event 2005 Perryton Well No. 2 Superfund Site.* January.

CH2M HILL, 2006a. *Annual Operations and Maintenance Progress Report: October 1, 2004 to September 30, 2005, City of Perryton Well No. 2*. March.

CH2M HILL, 2006b. *First Semiannual Ground Water Sampling Event 2006, Year Two of the Long Term Remedial Action, City of Perryton Well No. 2 Superfund Site*. May.

CH2M HILL, 2007. *Annual Operations and Maintenance Progress Report: October 1, 2005 to September 30, 2006, City of Perryton Well No. 2*. March.

CH2M HILL, 2007a. *Draft Perryton Well No. 2 – Analytical Calculations Supporting Transport of CTC.* September.

CH2M HILL, 2007b. *Field Sampling Plan Long-Term Remedial Action: Version 3, City of Perryton Well No. 2.* October.

CH2M HILL, 2007c. *City of Perryton Well No. 2 – Solute Transport Modeling, Version 1.0.* November.

CH2M HILL, 2007d. *Inspection Data Log Form, Well No. 2 Air Stripper Treatment Plant, City of Perryton, Texas.* November.

CH2M HILL, 2007e. *Annual Operations and Maintenance Progress Report: October 1, 2006 to September 30, 2007, City of Perryton Well No. 2*. December.

CH2M HILL, 2007f. *Inspection Data Log Form, Well No. 2 Air Stripper Treatment Plant, City of Perryton, Texas*. December.

CH2M HILL, 2007g. *Site Closure Strategy, City of Perryton Well No. 2 Superfund Site, Version 1.0.* December.

CH2M HILL, 2008. *Inspection Data Log Form December 26th – January 18th, Well No. 2 Air Stripper Treatment Plant, City of Perryton, Texas*. January.

CH2M HILL, 2008a. *Inspection Data Log Form January 23th –February 20th, Well No. 2 Air Stripper Treatment Plant, City of Perryton, Texas*. February.

CH2M HILL, 2008b. *Inspection Data Log Form February 20th –March 20th, Well No. 2 Air Stripper Treatment Plant, City of Perryton, Texas*. March.

CH2M HILL, 2008d. *Inspection Data Log Form March 24th – April 21st, Well No. 2 Air Stripper Treatment Plant, City of Perryton, Texas*. April.

CH2M HILL, 2008e. *Inspection Data Log Form April 25th – May 21st, Well No. 2 Air Stripper Treatment Plant, City of Perryton, Texas*. May.

CH2M HILL, 2008f. *Technical Memorandum: Annual Ground Water Sampling Event 2008, Year Four of the Long Term Remedial Action,* May.

United States Environmental Protection Agency (EPA), 1999. *Interim Record of Decision, City of Perryton Well No. 2 Superfund Site.* September.

United States Environmental Protection Agency (EPA), 2000. *Institutional Controls: A Site Manager's Guide to Indentifying, Evaluating, and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups,* EPA 540-F-00-005. September.

United States Environmental Protection Agency (EPA), 2001. *Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P,* June.

United States Environmental Protection Agency (EPA), 2002. *EPA Superfund Record of Decision, City of Perryton Well No. 2.* September.

United States Environmental Protection Agency (EPA), 2003. *Preliminary Close Out Report, City of Perryton Well No. 2 Site.* September.

United States Environmental Protection Agency (EPA), 2005. *Institutional Controls: A Citizen's Guide to Understanding Institutional Controls at Superfund, Brownfields, Federal Facilities, Underground Storage Tank, and Resource Conservation and Recovery Act Cleanups.* EPA-540-R-04-003. February.

United States Environmental Protection Agency (EPA), 2008. *City of Perryton Well #2, (Ochiltree County) Perryton, Texas.* EPA Superfund Site Status Summary Update. April.

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Attachment 2
Interview Record Forms

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Five-Year Review Interview Record City of Perryton Well No. 2 Perryton, Ochiltree County, Texas	Interviewee: Shawn Hughes (General Manager) Affiliation: Perryton Equity Exchange (PEX) Telephone: (806) 435-4016 Email address: shughes@perrytonequity.com

Site Name	EPA ID Number	Date of Interview	Interview Method
City of Perryton Well No. 2 Superfund Site	EPA ID# TX00001399435	5/12/2008	In person

Interview Contacts

Name	Organization	Phone	Email	Address
Vincent Malott	EPA Region 6	214-665-8313	malott.vincent@epa.gov	1445 Ross Ave, Suite 1200 Dallas, Texas 75202
Darren Davis	CH2M HILL, EPA contractor	972-980-2170 ext 52253	ddavis9@ch2m.com	12377 Merit Drive, Suite 1000 Dallas, Texas 75251
Kimberly Stokes	CH2M HILL, EPA contractor	972-980-2170 ext 52269	kstokes@ch2m.com	12377 Merit Drive, 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 actions performed. This interview is being conducted as a part of the first five-year review for the City of Perryton Well No. 2 Site. The period covered by this five-year review is from construction completion of the selected remedy in September 30, 2003, until September 2008.

Interview Questions

1. What is your overall impression of the activities performed at the site since completion of the remedy construction in September 2003?

Response: Mr. Hughes indicated that the PEX has not been directly involved in the City of Perryton Well No. 2 site activities.

2. From your perspective, what effects have the remedial actions at the site had on the PEX operations? Are you aware of any ongoing employee concerns regarding the site?

Response: Mr. Hughes stated that the remedial actions have not had an affect on PEX operations.

3. Are you aware of any changes in land use in the vicinity of the site since September 2003? Are you aware of any anticipated changes in land use or other environmental issues that may impact cleanup of the site?

Response:	Mr. Hughes stated that the railroad tracks have been removed, and that land ownership of railroad easement is not yet resolved. He stated that the ownership may potentially transfer to a government entity, or the land ownership may revert back to adjoining land owners. The Top of Texas Rural Rail District, of which Mr. Hughes is a board member, is having a meeting on May 22, 2008 concerning future use of the land. Mr. Hughes indicated that EPA could contact him regarding future land use changes that might result from the removal of the rail line. Mr. Hughes indicated that there were no current anticipated land use changes at the PEX itself, and that he could not foresee any changes over the next 20 years.
4.	Is the information available at the local public library and on the EPA Region 6 website adequate to keep you well-informed about the site's status?
Response:	Mr. Hughes indicated that he had visited the EPA website when he first became general manager of PEX, but he has not visited the website recently.
5.	Do you have any comments, suggestions, or recommendations regarding the site or its administration?
Response:	Mr. Hughes had no additional comments.

Five-Year Review Interview Record City of Perryton Well No. 2 Perryton, Ochiltree County, Texas	Interviewee: David Landis (City Manager) Richard Collins (Water Supervisor) Judy Headlee (TCEQ), present during interview Affiliation: City of Perryton Telephone: (806) 435-4014 (City Hall) Email address: N/A

Site Name	EPA ID Number	Date of Interview	Interview Method
City of Perryton Well No. 2 Superfund Site	EPA ID# TX00001399435	5/12/2008	In person

Interview Contacts

Name	Organization	Phone	Email	Address
Vincent Malott	EPA Region 6	214-665-8313	malott.vincent@epa.gov	1445 Ross Ave, Suite 1200 Dallas, Texas 75202
Darren Davis	CH2M HILL, EPA contractor	972-980-2170 ext 52253	ddavis9@ch2m.com	12377 Merit Drive, Suite 1000 Dallas, Texas 75251
Kimberly Stokes	CH2M HILL, EPA contractor	972-980-2170 ext 52269	kstokes@ch2m.com	12377 Merit Drive, Suite 1000 Dallas, Texas 75251

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Interview Questions

1. What is your overall impression of the activities performed at the site since the completion of the remedy construction in September 2003?

Response: Mr. Landis stated that there has been effective follow-up and communication regarding site activities, and the remedy approach is reasonable for the site contamination.

2. From your perspective, what effects have the remedial actions at the site had on the surrounding community? Are you aware of any ongoing community concerns regarding the treatment plant or the ground water contamination?

Response: Mr. Landis stated that since the initial public interest related to the Proposed Plan for the remedy selection, there has not been any concerns expressed to the City on the remedy performance that he is aware of.

3. Have there been any complaints, violations, or other incidents related to the maintenance yard or treatment plant, such as vandalism or trespassing, which required a response by the City? If so, please summarize the events and results.

Response: Neither Mr. Landis nor Mr. Collins were aware of any complaints or incidents involving the site.

4. Do you feel the annual operation and maintenance reports are useful in providing updates on the project status? Are there other issues or concerns related to the remedy implementation or performance?

Response: Mr. Landis stated that the City has received sufficient information regarding the ongoing Site activities.

5. Are you aware of any changes in the ground water use by private water wells in the vicinity of the site within the time period since completion of the remedy in September 2003? Are you aware of any anticipated changes in ground water use? Are there anticipated changes in the ground water usage for the public water supply system?

Response: Mr. Landis stated that no new private wells were installed or requests for permits since the City Ordinance were enacted. Mr. Landis and Mr. Collins stated that water demand on the north side of the city is still an issue for the City. Mr. Landis stated that the only ground water use changes in the area that he was aware of were related to the recent purchase of water rights outside of the City. He indicated that the area were this was occurring was approximately 15 miles outside of the City.

6. Has anyone applied for a private well permit, as required by City Ordinance, since the ROD was signed on September 26, 2002? Is there a process in place to notify EPA regarding well permit applications, and if so, can you describe the process?

Response: Mr. Landis stated that the City has not received any new well permit applications, and there have been only a few inquiries over the years.

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

Response: Mr. Landis and Mr. Collins had no additional comments.

Five-Year Review Interview Record City of Perryton Well No. 2 Superfund Site Perryton, Ochiltree County, Texas	Interviewee: April Palmie Affiliation: Texas Commission on Environmental Quality Telephone: (512) 239 - 4152 Email address: APalmie@tceq.state.tx.us

Site Name	EPA ID Number	Date of Interview	Interview Method
City of Perryton Well No. 2 Superfund Site	EPA ID# TX00001399435	May 14, 2008	Written response provided via email.

Interview Contacts

Name	Organization	Phone	Email	Address
Vince Malott	EPA Region 6	214-665-8313	malott.vincent@epa.gov	1445 Ross Ave, Suite 1200 Dallas, Texas 75202
Darren Davis	CH2M HILL, EPA contractor	972-980-2170 ext 52253	ddavis9@ch2m.com	12377 Merit Drive, Suite 1000 Dallas, Texas 75251
Kimberly Stokes	CH2M HILL, EPA contractor	972-980-2170 ext 52269	kstokes@ch2m.com	12377 Merit Drive, 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 actions performed. This interview is being conducted as a part of the first five-year review for the City of Perryton Well No. 2 Site. The period covered by this five-year review is from construction completion of the selected remedy in September 30, 2003 until September 2008.

Interview Questions

1. Are there any concerns or recommendations for the remedy implementation or performance?

Response: The rebound of CTC in Well #2 when it was removed from the air stripper is evidence that the remedy needs amendment in order for the site to attain the remedial objectives.

2. Are there other environmental issues in the area that may impact the remedy performance and/or attainment of the remedial objectives and goals?

Response: The future usage of Perryton Equity Exchange land is a concern. Institutional controls can address any concerns regarding soil vapors or other issues.

3. Are there any changes in State environmental regulations or standards that may impact the remedy performance and/or the protectiveness of the remedy?

Response: None that I am aware of.

4. Do you have any suggestions to expedite achieving the remediation goals and/or to make it more cost effective?

Response: Revising the remedial action to include drilling a new City water well and attempting to grout in the CTC contamination related to Well #2 should expedite achieving site clean up goals.

5. Do you have any comments, suggestions, or recommendations regarding the site or its administration?

Response: No additional comments at this time.

Attachment 3
Site Inspection Checklist

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City of Perryton Well No. 2
Perryton, Ochiltree County, Texas
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: City of Perryton Well No. 2 Superfund Site	EPA ID: TX0001399435
City/State: Perryton, Texas	Date of Inspection: May 12, 2008
Agency Completing 5 Year Review: EPA	Weather/temperature: Sunny, 60° F to 80° F

Remedy Includes: (Check all that apply)
- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other:

Attachments: ☒ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS (Check all that apply)

1. O&M site manager: No onsite O&M personnel
   Name:
   Title:
   Date:
   Interviewed: ☐ at site ☐ at office ☐ by phone Phone Number:
   Problems, suggestions: ☐ Additional report attached (if additional space required).

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

   Agency: Texas Commission of Environmental Quality
   Contact:
   Name: April Palmie
   Title: Project Manager
   Date: Provided email response on May 20, 2008
   Phone Number: 512-239-4152
   Problems, suggestions: ☒ Additional report attached (if additional space required).

Agency: City of Perryton
Contact:
Name: David Landis (interviewed with Mr. Richard Collins)
Title: City Manager
Date: May 12, 2008
Phone Number: (806) 435-4014 (City Hall)
Problems, suggestions: ☒ Additional report attached (if additional space required).

Agency: City of Perryton
Contact:
Name: Richard Collins (interviewed with Mr. David Landis)
Title: Water Supervisor
Date: May 12, 2008
Phone Number: (806) 435-4014 (City Hall)
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).

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

Shawn Hughes (General Manager) – Perryton Equity Exchange (PEX)

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: The RO facility had O&M plans on the wall by the safety shower. The ASTP building had O&M Manuals and As-Built Drawings on a shelving unit. Maintenance log sheets maintained by CH2M HILL at their Dallas office.

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: RO facility has MSDS displayed on wall by safety shower. ASTP building had HASP and Emergency Response Plan on shelving unit. MSDS forms also maintained in the HASP.

3. O&M and OSHA Training Records ☐ Readily available ☐ Up to date ☒ N/A
Remarks:
O&M and OSHA Training Records maintained at CH2M HILL corporate office.

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: Air discharge permit is an agreement addendum with the EPA on file at their Dallas office.

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: Monitoring Records maintained at CH2M HILL Dallas office.

8. Leachate Extraction Records ☐ Readily available ☐ Up to date ☒ N/A
Remarks:

9. Discharge Compliance Records ☒ Readily available ☐ Up to date ☐ N/A
Remarks:. Discharge Compliance Records maintained at CH2M HILL Dallas office.

10. Daily Access/Security Logs ☐ Readily available ☐ Up to date ☒ N/A
Remarks: The City does not maintain sign in/out sheets at ASTP. Building is located within the City of Perryton Warehouse facility fence, which restricts unauthorized access.

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 for USEPA

2. O&M Cost Records
☐ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
Original O&M cost estimate: ☐ Breakdown attached

Total annual cost by year for review period if available

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

3. Unanticipated or Unusually High O&M Costs During Review Period ☐ N/A
Describe costs and reasons: The remedy has undergone significant modifications over the period of the five-year review to address changed conditions. The modifications have included discontinuation of operation of the RO Facility, decreased ground water monitoring frequency, and the discontinuation of operation of MW-17-EX as an extraction well. These O&M activities have been implemented to reduce O&M costs overall. There were operational issues with the RO Facility during its operation that resulted in high O&M costs during the period August 2003 – August 2004. The RO Facility has not operated since August 2004.

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

1. Fencing

1. Fencing damaged ☒ Location shown on site map ☒ Gates secured ☐ N/A
Remarks: Gate to City yard is locked each evening. Buildings are kept locked.

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:
Contact:
Name:
Title:
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: None. ☐ 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: The Southwestern Railroad tracks have been removed and the rail line abandoned. The railroad right-of-way is still present, with no other land use changes noted. No new construction has occurred within the right-of-way.

3. Land use changes offsite ☒ N/A
Remarks: Land use around the site remains mixed commercial and residential.

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) ☐ Location shown on site map ☐ Settlement not evident
Areal extent: Depth:
Remarks:

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

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

4.	Holes Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ Holes not evident
5.	Vegetative Cover ☐ Cover properly established ☐ No signs of stress ☐ Grass ☐ Trees/Shrubs Remarks:		
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:	
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 ☐ Routinely sampled ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:	☐ Functioning ☐ Needs O&M	☐ N/A ☐ Good condition

5.	Settlement Monuments ☐ Located ☐ Routinely surveyed ☐ N/A Remarks:
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:
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 ☐ Functioning ☐ N/A Remarks:
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:	☐ Location shown on site map Depth:	☐ Erosion not evident
4.	Discharge Structure ☐ Functioning ☐ Good Condition Remarks:	☐ Location shown on site map	☐ 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 ☒ All required wells located ☒ Good condition ☐ Needs O& M Remarks: All equipment and associated piping and controls appear to be in good condition. Well No. 2 is owned, operated, and maintained by the City of Perryton.		☐ N/A

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ N/A
☒ System located ☒ Good condition ☒ Needs O& M
Remarks: Inspection team could hear water running in overflow from the break tank. Sulfuric acid is present in acid tank overflow tray in ASTP building. Water pipe which feeds safety shower in ASTP building was leaking.

3. Spare Parts and Equipment ☐ N/A
☐ Readily available ☒ Good condition
☐ Requires Upgrade ☐ Needs to be provided
Remarks: Most equipment/parts can be purchased locally. The air stripper gaskets need to be ordered from a supplier when an inspection reveals that they are cracked/leaking. It is not recommended to keep spare gaskets on hand as they become dry and crack without use.

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): Bag
☐ 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): Approximately 100,000,000 gallons
☐ Quantity of surface water treated annually (list volume): 0
Remarks: Air stripper is functioning at full capacity at time of inspection. Operation of the RO unit was discontinued and the units preserved in August 2004. Decommissioning of the RO facility is being evaluated.

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

3. Tanks, Vaults, Storage Vessels ☐ N/A
☒ Good condition ☒ Proper secondary containment ☒ Needs O&M
Remarks: Acid tank in ASTP building showed signs of acid having been spilt around tank when tank was refilled. A small amount of acid was present inside the secondary containment tank.

4. Discharge Structure and Appurtenances ☐ N/A
☒ Good condition ☐ Needs O& M
Remarks: Effluent pipes and vent stack in ASTP appear to be in working order and in good condition.

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: Monitor wells sampled according to the schedule outlined in the Field Sampling Plan. All monitor wells are in good condition. Most wells were properly locked and secured. MW-16 needs a lock. Some wells need maintenance to replace expansion plugs and o-rings, as these pieces are wearing out with age.

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:

5. Long Term Monitoring ☐ Applicable ☒ N/A

2. 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

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 remedial action objectives, as stated in the Final Record of Decision (ROD), are to prevent or minimize further migration of the contaminant plume and to restore the ground water throughout the plume to its expected beneficial use as a drinking water supply wherever practicable. The remediation goals for the ground water are based on the maximum contaminant levels (MCLs) of 0.005 milligrams per liter (mg/L) for carbon tetrachloride and 10 mg/L for nitrate established under the Safe Drinking Water Act.

The ASTP was installed under the interim ROD to remove carbon tetrachloride (CTC) contamination from the ground water and to address the immediate need of the City for an adequate supply of drinking water. Initially, water was extracted from Well No. 2 and treated in the ASTP. The water was discharged to the North Ground Storage Tank (NGST), where the water was blended with ground water pumped from Well No. 1 to reduce nitrate concentrations. The final remedy included: 1) continued operation of Well No. 2 and the ASTP; 2) the installation of a Reverse Osmosis (RO) unit to treat the nitrate concentrations to below the MCL; 3) installation of an additional extraction well (MW-17-EX); and, 4) long-term ground water monitoring to track the progress of the remedy.

Within one year of construction of the RO Facility, nitrate concentrations in the two extraction wells decreased to below MCL, and operation of the RO Facility was discontinued. Water extracted from Well No. 2 and MW-17-EX was treated in the ASTP to remove CTC and discharged to the City's water supply system at the NGST. CTC concentrations in Well No. 2 and MW-17-EX were near the MCL by August 2007. The Pump and Treat (P&T) System was shut down between September 29 and November 29, 2007 to monitor rebound in CTC concentrations in the two extraction wells. The CTC concentration in Well No. 2 rebounded to concentrations near what they were at the start of the Remedial Action (RA). The CTC concentration in MW-17-EX remained below the MCL. The P&T System currently operates with only Well No. 2 pumping ground water that is treated in the ASTP and discharged to the City's water supply at the NGST.

Long-term ground water monitoring demonstrates that the P&T System has effectively remediated the CTC and nitrate contamination contained within the primary portion of the aquifer used for drinking water supply (Unit 3). The CTC concentration remains elevated above the MCL in the upper portion of the aquifer, and the nitrate concentration remains at to just slightly above the MCL in the upper portion of the aquifer.

Based on the site inspection, all components of the remedy appear to be functioning properly and as designed.

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.

Operations and Maintenance (O&M) activities at the site includes O&M of MW-17-EX, the RO Facility, the ASTP, and long-term ground water monitoring. An on-site physical inspection of is currently performed monthly, and long-term monitoring is performed annually. Site monitoring data demonstrates that the ASTP effectively removes CTC contamination from the extracted ground water to non-detect levels. Ground water monitoring data demonstrates that the P&T System effectively captures the plume, and the CTC and nitrate concentrations within the primary ground water production zone at the site have been reduced to levels below the MCLs. CTC and nitrate concentrations remain at levels above the MCLs in the upper portions of the aquifer. There have been no significant operational issues associated with the ASTP since it was constructed and began operation in November 2002. The RO Facility is no longer operational. The current O&M and long-term monitoring procedures in place at the site are adequate to ensure the continued protectiveness of the remedy.

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 are no issues or observations that would suggest that the protectiveness of the remedy may be compromised in the future. The remedy has been successful at remediating the primary portion of the aquifer used as a drinking water supply.
4. Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Operation of the RO Facility was discontinued once the nitrate concentrations in the primary drinking water portion of the aquifer decreased to below the MCL. On-site inspections have decreased from weekly to monthly during the period of this five-year review. CTC concentrations in MW-17-EX have decreased to below the MCL, and this well is no longer operated. The long-term monitoring program is assessed annually to evaluate which monitor wells are critical for evaluating the current extent of CTC contamination at the site and to assess remedy performance. An optimization review was performed for the blower and effluent pump in the ASTP. It was determined that, although units were available that were more efficient and would use less electric power, the life cycle costs would not be recovered in a time period that was sufficient enough to warrant replacement of the existing equipment. From an operational standpoint, bypassing the air stripper unit could possibly reduce costs for operation and inspection of this equipment.

City of Perryton Well No. 2 Site Inspection – Inspection Team Roster
Date of Site Inspection – May 12, 2008

Name	Organization	Title
Vincent Malott	USEPA	Remedial Project Manager
Darren Davis	CH2M HILL	5-Year Review Project Manager
Kimberly Stokes	CH2M HILL	Staff Consultant

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Attachment 4
Site Inspection Photographs

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Photo 1: Sign on south side of Air Stripper Treatment Plant (ASTP) building facing street.	Filename: Perryton01.jpg

Photo 2: Air Stripper exhaust stack on top of ASTP building.	Filename:Perryton02.jpg

Photo 3: Well #2, located outside the ASTP building at the City of Perryton Warehouse.	Filename:Perryton03.jpg

Photo 4: Entrance door on east side of ASTP building.	Filename:Perryton04.jpg

Photo 5: North side of Reverse Osmosis (RO) Facility building.	Filename: Perryton05.jpg

Photo 6: RO unit inside RO Facility.	Filename:Perryton06.jpg

Photo 7: RO unit inside RO Facility.	Filename:Perryton07.jpg

Photo 8: View of equipment inside RO Facility.	Filename:Perryton08.jpg

Photo 9: Safety equipment on wall inside RO Facility.	Filename:Perryton09.jpg

Photo 10: Caustic Soda tank inside RO Facility.	Filename:Perryton11.jpg

Photo 11: Instrument and Control panel in RO Facility.	Filename:Perryton12.jpg

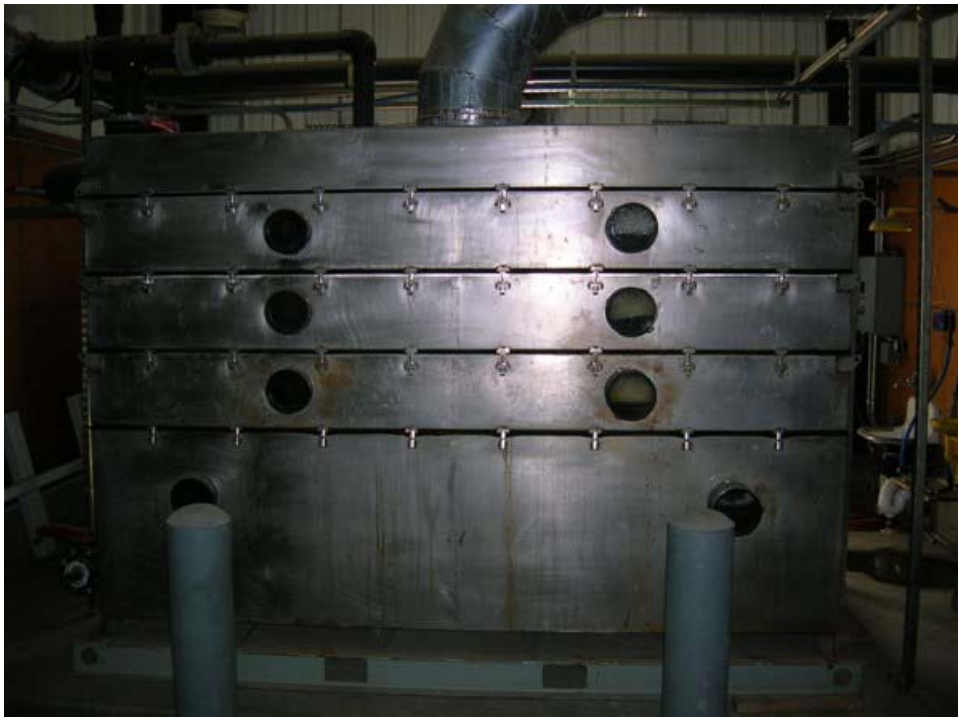

Photo 12: Air Stripper unit inside ASTP.	Filename:Perryton13.jpg

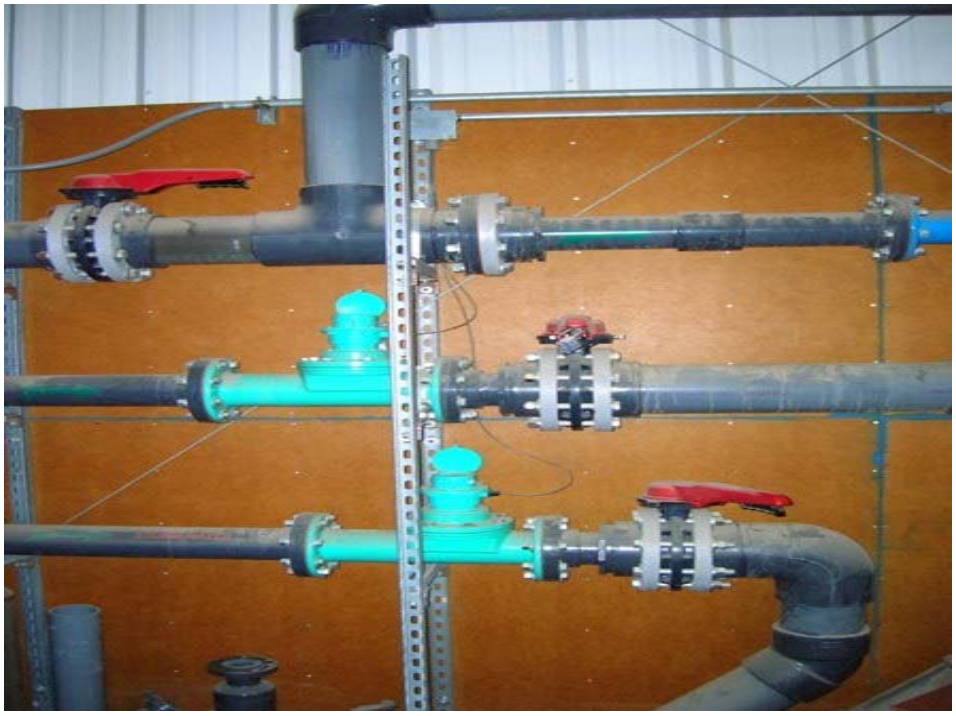

Photo 13: Effluent piping inside ASTP.	Filename:Perryton14.jpg

Photo 14: Sulfuric acid storage tank inside ASTP.	Filename:Perryton15.jpg

Photo 15: Acid staining from spills on the metal railing on secondary containment of the acid tank in ASTP.	Filename:Perryton17.jpg

Photo 16: Leak on safety shower in the ASTP.	Filename:Perryton18.jpg

Photo 17: Blower unit in the ASTP.	Filename:Perryton19.jpg

Photo 18: Instrument and Control panel in the ASTP.	Filename:Perryton20.jpg

Photo 19: Bag filter in the ASTP. Water from the extraction wells enters from the right.	Filename:Perryton22.jpg

Photo 20: Piping on north side of air stripper in ASTP.	Filename:Perryton23.jpg

Photo 21: Acid staining on floor around acid tank in ASTP.	Filename:Perryton24.jpg

Photo 22: MW-18-EX in city yard.	Filename:Perryton26.jpg

Photo 23: View of Perryton Equity Exchange (PEX) on south side of City yard (looking south east).	Filename:Perryton27.jpg

Photo 24: View of Perryton Equity Exchange (PEX) on south side of City yard (looking south west).	Filename:Perryton28.jpg

Photo 25: MPMW-02 in City yard.	Filename:Perryton29.jpg

Photo 26: MPMW-03	Filename:Perryton30.jpg

Photo 27: North Groundwater Storage Tank (NGST).	Filename:Perryton31.jpg

Photo 28: View of MW-5 D/S looking east.	Filename:Perryton32.jpg

Photo 29: MWCL-07 D/S	Filename:Perryton33.jpg

Photo 30: MPMW-01 on PEX property.	Filename:Perryton34.jpg

Photo 31: View of MWCL-11 D/S looking east.	Filename:Perryton36.jpg

Photo 32: View of MPMW-04 looking south.	Filename:Perryton37.jpg

Photo 33: View of MW-08 looking north.	Filename:Perryton38.jpg

Photo 34: View of MW-14 looking north east.	Filename:Perryton39.jpg

Photo 35: View of MW-09 looking north east.	Filename:Perryton40.jpg

Photo 36: MW-17-EX well vault in front of City of Perryton City Hall.	Filename:Perryton41.jpg

Photo 37: View of MW-16 looking southwest.	Filename:Perryton42.jpg

Photo 38: View of MW-10 looking east.	Filename:Perryton43.jpg

Photo 39: View of MW-15 looking west.	Filename:Perryton44.jpg

Photo 40: View of MWCL-13 D/S looking south.	Filename: Perryton45.jpg

Photo 41: View of MPMW-06 looking north.	Filename:Perryton46.jpg

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Attachment 5
Notices to the Public Regarding the Five-Year Review

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CITY OF PERRYTON WELL NO. 2
SUPERFUND SITE PUBLIC NOTICE
U.S. EPA Region 6 Begins
First Five-Year Review of Site Remedy
May 2008

The U.S. Environmental Protection Agency Region 6 (EPA) will be conducting the first five-year review of the remedy implementation and performance at the City of Perryton Well No. 2 Superfund Site in Perryton, Ochiltree County, Texas. The site-wide remedy consists of a ground water extraction and treatment system to contain and cleanup a carbon tetrachloride plume in the Ogallala aquifer. The five-year review will determine if the remedy is still protective of human health at the Site following completion of the remedy construction in 2003. Questions or concerns about the Superfund Site and the remedy performance should be directed to Vince Malott/Remedial Project Manager at (214) 665-8313 (direct) or 1-800-533-3508 (toll-free). The five-year review is scheduled for completion in September 2008, and the report will be made available to the public at the local information repository located at the Perry Memorial Library, 22 S.E. 5th Street, Perryton, TX 79070-3112, (806) 435-5801; and, on the Internet at http://www.epa.gov/region6/6sf/6sf-5_year_reviews.htm. Site information, including annual operation and maintenance reports, are available at the Perry Memorial Library, and monthly site status updates are available on the Internet at http://www.epa.gov/region6/6sf/6sf-tx.htm.

CONFIRMED PUBLICATION in the Perryton Herald and the Amarillo Globe-News on May 7, 2008

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CITY OF PERRYTON WELL NO. 2
SUPERFUND SITE PUBLIC NOTICE
U.S. EPA Region 6 Completes
First Five-Year Review of Site Remedy
September 2008

The U.S. Environmental Protection Agency Region 6 (EPA) has completed the first five-year review of the remedy implementation and performance at the City of Perryton Well No. 2 Superfund Site in Perryton, Ochiltree County, Texas. The site-wide remedy consists of a ground water extraction and treatment system to contain and cleanup a carbon tetrachloride plume in the Ogallala aquifer. The remedy has achieved cleanup of the primary ground water producing zone in the Ogallala aquifer based on performance monitoring completed at the site. The remedy has not achieved cleanup of the upper zone in the aquifer, which is not considered to be a primary production zone for the City water supply. The five-year review determined that the remedy is currently protective of human health and the environment. The remedy will attain long-term protectiveness after the issues and recommendations identified in the First Five-Year Review Report have been addressed. The issues affecting the long-term remedy protectiveness are: 1) the source area contamination in the non-productive upper perched zone of the Ogallala aquifer cannot be effectively remediated with the current remedy; 2) the gravel pack in the Well No. 2 annulus allows for the downward migration of carbon tetrachloride to recontaminate the lower production zone of the aquifer; 3) the absence of institutional controls to protect the remedy effectiveness in the former source area; 4) the minor repairs needed to the site monitoring wells; and, 5) the determination of the risk from vapor intrusion to indoor air at the former source if there is a change in land use. The next five-year review is scheduled for completion in September 2013. Questions or concerns about the Superfund Site and the remedy performance should be directed to Vince Malott/Remedial Project Manager at (214) 665-8313 (direct) or 1-800-533-3508 (toll-free). The Five-Year Review Report will be available to the public by September 30, 2008, at the local information repository located at the Perry Memorial Library, 22 S.E. 5th Street, Perryton, TX 79070-3112, (806) 435-5801. The Report will also be available by September 30, 2008, on the Internet at http://www.epa.gov/region6/6sf/6sf-5_year_reviews.htm. Site information, including annual operation and maintenance reports, are available at the Perry Memorial Library, and monthly site status updates are available on the Internet at http://www.epa.gov/region6/6sf/6sf-tx.htm.

For publication in the Perryton Herald and the Amarillo Globe-News

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Attachment 6
Technical Memorandum: Annual Ground Water Sampling Event 2008, Year Four of the Long Term Remedial Action

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Annual Ground Water Sampling Event 2008, Year Four of the Long Term Remedial Action, City of Perryton Well No. 2 Superfund Site

PREPARED FOR: Vincent Malott/EPA

PREPARED BY: CH2M HILL

COPY TO: Darren Davis/CH2M HILL
John Ynfante/CH2M HILL
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Victor Martinez/CH2M HILL
Scott McKinley/CH2M HILL

PREPARED UNDER: EPA Region 6 RAC 2 Contract No. EP-W-06-021
Task Order No. 0012-LRLR-06DH
DCN 0012-02017

DATE: June 4, 2008

Long-term ground water monitoring is performed as a part of the Long-Term Remedial Action (LTRA) at the Perryton Well No. 2 Superfund Site (herein referenced as the "Site"), specifically to track concentrations of carbon tetrachloride (CTC) and nitrates and to evaluate system performance. The remedial goals for these contaminants are 5 micrograms per liter (µg/L) and 10 milligrams per liter (mg/L), respectively. The monitoring is required by the Record of Decision (ROD) for the site, dated September 26, 2002 **(EPA, 2002)**. This Technical Memorandum (TM) documents the annual 2008 ground water sampling event conducted from April 7 through April 9, 2008. The ground water sampling activities were completed in accordance with the approved Work Plan dated April 3, 2007 **(CH2M HILL, 2007b)** and the current Field Sampling Plan for the LTRA dated October 2007 **(CH2M HILL, 2007c)**. In addition, the results of the contaminant rebound sampling, performed between October 2007 and January 2008 to assess rebound of CTC concentrations in the two extraction wells (Well No. 2 and MW-17-EX) after the Pump and Treat (P&T) System was shut down, are provided in this TM. This is the sixth monitoring event conducted under the LTRA for the Site, and the fourteenth monitoring event since the EPA signed the final ROD for the Site in September 2002.

The following pages provide the table of contents and list of acronyms for this TM, followed by an introduction, description of field activities, description and evaluation of results, and conclusions. References are listed at the end of the TM text.

Table of Contents

List of Tables:

List of Figures:

Acronyms and Abbreviations

µg/L	micrograms per liter
ASTP	Air Stripper Treatment Plant
CLP	Contract Laboratory Program
CSM	Conceptual Site Model
CTC	carbon tetrachloride
EPA	United States Environmental Protection Agency
FSP	Field Sampling Plan
LTRA	Long-Term Remedial Action
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
MPMW	Multi Port Monitor Wells
O&M	Operation & Maintenance
PDB	Passive Diffusion Bag
P&T	Pump and Treat
ROD	Record of Decision
TM	Technical Memorandum
VOC	Volatile Organic Compound

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1.0 Introduction

The ground water sampling event for 2008 described by this Technical Memorandum (TM) was conducted as an annual sampling event. Completed sampling activities were based on the recommendations included in the Annual Operations and Maintenance (O&M) Report for the period October 2005 – September 2006. These recommendations included the following: (1) only the passive diffusion bag (PDB) placed in the center of each well screen be sampled, and (2) discontinue nitrate sampling (**CH2M HILL, 2007a**).

The Field Sampling Plan (FSP) for ground water sampling events requires the collection of water level measurements at all Site monitor wells and selected municipal supply wells, and collection of ground water samples at a subset of conventional monitor wells and multi-port monitor wells (MPMWs), the extraction well (MW-17-EX), and Well No. 2 (also known as GW-02) (**CH2M HILL, 2007c**). This monitoring is conducted to track concentrations of carbon tetrachloride (CTC) and to evaluate the Long-Term Remedial Action (LTRA) system performance, as required by the Record of Decision (ROD) (**EPA, 2002**).

During the period September 28 through November 29, 2007, the Pump and Treat (P&T) System was shut down to monitor the rebound in carbon tetrachloride (CTC) concentrations in the two extraction wells (Well No. 2 and MW-17-EX). Samples were collected from both wells on October 29, 2007 and November 28, 2007. The P&T System was restarted on November 29, 2007, and a final sampling event was performed on January 9, 2008 to verify that the CTC concentrations had returned to pre-shut down levels.

This TM is organized into five sections. **Section 1** is the introduction. **Section 2** provides a summary of the field activities. The results of the sampling events are summarized in **Section 3.** Conclusions are provided in **Sections 4**, and references are provided in **Section 5**.

2.0 Description of Field Activities

One field team member traveled to the site on October 29, 2007, November 28, 2007, and January 9, 2008 to performed contaminant rebound sampling at Well No. 2 and MW-17-EX.

A two-person field team conducted the annual 2008 sampling event from April 7 through April 9, 2008. Field activities included measurement of water levels, collection of ground water samples, and measurement of in-place PDB sample bag depths at MWCL-07S and MW-08. Water levels were collected prior to sampling using a water level meter for conventional monitor wells and municipal wells and Westbay™ technology for the MPMWs. Conventional wells were sampled using the PDB

samplers (11 wells total); MPMWs were sampled using Westbay™ technology (16 ports total). In addition, samples of the influent and effluent from the Air Stripper Treatment Plant (ASTP), and extracted ground water at MW-17-EX and Well No. 2 were collected to meet quarterly O&M sampling requirements. A list of the locations that were sampled is provided in **Table 1**. The locations of the wells sampled are shown on **Figure 1.**

2.1 Water Level Measurements

On April 7, 2008, before sampling activities were performed, the depth-to-water was measured in each MPMW, each conventional monitor well, and Municipal Wells No. 1 (GW-01), No. 3 (GW-03), and No. 4 (GW-04). To restore static water level conditions the municipal wells were turned off for a minimum of two hours prior to the collection of water level measurements from these wells. These wells run intermittently and, therefore, it is appropriate to measure static water levels at these locations in order to evaluate non-pumping conditions. Past investigations have indicated that water levels generally recover to static conditions within 1-1.5 hours after pumping ceases. Well No. 2 operates continuously and was operating during the collection of water levels so that the water levels collected at the monitor wells are indicative of the hydraulic influence with Well No. 2 pumping. MW-17-EX has been shut down since September 29, 2007 and was not operating during the collection of water levels. Water level measurements at Well No. 2 are not possible because the water level sounding tube does not function properly. MW-17-EX was constructed without a water level sounding tube, preventing the collection of a water level from this well. The water level measurement collected from each well and corresponding ground water elevations are listed in **Table 3**.

2.2 Ground Water, O&M, and Rebound Sample Collection Activities

The rebound sampling included collection of analytical samples to monitor potential changes in the CTC concentration in Well No. 2 and MW-17-EX under non-pumping conditions. Samples were collected from both wells for analysis of volatile organic compounds (VOCs). A total of 3 rebound sampling events were performed between October 2007 and January 2008. Samples were collected from Well No. 2 and MW-17-EX and shipped to the laboratory on October 29, 2007, November 28, 2007, and January 9, 2008. During the November 28, 2007 sampling event, samples were collected from Well No. 2 after the well had pumped 1,000, 10,000, and 100,000 gallons. These samples were collected to assess potential changes in the CTC concentration over time as the well is pumped.

The annual sampling event included collection of analytical samples for ground water monitoring and O&M performance monitoring. Samples for ground water monitoring were collected from a subset

of conventional monitor wells and MPMWs for analysis of VOCs. Samples were collected from the conventional monitor wells using the pre-installed PDBs. The conventional wells sampled included MWCL-07S, MW-08, MW-09, MW-10, MWCL-11S, MWCL-11D, MW-14, MW-15, MW-16, MW-18-EX, and MW-19-EX. Sampling of the MPMWs was conducted using Westbay™ technology. The MPMW ports sampled included MPMW01 ports 1 through 5, MPMW02 ports 1 through 3, MPMW03 ports 1 through 4, MPMW04 ports 1 and 4, and MPMW06 ports 1 and 3. Samples for O&M performance monitoring purposes were collected from the extraction wells and the ASTP influent and effluent for analysis of VOCs. All samples were collected on April 8, 2008 and shipped to the laboratory on April 9, 2008.

All samples were submitted to the Environmental Protection Agency (EPA) Region 6 Houston Laboratory for VOC analysis, which includes CTC, via Contract Laboratory Program (CLP) method OLM04.2 – GC/MS (low level). VOC sample analysis and data validation were performed by the Region 6 Laboratory, and all data were determined to be suitable for use. No additional data quality review was performed by CH2M HILL.

Table 1 presents the CTC results of samples from the annual 2008 ground water sampling event. **Table 2** presents the CTC results from the extraction wells collected during the rebound sampling events. Results are discussed further in **Section 3.0**.

2.3 PDB Quality Assurance/Quality Control

Quality assurance/quality control activities for the PDBs include inspection, replacement (if necessary), and measurement of the PDB tethers and PDB placement on the tethers. The PDB tether and PDB placement are measured to ensure that the PDBs are set at the appropriate depth intervals, relative to the well screen depth, in each monitor well.

Following sample collection, each PDB is inspected for wear and overall condition. Once sample collection and inspection are conducted, the PDBs are refilled with American Society of Testing and Materials Type II water and placed back into the well. PDBs that show signs of wear or leakage are replaced. The dates the PDBs were last replaced in each conventional monitor well are listed in **Table 4**.

During each sampling event, the lengths of the PDB tethers and PDB placement depths are measured at 10 percent of the well locations. PDBs that are set at depths that deviate more than 0.25 feet from their respective designated position are adjusted. During the annual ground water monitoring event, the tethers and PDB placements for wells MWCL-07S and MW-08 were measured. The PDBs did

not require adjustment. The measured and adjusted PDB placements for the conventional monitor wells are listed in **Table 4**.

3.0 Description and Evaluation of Results

This section provides a discussion of the water level distribution observed in the upper and lower ground water zones, and the concentrations of VOCs detected in the ground water samples collected during April 2008, as well as the results of samples collected from the extraction wells during the rebound monitoring events.

3.1 Water Level Distribution

Water level measurements from the conventional and municipal wells and MPMWs are presented in **Table 3**. Based on these measurements, **Figure 2** illustrates the distribution of water levels in the Upper Zone in April 2008, and **Figure 3** illustrates the distribution of water levels in the Lower Zone, Unit 3 in April 2008.

Water level elevation contours for the Upper Zone (Unit 1 and the upper portion of Unit 2) are presented on **Figure 2** for April 2008 (**Table 3** provides the hydrologic zone information for the existing wells at the site). Ground water flow within the Upper Zone is converging toward Well No. 2 across most of the Site. An apparent ground water flow divide, which has been observed in previous monitoring events, exists in the area between wells MPMW01, MPMW04, and MWCL-07S. The flow divide is evidenced by the lower water level elevation in MWCL-07S than in MPMW01 and MPMW04. The convergent flow pattern observed in the Upper Zone differs from the regional ground water flow direction present in the Lower Zone. It is suspected that the gravel pack in the annulus at Well No. 2 provides a connection between the Upper and Lower Zones. The current Conceptual Site Model (CSM) is based on the idea that ground water in the Upper Zone is draining down the annulus of Well No. 2 into the Lower Zone, resulting in the ground water flow pattern observed in the Upper Zone. The water level elevation data continue to support the CSM. There are no monitor wells located further north and west of Well No. 2 in the Upper Zone to confirm that the observed ground water depression in the Upper Zone is centered on Well No. 2.

Due to poor correlation of water levels between Lower Unit 2 wells, water level elevation contours are not prepared for wells screened in this unit. This has been a consistent phenomenon since the initial site investigation and is the result of the lower permeability and poor interconnectivity between strata that comprise Unit 2.

Water level elevation contours for Unit 3 of the Lower Zone are presented on **Figure 3** for April 2008. Ground water flow within Unit 3 at and near the Site is toward the south. A ground water depression exists in Unit 3 that has formed in response to pumping at Well No. 2. This depression is centered on Well No. 2 and extends east towards monitor well MPMW06 and then south between monitor wells MWCL-11D and MW-16 and between monitor wells MPMW04 and MW-09. The current ground water depression in Unit 3 is smaller in size, lacking a closed depression contour, than has been observed at the Site over the past several years. The decrease in size of the ground water depression is the result of MW-17-EX no longer being operated as an extraction well. The apparent mounding observed in Unit 3 around GW-03 (Well No. 3) has been documented in previous sampling events. Well No. 3 is constructed similar to Well No. 2, with a gravel pack that extends across both the Upper and Lower Zones (**CH2M HILL, 2007d**). This construction potentially allows leakage from the Upper Zone to move down the gravel pack into the Lower Zone resulting in an apparent ground water elevation mound around Well No. 3. This condition is not significant relative to conclusions on the ground water flow direction in the area located north of Well No. 3.

3.2 Rebound Sampling Analytical Results

The CTC concentrations in Well No. 2 and MW-17-EX have been decreasing towards the maximum contaminant level (MCL) of 5 micrograms per liter (µg/L) since June 2004 and September 2005 respectively, and the CTC concentrations in all Unit 3 monitor wells were below the MCL for the first time during August 2007 (**CH2M HILL, 2007d**). As a result of the decreasing CTC concentrations in Unit 3, the P&T System was shut down on September 28, 2007 to assess potential CTC concentration rebound in Well No. 2 and MW-17-EX. The initial plan was to leave the P&T System shut down for a period of 6 months and sample the two wells monthly. As a result of the significant CTC concentration detected during the first sampling event in Well No. 2 (discussed below), the rebound monitoring period was discontinued after two months and pumping at Well No. 2 resumed. MW-17-EX has remained off.

Rebound sampling events were performed on October 29 and November 28, 2007. A third sampling event was performed on January 9, 2008 to determine CTC concentrations in both wells 6 weeks after the resumption of pumping at Well No. 2 only. The CTC results from samples collected during the rebound sampling events, along with the CTC results from the previous sampling event (August 2007) and the April 2008 event are provided in **Table 2**.

In Well No. 2, the CTC concentration increased one month after pumping had ceased from 6.3 µg/L in August 2007 to 27.9 µg/L on October 29, 2007. The October 29, 2007 CTC result represents the

highest detection in Well No. 2 since July 2003, when CTC was detected at a concentration of 41 µg/L. Since the first year (November 2002 – November 2003) of P&T System operations, the highest CTC concentration detected in Well No. 2 was 12 µg/L in March 2004 (**CH2M HILL, 2007d**). Based on the significant CTC concentration increase, to levels similar to those detected early during the LTRA, it was decided that one more sampling event would be performed on November 28, 2007 and Well No. 2 returned to operation to prevent further CTC rebound in the well.

During the November sampling event, ground water samples were collected from Well No. 2 after 1,000 gallons, 10,000 gallons, and 100,000 gallons had been pumped from the well. These samples were collected to evaluate whether or not the CTC concentration would vary as the well was pumped over time. The CTC results (see **Table 2**) from these three samples did not indicate that the concentration varied over the period of time sampled (approximately 10 hours) and as more ground water had been withdrawn from the well.

The CTC concentration in MW-17-EX did not increase significantly during the rebound monitoring period. The concentration increased slightly from 3.6 µg/L in August 2007 to 4.8 µg/L on October 29, 2007. The CTC concentration then decreased to 2.7 µg/L on November 28, 2007.

The P&T System was restarted on November 29, 2007 due to the increase in the CTC concentration in Well No. 2 detected in the October 29, 2007 sample. Due to the lack of significant rebound observed in the October 29, 2007 sample collected from MW-17-EX, it was decided that this well would be left off, and the well would continued to be monitored to assess the CTC concentration in this well. A final round of samples was collected on January 9, 2008. The CTC concentration in Well No. 2 had decreased to 3.6 µg/L, and the CTC concentration in MW-17-EX decreased to 1.0 µg/L. The CTC concentrations detected in both wells in April 2008 continued to be below the MCL (see **Table 2**). As a result of the sampling performed at both wells between October 2007 and April 2008, the P&T System continues to operate with Well No. 2 pumping and MW-17-EX shut down.

3.3 Analytical Results – April 2008

The CTC analytical results from the April 2008 sampling event are presented in **Table 1**. The CTC distribution in the Upper Zone, Lower Unit 2, and Unit 3 is provided on **Figures 4**, **5**, and **6**, respectively.

CTC was detected in samples from seven of the ten wells sampled in the Upper Zone. CTC was not detected in monitor wells MPMW03 port 1, MPMW04 port 1, and MWCL-07S. The highest CTC concentration in the Upper Zone was 91.2 µg/L, detected at MPMW02 port 1 (see **Table 1**).

CTC was detected in samples from all four wells sampled in Lower Unit 2. The CTC concentration in Lower Unit 2 ranged from 2.8 µg/L, at MPMW03 port 3, up to 16.4 µg/L at MPMW02 port 2 (see **Table 1**).

CTC was detected in samples from three of the fourteen wells screened in the Lower Zone, Unit 3. The highest CTC concentration in Unit 3 was 3.6 µg/L detected at Well No. 2 (see **Table 1**). Based on findings from the rebound testing, and prior analytical evaluations, a majority of the CTC present in Well No. 2 ground water originates from Upper Zone leakage.

CTC concentrations decreased from the previous sampling event conducted in August 2007 at 11 monitor wells. The CTC concentrations increased from the previous sampling event at three monitor wells, and the CTC concentrations were similar to the previous sampling event in 15 monitor wells. CTC concentration trends are further discussed in **Section 4.3**.

Figure 4 shows the CTC plume in the Upper Zone in April 2008, as defined by concentrations exceeding the 5 µg/L MCL. The plume in the Upper Zone is geographically centered in the vicinity of monitor well MWCL-11S, with a majority of the plume residing underneath the PEX facility, the railroad right-of-way, and the City of Perryton Warehouse. The CTC plume shown on **Figure 4** is similar in size to the plume observed during August 2007 (**CH2M HILL, 2007d**).

Figure 5 shows the CTC plume in Lower Unit 2 in April 2008, as defined by concentrations exceeding the 5 µg/L MCL. The plume in Lower Unit 2 is geographically centered on monitor well MPMW02 with a majority of the plume residing underneath the City of Perryton Warehouse and the city block immediately to the west. The CTC plume shown on **Figure 5** for Lower Unit 2 is smaller in size than the plume observed during August 2007 (**CH2M HILL, 2007d**). The reduction in size of the CTC plume in Lower Unit 2 is due to the decrease in the CTC concentration at monitor wells MPMW01 and MPMW03 to concentrations less than the MCL.

Figure 6 shows the CTC detections in the Lower Zone, Unit 3 in April 2008. There were no CTC detections in Unit 3 during April 2008 that exceeded the 5 µg/L MCL. During August 2007, the CTC concentration exceeded the MCL in Unit 3 at Well No. 2 only (**CH2M HILL, 2007d**).

4.0 Conclusions

Provided below is a summary of conclusions pertaining to the Annual 2008 ground water sampling event.

4.1 Water Level Trends

Interpretation of Upper Zone (**Figure 2**) water level data indicates that ground water flows primarily towards Well No. 2. This flow pattern is consistent with previous monitoring events. There has been no significant change in the distribution of water levels or ground water flow in the Upper Zone.

Figure 3 shows the presence of a ground water depression in the area between Well No. 2 and MPMW06 in the Lower Zone, Unit 3 in response to pumping at Well No. 2. The ground water depression has been documented in previous monitoring events. The ground water depression is smaller in size than in previous monitoring events because MW-17-EX is no longer pumping.

4.2 CTC Rebound in Well No. 2 and MW-17-EX

The CTC concentration in Well No. 2 increased significantly within one month of the P&T System being shut down (see **Table 2**). The most likely cause of the increase in CTC concentration in Well No. 2 is vertical leakage of CTC contaminated ground water from the Upper Zone down the gravel packed annulus of Well No. 2 into the Lower Zone. Within six weeks after Well No. 2 was returned to operation, the CTC concentration in the well decreased to below the MCL.

The CTC concentration in MW-17-EX did not exhibit a sustained increase after operation of the well ceased (see **Table 2**). Although the CTC concentration increased slightly one month after the well was turned off, the CTC concentration later decreased and has since declined to less than 1 µg/L during April 2008. This well has not been operated for over six months.

4.3 CTC Contaminant Trends

CTC trends at selected monitor wells for the Upper Zone, Lower Unit 2, and Unit 3 are presented on **Figures 7**, **8**, and **9,** respectively. Following are specific observations associated with the CTC concentration trends in the Upper Zone, Lower Unit 2, and Unit 3:

Upper Zone

- At MWCL-11S (**Figure 7**), the CTC concentration has been decreasing for the last two years. Although the CTC concentration still exceeds the MCL, the current concentration is less than one-half what the concentration was in early 2006.

- At MPMW02-1, the CTC concentration increased from the August 2007 concentration of 60.7 µg/L to 91.2 µg/L during April 2008 (**Figure 7**). Concentrations of CTC in samples from this well have varied since sampling began in October 2002, with the highest detection occurring during the March 2004 sampling event (at 110 ug/L). From March 2004 through August 2007, the overall CTC concentration trend has been decreasing in this well.

- At MW-19-EX, the CTC concentration increased from the August 2007 concentration of 14.6 µg/L to 27.1 µg/L during April 2008 (**Figure 7**). CTC concentrations in this well have been increasing since the well was first sampled in February 2007.
- At MPMW01-1, the CTC concentration in April 2008 decreased from the August 2007 concentration (**Figure 7**). The CTC concentration trend in this well has been variable since October 2002.
- At MPMW03-1 and MPMW03-2, the CTC concentration trends are similar and have been decreasing since early 2006 (**Figure 7**). The CTC concentration in both wells is currently below the MCL.
- At MPMW06-1, the CTC concentration decreased slightly from the August 2007 concentration of 15 µg/L to 12.9 µg/L during April 2008 (**Figure 7**). The overall concentration trend in this well has been gradually decreasing since August 2003.

Lower Unit 2

- At MPMW01-3, the CTC concentration has been decreasing since October 2006 (**Figure 8**). The CTC concentration in this well has been slightly variable at concentrations near the MCL. The concentration in April 2008 was below the MCL at 4.5 µg/L.
- At MPMW02-2, the CTC concentration decreased from the August 2007 concentration of 30.7 µg/L to 16.4 µg/L during April 2008 (**Figure 8**). The overall concentration trend in this well has been variable since monitoring began in October 2002. This is the only well in Lower Unit 2 where the CTC concentration currently exceeds the MCL.
- At MPMW03-3, the CTC concentration has been decreasing since February 2006 (**Figure 8**). The CTC concentration in April 2008 was below the MCL at 2.8 µg/L. April 2008 was the first time the CTC concentration was below the MCL in this well.

Unit 3

CTC concentration trends at selected monitor wells in Unit 3 are provided on **Figure 9**. In Unit 3, CTC is currently only detected at monitor wells MPMW04-4 and MPMW06-3 and Well No. 2, and CTC concentrations are currently below the MCL in all wells. CTC concentrations in Unit 3 monitor wells have not shown any evidence of rebound in response to the P&T System being shut down in October and November 2007.

5.0 References

CH2M HILL, 2007a. *Annual Operations and Maintenance Report, Year 2 of the Long-Term Remedial Action, October 1, 2005 through September 30, 2006, City of Perryton Well No. 2 Site, Perryton, Ochiltree County, Texas.* March 2007.

CH2M HILL, 2007b. *Contract No. EP-W-06-021, FR Task Order Work Plan Revision No. 2, City of Perryton Well No. 2 Superfund Site RA.* April 3, 2007.

CH2M HILL, 2007c. *Field Sampling Plan, Version 3.0, Long-Term Remedial Action, City of Perryton Well No. 2, Perryton, Ochiltree County, Texas.* October 2007.

CH2M HILL, 2007d. *Annual Operations and Maintenance Report, Year 3 of the Long-Term Remedial Action, October 1, 2006 through September 30, 2007, City of Perryton Well No. 2 Site, Perryton, Ochiltree County, Texas.* December 2007.

United States Environmental Protection Agency (EPA), 2002. *Superfund Record of Decision, City of Perryton Well No. 2, Perryton, Ochiltree County, Texas.* September 2002.

Tables

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Table 1
Summary of CTC Results in Site Monitor Wells, April 2008
City of Perryton Well No. 2 Superfund Site, Perryton Texas

StationID	Hydrologic Zone [1]	Date Collected	CARBON TETRACHLORIDE		
			Concentration	Qualifier	Unit
Remediation Goal			**5 ug/L**		
MPMW-01-1	U	8-Apr-08	**24**	=	UG/L
MPMW-01-2	U	8-Apr-08	4.8	=	UG/L
MPMW-01-3	L	8-Apr-08	4.5	=	UG/L
MPMW-01-4	L	8-Apr-08	1	U	UG/L
MPMW-01-5	L	8-Apr-08	1	U	UG/L
MPMW-02-1	U	8-Apr-08	**91.2**	=	UG/L
MPMW-02-2	L	8-Apr-08	**16.4**	=	UG/L
MPMW-02-2-FD	L	8-Apr-08	**13.3**	=	UG/L
MPMW-02-3	L	8-Apr-08	1	U	UG/L
MPMW-03-1	U	8-Apr-08	1	U	UG/L
MPMW-03-2	U	8-Apr-08	1.2	=	UG/L
MPMW-03-3	L	8-Apr-08	2.8	=	UG/L
MPMW-03-4	L	8-Apr-08	1	U	UG/L
MPMW-04-1	U	8-Apr-08	1	U	UG/L
MPMW-04-4	L	8-Apr-08	2.3	=	UG/L
MPMW-06-1	U	8-Apr-08	**12.9**	=	UG/L
MPMW-06-3	L	8-Apr-08	1.9	=	UG/L
MWCL-07S-5	U	8-Apr-08	1	U	UG/L
MW-08-5	L	8-Apr-08	1	U	UG/L
MW-09-5	L	8-Apr-08	1	U	UG/L
MW-10-5	L	8-Apr-08	1	U	UG/L
MWCL-11S-5	U	8-Apr-08	**51.8**	=	UG/L
MWCL-11D-5	L	8-Apr-08	1	U	UG/L
MW-14-5	L	8-Apr-08	1	U	UG/L
MW-15-5	L	8-Apr-08	1	U	UG/L
MW-16-10	L	8-Apr-08	1	U	UG/L
MW-17-EX	L	8-Apr-08	1	U	UG/L
MW-18-EX-32	L	8-Apr-08	4.9	=	UG/L
MW-19-EX-37	U	8-Apr-08	**27.1**	=	UG/L
GW-02[2]	L	8-Apr-08	3.6	=	UG/L
Operations and Maintenance Samples					
ASTP-INF		8-Apr-08	2.6	=	UG/L
ASTP-EFF		8-Apr-08	1	U	UG/L
ASTP-EFF-FD		8-Apr-08	1	U	UG/L
Field Quality Control Samples					
EB01		4/8/2008	1	U	UG/L
FB01		4/8/2008	1	U	UG/L
FB02		4/8/2008	1	U	UG/L
TB01		4/8/2008	1	U	UG/L
TB02		4/8/2008	1	U	UG/L

Notes:
1 - See Remedial Investigation Report for explaination of hydrologic units
2 - GW-02 is the same as Well No. 2
CTC - Carbon Tetrachloride
U - Not Detected
"=" - Detected Value
UG/L - Micrograms per liter
BOLD - indicates exceedance of the Remediation Goal

Table 2
Summary of CTC Results in Well No. 2 and MW-17-EX
Collected During Rebound Sampling Events
City of Perryton Well No. 2 Superfund Site, Perryton Texas

StationID	Date Collected	CARBON TETRACHLORIDE		
		Concentration	Qualifier	Unit
Remediation Goal		**5 ug/L**		
GW-02	3-Aug-07	6.3	=	UG/L
GW-02	29-Oct-07	27.9	=	UG/L
GW-02-1000[1]	28-Nov-07	19.8	=	UG/L
GW-02-10000[1]	28-Nov-07	17.5	=	UG/L
GW-02-100000[1]	28-Nov-07	19.7	=	UG/L
GW-02	09-Jan-08	3.6	=	UG/L
GW-02	08-Apr-08	3.6	=	UG/L
MW-17-EX	03-Aug-07	3.6	=	UG/L
MW-17-EX	29-Oct-07	4.8	=	UG/L
MW-17-EX	28-Nov-07	2.7	=	UG/L
MW-17-EX	09-Jan-08	1	=	UG/L
MW-17-EX	08-Apr-08	1	U	UG/L

Notes:
1 - Samples were collected from Well No. 2 during November 2007 to determine if the CTC concentration changed with increased pumping from the well.
Pump and Treat System was shut-down on 28-Sept-07 to begin the rebound sampling period and restarted on 29-Nov-07.
GW-02 is the same as Well No. 2
CTC - Carbon Tetrachloride
U - Not Detected
"=" - Detected Value
UG/L - Micrograms per liter

TABLE 3
Water Level Measurements, April 2008
City of Perryton Well No. 2 Superfund Site, Perryton, Texas

Well ID	Date	Hydrologic Zone Screened[1]	TOC Elevation (feet above MSL)	Depth to Water (feet BTOC)	Water Level Elevation (feet above MSL)
MPMW-01-1	7-Apr-08	U	2934.60	246.04	2688.56
MPMW-01-2	7-Apr-08	U	2934.60	246.43	2688.17
MPMW-01-3	7-Apr-08	L	2934.60	278.28	2656.32
MPMW-01-4	7-Apr-08	L	2934.60	288.13	2646.47
MPMW-01-5	7-Apr-08	L	2934.60	287.19	2647.41
MPMW-02-1	7-Apr-08	U	2931.20	246.10	2685.10
MPMW-02-2	7-Apr-08	L	2931.20	289.16	2642.04
MPMW-02-3	7-Apr-08	L	2931.20	286.20	2645.00
MPMW-02-4	7-Apr-08	L	2931.20	284.59	2646.61
MPMW-03-1	7-Apr-08	U	2932.30	246.70	2685.60
MPMW-03-2	7-Apr-08	U	2932.30	246.73	2685.57
MPMW-03-3	7-Apr-08	L	2932.30	281.47	2650.83
MPMW-03-4	7-Apr-08	L	2932.30	285.53	2646.77
MPMW-03-5	7-Apr-08	L	2932.30	285.03	2647.27
MPMW-04-1	7-Apr-08	U	2942.40	253.91	2688.49
MPMW-04-2	7-Apr-08	U	2942.40	257.66	2684.74
MPMW-04-3	7-Apr-08	L	2942.40	286.56	2655.84
MPMW-04-4	7-Apr-08	L	2942.40	296.95	2645.45
MPMW-04-5	7-Apr-08	L	2942.40	295.79	2646.61
MW-05D	7-Apr-08	L	2929.69	279.89	2649.80
MW-05S	7-Apr-08	U	2930.22	237.31	2692.91
MPMW-06-1	7-Apr-08	U	2939.70	251.03	2688.67
MPMW-06-2	7-Apr-08	L	2939.70	285.80	2653.90
MPMW-06-3	7-Apr-08	L	2939.70	294.32	2645.38
MWCL-07D	7-Apr-08	L	2941.53	293.79	2647.74
MWCL-07S	7-Apr-08	U	2941.65	253.76	2687.89
MW-08	7-Apr-08	L	2938.03	292.07	2645.96
MW-09	7-Apr-08	L	2933.99	285.64	2648.35
MW-10	7-Apr-08	L	2940.38	291.24	2649.14
MWCL-11D	7-Apr-08	L	2935.39	288.60	2646.79
MWCL-11S	7-Apr-08	U	2935.34	247.92	2687.42
MWCL-13D	7-Apr-08	L	2939.48	289.02	2650.46
MWCL-13S	7-Apr-08	U	2939.40	241.22	2698.18
MW-14	7-Apr-08	L	2931.21	283.01	2648.20
MW-15	7-Apr-08	L	2932.95	283.10	2649.85
MW-16	7-Apr-08	L	2939.56	292.90	2646.66
MW-18-EX	7-Apr-08	L	NA	NC	NC
MW-19-EX	7-Apr-08	U	NA	NC	NC
Well No. 1 (GW-01)	7-Apr-08	L	2934.37	276.44	2657.93
Well No. 3 (GW-03)	7-Apr-08	L	2929.16	278.60	2650.56
Well No. 4 (GW-04)	7-Apr-08	L	2926.30	285.57	2640.73

Notes:
1 - See Remedial Investigation Report for explaination of hydrologic zones
TOC - Top of Casing
MSL - Mean Sea Level
NA - No information is available because wells have not been surveyed
NC - Not calculated, because the TOC elevation is not available
NM - Not measured
BTOC - Below Top of Casing
U - Upper
L - Lower

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TABLE 4
Passive Diffusion Bags - Measurements, Set Depths, and Dates of Replacement
City of Perryton Well No. 2 Superfund Site, Perryton Texas

Well ID	Date Measured	PDB Assigned Interval Below Top of Screen (feet)	Measured Depth Below Top of Screen (feet)	Adjusted Depth Below Top of Screen (feet)	Date of Last Adjustment	Date Replaced
MW-05D	9/7/2005	2.0	2.90	2.0	3/2/2006	March 2004
		5.0	5.90	5.0	3/2/2006	March 2004
		8.0	8.90	8.0	3/2/2006	March 2004
MW-05S	9/8/2005	2.0	3.29	2.0	3/2/2006	March 2004
		5.0	6.28	5.0	3/2/2006	March 2004
		8.0	9.28	8.0	3/2/2006	March 2004
MWCL-07D	3/1/2006	2.0	2.87	2.0	3/1/2006	March 2006
		5.0	5.90	5.0	3/1/2006	March 2006
		8.0	8.95	8.0	3/1/2006	March 2006
MWCL-07S	4/9/2008	2.0	2.16	2.16	3/1/2006	March 2006
		5.0	5.25	5.25	3/1/2006	March 2006
		8.0	8.25	8.25	3/1/2006	March 2006
MW-08	4/9/2008	2.0	2.00	2.0	2/28/2006	March 2004
		5.0	5.00	5.0	2/28/2006	March 2004
		8.0	8.00	8.0	2/28/2006	March 2004
MW-09	9/8/2005	0.5	1.28	0.5	2/28/2006	March 2005
		2.0	2.75	2.0	2/28/2006	March 2004
		3.5	4.19	3.5	2/28/2006	March 2005
		5.0	5.68	5.0	2/28/2006	March 2004
		6.5	7.17	6.5	2/28/2006	March 2005
		8.0	8.65	8.0	2/28/2006	March 2004
		9.5	10.15	9.5	2/28/2006	March 2005
MW-10	10/26/2006	2.0	3.61	2.0	3/2/2006	March 2004
		5.0	6.60	5.0	3/2/2006	March 2004
		8.0	9.56	8.0	3/2/2006	March 2004
MWCL-11D	9/8/2005	0.5	0.32	0.5	3/2/2006	March 2005
		2.0	1.78	2.0	3/2/2006	March 2004
		3.5	3.22	3.5	3/2/2006	March 2005
		5.0	4.75	5.0	3/2/2006	March 2004
		6.5	6.20	7.0	3/2/2006	March 2005
		8.0	7.72	8.0	3/2/2006	March 2004
		9.5	9.23	10.0	3/2/2006	March 2005
MWCL-11S	9/8/2005	2.0	2.40	2.0	2/28/2006	March 2004
		5.0	5.39	5.0	2/28/2006	March 2004
		8.0	8.40	8.0	2/28/2006	March 2004
MWCL-13D	9/8/2005	2.0	2.60	2.0	3/2/2006	March 2004
		5.0	5.60	5.0	3/2/2006	March 2004
		8.0	8.60	8.0	3/2/2006	March 2004
MWCL-13S	9/8/2005	1.0	1.40	1.0	3/1/2006	March 2005
		4.0	4.32	4.0	3/1/2006	March 2005
		7.0	7.27	7.0	3/1/2006	March 2005
		10.0	10.35	10.0	3/1/2006	March 2005
		13.0	13.43	13.0	3/1/2006	March 2005
		16.0	16.42	16.0	3/1/2006	March 2005
		19.0	19.45	19.0	3/1/2006	March 2005
		22.0	22.40	22.0	3/1/2006	March 2004
		25.0	25.37	25.0	3/1/2006	March 2004
		28.0	28.38	28.0	3/1/2006	March 2004

TABLE 4
Passive Diffusion Bags - Measurements, Set Depths, and Dates of Replacement
City of Perryton Well No. 2 Superfund Site, Perryton Texas

Well ID	Date Measured	PDB Assigned Interval Below Top of Screen (feet)	Measured Depth Below Top of Screen (feet)	Adjusted Depth Below Top of Screen (feet)	Date of Last Adjustment	Date Replaced
MW-14	10/26/2006	2.0	3.14	2.1	10/26/2006	March 2004
		5.0	6.14	5.1	10/26/2006	March 2004
		8.0	9.14	8.2	10/26/2006	March 2004
MW-15	9/9/2005	2.0	3.74	2.0	3/2/2006	March 2004
		5.0	6.68	5.0	3/2/2006	March 2004
		8.0	9.66	8.0	3/2/2006	March 2004
MW-16	9/9/2005	2.0	3.62	2.0	3/2/2006	March 2004
		6.0	7.59	6.0	3/2/2006	March 2004
		10.0	11.59	10.0	3/2/2006	March 2004
		14.0	15.59	14.0	3/2/2006	March 2004
		18.0	19.59	18.0	3/2/2006	March 2004
MW-18-EX	3/2/2007	2.0	2.0	2.0	3/2/2007	January 2007
		7.0	7.0	7.0	3/2/2007	January 2007
		12.0	12.0	12.0	3/2/2007	January 2007
		17.0	17.0	17.0	3/2/2007	January 2007
		22.0	22.0	22.0	3/2/2007	January 2007
		27.0	27.0	27.0	3/2/2007	January 2007
		32.0	32.0	32.0	3/2/2007	January 2007
MW-19-EX	3/2/2007	2.0	2.0	2.0	3/2/2007	January 2007
		7.0	7.0	7.0	3/2/2007	January 2007
		12.0	12.0	12.0	3/2/2007	January 2007
		17.0	17.0	17.0	3/2/2007	January 2007
		22.0	22.0	22.0	3/2/2007	January 2007
		27.0	27.0	27.0	3/2/2007	January 2007
		32.0	32.0	32.0	3/2/2007	January 2007
		37.0	37.0	37.0	3/2/2007	January 2007

Notes:
PDB = Passive Diffusion Bag

Figures

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MW-19-EX
GW-02
MW-18-EX
MPMW02
MWCL-11D/S
C
GW-01
APPROXIMATE LOCATION OF WELL 99162 *
MW-05D/S
MPMW03
NORTH GROUND STORAGE TANK
APPROXIMATE LOCATION OF OLD WELL NO. 1 *
PEX FACILITY
MPMW06
MWCL-13D/S
C
MW-10
GW-02
ASTP
MPMW02
MWCL-11D/S
C
MW-15
MW-16
MW-17-EX
MPMW01
MW-09
MWCL-7D/S
C
MW-08
MW-14
BATTIN
MPMW04
GW-03
GW-04
83
15
Industrial
Juniper
Loop
Main
Brillhart
Santa Fe
Loyola
Kentucky
Key
Lamaster
Indiana
Grinnell
Drake
Harvard
Fordham
Amherst
Colgate
Jackson
Michigan
Jefferson
Eton
Birch
Ash
Date
Cedar
Elm
Fir
Gum
Baylor
Catalina
A
H
1st
2nd
3rd
4th
5th
6th
7th
8th
9th
10th
11th
12th
13th
14th
15th
16th

Legend

- MUNICIPAL WELL
- MONITOR WELL
- C MONITOR WELL COUPLET
- MULTI-PORT MONITOR WELL
- PRIVATE WELL
- EXTRACTION WELL
- AIR STRIPPER TREATMENT PLANT

N

0 1,000 Feet

FIGURE 1
SITE AREA MAP

CITY OF PERRTYOWN WELL NO.2 SUPERFUND SITE
PERRTYON, TEXAS

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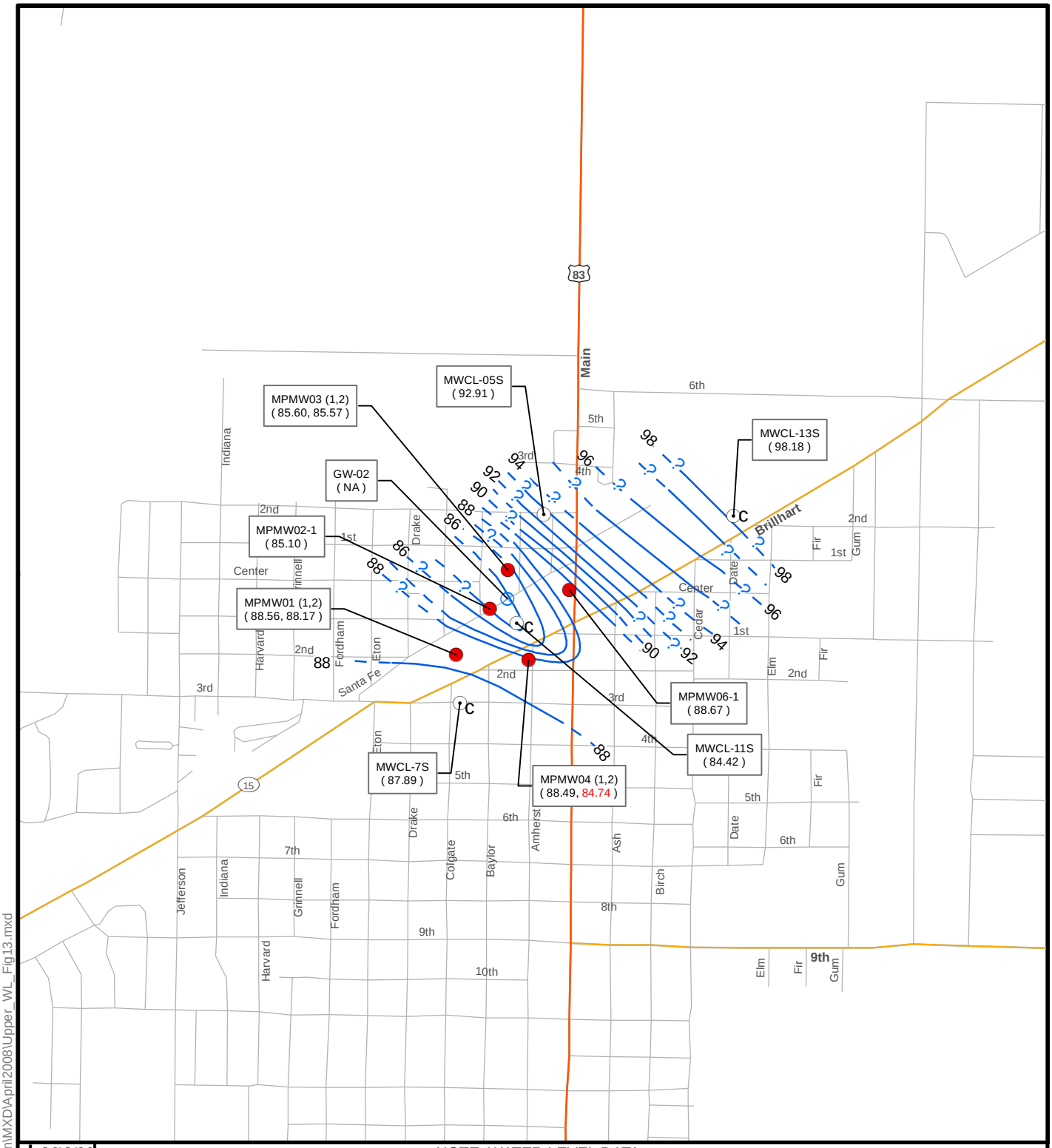

Legend

- MONITOR WELL
- C MONITOR WELL COUPLET
- MULTI-PORT MONITOR WELL
- MUNICIPAL WELL
- (43.75) WATER LEVEL ELEVATION IN FEET ABOVE LOCAL DATUM (2600FT)
- GROUND WATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

CONTOUR INTERVAL: 1 FOOT
WATER LEVEL IN RED NOT USED IN CONTOURING

NOTE: WATER LEVEL DATA CONTOURED BY HAND

0 1,000 Feet

N

FIGURE 2
DISTRIBUTION OF WATER LEVELS IN UPPER ZONE
APRIL 2008
CITY OF PERRYTON WELL NO.2 SUPERFUND SITE
PERRYTON, TEXAS

CH2MHILL

File Path: \\chuckwagon\GIS\NWOFiles\Perryton\MXD\April2008\Upper_WL_Fig13.mxd
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GW-01 (57.93)

MW-05D (49.80)

MPMW03-4 (46.67)

GW-02

MPMW02-3 (45.00)

MWCL-11D (46.79)

MPMW01-4 (46.47)

MPMW04-4 (46.45)

MWCL-07D (47.74)

MW-08 (45.96)

MWCL-13D (50.46)

MPMW06-3 (45.38)

MW-10 (49.14)

MW-16 (46.66)

MW-15 (49.36)

MW-17-EX

MW-14 (48.20)

MW-09 (48.35)

GW-03 (50.56)

GW-04 (40.73)

83

15

Brillhart

Main

Santa Fe

Industrial

Juniper

Loon

Indiana

Loyola

Kentucky

Key

Lamaster

Harvard

Jackson

Grinnell

Colgate

Baylor

Jefferson

Michigan

Drake

Birch

Ash

Date

Fir

Cedar

Elm

Gum

Catalina

2nd

3rd

4th

5th

6th

7th

8th

9th

10th

11th

12th

13th

14th

15th

Legend

- MUNICIPAL WELL
- MONITOR WELL
- C MONITOR WELL COUPLET
- MULTI-PORT MONITOR WELL
- EXTRACTION WELL
- (43.75) WATER LEVEL ELEVATION IN FEET ABOVE LOCAL DATUM (2600FT)
- GROUND WATER ELEVATION CONTOUR(DASHED WHERE INFERRED)

CONTOUR INTERVAL : 1 FOOT

NOTE: WATER LEVEL DATA CONTOURED BY HAND

N

0 1,000 Feet

FIGURE 3
DISTRIBUTION OF WATER LEVELS IN LOWER ZONE UNIT 3
APRIL 2008
CITY OF PERRYTON WELL NO.2 SUPERFUND SITE
PERRYTON, TEXAS

CH2MHILL

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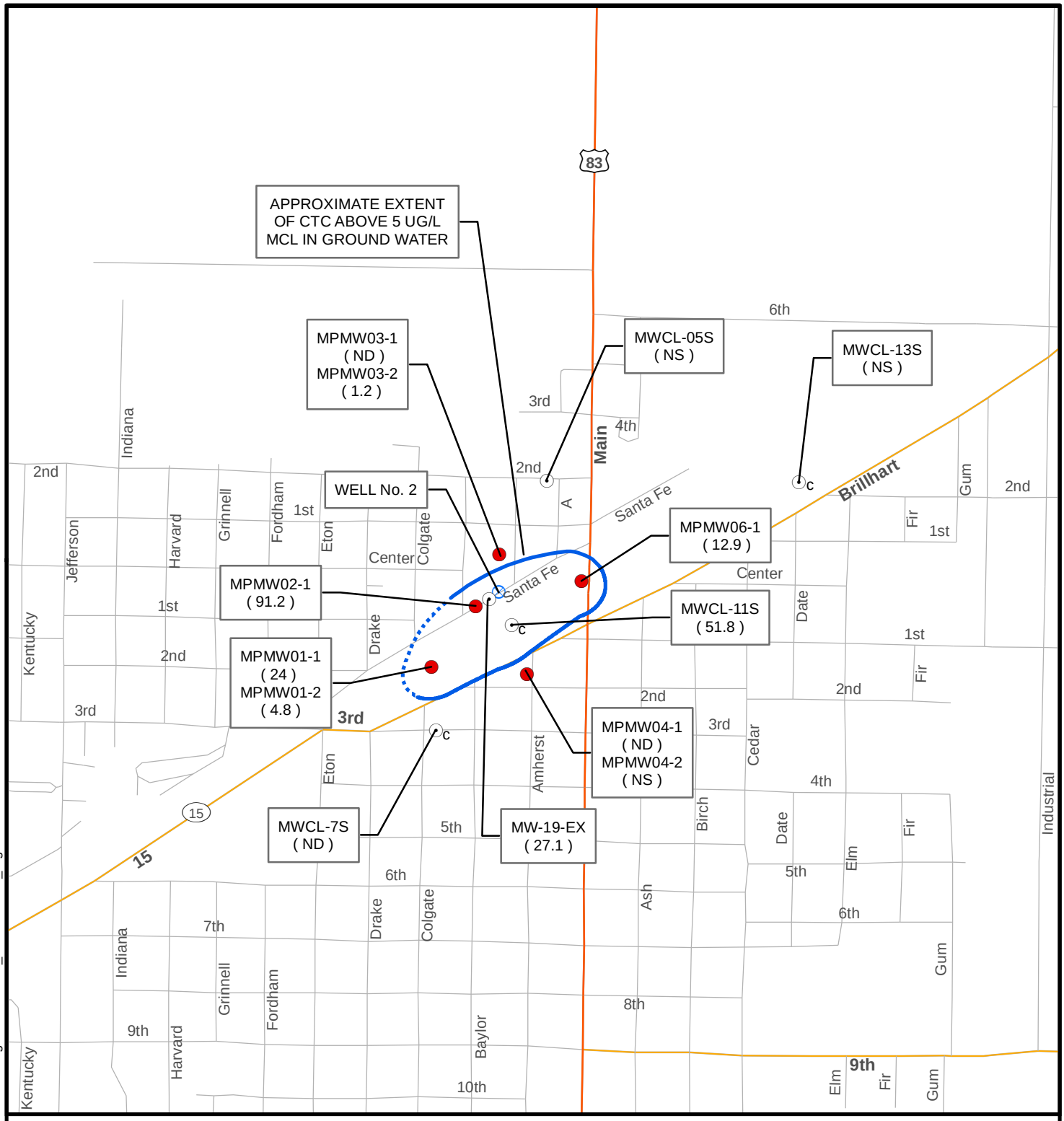

Legend

- MONITOR WELL
- C MONITOR WELL COUPLET
- MULTI-PORT MONITOR WELL
- MUNICIPAL WELL
- EXTRACTION WELL
- (75) CONCENTRATION OF CARBON TETRACHLORIDE MICROGRAMS PER LITER (ug/L)
- 5 ug/L CARBON TETRACHLORIDE CONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- ND NOT DETECTED
- NS NOT SAMPLED

NOTE: CONCENTRATION DATA CONTOURED BY HAND

0 1,000 Feet

N

FIGURE 4
DISTRIBUTION OF CARBON TETRACHLORIDE IN GROUND WATER IN UPPER ZONE APRIL 2008
CITY OF PERRYTON WELL NO.2 SUPERFUND SITE
PERRYTON, TEXAS

CH2MHILL

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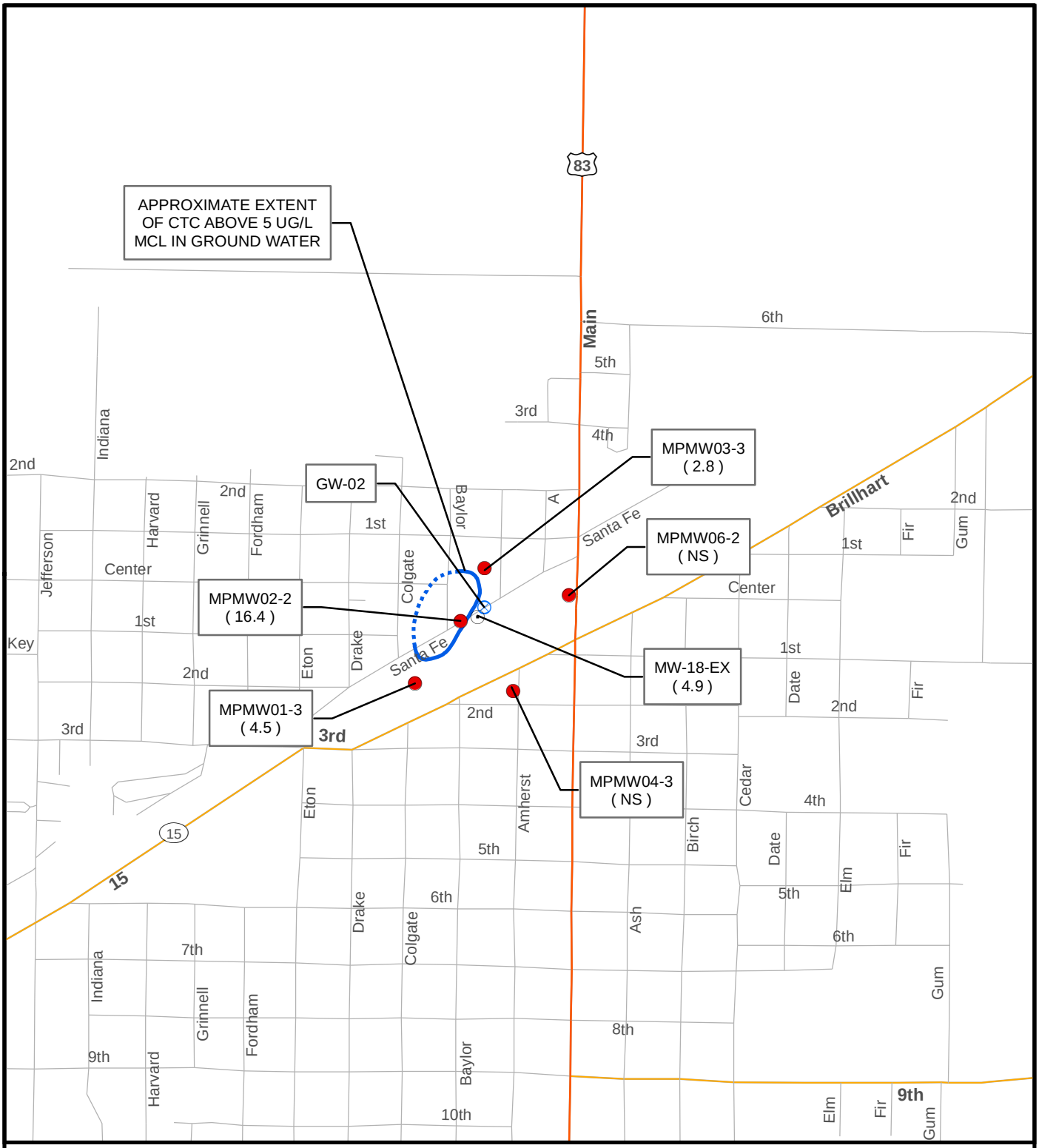

Legend

- MULTI-PORT MONITOR WELL
- MUNICIPAL WELL
- MONITOR WELL
- EXTRACTION WELL
- (75) CONCENTRATION OF CARBON TETRACHLORIDE MICROGRAMS PER LITER (ug/L)
- 5 ug/L CARBON TETRACHLORIDE CONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- ND NOT DETECTED
- NS NOT SAMPLED

NOTE: CONCENTRATION DATA CONTOURED BY HAND

0 1,000 Feet

N

FIGURE 5
DISTRIBUTION OF CARBON TETRACHLORIDE IN GROUND WATER IN LOWER UNIT 2
APRIL 2008
CITY OF PERRYTON WELL NO.2 SUPERFUND SITE
PERRYTON, TEXAS

CH2MHILL

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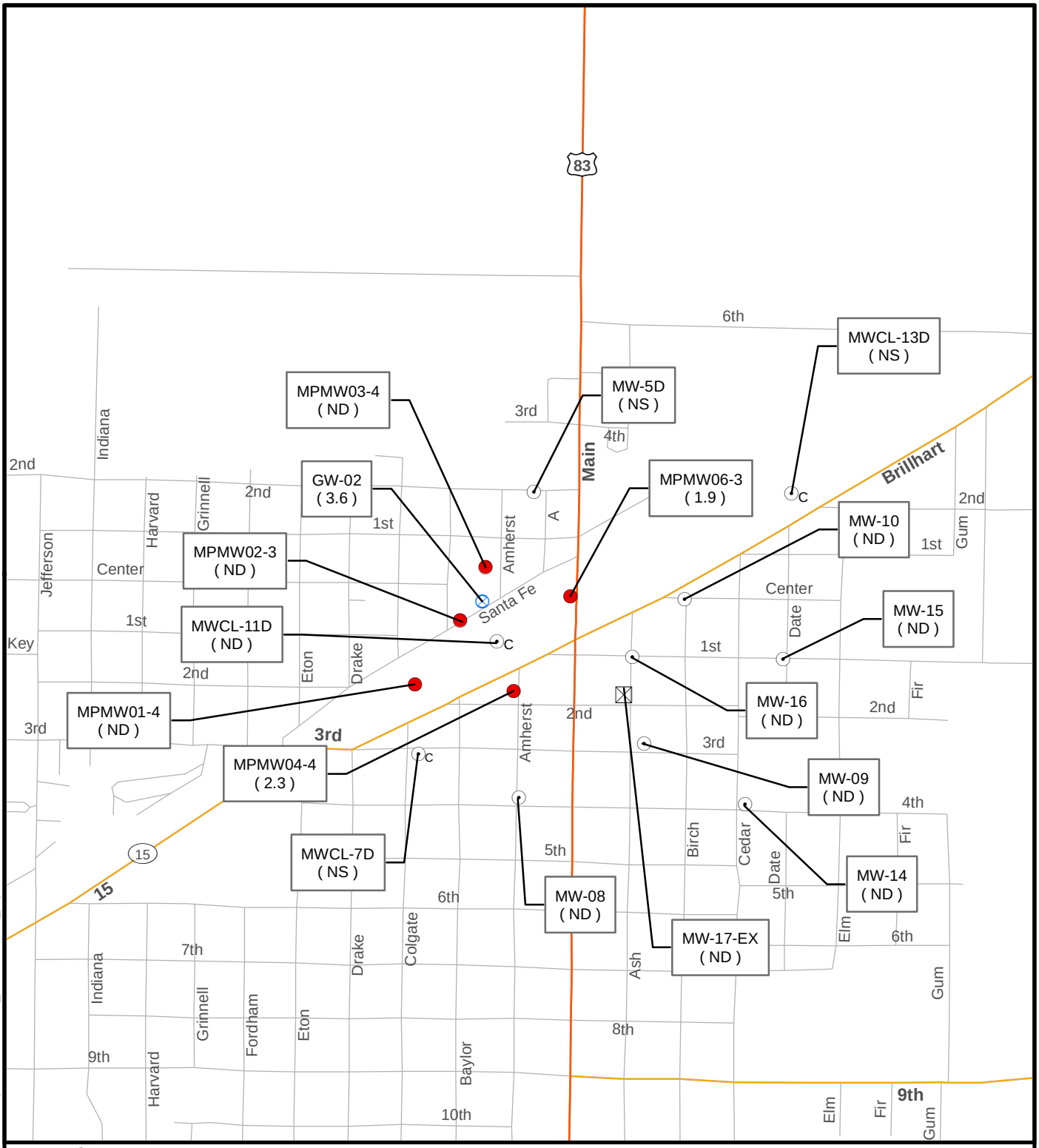

Legend

- MONITOR WELL
- C MONITOR WELL COUPLET
- MULTI-PORT MONITOR WELL
- MUNICIPAL WELL
- EXTRACTION WELL
- (4.4) CONCENTRATION OF CARBON TETRACHLORIDE MICROGRAMS PER LITER (ug/L)
- ND NOT DETECTED
- NS NOT SAMPLED

0 1,000 Feet

N

FIGURE 6
DISTRIBUTION OF CARBON TETRACHLORIDE IN GROUND WATER IN LOWER ZONE UNIT 3
APRIL 2008

CITY OF PERRYTON WELL NO.2 SUPERFUND SITE
PERRYTON, TEXAS

CH2MHILL

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Figure 7
CTC Concentration Trends at Selected Monitor Wells in the Upper Zone
City of Perryton Well No. 2 Superfund Site, Perryton, Texas

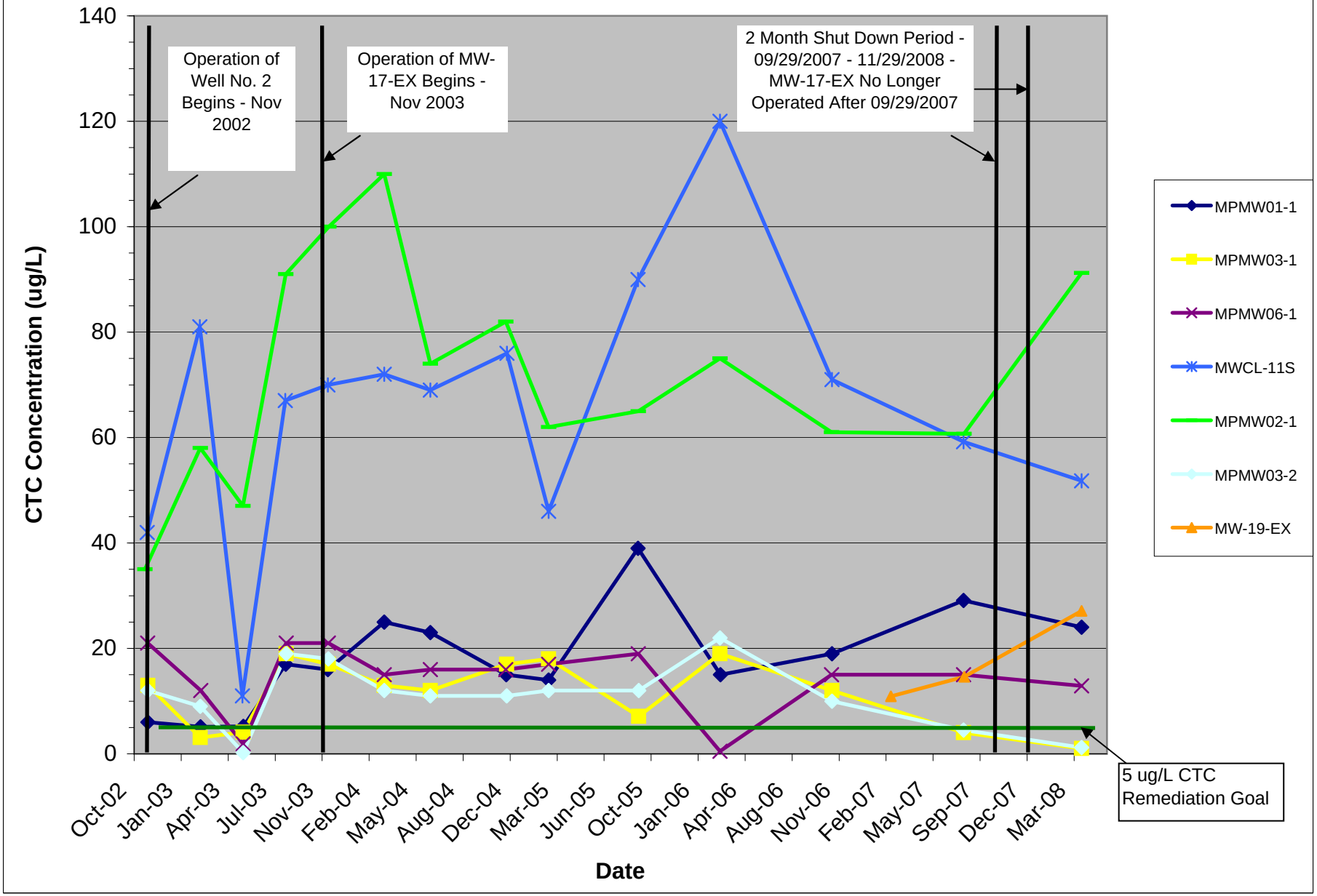


Figure 8
CTC Concentration Trends at Selected Monitor Wells in Lower Unit 2
City of Perryton Well No. 2 Superfund Site, Perryton, Texas

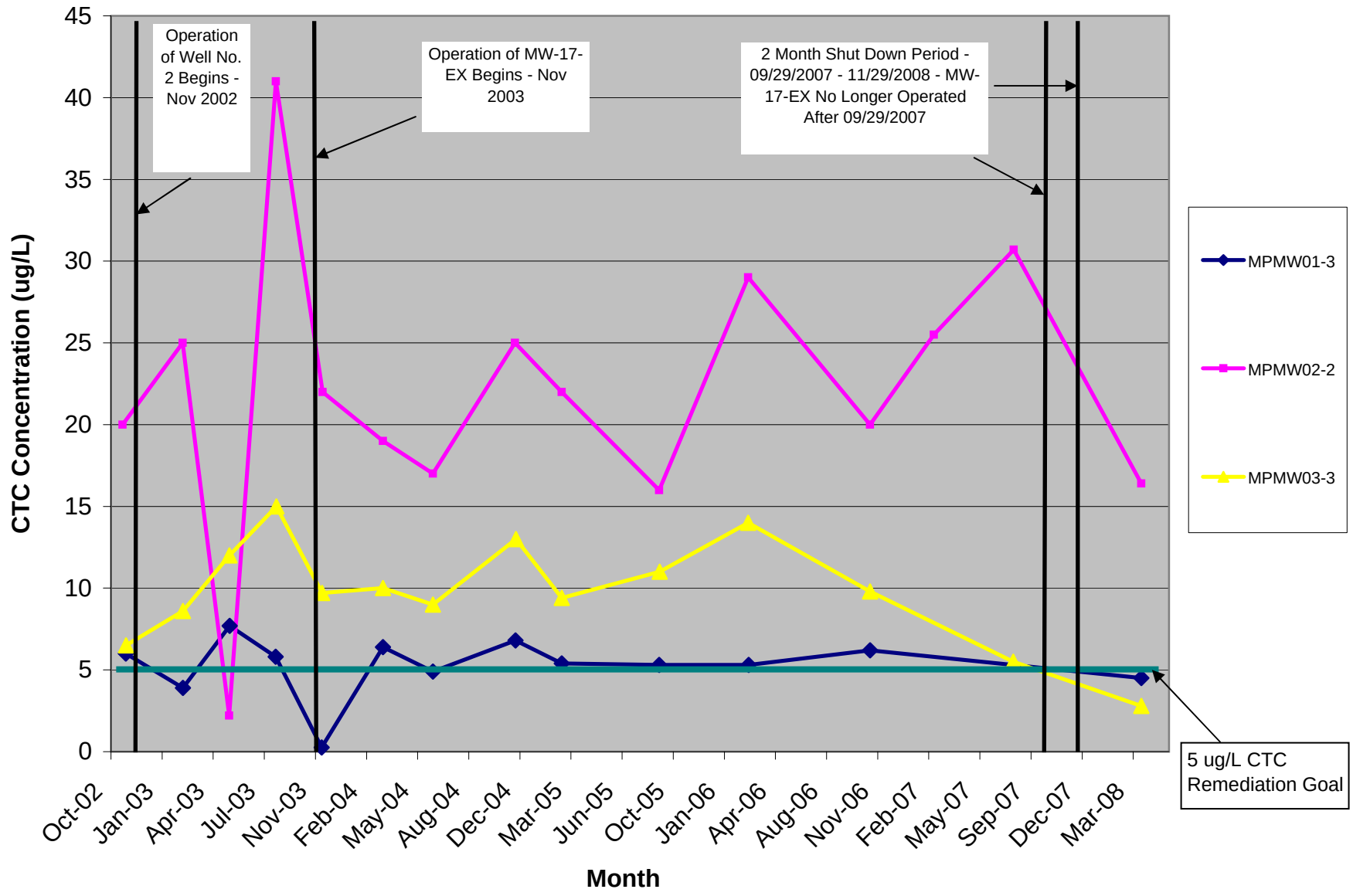
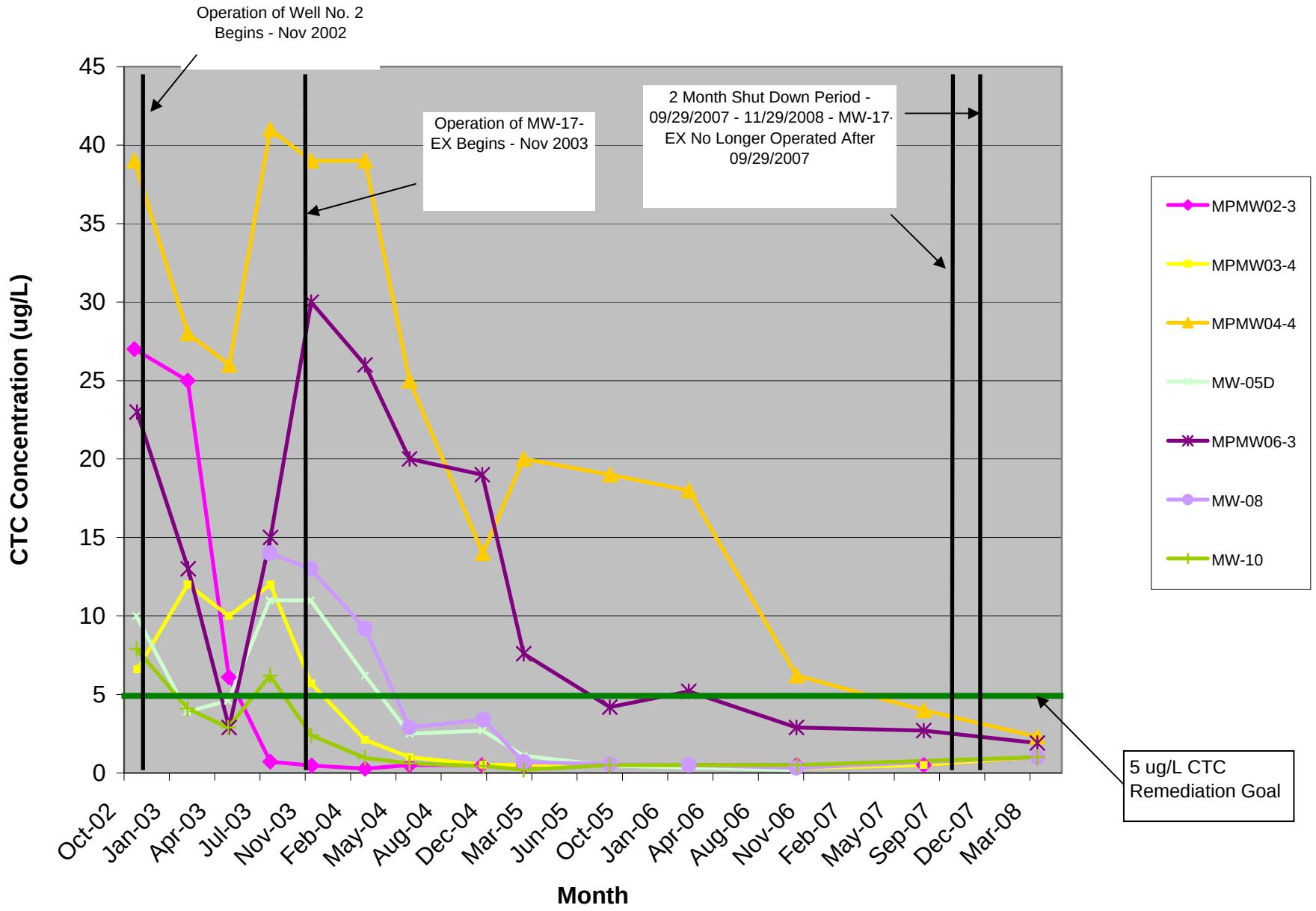


Figure 9

CTC Concentration Trends at Selected Monitor Wells in Unit 3

City of Perryton Well No. 2 Superfund Site, Perryton, Texas



Attachment 7
City of Perryton Well Permit Ordinance

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ORDINANCE #790

THAT SECTION 6-233.2(2) AND SECTIONS 6-517, 6-518, 6-519, 6-520, 6-521 and 6-522 OF THE CODE OF ORDINANCES FOR THE CITY OF PERRYTON, TEXAS, IS HEREBY AMENDED TO READ AS FOLLOWS:

SECTION 6-233
CHAPTER 6
EXEMPTIONS

Plumbing work done by anyone who is regularly employed as or acting as a maintenance man or maintenance engineer, incidentals to and in connection with the business in which he is employed or engaged and who does not engage in the occupation of plumbing for the general public; construction, installation and maintenance work done upon the premises or equipment of a railroad by an employee thereof who does not engage in the occupation of a plumber for the general public; and plumbing work done by person engaged by a public service company in the laying, maintenance and operation of its service mains or lines to the point of measurement and the installation, alteration, adjustment, repair, removal and renovation of all types of appurtenances, equipment and appliances including doing all that is necessary to render the appliances useable or serviceable; appliance installation and service work done by anyone who is an appliance dealer or is employed by an appliance dealer and acting as an appliance installation person or appliance service person in connecting appliances to existing piping installations; exchanges, service, or repairs. Provided, however, that all work and service herein named or referred to shall be subject to inspection and approval in accordance with the terms of all local valid city or municipal ordinances.

SECTION 6-517 through 6-522
CHAPTER 25
INDIVIDUAL WATER SUPPLIES

25.1 GENERAL

Suitable water for drinking purposes seldom occurs in nature. Rain and snow waters become contaminated quickly by dust, insects, animals and man. Some of the organisms introduced into water by these means cause typhoid fever, para-typhoid fever, bacillary and amoebic dysentery. The organisms causing these diseases are excreted in human discharges and if defective excreta disposal methods or a lack of safeguards around the water source allow the organisms to reach water supplies, human illness will result.

In order that we may free ourselves of these dreaded diseases, certain safeguards must be provided. We cannot depend on the physical appearance of water as a measure of safety for it is possible that clear and sparkling waters may be unsafe, pleasant to taste, clear and free of gasses and minerals that impart disagreeable odors. Too, a good water supply is one that is adequate for needs, dependable and convenient. A minimum of approximately 50 gallons of water per person per day. Of course, if stock or irrigation water is to be provided from the household supply, additional allowances must be made.

Detailed technical information concerning any phase of water supply or treatment may be obtained upon request from the Texas Department of Health, Water Hygiene Division, Austin, Texas.

25.2 WELL CONSTRUCTION

25.2.1 Wells Within City Limits: All wells within the City of Perryton shall comply with the Rules and Regulations for Public Water Systems, Texas Department of Health, Water Hygiene Division, Adopted 1978 and revised effective July 1, 1988.

25-2.2 Issuance of Permit: The Plumbing Inspector or his designated representative shall issue all permits in accordance with the provisions and requirements of this code. All applications for permits shall give the correct location of the property where the well is to be drilled, including name of the owner of such property.

25.2.3 Planning Material: All planning material for the construction of the well as set forth in the Rules and Regulations for Public Water Systems, Texas Department of Health, Water Hygiene Division, Section 337.202 General Provisions, Part (d), Adopted 1978 and revised effective July 1, 1988, shall be submitted to the Plumbing Inspector before construction begins. Plans for Residential wells may be submitted by the well driller.

25.3 METERS

25.3.1 Well Meter: All residential or commercial water wells within the City of Perryton shall be metered by a City provided and maintained water meter.

25.3.1.1 Meter Bypass: If a meter bypass is installed, it must include a stop with a locking device. The lock shall be provided and maintained by the City of Perryton.

25.3.2 Public Water System: If residential or commerical water system is connected to the public water system, it shall be metered by a City provided and maintained water meter.

25.3.2.1 Check Valve: A double check valve shall be installed between the City water meter and the residential or commerical water system.

25.4 WELL DRILLERS

25.4.1 License Required: All persons who engage in or work at the actual drilling or alteration of a water well shall possess a license with the Texas Water Well Drillers Board, Texas Civil Statutes, Article 7621e.

25.5 WATER SYSTEM

25.5.1 Plumbing: All plumbing shall be in accordance with the City of Perryton Plumbing Code.

PASSED AND APPROVED This the 4th day of October, 1988.

David A. Hale, Mayor Pro-Tem

ATTEST:

Janice Henson, City Secretary