Hazard Ranking System
State Documentation Record

Moss Lake Road Groundwater Site
Big Spring, Howard County, Texas

Prepared by:

Texas Commission on Environmental Quality
Superfund Program
Austin, Texas

June 2010

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Table of Contents

1.0 HRS STATE DOCUMENTATION RECORD - REVIEW COVER SHEET 1

2.0 HRS STATE DOCUMENTATION RECORD – SITE SUMMARY 2

Site Scoring Summary 2

3.0 SITE SUMMARY 6

General Description of the Site 6

Site History 6

4.0 GROUNDWATER PATHWAY 10

General Considerations 10

Geologic Stratum 1: Quaternary (Post Ogallala Sediments) 11

Geologic Stratum 2: Caliche 11

Geologic Stratum 3: Ogallala Formation 12

Geologic Stratum 4: Dockum Group (Triassic Red Beds) 13

5.0 OBSERVED RELEASE TO GROUNDWATER 14

Background Groundwater Samples 14

Observed Release to Groundwater: Tetrachloroethene (PCE) 15

6.0 WORKSHEET FOR HRS SITE SCORE 18

7.0 GROUNDWATER MIGRATION PATHWAY SCORESHEET 19

8.0 REFERENCES 20

List of Figures

FIGURE 1: SITE LOCATION 3
FIGURE 2: SITE FEATURE MAP 4
FIGURE 3: SOURCE AREA MAP 5

List of Tables

TABLE 1: BACKGROUND GROUNDWATER SAMPLES FOR TETRACHLOROETHENE (PCE) 14
TABLE 2: OBSERVED RELEASES FOR TETRACHLOROETHENE (PCE) 16

NOTES TO THE READER

The following rules were used when citing references in the Documentation Record:

1. All references attached to this report have been stamped with designated reference and page numbers (example: Ref. 1, p. 10 = 010010). The stamped reference and page numbers are used for all citations within the report. References not attached in their entirety, such as EPA documents, are referenced by original section, page, figure, or table number.

2. The State predecessor agencies: Texas Natural Resource Conservation Commission (TNRCC), Texas Water Quality Board (TWQB), Texas Department of Water Resources (TDWR), Texas Water Commission (TWC), and Texas Air Control Board (TACB), referred to throughout this report are now known as the Texas Commission on Environmental Quality (TCEQ). The new agency, TCEQ, became effective September 1, 2002, as mandated under House Bill 2912, Article 18 of the 77th Regular Legislative Session.

1.0 HRS STATE DOCUMENTATION RECORD - REVIEW COVER SHEET

SITE NAME: Moss Lake Road Groundwater Site

CONTACT PERSON:

Documentation Record:	Ronald Dildine, TCEQ Project Manager	(512) 239-4977
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PATHWAY OF CONCERN:

Groundwater Pathway

The Moss Lake Road Groundwater site is designated as a contaminated groundwater plume originating from unknown sources where hazardous substances may have been released to the aquifer. Releases of hazardous substances to the groundwater pathway are the major concern for this site. The Ogallala Aquifer is the aquifer of concern; refer to Section 4.0: Groundwater Pathway for the complete site geology (Ref. 4, p. 5). The groundwater pathway is being scored based on a Level I and a Level II observed release to the groundwater (Ref. 1 and Ref. 2). The primary chemical of concern (COC) evaluated for this HRS documentation record is tetrachloroethene, also known as tetrachloroethylene, perchloroethene, or perchloroethylene (PCE) (Ref. 3, p. 1).

PATHWAYS, COMPONENTS, OR THREATS NOT EVALUATED:

Surface Water Pathway

The Surface Water Pathway was not evaluated due to the lack of observed release and because the inclusion of this pathway would not significantly affect the site score (Ref. 2).

Soil Exposure Pathway

The Soil Exposure Pathway was not included in the scoring of this site, because this pathway would not significantly affect the site score (Ref. 2).

Air Migration Pathway

The Air Migration Pathway was not evaluated due to the lack of observed release and because the inclusion of this pathway would not significantly affect the site score (Ref. 2).

2.0 HRS STATE DOCUMENTATION RECORD – SITE SUMMARY

Name of Site: Moss Lake Road Groundwater Site **Date Prepared:** June 2010

Site Owner: Not Applicable (N/A)

Location of Site: Groundwater Plume Underlying Moss Lake Road

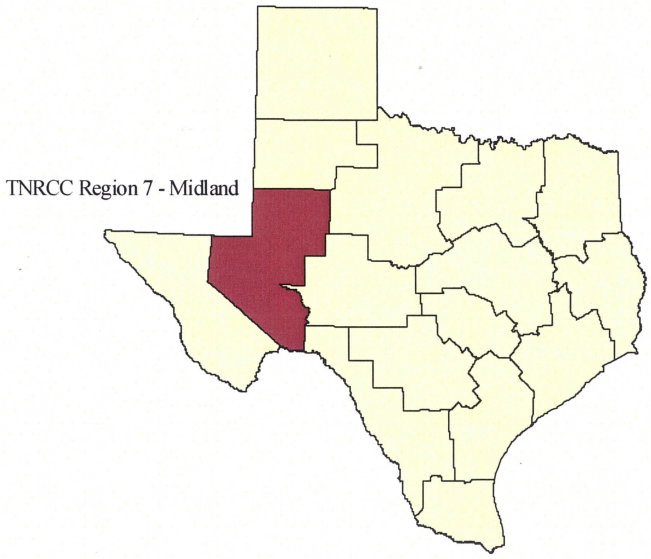
City, County, State: Big Spring, Howard County, Texas

General Location in the State: (see below and Figure 1: Site Location Map)

Topographic Map(s): U.S. Geological Survey 7.5 Minute Topographic Map, Big Spring North Quadrangle, 1978 and Coahoma Quadrangle, 1991

Latitude: 32.278972° North **Longitude:** 101.371755° West

TCEQ Region: 7

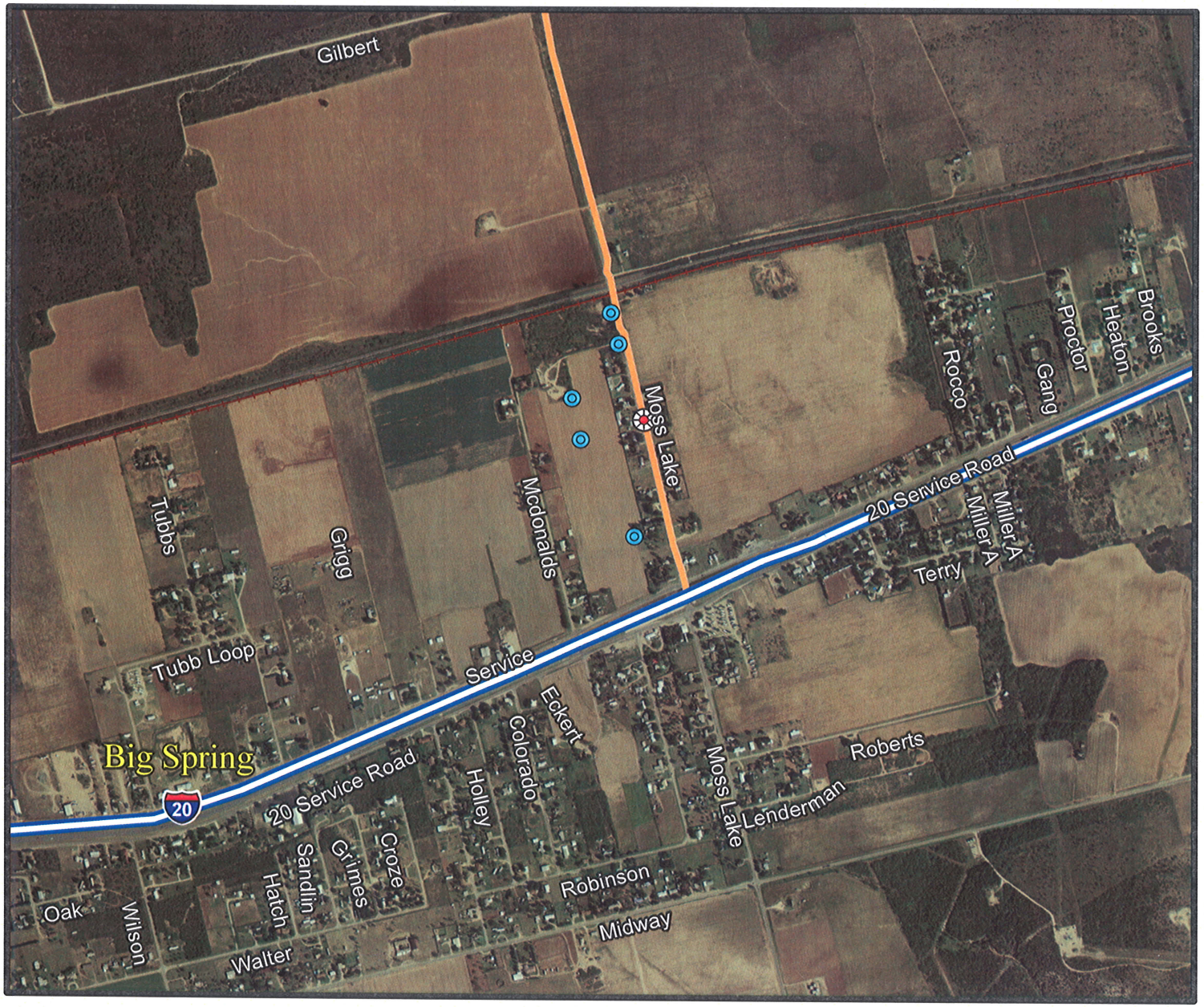


Site Scoring Summary

Groundwater Migration Pathway – 26.98
Surface Water Migration Pathway - NS
Soil Exposure Pathway - NS
Air Migration Pathway - NS
(NS - Not Scored)

HRS Site Score: 13.49

Figure 1: Site Location Map



0 0.25 0.5 0.75 1 1.25 1.5 1.75 Miles

The base data set is UTM Zone 14, 0.5 Meter Resolution, Natural Color, NAD 1983

N W E S

TCEQ

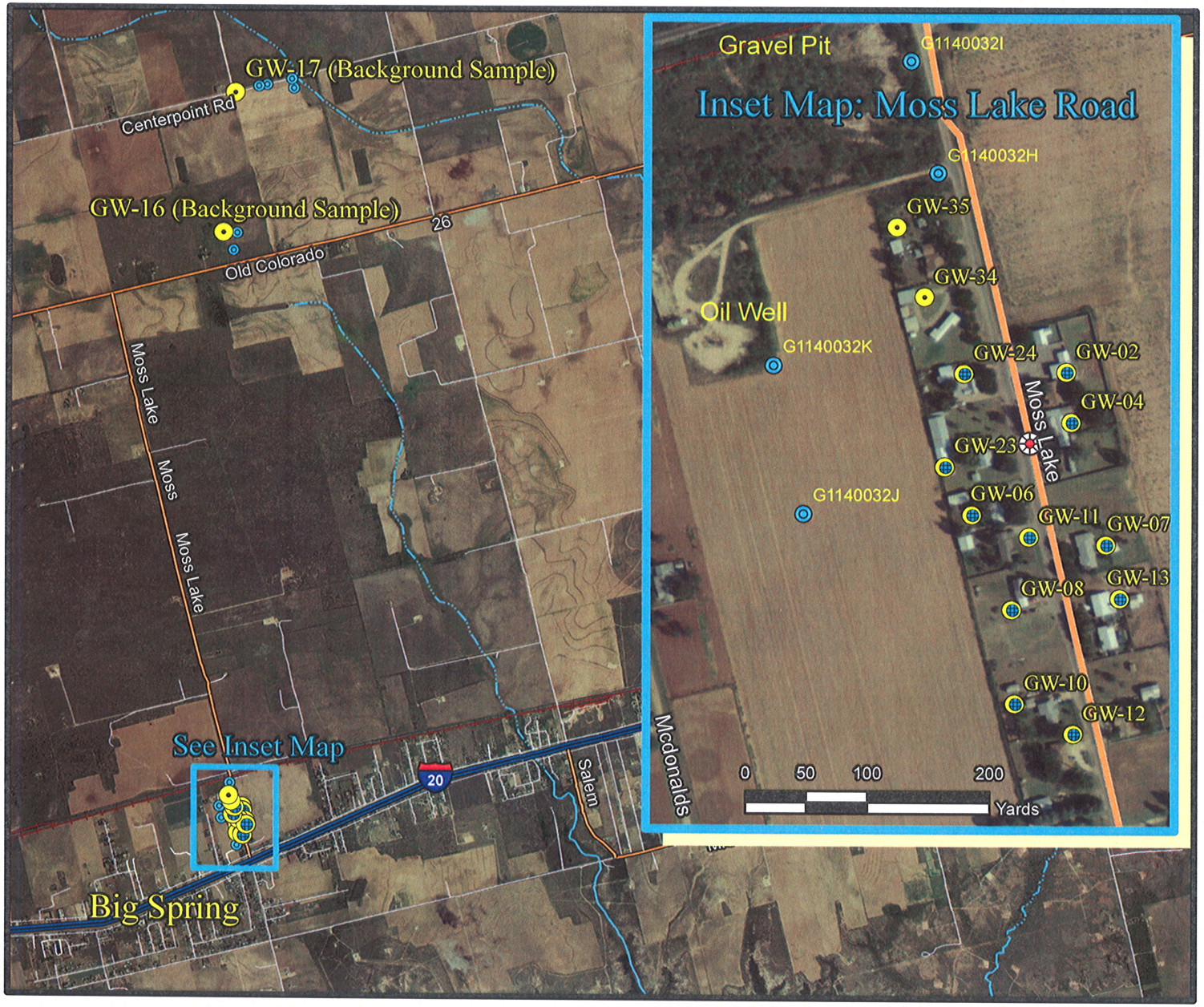
Moss Lake Road Groundwater Plume
Big Spring, Texas
Howard County
TXN000606838

Legend

- Site Center
- PWS ID 1140032 Wells

This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. It is intended for illustrative or informational purposes only, and is not suitable for legal, engineering, or survey purposes. This map does not represent an on-the-ground survey conducted by or under the supervision of a registered professional land surveyor. In cases where property boundaries are shown, it only represents their approximate relative location. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Remediation Division at 800-633-9363.

Figure 2: Site Features Map



0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5
Miles

The base data set is UTM Zone 14, 0.5 Meter Resolution, Natural Color, NAD 1983

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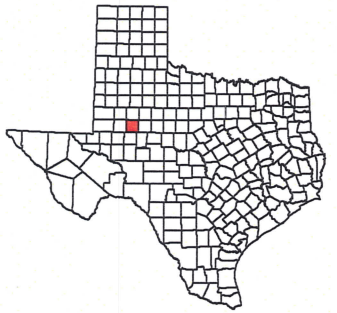
TCEQ

Moss Lake Road Groundwater Plume
Big Spring, Texas
Howard County
TXN000606838

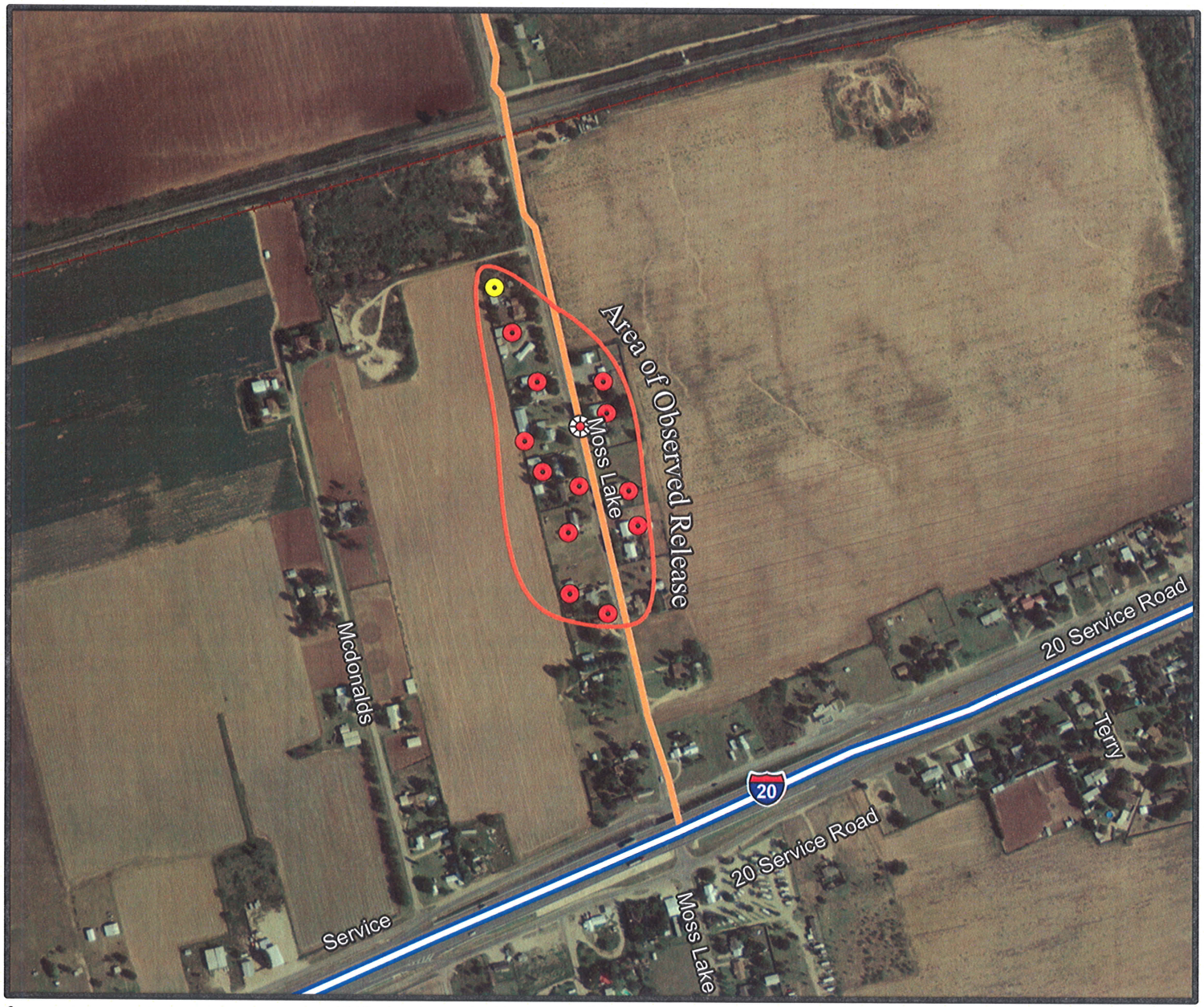


Legend

- Site Center
- Public Water Supply Wells
- Groundwater Well
- Filtered Groundwater Well

This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. It is intended for illustrative or informational purposes only, and is not suitable for legal, engineering, or survey purposes. This map does not represent an on-the-ground survey conducted by or under the supervision of a registered professional land surveyor. In cases where property boundaries are shown, it only represents their approximate relative location. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Remediation Division at 800-633-9363.

Figure 3: Source Area Map



The base data set is UTM Zone 14, 0.5 Meter Resolution, Natural Color, NAD 1983

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TCEQ

Moss Lake Road Groundwater Plume
Big Spring, Texas
Howard County
TXN000606838

Legend

- Site Center

Observed Release of Tetrachloroethene

- Level I Concentration
- Level II Concentration

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3.0 SITE SUMMARY

General Description of the Site

The site is a PCE groundwater plume of unknown source (site) located four (4) miles east of the city limits of Big Spring in Howard County, Texas (Figure 1: Site Location Map). The site is underlying North Moss Lake Road, north of Interstate 20 in a predominantly residential/agricultural area (Figure 2: Site Features Map). In the vicinity of the site, the groundwater is used primarily for drinking and irrigation. The static groundwater levels are at a depth of approximately 40 feet (Ref. 4, pp. 4 and 22). Groundwater ingestion by residents from private drinking water wells represents the most significant risk to human health (Ref. 4, p. 9).

Based on sample results, thirteen domestic water wells have been identified as having PCE concentrations above background levels and are identified as wells of concern (Tables 1 and 2). All of these wells of concern draw from the Ogallala Aquifer (Ref. 4, p. 5). Eleven of the wells are identified as primary source domestic drinking water wells (Ref. 4, p. 9; Ref 28, pp. 1-5); two of the wells were irrigation wells. The Public Water System (PWS) ID 1140032 groundwater wells impacted by PCE are no longer in use (Ref. 14, p. 1).

Site History

- A June 5, 2007 letter from TCEQ notified the Sid Richardson Carbon Company (SRCC) that the results of samples, collected during the May 14, 2007 quarterly sampling event of the PWS ID 1140032, confirm PCE contamination of the groundwater (Ref. 5, pp. 1-2). The PWS consists of thirteen public water supply wells and is leased by the SRCC (Ref. 12, pp. 3-5). The groundwater from these wells is blended in a 6,000 gallon holding tank at the SRCC facility (Ref. 7, p. 6). This PWS serves a population of 75 employees at the SRCC facility (Ref. 12, p. 1). Nine of the groundwater supply wells for the PWS were sampled during the May 14, 2007 quarterly sampling event. The PCE was detected only in well SRCC-17 (also known as G1140032J). The concentration of PCE measured in that well was 9.08 microgram/liter (µg/L) (Ref. 5, p. 1). The federal maximum contaminant limit (MCL) for PCE is 5µg/L (Ref. 3, p. 1). The SRCC-17 well was removed from service, and based on subsequent sampling events, wells, SRCC-15 and 18 (also known as G1140032H and K, respectively) have been removed from service (Ref. 14, p. 1).

- On August 7, 2007, a Pre-CERCLIS field investigation was conducted to inspect the area and locate potential sources of contamination (Ref. 6, pp. 1-12; Ref. 8, pp. 3-7). The SRCC facility was located three miles to the west of the SRCC-17 well. No commercial or industrial business was located within ¼ mile of SRCC-17 (Ref. 6, pp. 1-12; Ref. 7, pp. 1-6). The locations of historical or current commercial or industrial activities within ¼ mile of SRCC-17 included an operating oil well pump station, active auto body repair activities conducted on a residential property located on North Moss Lake Road, and an inactive gravel pit; these activities were identified as potential sources of contamination (Ref. 7, pp. 1-6).

- November 2007, a TCEQ sampling event was conducted in the vicinity of SRCC-17. Groundwater samples were collected from thirteen residential wells. The PCE concentration measured in six of those sampled wells exceeded the MCL of 5 ug/L for PCE. The TCEQ notified the residents using water from those six wells and installed a granulated activated carbon (GAC) water filtration system at each residence (Ref. 6, pp. 13-21; Ref. 9, p. 1; Ref. 10, pp. 11-31).

- December 2007, a TCEQ sampling event was conducted by a TCEQ contractor to sample the GAC water filtration systems at the six residences to confirm treatment effectiveness of the filter systems (Ref. 11, pp. 1-16). No new GAC water filtration systems were installed based on the sample results generated during this event.

- February 2008, a TCEQ sampling event expanded the sample area to include residences south of the groundwater plume (Ref. 6, pp. 22-37). No new GAC water filtration systems were installed based on the sample results generated during this event.

- On February 29, 2008, a Preliminary Assessment (PA) report for the site was submitted to the EPA for review to determine if the site would be eligible for a Site Inspection (SI) (Ref. 13, pp. 1-21). EPA authorized an SI for the site.

- June 23-27, 2008, the TCEQ sampled eight private water wells, four irrigation wells, and three SRCC PWS wells at the Moss Lake Road Groundwater site as part of the SI (Ref. 20, pp. 13-18; Ref. 21, pp. 13-23). The purpose of this investigation was to document the release(s) or potential release(s) of hazardous substances from identifiable sources which may have migrated off-site (Ref. 20, p. 8). Six of the eight private water wells were previously sampled in November and December 2007; the other two wells were at two residences not previously sampled. In addition to the groundwater samples collected, three soil samples were collected from two potential sources of contamination: 1) stained soil by the oil well pump jack station located in the field west of North Moss Lake Road and 2) soil at the front and back of the auto body repair shop building on North Moss Lake Road (Ref. 21, pp. 24-27). The groundwater sample results confirmed the presence of PCE in the eight residential wells, two of the four irrigation water wells, and one of the three SRCC PWS wells; all of these wells are located within ¼ mile of SRCC-17 (Ref. 21, pp 20-23; Table 2). No hazardous substance was detected in the soil samples, therefore, no observed release was documented for the soil pathway (Ref. 21, pp. 24-27). Data review and validation for this event are included as References 17 and 19. TCEQ notified the residents, using groundwater from the two additional private wells with concentrations of PCE exceeding the MCL, and installed GAC water filtration systems at those residences (Ref. 9, p. 1).

- September 2008, the TCEQ conducted a sampling event in the vicinity of the known impacted PWS well and domestic water wells. TCEQ notified residents, using groundwater from three additional wells with concentrations of PCE exceeding the MCL, and installed GAC water filtration systems at those residences (Ref. 6, pp. 69-92; Ref. 9, p. 1). During this sampling event, the TCEQ also collected surface soil samples at depths of six inches below ground surface from the gravel pit, a potential source area north of the site (Ref. 6, pp. 69 and 85-92, Ref. 37, pp. 9 and 13). PCE was detected in all three soil samples collected from the gravel pit potential source area at concentrations ranging from 0.74 to 1.3 µg/kg (Ref. 38, pp. 30-37).

- On February 2, 2009, the TCEQ sampled twelve private water wells, four irrigation wells, one SRCC PWS well, and several GAC water filtration systems at the Moss Lake Road Groundwater site (Ref. 6, pp. 93-117). The purpose of the sampling event was to document the potential migration of the PCE plume and monitor the effectiveness of household GAC water filtration systems (Ref. 24; pp. 5-9). The sampling event was conducted according to the field sampling

plan (FSP) and supplemental FSP included as References 23 and 24. No new GAC water filtration systems were installed based on the event results; sample results indicated that the GAC water filtration systems are effective at the site (Ref. 22, pp. 23-74).

- November 12, 2009, the EPA issued recommendation to TCEQ indicated that the site did not meet NPL criteria and deferred the site to the State of Texas for additional investigation (Ref. 25, pp. 1-2).

- The QAPPs, as amended and applicable to the sampling events discussed above, are:

    1. the Preliminary Assessment/Site Inspection Program QAPP for the SI sampling event (Ref. 26); and
    2. the Superfund Quality Assurance Project Plan (QAPP) for TCEQ state sampling events (Ref. 27).

4.0 GROUNDWATER PATHWAY

General Considerations

Average annual precipitation for Howard County is 15-20 inches per year (Ref. 29, p. 2). The soil overlying the site is Amarillo loamy fine sand of low relief. The soil typically has a profile of loamy eolian deposits up to 80 inches below ground surface. The soil is well drained with moderately high to high permeability (Ref. 30, pp. 1-4).

The groundwater migration pathway was evaluated for the site groundwater PCE plume of unknown source. An observed release to the groundwater was established by chemical analysis, see Tables 1 and 2. Level I and Level II concentrations were evaluated during the investigation. Level I is the concentration above a benchmark and Level II is the concentration above the background, but below the benchmark.

The aquifer impacted by the Moss Lake Road Groundwater site is the Ogallala (Ref. 4, p.5). To understand the hydrogeologic or aquifer characteristics of the Ogallala, the geologic strata that compose the aquifer are described first. A description of the hydrogeologic or aquifer characteristics of the various formations and the geologic stratum follows.

From a county wide perspective, Howard County is at the intersection of three physiographic sections: The Edwards Plateau, The Llano Estacado or High Plains, and the Osage Plains. The Edwards Plateau and the Llano Estacado belong to the Great Plains Province and the Osage Plains to the Central Lowland Province (Ref. 33, p. 10). The Edwards Plateau is capped by resistant limestones of the Fredericksburg Group (Lower Cretaceous age). These limestones are underlain by the Trinity sandstones of basal Lower Cretaceous age. The High Plains are underlain in most places by a varying thickness of silt, clay, sand, and gravel, chiefly of Tertiary age. The Osage Plains are underlain by Triassic age red beds, the Dockum Group. These red beds underlay all sections in Howard County and are underlain by Permian age rocks (Ref. 33, p. 6). The site lies completely in the High Plains portion of Howard County, thus the Cretaceous beds have been largely removed by erosion (Ref. 33, p.15; Ref. 34, p. 20). The Ogallala Formation of Tertiary age forms the aquifer used as a primary source of domestic water by residents on

North Moss Lake Road. Below is a detailed description of the geologic strata, from youngest to oldest, that underlie the immediate vicinity of the North Moss Lake Road area.

Geologic Stratum 1: Quaternary (Post Ogallala Sediments)

Post-Ogallala sediments consist primarily of windblown (eolian) sand and silt, alluvium, and lucustrian deposits (playa lake deposits). Eolian sands occupy the largest surface area of the High Plains of Texas and are of both Pleistocene and Recent (Holocene) age. They are primarily fine-grained to silty, sometimes calcareous, and are derived from lacustrine, fluvial, and eolian deposits. These sands and silts form sheet or cover sand, dunes, and dune ridges with thicknesses generally ranging from 0 to 10 feet (Ref. 34, p. 33).

At the site, the surface and shallow subsurface deposits attributed to eolian or lucustrian deposits are typically encountered from the surface to a depth of about 4 to 6 feet. The deposits are typically brown sand, sandy silts, and silty sands (Ref. 4, pp. 36, 53, and 92).

Geologic Stratum 2: Caliche

Caliche deposits underlie much of the surface of the Southern High Plains of Texas, and typically separate the Ogallala Formation from overlying eolian sediments of Pleistocene and Recent age deposits. Near the surface of much of the Texas High Plains are layers of resistant caliche known as "caprock". Caliche occurs in both Ogallala and post-Ogallala sediments and is formed by the leaching of carbonate and silica from surface soils and the redeposition of the dissolved minerals layers below the surface. Although caliche layers occur primarily near the surface, deeper zones of caliche are also present (Ref. 34, p. 28).

At the site, significant caliche horizons are typically encountered near the ground surface in the soils at approximately 4 to 18 feet below ground surface (Ref. 4, pp. 36, 53, and 92).

Geologic Stratum 3: Ogallala Formation

The Ogallala Formation of late Miocene/Pliocene age unconformably overlies the Triassic red beds (Ref. 33, p. 30). Ogallala sediments consist primarily of fine- to coarse-grained elastics from the southern Rocky Mountains to the west (Ref. 34, p. 13). However, erosion has completely isolated the formation so that the segment in the Southern High Plains is cut off in all directions (Ref. 35, p. 3). The sands are generally tan, yellow, or reddish brown, medium- to coarse-grained, moderately- to well-sorted, unconsolidated quartz grains, interbedded with thin layers of clay and occasionally sandstone. Gravel commonly occurs in layers in the basal section of the Ogallala Formation and ranges in size from boulders to pea size. The gravel is usually associated with sand, silt, and clay and is occasionally cemented. The gravel is composed largely of limestone pebbles, although quartz pebbles are always present and in some places are observed at a greater proportion than the limestone pebbles (Ref. 33, pp. 30-31; Ref. 34, p. 27).

Hydrogeologic Properties: Saturated intervals of the Ogallala Formation are typically confined to coarser-grained sediments and are therefore only a percentage of the total formation thickness. As stated above, the disconnected nature of the formation allows for the conclusion that precipitation is the sole source of recharge. Groundwater is generally under water-table conditions and flows to the southeast with an average slope of 10 feet per mile (Ref. 35, pp. 3-4).

At the site, sediments attributed to the Ogallala Formation are typically encountered from approximately 5 feet to 64 feet below ground surface. These deposits are primarily sands, clays and gravel deposits. Often, the bottom confining layer will have red clay to mark the top of the Dockum Formation (Ref. 33, pp 20-21; Ref. 4, pp. 36, 53, and 92).

Geologic Stratum 4: Dockum Group (Triassic Red Beds)

During the late Triassic time, Paleozoic rocks were eroded from the surrounding high ground and redeposited in low-lying fluvial, deltaic, and lacustrine environments as red beds of the Dockum Group (Ref. 36, pp. 14-16). The Upper Dockum Group is comprised of the Trecovas, Santa Rosa, and the uppermost Chinle formation which underlies the Ogallala formation. The Chinle Formation consists of up to 600 feet of red, blue, and reddish brown clays and shales (Ref. 34, p. 22).

Hydrogeologic properties: As the Dockum Group consists largely of shale, it is too impermeable to yield much water. The small amount of water produced from the Dockum Group is usually too mineralized for domestic use (Ref. 33, p. 36).

At the site, the Chinle Formation of the Dockum Group is typically encountered below the Ogallala Formation at approximately 35 to 65 feet below ground surface depending on site specific geology (Ref. 33, pp 17-18; Ref. 4, pp. 36, 53, and 92).

5.0 OBSERVED RELEASE TO GROUNDWATER

An observed release was documented to the groundwater pathway for the site by chemical analysis. To establish an observed release by chemical analysis at a groundwater plume site with no identified source requires documenting that the concentration of at least one hazardous substance in the groundwater plume is significantly increased (three times) above its background level, or greater than its own sample quantitation limit (SQL) (Ref. 1, Sections 2.3 and 3.1.1).

Background Groundwater Samples

Two wells completed in the Ogallala Aquifer and up gradient of the groundwater plume or outside of the suspected groundwater plume area have been designated as background well locations. The background samples were collected from these two wells. All samples were collected according to the June, 2008 EPA approved *Site Inspection Work Plan for the Moss Lake Road Ground Water Plume* (Ref. 20, pp. 16-22; Ref. 26, pp. 30-51). The background sample locations are illustrated in Figure 2, and the samples collected from these locations are described in Table 1. All referencing of field notebooks, photographic logs, water use, well depth, and analytical results is included in the references column of Table 1.

TABLE 1: BACKGROUND GROUNDWATER SAMPLES FOR TETRACHLOROETHENE (PCE)

Sample ID	Sample Location	Well Depth (feet bgs)	PCE Conc. (µg/L)	RL/ SQL (µg/L)	Date Collected	References
GW-16	SRCC PWS ID G1140032F 3 miles up-gradient on County Hwy 26.	105	U	0.5	6/25/2008	Ref. 6, p. 59; Ref. 14, p. 4; Ref. 16, p. 13; Ref. 18, p. 100
GW-17	SRCC PWS ID G1140032J 3 miles up-gradient on Centerpoint Rd.	120	U	0.5	6/25/2008	Ref. 6, p. 60; Ref. 14, p. 4; Ref. 16, p. 13; Ref. 18, p. 62

Table Notes:
MCL for PCE = 5 µg/L (Ref 3, p. 1)
SCDM Benchmark = 1.6 µg/L (Ref 3, p. 1)
U = Non-detect
bgs = Below Ground Surface
RL = Reporting Limit for EPA Region 6 Laboratory, June 2008 SI Sampling Event
SQL = Sample Quantitation Limit for Environmental Chemistry Services, February 2009 Sampling Event

Observed Release to Groundwater: Tetrachloroethene (PCE)

For the site, an observed release of PCE to the groundwater pathway has been documented by chemical analysis (Table 2). PCE was detected in release samples collected from groundwater wells located in the suspected plume area. The range of PCE concentrations measured in the release samples is presented in Table 2. PCE was not detected in any background sample and the sample quantitation limit was 0.5 u/L as presented in Table 1. According to the decision criteria for the Hazard Ranking System, an observed release is documented, because PCE is not detected in any background sample, and the concentration of PCE measured in one or more of the release samples is equal to or greater than the release sample quantitation limit and is greater than the background sample quantitation limit, and the source is unknown (Tables 1 and 2). No attribution of PCE to the site is required, because the site is a contaminated groundwater plume (Ref. 1, Sections 2.2.3 and 3.1.1).

Level I concentrations of PCE were found in release samples collected from twelve well locations: GW-02, GW-04, GW-06, GW-07, GW-08, GW-10, GW-11, GW-12, GW-13 (previously labeled GW-09), GW-23, GW-24, and GW-34. These wells are established drinking water wells that serve as the sole source of drinking water for the population in proximity to the PCE plume (Ref. 4, p. 9). A Level II concentration was found at one sample location (Table 2).

Table 2 includes the samples meeting the observed release criteria for PCE at Level I and Level II concentrations. All referencing of field notebooks, photographic logs, water use, well depth, and analytical results is included in the references column of Table 2. Level I and II observed release sample locations are presented in Figures 2 and 3.

TABLE 2: OBSERVED RELEASES FOR TETRACHLOROETHENE (PCE)						
Sample ID	**Sample Location**	**Well Depth (feet bgs)**	**PCE (µg/L)**	**RL/ SQL (µg/L)**	**Date Collected**	**References**
Level I Concentrations						
GW-02	404 North Moss Lake Road	60	333.0	12.5	6/24/2008	Ref. 6, p. 51; Ref. 16, p. 1; Ref. 18, p. 18; Ref. 28, p. 4
			14.99	0.06	2/3/2009	Ref. 6, pp. 111-112; Ref. 22, p. 69
GW-04	402 North Moss Lake Road	67	29.02	0.06	2/3/2009	Ref. 4, pp. 22, 61-62; Ref. 6, pp. 109-110; Ref. 16, p. 2; Ref. 22, p. 65
GW-06	309 North Moss Lake Road	62-64	61.7	0.5	6/24/2008	Ref. 6, p. 48; Ref. 16, pp. 3-4; Ref. 18, p. 24; Ref. 28, p. 2
			37.55	0.06	2/3/2009	Ref. 6, p.113-114; Ref. 22, p. 75
GW-07	304 North Moss Lake Road	80	24.3	0.5	6/24/2008	Ref. 6, p. 47; Ref. 16, pp. 4-5; Ref. 18, p. 44; Ref. 28, p. 1
			19.27	0.06	2/2/2009	Ref. 6, p.93-94; Ref. 22, p. 25
GW-08	305 North Moss Lake Road	60	81.3	1.0	6/24/2008	Ref. 4, pp. 22, 47-49; Ref. 6, p. 55; Ref. 15, pp. 14-15; Ref. 18, p. 94
			59.70	0.12	2/2/2009	Ref. 6, p. 99-100; Ref. 22, p. 37
GW-10	207 North Moss Lake Road	Not specified, Ogallala Aquifer	50.39	0.06	2/2/2009	Ref. 4, p. 5; Ref. 6, p. 101-102; Ref. 15, pp. 11-12; Ref. 22, p. 43
GW-11	307 North Moss Lake Road	62	64.4	0.5	6/24/2008	Ref. 4, pp. 22, 63-64; Ref. 6, p. 46; Ref. 16, pp. 5-6; Ref. 18, p. 30
			45.05	0.06	2/3/2009	Ref. 6, pp. 103-104; Ref. 22, p. 49
GW-12	203 North Moss Lake Road	Not specified, Ogallala Aquifer	14.35	0.06	2/2/2009	Ref. 4, p. 5; Ref. 6, pp. 95-96; Ref. 15, pp. 4-5; Ref. 22, p. 29
GW-13 (GW-09)	300 North Moss Lake Road	65	67.52	0.12	2/2/2009	Ref. 4, pp. 22, 50-59; Ref. 6, pp. 97-98; Ref. 15, pp. 10-11; Ref. 22, p. 33

TABLE 2: OBSERVED RELEASES FOR TETRACHLOROETHENE (PCE)						
Sample ID	**Sample Location**	**Well Depth (feet bgs)**	**PCE (µg/L)**	**RL/ SQL (µg/L)**	**Date Collected**	**References**
GW-23	401 North Moss Lake Road	67	21.7	0.5	6/24/2008	Ref. 6, p. 49; Ref. 16, pp. 7-8; Ref. 18, p. 6; Ref. 28, p. 3
			51.94	0.06	2/3/2009	Ref. 6, pp. 105-106; Ref. 22, p. 53
GW-24	405 North Moss Lake Road	Not specified, Ogallala Aquifer	33.25	0.06	2/3/2009	Ref. 4, p. 5; Ref. 6, pp. 107-108; Ref. 16, pp. 8-9; Ref. 22, p. 59
GW-34	501 North Moss Lake Road	60	2.68	0.06	2/3/2009	Ref. 6, p. 115; Ref. 16, p. 10; Ref. 22, p. 77, Ref. 28, p. 5
Level II Concentrations						
GW-35	503 North Moss Lake Road	Not specified, Ogallala Aquifer	0.43	0.06	2/3/2009	Ref. 4, p. 5; Ref. 6, p. 116; Ref. 16, p. 11; Ref. 22, p. 79

Table Notes:
MCL for PCE = 5 µg/L (Ref 3, p. 1)
SCDM Benchmark = 1.6 µg/L (Ref 3, p. 1)
bgs = Below Ground Surface
RL = Reporting Limit for EPA Region 6 Laboratory, June 2008 SI Sampling Event
SQL = Sample Quantitation Limit for Environmental Chemistry Services, February 2009 Sampling Event

6.0 WORKSHEET FOR HRS SITE SCORE

Name of Site: Moss Lake Road Groundwater Site

City, County, State: Big Spring, Howard County, Texas

EPA ID Number: TXN000606838

	S pathway	S^2 pathway
Groundwater Migration Pathway Score (S_{gw})	26.98	727.9204
Surface Water Migration Pathway Score (S_{sw})	*	*
Soil Exposure Pathway Score (S_s)	*	*
Air Migration Score (S_a)	*	*
$S^2_{gw} + S^2_{sw} + S^2_s + S^2_a$		727.9204
$(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)/4$		181.9801
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)/4}$		13.49

Table notes
S = Numeric value
✳ = Pathways not assigned a score. The surface water, soil exposure, and air migration pathways were not evaluated due to the lack of observed releases and/or because the inclusion of these pathways would not significantly affect the site score.

7.0 GROUNDWATER MIGRATION PATHWAY SCORESHEET

Factor categories and factors	Maximum Value	Value Assigned	
Aquifer Evaluated: Ogallala			
Likelihood of Release to an Aquifer:			
1. Observed Release (Ref. 1, Section 3.1.1; Tables 1 and 2)	550	550	
2. Potential to Release:			
2a. Containment	10		
2b. Net Precipitation	10		
2c. Depth to Aquifer	5		
2d. Travel Time	35		
2e. Potential to Release [lines 2a(2b + 2c + 2d)]	500		
3. Likelihood of Release (higher of lines 1 and 2e)	550		550
Waste Characteristics:			
4. Toxicity/Mobility (Ref. 1, Table 3-9, Ref. 3, p. 1; COC = PCE)	(a)	100	
5. Hazardous Waste Quantity (Ref. 1, Table 2-6; Level I = 100)	(a)	100	
6. Waste Characteristics (Ref. 1, Table 2-7)	100		10
Targets:			
7. Nearest Well (Ref. 1, Table 3-11; Level I at nearest well)	(b)	50	
8. Population: (Ref. 1, Table 3-12 and Section 3.3.2, Ref. 31, p. 1; 2.53 people/household census average)			
8a. Level I Concentrations (Table 2; Ref 28, pp. 1-5) Calculation: [(7 households X 2.53) + (15 population from Well Surveys)] X 10	(b)	327.1	
8b. Level II Concentrations (Table 2; 1 household X 2.53 X 1)	(b)	2.53	
8c. Potential Contamination	(b)		
8d. Population (lines 8a + 8b + 8c)	(b)	329.63	
9. Resources (Ref. 1, Section 3.3.3; Irrigation of fields)	5	5	
10. Wellhead Protection Area (Ref. 1, Section 3.3.4; Ref. 32, pp.1-2; PWS wells have wellhead protection area)	20	20	
11. Targets (lines 7 + 8d + 9 + 10)	(b)		404.63
Groundwater Migration Score for an Aquifer:			
12. Aquifer Score [(lines 3 x 6 x 11)/82,500][c]	100		26.975333
Groundwater Migration Pathway Score:			
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)[c]	100		26.975333

[a] Maximum value applies to waste characteristics category
[b] Maximum value not applicable
[c] Do not round to nearest integer

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