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Final Work Plan: Investigation of Potential Contamination at the Former USDA Facility in Ramona, Kansas

prepared by
Environmental Research Division
Argonne National Laboratory

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by
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Notation

AGEM	Applied Geosciences and Environmental Management
BGL	below ground level
BTEX	benzene, toluene, ethylbenzene, and xylene
°C	degree(s) Celsius
CAS	Corrective Action Study
CCC	Commodity Credit Corporation
1,2-DCA	1,2-dichloroethane
EPA	U.S. Environmental Protection Agency
ft	foot (feet)
g	gram(s)
h	hour
HSA	hollow-stem auger
in.	inch(es)
KDHE	Kansas Department of Health and Environment
LUST	Leaking Underground Storage Tank
µg/L	microgram(s) per liter
MCL	maximum contaminant level
µg/kg	microgram(s) per kilogram
$\mu g/m^3$	microgram(s) per cubic meter
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
mi	mile(s)
PEL	permissible exposure limit
ppmv	part(s) per million by volume
PVC	polyvinyl chloride
RWD	Rural Water District
TDC	top of casing
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
VOC	volatile organic compound

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1 Introduction

This *Work Plan* outlines the scope of work that will be conducted to investigate the subsurface contaminant conditions at the property formerly leased by the Commodity Credit Corporation (CCC) in Ramona, Kansas (Figure 1.1). Data obtained during this event will be used to (1) evaluate potential source areas on the property, (2) determine the vertical and horizontal extent of potential contamination, and (3) provide recommendations for future actions, with the ultimate goal of assigning this site *No Further Action* status.

The planned investigation includes groundwater monitoring requested by the Kansas Department of Health and Environment (KDHE), in accordance with Section V of the Intergovernmental Agreement between the KDHE and the Farm Service Agency of the United States Department of Agriculture (USDA). The work is being performed on behalf of the CCC/USDA by the Environmental Research Division of Argonne National Laboratory. Argonne is a nonprofit, multidisciplinary research center operated by the University of Chicago for the U.S. Department of Energy. Under the Intergovernmental Agreement, Argonne provides technical assistance to the CCC/USDA with environmental site characterization and remediation at former CCC/USDA grain storage facilities.

Argonne has issued a *Master Work Plan* (Argonne 2002) that describes the general scope of all investigations at former CCC/USDA facilities in Kansas and provides guidance for these investigations. The *Master Work Plan* was approved by the KDHE. It contains materials common to investigations at locations in Kansas and should be consulted for the complete details of plans for work associated with the former CCC/USDA facility at Ramona.

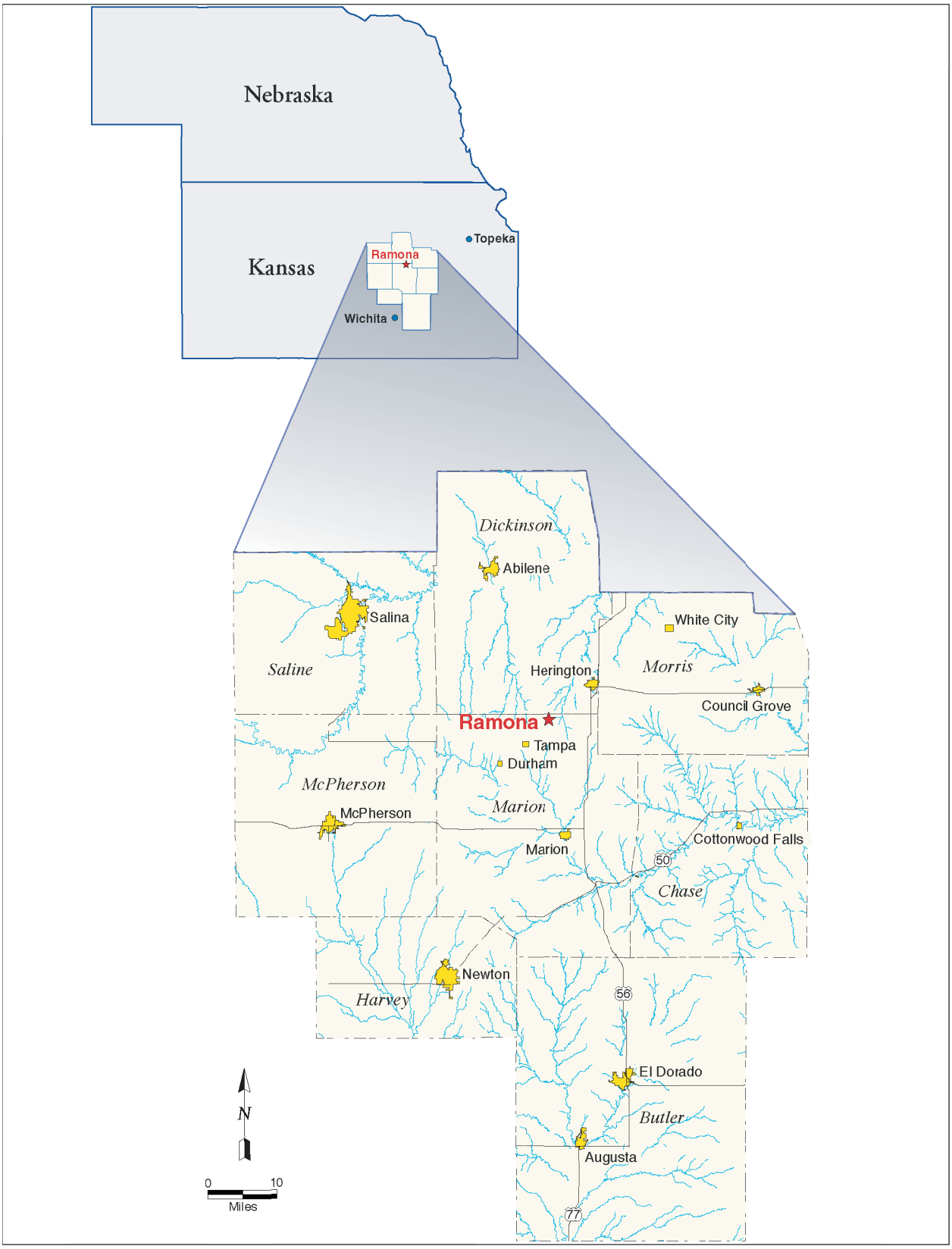

FIGURE 1.1 Location of Ramona, Kansas.

2 Background and History

2.1 Site Background

Ramona, Kansas, is a small rural town with 94 residents occupying 57 housing units (2000 Census). Located in the north-central portion of Marion County, Ramona is 104 mi southwest of Topeka, Kansas, in the SE 1/4, SE 1/4 of Section 2, Township 17 South, Range 3 East. Grain storage has occurred over the years at multiple locations in Ramona, including the former CCC/USDA facility, the facility operated by Agri Producers, Inc. (the co-op), and several privately owned locations along the east and south edges of Ramona. (Figure 2.1). The co-op operates on the Union Pacific Railroad right-of-way.

Ramona lies in the Flint Hills physiographic province, which is noted for its steep east-facing escarpments. Surface soils generally consist of silty clay loam underlain by shale of the Wellington Formation. The thickness of this shale ranges from 30 ft to 55 ft. Below the Wellington is interbedded limestone and shale associated with the Nolans Formation. The Nolans Formation, in turn, is underlain by shale of the Odell Formation. In the Ramona area the Nolans Formation is 21–26 ft thick, and the Odell shale is about 20–30 ft thick. Water-bearing zones in these consolidated formations supply adequate quantities of groundwater for domestic purposes.

Data from a previous investigation conducted by Argonne identified two aquifers underlying the Ramona area. The upper unit is composed of alternating thin beds of highly weathered shale, limestone, and dolomite. Water is probably produced from the fractures and fissures in these weak units. The confining layer that separates the upper and lower aquifers consists of weathered shale. This distinct layer, which is about 6–10 ft thick, was encountered at depths ranging of 48–65 ft BGL (below ground level). The lower unit is composed of alternating beds of shale, limestone, and dolomite; however, there is significantly less weathering than in the upper unit. The beds in the lower unit are thicker and harder than those in the upper unit and exhibit less fracturing. The thickness of the lower unit is about 10–20 ft.

The monitoring wells installed at Ramona are typically 38–53 ft deep. Exceptions are three wells installed by Argonne in 1994 to depths of 68, 84, and 83 ft BGL (SB01, SB02, and SB04, respectively). Monitoring wells SB04 and SB04A were plugged in 1997 at the request of the property owner. Private well depths are approximately 40–100 ft BGL. Depth to groundwater

is generally about 30–45 ft BGL. Static water level data collected during a site reconnaissance in March 2005 indicated that groundwater flow in the upper aquifer is toward the northwest to west (Figure 2.2).

The principal water source for Ramona residents is the Marion County Rural Water District (RWD) #1. This water supply source became available in September 1995 under an emergency grant from the Farmers' Home Administration. The water is delivered to Ramona via a connection to the RWD #1 water line in Tampa, Kansas, about 5 mi southwest of Ramona. Before the connection to RWD #1 was established, all Ramona residents used private water wells for their drinking water supply.

In November 2004, Argonne conducted a preliminary survey to determine which Ramona residences are not connected to RWD #1. Records of the KDHE and RWD #1 were reviewed, along with property ownership information from the Marion County, Kansas, appraiser's office. A list from the KDHE dated November 5, 2004, indicated that five residences were not connected to RWD #1 (KDHE 2004a). Cross-indexing of the customer list obtained from RWD #1 against property ownership records from Marion County suggested that 19 properties in Ramona were not on the RWD #1 customer list, including the 5 properties identified by the KDHE.

In September-October 2005, KDHE personnel conducted telephone research and a site visit to verify the status of the 19 properties. Table 2.1 summarizes the KDHE's findings. The KDHE personnel attempted to sample the 6 private wells in use for domestic consumption. Results for 5 of these wells are in Table 2.1. Access to the Elgin well was denied; it has historically had high nitrate levels (KDHE 2005). In the October 2005 sampling, the Werth lawn and garden well contained nitrate at 13 mg/L, above the maximum contaminant level (MCL) of 10 mg/L. Concentrations of carbon tetrachloride were below the MCL of 5 µg/L for that compound in all 5 wells sampled in October 2005.

TABLE 2.1 Ramona water source screening summary, as of October 4–5, 2005. Source: KDHE (2005).

Ramona Street Address	Well No.	Concentration in October 4-5, 2005, Sampling: Carbon Tetra-chloride (µg/L)	Chloro-form (µg/L)	Nitrate (mg/L)	Current Owner	Nonowner Resident or Contact	Former Owner	Status	Water Supply	Sampled
Addresses with inhabited residences or businesses; private wells in use for domestic consumption										
301 North C	13	2.3	0.55	4.2	Robert Thornhill			Inhabited	Has RWD meter but uses well water.	X
312 North C	19	< 0.50	< 0.50	0.35	Irene Beames		Robert Beames	Inhabited	Private well. Owner wants to be connected to RWD.	X
211 North D	59	8.0	1.5	4.4	Fire Dept.	Allen Bentz	Ramona Fire Dept.	Business	Private well used mostly for filling tanks.	X
201 East 3rd	12	—	—	—	Neil Elgin			Inhabited	Private well.	Refused
502 East 4th	35	1.4	< 0.50	5.8	Kathy Hermann		David Brunner, Olaf Hermann	Inhabited	Private well.	X
504 East 4th	42	0.68	< 0.50	13	Kathy Ann Werth		Richard Bowman	Inhabited	House on RWD. Private well sampled is used for lawn and garden purposes.	X
Addresses with RWD connections for domestic consumption										
309 North C	17				Titus and Mary Wingerd	Sheila Mercer	Boyd Coffey	Inhabited	House on RWD. Residents have considered connecting pump to shower.	
215 North D	None				Post Office	Kathy Werth		Business	Post Office on RWD.	
401 North D	None				Bed and Breakfast	Patricia Wick		Business	Facility on RWD.	
602 North D	44				Francis Hanschu		Clinton Hanschu	Inhabited	House on RWD.	
302 North E	39				Frank Sticka	Johnny Harold		Inhabited	House on RWD. Private well not functional.	

TABLE 2.1 (Cont.)

Ramona Street Address	Well No.	Concentration in October 4-5, 2005, Sampling: Carbon Tetra-chloride (µg/L)	Chloro-form (µg/L)	Nitrate (mg/L)	Current Owner	Nonowner Resident or Contact	Former Owner	Status	Water Supply	Sampled
Addresses with RWD connections for domestic consumption (Cont.)										
411 North E	33				Patricia Wick		Erich Utech Marie Hill	Uninhabited	House on RWD.	
1737 360th	52				Dennis Ryff			Inhabited	House on RWD.	
Addresses with no inhabitants and unknown water supplies										
311 North C	None				Jean Rymer			Uninhabited	Unknown.	
203 North D	None				Larry Miller			Storage	Unknown.	
507 North D	32				Jamie Floyd		Michelle Mock	Uninhabited	Unknown.	
Vacant lots with no water supplies										
XXX North B[a]	None				Robert Thornhill			Vacant lot	None.	
102 North B	None				Marion County			Vacant lot	None.	
410 North D[b]	None				Colin Baily			Vacant lot	None.	

[a] Lot/house number not assigned.

[b] Information from Argonne-CCC/USDA; not verified by KDHE.

2.2 Previous Investigations

2.2.1 Initial KDHE Groundwater Sampling in 1988–1989

Environmental investigations at Ramona began in November 1988 in response to a citizen's complaint to the KDHE about petroleum odors in a private drinking water well. At that time, the KDHE sampled one drinking water well (owned by A. Gonzalez). The carbon tetrachloride concentration in the groundwater sample from this well was 16.4 µg/L (KDHE 1993). Like the MCL, the Kansas Tier 2 risk-based screening level for carbon tetrachloride is 5 µg/L (KDHE 2003). Analysis of the sample also indicated the presence of 1,2-dichloroethane (1,2-DCA) at 1.2 µg/L.

The results of this initial sampling event prompted several investigations to determine the extent and source of the contaminants detected. To date, more than 300 groundwater samples have been collected from nearly 100 wells. Nitrates and numerous volatile organic compounds (VOCs) have been detected in many wells. The most persistent compounds are those related to petroleum products, as well as carbon tetrachloride and nitrates.

Shown in Figure 2.3 are the locations of previously sampled wells. Of the wells sampled, the locations of two (N. Applegate and J. Beaver) are uncertain. These locations will be determined or verified during field work. Table 2.2 summarizes the investigations and corrective actions conducted to date. All available construction details and water levels for the private and monitoring wells are in Table A.1, Appendix A. Complete historical analytical data for groundwater samples are in Appendix A, Table A.2. Analytical results for carbon tetrachloride, chloroform, nitrate, and benzene in groundwater samples collected in 1988–2004 are summarized in Figures 2.4, 2.5, 2.6, and 2.7, respectively.

In 1988 and 1989, the KDHE sampled 25 private wells (KDHE 1993). Carbon tetrachloride was detected in 17 of these wells; contaminant levels were above the MCL in 7 of the wells. The highest carbon tetrachloride concentration detected in 1988–1989 was 45.5 µg/L in the co-op well.

TABLE 2.2 History of work conducted at Ramona, Kansas.

Date	Description of Work	Reference
November 1988	KDHE sampling of 1 private well (A. Gonzales, owner). In addition to carbon tetrachloride (16.4 µg/L), 1,2-DCA was detected (1.2 µg/L).	KDHE 1993
December 1988 to January 1989	KDHE sampling of 25 private wells. Carbon tetrachloride was detected in 17 wells. Levels in 7 wells were above the MCL. The highest concentration detected was 45.5 µg/L in the co-op well.	KDHE 1993
June 1992	EPA removal assessment, Phase 1, with sampling of 59 private wells. VOCs were detected in 43. Carbon tetrachloride levels in 5 wells exceeded the MCL. The highest concentration was 188 µg/L in the co-op well.	KDHE 1993
September 1992	EPA removal assessment, Phase 2, with 32 soil samples collected (including 3 replicate samples). Only trace levels of carbon tetrachloride were detected near the CCC/USDA facility. Significantly higher levels were detected near the co-op. The occurrence of uncontaminated samples between these properties suggested independent carbon tetrachloride sources.	KDHE 1993
October 1992	EPA removal assessment, Phase 3, with groundwater sampling and residential air sampling at 3 residences. Carbon tetrachloride was detected at a level below permissible exposure limit (PEL) in 2 homes; benzene was detected at a level above the PEL in 1 home. The KDHE Tank Section conducted soil gas sampling to investigate the benzene contamination.	KDHE 1993
January 1993	Removal action. EPA and KDHE supplied carbon filter units to 7 homes and bottled water to City Hall. The CCC/USDA assumed responsibility for maintenance of the filters and bottled water.	KDHE 1993
March 1993	KDHE preliminary assessment, naming the co-op and the former CCC/USDA facility as likely sources of carbon tetrachloride contamination. Other sources identified include the former location of an underground storage tank system (for benzene) and general farming and feedlot practices (for nitrates).	KDHE 1993
June–August 1994	Argonne Expedited Site Characterization conducted for the CCC/USDA, with installation of 6 monitoring wells (SB01–SB05 and SB04A). Additional work was suspended because of denial of access to railroad property.	Argonne 2001
September 1995	Removal action. An emergency grant from the Federal Housing Administration to the City of Ramona funded connection of most residences to the Tampa Public Water Supply.	E&E 1996
April 1996	EPA preliminary assessment of previous data. No new data were generated.	E&E 1996
December 1996 to August 1998	KDHE CAS, Phase 1, with 21 private wells sampled. KDHE CAS, Phase 2, with soil and soil gas sampling and with groundwater samples collected from CCC/USDA wells and 5 private wells. KDHE CAS, Phase 3, with 2 additional monitoring wells installed. KDHE CAS, Phase 4, with sampling of new and existing monitoring wells.	Tetra Tech 1999a

TABLE 2.2 (Cont.)

Date	Description of Work	Reference
June 1999	KDHE sampling of 6 monitoring wells and 11 private wells being used for drinking water supply. No carbon tetrachloride was detected in any private well. Two monitoring wells contained carbon tetrachloride (MW01 at 8.2 µg/L and SB03 at 7.5 µg/L). Groundwater flow was determined to be to the southeast; however, measurements were collected from ground surface, rather than the tops of casings. Wells completed in both the upper and lower aquifers were used to determine flow direction.	Tetra Tech 1999b
April 2000	Initial event of KDHE long-term monitoring, with sampling of all monitoring wells. Two wells contained carbon tetrachloride (MW01 at 0.8 µg/L and SB03 at 48.5 µg/L). Groundwater flow was found to be to the northwest.	KDHE 2000
April 2001	KDHE long-term monitoring. CCC/USDA wells were sampled, but KDHE wells were dry. Only SB03 showed carbon tetrachloride (16.4 µg/L).	KDHE 2001
February 2002	KDHE long-term monitoring for nitrates only. Only SB05 had enough water to sample.	KDHE 2002
May 2002	KDHE Tank Section sampling of the Jim Brunner private well and 13 wells installed in 2001–2002 as part of the federal Leaking Underground Storage Tank (LUST) program, with analysis for BTEX (benzene, toluene, ethylbenzene, and xylene) compounds and other petroleum-related compounds.	Maxim, Inc., 2003
August 2002	KDHE Tank Section sampling of 13 monitoring wells for BTEX and other petroleum-related compounds.	Maxim, Inc., 2003
February 2003	KDHE Tank Section sampling of 12 monitoring wells for BTEX and other petroleum-related compounds.	Maxim, Inc., 2003
March 2003	KDHE long-term-monitoring sampling event. All wells were dry.	Geotechnical Services, Inc., 2004
June 2003	KDHE Tank Section sampling of 12 wells installed in 2001–2002 as part of the LUST program. Three wells contained carbon tetrachloride (1.5 µg/L, 4.9 µg/L, 9.2 µg/L).	Maxim, Inc., 2003
February 2004	KDHE long-term monitoring, with sampling of CCC/USDA and KDHE wells. KDHE wells were dry. Only SB03 contained carbon tetrachloride (22 µg/L).	Geotechnical Services, Inc., 2004
May 2004	KDHE Tank Section sampling of Brunner private well and 11 monitoring wells. Three monitoring wells contained carbon tetrachloride at 6.5 µg/L, 5.6 µg/L, and 1.1 µg/L. The Brunner well contained carbon tetrachloride at 0.56 µg/L.	KDHE 2004b

2.2.2 Environmental Protection Agency Removal Assessment in 1992

In 1992 the U.S. Environmental Protection Agency (EPA) conducted a removal assessment involving sampling of groundwater in 59 private wells, soil sampling at 15 locations, and air sampling in 3 homes (KDHE 1993).

Of the 59 private wells sampled, 32 contained detectable levels of carbon tetrachloride; 5 of these levels exceeded the MCL. The highest level of carbon tetrachloride found in this 1992 sampling event was 188 µg/L in a groundwater sample from the co-op well. No samples were collected subsequently from this well, because it was abandoned and plugged.

The 1992 soil samples (analyzed by a headspace method in an on-site laboratory) showed only trace carbon tetrachloride levels near the former CCC/USDA facility and significantly higher levels near the co-op (Figure 2.8 and Table B.1, Appendix B). No carbon tetrachloride was detected in two samples from the former CCC/USDA facility that were sent to an off-site laboratory for verification analyses, whereas significantly higher concentrations in two samples from the co-op were confirmed. The absence of carbon tetrachloride in samples collected between the properties suggested at least two independent contaminant sources. Complete historical analytical results for soil (and soil gas) samples are in Appendix B.

The residential air sampling revealed no carbon tetrachloride concentrations above the permissible exposure limit (PEL; see http://www.osha.gov/dts/chemicalsampling/toc/toc_chemsamp.html). In early 1993, carbon filter units for household water were supplied to seven homes, and bottled water was provided to City Hall.

2.2.3 KDHE Preliminary Assessment in 1992–1993

In its report for a preliminary assessment conducted in 1992–1993, the KDHE (1993) indicated that the likely sources for the carbon tetrachloride contamination were the co-op and the former CCC/USDA facility. The KDHE further identified the former gasoline station (Ramona Garage) as the likely source for benzene contamination (Table B.2, Appendix B) and general farming and feedlot practices as sources for nitrate contamination.

2.2.4 Sampling of Argonne Monitoring Wells Installed in 1994

Monitoring wells SB01, SB02, SB03, SB04, SB04A, and SB05, which were installed by Argonne for the CCC/USDA in 1994, have been sampled up to nine times (Table A.2, Appendix A). Only one of these wells, SB03, has shown detectable concentrations of carbon tetrachloride. This well is located across the street from the co-op. The concentrations detected have ranged from 7.5 µg/L to 48.5 µg/L. The most recent sampling event (February 2004) showed carbon tetrachloride in SB03 at 22 µg/L. During the 1994 investigation, Argonne made several attempts to obtain access to the former CCC/USDA facility and the railroad right-of-way that separates the co-op property from the former CCC/USDA facility. The property owners repeatedly denied all access. The lack of access prevented Argonne from completing its investigation of the carbon tetrachloride contamination.

2.2.5 Tetra Tech Corrective Action Study in 1996–1998

In late 1996 through 1998, Tetra Tech conducted a Corrective Action Study (CAS) for the KDHE (Tetra Tech 1999a). This work included the collection of groundwater samples from 21 private wells and all monitoring wells, a soil survey involving 12 soil gas samples and 22 soil samples, and the installation of 2 additional monitoring wells (MW01 and MW03). Tetra Tech attempted to install a third well (MW02) but was denied property access after drilling to a depth of 42 ft BGL. Tetra Tech subsequently plugged the borehole. Field notes and a photograph in the CAS indicate that soil cuttings from drilling activities were used as fill material for the basement of a house being built near Ramona. Well completion (WWC-5) records could not be located in the Kansas Geological Survey database for either MW01 or MW03.

Analyses of groundwater samples from the private wells showed carbon tetrachloride in seven wells at values ranging from “not detected” to 13 µg/L (Table A.2, Appendix A). Only one private well contained carbon tetrachloride at a level above the MCL. Furthermore, carbon tetrachloride was detected in groundwater samples from only one monitoring well: SB03. The concentrations in this well in two events were 27 µg/L and 30 µg/L.

In April 1997, Tetra Tech collected soil gas samples for VOCs analyses at the former CCC/USDA facility (4 locations), on the co-op property (5 locations) and along 2nd Street west of D Street (1 location) (Figure 2.9 and Table B.3, Appendix B), at depths of 8–20 ft BGL. These samples were analyzed in an on-site mobile laboratory.

The analytical results for soil gas samples collected on the former CCC/USDA facility property in April 1997 indicated at least trace concentrations of carbon tetrachloride in all samples and somewhat higher concentrations in samples GP-4-20 and GP-5-20. Initial, duplicate, and triplicate samples from these locations gave results of 5.1, 0.39, and 0.21 µg/L, respectively, for GP-4-20 and 0.73, 0.44, and 5.13 µg/L, respectively, for GP-5-20. The replicate results are significantly different from the initial analytical results. Furthermore, a review of the chromatograms for all of the soil gas analyses revealed several discrepancies in the analyses and interpretation of the data. Quality control problems associated with these analyses (including the apparent absence of laboratory blanks and inconsistent sampling methodology) are discussed further in Appendix B.

Four soil gas samples collected on the co-op property in April 1997 showed trace levels of carbon tetrachloride, and results for three samples were reported as "not detected" (Figure 2.9). (Two depths were sampled at two of the five co-op locations.) No replicates were analyzed for any of these samples. The result for the soil gas sample collected on 2nd Street west of D Street was reported as "not detected."

Three of the soil samples collected in April 1997 were analyzed for selected VOCs in an on-site mobile laboratory. Trace levels of carbon tetrachloride were reported in 2 samples: 1 from the former CCC/USDA facility and 1 from the co-op property (Table B.4, Appendix B). The soil sample from the former CCC/USDA facility in which carbon tetrachloride was detected by the on-site laboratory was also analyzed in a certified off-site laboratory; no carbon tetrachloride was detected. The remaining soil samples were analyzed by a certified off-site laboratory for nitrates (Table B.5). The nitrate levels ranged from 0.41 mg/kg to 17.1 mg/kg.

During installation of well MW01 in June 1998 at the former CCC/USDA facility, soil samples were collected for VOCs analyses, including carbon tetrachloride and chloroform, at depths of 5, 10, and 15 ft BGL. No reportable quantities of VOCs were detected in these samples (Table B.6, Appendix B).

2.2.6 Additional Groundwater Sampling by Tetra Tech in 1999

In June 1999 Tetra Tech conducted additional groundwater sampling in existing monitoring wells and selected private wells for the KDHE (Tetra Tech 1999b). The results

indicated no detectable concentrations of carbon tetrachloride in the private well samples and concentrations of 8.1 µg/L and 7.5 µg/L in samples from wells MW01 and SB03, respectively.

During this sampling event groundwater flow was reported to be in a southeasterly direction. The field notes indicate that static water levels were measured from the ground surface, not the top of casing (TOC). Survey data for each well represent the TOC elevation. Measurements made from any point except the TOC require correction to account for the elevation differences between the ground surface and TOC. The report gives no indication that such corrections were made to account for elevation differences between wells completed above grade (SB01, SB02, SB03, and SB05) and wells completed flush to the ground (MW01 and MW03). Furthermore, wells SB01 and SB02 are completed in the lower aquifer, while wells SB03, SB05, MW01, and MW03 are completed in the upper aquifer. These errors could account for the investigation's conclusion that groundwater flow was to the southeast, which is at odds with other findings.

2.2.7 Annual Monitoring by the KDHE, Starting in 2000

In 2000 the KDHE initiated a yearly monitoring program for the monitoring wells. The annual results have shown contaminant levels similar to those found in previous sampling events. In addition, some of the wells have been dry during one or more events: well MW01 has been dry since 2001, MW03 has been dry since 2002, SB01 and SB03 were dry in 2002 and 2003, and SB05 was dry in 2003.

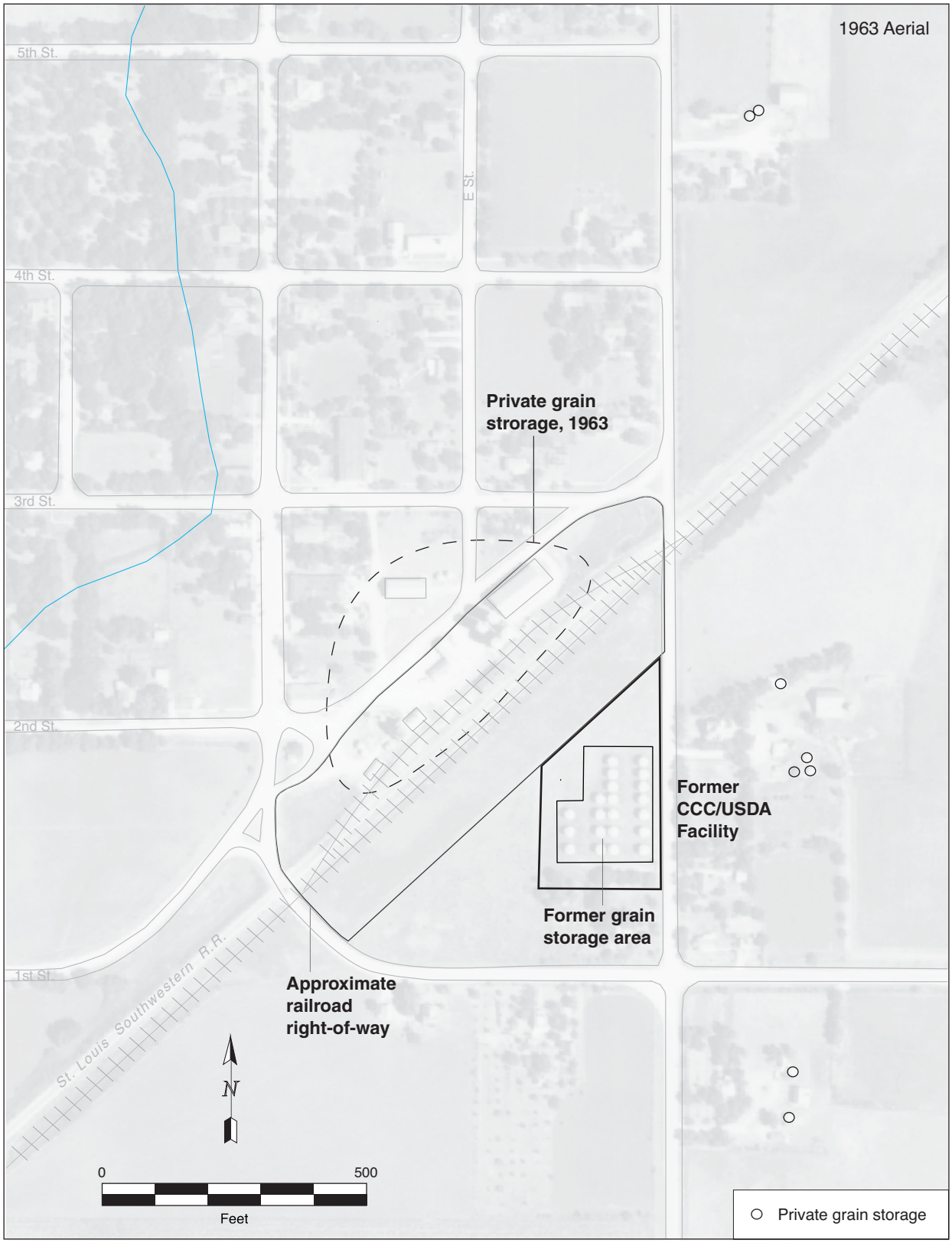

FIGURE 2.1 Locations of former grain storage facilities at Ramona, Kansas. Source of photograph: USGS (1963).

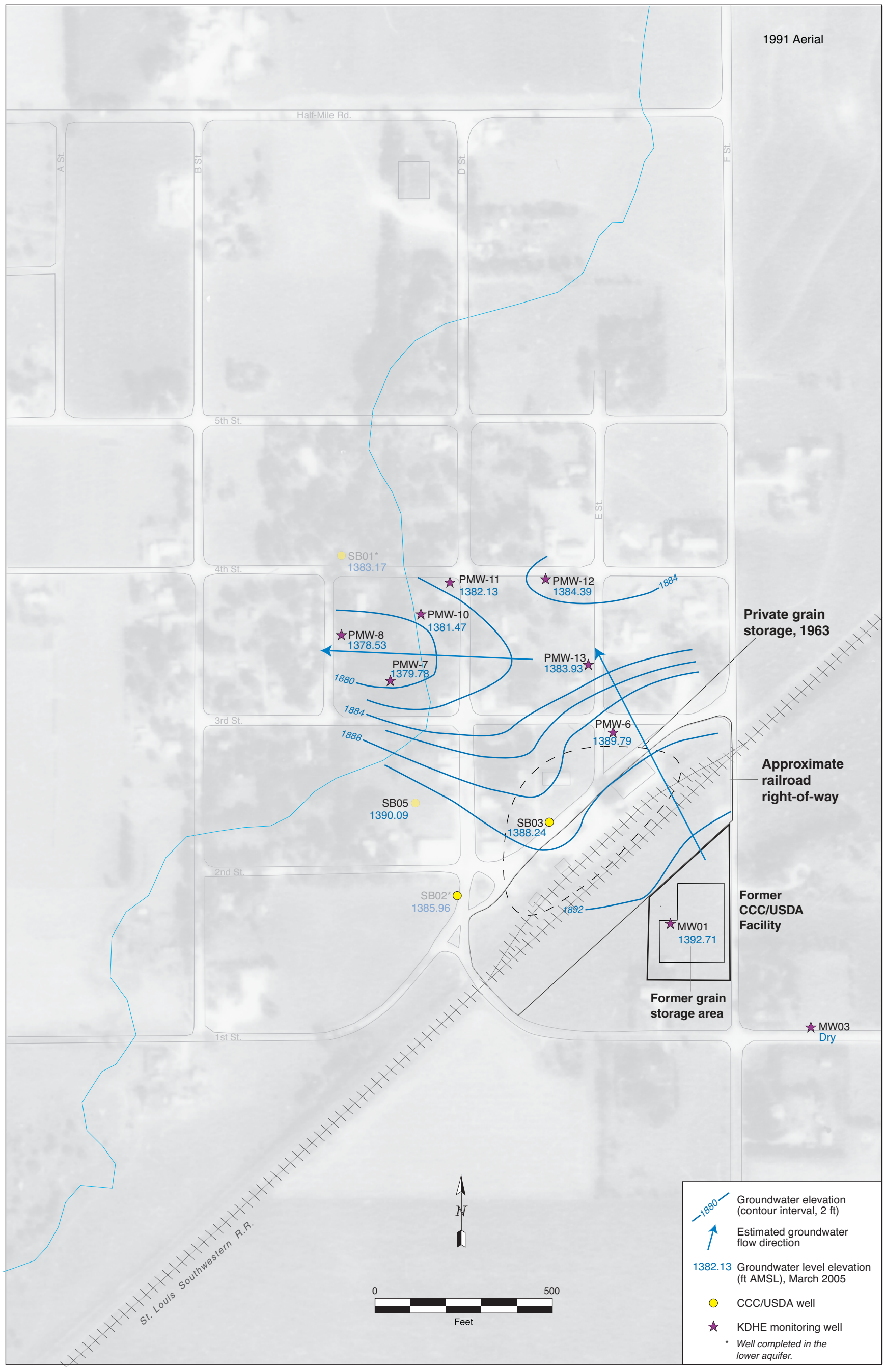

FIGURE 2.2 Groundwater levels at Ramona in March 2005, with interpreted potentiometric surface. Source of photograph: USGS (1991).

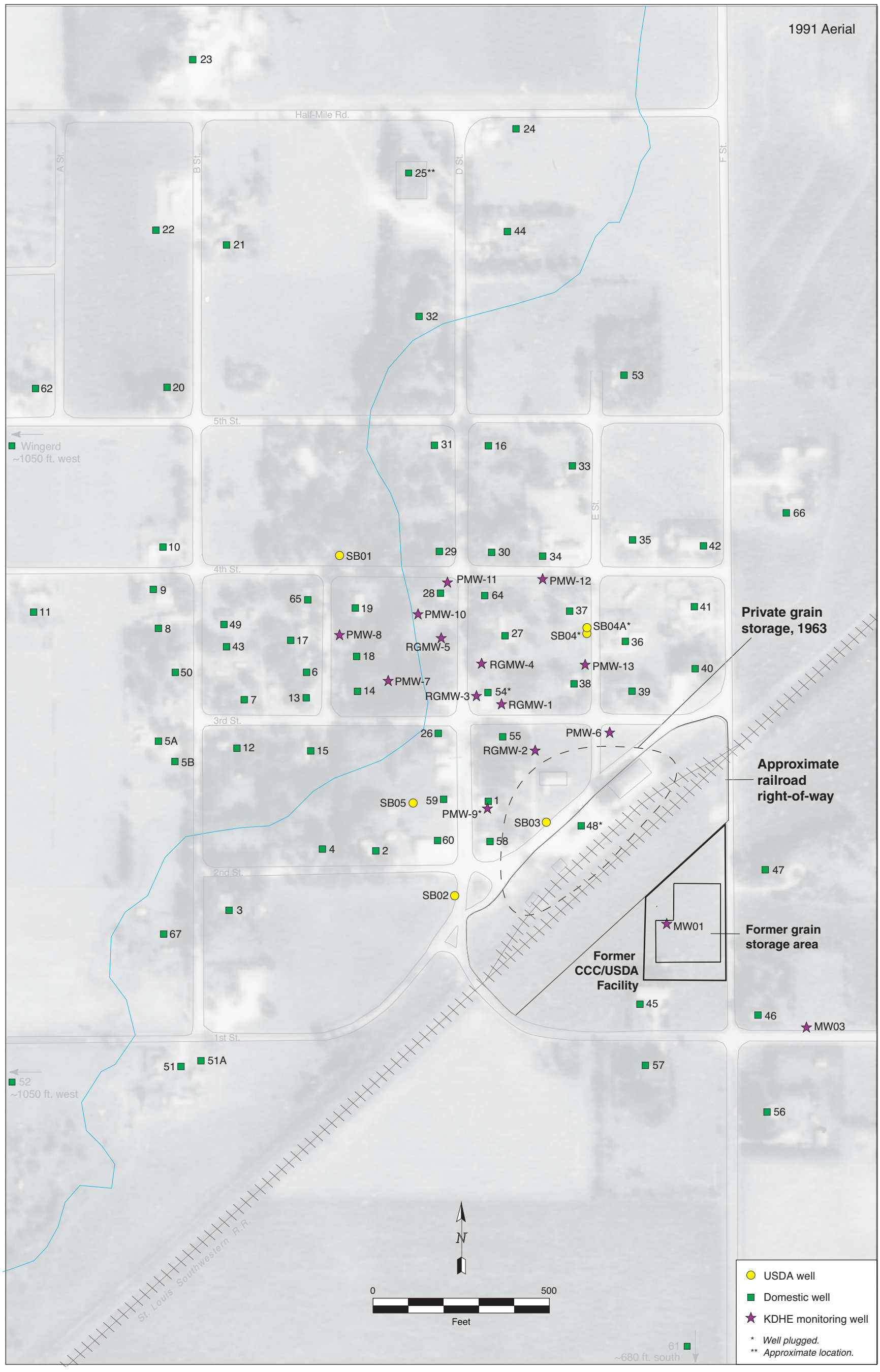

FIGURE 2.3 Locations of previously sampled wells at Ramona, Kansas. Source of photograph: USGS (1991).

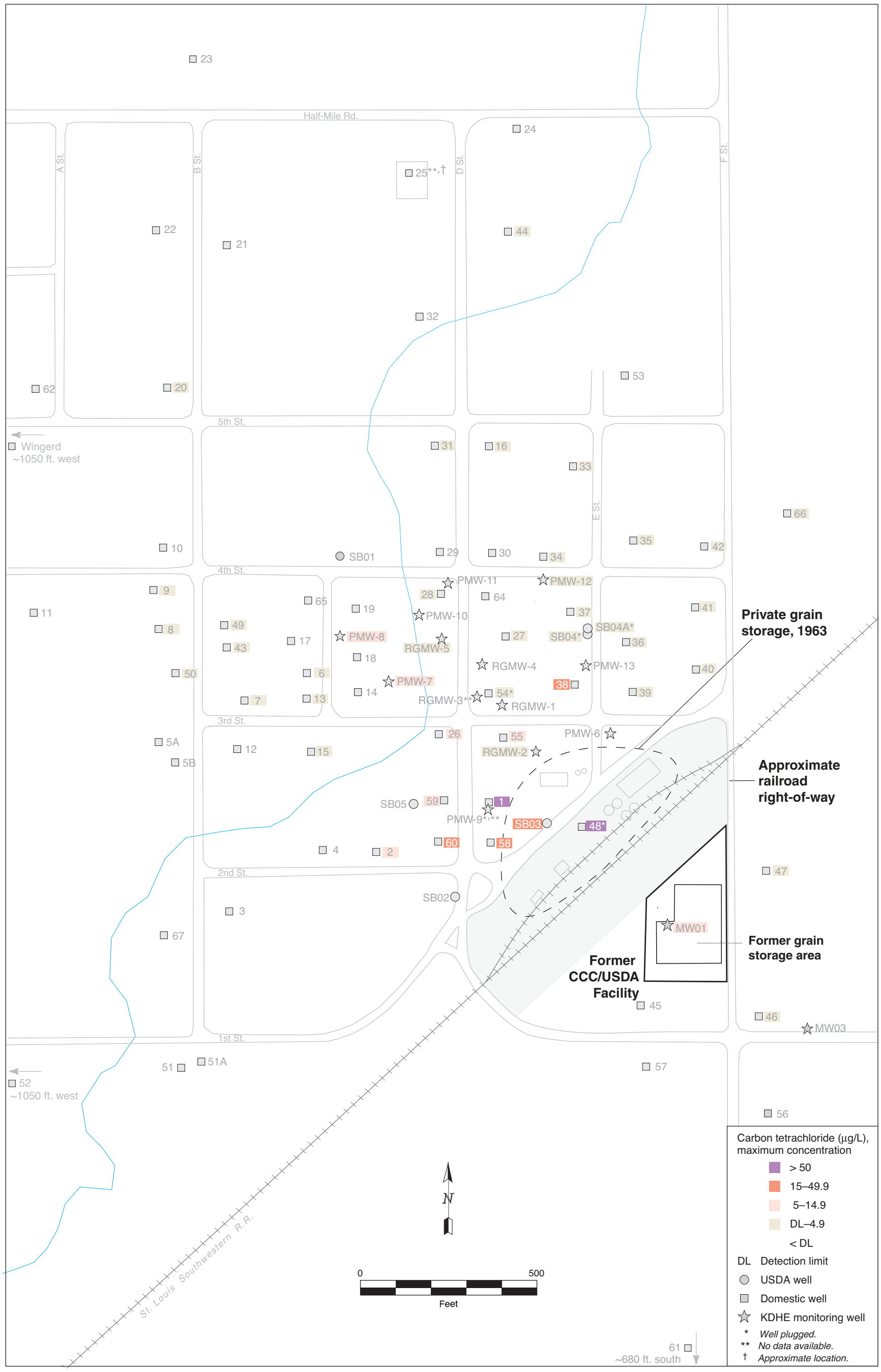

FIGURE 2.4 Ranges of maximum carbon tetrachloride levels in groundwater samples at Ramona, Kansas, in 1988 to 2004.

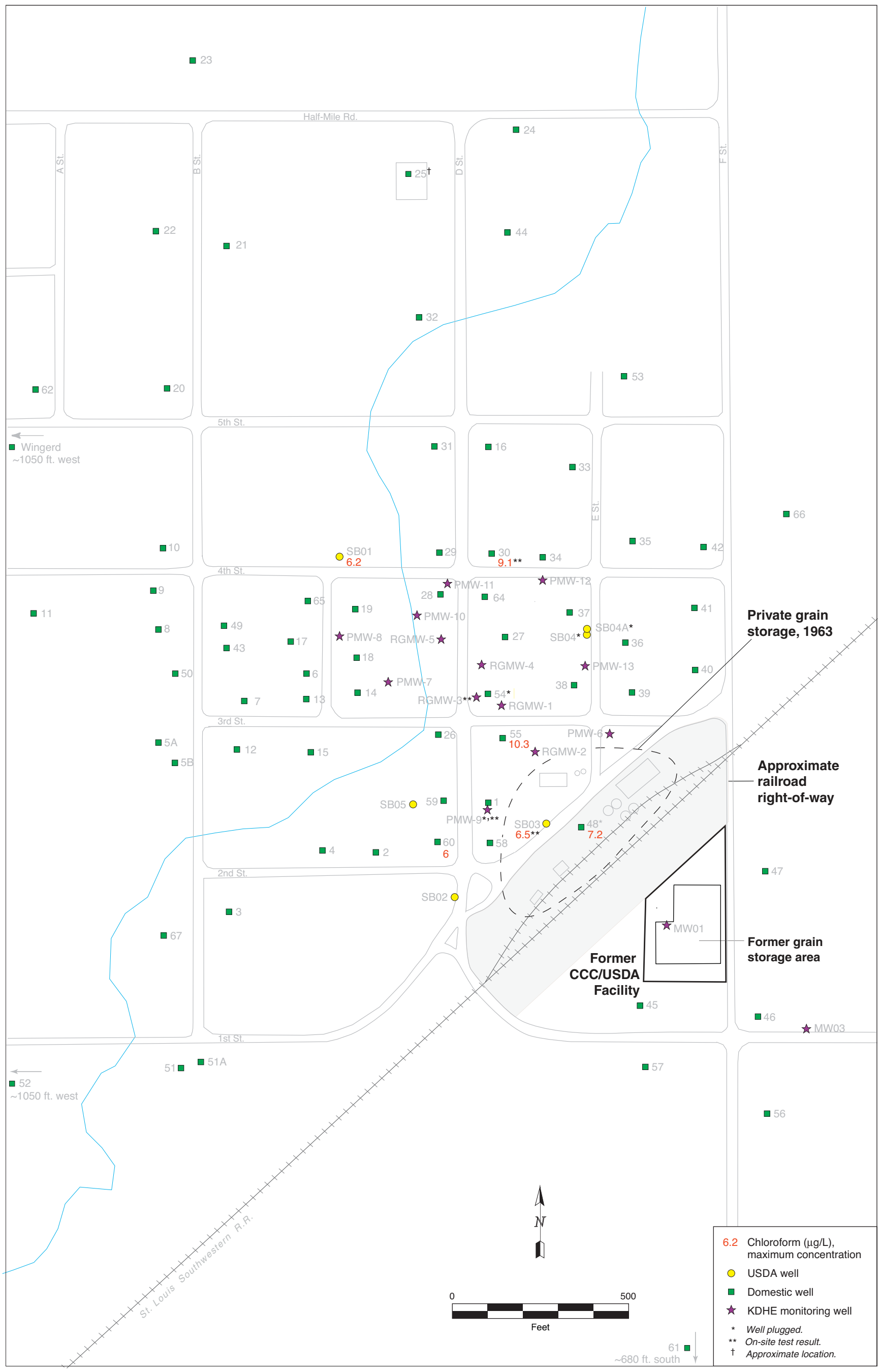

FIGURE 2.5 Maximum chloroform levels in groundwater samples at Ramona, Kansas, in 1988 to 2004.

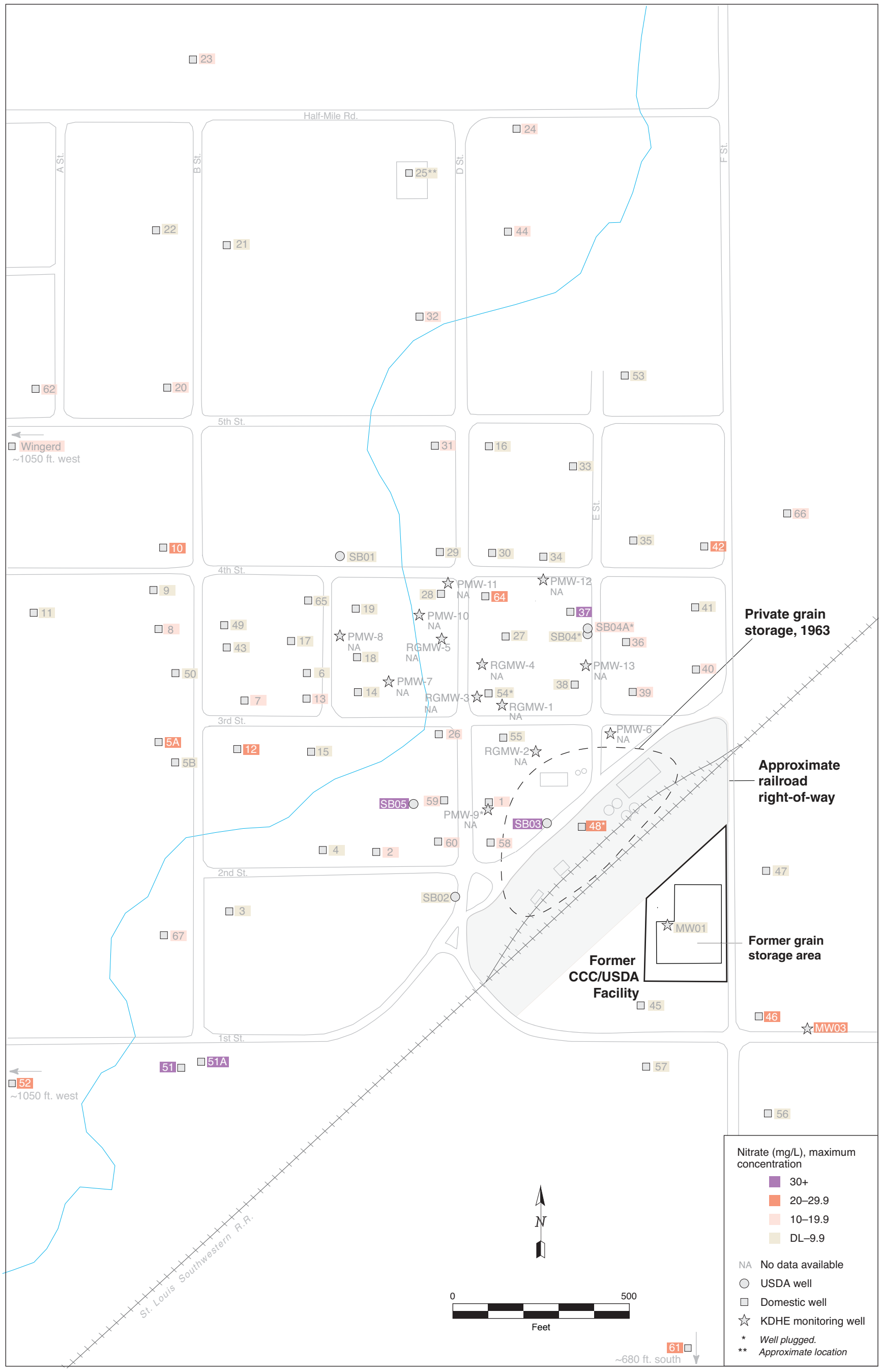

FIGURE 2.6 Ranges of maximum nitrate levels in groundwater samples at Ramona, Kansas, in 1988 to 2004.

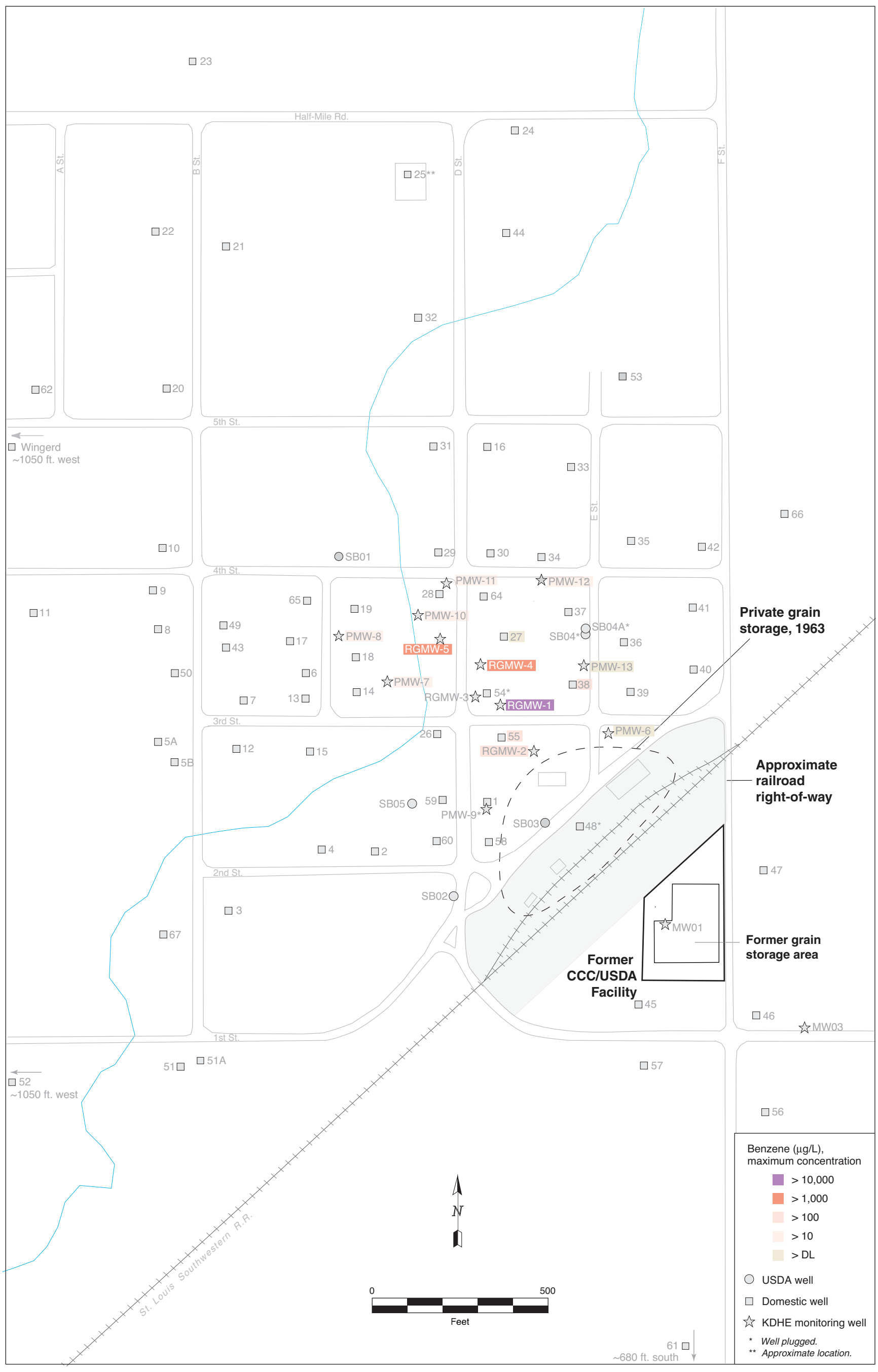

FIGURE 2.7 Ranges of maximum benzene levels in groundwater samples at Ramona, Kansas, in 1988 to 2004.

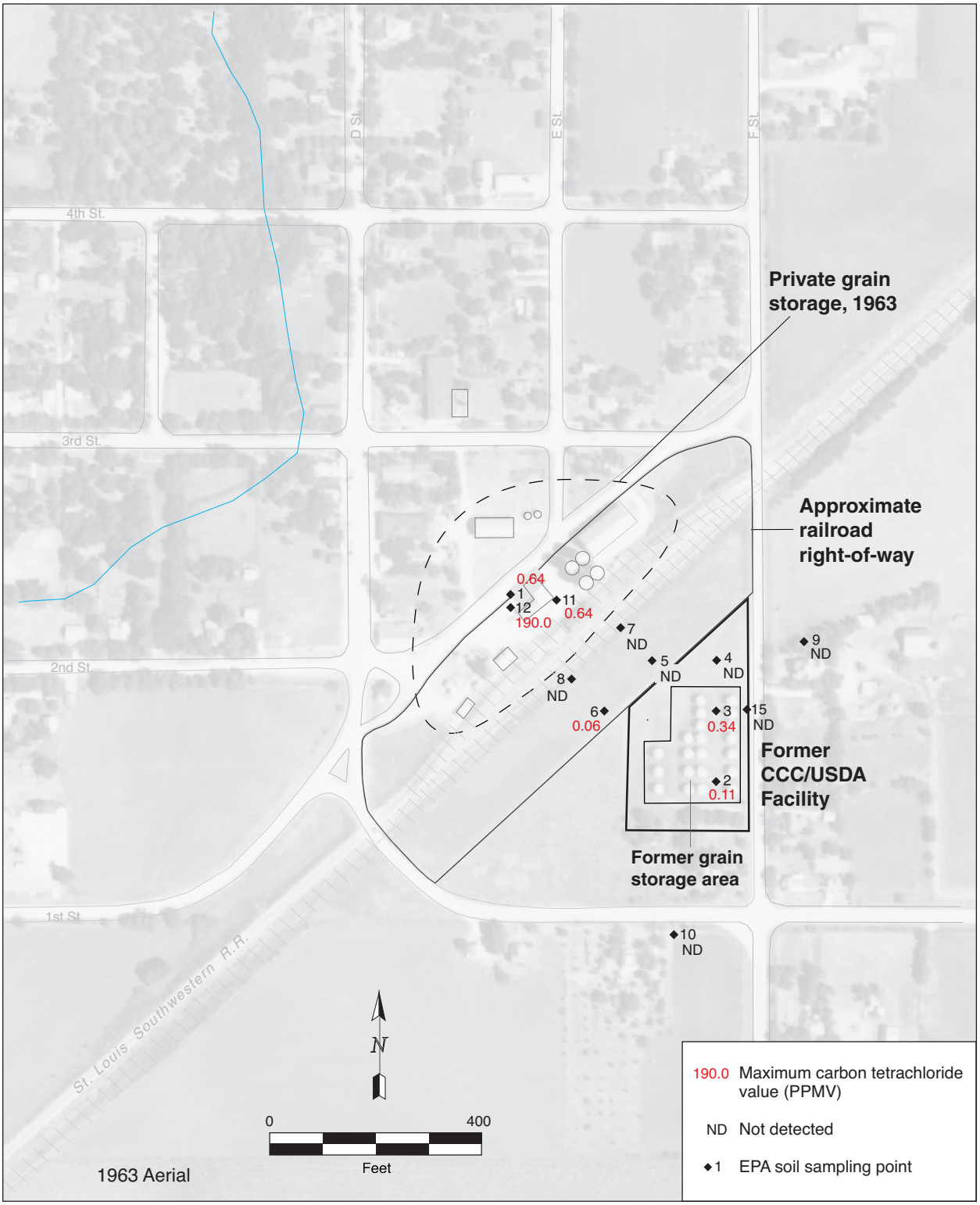

FIGURE 2.8 Results of headspace analyses of soil samples in the U.S. Environmental Protection Agency's 1992 investigation at Ramona. Source of photograph: USGS (1963).

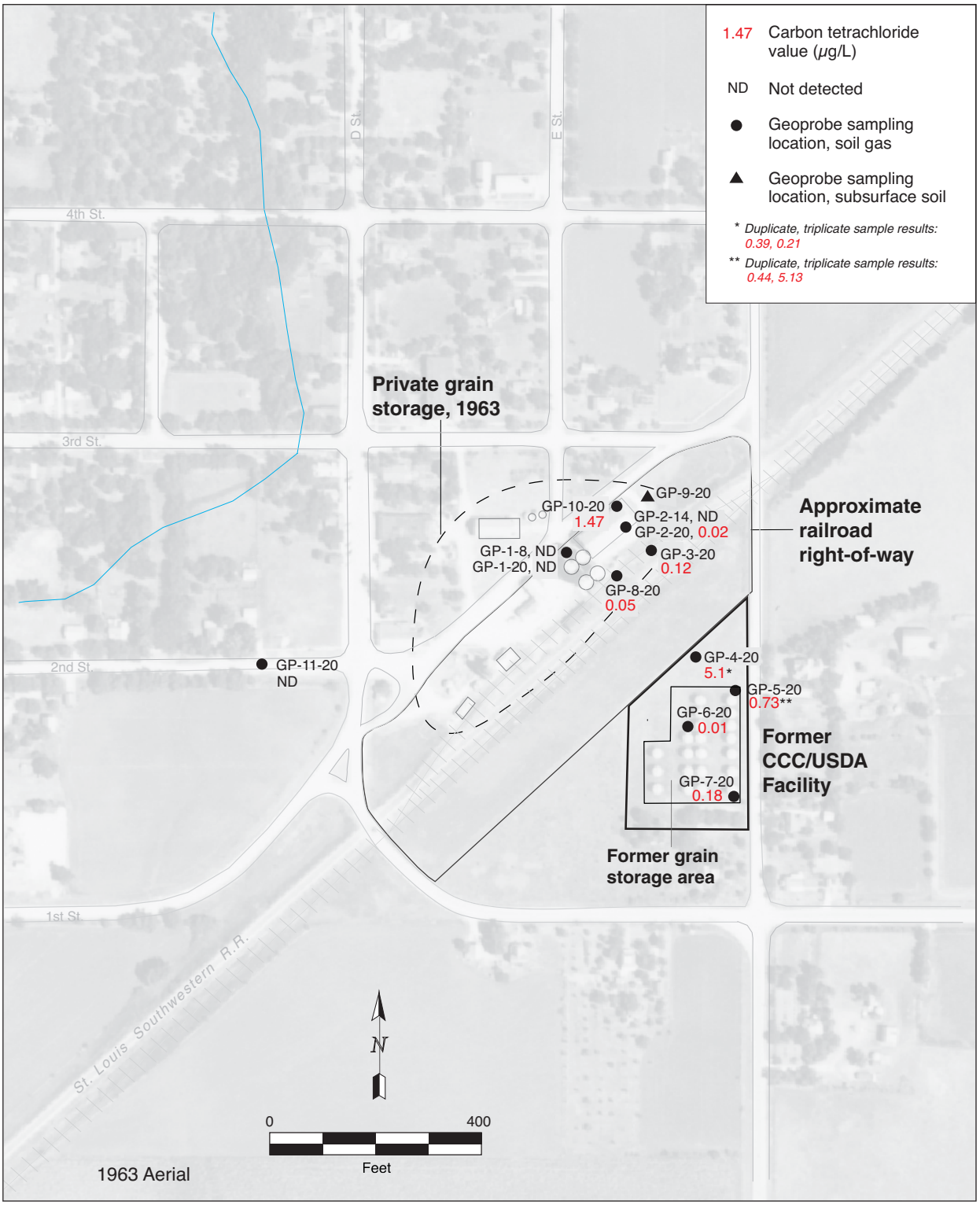

FIGURE 2.9 Soil gas analysis results from the Tetra Tech 1997 investigation at Ramona. Source of photograph: USGS (1963).

3 Proposed Investigation Activities

3.1 Investigation Methods

The investigation at Ramona will be conducted in accordance with procedures in the *Master Work Plan* (Argonne 2002). The *Master Work Plan* provides details concerning investigation procedures at former CCC/USDA facilities in Kansas. Furthermore, the *Master Work Plan* has been approved by the KDHE.

Acquiring the data needed to meet the goals of this investigation will require the collection of groundwater level measurements, soil samples, and groundwater samples. The samples collected will be analyzed for organic and inorganic chemical compounds, as well as for lithologic and hydrogeologic properties.

Initial attempts to collect soil and groundwater samples and set small-diameter monitoring wells/piezometers in the upper aquifer will be made with the cone penetrometer. If refusal is encountered in any hole, alternate drilling methods — either hollow stem auger (HSA) or air rotary methods — will be implemented. The lower aquifer will be explored by using the alternate drilling methods.

Soil samples collected with the cone penetrometer will be taken at intervals of 5 ft or less from the surface to the top of the upper aquifer saturated zone. Groundwater samples collected from the upper aquifer with the cone penetrometer will be taken at 5-ft intervals to the confining layer. The cone penetrometer will also be used for electronic logging from ground surface to the base of the upper aquifer. The analytical and electronic data will provide information on the vertical and horizontal distribution of potential contaminants and will identify lithologic units.

After collection of initial soil and groundwater data, small-diameter monitoring wells will be installed at selected locations. The data collected during this phase of work will be used to further delineate the vertical and horizontal extent of potential contaminant source areas and to establish sampling points for future monitoring.

Upper aquifer monitoring wells/piezometers installed by using the direct-push capabilities of the cone penetrometer will be advanced to the top of the confining layer that

separates the upper and lower aquifers. In accordance with KDHE regulations, well installation methods will include use of the cone penetrometer to advance a 4.25-in. borehole to a depth of 20 ft BGL. From 20 ft BGL to the base of the upper aquifer, a 3.25-in.-diameter hole will be driven to the desired depth.

Lower aquifer monitoring wells will be installed by using a drill rig with HSA or air rotary methods or both. Drilling will proceed to the top of the confining layer that separates the lower and upper aquifers. The lower aquifer will be explored by using air rotary drilling methods. Drilling into the lower aquifer will require the setting of intermediate casing to seal the upper aquifer and prevent potential communication between the two aquifers.

To set intermediate casing, a borehole with a diameter of at least 10 in. will be drilled to the top of the confining layer that separates the upper and lower aquifers. The borehole will be drilled and cased with steel casing at least 6 in. in diameter, set from ground surface to a point slightly below the top of the confining layer. The annular space of the casing will be filled with bentonite or other KDHE-approved grout material, placed from the bottom to the top of the hole by using a tremie pipe. The grout will be allowed to cure adequately before drilling proceeds into the lower aquifer.

Drilling will continue to a depth that ensures adequate penetration of the lower aquifer. Drilling and well completion using these methods will be conducted in accordance with KDHE regulations and will follow the procedures detailed in the *Master Work Plan* (Argonne 2002).

Soil and groundwater sampling will be conducted during all well installation activities. When possible, soil samples will be collected by using a continuous core barrel. At a minimum, soil samples for chemical analyses will be collected every 5 ft to the top of the upper aquifer. An attempt will be made to core the lower aquifer. If continuous coring is not successful there, samples will be collected from cuttings as they reach the surface.

All upper aquifer monitoring wells/piezometers installed with direct-push technology as part of this investigation will be cased with 1-in.-diameter, Schedule 40 polyvinyl chloride (PVC) with a 0.010-in. slotted screen. The drilled monitoring wells in the lower aquifer will be cased with 2-in.-diameter, Schedule 40 PVC with 0.010-in. slotted screen. Casing centralizers will be used when necessary, and screen lengths and depths will be dictated by the aquifer thickness and analytical data for groundwater samples collected during the initial sampling. The

CCC/USDA and KDHE project managers will be consulted before the exact screen depth intervals are determined.

Appropriate quantities of sand and grout will be used to complete each well properly. A tremie pipe will be used to ensure that materials are placed properly in all annular spaces. Wells will be completed flush to the ground where necessary. All other wells will be completed above grade. Well completions will be conducted in accordance with KDHE regulations and will follow the procedures detailed in the *Master Work Plan* (Argonne 2002).

Soil and groundwater samples will be collected in laboratory-approved containers and shipped overnight to the Applied Geosciences and Environmental Management (AGEM) Laboratory at Argonne. Before shipping, soil samples will be preserved on dry ice, and groundwater samples will be preserved on ice. The soil samples will be analyzed for carbon tetrachloride and chloroform by using a gas chromatograph-mass spectrometer, according to EPA laboratory methods 5030B and 8260B (http://www.epa.gov/epahome/index/). Groundwater samples will be analyzed at the AGEM Laboratory for VOCs including carbon tetrachloride and chloroform. In addition, selected groundwater samples will be analyzed for cations and anions at a certified reference laboratory, and hydrogeologic testing will be conducted on selected soil samples. Proposed tests include porosity, organic carbon content, dry bulk density, and grain size.

Argonne will develop a comprehensive report after field activities have been completed and the data have been received and evaluated. The report will include documentation and discussions of all field activities and analytical data.

3.2 Investigation Goals

Previous investigations of the carbon tetrachloride contamination at Ramona focused on collecting analytical data for subsurface soil and soil gas samples from the co-op property and the former CCC/USDA facility, plus groundwater data from private wells and monitoring wells.

Previous investigations at the former CCC/USDA facility were limited to the collection of minimal numbers of soil, soil gas, and groundwater samples. Some samples were analyzed in an on-site laboratory, while others were analyzed in an off-site certified laboratory. The

analytical data from the on-site analyses are of variable quality, with poor replication of results. A review of the chromatograms from the on-site laboratory revealed several discrepancies in the data analyses and interpretation (Appendix B).

Only one shallow monitoring well (MW01) on the former CCC/USDA facility augments the limited soil and soil gas data. Groundwater samples were collected from this well during yearly monitoring events in 1998–2000; however, the well has been reported as dry during the last four years. No exploration of the lower aquifer has been conducted on the property.

Because of the limited amount of data collected to date at the former CCC/USDA facility, the present investigation will focus on subsurface contaminant conditions on that property. Several phases of work are proposed to accomplish the investigation's goals. Data collected during each phase will be evaluated to determine whether the subsequent phase is necessary. The CCC/USDA and KDHE project managers will be contacted during each phase and kept apprised of the results. Whether implementation of each phase of work is necessary will be discussed and mutually agreed upon by the KDHE and the CCC/USDA. The data collected will be used to support recommendations for future actions, with the ultimate goal of assigning the Ramona site *No Further Action* status, in accordance with the Intergovernmental Agreement between the KDHE and the Farm Service Agency of the USDA.

Proposed phases of work for the investigation at Ramona are as follows:

1. Determine the subsurface contaminant conditions on the former CCC/USDA facility.

2. Determine the horizontal and vertical extent of contamination associated with any potential source areas identified on the former CCC/USDA facility.

3. Establish the current contaminant levels in groundwater samples from existing and newly installed monitoring wells.

4. Verify the groundwater flow direction through initiation of long-term monitoring.

5. Investigate subsurface contaminant conditions on adjacent properties. This is a contingency phase to be pursued *only* if data indicate that contamination associated with the former CCC/USDA facility has migrated off the property or if contamination from a source outside the property is migrating onto the former facility.

3.3 Investigation Strategy and Tasks

Phase 1: *Determine the subsurface contaminant conditions on the former CCC/USDA facility.*

The cone penetrometer will be used to collect soil and groundwater samples during this phase of the investigation, according to procedures in the *Master Work Plan* (Argonne 2002). Activities will be as follows:

- Before subsurface exploration of the former CCC/USDA facility, water levels will be measured in monitoring wells SB01, SB02, SB03, SB05, MW01, MW03, PMW6, PMW7, PMW8, PMW10, PMW11, PMW12, PMW13, RGMW2, and RGMW5 to establish the current groundwater flow direction. Wells SB01 and SB02 are completed in the lower aquifer; the other 13 monitoring wells are completed in the upper aquifer.

- An initial borehole (SB06; Figure 3.1) will be advanced at the former CCC/USDA facility. Electronic data collected from this initial borehole will be used to define the site lithology and determine the potential depth limitations of the cone penetrometer. After collection of electronic data, soil samples will be collected continuously to the base of the upper aquifer at an offset location. The offset hole will be approximately 1–2 ft from the original location. Penetration will be discontinued if refusal is met or the base of the upper aquifer is encountered. Additional boreholes will be advanced at this location to collect groundwater samples for chemical analyses. Groundwater samples will be collected at 5-ft intervals to the top of the confining layer.

- Upon completion of the initial borehole (SB06), electronic data and soil and groundwater samples will be collected from a maximum of nine additional locations at the former CCC/USDA facility for chemical analyses and lithologic evaluation. The exact number and locations of boreholes necessary to accomplish this goal will be determined as data are collected during field activities. Figure 3.1 shows the potential locations (SB07–SB15). Soil samples will be collected from these boreholes at 5-ft intervals to the top of the upper aquifer. Groundwater samples will be collected every 5 ft to the base of the upper aquifer, provided that the aquifer yields enough water for sampling.

- Exploration of the lower aquifer at the former CCC/USDA facility will be limited to the proposed monitoring well locations indicated in Figure 3.1. Attempts will be made to collect soil samples from the lower aquifer zone at 5-ft intervals. Groundwater samples will be collected only if the aquifer produces adequate quantities of water for sampling.

- Chemical analyses will be conducted on the soil and groundwater samples, and hydrogeologic testing and grain size analysis will be conducted on selected soil samples.

- As data are collected in the field, adjustments to the number of sample points, the sample locations, and sampling intervals may be necessary. The CCC/USDA and KDHE project managers will be contacted during field activities and kept apprised of results. Any proposed changes to the work plan will be discussed and mutually agreed upon by the KDHE and the CCC/USDA before the plan is modified.

Phase 2: *Determine the horizontal and vertical extent of contamination associated with any potential source areas identified on the former CCC/USDA facility.*

Conventional drilling methods (HSA and air rotary methods) will be used to complete this phase of the investigation, according to procedures in the *Master Work Plan* (Argonne 2002).

- The initial task required in this phase will include the installation of ten monitoring wells. Five of the wells will be completed in the upper aquifer and five in the lower aquifer. The data collected will provide additional information concerning contaminant distribution in both the upper and lower aquifers. In addition, the wells will be long-term groundwater sampling points. The proposed well locations (MW4S, MW5D, MW6S, MW7D, MW8S, MW9D, MW10S, MW11D, MW12S, and MW13D) are shown in Figure 3.1.

- Additional wells are proposed for installation if the groundwater analytical data indicate that contamination associated with a potential source area on the former CCC/USDA facility has migrated beyond the first tier of wells. The well locations will be determined after consultation with the CCC/USDA and KDHE project managers. Proposed locations will be mutually agreed upon by the KDHE and the CCC/USDA.

- During drilling activities, soil sampling will be conducted at 5-ft intervals from ground surface to the base of the upper aquifer. In addition, attempts will be made to collect discrete soil samples from the lower aquifer. Groundwater samples will be collected during drilling if the aquifer immediately produces water. If the aquifer is slow to recharge, groundwater samples will be collected after the well has been set or when the aquifer initially produces water. Chemical analyses will be conducted on the soil and groundwater samples. In addition, hydrogeologic testing and grain size analysis will be conducted on selected soil samples.

- The total number of wells installed will be dictated by the analytical data from soil and groundwater samples collected during the investigation. Wells will be installed only to the extent necessary to accomplish the investigational goals. The CCC/USDA and KDHE project managers will be contacted during field activities and kept apprised of results. Any proposed changes to the work plan and the locations and positioning of monitoring wells will be discussed and mutually agreed upon by the KDHE and the CCC/USDA.

Phase 3: *Establish the current contaminant levels in groundwater samples from existing and newly installed monitoring wells.*

After subsurface drilling activities are complete, groundwater samples will be collected from the newly installed monitoring wells and some of the existing monitoring wells (Figure 3.1), according to procedures in Section 6 of the *Master Work Plan* (Argonne 2002). Sampling will proceed as follows:

- All of the newly installed wells and existing monitoring wells SB01, SB02, SB03, SB05, MW01, MW03, PMW6, PMW7, PMW8, PMW10, PMW11, PMW12, PMW13, RGMW2, and RGMW5 will be sampled.

- Before samples are collected, the static groundwater level and the total depth will be measured and documented for each well.

- The groundwater from each well will be purged until field parameters of pH, temperature, and conductivity are stable. If possible, a minimum of three well volumes of water will be purged.

- The wells will be sampled after adequate recharge has occurred, but no more than 24 h after purging.

- Groundwater samples intended for analysis of VOCs (including carbon tetrachloride, chloroform, and methylene chloride) will be collected in laboratory-approved containers and stored on ice. Selected samples will also be tested for cations and anions and for evidence of natural attenuation. All samples will be shipped for overnight delivery to the AGEM Laboratory for analysis. Confirmation samples will subsequently be shipped to a certified reference laboratory for verification analyses, as appropriate.

Phase 4: *Verify the groundwater flow direction through initiation of long-term monitoring.*

- Automatic water level recorders will be installed in a set of new and existing monitoring wells (to be identified in consultation with the CCC/USDA and KDHE project managers) for long-term water level monitoring. This task will initially be conducted for a one-year period to document any seasonal changes in groundwater flow. The results will be evaluated further in conjunction with all analytical data to determine whether additional monitoring is warranted. The CCC/USDA and KDHE project managers will be kept apprised of the results, and any modifications to this task will be discussed and mutually agreed upon.

Phase 5: *Investigate subsurface contaminant conditions on adjacent properties. This is a contingency phase to be pursued only if data indicate that contamination associated with the former CCC/USDA facility has migrated off the property or if contamination from a source outside the property is migrating onto the former facility.*

- The cone penetrometer will be used to collect soil and groundwater samples from additional locations on property adjacent to the former CCC/USDA facility. The data collected will be used to further delineate any source areas identified during exploration of the former CCC/USDA facility. The proposed locations will be based on the Phase I results.

- Soil samples from the additional locations will be collected at 5-ft intervals to the top of the upper aquifer. Groundwater samples from these locations will be collected every 5 ft to the base of the upper aquifer, provided that the aquifer yields enough water for sampling.

- Chemical analyses will be conducted on the soil and groundwater samples, and hydrogeologic testing and grain size analysis will be conducted on selected soil samples.

- As data are collected in the field, adjustments to locations or sample intervals may be necessary. The CCC/USDA and KDHE project managers will be contacted during field activities and kept apprised of results. Any proposed changes to the work plan will be mutually agreed upon by the KDHE and the CCC/USDA before the plan is modified.

3.4 Quality Assurance and Quality Control

Procedures necessary to maintain the quality of data will be implemented during all phases of this investigation. Descriptions of the quality assurance and quality control methods are in Section 4 of the *Master Work Plan* (Argonne 2002). That document should be consulted for a more detailed narrative of these procedures.

3.5 Health and Safety

The general health and safety plan for use during this project, Section 3 of the *Master Work Plan* (Argonne 2002), addresses all anticipated safety issues for activities at the Ramona site. Specific emergency information for Ramona is given here.

Ramona has 911 service. All emergency calls, including police, fire, and ambulance calls, will be directed for an appropriate response from this number. Ramona has no emergency medical facilities. The nearest hospital with emergency medical facilities is in Herington, Kansas. Driving directions and a map of the route to the hospital are in Figure 3.2. Additional emergency information is in Table 3.1.

An Argonne health-safety-environmental protection representative will visit the site during field activities to observe and monitor operations.

TABLE 3.1 Emergency information for the investigation at Ramona, Kansas.

Resource	Telephone No.	Name
At the Site		
All emergencies	911	
Medical care	785-258-5100 785-258-2207	Herington Municipal Hospital[b] 100 East Helen Street Herington, Kansas
Industrial hygiene	630-252-3310	Argonne — Industrial Hygiene
Safety	630-252-2885 630-252-3924	EVS Division[c] Field Safety Coordinator (Monte Brandner) EVS Division[c] Environment, Safety, and Health Coordinator (Dave Peterson)
Security	630-252-5737	Argonne — Operations Security General Information
In the Local Area		
All emergencies	911	
Hospital	785-258-5100 785-258-2207	Herington Municipal Hospital[b] 100 East Helen Street Herington, Kansas
Police (nonemergency)	620-382-2144	Marion County Sheriff's Office Fourth and Main Marion, Kansas
Poison control	800-248-0074	University of Kansas Medical Center

[a] Post this table in the field operations base.

[b] The route from Ramona to the hospital is shown in Figure 3.2.

[c] Environmental Science Division at Argonne National Laboratory.

3.6 Ramona Contacts

Marion County Clerk
200 South Third Street (Courthouse Square)
Marion, KS 66861
620-382-2185

Rural Water District No. 1 of Marion County
RR 1, 2868 Kanza
Durham, KS
785-965-7264

Ramona Post Office
Hours: 7 a.m. to noon, 1 p.m. to 4 p.m.
Nancy Hatterman, Clerk
215 North D Street
Ramona, KS 67476
785-965-7171

Ramona Mayor, Pat Wick
Ramona City Clerk, Jessica Gilbert
785-965-7110

Ramona City Maintenance Director, Paul Jones
785-965-7213

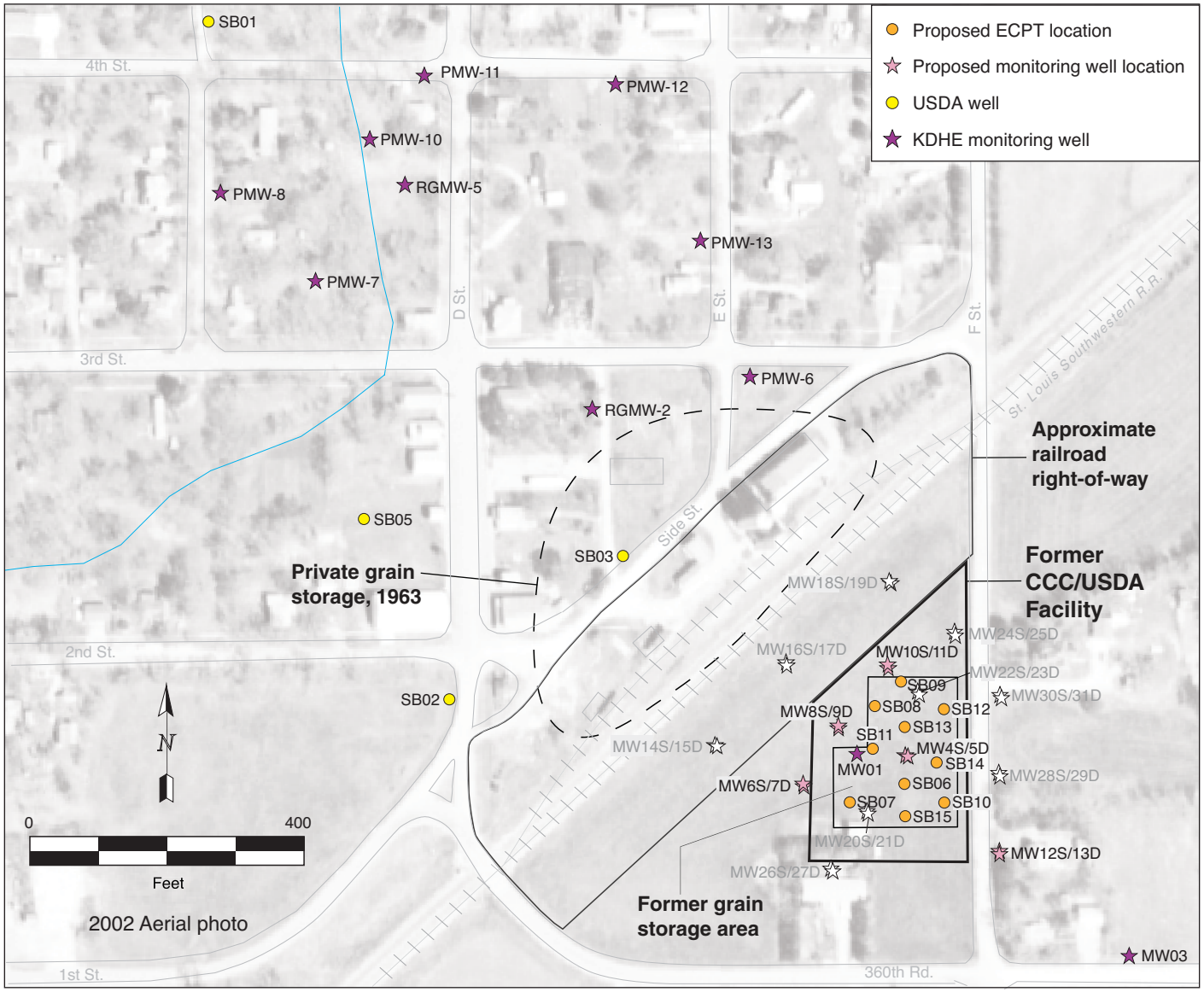

FIGURE 3.1 Planned and potential sampling points at Ramona, Kansas.

Directions from Ramona to Herington Municipal Hospital in Herington, Kansas

- From Ramona former CCC facility, go east on 360th Rd. to US 56E/US 77N (approximately 6 miles).
- Turn left onto 56E/77N.
- Continue to follow US 77N (also *Wolf Rd.* in Herington) for 6 miles to E. Helen Street, Herington.
- Turn left onto E. Helen St.
- Proceed approximately 1/2 mile; hospital is on the left.

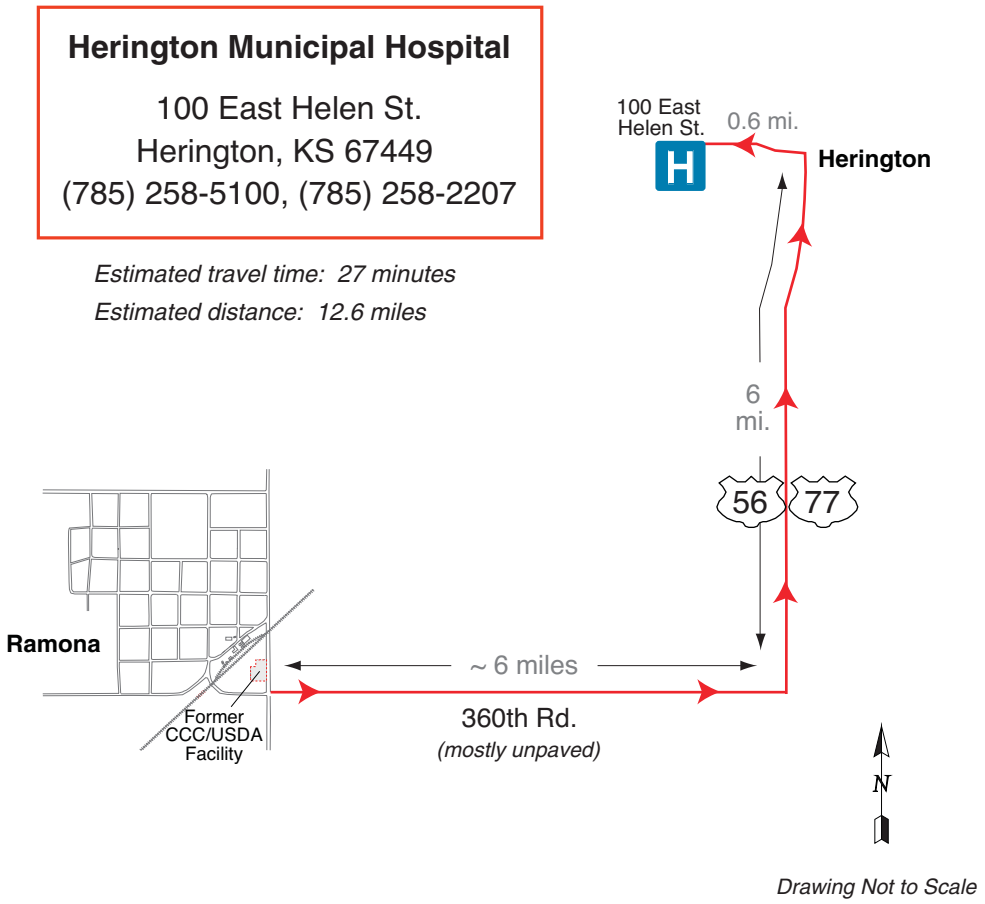

FIGURE 3.2 Route to the Herington Municipal Hospital from Ramona, Kansas.

4 References

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Appendix A:

Detailed Results of Groundwater Sampling and Water Level Monitoring in Previous Investigations

TABLE A.1 Construction summary for wells at Ramona, Kansas.[a]

Well Name	Well Owner[b]	Well Location	WWC-5 Filed?	Well Diameter (in.)	Casing Type[c]	Pump Type[d]	Casing Elevation (ft ASML)	Screen Depth (ft BGL)	Total Depth (ft BGL)	Completion Date
Monitoring wells										
MW01	KDHE	Northwest corner of 1st and F (USDA)	No	2	PVC	None	1435.20	32.0–42.0	42.86	6/27/98
MW03	KDHE	Northeast of 1st and F	No	2	PVC	None	1442.63	34.0–44.0	43.68	6/30/98
SB01	CCC/USDA	4th between C and D	Yes	2	PVC	None	1417.19	62.0–67.0	68.00	6/7/94
SB02	CCC/USDA	Southwest of 2nd and D	Yes	2	PVC	None	1428.61	70.0–80.0	83.80	6/16/94
SB03	CCC/USDA	2nd between D and E	Yes	2	PVC	None	1430.06	38.0–43.0	45.63	6/26/94
SB04	CCC/USDA	E Street between 3rd and 4th	Yes	2	PVC	None	Plugged	69.0–79.0	82.62	6/28/94
SB04A	CCC/USDA	E Street between 3rd and 4th	Yes	2	PVC	None	Plugged	39.0–49.0	52.55	6/30/94
SB05	CCC/USDA	Northwest of 2nd and D	Yes	2	PVC	None	1422.93	30.0–35.0	38.43	6/29/94
RGMW1	City of Ramona	Northeast corner of 4th and D	Yes	2	PVC	None	1420.27	27.0–4.07	49.00	9/19/01
RGMW2	City of Ramona	Alley between D and E, south of 3rd	Yes	2	PVC	None	1422.00	27.0–46.5	46.50	9/19/01
RGMW3	City of Ramona	Northeast corner of 3rd and D	Yes	2	PVC	None	1418.35	27.5–43.0	43.00	9/20/01
RGMW4	City of Ramona	310 North D Street	Yes	2	PVC	None	1417.57	27.5–42.5	42.50	9/20/01
RGMW5	City of Ramona	West side D between 3rd and 4th	Yes	2	PVC	None	1415.58	21.5–41.5	42.00	9/20/01
PMW6	City of Ramona	Southeast corner of 3rd and D	Yes	2	PVC	None	1422.91	25.0–45.0	45.00	5/28/02
PMW7	City of Ramona	Alley between C and D, north of 3rd	Yes	2	PVC	None	1412.92	25.0–45.0	45.00	5/28/02
PMW8	City of Ramona	East side of C between 3rd and 4th	Yes	2	PVC	None	1416.51	25.0–45.0	45.00	5/28/02
PMW9	City of Ramona	East side of D between 2nd and 3rd	Yes	2	PVC	None	1420.71	25.0–45.0	45.00	5/16/02
PMW10	City of Ramona	Alley between C and D, south of 4th	Yes	2	PVC	None	1411.56	25.0–45.0	45.00	5/29/02
PMW11	City of Ramona	Southwest corner of 4th and D	Yes	2	PVC	None	1416.05	21.0–41.0	41.00	5/29/02

TABLE A.1 (Cont.)

Well Name	Well Owner	Well Location	WWC-5 Filed?	Well Diameter (in.)	Casing Type[c]	Pump Type[d]	Casing Elevation (ft ASML)	Screen Depth (ft BGL)	Total Depth (ft BGL)	Completion Date
Monitoring wells (Cont.)										
PMW12	City of Ramona	311 North E Street	Yes	2	PVC	None	1418.04	23.5–43.5	43.50	5/29/02
PMW13	City of Ramona	West side of E between 3rd and 4th	Yes	2	PVC	None	1421.47	25.0–45.0	45.00	5/30/02
Private wells										
01	Ohm (Betty) Café	206 North D Street	No	6	Gal	Sub			43	1972
02	Ohm, Harold (Spike Sadler)	302 East 2nd	No						43	1972
03	Smith, Dan	110 North B Street	No	6			1426.74		65[e]	
04	Cheever, Ronald and Connie	208 East B Street	No				1423.02			
05B	Riffle, Wanda	210 North B Street	No							
05A	Antoszyk, John (prior owner Riffle)	210 North B Street	No							
06	Schubert	305 North C Street	No						41	
07	Weber, Norma	302 North B Street	No							
08	Bernhardt, Ralph	309 North B Street	No							
09	Fike, Naomi	311 North B Street	No							
10	Craney	Northwest corner of 4th and B	No							
11	Wiles, Stan and Deb	103 West 4th Street	No			Sub			70[e]	
12	Elgin, Neil	201 East 3rd Street	No							
13	Thornhill, Robert	301 North C Street	No	6	PVC	Sub			43	
14	Thornhill, Robert	Across from 13	No							
15	Thornhill, Dorothy	212 East 3rd Street	No	6	PVC	Sub			69	
16	Schubert, Hank	Southeast corner of 5th and D	No							

TABLE A.1 (Cont.)

Well Name	Well Owner	Well Location	WWC-5 Filed?	Well Diameter (in.)	Casing Type[c]	Pump Type[d]	Casing Elevation (ft ASML)	Screen Depth (ft BGL)	Total Depth (ft BGL)	Completion Date
Private wells (Cont.)										
17	Coffey, Boyd	309 North C Street	No						60	
18	Schneider, Bertha	306 North C Street	No							
19	Beames, Robert	312 North C Street	No							
20	Birdsill, Willy	501 North B Street	No							
21	Cheever, Harry	602 North B Street	No				1422.19		80[e]	
22	Stenzel, Greg	603 North B Street	No							
23	Stenzel, Betty	North of B and Half-Mile Road	No							
24	Brunner, Phyllis	612 North D Street	No							
25	Tatge Manufacturing	Southwest corner of D and Half-Mile Road	No							
26	Post Office/Bank	302 North D	No							
27	Brunner, Jim	310 North D Street	No	6	PVC	Sub	1417.08		60[e]	~1986[e]
28	Meyer, Tony (prior owner Dan Biesel)	Southwest corner of 4th and D	No							
29	Schneider, Lydia	Northwest corner of 4th and D	No						68	
30	Bailey, Nathan	Northeast corner of 4th and D	No						74	
31	Staatz, Jane and David	Southwest corner of 5th and D	No			Sub				
32	Mock, Michelle	507 North D Street	No	6	Gal	Sub	1409.27		32.50	
33	Hill, Marie	411 North E Street	No						65[e]	
34	Trinity Parish Hall	Northwest corner of 4th and D	No							
35	Brunner, David	502 4th Street	No						75[e]	
36	Mathis, Warner	E Street between 3rd and 4th	No							
37	Sondergard, Alfred	311 North E Street	No						70[e]	~1947[e]

TABLE A.1 (Cont.)

Well Name	Well Owner	Well Location	WWC-5 Filed?	Well Diameter (in.)	Casing Type[c]	Pump Type[d]	Casing Elevation (ft ASML)	Screen Depth (ft BGL)	Total Depth (ft BGL)	Completion Date
Private wells (Cont.)										
38	Gonzales, Al	303 North E Street	No	6			1420.55		58	
39	Sticka, Frank	302 North E Street	No							
40	Schneider, Verdon	303 North F Street	No						40[e]?	
41	Bird, Donald Sr.	SW Corner 4th & F	No				1428.70			
42	Bowman, Richard	504 East 4th Street	No	6	PVC	Sub			70[e]	
43	Taylor, Bonnie	308 North B Street	No							
44	Hanschu, Clinton	602 North D Street	Yes	5	PVC		1413.73	40–68	68	
45	Chartier, Roger	506 1st Street	No							
46	Bura, Leon	102 North F Street	No				1439.14		65[e]	
47	Buxman, Francis	110 North F Street	No						75	
48	Agri Producers, Inc.	2nd Street	Yes	5	Sty			70–80	80	6/28/79
49	Brunner, Jacob	B Street between 3rd and 4th	No						44	
50	Kristek, Petrona	303 North B Street	No							
51	Ryff, Tim and Donita	104 1st Street	No							~1980
51A	Ryff, Tim and Donita	104 1st Street	No							~1980
52	Ryff, Dennis	West 1st Street (past cemetery)	No							
53	Antoszyk, John (prior owner Cheever)	Northeast corner of 5th and E	No							
54	Ramona Senior Center	Northeast corner of 3rd and D	No							
55	Brunner, Ben	Southeast corner of 3rd and D	No							
56	Kristek, Bob	Southeast corner of 1st and F	Yes					70–90	90	11/11/89

TABLE A.1 (Cont.)

Well Name	Well Owner	Well Location	WWC-5 Filed?	Well Diameter (in.)	Casing Type[c]	Pump Type[d]	Casing Elevation (ft ASML)	Screen Depth (ft BGL)	Total Depth (ft BGL)	Completion Date
Private wells (Cont.)										
57	Klover (Klauer), George	Southwest corner of 1st and F	No						90?	
58	Sader's (Hanna) Café	202 North D Street	No							
59	Ramona Fire Station	West side of D between 2nd and 3rd	No				1422.89			
60	M & W Manufacturing	Northwest corner of 2nd and D	No							
61	Jones, Terry	South on F Street	Yes					80–100	100	6/26/91
62	True, Shell	Rt 1, Box 170	No						110[e]	1988
64	Ohms, Harold	Southeast corner of 4th and D	No							
65	Thornhill, Robert	Southwest corner of C and 4th	No							
66	Bailey, Brandon and Jennifer	406 North F Street	No			Sub			90[e]	
67	Hanschu, Clinton	Near corner of 1st and B Street	No							
None	Applegate, Neva	Unknown	No							
None	Beaver, Janice	Unknown	No							
None	Wingerd	Rt 1, Box 68	No	6	PVC	Sub			69	8/17/84

[a] Empty cells indicate that the information is not available at this time.

[b] Owners shown are for sampling dates in Table A.2.

[c] Casing types: PVC, polyvinyl chloride; Gal, galvanized steel; Sty, styrene.

[d] Pump types: None; Sub, submersible.

[e] Information provided by well owner.

TABLE A.2 Analytical data summary for wells at Ramona, Kansas.

						Concentration (µg/L)																																			
Well	Screen Interval (ft BGL)	Sample Date	Static Water Level (ft BGL)	Nitrate (mg/L)	Separate-Phase Hydrocarbon Thickness (ft)	Carbon Tetra-chloride	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1,2-Dichloro-ethane	Methyl-tert-butyl ether	Trichloro-ethylene	Tetrachloro-ethylene	1,2-Dichloro-propane	***cis***-1,2-Di-chloroethylene	1,1,1-Tri-chloroethane	1,1,2,2-Tetra-chloroethane	1,1,1,2-Tri-chloroethane	***n***-Butyl-benzene	Isopropyl-toluene	***n***-Propyl-benzene	Isopropyl-benzene	Hexachloro-butadiene	***sec***-Butyl-benzene	1,3,5-Trimethyl-benzene	1,3,4-Trimethyl-benzene	1,2,4-Trimethyl-benzene	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Chlorobenzene	***tert***-Butyl benzene	***m***-Xylene and ρ-Xylene	***o***-Xylene	Bromomethane	1,1,2-Trichloro-ethane	Trichlorofluoro-methane	Bromodichloro-methane
Monitoring wells																																									
MW01	32–42	8/13/98	38.75	5.32	0.00	< 1.2[a]	< 0.5	b					< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
MW01	32–42	6/11/99	32.78	9.23	0.00	8.2	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW01	32–42	4/25/00	40.16		0.00	0.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5		< 0.5
MW01	32–42	4/26/01	Dry		0.00																																				
MW01	32–42	2/9/02	Dry		0.00																																				
MW01	32–42	3/03	Dry		0.00																																				
MW01	32–42	2/23/04	Dry		0.00																																				
MW01	32–42	5/19/05	Not found.																																						
MW03	34–44	8/13/98	Dry		0.00																																				
MW03	34–44	6/11/99	40.45	24.3	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW03	34–44	4/25/00	43.35		0.00																																				
MW03	34–44	4/26/01	43.82		0.00																																				
MW03	34–44	2/9/02	Dry		0.00																																				
MW03	34–44	3/03	Dry		0.00																																				
MW03	34–44	2/23/04	Dry		0.00																																				
MW03	34–44	5/19/05	Dry		0.00																																				
SB01	45[c]	6/7/94		9.7	0.00	< 2[d]	< 2[d]																																		
SB01	45[c]	6/7/94			0.00	< 2[d]	< 2[d]																																		
SB01	45[c]	6/7/94		9.8	0.00	< 5	< 5																																		
SB01	56[c]	6/10/94			0.00	< 2[d]	< 2[d]																																		
SB01	56[c]	6/10/94		1.97	0.00	< 5	< 5																																		
SB01	67[c]	6/11/94		< 0.1	0.00	< 2[d]	< 2[d]																																		
SB01	62–67	6/16/94		0.23	0.00	< 2[d]	< 2[d]																																		
SB01	62–67	4/6/97		< 0.1	0.00	< 1.2	< 0.5						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
SB01	62–67	7/24/98	26.85	< 0.1	0.00	< 1.2	< 0.5						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
SB01	62–67	6/11/99	19.12	< 0.5	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
SB01	62–67	4/25/00	27.73		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5		< 0.5
SB01	62–67	4/26/01	34.23	0.9	0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5		< 0.5
SB01	62–67	2/9/02	Dry		0.00																																				
SB01	62–67	3/03	Dry		0.00																																				
SB01	62–67	2/23/04	35.82	< 1	0.00	< 1	< 1	< 1	< 1	< 1	< 3	< 5	< 1	< 1	1.3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1			< 1	< 1	< 1	< 1
SB01	62–67	5/19/05	31.50	< 0.5		< 1	< 1	< 1	< 1	< 1	< 3	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1			< 1	< 1	< 1	< 1
SB02	38.3[c]	6/8/94			0.00	< 2[d]	< 2[d]																																		
SB02	38.3[c]	6/8/94			0.00	< 2[d]	< 2[d]																																		
SB02	38.3[c]	6/8/94		1.72	0.00	< 5	< 5																																		
SB02	50[c]	6/13/94			0.00	< 2[d]	< 2[d]																																		
SB02	50[c]	6/13/94		6.8	0.00	< 5	< 5																																		
SB02	72[c]	6/13/94			0.00	< 2[d]	< 2[d]																																		
SB02	72[c]	6/13/94		1.3	0.00	< 5	< 5																																		
SB02	70–80	6/16/94		2.4	0.00	< 2[d]	< 2[d]																																		
SB02	70–80	6/16/94		1.9	0.00	< 2[d]	< 2[d]																																		
SB02	70–80	6/16/94			0.00	< 2[d]	< 2[d]																																		
SB02	70–80	4/7/97	36.55	1.25	0.00	< 1.2	< 0.5						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
SB02	70–80	7/24/98	34.96	2.53	0.00	< 1.2	< 0.5						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
SB02	70–80	6/11/99	25.20	1.88	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
SB02	70–80	4/25/00	39.94		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5		< 0.5
SB02	70–80	4/26/01	43.00	1.69	0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5		< 0.5
SB02	70–80	2/9/02	Dry		0.00																																				
SB02	70–80	3/03	Dry		0.00																																				
SB02	70–80	2/23/04	44.62	2.69	0.00	< 1	< 1	< 1	< 1	< 1	< 3	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1
SB02	70–80	5/19/05	39.85	1.58		< 1	< 1	< 1	< 1	< 1	< 3	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1			< 1	< 1	< 1	< 1
SB03	42.5[c]	7/26/94		30	0.00	17[d]	6.5[d]																																		
SB03	38–43	7/28/94		23	0.00	< 5[e]	< 5[e]																																		
SB03	38–43	4/7/97		18.8	0.00	27	3.4						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1

TABLE A.2 (Cont.)

						Concentration (µg/L)																																			
Well	Screen Interval (ft BGL)	Sample Date	Static Water Level (ft BGL)	Nitrate (mg/L)	Separate-Phase Hydrocarbon Thickness (ft)	Carbon Tetra-chloride	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1,2-Dichloro-ethane	Methyl-tert-butyl ether	Trichloro-ethylene	Tetrachloro-ethylene	1,2-Dichloro-propane	***cis***-1,2-Di-chloroethylene	1,1,1-Tri-chloroethane	1,1,2,2-Tetra-chloroethane	1,1,1,2-Tri-chloroethane	***n***-Butyl-benzene	Isopropyl-toluene	***n***-Propyl-benzene	Isopropyl-benzene	Hexachloro-butadiene	***sec***-Butyl-benzene	1,3,5-Trimethyl-benzene	1,3,4-Trimethyl-benzene	1,2,4-Trimethyl-benzene	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Chlorobenzene	***tert***-Butyl benzene	***m***-Xylene and ρ-Xylene	***o***-Xylene	Bromomethane	1,1,2-Trichloro-ethane	Trichlorofluoro-methane	Bromodichloro-methane
Monitoring wells (Cont.)																																									
SB03	38–43	7/24/98	33.09	24.4	0.00	30	4.1						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
SB03	38–43	6/11/99	24.83	16.9	0.00	7.5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
SB03	38–43	4/25/00	35.10		0.00	48.5	4.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5		< 0.5
SB03	38–43	4/26/01	42.31	8.45	0.00	16.4	1.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5		< 0.5
SB03	38–43	2/9/02	Dry		0.00																																				
SB03	38–43	3/03	Dry		0.00																																				
SB03	38–43	2/23/04	44.37	24.2	0.00	22	2.3	< 1	< 1	< 1	< 3	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1
SB03	38–43	5/19/05	38.84	21.6		19	1.8	< 1	< 1	< 1	< 3	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1			< 1	< 1	< 1	< 1
SB04	79.5[c]	7/31/94		8.9	0.00	< 2[d]	< 2[d]																																		
SB04	69–79	8/1/94			0.00	< 2[d]	< 2[d]																																		
SB04	69–79	8/1/94		7.2	0.00	< 5	< 5																																		
SB04	69–79	4/6/97	Plugged 4/30/97	7.08	0.00	2.3	2.8						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	2.1
SB04A	39–49	7/31/94			0.00	2.3[d]	< 2[d]																																		
SB04A	39–49	7/31/94		11.2	0.00	1 J[f]	1.9 J																																		
SB04A	39–49	4/6/97	Plugged 4/30/97	14.4	0.00	< 1.2	0.98						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
SB05	30–35	7/31/94		39	0.00	< 2[d]	< 2[d]																																		
SB05	30–35	4/7/97	27.04	36.8	0.00	< 1.2	< 0.5						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
SB05	30–35	7/24/98	25.26	35.9	0.00	< 1.2	< 0.5						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
SB05	30–35	6/11/99	14.02	31.6	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
SB05	30–35	4/25/00	26.10		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5		< 0.5
SB05	30–35	4/26/01	33.25	32.81	0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5		< 0.5
SB05	30–35	2/9/02		30	0.00																																				
SB05	30–35	3/03	Dry		0.00																																				
SB05	30–35	2/23/04	35.03	34.3	0.00	< 1	< 1	< 1	< 1	< 1	< 3	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1
SB05	30–35	5/19/05	29.99	23		< 1	< 1	< 1	< 1	< 1	< 3	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1			< 1	< 1	< 1	< 1
RGMW1	27–47	9/27/01	35.00		0.00			15500	16300	2270	11800	407	< 100	262																											
RGMW1	27–47	5/28/02	38.39		0.00			15200	17300	2120	10700	534	< 100	383																											
RGMW1	27–47	8/6/02	37.10		0.00			14700	15900	1730	9050	1150	< 100	< 100																											
RGMW1	27–47	10/17/02	36.00		0.00																																				
RGMW1	27–47	2/7/03	38.30		0.00			17100	18400	2440	11700	820	< 100	392																											
RGMW1	27–47	6/5/03	33.76		0.00	< 100	< 100	11800	9920	1190	5730	146	< 100	568	< 100		<100	< 100	<100	<100	<100	< 100	108	116	< 100	< 100	352	256		938	< 100	< 100	< 100	< 100	< 100	3790	1940	<500	<100	<100	<100
RGMW1	27–47	5/11/04	34.82		0.00	< 10	< 10	15000	25000	2500	11000	410	< 10	520	< 10	< 10	< 10	< 10	< 10	< 10	< 10	35	< 10	170	75	< 10	< 10	540	< 10	1800	< 10	< 10	< 10	< 10	< 10			< 10	< 10	< 10	< 10
RGMW1	27–47	3/25/05	35.40			< 6	< 2.5	5300	3400	450	1890	73		280	< 6	< 2.5	< 2.5		< 2.5	< 2.5		< 5	< 5	< 5	< 5	< 5	< 5	< 5		250	< 5	< 5	< 5	< 3.5	< 5	1300	590	< 15	< 2.5	< 25	< 5
RGMW2	27–46.5	9/27/01	37.00		0.00			25.9	8.2	0.8	38.4	1.5	< 0.5	1.1																											
RGMW2	27–46.5	5/28/02	38.55		0.00			121	2.1	87.8	63.7	8.7	< 0.5	1.5																											
RGMW2	27–46.5	8/6/02	38.22		0.00			18.6	0.7	2.4	5.7	21.1	< 0.5	< 0.5																											
RGMW2	27–46.5	10/17/02	37.51		0.00																																				
RGMW2	27–46.5	2/7/03	40.10		0.00			30.3	< 0.5	24.9	5.7	5.8	< 0.5	2.5																											
RGMW2	27–46.5	6/5/03	35.32		0.00	< 0.5	2.9	72.6	1.3	15.6	4.7	< 0.5	< 0.5	4.4	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.9	0.8	11.4	8.3	< 0.5	3.4	2.2		8.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	3.4	1.3	< 5	< 0.5	< 0.5	< 0.5
RGMW2	27–46.5	5/11/04	36.37		0.00	< 0.5	< 0.5	18	< 0.5	15	6.1	1.6	< 0.5	2.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	6.9	7	< 0.5	5.3	3.3	< 0.5	16	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
RGMW2	27–46.5	3/25/05	36.89			< 1.2	< 0.5	3.4	< 2	2.7		< 10	< 0.5	1.9	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	2.1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
RGMW3	27.5–43	9/27/01			1.03																																				
RGMW3	27.5–43	5/28/02	36.40		0.78																																				
RGMW3	27.5–43	8/6/02	37.88		0.17																																				
RGMW3	27.5–43	10/17/02	35.80																																						
RGMW3	27.5–43	2/7/03	36.25		0.20																																				
RGMW3	27.5–43	6/5/03	33.00		0.02																																				
RGMW3	27.5–43	5/11/04	34.03																																						
RGMW3	27.5–43	3/25/05	34.88		Free product; not sampled.																																				
RGMW4	27.5–42.5	9/27/01	34.00		0.00			1470	1210	136	7860	252	< 100	< 10	< 12	< 5	< 5		< 5	< 5		< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 10	< 10	< 10	< 10	< 7	< 10	< 70	< 70	< 30	< 5	< 50	< 10
RGMW4	27.5–42.5	5/28/02	35.32		0.00			1130	521	651	2170	< 50	< 50																												
RGMW4	27.5–42.5	8/6/02	35.19		0.00			679	353	239	921	158	< 10																												

TABLE A.2 (Cont.)

						Concentration (µg/L)																																		
Well	Screen Interval (ft BGL)	Sample Date	Static Water Level (ft BGL)	Nitrate (mg/L)	Separate-Phase Hydrocarbon Thickness (ft)	Carbon Tetra-chloride	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1,2-Dichloro-ethane	Methyl-tert-butyl ether	Trichloro-ethylene	Tetrachloro-ethylene	1,2-Dichloro-propane	***cis***-1,2-Di-chloroethylene	1,1,1-Tri-chloroethane	1,1,2,2-Tetra-chloroethane	1,1,1,2-Tri-chloroethane	***n***-Butyl-benzene	Isopropyl-toluene	***n***-Propyl-benzene	Isopropyl-benzene	Hexachloro-butadiene	***sec***-Butyl-benzene	1,3,5-Trimethyl-benzene	1,3,4-Trimethyl-benzene	1,2,4-Trimethyl-benzene	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Chlorobenzene	***tert***-Butyl benzene	***m***-Xylene and ρ-Xylene	***o***-Xylene	Bromomethane	1,1,2-Trichloro-ethane	Trichlorofluoro-methane	Bromodichloro-methane
Monitoring wells (Cont.)																																								
RGMW4	27.5–42.5	10/17/02	34.37		0.00																																			
RGMW4	27.5–42.5	2/7/03	36.80		0.00			1640	1100	976	3420	657	< 10																											
RGMW4	27.5–42.5	6/5/03	32.10		0.00	< 10	< 10	1790	566	779	2441	118	< 10	< 10	< 10		< 10	< 10	< 10	< 10	< 10	109	202	268	97	< 10	18	504		1670	< 10	< 10	< 10	< 10	< 10	1830	611	<100	< 10	< 10	< 10
RGMW4	27.5–42.5	5/11/04	33.47		0.00	< 0.5	< 0.5	1300	220	390	770	70	< 0.5	27	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	25	11	72	34	< 0.5	< 0.5	200	< 0.5	370	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
RGMW4	27.5–42.5	3/25/05	33.95			< 12	< 5	1000	180	330	740	< 100	< 5	< 10	< 12	< 5	< 5		< 5	< 5		< 10	< 10	100	27	< 10	< 10	160		490	< 10	< 10	< 10	< 7	< 10	580	160	< 30	< 5	< 50	< 10
RGMW5	21.5–41.5	9/27/01	34.00		0.00			109	< 0.5	< 0.5	55.5	< 0.5	< 0.5	25.4																										
RGMW5	21.5–41.5	5/28/02	34.40		0.00			479	< 2.5	3.6	< 2.5	< 2.5	< 2.5	19.8																										
RGMW5	21.5–41.5	8/6/02	34.26		0.00			502	10.9	7.3	32.1	47.4	< 2.5	27.2																										
RGMW5	21.5–41.5	10/17/02	33.47		0.00																																			
RGMW5	21.5–41.5	2/7/03			0.00			2160	1930	1470	5960	1390	< 100	< 100																										
RGMW5	21.5–41.5	6/5/03	31.86		0.00	< 0.5	< 0.5	18.2	< 0.5	< 0.5	0.6	< 0.5	< 0.5	2.2	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5
RGMW5	21.5–41.5	5/11/04	32.62		0.00	< 0.5	< 0.5	7.5	0.92	0.51	2.5	< 0.5	< 0.5	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
RGMW5	21.5–41.5	3/25/05	33.10			< 1.2	< 0.5	17	< 2	< 2		< 10	< 0.5	3.3	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
PMW6	25–45	5/28/02	Dry		0.00																																			
PMW6	25–45	8/6/02	37.31		0.00			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5																										
PMW6	25–45	2/7/03	38.10		0.00			78.6	90	21.1	89.1	41.9	< 2.5	3.3																										
PMW6	25–45	6/5/03	34.57		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5
PMW6	25–45	5/11/04	36.11		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
PMW6	25–45	3/25/05	22.96		0.00	< 1.2	< 0.5	< 2	< 2	< 2		< 10	< 0.5	< 1	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
PMW7	25–45	5/28/02	34.42		0.00			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.9																										
PMW7	25–45	8/6/02	34.04		0.00			< 0.5	< 0.5	< 0.5	< 0.5	6.7	< 0.5	< 0.5																										
PMW7	25–45	2/7/03	35.33		0.00			5.3	14.1	3.7	20.2	6.4	< 0.5	< 0.5																										
PMW7	25–45	6/5/03	31.78		0.00	9.2	3.4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5
PMW7	25–45	5/11/04	32.69		0.00	6.5	1.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.52	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
PMW7	25–45	3/25/05	32.95 [g]			5.8	1.9	< 2	< 2	< 2		< 10	< 0.5	1.4	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
PMW8	25–45	5/28/02	39.39		0.00			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6																										
PMW8	25–45	8/6/02	38.80		0.00			< 0.5	< 0.5	< 0.5	< 0.5	7.9	< 0.5	< 0.5																										
PMW8	25–45	2/7/03	40.00		0.00			3.5	8.9	2.4	13.6	5	< 0.5	< 0.5																										
PMW8	25–45	6/5/03	36.71		0.00	4.9	2.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.8	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5
PMW8	25–45	5/11/04	37.73		0.00	5.6	2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.52	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
PMW8	25–45	3/25/05	37.80			< 1.2	0.58	< 2	< 2	< 2		< 10	< 0.5	1.3	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
PMW9	25–45	5/28/02	37.48		0.00			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5																										
PMW9	25–45	8/6/02	32.50		0.00			< 0.5	< 0.5	< 0.5	< 0.5	6.5	< 0.5	< 0.5																										
PMW10	25–45	5/8/02	34.67		0.00			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5																										
PMW10	25–45	8/6/02	31.48		0.00			< 0.5	< 0.5	< 0.5	< 0.5	6.1	< 0.5	< 0.5																										
PMW10	25–45	2/7/03	36.72		0.00			4.6	11.5	3.1	17	5.7	< 0.5	< 0.5																										
PMW10	25–45	6/5/03	30.03		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5
PMW10	25–45	5/11/04	30.45		0.00	< 0.5	< 0.5	< 0.5	0.67	< 0.5	1.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.84	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
PMW10	25–45	3/25/05	29.07			< 1.2	< 0.5	< 2	< 2	< 2		< 10	< 0.5	< 1	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
PMW11	21–41	5/28/02	35.01		0.00			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	4.9																										
PMW11	21–41	8/6/02	34.91		0.00			< 0.5	< 0.5	< 0.5	6.8	6.3	< 0.5	< 0.5																										
PMW11	21–41	2/7/03	37.20		0.00			4.4	11.1	3.1	16.5	6	< 0.5	< 0.5																										
PMW11	21–41	6/5/03	32.44		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	12.9	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5
PMW11	21–41	5/11/04	33.22		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	13	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
PMW11	21–41	3/25/05	33.75			< 1.2	< 0.5	< 2	< 2	< 2		< 10	< 0.5	1.4	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
PMW12	23.5–43.5	5/28/02	34.02		0.00			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5																										
PMW12	23.5–43.5	8/6/02	34.30		0.00			< 0.5	< 0.5	< 0.5	< 0.5	6.8	< 0.5	< 0.5																										
PMW12	23.5–43.5	2/7/03	36.10		0.00			2.9	6.2	2.3	9.6	4.1	< 0.5	< 0.5																										
PMW12	23.5–43.5	6/5/03	31.67		0.00	1.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5
PMW12	23.5–43.5	5/11/04	32.86		0.00	1.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.84	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
PMW12	23.5–43.5	3/25/05	33.51			< 1.2	< 0.5	< 2	< 2	< 2		< 10	< 0.5	< 1	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
PMW13	25–45	5/28/02	42.65																																					
PMW13	25–45	8/6/02	38.46		0.00			< 0.5	< 0.5	< 0.5	< 0.5	10	< 0.5	< 0.5																										

TABLE A.2 (Cont.)

						Concentration (µg/L)																																			
Well	Screen Interval (ft BGL)	Sample Date	Static Water Level (ft BGL)	Nitrate (mg/L)	Separate-Phase Hydrocarbon Thickness (ft)	Carbon Tetra-chloride	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1,2-Dichloro-ethane	Methyl-tert-butyl ether	Trichloro-ethylene	Tetrachloro-ethylene	1,2-Dichloro-propane	***cis***-1,2-Di-chloroethylene	1,1,1-Tri-chloroethane	1,1,2,2-Tetra-chloroethane	1,1,1,2-Tri-chloroethane	***n***-Butyl-benzene	Isopropyl-toluene	***n***-Propyl-benzene	Isopropyl-benzene	Hexachloro-butadiene	***sec***-Butyl-benzene	1,3,5-Trimethyl-benzene	1,3,4-Trimethyl-benzene	1,2,4-Trimethyl-benzene	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Chlorobenzene	***tert***-Butyl benzene	***m***-Xylene and ρ-Xylene	***o***-Xylene	Bromomethane	1,1,2-Trichloro-ethane	Trichlorofluoro-methane	Bromodichloro-methane
Monitoring wells (Cont.)																																									
PMW13	25–45	2/7/03	40.00		0.00			16.1	32.2	6.9	37.1	10.6	< 0.5	< 0.5																											
PMW13	25–45	6/5/03	36.90		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5
PMW13	25–45	5/11/04	37.18		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5
PMW13	25–45	3/25/05	36.32			< 1.2	< 0.5	< 2	< 2	< 2		< 10	< 0.5	< 1	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
Private wells																																									
01		12/22/88			0.00	29.8							ND[h]																												
01		6/22/92		18.8	0.00	75.2	6.2	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	0.2		0.35	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
01		10/6/92			0.00	18.8																																			
01		6/9/94		15.8	0.00	22[d]	< 2[d]																																		
01		6/9/94			0.00	18	< 2																																		
01		12/12/96			0.00	1.2[d]	0.19 J						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
01		12/13/96			0.00	13	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
02		6/22/92		7.92	0.00	2.6	0.3	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
02		6/9/94		14	0.00	< 2[d]	< 2[d]																																		
02		6/9/94			0.00	1.9	< 5																																		
02		12/13/96		10.2	0.00	3.0[d]	0.67[d]						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
03		6/22/92		0.66	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
03		6/9/94		0.29	0.00	< 2	< 2																																		
03		12/13/96		0.105	0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											< 0.5	< 0.5	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
04		1/13/89			0.00	15.1							ND																												
04		6/22/92		0.05	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
04		6/9/94		1.05	0.00	< 2[d]	< 2[d]																																		
04		6/9/94			0.00	< 5	< 5																																		
05B		6/22/92		0.09	0.00	< 0.01	< 0.01	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
05A		6/8/94		21	0.00	< 2[d]	< 2[d]																																		
05A		6/8/94			0.00	< 5	< 5																																		
05A		12/11/96			0.00	< 0.1[d]	< 0.5[d]						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
06		6/22/92		2	0.00	0.3	0.3	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
06		6/9/94		5.8	0.00	2.6[d]	< 2[d]																																		
07		6/22/92		5.3	0.00	2.6	0.7	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		0.24	0.34	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	0.11	< 0.04	< 0.02	< 2.0	< 0.1	0.4	< 0.1
07		6/9/94		19.6	0.00	< 2[d]	< 2[d]																																		
08		6/22/92		4.5	0.00	0.6	0.2	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	0.3	< 0.1
08		6/8/94		10.3	0.00	< 2[d]	< 2[d]																																		
09		6/22/92		4.6	0.00	0.2	0.2	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
09		6/8/94		8.3	0.00	< 2[d]	< 2[d]																																		
10		6/22/92		21.5	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
10		6/8/94		16.1	0.00	< 2[d]	< 2[d]																																		
10		12/12/96		16.7	0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											< 0.5	< 0.5	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
11		6/22/92		0.38	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
11		6/8/94		4.3	0.00	< 2[d]	< 2[d]																																		
11		12/22/96		4.46	0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5	< 0.5													< 0.5	< 0.5	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
11		6/12/99		5.89	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
12		6/22/92		15.6	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
12		6/9/94		17.3	0.00	< 2[d]	< 2[d]																																		
12		12/12/96		11.6	0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5	< 0.5													< 0.5	< 0.5	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
12		6/12/99		21.2	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
12		10/4-5/05		Sampling refused by owner.																																					
13		1/13/89	31.32		0.00	2.1							ND																												
13		6/22/92		3.6	0.00	1.5	0.7	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	0.4	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
13		6/10/94		14.4	0.00	< 2[d]	< 2[d]																																		

TABLE A.2 (Cont.)

						Concentration (µg/L)																																			
Well	Screen Interval (ft BGL)	Sample Date	Static Water Level (ft BGL)	Nitrate (mg/L)	Separate-Phase Hydrocarbon Thickness (ft)	Carbon Tetra-chloride	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1,2-Dichloro-ethane	Methyl-*tert*-butyl ether	Trichloro-ethylene	Tetrachloro-ethylene	1,2-Dichloro-propane	*cis*-1,2-Di-chloroethylene	1,1,1-Tri-chloroethane	1,1,2,2-Tetra-chloroethane	1,1,1,2-Tri-chloroethane	*n*-Butyl-benzene	Isopropyl-toluene	*n*-Propyl-benzene	Isopropyl-benzene	Hexachloro-butadiene	*sec*-Butyl-benzene	1,3,5-Trimethyl-benzene	1,3,4-Trimethyl-benzene	1,2,4-Trimethyl-benzene	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Chlorobenzene	*tert*-Butyl benzene	*m*-Xylene and ρ-Xylene	*o*-Xylene	Bromomethane	1,1,2-Trichloro-ethane	Trichlorofluoro-methane	Bromodichloro-methane
Private wells (Cont.)																																									
13		12/11/96		8.15	0.00	1.9	ND						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											< 0.5	< 0.5	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
13		6/12/99		17.5	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
13		10/4/05		4.2 H[i]		2.3	0.55	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
14		1/13/89			0.00	0.7							ND																												
14		6/22/92			0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.01		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
14		6/10/94		0.95	0.00	< 2[d]	< 2[d]																																		
15		1/13/89	30.26		0.00	3.9							ND																												
15		6/22/92		3.6	0.00	1.6	0.5	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	0.26	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
15		6/10/94		5.1	0.00	2.8[d]	< 2[d]																																		
15		12/12/96		3.06	0.00	2.7	0.93						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											< 0.5	< 0.5	< 0.5	< 0.5				18	< 0.5	< 0.5	< 0.5
15		6/12/99		3.25	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
16		6/22/92		2	0.00	0.3	0.3	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.01		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
16		6/11/94		8.4	0.00	< 2[d]	< 2[d]																																		
17		6/22/92		0.22	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.01		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
17		6/9/94		7.1	0.00	< 2[d]	< 2[d]																																		
17		6/9/94			0.00	< 5	< 5																																		
18		6/22/92		0.1	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	0.3	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
18		6/10/94		< 0.1	0.00	< 2[d]	< 2[d]																																		
18		6/10/94			0.00	< 5	< 5																																		
19		6/22/92		0.18	0.00	< 0.1	0.2	< 0.04	0.11	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	0.11	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
19		6/10/94		0.12	0.00	< 2[d]	< 2[d]																																		
19		12/12/96			0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	0.81											< 0.5	0.75	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
19		10/4/05		0.35 H		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
20		12/22/88			0.00	3.8							ND																												
20		6/22/92		1.33	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
20		6/7/94		12.8	0.00	< 2[d]	< 2[d]																																		
21		6/22/92		3.09	0.00	< 0.1	< 0.1	0.57	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
21		6/7/94		3.4	0.00	< 2[d]	< 2[d]																																		
21		12/11/96			0.00	< 0.1[d]	< 0.5[d]						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																						
22		6/22/92		3.41	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
22		6/7/94		2.9	0.00	< 2[d]	< 2[d]																																		
22		6/7/94			0.00	< 5	< 5																																		
23		6/22/92		6.13	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
23		6/7/94		17.1	0.00	< 2[d]	< 2[d]																																		
24		6/22/92		15.6	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
24		6/11/94		12.3	0.00	< 2[d]	< 2[d]																																		
25		6/22/92		4.59	0.00	< 0.1	< 0.1	< 0.04	< 0.03	0.05	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
26		12/22/88			0.00	9.0																																			
26		6/22/92		11.5	0.00	12.4	4.7	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
26		6/9/94		7.7	0.00	4.3[d]	< 2[d]																																		
27		6/22/92		7.7	0.00	2.1	3.3	0.1	0.12	< 0.02	< 0.06	< 0.06	0.3		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	0.05	< 0.01	0.2	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
27		6/8/94		3.6	0.00	< 2[d]	< 2[d]																																		
27		6/8/94			0.00	< 5	< 5																																		
27		9/27/01	30.00		0.00			51.2	167	43.9	241	6.1	< 2.5	< 2.5																											
27		5/28/02	35.07		0.00			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5																											
27		6/5/03	32.30		0.00	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.3	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5
27		5/11/04	33.03		0.00	0.56	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
27		3/25/05	33.55			< 1.2	< 0.5	< 2	< 2	< 2		< 10	< 0.5	< 1	< 1.2	< 0.5	< 0.5		< 0.5	< 0.5		< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 0.7	< 1	< 7	< 7	< 3	< 0.5	< 5	< 1
28		6/23/92		4.8	0.00	2.5	1.4	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	0.06	< 0.01	< 0.02	< 0.05	0.11		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
28		6/9/94		9.4	0.00	< 2[d]	< 2[d]																																		
29		6/23/92		< 0.04	0.00	< 0.1	< 0.1	< 0.04	0.06	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	0.16	< 0.02	< 0.05	< 0.03		0.05	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
29		6/9/94		0.26	0.00	< 2[d]	< 2[d]																																		
30		6/23/92		1.1	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1

TABLE A.2 (Cont.)

						Concentration (µg/L)																																			
Well	Screen Interval (ft BGL)	Sample Date	Static Water Level (ft BGL)	Nitrate (mg/L)	Separate-Phase Hydrocarbon Thickness (ft)	Carbon Tetra-chloride	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1,2-Dichloro-ethane	Methyl-*tert*-butyl ether	Trichloro-ethylene	Tetrachloro-ethylene	1,2-Dichloro-propane	*cis*-1,2-Di-chloroethylene	1,1,1-Tri-chloroethane	1,1,2,2-Tetra-chloroethane	1,1,1,2-Tri-chloroethane	*n*-Butyl-benzene	Isopropyl-toluene	*n*-Propyl-benzene	Isopropyl-benzene	Hexachloro-butadiene	*sec*-Butyl-benzene	1,3,5-Trimethyl-benzene	1,3,4-Trimethyl-benzene	1,2,4-Trimethyl-benzene	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Chlorobenzene	*tert*-Butyl benzene	*m*-Xylene and ρ-Xylene	*o*-Xylene	Bromomethane	1,1,2-Trichloro-ethane	Trichlorofluoro-methane	Bromodichloro-methane
Private wells (Cont.)																																									
30		6/10/94		3.62	0.00	< 2[d]	9.1[d]																																		
31		6/23/92		10.9	0.00	0.2	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
31		6/11/94		6.8	0.00	< 2[d]	< 2[d]																																		
31		12/13/96		6.56	0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											< 0.5	< 0.5	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
32		6/23/92	21.60	12.1	0.00	< 0.1	< 0.1	< 0.04	0.13	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	0.02	< 2.0	< 0.1	< 0.1	< 0.1
32		6/11/94		9.8	0.00	< 2[d]	< 2[d]																																		
32		12/12/96		8.02	0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											< 0.5	< 0.5	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
33		6/23/92	25[j]	6.63	0.00	0.2	< 0.1	< 0.04	0.08	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
33		6/11/94		9	0.00	< 2[d]	< 2[d]																																		
33		12/12/96		7.17	0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											< 0.5	< 0.5	< 0.5	< 0.5				1.4	< 0.5	< 0.5	< 0.5
33		6/12/99		8.79	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
34		2/10/89			0.00	3.8							ND																												
34		6/23/92		5.06	0.00	0.3	0.2	< 0.04	0.05	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
34		6/10/94		< 0.1	0.00	< 2[d]	< 2[d]																																		
34		6/10/94			0.00	< 5	< 5																																		
35		6/23/92	35[j]	7.24	0.00	0.6	0.2	< 0.04	1.1	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
35		6/10/94		9.39	0.00	2.3[d]	< 2[d]																																		
35		12/12/96		8.27	0.00	1.1	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											< 0.5	< 0.5	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
35		10/4/05		5.8 H		1.4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
36		6/23/92		8.42	0.00	0.5	0.2	< 0.04	0.28	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	0.07	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
36		6/10/94		11.8	0.00	2.2[d]	< 2[d]																																		
36		6/10/94			0.00	1.2	< 5																																		
37		1/13/89	35[j]		0.00	1.8							ND																												
37		6/23/92	35[j]	7.87	0.00	0.6	< 0.1	< 0.04	0.07	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	0.58	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
37		6/8/94		10.4	0.00	< 2[d]	< 2[d]																																		
37		6/8/94			0.00	< 5	< 5																																		
37		12/13/96		35.3	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
37		6/12/99		30.3	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
38		11/9/88	30.39		0.00	16.4							1.2																												
38		6/23/92		3.52	0.00	0.4	2.7	486	21.8	3.84	38.6	< 0.06	3.1		< 0.01	0.04	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	2.26	0.55	< 0.03	1.04	< 0.02	< 0.05	1.59		2.59	< 0.02	< 0.02	< 0.01	0.58	0.81	17.8	20.8	< 2.0	< 0.1	< 0.1	< 0.1
38		6/10/94		7.1	0.00	< 2[d]	< 2[d]																																		
38		6/10/94			0.00	< 5	< 5																																		
38		12/13/96	30.39		0.00	< 0.1[d]	< 0.5[d]						< 10[d]		0.04 J	0.04 J		25[d]	0.08J	2.2[d]																					
38		12/13/96	30.39		0.00	< 500	< 500	370	1700	770	12600	400	< 500		< 500		<500	< 500	<500	<500	<500	< 500	< 500	330	< 500	< 500	< 500	920		3700	< 500	< 500	< 500	< 500	< 500	9000	3600	<500	<500	<500	<500
39		12/22/88			0.00	1.7							ND																												
39		6/23/92		9.92	0.00	1.4	0.2	< 0.04	< 0.03	0.02	0.1	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
39		6/10/94		13.1	0.00	< 2[d]	< 2[d]																																		
39		6/10/94			0.00	< 5	< 5																																		
40		6/23/92		8.5	0.00	0.8	0.2	< 0.04	0.28	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	0.1		< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
40		6/10/94		10.1	0.00	2.5[d]	< 2[d]																																		
40		12/13/96		9.29	0.00	1	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											< 0.5	< 0.5	< 0.5	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
41		6/23/92		8.48	0.00	0.2	< 0.1	< 0.04	0.37	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
41		6/10/94		3.5	0.00	< 2[d]	< 2[d]																																		
42		6/23/92	35[j]	5.76	0.00	0.2	< 0.1	< 0.04	0.16	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
42		6/10/94		9.5	0.00	< 2[d]	< 2[d]																																		
42		6/10/94			0.00	< 5	< 5																																		
42		12/12/96		17.3	0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											0.57	1.1	0.52	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
42		6/12/99		28.3	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
42		10/5/05		13 H		0.68	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
43		6/23/92		9.59	0.00	0.2	0.2	< 0.04	0.16	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
43		6/9/94		0.11	0.00	< 2[d]	< 2[d]																																		
44	40–68	6/23/92		16.6	0.00	< 0.1	< 0.1	< 0.04	0.12	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
44	40–68	6/11/94		4.9	0.00	< 2[d]	< 2[d]																																		

TABLE A.2 (Cont.)

						Concentration (µg/L)																																			
Well	Screen Interval (ft BGL)	Sample Date	Static Water Level (ft BGL)	Nitrate (mg/L)	Separate-Phase Hydrocarbon Thickness (ft)	Carbon Tetra-chloride	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1,2-Dichloro-ethane	Methyl-***tert***-butyl ether	Trichloro-ethylene	Tetrachloro-ethylene	1,2-Dichloro-propane	***cis***-1,2-Di-chloroethylene	1,1,1-Tri-chloroethane	1,1,2,2-Tetra-chloroethane	1,1,1,2-Tri-chloroethane	***n***-Butyl-benzene	Isopropyl-toluene	***n***-Propyl-benzene	Isopropyl-benzene	Hexachloro-butadiene	***sec***-Butyl-benzene	1,3,5-Trimethyl-benzene	1,3,4-Trimethyl-benzene	1,2,4-Trimethyl-benzene	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Chlorobenzene	***tert***-Butyl benzene	***m***-Xylene and ρ-Xylene	***o***-Xylene	Bromomethane	1,1,2-Trichloro-ethane	Trichlorofluoro-methane	Bromodichloro-methane
Private wells (Cont.)																																									
44	40–68	12/11/96			0.00	0.04[d]	< 0.5[d]						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
44	40–68	12/11/96			0.00	0.06[d]	< 0.5[d]						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
45		6/23/92		5.03	0.00	< 0.1	< 0.1	< 0.04	0.18	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	0.24	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
45		6/11/94		4.8	0.00	< 2[d]	< 2[d]																																		
45		6/11/94			0.00	< 5	< 5																																		
45		12/13/96		3.79	0.00	< 0.1[d]	< 0.5[d]						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
45		6/11/99		3.7	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
46		6/23/92		9.98	0.00	0.1	0.1	< 0.04	0.2	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	0.2	< 0.1	< 0.1
46		6/11/94		10.9	0.00	< 2[d]	< 2[d]																																		
46		8/13/98		29.1	0.00	< 1.2	< 0.5						< 0.5		< 1.2		< 0.5		< 0.5	< 0.5											< 1	< 1	< 1	< 0.7					< 0.5	< 5	< 1
47		6/23/92		1.36	0.00	0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
47		6/11/94		7.5	0.00	2.2[d]	< 2[d]																																		
47		6/11/94			0.00	1.7	< 5																																		
47		12/13/96		9.44	0.00	0.75[d]	0.17 J						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
47		6/12/99		40	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
48	70–80	12/22/88			0.00	45.5							ND																												
48	70–80	6/23/92		20.3	0.00	188	7.2	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		0.45	< 0.06	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
49		6/23/92		6.73	0.00	2.9	0.5	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	42.7	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	0.1	< 0.1
49		6/9/94		8.2	0.00	< 2[d]	< 2[d]																																		
50		6/23/92		1.67	0.00	0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	0.1	< 0.1
50		6/8/94		4.9	0.00	< 2[d]	< 2[d]																																		
51		6/23/92		6.53	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.5	< 0.03	< 0.3	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
51		6/9/94		10.5	0.00	< 2[d]	< 2[d]																																		
51		12/13/96		78.8	0.00	< 0.5	< 0.5						< 0.5		< 0.5		< 0.5		< 0.5	< 0.5											0.94	0.69	0.75	0.78				< 0.5	< 0.5	< 0.5	< 0.5
51		6/12/99		50.8	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
51A		6/9/94		10	0.00	< 2[d]	< 2[d]																																		
52		6/23/92		29.1	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
52		6/8/94		29	0.00	< 2[d]	< 2[d]																																		
53		6/23/92		8.4	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.5	< 0.03	< 0.3	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
53		6/11/94		6.3	0.00	< 2[d]	< 2[d]																																		
54		12/22/88			0.00	3.3							ND																												
54		6/24/92		0.21	0.00	< 0.1	< 0.1	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
54		6/8/94		1.52	0.00	< 2[d]	< 2[d]																																		
54		6/8/94			0.00	< 5	< 5																																		
55		12/22/88			0.00	5.0							0.7																												
55		6/24/92		0.55	0.00	1.5	10.3	488	198	92.5	859	< 0.06	2.5		0.21	0.1	0.1	< 0.01	0.1	< 0.1	< 0.1	42.7	3.17	3.05	6.29	< 0.02	0.52	64.4		169	2.5	< 0.02	0.51	< 0.02	< 0.03	666	193	< 2.0	< 0.1	0.1	< 0.1
55		10/6/92			0.00	< 0.1		154																																	
56	70–90	6/24/92		7.72	0.00	< 0.1	0.2	< 0.04	0.38	0.15	1.9	< 0.06	< 0.1		< 0.01	< 0.06	0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	0.11	0.04	0.02	< 0.02	< 0.05	0.23		0.59	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	1.16	0.74	< 2.0	< 0.1	< 0.1	< 0.1
56	70–90	6/11/94		6	0.00	< 2[d]	< 2[d]																																		
57		6/24/92		4.55	0.00	< 0.1	< 0.1	< 0.04	0.2	0.04	0.39	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	0.07		0.12	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	0.26	0.13	< 2.0	< 0.1	< 0.1	< 0.1
57		6/11/94		5.9	0.00	< 2[d]	< 2[d]																																		
58		1/13/89			0.00	27.5							ND																												
58		6/24/92		12.5	0.00	27.1	2.6	< 0.04	0.03	< 0.02	< 0.06	< 0.06	0.1		0.28	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
58		10/6/92			0.00	7.1		0.4					ND																												
58		6/8/94		11.3	0.00	18[d]	< 2[d]																																		
58		6/8/94			0.00	16	2.3																																		
58		6/8/94			0.00	< 2[d]	< 2[d]																																		
58		12/11/96			0.00	< 0.1[d]	< 0.5[d]						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
59		6/24/92		6.02	0.00	8.8	0.6	< 0.04	< 0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
59		6/9/94		10.2	0.00	7.2[d]	< 2[d]																																		
59		6/9/94			0.00	7	1.3																																		
59		10/5/05		4.4 H		8	1.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.5	< 0.5	< 0.5	< 0.5
60		7/27/94		13.2	0.00	41	6																																		

TABLE A.2 (Cont.)

						Concentration (µg/L)																																		
Well	Screen Interval (ft BGL)	Sample Date	Static Water Level (ft BGL)	Nitrate (mg/L)	Separate-Phase Hydrocarbon Thickness (ft)	Carbon Tetra-chloride	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1,2-Dichloro-ethane	Methyl-***tert***-butyl ether	Trichloro-ethylene	Tetrachloro-ethylene	1,2-Dichloro-propane	***cis***-1,2-Di-chloroethylene	1,1,1-Tri-chloroethane	1,1,2,2-Tetra-chloroethane	1,1,1,2-Tri-chloroethane	***n***-Butyl-benzene	Isopropyl-toluene	***n***-Propyl-benzene	Isopropyl-benzene	Hexachloro-butadiene	***sec***-Butyl-benzene	1,3,5-Trimethyl-benzene	1,3,4-Trimethyl-benzene	1,2,4-Trimethyl-benzene	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Chlorobenzene	***tert***-Butyl benzene	***m***-Xylene and ρ-Xylene	***o***-Xylene	Bromomethane	1,1,2-Trichloro-ethane	Trichlorofluoro-methane	Bromodichloro-methane
Private wells (Cont.)																																								
61	80–100	6/15/94	~64	28	0.00	< 2[d]	< 2[d]																																	
62		6/8/94		12.5	0.00	< 2[d]	< 2[d]																																	
62		12/13/96		11.2	0.00	< 0.5	< 0.5						< 0.5		0.75		< 0.5		< 0.5	< 0.5										0.68	0.57	0.65	< 0.5				< 0.5	< 0.5	< 0.5	< 0.5
64		6/8/94		26	0.00	< 2[d]	< 2[d]																																	
64		6/8/94			0.00	< 5	< 5																																	
65		6/9/94		0.1	0.00	< 2[d]	< 2[d]																																	
66		6/23/92			0.00	8.8	0.6	< 0.04	0.03	< 0.02	< 0.06	< 0.06	< 0.1		< 0.01	< 0.06	< 0.1	< 0.01	< 0.1	< 0.1	< 0.1	< 0.05	< 0.03	< 0.03	< 0.01	< 0.02	< 0.05	< 0.03		< 0.03	< 0.02	< 0.02	< 0.01	< 0.02	< 0.03	< 0.04	< 0.02	< 2.0	< 0.1	< 0.1	< 0.1
66		6/10/94		13.9	0.00	< 2[d]	< 2[d]																																	
66		12/11/96		11	0.00	0.93[d]	< 0.5[d]						320[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
67		6/12/94		13.9	0.00	< 2[d]	< 2[d]																																	
Applegate		1/13/89			0.00	3.7							ND																											
Beaver		2/10/89			0.00	3.6							ND																											
Wingerd		12/12/96	53.75	4.2	0.00	< 0.1[d]	< 0.5[d]						< 10[d]		< 0.5[d]	< 0.2[d]		< 10[d]	<0.5[d]	< 1[d]																					
Wingerd		6/12/99		19	0.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5

[a] Not detected at the indicated quantitation limit.

[b] Empty cell indicates that the information is not available.

[c] Samples were collected at the depth(s) listed.

[d] On-site testing.

[e] The trip blank accompanying this sample was analyzed with a result of 13 µg/L, suggesting that the sample and trip blank might have been switched.

[f] Qualifier J indicates an estimated concentration below the method quantitation limit.

[g] Static water level for PMW7 on 3/25/05 is as reported in the field log in the report by Associated Environmental. A value of 33.95 appeared in the report's table and figure.

[h] Not detected at a detection limit not specified in the original report.

[i] Qualifier H indicates that holding time was exceeded for nitrate analysis (applies to all October 2005 private well samples).

[j] Information provided by well owner.

Appendix B:

Detailed Results of Soil and Soil Gas Sampling in Previous Investigations

TABLE B.1 Results of headspace analyses on soil samples collected by the EPA in September 1992 to determine the source of carbon tetrachloride and benzene contamination. Results are normalized to a 70-g sample. Data are from KDHE (1993). See Appendix C for EPA location maps and data tables.[a]

			Field Laboratory[b]				Off-site Laboratory[c]			
Sample Location	Located at CCC or Co-op	Depth (ft BGL)	CCl_4 (ppmv)	CCl_4 (µg/L)	Benzene (ppmv)	Benzene (µg/L)	CCl_4 (µg/m^3)	CCl_4 (µg/L)	Benzene (µg/m^3)	Benzene (µg/L)
Point 1	Co-op	2-3	< 0.020	ND[d]	NA[e]	NA				
Point 1	Co-op	12-13	< 0.020	ND	NA	NA				
Point 1	Co-op	15-16	0.176	1.105	NA	NA				
Point 1	Co-op	17-18	0.637	3.999	NA	NA				
Point 2	CCC	5-6	0.100	0.628	NA	NA				
Point 2	CCC	7.5-8.5	0.021	0.132	NA	NA				
Point 2	CCC	17-18	0.112	0.703	NA	NA				
Point 3	CCC	5-6[f]	0.338	2.122	NA	NA	< 20	< 0.02		
Point 3	CCC	17-18[f]	0.160	1.005	NA	NA	< 20	< 0.02		
Point 3	CCC	17-18 Dup[g]	0.159	0.998	NA	NA				
Point 4	CCC	5-6	< 0.020	ND	NA	NA				
Point 5	CCC	5-6	< 0.020	ND	NA	NA				
Point 5	CCC	16-17	< 0.020	ND	NA	NA				
Point 6	CCC	4-5	0.059	0.370	NA	NA				
Point 6	CCC	15-16	< 0.020	ND	NA	NA				
Point 7	Co-op	4-5	< 0.020	ND	NA	NA				
Point 7	Co-op	16-17	< 0.020	ND	NA	NA				
Point 8	Co-op	4-5	< 0.020	ND	NA	NA				
Point 8	Co-op	16-17	< 0.020	ND	NA	NA				
Point 9	–	4-5	< 0.020	ND	NA	NA				
Point 9	–	15-16	< 0.020	ND	NA	NA				
Point 10	–	5-6	< 0.020	ND	NA	NA				
Point 10	–	5-6 Dup[g]	< 0.020	ND	NA	NA				
Point 10	–	5-6[h]	< 0.020	ND	NA	NA				
Point 10	–	15-16	< 0.020	ND	NA	NA				
Point 11	Co-op	5-6	0.620	3.893	NA	NA				
Point 11	Co-op	5-6[h]	0.424	2.662	NA	NA				
Point 11	Co-op	12-13	0.635	3.987	NA	NA				
Point 11	Co-op	12-13[h]	0.129	0.810	NA	NA				

TABLE B.1 (Cont.)

Sample Location	Located at CCC or Co-op	Depth (ft BGL)	Field Laboratory[b]				Off-site Laboratory[c]			
			CCl_4 (ppmv)	CCl_4 (µg/L)	Benzene (ppmv)	Benzene (µg/L)	CCl_4 (µg/m^3)	CCl_4 (µg/L)	Benzene (µg/m^3)	Benzene (µg/L)
Point 12	Co-op	6-7[e]	1.530	9.606	NA	NA	220	0.220		
Point 12	Co-op	6-7 Dup[f]	1.526	9.581	NA	NA				
Point 12	Co-op	11.5-12.5	190	1193	NA	NA	170,000-620,000	170-620		
Point 13	–	3-4[e]	NA	NA	0.065	0.207			< 100	< 0.1
Point 14	–	3-4	NA	NA	0.064	0.204				
Point 15	CCC	5-6	< 0.020	ND	NA	NA				

[a] Quality analysis summary: Though little quality control information is available for this investigation in the KDHE (1993) preliminary assessment report, an EPA memo discussing quality is included in a later preliminary assessment report (E&E 1996). The supporting documentation is adequate to assign a generally high level of confidence to these analytical data.

[b] Data from field laboratory were reported in ppmv. Conversion to µg/L was accomplished by using the following equation: µg/L = ppmv × molecular weight/24.5.

[c] Data from off-site laboratory were reported in µg/m^3. Conversion to µg/L was accomplished by using the following equation: µg/L = µg/m^3 ÷ 1000. Samples sent to off-site laboratory were collected after the other samples. The depths and locations are poorly documented.

[d] ND, not detected at the method quantitation limit indicated.

[e] NA, not analyzed.

[f] Presumed depth for sample sent to off-site laboratory.

[g] Duplicate analysis; second aliquot from single sample container.

[h] Replicated sample; second sample collected at single location.

TABLE B.2 Analytical results for soil gas samples collected in October 1992 by the KDHE Storage Tank Section to determine the source of benzene contamination. Data are from KDHE (1993). See Appendix C for KDHE location map and data tables.

Sample Location	Depth (ft BGL)	Field Laboratory Results (µg/L)			
		Benzene	Toluene	Ethylbenzene	Xylene
Probe #2	9	ND[a]	ND	ND	ND
Probe #3	9	ND	ND	ND	ND
Probe #4	9	ND	ND	2	13
Probe #4	21	68	41	6	44
Probe #5	18	1	ND	ND	5

[a] ND, not detected.

TABLE B.3 Analytical results for soil gas samples collected by Tetra Tech in April 1997 to identify carbon tetrachloride source areas. Data are from Tetra Tech (1999a). See Appendix D for Tetra Tech maps and data tables.[a]

Sample Date	Sample Identifier[b]	Located at CCC or Co-op	Depth (ft BGL)	Field Laboratory Results (µg/L)[c]					Off-site Laboratory Results[d]			
				CCl_4	$CHCl_3$	TCE	PCE	TCA	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	CCl_4 (µg/L)	$CHCl_3$ (µg/L)
4/7/97	GP-1-8	Co-op	8	< 0.01	< 1	< 0.05	< 0.01	< 0.01				
4/7/97	GP-1-20	Co-op	20	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-2-14	Co-op	14	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-2-20	Co-op	20	0.02	< 0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-3-20	Co-op	20	0.12	< 0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-4-20[e]	CCC	20	5.1[f]	0.70	< 0.05	< 0.01	< 0.01	1.9	0.3	11.93	1.46
4/7/97	GP-4-20 Dup	CCC	20	0.39	0.04	< 0.05	< 0.01	< 0.01				
4/7/97	GP-4-20 Trip	CCC	20	0.21	0.02	< 0.05	< 0.01	< 0.01				
4/7/97	GP-5-20	CCC	17-20	0.73	< 0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-5-20 Dup	CCC	17-20	0.44	0.030	< 0.05	< 0.01	< 0.01				
4/7/97	GP-5-20 Trip	CCC	17-20	5.13[g]	< 0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-6-20	CCC	20	0.01	< 0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-7-20	CCC	20	0.18	0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-7-20 Dup	CCC	20	0.18	0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-8-20	Co-op	20	0.05	< 0.01	< 0.05	< 0.01	< 0.01				
4/7/97	GP-10-20	Co-op	20	1.47	< 0.01	< 0.05	< 0.01	< 0.01	0.27	< 0.13	1.7	ND[h]
4/8/97	GP-11-20	–	20	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01				

Footnotes on next page.

TABLE B.3 Footnotes

[a] Quality analysis summary: Plains Environmental Services, under contract to Tetra Tech, collected these soil gas samples by using a Geoprobe and performed on-site analyses. Replication of the analytical results was poor and did not meet the established quality control limits. Therefore, the level of confidence in these analytical data is low. Specific quality control problems include the following: no record of ambient air blanks and patterns of analytical results that suggest carryover from standards to samples; variability in purge volume during sampling, in run time, and in carbon tetrachloride retention during analyses; and relative percent difference levels as high as 168% and 174%.

[b] Identifier includes location (e.g., GP-1) and depth (e.g., -8 for depth of 8 ft BGL).

[c] Abbreviations: TCE, trichloroethylene; PCE, tetrachloroethylene; TCA, trichloroethane.

[d] Data from field laboratory were reported in ppmv. Conversion to µg/L was accomplished by using the following equation: µg/L = ppmv × molecular weight/24.5.

[e] Location noted in field log is inconsistent with mapped location.

[f] Value qualified as saturated by analyst.

[g] Sample followed three standards, with no ambient blank. Analyst noted shift in retention time due to late start (variability in purge time).

[h] ND, not detected.

TABLE B.4 Analytical results for soil samples collected by Tetra Tech in April 1997 to identify source areas. Data are from Tetra Tech (1999a). See Appendix D for Tetra Tech maps and data tables.

				Field Laboratory Results[b]							Off-site Laboratory Results (µg/kg)	
				Concentration (µg/L)		Concentration (µg/kg)						
Sample Date	Sample Identifier[a]	Located at CCC or Co-op	Depth (ft BGL)	CCl_4	$CHCl_3$	CCl_4	$CHCl_3$	TCE	PCE	TCA	CCl_4	$CHCl_3$
4/8/97	GP-4-20	CCC	20	0.2	0.16	1.5	1	< 0.1	< 0.1	< 0.1	< 1.2	< 0.5
4/7/97	GP-9-20	Co-op	20	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	NA[c]	NA
4/8/97	GP-10-20	Co-op	20	1.3[d]	1.03[d]	0.2	< 0.1	< 0.1	< 0.1	< 0.1	NA	NA

[a] Identifier includes location (e.g., GP-4) and depth (e.g., -20 for depth of 20 ft BGL).

[b] Results reported by field laboratory as µg/L and converted by Tetra Tech for the CAS report (Tetra Tech 1999a) to µg/kg; insufficient information to verify conversion to µg/kg.

[c] NA, not analyzed.

[d] Value inconsistent with result converted to µg/kg.

TABLE B.5 Analytical results for soil samples collected by Tetra Tech in April 1997 for nitrate analyses in off-site laboratory. Data are from Tetra Tech (1999a). See Appendix D for Tetra Tech maps and data tables.

Sample Date	Sample Location	Located at CCC or Co-op	Depth (ft BGL)	Nitrate (mg/kg)
4/8/97	GP-2	Co-op	1	17.1
4/8/97	GP-2	Co-op	5	0.65
4/8/97	GP-4	CCC	1	0.84
4/8/97	GP-4	CCC	5	0.96
4/8/97	GP-10	Co-op	1	1.49
4/8/97	GP-10	Co-op	5	0.67
4/8/97	GP-12	Co-op	1	9.44
4/8/97	GP-12	Co-op	5	0.64
4/8/97	GP-13	Co-op	1	4.05
4/8/97	GP-13	Co-op	5	1.43
4/8/97	GP-14	Co-op	1	5.13
4/8/97	GP-14 Dup	Co-op	1	6.87
4/8/97	GP-14	Co-op	5	1.42
4/8/97	GP-15	CCC	1	9.17
4/8/97	GP-15 Dup	CCC	1	4.28
4/8/97	GP-15	CCC	5	0.41
4/8/97	GP-16	Co-op	1	9.05
4/8/97	GP-16	Co-op	5	1.94

TABLE B.6 Organic analytical results for soil samples collected by Tetra Tech in June 1998, during installation of MW01 at the former CCC/USDA facility, and analyzed by off-site laboratory. Data are from Tetra Tech (1999a). See Appendix D for Tetra Tech maps and data tables.

Sample Date	Depth (ft BGL)	Concentration (µg/kg)	
		CCl_4	$CHCl_3$
6/27/98	5	< 30	< 13
6/27/98	10	< 30	< 13
6/27/98	10 Dup	< 30	< 13
6/27/98	15	< 30	< 13

[a] Methylene chloride was present in all samples at concentrations similar to that in blanks but is not reported. No other compounds were detected.

Appendix C:

Analytical Documentation for Soil and Soil Gas Samples from the Preliminary Assessment (KDHE 1993)

PRELIMINARY ASSESSMENT

CITY OF RAMONA
MARION COUNTY, KANSAS

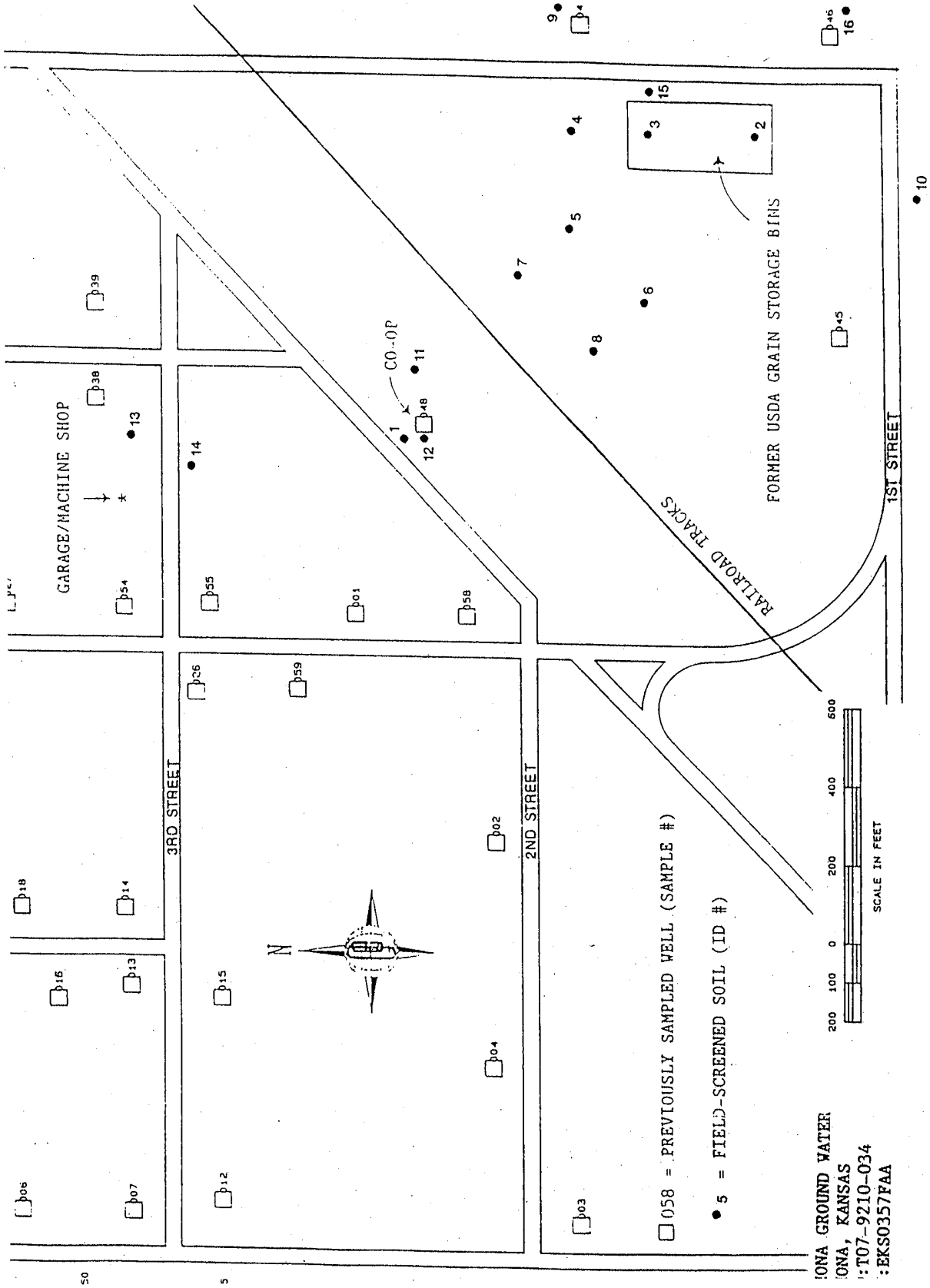
CERCLIS Identification Number
KSD985012186

Kansas Department of Health and Environment
Bureau of Environmental Remediation
Pre-Remedial Unit/Remedial Section

March 1993

ATTACHMENT 3

U.S. EPA Soil Gas Investigation Sample Location Map and Table of Results


GARAGE/MACHINE SHOP
CO-OP
FORMER USDA GRAIN STORAGE BINS
RAILROAD TRACKS
1ST STREET
2ND STREET
3RD STREET
N
058 = PREVIOUSLY SAMPLED WELL (SAMPLE #)
5 = FIELD-SCREENED SOIL (ID #)
SCALE IN FEET
200 100 0 200 400 600
GROUND WATER
KANSAS
T07-9210-034
EKS0357FAA

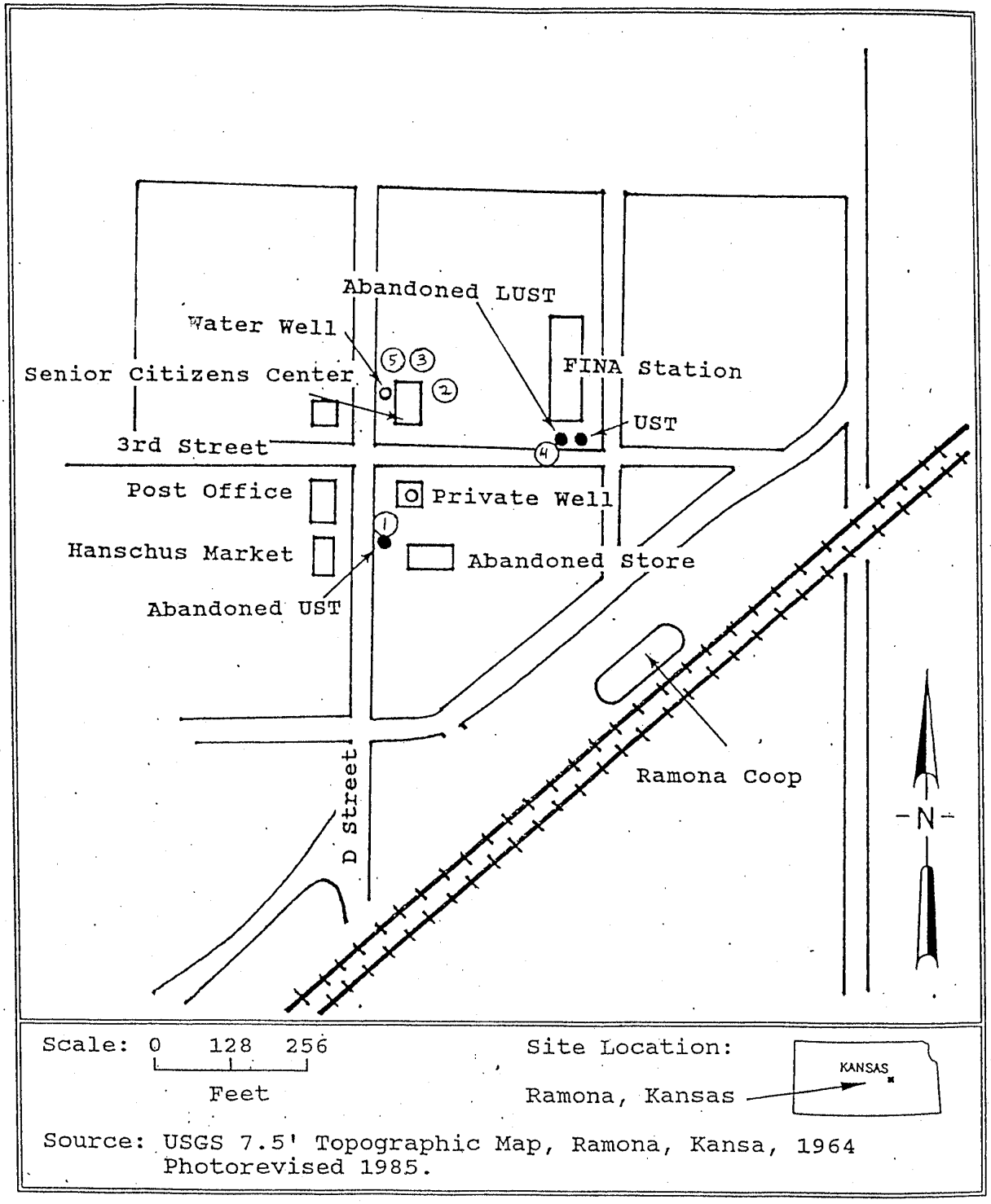
PHOTOVAC GC SCREENING RESULTS

SAMPLE LOCATION	DEPTH	CONCENTRATION OF HEAD SPACE VAPOR (ppmv)* CARBON TETRACHLORIDE	BENZENE
Point 1	2'-3'	< 0.020	NA
"	12'-13'	< 0.020	NA
"	15'-16'	0.176	NA
"	17'-18'	0.637	NA
Point 2	5'-6'	0.100	NA
"	7.5'-8.5'	0.021	NA
"	17'-18'	0.112	NA
Point 3	5'-6'	0.338	NA
"	17'-18'	0.160	NA
Point 4	5'-6'	< 0.020	NA
Point 5	5'-6'	< 0.020	NA
"	16'-17'	< 0.020	NA
Point 6	4'-5'	0.059	NA
"	15'-16'	< 0.020	NA
Point 7	4'-5'	< 0.020	NA
"	16'-17'	< 0.020	NA
Point 8	4'-5'	< 0.020	NA
"	16'-17'	< 0.020	NA
Point 9	4'-5'	< 0.020	NA
"	15'-16'	< 0.020	NA
Point 10	5'-6'	< 0.020	NA
"	5'-6'(C)	< 0.020	NA
"	15'-16'	< 0.020	NA
Point 11	5'-6'	0.620 (estimated)	NA
"	5'-6'(C)	0.424	NA
"	12'-13'	0.635	NA
"	12'-13'(C)	0.129	NA
Point 12	6'-7'	1.530	NA
"	11.5'- 12.5'	190.000	NA
Point 13	3'-4'	NA	0.065
Point 14	3'-4'	NA	0.064
Point 15	5'-6'	< 0.020	NA

* = All values normalized to a 70-gram soil sample.
C = Collocated soil sample.

ATTACHMENT 4

KDHE/BER Soil Gas Investigation
Sample Location Map
and
Table of Results



Prepared by the KDHE/BER November 1992

Figure 3: Sampling Location Map - Ramona LUST Site

TABLE 3

RAMONA LUST SITE
FIELD SCREENING ANALYTICAL DATA
OCTOBER 22, 1992

Probe #	Depth (feet)	Contaminant concentrations in µg/L			
		Benzene	Toluene	E-Benzene	Xylene
#1 GW	12'	ND	ND	ND	ND
#2 SG	9'	ND	ND	ND	ND
#3 SG	9'	ND	ND	ND	ND
#4 SG	9'	ND	ND	2	13
#4 SG	21'	68	41	6	44
#5 SG	18'	1	ND	ND	5
Well*	---	ND	ND	ND	ND

Notes: E-Benzene = Ethylbenzene
ND = Non Detect
Xylene = Total meta, para, and ortho Xylene
GW = Ground Water
SG = Soil Gas
* = Water sample obtained out of tap at Senior Citizen,s Center, depth of well unknown.

Source: KDHE/BER Ramona Lust Site Field Notes, 1992.
All field analysis performed by head space methodology on a Shimadzu gas chromatograph using a flame ionization and photo-ionization detectors.

Appendix D:

Analytical Documentation for Soil and Soil Gas Samples from the Corrective Action Study (Tetra Tech 1999a)

CORRECTIVE ACTION STUDY OF THE RAMONA GROUNDWATER CONTAMINATION SITE RAMONA, MARION COUNTY, KANSAS

PHASE I REVISED FINAL REPORT

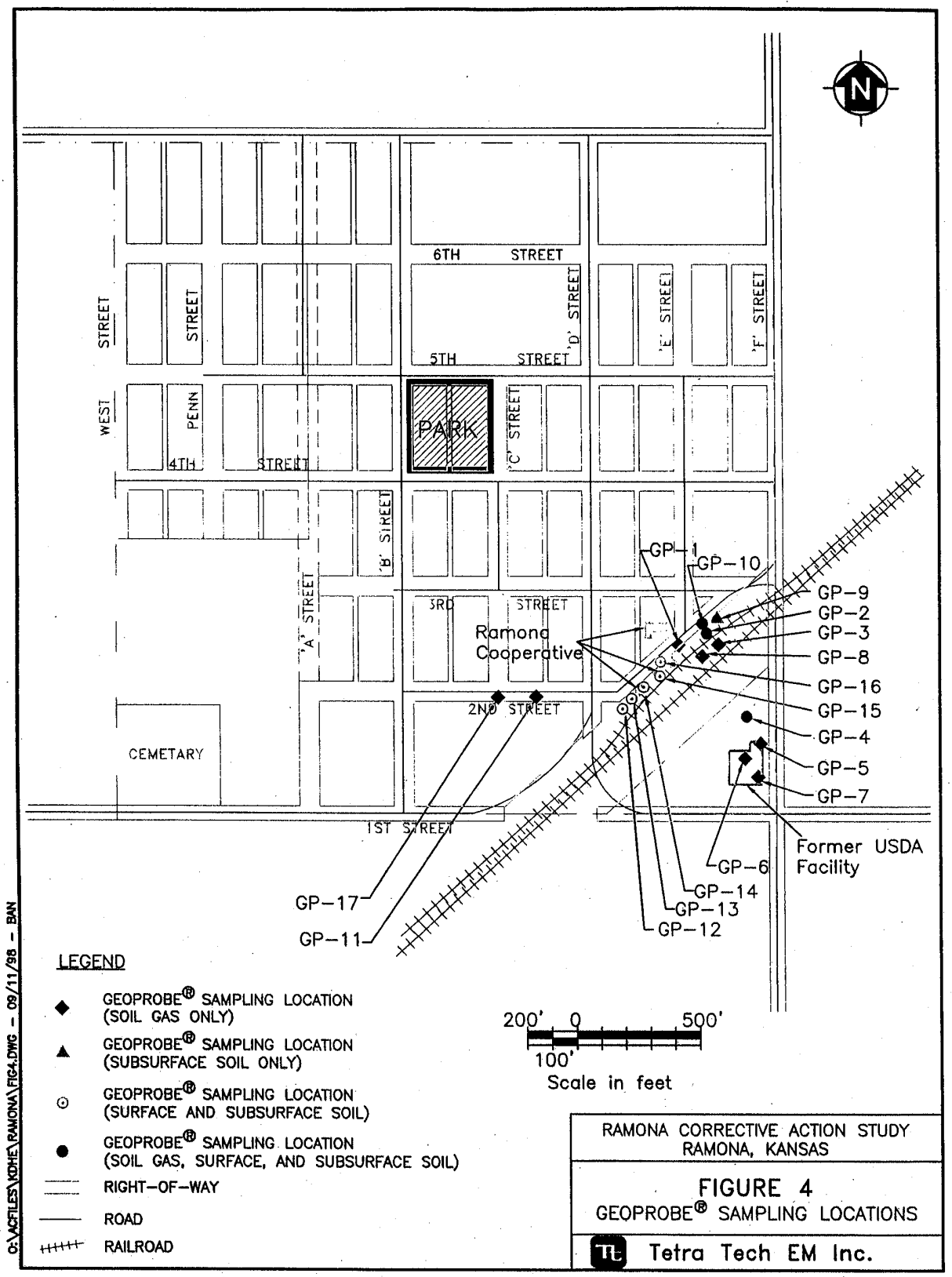
RECEIVED
JAN 15 1999
BUREAU OF ENVIRONMENTAL REMEDIATION

Prepared for:

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
Bureau of Environmental Remediation
Topeka, Kansas 66620-0001

Work Assignment Number	:	04
Date Prepared	:	January 13, 1999
Contract Number	:	32453
Prepared By	:	Tetra Tech EM Inc.
Project Manager	:	Paige Marett
Telephone Number	:	(913) 495-3919
KDHE Project Manager	:	Tom Peterson
Telephone Number	:	(785) 296-5555

RECEIVED
2001 AUG -3 AM 9: 12
USDA/FSA/CEPD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5TH STREET
4TH STREET
3RD STREET
2ND STREET
1ST STREET
WEST PENN STREET
'A' STREET
'B' STREET
'C' STREET
'D' STREET
'E' STREET
'F' STREET
PARK
CEMETARY
Ramona Cooperative
GP-1
GP-10
GP-9
GP-2
GP-3
GP-8
GP-16
GP-15
GP-4
GP-5
GP-7
GP-6
GP-14
GP-13
GP-12
GP-17
GP-11
Former USDA Facility
LEGEND
GEOPROBE® SAMPLING LOCATION (SOIL GAS ONLY)
GEOPROBE® SAMPLING LOCATION (SUBSURFACE SOIL ONLY)
GEOPROBE® SAMPLING LOCATION (SURFACE AND SUBSURFACE SOIL)
GEOPROBE® SAMPLING LOCATION (SOIL GAS, SURFACE, AND SUBSURFACE SOIL)
RIGHT-OF-WAY
ROAD
RAILROAD
200' 0 500'
100'
Scale in feet
RAMONA CORRECTIVE ACTION STUDY
RAMONA, KANSAS
FIGURE 4
GEOPROBE® SAMPLING LOCATIONS
Tetra Tech EM Inc.
C:\ACFILES\KDHE\RAMONA\FIG4.DWG - 09/11/98 - BAN

TABLE 4

SUMMARY OF SOIL AND SOIL GAS SAMPLES

Sample No.	Matrix	Sample Date	Depth (feet bgs)	Sampling Method	On-Site Analysis	Off-Site Analysis*	Location and Description
GP-1-8	Soil gas	04/07/97	8	Geoprobe®	Chlorinated VOCs	None	At cooperative, north of four metal silos
GP-1-20	Soil gas	04/07/97	20	Geoprobe®	Chlorinated VOCs	None	At cooperative, north of four metal silos
GP-2-1	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	At cooperative, south of flat building
GP-2-5	Soil	04/08/97	4 to 6	Geoprobe®	None	353.2	At cooperative, south of flat building
GP-2-14	Soil gas	04/07/97	14	Geoprobe®	Chlorinated VOCs	None	At cooperative, south of flat building
GP-2-20	Soil gas	04/07/97	20	Geoprobe®	Chlorinated VOCs	None	At cooperative, south of flat building
GP-3-20	Soil gas	04/07/97	20	Geoprobe®	Chlorinated VOCs	None	At cooperative, south of GP-2 between side and main railroad tracks
GP-4-1	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	North of former USDA grain bin storage facility
GP-4-5	Soil	04/08/97	4 to 6	Geoprobe®	None	353.2	North of former USDA grain bin storage facility
GP-4-20	Soil	04/08/97	18 to 20	Geoprobe®	Chlorinated VOCs	8010	North of former USDA grain bin storage facility
GP-4-20	Soil gas	04/0797	20	Geoprobe®	Chlorinated VOCs	TO-14	North of former USDA grain bin storage facility
GP-4-20 Duplicate	Soil gas	04/07/97	20	Geoprobe®	Chlorinated VOCs	None	North of former USDA grain bin storage facility
GP-4-20 Triplicate	Soil gas	04/07/97	20	Geoprobe®	Chlorinated VOCs	None	North of former USDA grain bin storage facility

TABLE 4 (Continued)

SUMMARY OF SOIL AND SOIL GAS SAMPLES

Sample No.	Matrix	Sample Date	Depth (feet bgs)	Sampling Method	On-Site Analysis	Off-Site Analysis[a]	Location and Description
GP-5-20	Soil gas	04/07/97	17 to 20	Geoprobe®	Chlorinated VOCs	None	Eastern part of former USDA grain bin storage facility, near F Street
GP-5-20 Duplicate	Soil gas	04/07/97	17 to 20	Geoprobe®	Chlorinated VOCs	None	Eastern part of former USDA grain bin storage facility, near F Street
GP-5-20 Triplicate	Soil gas	04/07/97	17 to 20	Geoprobe®	Chlorinated VOCs	None	Eastern part of former USDA grain bin storage facility, near F Street
GP-6-20	Soil gas	04/07/97	17 to 20	Geoprobe®	Chlorinated VOCs	None	Center of former USDA grain bin storage facility
GP-7-20	Soil gas	04/07/97	20	Geoprobe®	Chlorinated VOCs	None	South of former USDA grain bin storage facility
GP-7-20 Duplicate	Soil gas	04/07/97	20	Geoprobe®	Chlorinated VOCs	None	South of former USDA grain bin storage facility
GP-8-20	Soil gas	04/07/97	20	Geoprobe®	Chlorinated VOCs	None	At cooperative, southwest of GP-3, between side and main railroad tracks
GP-9-20	Soil	04/07/97	18 to 20	Geoprobe®	Chlorinated VOCs	None	At cooperative, on east end of flat metal grain storage building
GP-10-1	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	At cooperative, on north side of metal grain storage building
GP-10-5	Soil	04/08/97	4 to 6	Geoprobe®	None	353.2	At cooperative, on north side of metal grain storage building
GP-10-20	Soil	04/08/97	18 to 20	Geoprobe®	Chlorinated VOCs	None	At cooperative, on north side of metal grain storage building
GP-10-20	Soil gas	04/07/97	15 to 20	Geoprobe®	Chlorinated VOCs	TO-14	At cooperative, on north side of metal grain storage building

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TABLE 4 (Continued)

SUMMARY OF SOIL AND SOIL GAS SAMPLES

Sample No.	Matrix	Sample Date	Depth (feet bgs)	Sampling Method	On-Site Analysis	Off-Site Analysis[a]	Location and Description
GP-11-20	Soil gas	04/08/97	15 to 20	Geoprobe®	Chlorinated VOCs	None	On 2nd Street, between former garage and Andrews residence
GP-12-1	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	At cooperative, south of coal shed on west end of property
GP-12-5	Soil	04/08/97	4 to 6	Geoprobe®	None	353.2	At cooperative, south of coal shed on west end of property
GP-13-1	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	At cooperative, amidst old foundations near existing shed
GP-13-5	Soil	04/08/97	4 to 6	Geoprobe®	None	353.2	At cooperative, amidst old foundations near existing shed
GP-14-1	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	At cooperative, in doorway of suspected former feed mill
GP-14-1 Duplicate	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	At cooperative, in doorway of suspected former feed mill
GP-14-5	Soil	04/08/97	4 to 6	Geoprobe®	None	353.2	At cooperative, in doorway of suspected former feed mill
GP-15-1	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	At cooperative, loading dock of warehouse just north of office
GP-15-1 Duplicate	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	At cooperative, loading dock of warehouse just north of office
GP-15-5	Soil	04/08/97	4 to 6	Geoprobe®	None	353.2	At cooperative, loading dock of warehouse just north of office
GP-16-1	Soil	04/08/97	0 to 0.5	Spoon	None	353.2	At cooperative, north end of warehouse jutting north from warehouse

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TABLE 4 (Continued)

SUMMARY OF SOIL AND SOIL GAS SAMPLES

Sample No.	Matrix	Sample Date	Depth (feet bgs)	Sampling Method	On-Site Analysis	Off-Site Analysis[a]	Location and Description
GP-16-5	Soil	04/08/97	4 to 6	Geoprobe®	None	353.2	At cooperative, north end of warehouse jutting north from warehouse
RMW0105	Soil	06/27/98	5	Auger Rig	None	8010	Monitoring well MW01
RMW0110	Soil	06/27/98	10	Auger Rig	None	8010	Monitoring well MW01
RMW0110D	Soil	06/27/98	10	Auger Rig	None	8010	Monitoring well MW01 (duplicate of RMW0110)
RMW0115	Soil	06/27/98	15	Auger Rig	None	8010	Monitoring well MW01
REQ01[b]	Water	06/27/98	NA	NA	None	8010, 353.2	NA
EB-1-5[b]	Water	04/06/97	NA	NA	None	353.2	NA

Notes:
Soil gas samples were attempted at locations GP-9 and GP-17; however, samples were not collected due to lack of soil gas flow.
VOCs volatile organic compounds
bgs Below ground surface.
NA Not applicable.
[a] Methods provided are EPA SW-846 methods.
[b] Equipment blank sample.

TABLE 12
ON-SITE SOIL GAS ANALYTICAL RESULTS

Sample Number	Sample and Analysis Date	Sample Depth (feet)	Carbon Tetrachloride (μg/L)	Chloroform (μg/L)
GP-1-8	04/07/97	8	ND	ND
GP-1-20	04/07/97	20	ND	ND
GP-2-14	04/07/97	14	ND	ND
GP-2-20	04/07/97	20	0.02	ND
GP-3-20	04/07/97	20	0.12	ND
GP-4-20	04/07/97	20	5.1	0.7
GP-4-20 Duplicate	04/07/97	20	0.39	0.04
GP-4-20 Triplicate	04/07/97	20	0.21	0.02
GP-5-20	04/07/97	17-20	0.73	ND
GP-5-20 Duplicate	04/07/97	17-20	0.44	ND
GP-5-20 Triplicate	04/07/97	17-20	5.13	ND
GP-6-20	04/07/97	20	0.01	ND
GP-7-20	04/07/97	20	0.18	0.01
GP-7-20 Duplicate	04/07/97	20	0.18	0.01
GP-8-20	04/07/97	20	0.05	ND
GP-10-20	04/07/97	20	1.47	ND
GP-11-20	04/08/97	20	ND	ND

Notes:

μg/L Micrograms per liter
ND Not detected

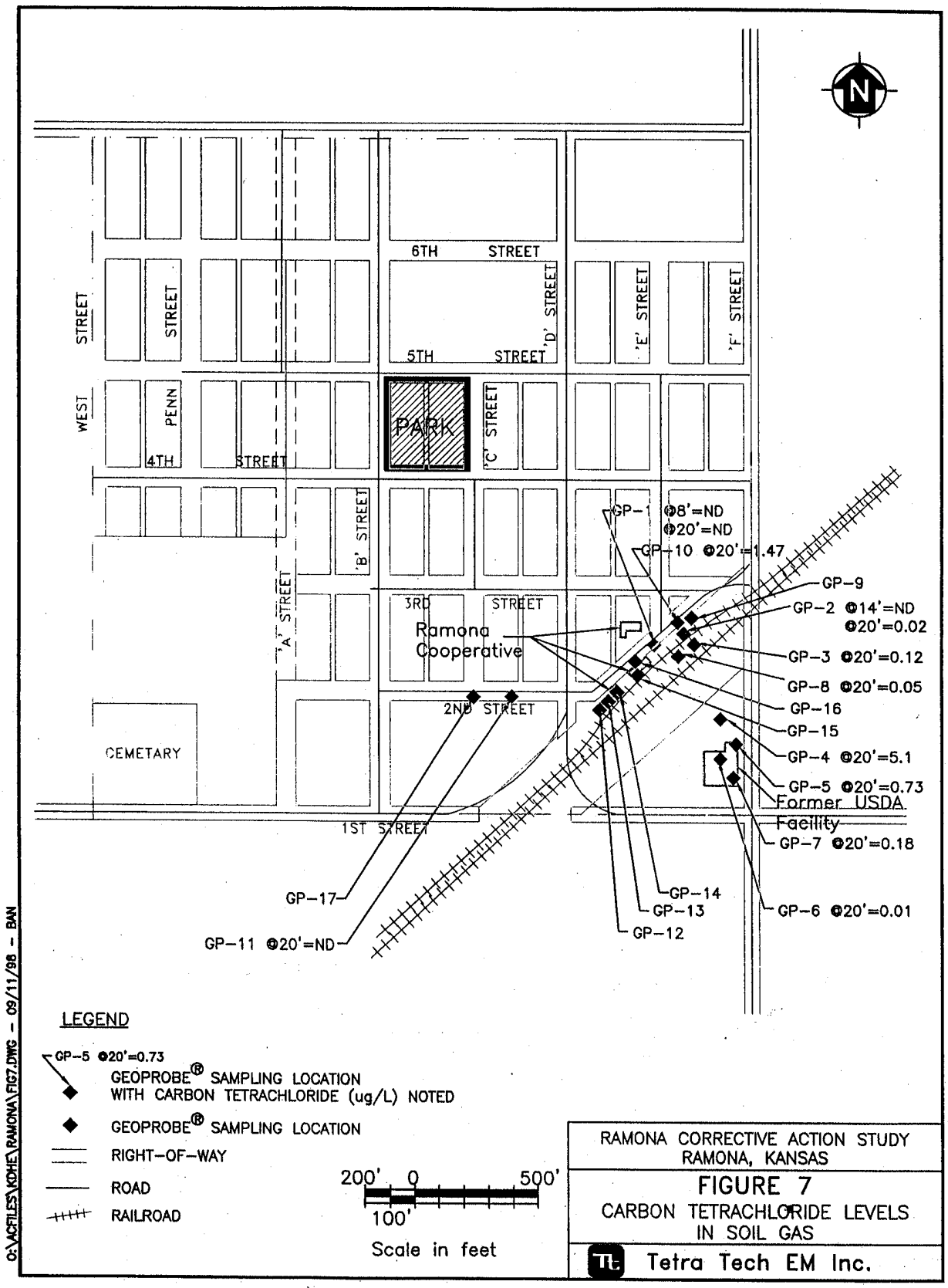

N
6TH STREET
5TH STREET
4TH STREET
3RD STREET
2ND STREET
1ST STREET
WEST STREET
PENN STREET
'A' STREET
'B' STREET
'C' STREET
'D' STREET
'E' STREET
'F' STREET
PARK
CEMETARY
Ramona Cooperative
Former USDA Facility
GP-1 @8'=ND @20'=ND
GP-10 @20'=1.47
GP-9
GP-2 @14'=ND @20'=0.02
GP-3 @20'=0.12
GP-8 @20'=0.05
GP-16
GP-15
GP-4 @20'=5.1
GP-5 @20'=0.73
GP-7 @20'=0.18
GP-6 @20'=0.01
GP-14
GP-13
GP-12
GP-17
GP-11 @20'=ND
LEGEND
GP-5 @20'=0.73
GEOPROBE® SAMPLING LOCATION WITH CARBON TETRACHLORIDE (ug/L) NOTED
GEOPROBE® SAMPLING LOCATION
RIGHT-OF-WAY
ROAD
RAILROAD
200' 0 500'
100'
Scale in feet
RAMONA CORRECTIVE ACTION STUDY
RAMONA, KANSAS
FIGURE 7
CARBON TETRACHLORIDE LEVELS IN SOIL GAS
Tetra Tech EM Inc.
C:\ACFILES\KOHE\RAMONA\FIG7.DWG - 09/11/98 - BAN

TABLE 13

ON-SITE VOCs IN SOIL (μg/kg)

Sample No.	Sample Date	Carbon Tetrachloride	Chloroform	TCE	PCE	TCA
GP-4-20	04/08/97	1.5	1	ND	ND	ND
GP-9-20	04/07/97	ND	ND	ND	ND	ND
GP-10-20	04/08/97	0.2	ND	ND	ND	ND

Note:

ND Not detected

TABLE 16

OFF-SITE NITRATE ANALYTICAL RESULTS FOR SOIL SAMPLES

Sample Number	Nitrate (mg/kg)
GP-2-1	17.1
GP-2-5	0.65
GP-4-1	0.84
GP-4-5	0.96
GP-10-1	1.49
GP-10-5	0.67
GP-12-1	9.44
GP-12-5	0.64
GP-13-1	4.05
GP-13-5	1.43
GP-14-1	5.13
GP-14-1 Duplicate	6.87
GP-14-5	1.42
GP-15-1	9.17
GP-15-1 Duplicate	4.28
GP-15-5	0.41
GP-16-1	9.05
GP-16-5	1.94

Note:

mg/kg milligrams per kilogram
All samples were collected on April 8, 1997.

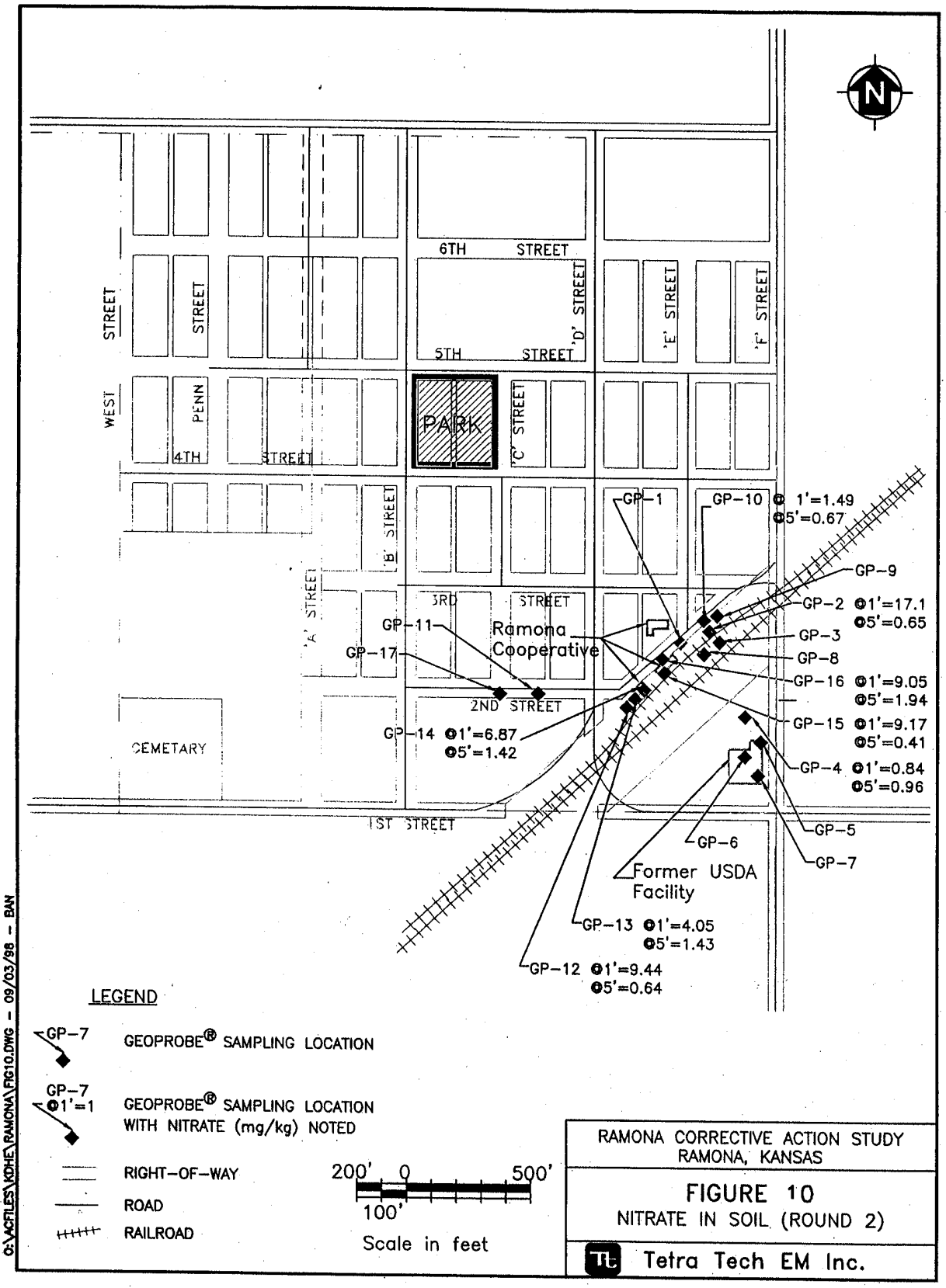
TABLE 20

COMPARISON OF ON-SITE AND OFF-SITE ANALYTICAL RESULTS

Compound	On-site laboratory Value	Pace Value (PRL)	RPD (%)
Ohm Private Well (μg/L)			
Carbon tetrachloride	1.2	13	166
Chloroform	0.19 J	ND (5)	NA
Gonzales Private Well (μg/L)			
cis-1,2-DCE	25	ND (500)	NA
1,1,1-TCA	0.08 J	ND (500)	NA
TCE	0.04 J	ND (500)	NA
PCE	0.04 J	ND (500)	NA
1,1,2,2-PCA	2.2	ND (500)	NA
GP-4-20 (μg/L)			
Carbon tetrachloride	1.5	ND (1.2)	NA
Chloroform	1.0	ND (0.5)	NA
GP-4-20 (μg/L)			
Carbon tetrachloride	5.1	11.93[a]	80
Chloroform	0.7	1.46[a]	70
GP-10-20 (μg/L)			
Carbon tetrachloride	1.47	1.7[a]	15

Notes:

μg/L micrograms per liter
[a] The Pace soil gas results were reported in ppmv, and converted to μg/L using the following equation based on the ideal gas law: (concentration in ppmv x molecular weight of the compound)/24.5.
PRL Pace reporting limit
J The value reported was below the on-site laboratory's reporting limit, and is therefore considered an estimated value.
ND Not detected
NA Not applicable. An RPD cannot be calculated if one of the comparative values was not detected.


N
6TH STREET
5TH STREET
'D' STREET
'E' STREET
'F' STREET
WEST STREET
PENN STREET
4TH STREET
PARK
'C' STREET
'B' STREET
'A' STREET
3RD STREET
2ND STREET
1ST STREET
CEMETARY
Ramona Cooperative
Former USDA Facility
GP-1
GP-10 1'=1.49 5'=0.67
GP-9
GP-2 1'=17.1 5'=0.65
GP-3
GP-8
GP-16 1'=9.05 5'=1.94
GP-15 1'=9.17 5'=0.41
GP-4 1'=0.84 5'=0.96
GP-5
GP-6
GP-7
GP-11
GP-17
GP-14 1'=6.87 5'=1.42
GP-13 1'=4.05 5'=1.43
GP-12 1'=9.44 5'=0.64
LEGEND
GP-7 GEOPROBE® SAMPLING LOCATION
GP-7 1'=1 GEOPROBE® SAMPLING LOCATION WITH NITRATE (mg/kg) NOTED
RIGHT-OF-WAY
ROAD
RAILROAD
200' 0 500'
100'
Scale in feet
RAMONA CORRECTIVE ACTION STUDY
RAMONA, KANSAS
FIGURE 10
NITRATE IN SOIL (ROUND 2)
Tetra Tech EM Inc.
O:\ACFILES\KOHE\RAMONA\FIG10.DWG - 09/03/98 - BAN

permission to install a monitoring well on their property. The boring was abandoned on June 29, 1998, by placing bentonite grout to within 5 feet of the surface and filling in the remainder of the hole with drill cuttings.

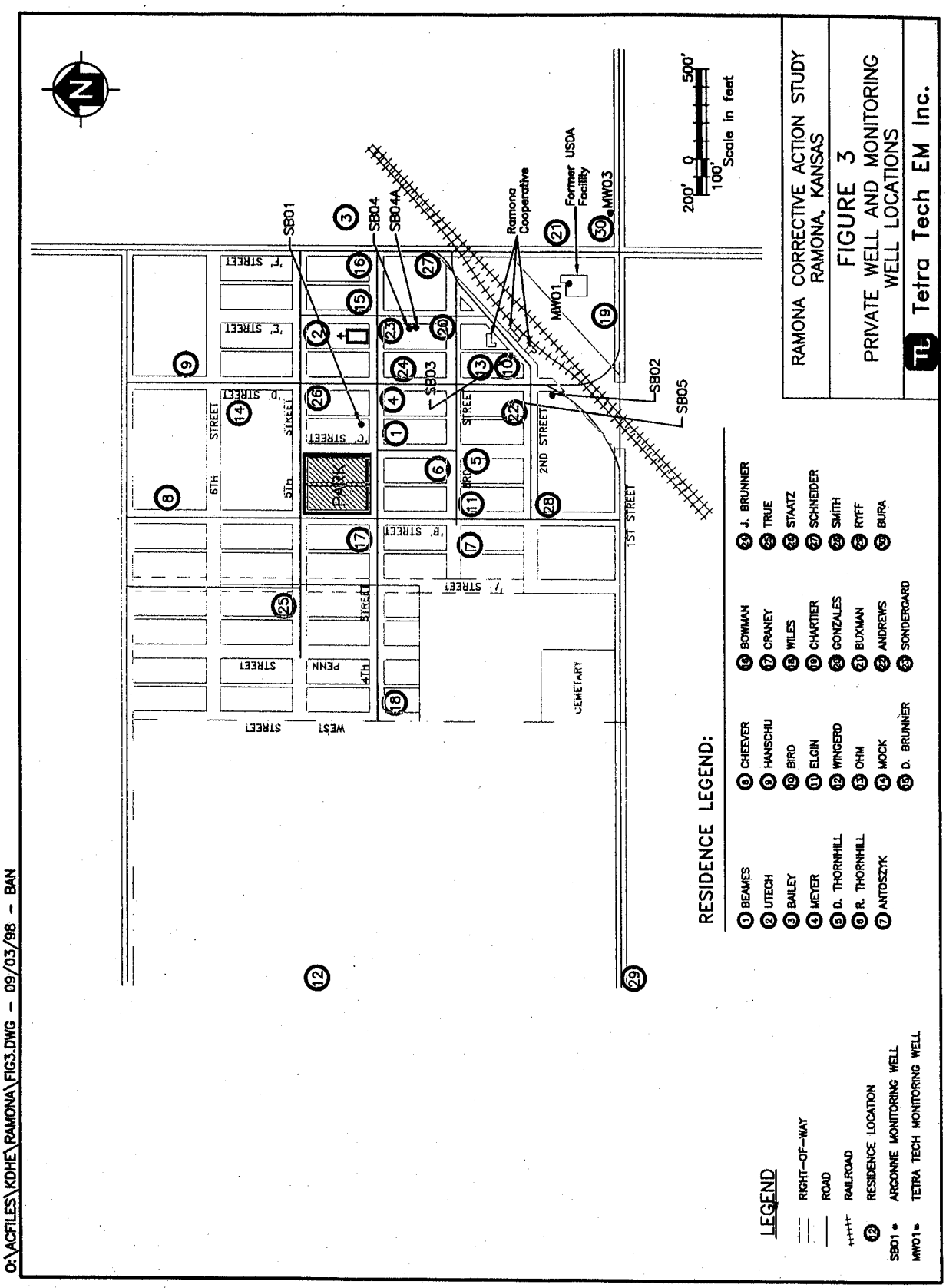
Borehole MW03 is located on property co-owned by Ms. Jessica Gilbert and Ms. Pat Whick. Both owners reside in California. Tetra Tech was able to arrange a chance meeting with Ms. Gilbert on June 29, 1998, who was in town for the Fourth-of-July holiday. Permission to drill on the property was granted by Ms. Gilbert. Drilling commenced on June 30, 1998. Air-rotary drilling was the only method used to advance the borehole to a total depth of 47 feet. A geologic log was prepared from visual inspection of drill cuttings (Appendix E).

4.3.3 Soil Sampling

During drilling at boring location MW01, soil samples were collected from continuous split-spoon samples removed from the boring. Samples were collected at depths of 5 feet, 10 feet, and 15 feet. A duplicate sample was collected from the 10-foot sample. Samples were analyzed for VOCs by EPA SW-846 Method 8010. No site-related VOCs were detected in the soil samples. Methylene chloride, a common laboratory contaminant, was detected in all of the soil samples and also in the associated method blank.

4.3.4 Monitoring Well Installation Procedures

All wells were constructed of 2-inch, schedule 40 PVC casing and screen using flush-threaded joints. The wells were installed with 10-foot screened intervals. Monitoring well installation began with placing the well material to the bottom of the boring. Sand was then poured into the annular space and allowed to fall to the bottom of the boring to act as a filter pack. The elevation of the sand was frequently monitored during installation using a weighted tape measure. Once the elevation of the sand filter pack exceeded the elevation of the top of the screen by 2 feet, the placement of the filter pack was considered complete. Next, the screened zone of the aquifer was sealed from the remaining upper zones using hydrated bentonite pellets. No less than 2 feet of measured pellets were placed above the sand. Manufacturer specifications recommend a minimum of 1 hour for hydration. Grouting was not attempted prior to the minimum time requirement. Next, grout was placed from the bentonite seal to


O:\ACFILES\KDHE\RAMONA\FIG3.DWG - 09/03/98 - BAN
RAMONA CORRECTIVE ACTION STUDY
RAMONA, KANSAS
FIGURE 3
PRIVATE WELL AND MONITORING WELL LOCATIONS
Tetra Tech EM Inc.
Scale in feet
200' 0 100' 500'
SB01
SB02
SB03
SB04
SB04A
SB05
MW01
MW03
Ramona Cooperative
Former USDA Facility
PARK
CEMETARY
WEST STREET
PENN
4TH
BIRD
7th STREET
B' STREET
C' STREET
D' STREET
E' STREET
F' STREET
5th
6TH
STREET
2ND STREET
1ST STREET
RESIDENCE LEGEND:
1 BEAMES
2 UTECH
3 BAILEY
4 MEYER
5 D. THORNHILL
6 R. THORNHILL
7 ANTOSZYK
8 CHEEVER
9 HANSCHU
10 BIRD
11 ELGIN
12 WINGERD
13 OHM
14 MOCK
15 D. BRUNNER
16 BOWMAN
17 CRANEY
18 WILES
19 CHARTIER
20 GONZALES
21 BUXMAN
22 ANDREWS
23 SONDERGARD
24 J. BRUNNER
25 TRUE
26 STAATZ
27 SCHNEIDER
28 SMITH
29 RYFF
30 BURA
LEGEND
RIGHT-OF-WAY
ROAD
RAILROAD
RESIDENCE LOCATION
SB01 ARGONNE MONITORING WELL
MW01 TETRA TECH MONITORING WELL