

October 2008 Monitoring Results for Barnes, Kansas

Environmental Science Division



United States Department of Agriculture

Work sponsored by Commodity Credit Corporation,
United States Department of Agriculture

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October 2008 Monitoring Results for Barnes, Kansas

by
Applied Geosciences and Environmental Management Section
Environmental Science Division, Argonne National Laboratory

February 2009



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Notation

AGEM	Applied Geosciences and Environmental Management
AMSL	above mean sea level
BGL	below ground level
°C	degree(s) Celsius
CCC	Commodity Credit Corporation
COC	chain of custody
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
ft	foot (feet)
gal	gallon(s)
hr	hour(s)
KDHE	Kansas Department of Health and Environment
L	liter(s)
µg/L	microgram(s) per liter
µS/cm	microsiemen(s) per centimeter
mg/L	milligram(s) per liter
min	minute
mV	millivolt(s)
ORP	oxidation-reduction potential
PWS	public water supply
RBSL	risk-based screening level
TOC	top of casing
USDA	U.S. Department of Agriculture
VOC	volatile organic compound

October 2008 Monitoring Results for Barnes, Kansas

1 Introduction and Background

The Commodity Credit Corporation of the U.S. Department of Agriculture (CCC/USDA) operated a grain storage facility at Barnes, Kansas, during most of the interval 1949-1974. Carbon tetrachloride contamination was initially detected in 1986 in the town's public water supply wells. In 2006-2007, the CCC/USDA conducted a comprehensive targeted investigation at and near its former property in Barnes to characterize this contamination. Those results were reported previously (Argonne 2008a).

In November 2007, the CCC/USDA began quarterly groundwater monitoring at Barnes. The monitoring is being conducted on behalf of the CCC/USDA by Argonne National Laboratory, in accord with the recommendations made in the report for the 2006-2007 targeted investigation (Argonne 2008a). The objective is to monitor the carbon tetrachloride contamination identified in the groundwater at Barnes. The sampling is presently conducted in a network of 28 individual monitoring wells (at 19 distinct locations), 2 public water supply wells, and 1 private well (Figure 1.1).

The results of the 2006-2007 targeted investigation and the subsequent monitoring events in November 2007 (Argonne 2008b), March 2008 (Argonne 2008c), and July 2008 (Argonne 2008d) demonstrated the presence of carbon tetrachloride contamination in groundwater at levels exceeding the Kansas Department of Health and Environment (KDHE) Tier 2 risk-based screening level (RBSL) of 5.0 µg/L for this compound. The contaminant plume appears to extend from the former CCC/USDA property northwestward, toward the Barnes public water supply wells. Information obtained during the 2006-2007 investigations indicates that at least one other potential source might have contributed to the groundwater contaminant plume (Argonne 2008a). The former agriculture building owned by the local school district, located immediately east of well PWS3, is also a potential source of the contamination.

This current report presents the results of the fourth monitoring event, conducted in October 2008. During this fourth monitoring event, low-flow sampling methods were used to purge and sample all wells. This was the third event at Barnes during which low-flow sampling methods were used.

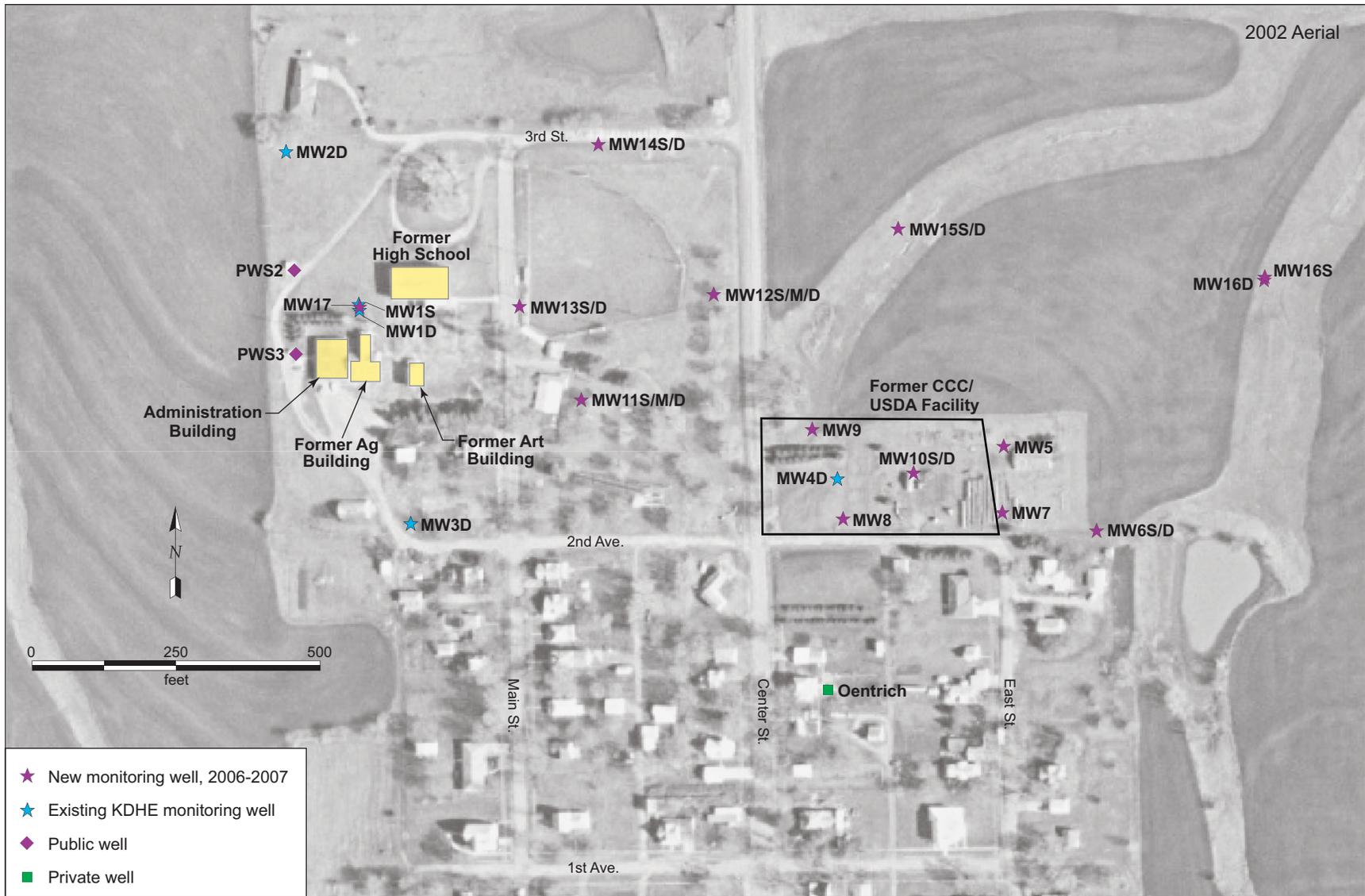


FIGURE 1.1 Groundwater sampling locations at Barnes in October 2008. Source of photograph: NAPP (2002).

2 Sampling and Analysis Activities

2.1 Measurement of Groundwater Levels

The groundwater sampling event at Barnes on October 22-24, 2008, involved 28 monitoring wells (MW1S, MW1D, MW2D, MW3D, MW4D, MW5, MW6S, MW6D, MW7, MW8, MW9, MW10S, MW10D, MW11S, MW11M, MW11D, MW12S, MW12M, MW12D, MW13S, MW13D, MW14S, MW14D, MW15S, MW15D, MW16S, MW16D, MW17). All of the well locations are shown in Figure 1.1. A chronological summary of the field activities is in Appendix A, Table A.1.

Before implementation of the low-flow sampling described in Section 2.2, a hand-held water level indicator was used to measure the depth to groundwater and the total depth of each well, to within 0.01 ft, from the top of the well casing. Monitoring wells MW1S and MW12S were measured but were found to be dry and consequently could not be sampled. Two public water supply wells (PWS2 and PWS3) and one private well (Oentrich) were sampled but could not be measured because of well construction issues. The hand-measured water level data are presented in Section 3.1 and discussed further in Section 3.3.

In addition to the manual water level measurements, data recorders have been gathering long-term data on the groundwater elevation and gradient at monitoring wells MW1D, MW2D, MW3D, MW4D, MW7, MW9, MW14D, MW15D, and MW16D and at the Oentrich private well (Figure 2.1). With the exception of the Oentrich well, automated monitoring of these wells continued during the current review period, and the recorders were downloaded on November 19, 2008. (Automated monitoring of the Oentrich well was discontinued on May 9, 2008, because of changes in the well surface completion implemented by the property owner, which prevent the installation of a recorder.) The data loggers record water levels continuously at 60-min intervals.

During the download on November 19, 2008, problems were discovered that had caused the following data recorders to stop working:

- The recorder in well MW3D was found to be damaged, probably because of water infiltrating into the well vault. This was the fourth water level recorder that had failed at the MW3D location, because of water damage, since

automated water level monitoring was initiated in July 2006. The recorder was removed and will be replaced as soon as a replacement is delivered from the manufacturer. The data stored in the recorder could not be retrieved.

- The recorder in well MW7 failed to collect data after being reprogrammed in July 2008. After battery replacement on November 19, 2008, the recorder appeared to be working normally and was reinstalled.
- The recorder in well MW1D failed because of irreparable electrical damage; no data could be recovered from the unit. The recorder was removed and will be replaced as soon as possible.

Additional water level recorders have been ordered by Argonne, and the damaged units at wells MW1D and MW3D will be replaced as soon as possible.

Water level recorders were installed in five wells — MW10S, MW11M, MW12M, MW13S, and MW17 (Figure 2.2) — at the time of the November download event. These locations were prioritized for automated monitoring to investigate the potential hydraulic influences on groundwater flow and contaminant migration in the intermediate aquifer zone (as discussed in Section 3.3), in which the highest concentrations of carbon tetrachloride in groundwater have been identified. Upon completion of the November 2008 downloads and new installations, a total of 12 water level recorders are in place at the locations shown in Figure 2.2.

The automatically recorded groundwater level data are presented and discussed in Section 3.1.

2.2 Monitoring Well Sampling and Analyses

After measurement of water levels, low-flow groundwater sampling techniques, according to U.S. Environmental Protection Agency (EPA) guidelines (Puls and Barcelona 1996; Yeskis and Zavala 2002), were used to purge and sample the monitoring wells. The Oentrich well and the public water supply wells were sampled at their respective faucets (Table A.1 in Appendix A). The Oentrich well and public water supply well PWS2 were pumped for 5 min

before sampling. Public water supply well PWS3 had been running for 0.5 h, and a sample was collected without additional purging.

The low-flow sampling of monitoring wells involved the use of a bladder pump and field measurement equipment designed to determine when representative formation water was entering the well casing (Puls and Barcelona 1996; Yeskis and Zavala 2002). Stabilization of formation water in the screened area of the well was determined by measuring the static water levels and monitoring the levels of pH, temperature, specific conductivity, oxidation-reduction potential (ORP), and dissolved oxygen (DO) during pumping.

The following procedure was followed for each well sampled:

1. A bladder pump was inserted into the well to a depth midway between the top and bottom of the screen. To minimize disturbance of the solids that are typically present at the bottom of a well, care was taken not to lower the pump to the bottom of the casing.
2. The pumping rate for the bladder pump was set to ensure that minimal drawdown occurred in each well during pumping. The rate was monitored by measuring the static water level periodically throughout pumping.
3. Polyethylene tubing was used to connect the bladder pump to an in-line flow cell. Formation parameters, including pH, temperature, specific conductivity, ORP, and DO, were measured continuously in the in-line flow cell during pumping. Measurements were recorded every 4 min until three successive measurements for each parameter were within a range indicating that the formation water was stable. The range for formation stabilization varies for each parameter, as follows: pH, within 0.1; temperature, within 3%; specific conductivity, within 3%; ORP, within 10 mV; and DO, within 10%.
4. After stabilization of the formation water parameters occurred, the polyethylene tubing was disconnected from the in-line flow cell, and a representative groundwater sample was pumped through the tubing into laboratory-approved containers.

5. The polyethylene tubing for each well was kept and dedicated for reuse at that well. In addition, pumping rate data were recorded for each well as a reference for subsequent sampling events.

The sequence of activities during the October 2008 well sampling event is summarized in Appendix A, Table A.1. The field measurements are in Appendix A, Table A.2.

Groundwater samples designated for analyses for volatile organic compounds (VOCs) were collected in appropriate laboratory containers, labeled, packaged, and chilled to 4°C by placement in ice-filled coolers. The samples were shipped via an overnight delivery service to the Applied Geosciences and Environmental Management (AGEM) Laboratory at Argonne for VOCs analyses with EPA Method 524.2 (EPA 1995). Aliquots of selected samples (chosen in the field) were also shipped to TestAmerica Laboratories, Inc., South Burlington, Vermont, for verification VOCs analyses according to EPA Contract Laboratory Program protocols.

The analytical results are presented and discussed in Section 3.2.

2.3 Handling and Disposal of Investigation-Derived Waste

Purge water generated as potentially contaminated investigation-derived waste was containerized on-site in 55-gal drums. The accumulated purge water was sampled and analyzed for VOCs (including ethylene dibromide) and nitrates. The analytical results (Appendix B) indicated no detectable concentrations of carbon tetrachloride, chloroform, ethylene dibromide, or nitrate. The water was discharged on-site on December 11, 2008, with the verbal approval of the KDHE.

2.4 Quality Control for Sample Collection, Handling, and Analysis

Quality assurance/quality control procedures followed during the October 2008 monitoring event are described in detail in the *Master Work Plan* (Argonne 2002). The results are summarized as follows:

- Sample collection and handling activities were monitored by the documentation of samples as they were collected and the use of chain-of-

custody forms and custody seals to ensure sample integrity during handling and shipment.

- Samples designated for VOCs analyses were received with custody seals intact and at the appropriate preservation temperature. All samples sent to the AGEM Laboratory were analyzed within the required holding times.
- Quality control samples collected to monitor sample-handling activities (trip blanks and equipment rinsates) and method blanks analyzed with the samples to monitor analytical methodologies were all free of carbon tetrachloride and chloroform contamination.
- Groundwater samples were analyzed for VOCs at the AGEM Laboratory by the purge-and-trap method on a gas chromatograph-mass spectrometer system. Calibration checks analyzed with each sample delivery group were required to be within $\pm 20\%$ of the standard. Surrogate standard determinations performed on samples and blanks were within the specified range of 80-120% for all samples, in either the initial analysis or a successful reanalysis.
- Results from the AGEM Laboratory for dual analyses of the groundwater samples are in Appendix C, Table C.1. The results of the dual analyses compare well, indicating consistency in the sampling and analytical methodologies. Analytical results for quality control samples are also in Appendix C, Table C.1.
- In accordance with the procedures defined in the *Master Work Plan* (Argonne 2002), five groundwater samples were submitted to a second laboratory (TestAmerica) for verification analysis according to the protocols of the EPA's Contract Laboratory Program. Documentation is in Appendix D. The results from the two laboratories compare well over the range of contaminant concentrations detected. Samples from monitoring wells MW3D and MW11S analyzed at AGEM Laboratory with no carbon tetrachloride detected were analyzed by TestAmerica with similar results. The low detections of carbon tetrachloride (< 1 to $2.1 \mu\text{g/L}$) in monitoring wells MW7 and MW17 and in

public well PWS2 in analyses at the AGEM Laboratory were confirmed in verification analysis.

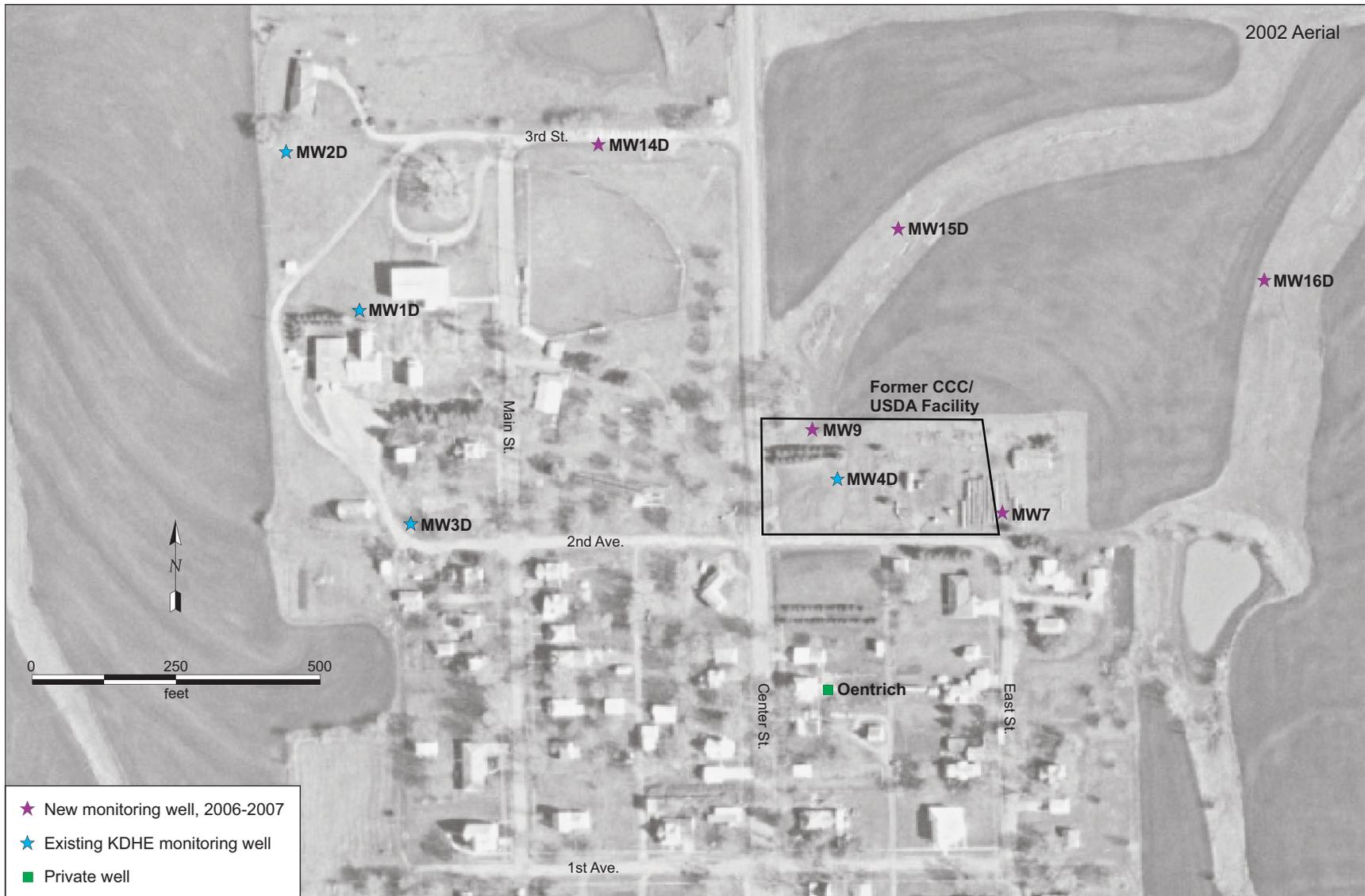


FIGURE 2.1 Wells at Barnes equipped with data loggers for water level monitoring, prior to the November 2008 download event. Source of photograph: NAPP (2002).

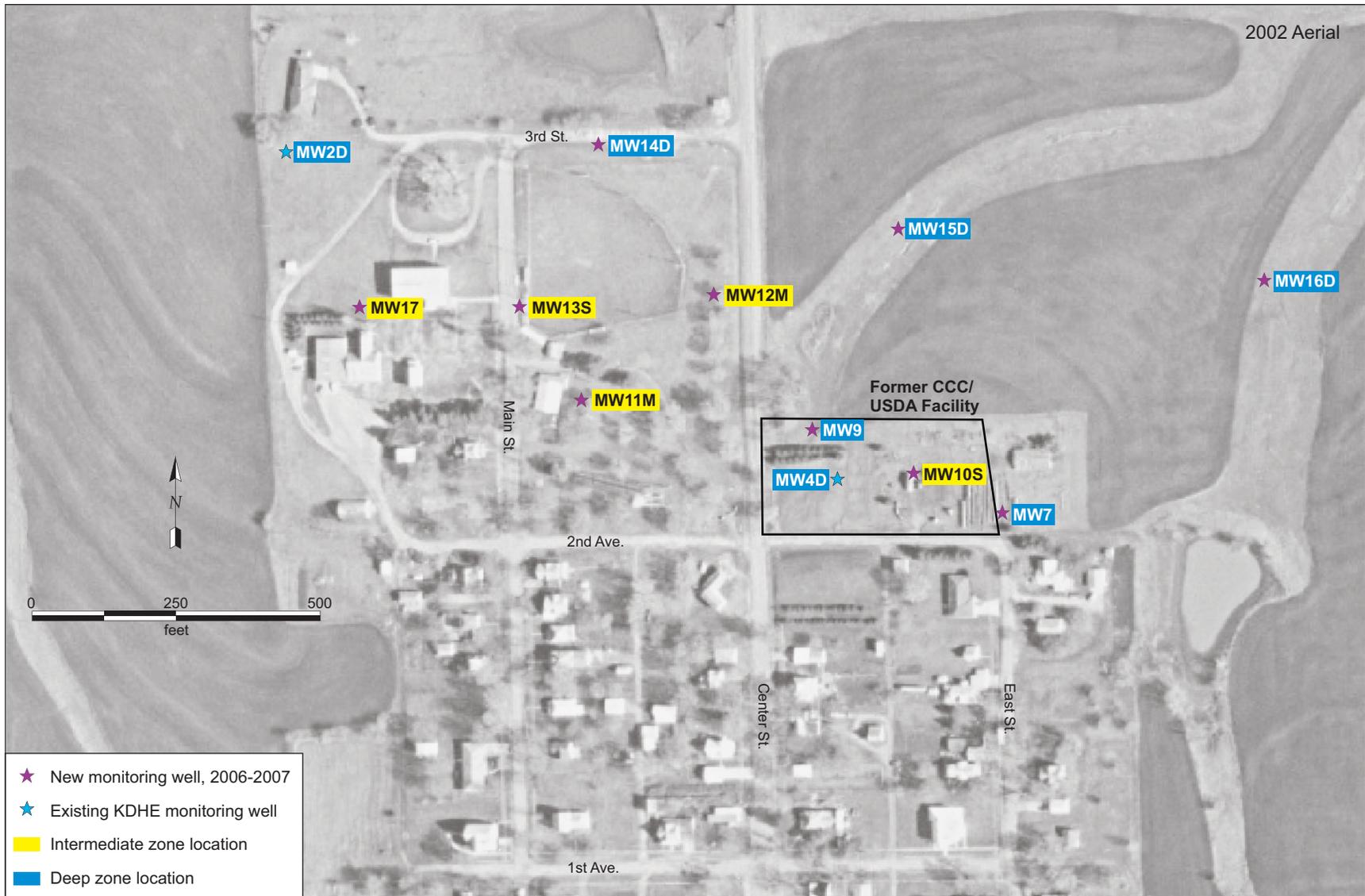


FIGURE 2.2 Wells at Barnes equipped with data loggers for future water level monitoring, after the November 2008 installation of five new recorders and the removal of others. Source of photograph: NAPP (2002).

3 Results and Discussion

3.1 Groundwater Level Data

The manual water level measurements taken during sampling on October 22-24, 2008, are in Table 3.1. These measurements are discussed in Section 3.3. Table 3.1 also includes manual water level measurements taken in March-July 2008 and November 2008.

Figure 3.1 presents water level contours for December 19, 2007, and May 9, 2008, for the network of recording transducers installed for long-term water level monitoring at Barnes. The network on those dates included wells MW1D, MW2D, MW3D, MW4D, MW7, MW9, MW14D, MW15D, MW16D, and the Oentrich private well. The Oentrich well was removed from the network later on May 9, 2008, when the property owner replaced the pump and installed a new sanitary seal that limits access to the well (see Section 2.1).

Extensive documentation of the potentiometric surface at Barnes during the targeted investigation (Argonne 2008a) and subsequent monitoring events has indicated that operation of the public water supply wells strongly influences the groundwater flow direction. The accumulated data document a predominant direction of groundwater flow to the northeast under non-pumping conditions. In contrast, flow is toward the northwest, in the approximate direction of the public water supply wells, when pumping is occurring. These data (see also Figure 3.2) demonstrate that the public water supply wells are operated on a daily basis, with individual pumping and subsequent water level recovery periods that typically range from 3 hr to 7 hr in duration, resulting in groundwater levels (and apparent flow directions) that shift relatively continuously throughout much of each day. For this reason, water level data collected by the automatic recorders, which are coincident in time at all monitored locations, provide the primary basis for determination of the topology of the potentiometric surface at any point in the cycles of groundwater pumping and recovery. Water levels measured by hand over a finite time period in the areally distributed network of monitoring wells at this site cannot generally be relied on to yield a meaningful representation of groundwater flow directions, because of the short-term, transient nature of the documented water level variations that are related to pumping cycles in the public water supply wells.

The apparent flow directions illustrated for May 9, 2008 (Figure 3.1), were previously discussed (Argonne 2008d) as potentially anomalous, because of mechanical contouring of the

available recorder data in the absence of values from monitoring well MW3D for the time intervals depicted. During the data downloads on July 9 and November 19, 2008, the recorders in MW3D were found to be damaged, and no data could be recovered. Previous findings have demonstrated that well MW3D and the Oentrich well represent critical locations for the interpretation of groundwater relationships at Barnes, because these two points largely constrain the southern and southwestern portions of the flow field in the vicinity of the carbon tetrachloride plume. The automatically recorded data from the remaining monitored wells suggest, however, that no significant changes have occurred in the relative patterns of groundwater levels at this site during the present review period.

The hydrographs in Figure 3.2 summarize data for the period January 1, 2008, to November 19, 2008, for the recording transducers. The hydrographs demonstrate that groundwater levels at Barnes have shown an overall increase of approximately 12 ft during the period illustrated. A relatively stable period in July, August, and early September was followed by a fairly uniform increase in groundwater levels — by approximately 3 ft — from mid September to mid November.

The water level data for well MW15D (Figure 3.2) indicate a persistent pattern of higher groundwater levels. This pattern of higher water levels in a deeper well might indicate that vertical hydraulic gradients are present.

The patterns in Figure 3.2 are similar to patterns recorded in 2007 during the targeted investigation and in subsequent monitoring events (Argonne 2008a-d). The hydrographs show responses to pumping of the public water supply wells that are characterized by drawdowns of as much as 2.25 ft during pumping, with subsequent rebound when pumping stops. The most prominent drawdowns are consistently observed in wells MW1D and MW2D, which are the closest monitoring points to the public wells.

3.2 Analytical Results for Volatile Organic Compounds in Groundwater Samples and Lateral Distribution of the Contaminants

The analytical data for VOCs in the groundwater samples collected in October 2008 are in Table 3.2, together with data for the previous sampling events at Barnes. The lateral distribution of carbon tetrachloride in groundwater in the November 2007, March 2008, July

2008, and October 2008 sampling events is illustrated in Figure 3.3; the distribution of chloroform during these four sampling events is illustrated in Figure 3.4.

Overall, the lateral distribution of carbon tetrachloride in groundwater in October 2008 is similar to the distribution during previous sampling events. The most significant changes during the current reporting period are the increase in the concentration of carbon tetrachloride in public well PWS2 (from $< 1 \mu\text{g/L}$ in July to $1.7 \mu\text{g/L}$ in October) and a decrease at PWS3 (from $< 1 \mu\text{g/L}$ in July to no detection in October).

The highest concentrations of carbon tetrachloride in sitewide monitoring have been found at well MW10S, which is located in the eastern portion of the former CCC/USDA facility and is screened at 93-103 ft below ground level (BGL). Concentrations at MW10S were in the range $49\text{-}68 \mu\text{g/L}$ during the March, July, and October 2008 sampling events when the low-flow sampling method was used. Earlier, a significantly lower concentration of $11 \mu\text{g/L}$ was measured in MW10S in November 2007, when the three-well-volume purging method was used. Northwest of well MW10S (in the direction of flow toward the public wells when they are in operation), the carbon tetrachloride decreases to $18\text{-}20 \mu\text{g/L}$ at MW12M and MW13S. The recent sampling at sentinel well MW17 (located farther west, between MW13S and the two public wells) showed a slight increasing trend in carbon tetrachloride contamination, although all detections to date have been at trace levels. The evaluation of water level data and vertical contaminant distribution discussed in Section 3.3 indicates that wells MW10S, MW12M, and MW13S (where the highest carbon tetrachloride concentrations have been found) are screened in the intermediate aquifer zone.

The recent sampling at sentinel well MW1D, which is near MW13S, did not show the increasing trend suggested for intermediate-zone wells MW10S, MW12M, and MW13S. Well MW1D is installed in the deep aquifer zone (Section 3.3), to a depth similar to that of the public wells.

The lateral distribution of chloroform in groundwater in October 2008 is also similar to the distribution during previous sampling events. The highest concentration of chloroform in sitewide sampling has been found at well MW12M, which is located northwest of the former CCC/USDA facility and is screened at 90-100 ft BGL (in the intermediate aquifer zone), with concentrations of $2.6\text{-}5.1 \mu\text{g/L}$.

3.3 Vertical Distribution of Carbon Tetrachloride and Evaluation of Data to Distinguish Aquifer Zones by Depth

The designations “S,” “M,” and “D” in monitoring well names were assigned at the time of well installation. They indicate shallow, medium, and deep screens (relative depths) in an individual well, rather than the aquifer zone screened. After the March 2008 monitoring, a detailed evaluation of the hand-measured water levels (Table 3.1) and VOCs data (Table 3.2) was conducted in an attempt to differentiate aquifer zones by depth. The data collected in July 2008 and in October 2008 were evaluated similarly. The data from these events suggest at least three vertically distinct zones within the aquifer. The aquifer zones are as follows:

- **Shallow Aquifer Zone.** The only monitoring wells believed to be completed in the *shallow zone* are MW1S, MW11S, and MW12S. Wells MW1S and MW12S were dry during the March, July, and October 2008 sampling events. Well MW11S showed a water level elevation of approximately 1,312 ft AMSL in the July event and approximately 1,314 ft AMSL in the October event.
- **Intermediate Aquifer Zone.** The *intermediate zone* is believed to be represented by monitoring wells MW10S, MW11M, MW12M, MW13S, and MW17. Water level elevations measured manually for these wells were approximately 1,255-1,258 ft AMSL in July 2008 and approximately 1,256-1,259 ft AMSL in October 2008. These wells were equipped with automatic water level recorders in November 2008, to obtain detailed data on the potential temporal variability of the hydraulic heads in this aquifer zone.
- **Deep Aquifer Zone.** Monitoring wells believed to represent the *deep zone* include MW1D, MW2D, MW3D, MW4D, MW5, MW6S, MW6D, MW7, MW8, MW9, MW10D, MW11D, MW12D, MW13D, MW14S, MW14D, MW15S, MW15D, MW16S, and MW16D. The water level elevations measured manually in these monitoring wells were approximately 1,229-1,239 ft AMSL in July 2008 and approximately 1,235-1,242 ft AMSL in October 2008. On the basis of its hand-measured water level in November 2007 (approximately 1,220 ft AMSL [Argonne 2008c] and the automatic measurements [Figure 3.2]), the Oentrich well is also considered to be screened in the deep aquifer zone. Wells MW2D, MW4D, MW7, MW9,

MW14D, MW15D, and MW16D in the deep aquifer zone are presently equipped with water level recorders (as of November 2008). New recorders will be installed in wells MW1D and MW3D as soon as they are received from the manufacturer.

The vertical distribution of the carbon tetrachloride in groundwater indicates that the highest concentrations were detected in the intermediate zone, at wells MW10S (68 µg/L), MW12M (18 µg/L), and MW13S (20 µg/L). The deep-zone wells at these locations showed lower concentrations (4.4 µg/L at MW10D, a trace [estimated at 0.9 µg/L] at MW12D, and 6.6 µg/L at MW13D). Figures 3.5 and 3.6 illustrate the interpreted contaminant distributions in the intermediate and deep zones, respectively. The shallow-zone well (MW11S) continued to show no detectable concentrations of carbon tetrachloride (Table 3.2 and Figure 3.3).

TABLE 3.1 Hand-measured water levels at Barnes, March-November 2008.

Well	Reference Elevation (ft AMSL)	Water Level on Date Indicated							
		4/16/08		7/9-12/08		10/22-24/08		11/19/08	
		ft TOC ^a	ft AMSL	ft TOC ^a	ft AMSL	ft TOC ^a	ft AMSL	ft TOC ^a	ft AMSL
<i>Shallow aquifer zone</i>									
MW1S	1351.58	Dry	–	Dry	–	Dry	–	Dry	–
MW11S	1336.58	NM	–	24.80	1311.78	22.50	1314.08	NM	–
MW12S	1327.46	Dry	–	Dry	–	Dry	–	Dry	–
<i>Intermediate aquifer zone</i>									
MW10S	1331.33	NM	–	73.40	1257.93	72.00	1259.33	72.13	1259.20
MW11M	1336.51	NM	–	78.85	1257.66	77.80	1258.71	77.4	1259.11
MW12M	1327.46	NM	–	70.10	1257.36	69.72	1257.74	68.69	1258.77
MW13S	1342.36	NM	–	87.00	1255.36	86.00	1256.36	85.02	1257.34
MW17	1351.77	NM	–	96.60	1255.17	95.15	1256.62	94.81	1256.96
<i>Deep aquifer zone</i>									
MW1D	1351.33	123.63	1227.70	119.40	1231.93	113.77	1237.56	113.62	1237.71
MW2D	1348.85	121.4	1227.45	117.15	1231.70	113.55	1235.30	111.61	1237.24
MW3D	1345.99	118.03	1227.96	113.30	1232.69	108.50	1237.49	108.2	1237.79
MW4D	1326.32	100.07	1226.25	93.60	1232.72	89.90	1236.42	90.72	1235.60
MW5	1327.20	NM	–	93.80	1233.40	91.40	1235.80	NM	–
MW6S	1323.13	NM	–	88.10	1235.03	84.60	1238.53	NM	–
MW6D	1323.15	NM	–	89.50	1233.65	87.15	1236.00	NM	–
MW7	1329.91	103.81	1226.10	97.50	1232.41	94.90	1235.01	96.67	1233.24
MW8	1330.06	NM	–	95.75	1234.31	93.40	1236.66	NM	–
MW9	1321.86	94.56	1227.30	87.65	1234.21	86.60	1235.26	86.19	1235.67
MW10D	1331.33	NM	–	97.30	1234.03	95.00	1236.33	NM	–
MW11D	1336.53	NM	–	102.10	1234.43	101.03	1235.50	NM	–
MW12D	1327.52	NM	–	93.70	1233.82	91.12	1236.40	NM	–
MW13D	1342.37	NM	–	107.90	1234.47	105.30	1237.07	NM	–
MW14S	1332.69	NM	–	99.40	1233.29	96.20	1236.49	NM	–
MW14D	1332.74	105.84	1226.90	101.00	1231.74	96.10	1236.64	96.18	1236.56
MW15S	1309.34	NM	–	80.30	1229.04	73.20	1236.14	NM	–
MW15D	1309.29	78.25	1231.04	70.30	1238.99	67.60	1241.69	67.33	1241.96
MW16S	1299.47	NM	–	67.35	1232.12	64.80	1234.67	NM	–
MW16D	1299.52	73.05	1226.47	66.30	1233.22	63.90	1235.62	64.31	1235.21
Oentrich ^b	1336.93	114.97	1221.96	NM	NM	NM	–	NM	–

^a TOC, top of casing.

^b The Oentrich well water level was measured from the concrete at the top of the well vault. The value shown was corrected by 5.5 ft to give a measured depth from the top of the casing.

^c NM, not measured (sampled from faucet).

TABLE 3.2 Analytical results from the AGEM Laboratory for volatile organic compounds in groundwater samples collected at Barnes, July 2006 to October 2008.

Location	Depth (ft BGL)	Sample	Sample Date	Concentration (µg/L)			Pumping Status of PWS Wells
				Carbon Tetrachloride	Chloroform	Methylene Chloride	
<i>Previously existing KDHE monitoring wells</i>							
MW1S	13.3-23.3	Not sampled (well dry)	7/19/06	–	–	–	–
		Not sampled (well dry)	4/4/07	–	–	–	–
		Not sampled (well dry)	11/18/07	–	–	–	–
		Not sampled (well dry)	3/4/08	–	–	–	–
		Not sampled (well dry)	7/9/08	–	–	–	–
		Not sampled (well dry)	10/22/08	–	–	–	–
MW1D	139.85-159.4	BAMW1D-W-21688	7/19/06	1.0	ND ^a	ND	–
		BAMW1D-W-22565	4/4/07	1.2	ND	ND	–
		BAMW1D-W-22593	11/18/07	ND	ND	ND	–
		BAMW1D-W-22627	3/4/08	0.2 J ^b	ND	ND	–
		BAMW1D-W-22668	7/9/08	0.2 J	ND	ND	–
		BAMW1D-W-27720	10/22/08	ND	ND	ND	–
MW2D	133.26-152.93	BAMW2D-W-21687	7/19/06	ND	ND	ND	–
		BAMW2D-W-22564	4/4/07	ND	ND	ND	–
		BAMW2D-W-22594	11/18/07	ND	ND	ND	–
		BAMW2D-W-22628	3/7/08	ND	ND	ND	–
		BAMW2D-W-22669	7/10/08	ND	ND	ND	–
		BAMW2D-W-27721	10/22/08	ND	ND	ND	–
MW3D	133.02-152.73	BAMW3D-W-21686	7/19/06	ND	ND	ND	–
		BAMW3D-W-22567	4/4/07	ND	ND	ND	–
		BAMW3D-W-22595	11/19/07	ND	ND	ND	–
		BAMW3D-W-22629	3/7/08	ND	ND	ND	–
		BAMW3D-W-22670	7/10/08	ND	ND	ND	–
		BAMW3D-W-27722	10/22/08	ND	ND	ND	–
MW4D	98.38-118.22	BAMW4D-W-21690	7/20/06	2.1	ND	ND	–
		BAMW4D-W-22583	4/6/07	3.5	0.1 J	ND	–
		BAMW4D-W-22596	11/19/07	1.7	0.4 J	ND	–
		BAMW4D-W-22642	3/9/08	18	0.4 J	ND	–

TABLE 3.2 (Cont.)

Location	Depth (ft BGL)	Sample	Sample Date	Concentration (µg/L)			Pumping Status of PWS Wells
				Carbon Tetrachloride	Chloroform	Methylene Chloride	
<i>Previously existing KDHE monitoring wells (cont.)</i>							
MW4D	98.38-118.22	BAMW4D-W-22671	7/12/08	9.4	0.5 J	ND	-
		BAMW4D-W-27723	10/23/08	7.6	ND	ND	-
<i>CCC/USDA wells installed during the 2006-2007 investigation</i>							
MW5	110-120	BAMW5-W-22589	4/6/07	0.6 J	ND	ND	-
		BAMW5-W-22597	11/19/07	0.6 J	ND	ND	-
		BAMW5-W-22637	3/8/08	0.7 J	ND	ND	-
		BAMW5-W-22672	7/11/08	ND	ND	ND	-
		BAMW5-W-27724	10/23/08	3.0	ND	ND	-
MW6S	90.5-100.5	Not sampled (well dry)	4/4/07	-	-	-	-
		BAMW6S-W-22598	11/19/07	0.3 J	ND	ND	-
		BAMW6S-W-22635	3/8/08	0.4 J	ND	ND	-
		BAMW6S-W-22673	7/11/08	ND	ND	ND	-
		BAMW6S-W-27725	10/23/08	ND	ND	ND	-
MW6D	105-115	BAMW6D-W-22573	4/5/07	ND	ND	ND	-
		BAMW6D-W-22599	11/19/07	0.5 J	ND	ND	-
		BAMW6D-W-22636	3/8/08	0.8 J	ND	ND	-
		BAMW6D-W-22674	7/11/08	0.9 J	ND	ND	-
		BAMW6D-W-27726	10/23/08	1.1	ND	ND	-
MW7	116-126	BAMW7-W-22588	4/6/07	1.0	ND	ND	-
		BAMW7-W-22600	11/19/07	2.6	ND	ND	-
		BAMW7-W-22643	3/9/08	2.8	ND	ND	-
		BAMW7-W-22675	7/12/08	1.7	ND	ND	-
		BAMW7-W-27727	10/23/08	2.1	ND	ND	-
MW8	110-120	BAMW8-W-22584	4/6/07	14	0.7 J	ND	-
		BAMW8-W-22601	11/19/07	23	0.6 J	ND	-
		BAMW8-W-22652	3/10/08	19	0.6 J	ND	-
		BAMW8-W-22676	7/11/08	21	0.6 J	ND	-
		BAMW8-W-27728	10/23/08	24	1.0	ND	-

TABLE 3.2 (Cont.)

Location	Depth (ft BGL)	Sample	Sample Date	Concentration (µg/L)			Pumping Status of PWS Wells
				Carbon Tetrachloride	Chloroform	Methylene Chloride	
<i>CCC/USDA wells installed during the 2006-2007 investigation (cont.)</i>							
MW9	100-110	BAMW9-W-22582	4/5/07	1.0	ND	ND	-
		BAMW9-W-22602	11/19/07	7.7	0.6 J	ND	-
		BAMW9-W-22647	3/9/08	3.0	0.3 J	ND	-
		BAMW9-W-22678	7/11/08	1.3	0.3 J	ND	-
		BAMW9-W-27729	10/24/08	2.2	0.2 J	ND	-
MW10S	93-103	BAMW10S-W-22586	4/6/07	20	1.4	ND	-
		BAMW10S-W-22603	11/19/07	11	0.7 J	ND	-
		BAMW10S-W-22649	3/10/08	56	2.0	ND	-
		BAMW10S-W-22679	7/11/08	49	1.8	ND	-
		BAMW10S-W-27730	10/23/08	68	2.3	ND	-
MW10D	115-125	BAMW10D-W-22585	4/6/07	2.4	0.2 J	ND	-
		BAMW10D-W-22604	11/19/07	6.3	0.5 J	ND	-
		BAMW10D-W-22646	3/9/08	5.7	0.5 J	ND	-
		BAMW10D-W-22680	7/11/08	3.9	0.7 J	ND	-
		BAMW10D-W-27731	10/23/08	4.4	0.6 J	ND	-
MW11S	40-50	BAMW11S-W-22570	4/4/07	ND	1.1	ND	-
		BAMW11S-W-22605	11/19/07	ND	0.6 J	ND	-
		BAMW11S-W-22630	3/5/08	ND	0.6 J	ND	-
		BAMW11S-W-22681	7/10/08	ND	0.4 J	ND	-
		BAMW11S-W-27732	10/23/08	ND	0.3 J	ND	-
MW11M	90-100	BAMW11M-W-22572	4/5/07	ND	ND	ND	-
		BAMW11M-W-22606	11/19/07	3.7	ND	ND	-
		BAMW11M-W-22644	3/6/08	2.4	0.5 J	ND	-
		BAMW11M-W-22682	7/10/08	2.4	0.7 J	ND	-
		BAMW11M-W-27733	10/23/08	1.7	2.1	ND	-
MW11D	125-135	BAMW11D-W-22571	4/4/07	1.1	ND	ND	-
		BAMW11D-W-22607	11/19/07	0.8 J	ND	ND	-
		BAMW11D-W-22639	3/5/08	0.4 J	ND	ND	-

TABLE 3.2 (Cont.)

Location	Depth (ft BGL)	Sample	Sample Date	Concentration (µg/L)			Pumping Status of PWS Wells
				Carbon Tetrachloride	Chloroform	Methylene Chloride	
<i>CCC/USDA wells installed during the 2006-2007 investigation (cont.)</i>							
MW11D	125-135	BAMW11D-W-22683	7/10/08	0.9 J	ND	ND	—
		BAMW11D-W-27734	10/23/08	0.9 J	0.2 J	ND	—
MW12S	43-50	Not sampled (well dry)	4/5/07	—	—	—	—
		Not sampled (well dry)	11/19/07	—	—	—	—
		Not sampled (well dry)	3/10/08	—	—	—	—
		Not sampled (well dry)	7/10/08	—	—	—	—
		Not sampled (well dry)	10/22/08	—	—	—	—
MW12M	90-100	BAMW12M-W-22580	4/5/07	20	4.2	ND	—
		BAMW12M-W-22609	11/19/07	18	5.1	ND	—
		BAMW12M-W-22651	3/10/08	18	2.6	ND	—
		BAMW12M-W-22685	7/10/08	27	4.2	ND	—
		BAMW12M-W-27736	10/22/08	18	4.5	ND	—
MW12D	115-125	BAMW12D-W-22576	4/5/07	0.6 J	ND	ND	—
		BAMW12D-W-22610	11/18/07	1.6	ND	ND	—
		BAMW12D-W-22641	3/9/08	1.0	ND	ND	—
		BAMW12D-W-22686	7/11/08	0.7 J	ND	ND	—
		BAMW12D-W-27737	10/22/08	0.9 J	ND	ND	—
MW13S	112-122	BAMW13S-W-22575	4/5/07	21	1.6	ND	—
		BAMW13S-W-22611	11/19/07	17	1.8	ND	—
		BAMW13S-W-22650	3/10/08	17	1.5	ND	—
		BAMW13S-W-22687	7/9/08	17	1.9	ND	—
		BAMW13S-W-27738	10/22/08	20	1.6	ND	—
MW13D	127-137	BAMW13D-W-22574	4/5/07	3.5	0.4 J	ND	—
		BAMW13D-W-22612	11/19/07	5.9	0.2 J	ND	—
		BAMW13D-W-22645	3/9/08	11	1.1	ND	—
		BAMW13D-W-22688	7/9/08	5.9	0.9 J	ND	—
		BAMW13D-W-27739	10/22/08	6.6	0.6 J	ND	—

TABLE 3.2 (Cont.)

Location	Depth (ft BGL)	Sample	Sample Date	Concentration (µg/L)			Pumping Status of PWS Wells
				Carbon Tetrachloride	Chloroform	Methylene Chloride	
<i>CCC/USDA wells installed during the 2006-2007 investigation (cont.)</i>							
MW14S	108-118	BAMW14S-W-22569	4/4/07	0.9 J	ND	ND	-
		BAMW14S-W-22613	11/18/07	1.2	ND	ND	-
		BAMW14S-W-22640	3/8/08	4.3	0.3 J	ND	-
		BAMW14S-W-22689	7/10/08	5.6	0.3 J	ND	-
		BAMW14S-W-27740	10/22/08	5.6	0.3 J	ND	-
MW14D	123-133	BAMW14D-W-22568	4/4/07	1.2	ND	ND	-
		BAMW14D-W-22614	11/18/07	0.6 J	ND	ND	-
		BAMW14D-W-22638	3/8/08	0.7 J	ND	ND	-
		BAMW14D-W-22690	7/10/08	0.5 J	ND	ND	-
		BAMW14D-W-27741	10/22/08	ND	ND	ND	-
MW15S	88-98	BAMW15S-W-22560	4/4/07	1.5	ND	ND	-
		BAMW15S-W-22615	11/18/07	8.7	0.4 J	ND	-
		BAMW15S-W-22648	3/10/08	1.8	0.2 J	ND	-
		BAMW15S-W-22691	7/12/08	2.2	0.3 J	ND	-
		BAMW15S-W-27742	10/23/08	1.9	ND	ND	-
MW15D	105-115	BAMW15D-W-22561	4/4/07	ND	ND	ND	-
		BAMW15D-W-22616	11/18/07	ND	ND	ND	-
		BAMW15D-W-22631	3/8/08	0.2 J	ND	ND	-
		BAMW15D-W-22692	7/12/08	ND	ND	ND	-
		BAMW15D-W-27743	10/24/08	ND	ND	ND	-
MW16S	76-86	BAMW16S-W-22563	4/4/07	ND	ND	ND	-
		BAMW16S-W-22617	11/19/07	ND	ND	ND	-
		BAMW16S-W-22632	3/7/08	0.4 J	ND	ND	-
		BAMW16S-W-22693	7/11/08	ND	ND	ND	-
		BAMW16S-W-27744	10/23/08	0.9 J	ND	ND	-
MW16D	90-100	BAMW16D-W-22562	4/4/07	ND	ND	ND	-
		BAMW16D-W-22618	11/19/07	ND	ND	ND	-
		BAMW16D-W-22633	3/7/08	ND	ND	ND	-

TABLE 3.2 (Cont.)

Location	Depth (ft BGL)	Sample	Sample Date	Concentration (µg/L)			Pumping Status of PWS Wells
				Carbon Tetrachloride	Chloroform	Methylene Chloride	
<i>CCC/USDA wells installed during the 2006-2007 investigation (cont.)</i>							
MW16D	90-100	BAMW16D-W-22694	7/11/08	ND	ND	ND	—
		BAMW16D-W-27745	10/23/08	ND	ND	ND	—
MW17	120-130	BAMW17D-W-22566	4/4/07	ND	ND	ND	—
		BAMW17D-W-22619	11/19/07	ND	ND	ND	—
		BAMW17-W-22634	3/5/08	0.3 J	ND	ND	—
		BAMW17-W-22695	7/9/08	0.4 J	ND	ND	—
		BAMW17-W-27746	10/22/08	0.7 J	ND	ND	—
<i>Private wells</i>							
Oentrich	150	BAOENT-W-21693	7/20/06	0.3 J	ND	ND	—
		BAOENT-W-21713	8/2/06	0.6 J	ND	ND	—
		BAOENTRICH-W-22579	4/5/07	0.6 J	ND	ND	—
		BAOENTRICH-W-22622	11/19/07	0.8 J	ND	ND	—
		BAOENTRICH-W-22654	3/6/08	1.3	ND	ND	—
		BAOENTRICH-W-22695	7/11/08	0.3 J	ND	ND	—
Sedivy	138	BACW-W-21849	8/22/06	ND	ND	ND	—
		BASED2-W-21913	9/13/06	ND	ND	ND	—
Sedivy1	90	Not sampled (well dry)	9/13/06	—	—	—	—
<i>Public water supply wells</i>							
PWS2	155	BAPWS2-W-22510	3/9/07	ND	ND	ND	Well has been pumping today. Sampled after pump had run for 5-10 in. Well on at time of sampling. Let water run out of tap for 2-3 min, then sampled. Running for 30 min. Unknown. Unkknown Well was pumping for 5 min.
		BAPW2-W-22578	4/5/07	ND	ND	ND	
		BAPW2-W-22620	11/20/07	ND	ND	ND	
		BAPWS2-W-22655	3/6/08	ND	ND	ND	
		BAPWS2-W-22696	7/11/08	0.8 J	ND	ND	
		—	7/14/08 ^c	1.3	—	—	
		—	8/3/08 ^c	0.89	—	—	
BAPW2-W-27748	10/23/08	1.7	ND	ND			

TABLE 3.2 (Cont.)

Location	Depth (ft BGL)	Sample	Sample Date	Concentration (µg/L)			Pumping Status of PWS Wells
				Carbon Tetrachloride	Chloroform	Methylene Chloride	
<i>Public water supply wells (cont.)</i>							
PWS3	160	BAPWS3-W-22511	3/9/07	0.2 J	ND	ND	Well has been pumping today.
		BAPW3-W-22577	4/5/07	ND	ND	ND	Well has been pumping all day.
		BAPW3-W-22621	11/20/07	ND	ND	ND	Well on at time of sampling.
		BAPWS3-W-22656	3/6/08	ND	ND	ND	Sample collected from tap in well house. Let water run from tap for 2-3 min, then sampled.
		BAPWS3-W-22697	7/11/08	0.2 J	ND	ND	Running for 30 min.
		–	7/14/08 ^c	ND	–	–	Unknown.
		BAPW3-W-27749	10/23/08	ND	ND	ND	Well was pumping for 30 min.

^a ND, contaminant not detected at an instrument detection limit of 0.1 µg/L.

^b Qualifier J indicates an estimated concentration below the purge-and-trap method quantitation limit of 1.0 µg/L.

^c Sample collected by City of Barnes. Complete results of the city's sampling in 1986-2008 are in Appendix E.

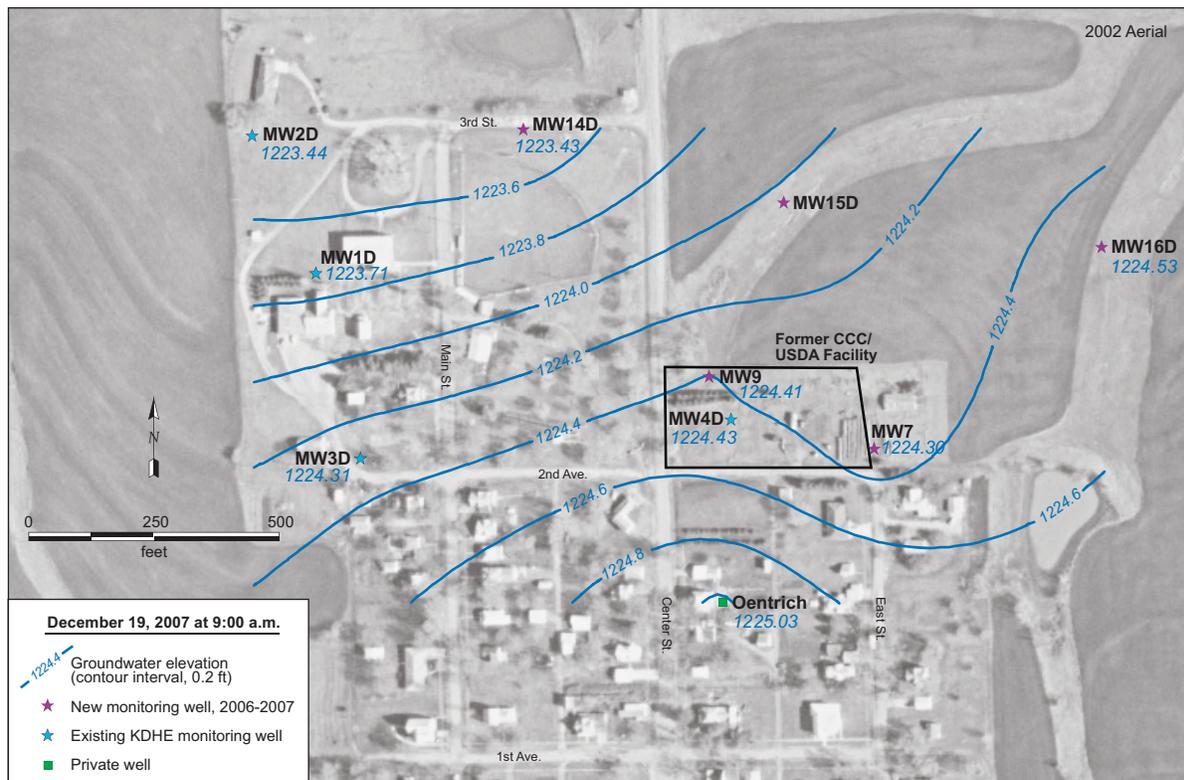
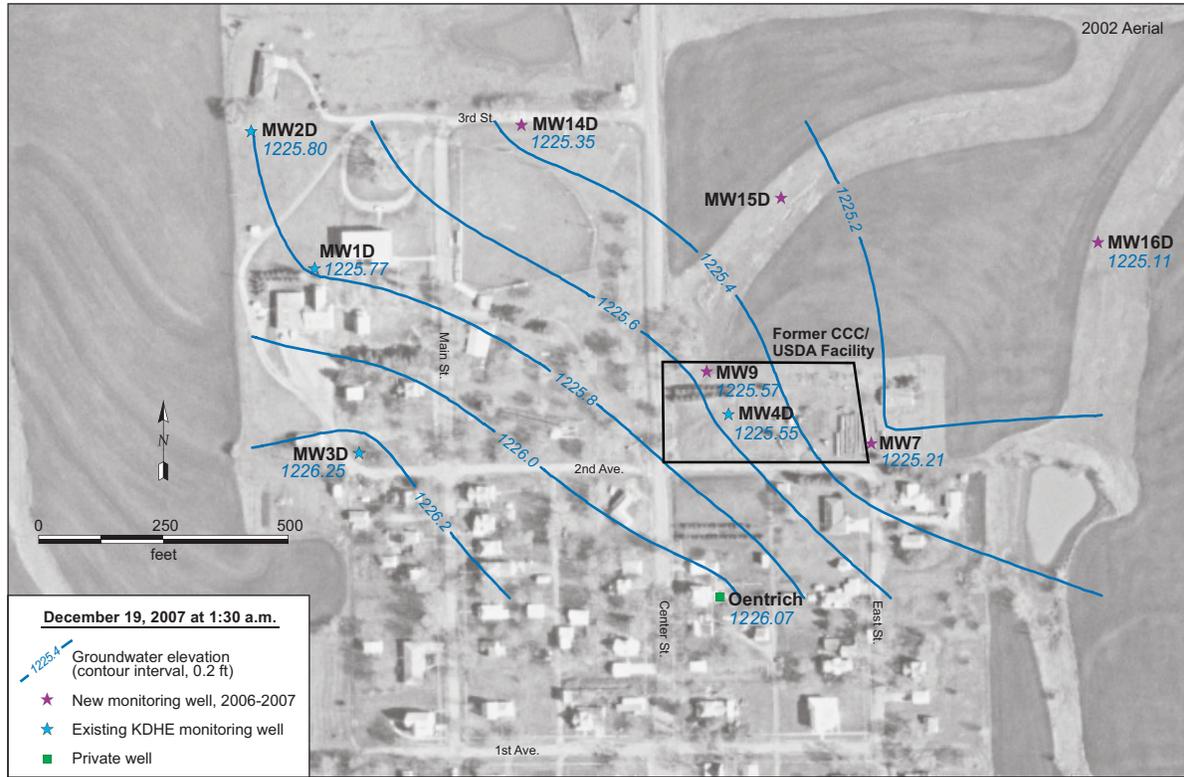


FIGURE 3.1 Potentiometric surface maps depicting the groundwater flow direction at Barnes in December 2007 and May 2008, before pumping of the public water supply wells (top panels) and during pumping (bottom panels). Source of photograph: NAPP (2002).

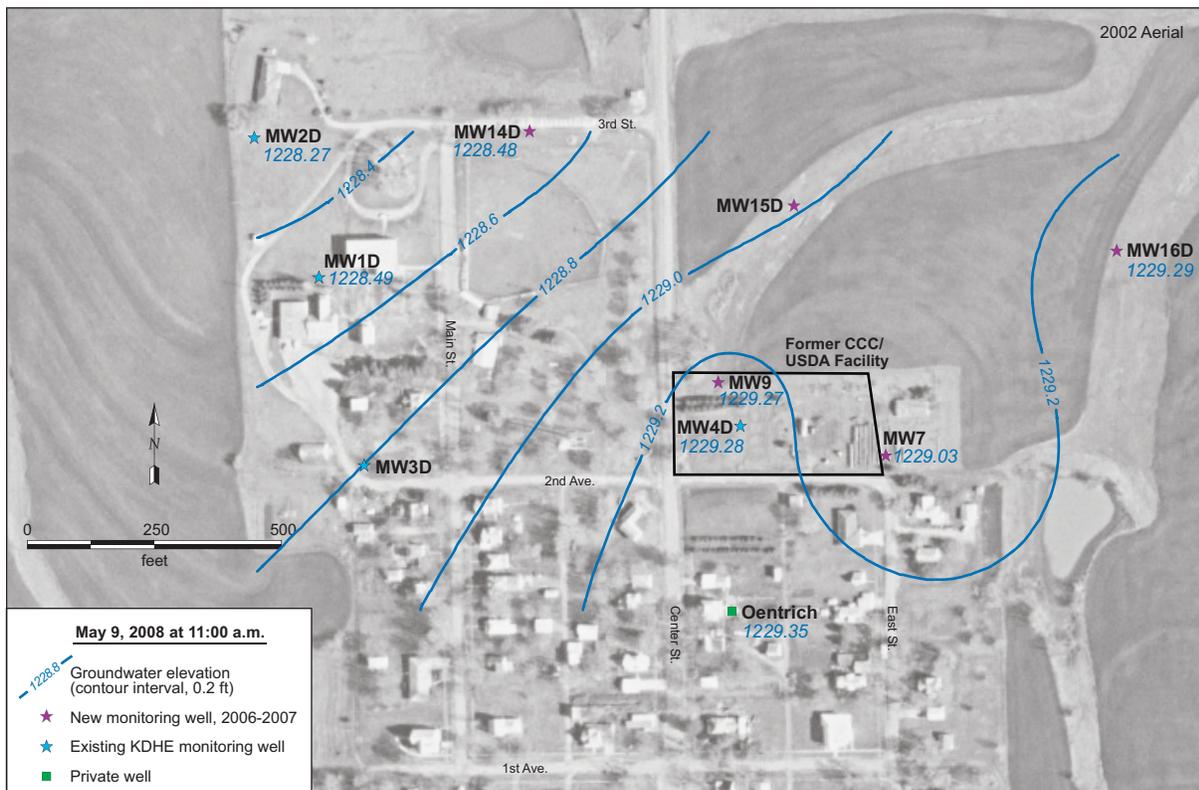
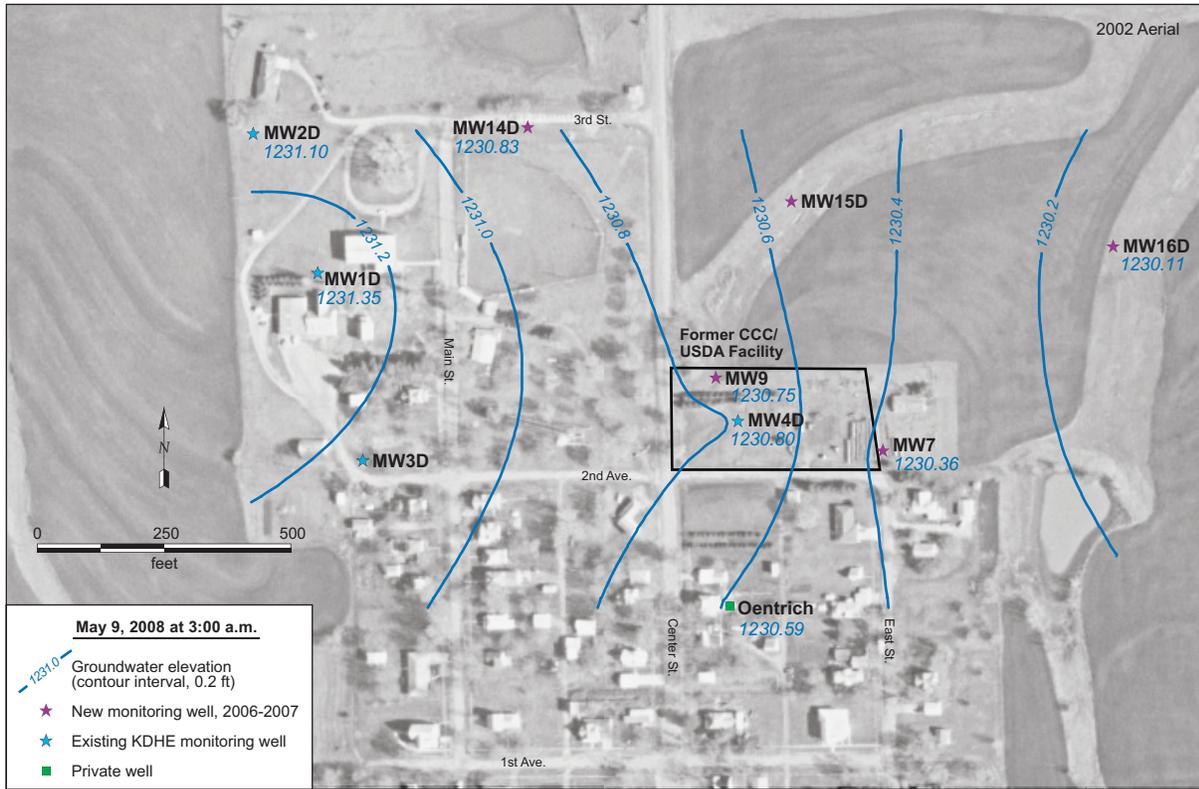


FIGURE 3.1 (cont.)

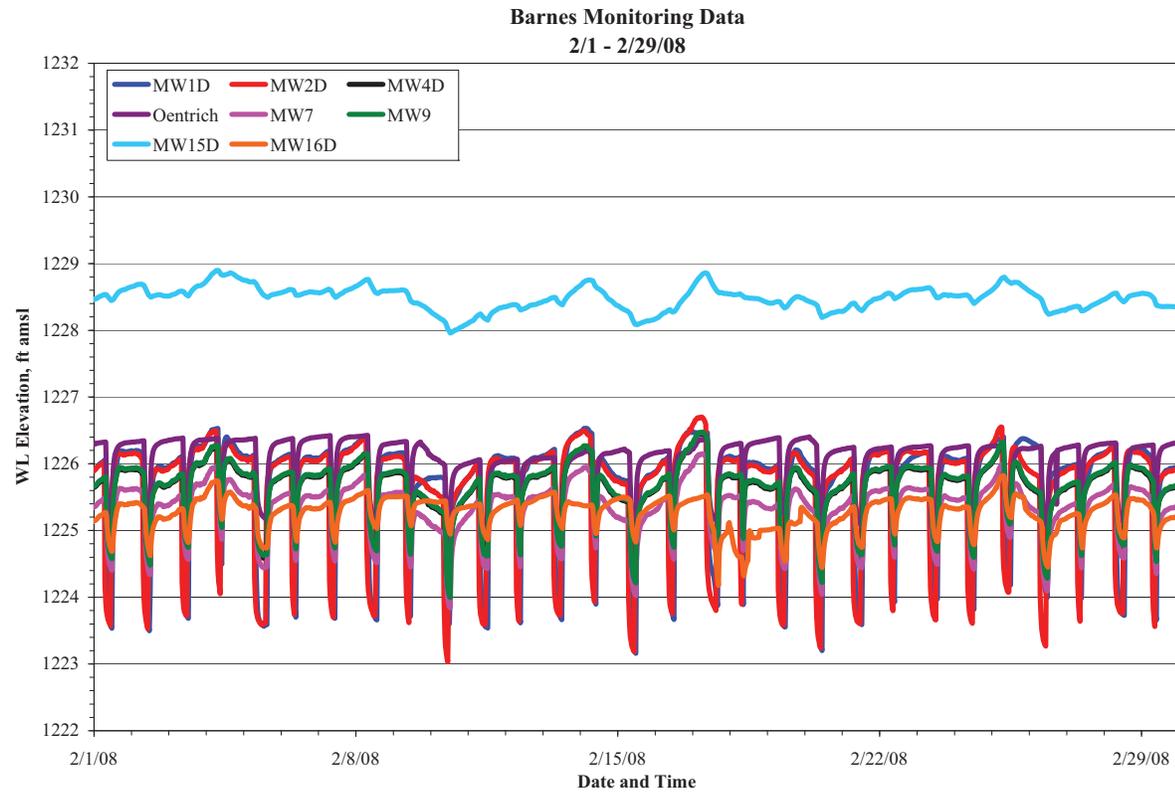
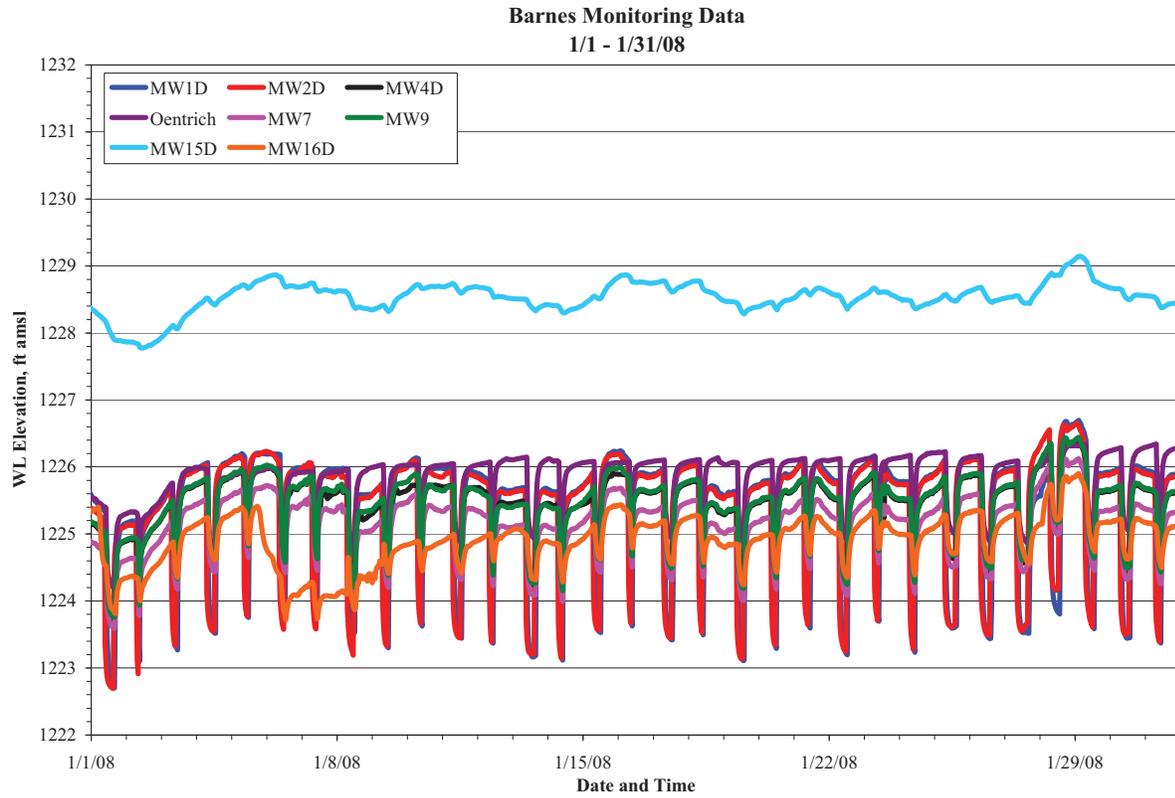


FIGURE 3.2 Hydrographs summarizing monthly results of long-term water level monitoring in wells at Barnes, January to November 2008.

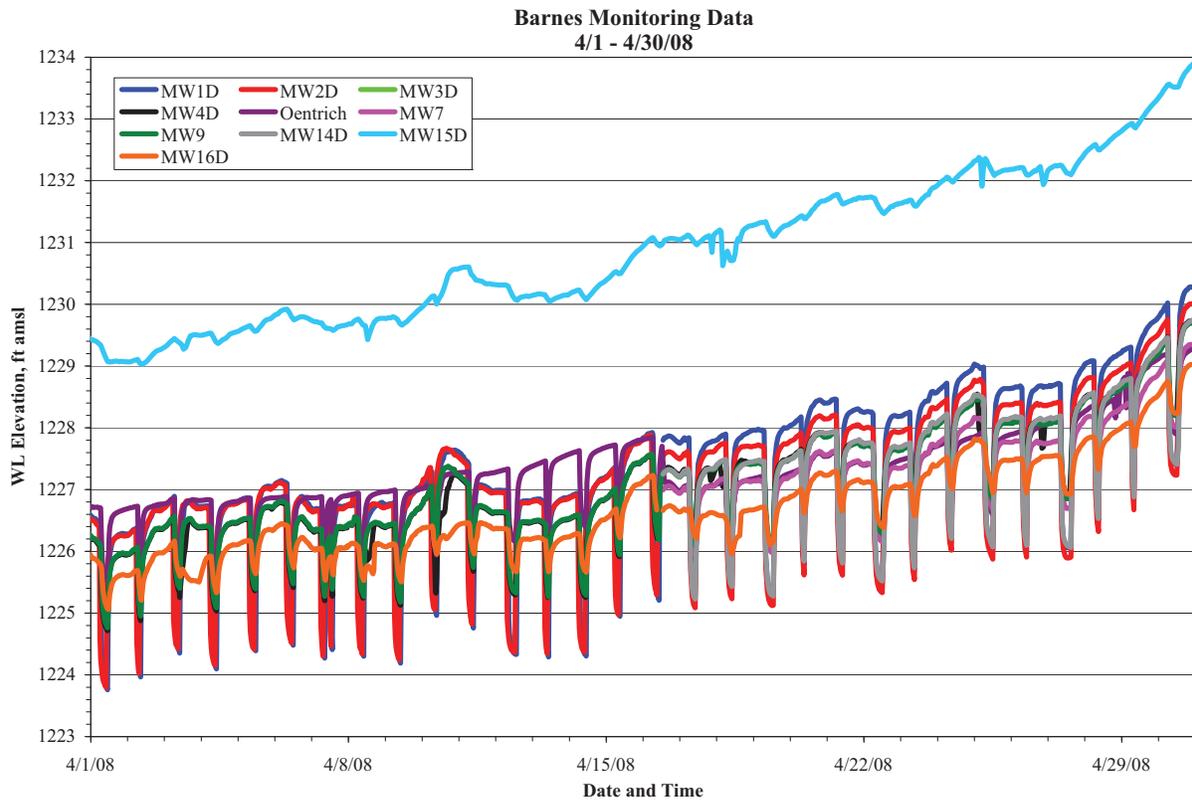
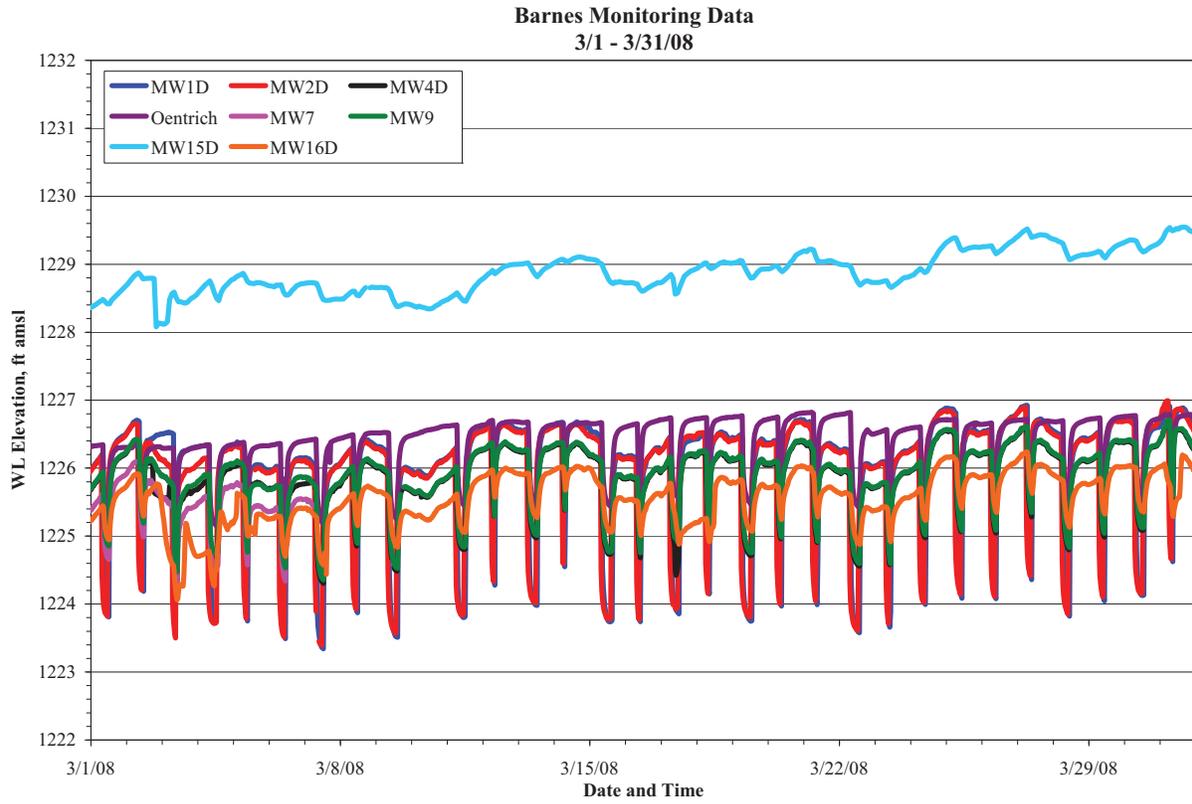


FIGURE 3.2 (cont.)

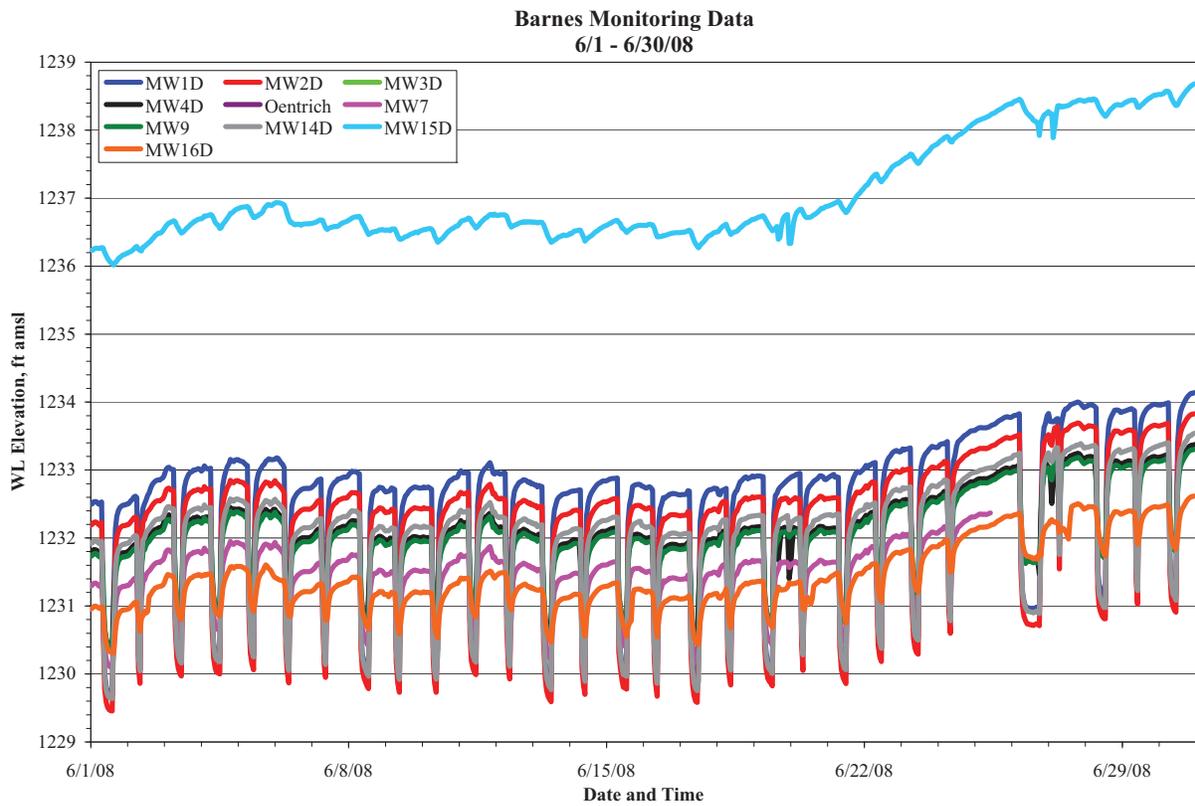
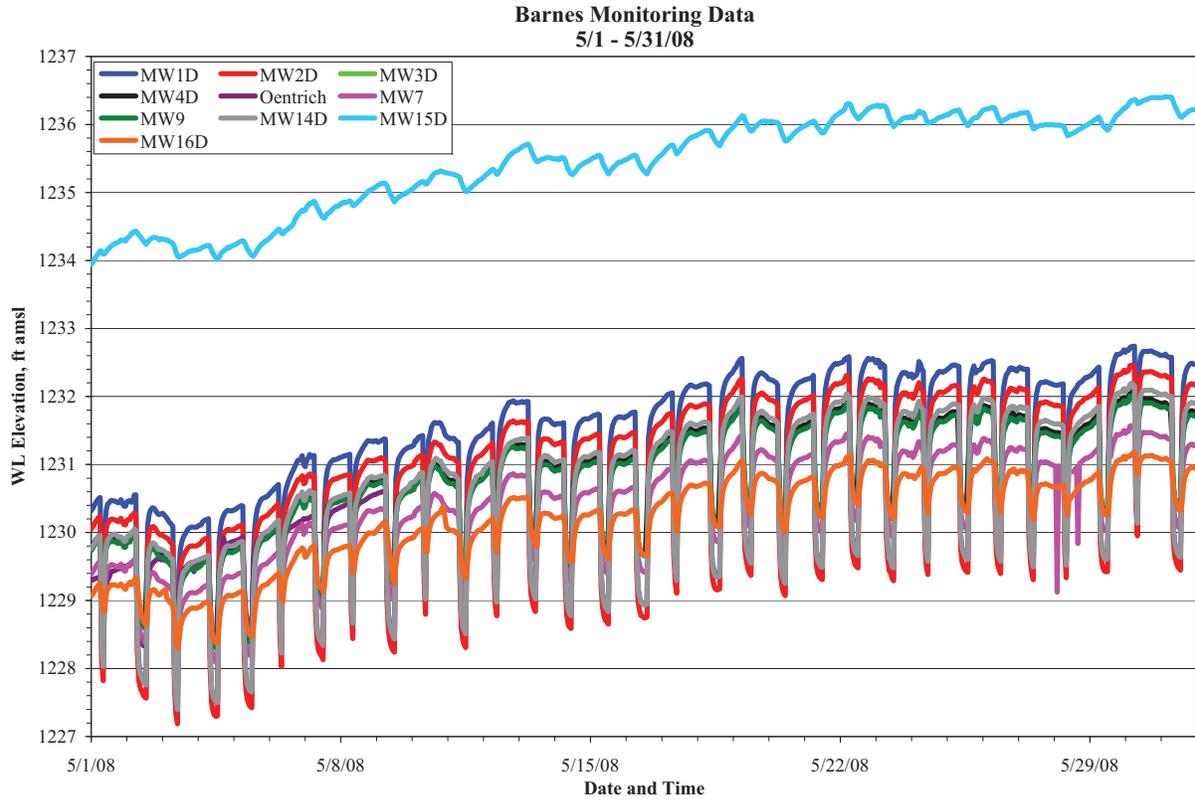


FIGURE 3.2 (cont.)

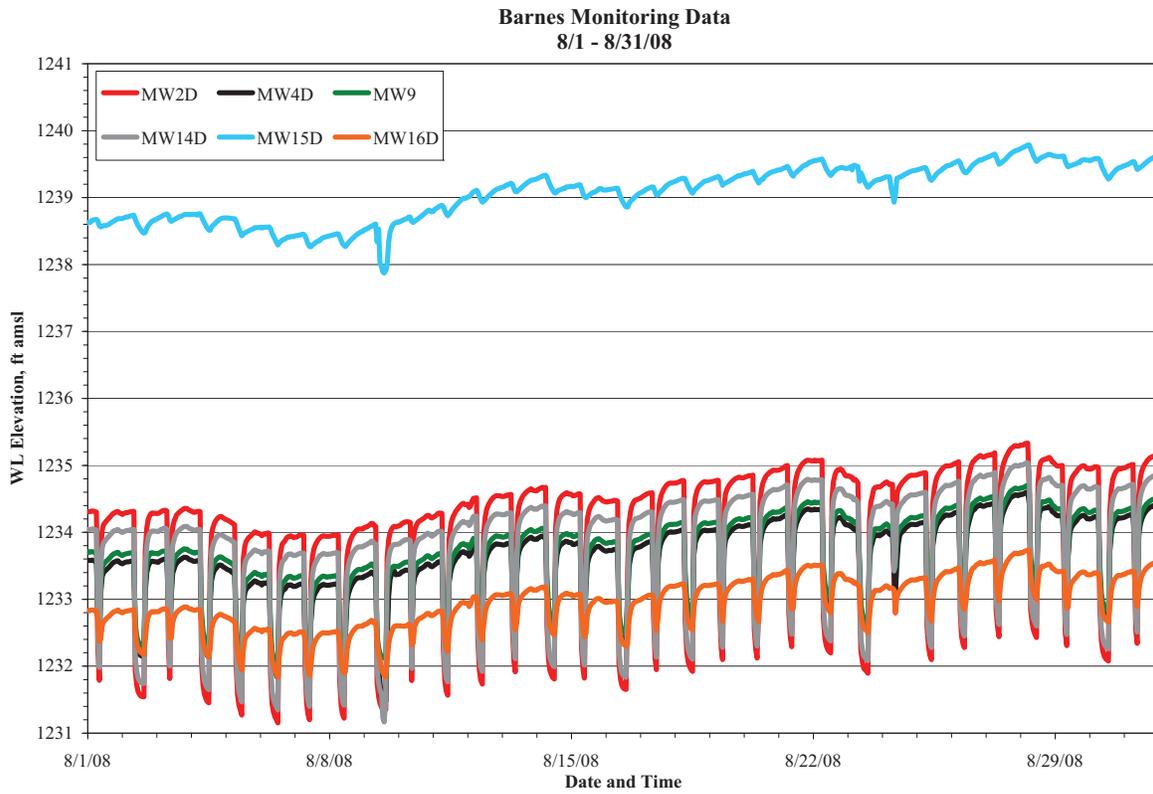
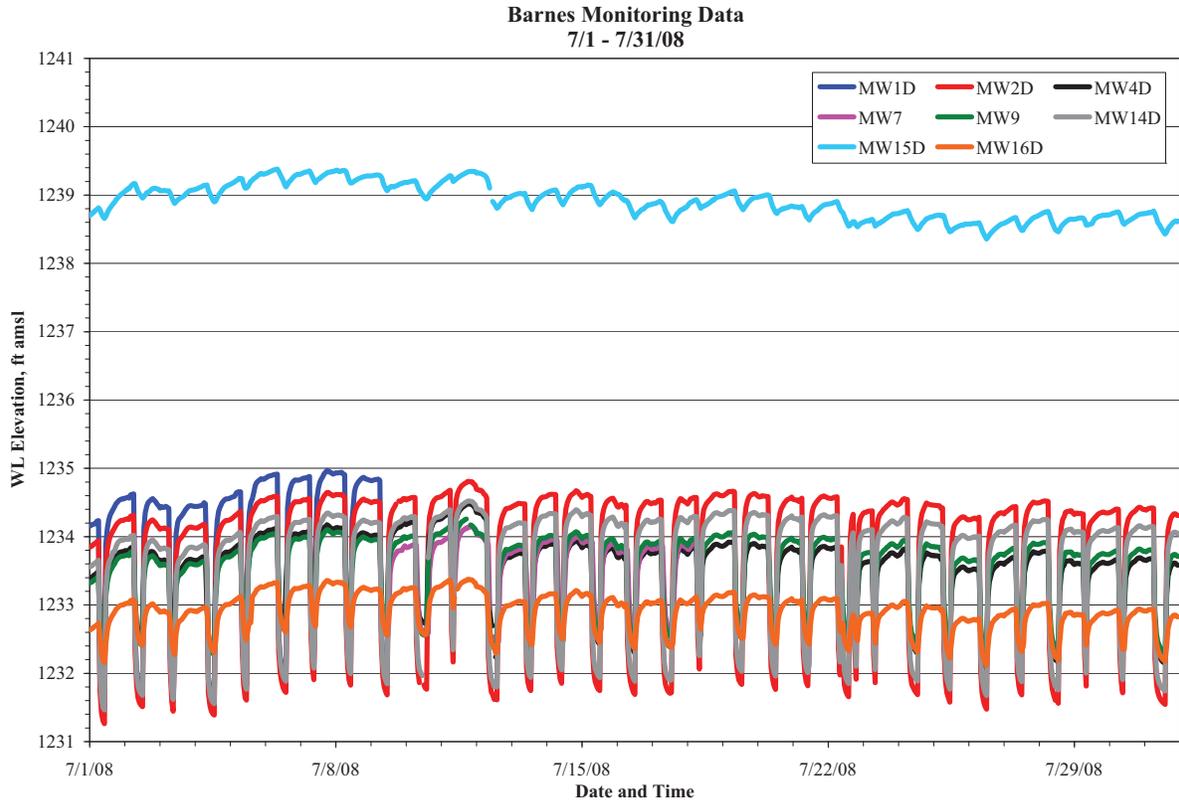


FIGURE 3.2 (cont.)

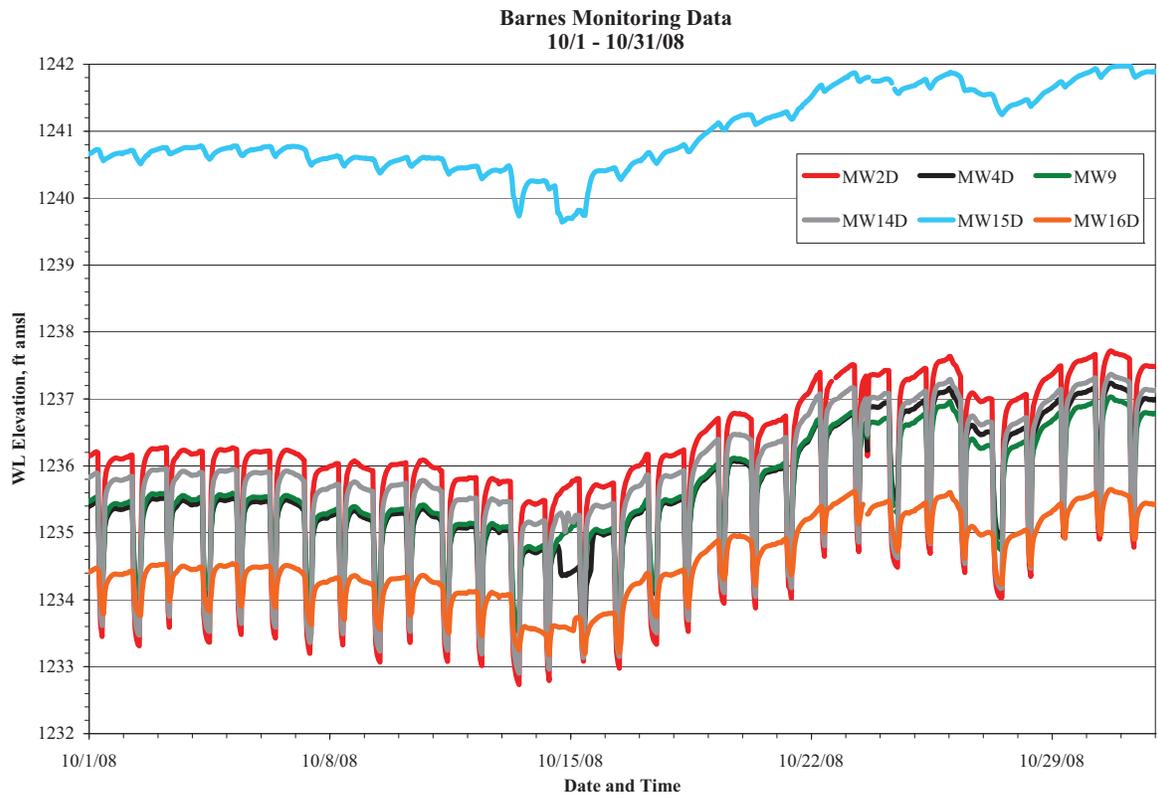
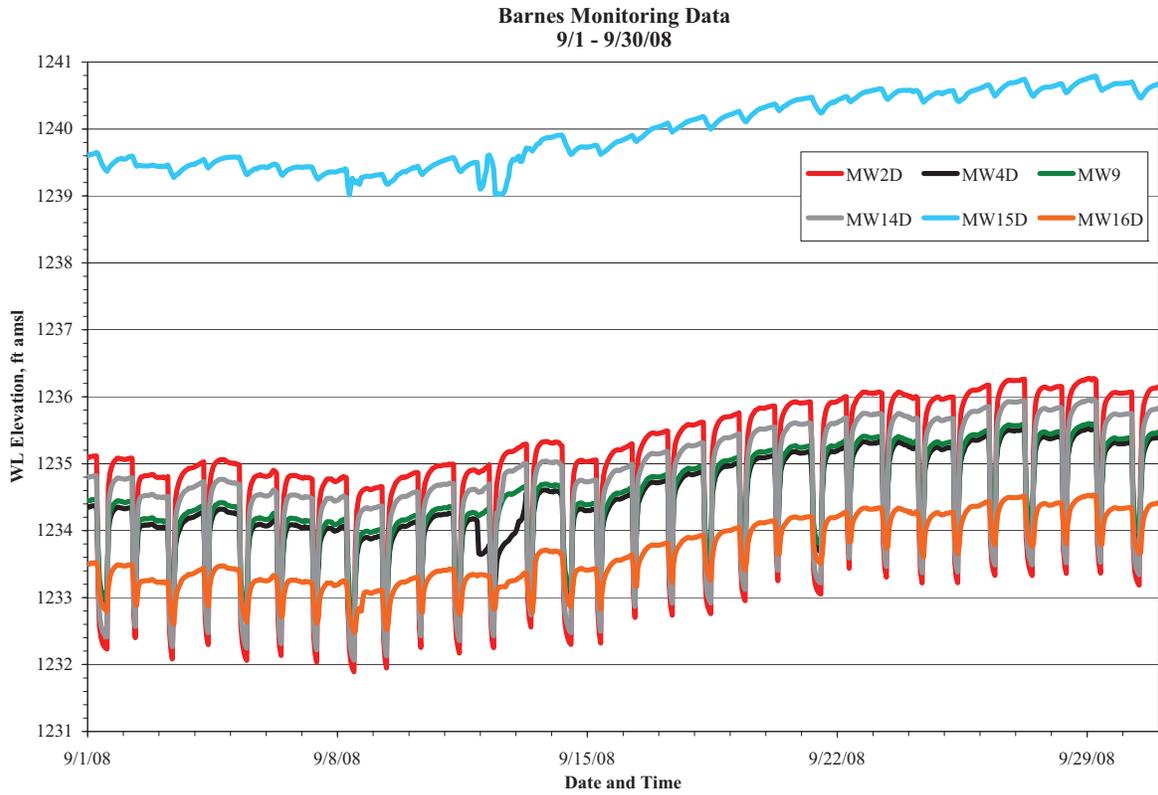


FIGURE 3.2 (cont.)

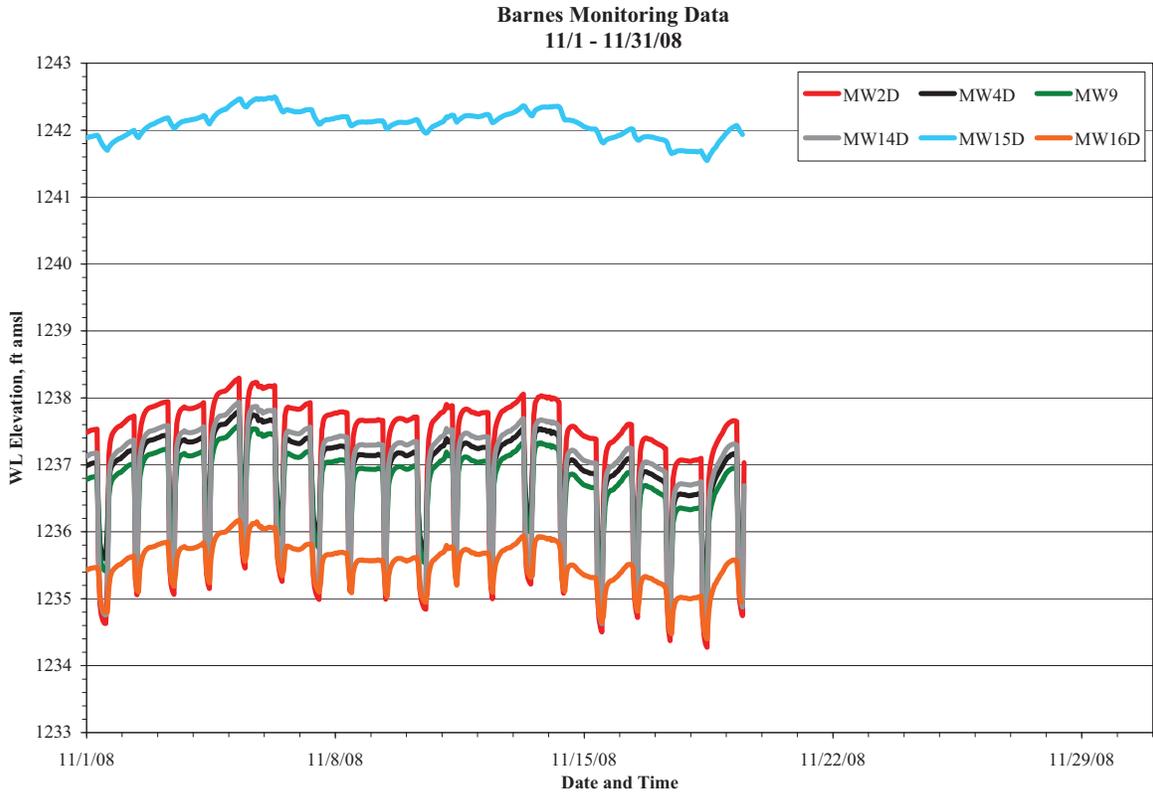


FIGURE 3.2 (cont.)

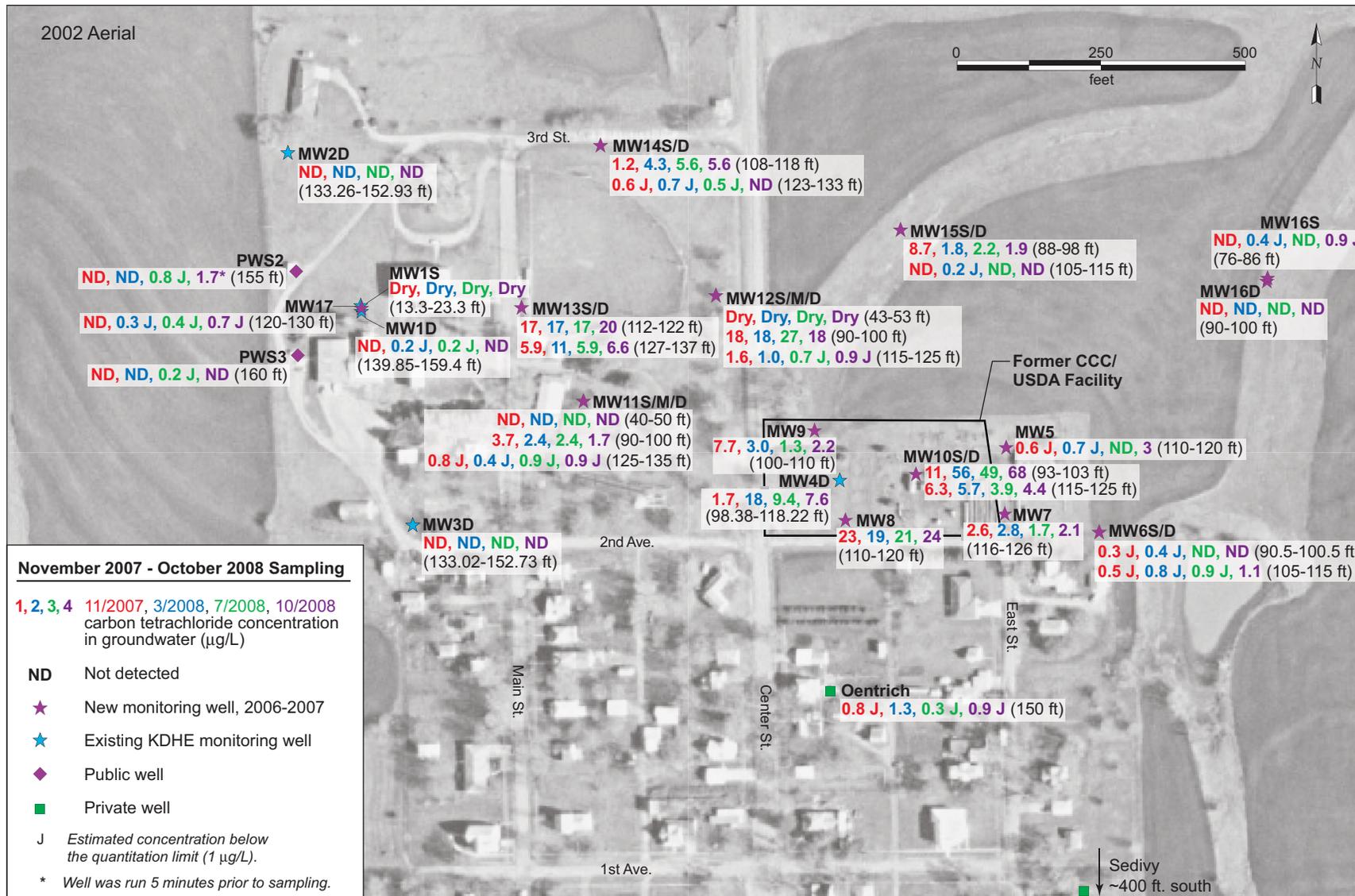


FIGURE 3.3 Analytical results for carbon tetrachloride in groundwater samples collected at Barnes in November 2007 to October 2008. Source of photograph: NAPP (2002).

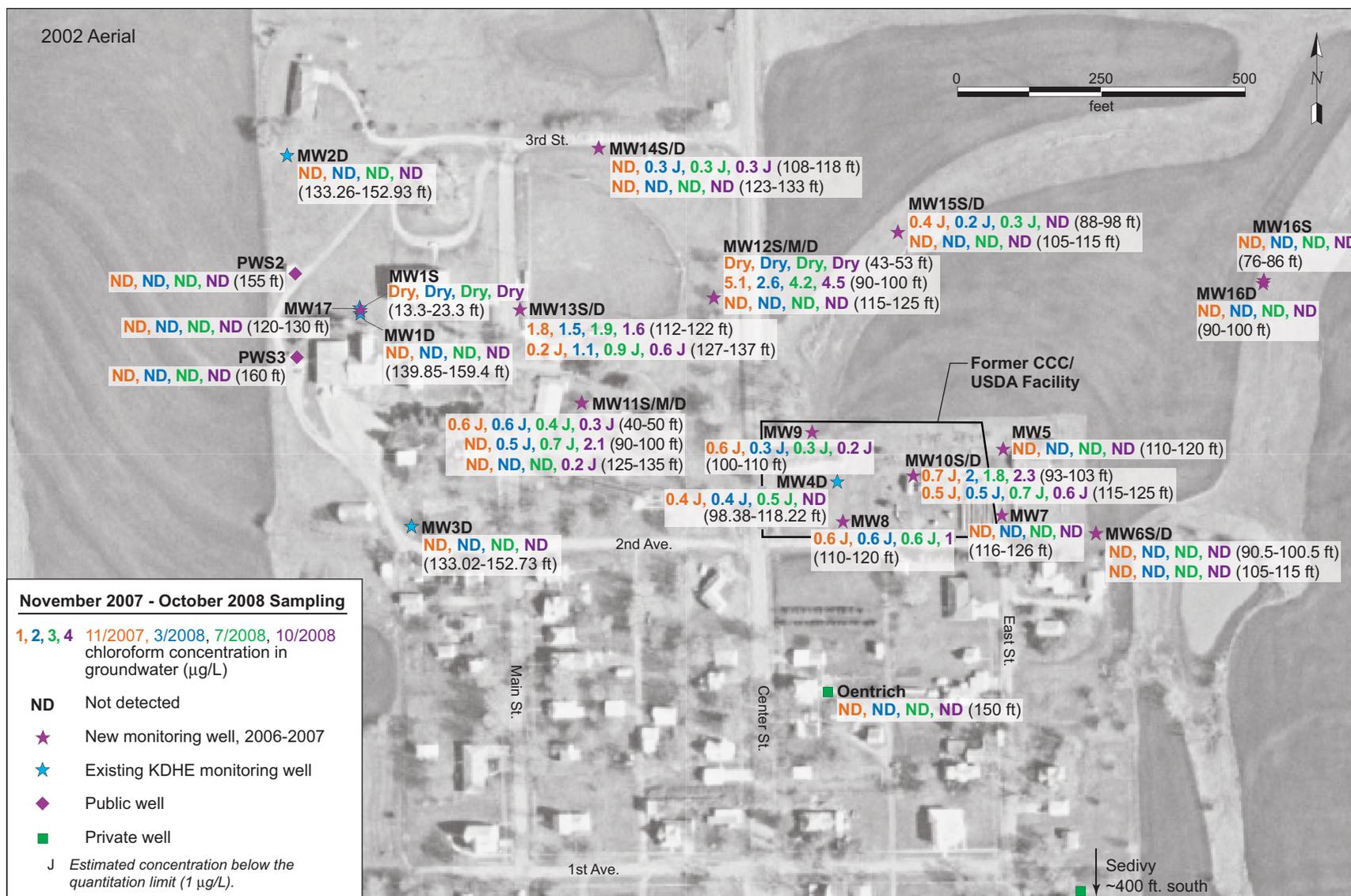


FIGURE 3.4 Analytical results for chloroform in groundwater samples collected at Barnes in November 2007 to October 2008. Source of photograph: NAPP (2002).

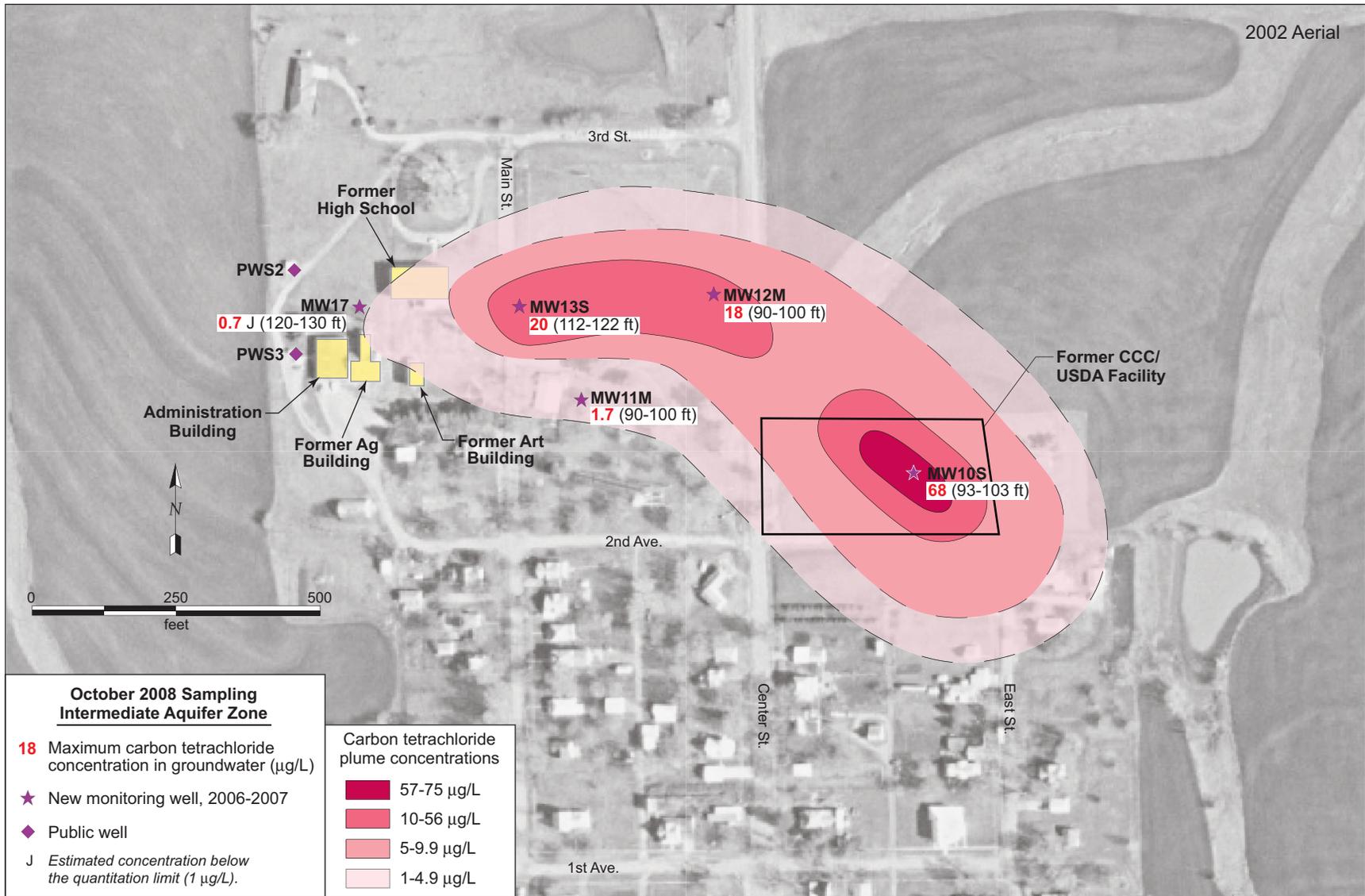


FIGURE 3.5 Interpreted carbon tetrachloride plume in October 2008 in wells screened in the intermediate aquifer zone (groundwater levels approximately 1,256-1,259 ft AMSL). Source of photograph: NAPP (2002).

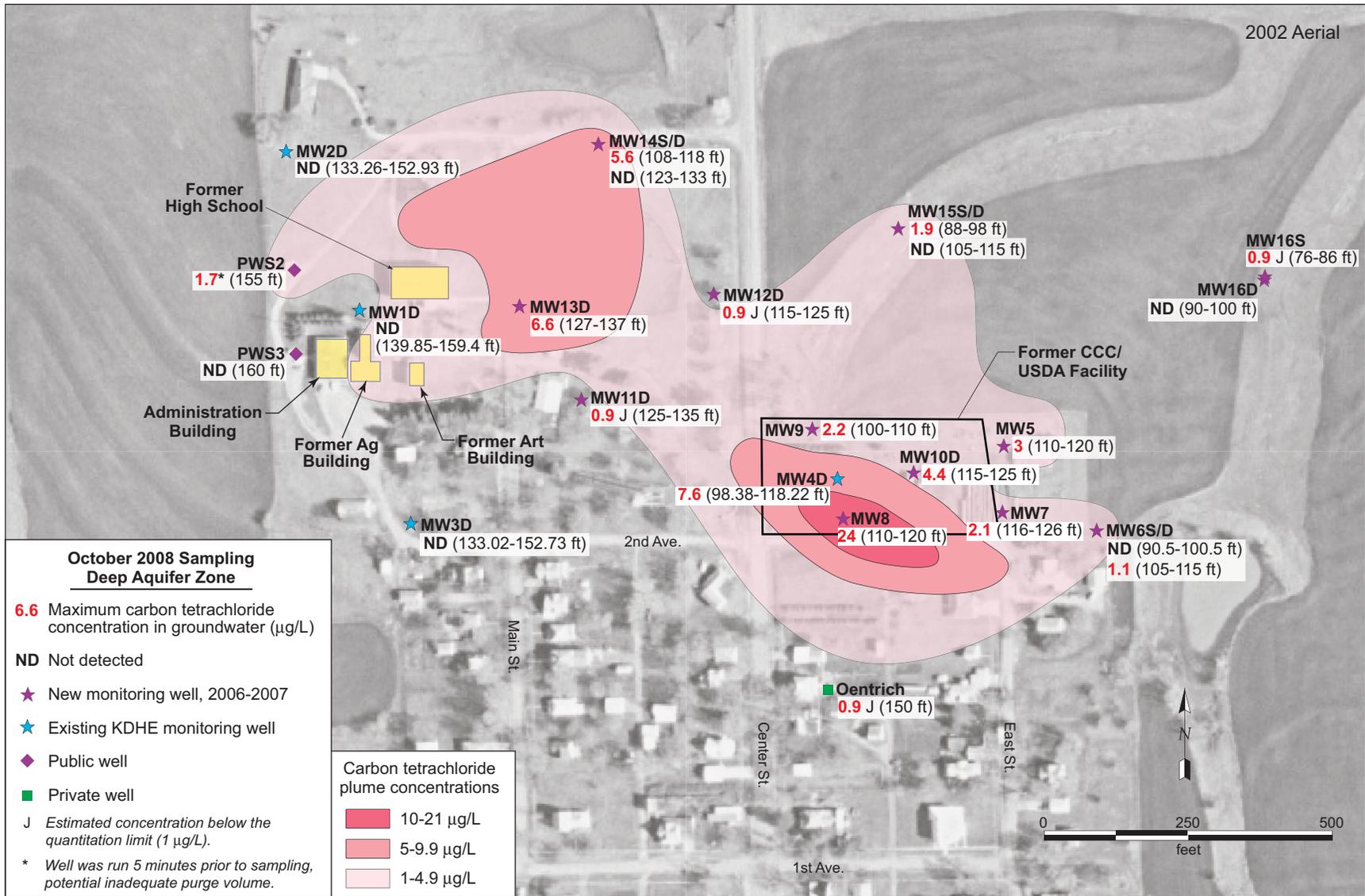


FIGURE 3.6 Interpreted carbon tetrachloride plume in October 2008 in wells screened in the deep aquifer zone (groundwater levels approximately 1,235-1,242 ft AMSL). Source of photograph: NAPP (2002).

4 Conclusions and Ongoing Tasks

4.1 Conclusions

The findings of the October 2008 monitoring event at Barnes support the following conclusions:

- Measurements of groundwater levels obtained manually and through the use of automatic recorders have consistently indicated that the flow direction is strongly influenced by pumping of the public water supply wells. The results have demonstrated
 - An apparent groundwater flow direction to the northeast when the public wells *are not pumping* and
 - A northwesterly groundwater flow trend when the public wells *are pumping*.
- Evaluation of manual water level measurements and carbon tetrachloride concentrations continued to suggest that three vertically distinguishable aquifer zones are present at Barnes: a shallow zone with a potentiometric surface at approximately 1,314 ft AMSL, an intermediate zone at approximately 1,256-1,259 ft AMSL, and a deep zone at approximately 1,235-1,242 ft AMSL (based on measurements taken in October 2008). As of November 2008, all 5 monitoring wells screened in the intermediate aquifer zone and 7 of 20 wells completed in the deep aquifer zone are equipped with automatic water level recorders. Additional recorders will be added as warranted and as they become available from the manufacturer.
- The vertical distribution of the carbon tetrachloride in groundwater continues to indicate that the highest concentrations occur in the intermediate aquifer zone. Lower concentrations have been detected in the deep aquifer zone, and no carbon tetrachloride has been detected in the shallow zone.

- Use of the low-flow sampling method during the three monitoring events from March to October 2008 indicated that the maximum level of carbon tetrachloride identified in sitewide monitoring has consistently been detected at intermediate-zone well MW10S, located in the eastern portion of the former CCC/USDA facility.
- Overall, the lateral distribution of carbon tetrachloride in groundwater in October 2008 is similar to the distribution during previous sampling events. The most significant changes are an increase in the concentration of carbon tetrachloride in public well PWS2 (from $< 1 \mu\text{g/L}$ in July to $1.7 \mu\text{g/L}$ in October) and a decrease at PWS3 (from $< 1 \mu\text{g/L}$ in July to no detection in October).

4.2 Ongoing Tasks

Ongoing tasks related to Barnes are as follows:

- Quarterly monitoring will continue, as recommended in the targeted investigation report (Argonne 2008a).
- In cooperation with the city, daily pumping rates are being recorded over a short time period to provide information for further evaluation of the aquifer characteristics. When this additional information is available, an attempt will be made to model the effects of the pumping (including rates and frequency) on the distribution of carbon tetrachloride in the subsurface. This effort is expected to include estimation of the capture zone for the pumping public water supply wells. The exact value of the effort will be predicated on the accuracy and level of detail of data provided by the city of Barnes for use in the modeling.
- The conceptual contingent interim measure work plan requested by the KDHE (2008) for protection of the public water supply wells is currently being prepared for submission. Cost estimates have been obtained for treatment at the wellhead through use of carbon filtration or air stripping. The CCC/USDA

and Argonne have also contacted Washington County Rural Water District #2 to determine the feasibility of connecting the city of Barnes to that water supply.

5 References

Argonne, 2002, *Final Master Work Plan: Environmental Investigations at Former CCC/USDA Facilities in Kansas, 2002 Revision*, ANL/ER/TR-02/004, prepared for the Commodity Credit Corporation, U.S. Department of Agriculture, Washington, D.C., by Argonne National Laboratory, Argonne, Illinois, December.

Argonne, 2008a, *Final Report: Results of the 2006-2007 Investigation of Potential Contamination at the Former CCC/USDA facility in Barnes, Kansas*, ANL/EVS/AGEM/TR-07-12, prepared for the Commodity Credit Corporation, U.S. Department of Agriculture, Washington, D.C., by Argonne National Laboratory, Argonne, Illinois, August.

Argonne, 2008b, *November 2007 Monitoring Results for Barnes, Kansas*, ANL/EVS/AGEM/TR-08-04, prepared for the Commodity Credit Corporation, U.S. Department of Agriculture, Washington, D.C., by Argonne National Laboratory, Argonne, Illinois, February.

Argonne, 2008c, *March 2008 Monitoring Results for Barnes, Kansas*, ANL/EVS/AGEM/TR-08-11, prepared for the Commodity Credit Corporation, U.S. Department of Agriculture, Washington, D.C., by Argonne National Laboratory, Argonne, Illinois, August.

Argonne, 2008d, *July 2008 Monitoring Results for Barnes, Kansas*, ANL/EVS/AGEM/TR-08-17, prepared for the Commodity Credit Corporation, U.S. Department of Agriculture, Washington, D.C., by Argonne National Laboratory, Argonne, Illinois, September.

EPA, 1995, *Method 524.2: Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry, Revision 4.1*, edited by J.W. Munch, National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

KDHE, 2008, letter from C. Carey (Bureau of Environmental Remediation, Kansas Department of Health and Environment, Topeka, Kansas) to C. Roe (Commodity Credit Corporation, U.S. Department of Agriculture, Washington, D.C.), regarding the former CCC/USDA facility at Barnes, March 13.

NAPP, 2002, aerial image NAPP 12897 222, National Aerial Photography Program, U.S. Geological Survey (available from Kansas Geospatial Community Commons [<http://www.kansasgis.org/>]), April 9.

Puls, R.W., and M.J. Barcelona, 1996, "Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures," EPA/540/S-95/504, in *Ground Water Issue*, Superfund Technology Support Center for Ground Water, National Risk Management Research Laboratory, U.S. Environmental Protection Agency, Ada, Oklahoma, April (www.epa.gov/tio/tsp/download/lwflw2a.pdf).

Yeskis, D., and B. Zavala, 2002, *Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers: Ground Water Forum Issue Paper*, EPA 542-S-02-001, Technology Innovative Office, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C., May (http://www.epa.gov/tio/tsp/download/gw_sampling_guide.pdf).

Appendix A:

Sampling Activities and Field Measurements at Barnes in October 2008

TABLE A.1 Sequence of sampling activities at Barnes in October 2008.^a

Date	Time	Sample	Type ^b	Location	Depth ^c (ft BGL)	Chain of Custody	Shipment Date	Sample Description
10/22/08	12:24	BAMW17-W-27746	MW	MW17	120-130	6151	10/22/08	Depth to water = 95.15 ft. Depth of 2-in. well = 130 ft. Sample collected by using low-flow bladder pump after purging of 6 L. Pump intake positioned at 125 ft. Aliquots collected for verification analysis by Test America.
10/22/08	12:30	BAQCIR-W-27753	RI	QC	–	6151	10/22/08	Rinsate of decontaminated sampling line after collection of sample BAMW17-W-27746.
10/22/08	13:00	BAMW1S-dry-Oct08	MW	MW1S	13.3-23.3	–	–	Monitoring well MW1S was dry.
10/22/08	13:12	BAMW3D-W-27722	MW	MW3D	133.02-152.73	6151	10/22/08	Depth to water = 108.5 ft. Depth of 2-in. well = 152.73 ft. Sample collected by using low-flow bladder pump after purging of 10 L. Pump intake positioned at 142.88 ft. Aliquots collected for verification analysis by TestAmerica.
10/22/08	13:40	–	–	MW1S	13.3-23.3	–	–	Monitoring Well MW1S was dry.
10/22/08	13:48	BAMW1D-W-27720	MW	MW1D	139.85-159.4	6151	10/22/08	Depth to water = 113.77 ft. Depth of 2-in. well = 159.4 ft. Sample collected by using low-flow bladder pump after purging of 4 L. Pump intake positioned at 149.63 ft.
10/22/08	13:49	BAMW1DDUP-W-27750	MW	MW1D	139.85-159.4	6151	10/22/08	Replicate of sample BAMW1D-W-27720.
10/22/08	14:12	BAMW13S-W-27738	MW	MW13S	112-122	6151	10/22/08	Depth to water = 86 ft. Depth of 2-in. well = 122 ft. Sample collected by using low-flow bladder pump after purging of 4.5 L. Pump intake positioned at 117 ft.
10/22/08	14:13	BAMW13SDUP-W-27751	MW	MW13S	112-122	6151	10/22/08	Replicate of sample BAMW13S-W-27738.
10/22/08	15:30	BAMW13D-W-27739	MW	MW13D	127-137	6151	10/22/08	Depth to water = 105.3 ft. Depth of 2-in. well = 137 ft. Sample collected by using low-flow bladder pump after purging of 5 L. Pump intake positioned at 132 ft.
10/22/08	15:40	BAQCIR-W-27752	RI	QC	–	6151	10/22/08	Rinsate of decontaminated sampling line after collection of sample BAMW13D-W-27739.
10/22/08	16:00	BAQCTB-W-27754	TB	QC	–	6151	10/22/08	Trip blank with water samples to the AGEM Laboratory for organic analysis listed on chain-of-custody form (COC) 6151.

TABLE A.1 (Cont.)

Date	Time	Sample	Type ^b	Location	Depth ^c (ft BGL)	Chain of Custody	Shipment Date	Sample Description
10/22/08	16:22	BAMW2D-W-27721	MW	MW2D	133.26-152.93	6151	10/22/08	Depth to water = 113.55 ft. Depth of 2-in. well = 152.93 ft. Sample collected by using low-flow bladder pump after purging of 7 L. Pump intake positioned at 143.10 ft.
10/22/08	16:46	BAMW14S-W-27740	MW	MW14S	108-118	6153	10/23/08	Depth to water = 96.2 ft. Depth of 2-in. well = 118 ft. Sample collected by using low-flow bladder pump after purging of 4.5 L. Pump intake positioned at 113 ft.
10/22/08	17:00	BAMW12S-dry-Oct08	MW	MW12S	43-53	–	–	Monitoring well MW12S was dry.
10/22/08	17:45	BAMW12M-W-27736	MW	MW12M	90-100	6153	10/23/08	Depth to water = 69.72 ft. Depth of 2-in. well = 99 ft. Sample collected by using low-flow bladder pump after purging of 4 L. Pump intake positioned at 95 ft.
10/22/08	18:02	BAMW14D-W-27741	MW	MW14D	123-133	6153	10/23/08	Depth to water = 96.1 ft. Depth of 2-in. well = 133 ft. Sample collected by using low-flow bladder pump after purging of 7.2 L. Pump intake positioned at 128 ft.
10/22/08	18:48	BAMW12D-W-27737	MW	MW12D	115-125	6153	10/23/08	Depth to water = 91.12 ft. Depth of 2-in. well = 125 ft. Sample collected by using low-flow bladder pump after purging of 6 L. Pump intake positioned at 120 ft.
10/23/08	10:04	BAMW11S-W-27732	MW	MW11S	40-50	6154	10/23/08	Depth to water = 22.5 ft. Depth of 1 in. well = 50 ft. Sample collected by using low-flow bladder pump after purging of 2.5 L. Pump intake positioned at 45 ft. Aliquots for collected verification analysis by TestAmerica.
10/23/08	10:18	BAMW7-W-27727	MW	MW7	116-126	6154	10/23/08	Depth to water = 94.9 ft. Depth of 2-in. well = 126 ft. Sample collected by using low-flow bladder pump after purging of 10 L. Pump intake positioned at 121 ft. Very sandy water, tan in color. Aliquots collected for verification analysis by TestAmerica.

TABLE A.1 (Cont.)

Date	Time	Sample	Type ^b	Location	Depth ^c (ft BGL)	Chain of Custody	Shipment Date	Sample Description
10/23/08	11:03	BAMW11D-W-27734	MW	MW11D	125-135	6154	10/23/08	Depth to water = 101.03 ft. Depth of 2-in. well = 135 ft. Sample collected by using low-flow bladder pump after purging of 6 L. Pump intake positioned at 130 ft.
10/23/08	11:28	BAMW5-W-27724	MW	MW5	110-120	6154	10/23/08	Depth to water = 91.4 ft. Depth of 2-in. well = 120 ft. Sample collected by using low-flow bladder pump after purging of 5.8 L. Pump intake positioned at 115 ft.
10/23/08	12:00	BAMW11M-W-27733	MW	MW11M	90-100	6154	10/23/08	Depth to water = 77.8 ft. Depth of 2-in. well = 100 ft. Sample collected by using low-flow bladder pump after purging of 4.5 L. Pump intake positioned at 95 ft.
10/23/08	12:40	BAMW10S-W-27730	MW	MW10S	93-103	6154	10/23/08	Depth to water = 72 ft. Depth of 2-in. well = 103 ft. Sample collected by using low-flow bladder pump after purging of 7 L. Pump intake positioned at 98 ft.
10/23/08	13:16	BAMW16S-W-27744	MW	MW16S	76-86	6154	10/23/08	Depth to water = 64.8 ft. Depth of 2-in. well = 86 ft. Sample collected by using low-flow bladder pump after purging of 4.5 L. Pump intake positioned at 81 ft.
10/23/08	13:36	BAMW10D-W-27731	MW	MW10D	115-125	6154	10/23/08	Depth to water = 95 ft. Depth of 2-in. well = 125 ft. Sample collected by using low-flow bladder pump after purging of 5 L. Pump intake positioned at 120 ft.
10/23/08	14:10	BAMW16D-W-27745	MW	MW16D	90-100	6154	10/23/08	Depth to water = 63.9 ft. Depth of 2-in. well = 100 ft. Sample collected by using low-flow bladder pump after purging of 4.75 L. Pump intake positioned at 95 ft.
10/23/08	14:44	BAMW8-W-27728	MW	MW8	110-120	6154	10/23/08	Depth to water = 93.4 ft. Depth of 2-in. well = 120 ft. Sample collected by using low-flow bladder pump after purging of 5 L. Pump intake positioned at 115 ft.
10/23/08	15:04	BAPW3-W-27749	PW	PWS3	160	6154	10/23/08	Well was running for 0.5 hr, then sampled at tap in well shed.
10/23/08	15:10	BAPW2-W-27748	PW	PWS2	155	6154	10/23/08	Well was running for 5 min, then sampled at tap in well shed.
10/23/08	15:20	BAOENTRICH-W-27747	DW	Oentrich	150	6154	10/23/08	Sampled from hydrant in back yard. Allowed to run for 5 min and then sampled.

TABLE A.1 (Cont.)

Date	Time	Sample	Type ^b	Location	Depth ^c (ft BGL)	Chain of Custody	Shipment Date	Sample Description
10/23/08	16:03	BAMW4D-W-27723	MW	MW4D	98.38-118.22	6154	10/23/08	Depth to water = 89.9 ft. Depth of 2-in. well = 118.22 ft. Sample collected by using low-flow bladder pump after purging of 6.5 L. Pump intake positioned at 108.30 ft.
10/23/08	16:30	BAQCTB-W-27755	TB	QC	–	6153	10/23/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COCs 6153 and 6154, as well as to TestAmerica with verification samples listed on COC 6155.
10/23/08	16:50	BAMW6D-W-27726	MW	MW6D	105-115	6156	10/24/08	Depth to water = 87.15 ft. Depth of 2-in. well = 115 ft. Sample collected by using low-flow bladder pump after purging of 4 L. Pump intake positioned at 110 ft.
10/23/08	16:58	BAMW6S-W-27725	MW	MW6S	90.5-100.5	6154	10/23/08	Depth to water = 84.6 ft. Depth of 2-in. well = 100.5 ft. Sample collected by using low-flow bladder pump after purging of 10 L. Pump intake positioned at 95.50 ft.
10/23/08	17:42	BAMW15S-W-27742	MW	MW15S	88-98	6156	10/24/08	Depth to water = 73.2 ft. Depth of 2-in. well = 98 ft. Sample collected by using low-flow bladder pump after purging of 12.5 L. Pump intake positioned at 93 ft.
10/24/08	9:00	BAMW15D-W-27743	MW	MW15D	105-115	6156	10/24/08	Depth to water = 67.6 ft. Depth of 2-in. well = 115 ft. Sample collected by using low-flow bladder pump after purging of 5 L. Pump intake positioned at 110 ft.
10/24/08	10:02	BAMW9-W-27729	MW	MW9	100-110	6156	10/24/08	Depth to water = 86.6 ft. Depth of 2-in. well = 110 ft. Sample collected by using low-flow bladder pump after purging of 4.5 L. Pump intake positioned at 105 ft.
10/24/08	12:00	BAQCTB-W-27756	TB	QC	–	6156	10/24/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COC 6156.

TABLE A.1 (Cont.)

- ^a All samples collected were water.
- ^b Sample types: DW, domestic well; MW, monitoring well; PW, public water supply well; RI, rinsate; TB, trip blank.
- ^c Depth is in feet below the top of the well casing.

TABLE A.2 Field measurements for groundwater samples collected at Barnes, July 2006 to October 2008.

Well	Screen Interval (ft BGL)	Sample Date	Temperature (°C)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxygen Reduction Potential (mV)
<i>Previously existing KDHE monitoring wells</i>							
MW1S	13.3-23.3	7/19/06 ^a	—	—	—	—	—
		4/4/07 ^a	—	—	—	—	—
		11/18/07 ^a	—	—	—	—	—
		3/4/08 ^a	—	—	—	—	—
		7/9/08 ^a	—	—	—	—	—
		10/22/08 ^a	—	—	—	—	—
MW1D	139.85-159.4	7/19/06	22.8	7.15	945	—	—
		4/4/07	15.7	6.30	855	—	—
		11/18/07	12.7	7.62	712	—	—
		3/4/08	5.5	7.22	1167	11.6	244.2
		7/9/08	18.1	7.05	992	16.2	97.5
		10/22/08	12.6	7.07	937	8.95	107.9
MW2D	133.26-152.93	7/19/06	24.7	7.72	946	—	—
		4/4/07	15.1	6.32	887	—	—
		11/18/07	12.1	6.96	1448	—	—
		3/7/08	6.5	7.22	1198	4.61	196.5
		7/10/08	18.4	6.91	1163	5.03	155.3
		10/22/08	11.6	7.07	931	6.19	131.6
MW3D	133.02-152.73	7/19/06	23.0	7.06	976	—	—
		4/4/07	15.6	6.37	989	—	—
		11/19/07	10.5	7.16	1093	—	—
		3/7/08	8.2	7.09	1195	5.34	254.8
		7/10/08	19.8	6.99	1177	13.8	109.9
		10/22/08	13.5	7.01	1238	4.46	84.0
MW4D	98.38-118.22	7/20/06	23.5	6.26	968	—	—
		4/6/07	11.3	6.21	1018	—	—
		11/19/07	15.7	6.98	1022	—	—
		3/9/08	11.5	7.14	859	6.57	201.2
		7/12/08	14.4	6.94	1001	6.77	148.7
		10/23/08	13.0	7.02	973	5.56	93.5
<i>CCC/USDA wells installed during 2006-2007 investigation</i>							
MW5	110-120	4/6/07	13.9	6.17	1705	—	—
		11/19/07	15.2	6.74	3070	—	—
		3/8/08	9.9	6.76	2770	0.66	123.2
		7/11/08	18.8	6.66	2930	1.32	36.6
		10/23/08	12.8	6.78	2384	0.67	20.4
MW6S	90.5-100.5	4/4/07 ^a	—	—	—	—	—
		11/19/07	12.0	7.60	723	—	—
		3/8/08	4.7	7.77	673	6.72	272.2
		7/11/08	28.2	7.61	753	9.85	92.4
		10/23/08	11.9	11.17 ^b	582	5.12	91.0

TABLE A.2 (Cont.)

Well	Screen Interval (ft BGL)	Sample Date	Temperature (°C)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxygen Reduction Potential (mV)
<i>CCC/USDA wells installed during 2006-2007 investigation (cont.)</i>							
MW6D	105-115	4/5/07	6.2	6.11	936	–	–
		11/19/07	13.6	7.00	1103	–	–
		3/8/08	9.1	7.15	908	5.56	241.0
		7/11/08	19.8	7.05	999	12.8	99.9
		10/23/08	12.0	7.18	957	6.27	127.5
MW7	116-126	4/6/07	14.1	6.30	1051	–	–
		11/19/07	14.6	7.16	890	–	–
		3/9/08	13.1	7.10	1068	4.24	186.4
		7/12/08	14.4	6.95	1238	4.36	98.3
		10/23/08	12.7	7.16	1191	8.61	121.8
MW8	110-120	4/6/07	12.1	6.23	974	–	–
		11/19/07	14.6	7.03	909	–	–
		3/10/08	13.1	7.09	961	6.71	182.1
		7/11/08	18.6	6.38	1049	6.19	152.2
		10/23/08	12.9	7.06	948	8.74	96.6
MW9	100-110	4/5/07	12.9	6.20	976	–	–
		11/19/07	16.5	7.21	1066	–	–
		3/9/08	11.2	7.07	928	5.80	239.0
		7/11/08	17.7	6.58	1010	5.63	188.7
		10/24/08	13.0	7.06	888	5.42	78.5
MW10S	93-103	4/6/07	13.2	6.36	1004	–	–
		11/19/07	14.5	7.22	942	–	–
		3/10/08	12.7	7.08	912	5.18	176.1
		7/11/08	17.3	6.91	975	12.8	118.6
		10/23/08	13.4	7.08	913	5.39	77.9
MW10D	115-125	4/6/07	12.1	6.21	992	–	–
		11/19/07	14.5	7.42	1175	–	–
		3/9/08	13.7	7.01	1024	5.07	235.9
		7/11/08	17.4	6.78	1090	12.6	117.1
		10/23/08	13.5	7.01	1000	5.00	92.8
MW11S	40-50	4/4/07	12.8	6.14	1027	–	–
		11/19/07	11.2	7.15	1174	–	–
		3/5/08	9.4	6.81	1122	2.26	240.8
		7/10/08	19.5	6.47	1224	1.86	166.2
		10/23/08	10.2	6.99	1085	5.80	146.4
MW11M	90-100	4/5/07	7.5	7.60	1097	–	–
		11/19/07	11.9	7.17	1144	–	–
		3/6/08	10.8	7.06	997	2.65	254.1
		7/10/08	31.9	7.08	1124	3.88	148.9
		10/23/08	12.4	7.06	962	3.19	116.1

TABLE A.2 (Cont.)

Well	Screen Interval (ft BGL)	Sample Date	Temperature (°C)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxygen Reduction Potential (mV)
<i>CCC/USDA wells installed during 2006-2007 investigation (cont.)</i>							
MW11D	125-135	4/4/07	13.8	6.18	990	—	—
		11/19/07	13.1	7.22	987	—	—
		3/5/08	6.0	7.06	872	6.85	252.0
		7/10/08	17.5	6.25	957	7.14	176.6
		10/23/08	12.3	7.11	863	8.71	123.0
MW12S	43-53	4/5/07 ^a	—	—	—	—	—
		11/19/07 ^a	—	—	—	—	—
		3/10/08 ^a	—	—	—	—	—
		7/10/08 ^a	—	—	—	—	—
		10/22/08 ^a	—	—	—	—	—
MW12M	90-100	4/5/07	12.6	6.42	867	—	—
		11/19/07	14.9	7.13	835	—	—
		3/10/08	12.6	7.13	665	1.81	211.5
		7/10/08	16.9	7.09	878	8.17	87.1
		10/22/08	12.2	7.20	785	8.93	125.8
MW12D	115-125	4/5/07	14.0	6.36	930	—	—
		11/18/07	15.6	6.95	571	—	—
		3/9/08	8.8	7.13	881	5.25	237.3
		7/11/08	19.9	6.01	987	4.72	196.5
		10/22/08	12.3	7.09	873	7.96	135.6
MW13S	112-122	4/5/07	9.8	6.42	946	—	—
		11/19/07	16.5	7.21	893	—	—
		3/10/08	12.2	7.13	810	6.21	199.3
		7/9/08	17.4	6.99	875	7.72	115.7
		10/22/08	13.5	7.08	793	5.08	100.4
MW13D	127-137	4/5/07	14.9	6.25	397	—	—
		11/19/07	17.0	7.00	763	—	—
		3/9/08	13.1	7.09	758	5.95	212.9
		7/9/08	18.6	7.07	848	18.1	56.9
		10/22/08	13.3	7.06	824	5.28	97.9
MW14S	108-118	4/4/07	13.4	6.50	704	—	—
		11/18/07	12.9	7.26	966	—	—
		3/8/08	13.2	7.20	729	6.59	207.8
		7/10/08	17.4	7.16	775	16.4	86.7
		10/22/08	13.2	7.11	716	5.81	90.2
MW14D	123-133	4/4/07	14.7	6.34	932	—	—
		11/18/07	13.2	7.47	739	—	—
		3/8/08	12.0	7.06	1424	1.95	282.4
		7/10/08	17.7	7.07	1459	14.4	85.7
		10/22/08	13.0	7.00	1212	1.41	78.7

TABLE A.2 (Cont.)

Well	Screen Interval (ft BGL)	Sample Date	Temperature (°C)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxygen Reduction Potential (mV)
<i>CCC/USDA wells installed during 2006-2007 investigation (cont.)</i>							
MW15S	88-98	4/4/07	13.1	8.03	854	—	—
		11/18/07	13.9	—	1883	—	—
		3/10/08	12.1	8.67	697	5.49	173.2
		7/12/08	14.0	8.88	660	11.6	93.7
		10/23/08	13.0	8.00	789	5.27	66.5
MW15D	105-115	4/4/07	14.8	6.15	2980	—	—
		11/18/07	13.1	6.85	2190	—	—
		3/8/08	9.0	6.85	2912	0.57	130.6
		7/12/08	14.1	6.80	3067	1.05	89.6
		10/24/08	13.0	6.81	2876	0.34	27.0
MW16S	76-86	4/4/07	12.8	6.35	1708	—	—
		11/19/07	15.0	6.94	1616	—	—
		3/7/08	7.3	6.96	1968	3.45	183.5
		7/11/08	18.8	6.71	2883	1.13	52.0
		10/23/08	11.6	7.01	1350	6.01	136.2
MW16D	90-100	4/4/07	14.1	6.17	2910	—	—
		11/19/07	12.5	6.78	2400	—	—
		3/7/08	7.0	6.86	2866	0.50	140.0
		7/11/08	18.9	6.64	3134	0.41	31.5
		10/23/08	11.3	6.79	2791	0.45	37.4
MW17	120-130	4/4/07	16.0	6.44	861	—	—
		11/19/07	8.3	7.15	610	—	—
		3/5/08	5.5	7.12	804	7.02	239.4
		7/9/08	17.5	7.11	843	20.6	89.4
		10/22/08	13.1	7.10	777	8.35	109.7
<i>Private wells</i>							
Oentrich	150	7/20/06	—	—	—	—	—
		8/2/06	—	—	—	—	—
		4/5/07	—	—	—	—	—
		11/19/07	12.1	8.26	1830	—	—
		3/6/08	—	—	—	—	—
		10/23/08	—	—	—	—	—
Sedivy	138	8/22/06	—	—	—	—	—
		9/13/06	22.5	6.57	739	—	—

^a Not sampled; well dry.

^b Questionable result. Value climbed steadily from 7.91 to 11.17 during the purging.

Appendix B:

Analytical Results for Wastewater Samples from Pace Analytical Services, Inc.



CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information: Company: Larsen & Associates, Inc. Address: 1311 E. 25th St. Suite B Lawrence, KS 66046 Email To: Larsen, Evans, Henderson, Burke Phone: 785-841-8707 Fax: 785-865-4282 Requested Due Date/TAT: STANDARD		Section B Required Project Information: Report To: Lisa Larsen Copy To: Brooke Evans, Holly Burke Purchase Order No.: BARNES PWS Project Name: BARNES PWS Project Number:	
Section C Invoice Information: Attention: Lisa Larsen Company Name: Address: City/State: Lawrence, KS Reference: Trudy Gipson Piece Project Manager: Piece Profile #:		REGULATORY AGENCY: <input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER State: KS	

Page: 1 of 1

ITEM #	Section D Required Client Information	Valid Matrix Codes	MATRIX CODE	SAMPLE ID (A-Z, 0-9 / -)	Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Analytes Test	X Full VOC X ZDB SD4 X Nitrate	Residual Chlorine (Y/N)	Face Project No./ Lab I.D.
								COMPOSITE START	COMPOSITE END/GRAB							
1				BARNES WQ			G	11/20/08	1500		9	H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₈ Methanol Other				

ADDITIONAL COMMENTS	REQUIRED BY AFFILIATION	DATE	TIME	RECEIVED BY AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
	Paul Gallagher / Lane	11/20/08	1500	Bioch 2mm	11/20/08	1500	
	Paul Gallagher	11/20/08	1500	Paul Gallagher	11/20/08	1500	Temp In °C
							Received on Ice (Y/N)
							Custody Sealed Cooler (Y/N)
							Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: **Paul Gallagher**
 SIGNATURE of SAMPLER: *Paul Gallagher*
 DATE SIGNED (MM/DD/YY): **11/26/08**

Important Note: By signing this form you are accepting Face's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.



Sample Condition Upon Receipt

Client Name: Levin Project # 0650658

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____
Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Packing Material: Bubble Wrap Bubble Bags None Other foam

Thermometer Used T-142, T-184 Type of Ice: We Blue None Samples on ice, cooling process has begun

Cooler Temperature 3.4 Biological Tissue is Frozen: Yes No

Optional
Proj. Due Date: <u>12/10</u>
Proj. Name: _____
<u>Don P.</u>

Date and initials of person examining contents: <u>Don P.</u>

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5.
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sufficient Volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	9.
-Pace Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10.
Filtered volume received for Dissolved tests	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11.
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
-Includes date/time/ID/Analysis Matrix: <u>LOS</u>		
All containers needing preservation have been checked.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
exceptions: <u>V/A, coliform, TOC, O&G, WH-DRO (water)</u>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Initial when completed <u>GP</u> Lot # of added preservative
Samples checked for dechlorination:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14.
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	15.
Trip Blank Present:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	16.
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: _____ Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: APL 11-28-08 Date: _____



Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

December 10, 2008

Lisa Larsen
Larsen & Associates, Inc.
1311 E. 25th St.
Suite B
Lawrence, KS 66046

RE: Project: BARNES PWS
Pace Project No.: 6050658

Dear Lisa Larsen:

Enclosed are the analytical results for sample(s) received by the laboratory on November 26, 2008. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Trudy Gipson

trudy.gipson@pacelabs.com
Project Manager

Enclosures

cc: Holly Burke, Larsen & Associates, Inc.
Brooke Evans, Larsen & Associates, Inc.

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: BARNES PWS
Pace Project No.: 6050658

Kansas Certification IDs

Utah Certification Number: 9135995665
Texas Certification Number: T104704407-08-TX
Oklahoma Certification Number: 9205/9935
Nevada Certification Number: KS000212008A
Louisiana Certification Number: 03055

Iowa Certification Number: 118
Illinois Certification Number: 001191
Arkansas Certification Number: 05-008-0
A2LA Certification Number: 2456.01
Kansas/NELAP Certification Number: E-10116

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: BARNES PWS
Pace Project No.: 6050658

Lab ID	Sample ID	Matrix	Date Collected	Date Received
6050658001	BARNES WW	Water	11/26/08 09:51	11/26/08 16:15

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SAMPLE ANALYTE COUNT

Project: BARNES PWS
Pace Project No.: 6050658

Lab ID	Sample ID	Method	Analysts	Analytes Reported
6050658001	BARNES WW	EPA 300.0	AJM	1
		EPA 5030B/8260	AJA	71
		EPA 504.1	SRM	1

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BARNES PWS
 Pace Project No.: 6050658

Sample: BARNES WW Lab ID: 6050658001 Collected: 11/26/08 09:51 Received: 11/26/08 16:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
------------	---------	-------	--------------	----	----------	----------	---------	------

504 GCS EDB and DBCP

Analytical Method: EPA 504.1 Preparation Method: EPA 504.1

1,2-Dibromoethane (EDB)	ND ug/L		0.029	1	12/08/08 00:00	12/08/08 20:31	106-93-4	
-------------------------	---------	--	-------	---	----------------	----------------	----------	--

8260 MSV

Analytical Method: EPA 5030B/8260

Acetone	ND ug/L		10.0	1		12/08/08 15:42	67-64-1	
Benzene	ND ug/L		1.0	1		12/08/08 15:42	71-43-2	
Bromobenzene	ND ug/L		1.0	1		12/08/08 15:42	108-86-1	
Bromochloromethane	ND ug/L		1.0	1		12/08/08 15:42	74-97-5	
Bromodichloromethane	ND ug/L		1.0	1		12/08/08 15:42	75-27-4	
Bromoform	ND ug/L		1.0	1		12/08/08 15:42	75-25-2	
Bromomethane	ND ug/L		1.0	1		12/08/08 15:42	74-83-9	
TOTAL BTEX	ND ug/L		1.0	1		12/08/08 15:42		
2-Butanone (MEK)	ND ug/L		10.0	1		12/08/08 15:42	78-93-3	
n-Butylbenzene	ND ug/L		1.0	1		12/08/08 15:42	104-51-8	
sec-Butylbenzene	ND ug/L		1.0	1		12/08/08 15:42	135-98-8	
tert-Butylbenzene	ND ug/L		1.0	1		12/08/08 15:42	98-06-6	
Carbon disulfide	ND ug/L		5.0	1		12/08/08 15:42	75-15-0	
Carbon tetrachloride	ND ug/L		1.0	1		12/08/08 15:42	56-23-5	
Chlorobenzene	ND ug/L		1.0	1		12/08/08 15:42	108-90-7	
Chloroethane	ND ug/L		1.0	1		12/08/08 15:42	75-00-3	
Chloroform	ND ug/L		1.0	1		12/08/08 15:42	67-66-3	
Chloromethane	ND ug/L		1.0	1		12/08/08 15:42	74-87-3	
2-Chlorotoluene	ND ug/L		1.0	1		12/08/08 15:42	95-49-8	
4-Chlorotoluene	ND ug/L		1.0	1		12/08/08 15:42	106-43-4	
1,2-Dibromo-3-chloropropane	ND ug/L		2.5	1		12/08/08 15:42	96-12-8	
Dibromochloromethane	ND ug/L		1.0	1		12/08/08 15:42	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		1.0	1		12/08/08 15:42	106-93-4	
Dibromomethane	ND ug/L		1.0	1		12/08/08 15:42	74-95-3	
1,2-Dichlorobenzene	ND ug/L		1.0	1		12/08/08 15:42	95-50-1	
1,3-Dichlorobenzene	ND ug/L		1.0	1		12/08/08 15:42	541-73-1	
1,4-Dichlorobenzene	ND ug/L		1.0	1		12/08/08 15:42	106-46-7	
Dichlorodifluoromethane	ND ug/L		1.0	1		12/08/08 15:42	75-71-8	
1,1-Dichloroethane	ND ug/L		1.0	1		12/08/08 15:42	75-34-3	
1,2-Dichloroethane	ND ug/L		1.0	1		12/08/08 15:42	107-06-2	
1,2-Dichloroethene (Total)	ND ug/L		1.0	1		12/08/08 15:42	540-59-0	
1,1-Dichloroethene	ND ug/L		1.0	1		12/08/08 15:42	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		1.0	1		12/08/08 15:42	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		1.0	1		12/08/08 15:42	156-60-5	
1,2-Dichloropropane	ND ug/L		1.0	1		12/08/08 15:42	78-87-5	
1,3-Dichloropropane	ND ug/L		1.0	1		12/08/08 15:42	142-28-9	
2,2-Dichloropropane	ND ug/L		1.0	1		12/08/08 15:42	594-20-7	
1,1-Dichloropropene	ND ug/L		1.0	1		12/08/08 15:42	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		1.0	1		12/08/08 15:42	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		1.0	1		12/08/08 15:42	10061-02-6	
Ethylbenzene	ND ug/L		1.0	1		12/08/08 15:42	100-41-4	
Hexachloro-1,3-butadiene	ND ug/L		1.0	1		12/08/08 15:42	87-68-3	
2-Hexanone	ND ug/L		10.0	1		12/08/08 15:42	591-78-6	
Isopropylbenzene (Cumene)	ND ug/L		1.0	1		12/08/08 15:42	98-82-8	

Date: 12/10/2008 03:01 PM

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BARNES PWS
 Pace Project No.: 6050658

Sample: BARNES WW Lab ID: 6050658001 Collected: 11/26/08 09:51 Received: 11/26/08 16:15 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV		Analytical Method: EPA 5030B/8260						
p-Isopropyltoluene	ND	ug/L	1.0	1		12/08/08 15:42	99-87-6	
Methylene chloride	ND	ug/L	1.0	1		12/08/08 15:42	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	10.0	1		12/08/08 15:42	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	1.0	1		12/08/08 15:42	1634-04-4	
Naphthalene	ND	ug/L	10.0	1		12/08/08 15:42	91-20-3	
n-Propylbenzene	ND	ug/L	1.0	1		12/08/08 15:42	103-65-1	
Styrene	ND	ug/L	1.0	1		12/08/08 15:42	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/L	1.0	1		12/08/08 15:42	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0	1		12/08/08 15:42	79-34-5	
Tetrachloroethene	ND	ug/L	1.0	1		12/08/08 15:42	127-18-4	
Toluene	ND	ug/L	1.0	1		12/08/08 15:42	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/L	1.0	1		12/08/08 15:42	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/L	1.0	1		12/08/08 15:42	120-82-1	
1,1,1-Trichloroethane	ND	ug/L	1.0	1		12/08/08 15:42	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	1.0	1		12/08/08 15:42	79-00-5	
Trichloroethene	ND	ug/L	1.0	1		12/08/08 15:42	79-01-6	
Trichlorofluoromethane	ND	ug/L	1.0	1		12/08/08 15:42	75-69-4	
1,2,3-Trichloropropane	ND	ug/L	2.5	1		12/08/08 15:42	96-18-4	
1,2,4-Trimethylbenzene	ND	ug/L	1.0	1		12/08/08 15:42	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/L	1.0	1		12/08/08 15:42	108-67-8	
Vinyl chloride	ND	ug/L	1.0	1		12/08/08 15:42	75-01-4	
Xylene (Total)	ND	ug/L	3.0	1		12/08/08 15:42	1330-20-7	
4-Bromofluorobenzene (S)	108	%	85-119	1		12/08/08 15:42	460-00-4	
Dibromofluoromethane (S)	102	%	85-114	1		12/08/08 15:42	1868-53-7	
1,2-Dichloroethane-d4 (S)	108	%	81-118	1		12/08/08 15:42	17060-07-0	
Toluene-d8 (S)	99	%	82-114	1		12/08/08 15:42	2037-26-5	
Preservation pH	1.0		0.10	1		12/08/08 15:42		
300.0 IC Anions		Analytical Method: EPA 300.0						
Nitrate as N	ND	mg/L	0.10	1		11/28/08 09:40	14797-55-8	





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QUALITY CONTROL DATA

Project: BARNES PWS
 Pace Project No.: 6050658

QC Batch: WETA/8508 Analysis Method: EPA 300.0
 QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
 Associated Lab Samples: 6050658001

METHOD BLANK: 414626 Matrix: Water
 Associated Lab Samples: 6050658001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrate as N	mg/L	ND	0.10	11/28/08 08:46	

LABORATORY CONTROL SAMPLE: 414627

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrate as N	mg/L	2.5	2.6	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 414628 414629

Parameter	Units	6050659001 Result	MS	MSD	MS	MSD	MS	MSD	% Rec	Max	
			Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec	Limits		
Nitrate as N	mg/L	ND	5	5	5.3	4.7	105	95	73-114	10	5 R1





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QUALITY CONTROL DATA

Project: BARNES PWS
 Pace Project No.: 6050658

QC Batch: OEXT/15115 Analysis Method: EPA 504.1
 QC Batch Method: EPA 504.1 Analysis Description: GCS 504 EDB DBCP
 Associated Lab Samples: 6050658001

METHOD BLANK: 418021 Matrix: Water

Associated Lab Samples: 6050658001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2-Dibromoethane (EDB)	ug/L	ND	0.030	12/08/08 14:15	

LABORATORY CONTROL SAMPLE & LCSD: 418022		418023								
Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,2-Dibromoethane (EDB)	ug/L	.25	0.23	0.26	94	103	70-130	9	20	





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QUALITY CONTROL DATA

Project: BARNES PWS
 Pace Project No.: 6050658

QC Batch: MSV/18481 Analysis Method: EPA 5030B/8260
 QC Batch Method: EPA 5030B/8260 Analysis Description: 8260 MSV Water 10 mL Purge
 Associated Lab Samples: 6050658001

METHOD BLANK: 418050 Matrix: Water
 Associated Lab Samples: 6050658001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	1.0	12/08/08 11:13	
1,1,1-Trichloroethane	ug/L	ND	1.0	12/08/08 11:13	
1,1,2,2-Tetrachloroethane	ug/L	ND	1.0	12/08/08 11:13	
1,1,2-Trichloroethane	ug/L	ND	1.0	12/08/08 11:13	
1,1-Dichloroethane	ug/L	ND	1.0	12/08/08 11:13	
1,1-Dichloroethene	ug/L	ND	1.0	12/08/08 11:13	
1,1-Dichloropropene	ug/L	ND	1.0	12/08/08 11:13	
1,2,3-Trichlorobenzene	ug/L	ND	1.0	12/08/08 11:13	
1,2,3-Trichloropropane	ug/L	ND	2.5	12/08/08 11:13	
1,2,4-Trichlorobenzene	ug/L	ND	1.0	12/08/08 11:13	
1,2,4-Trimethylbenzene	ug/L	ND	1.0	12/08/08 11:13	
1,2-Dibromo-3-chloropropane	ug/L	ND	2.5	12/08/08 11:13	
1,2-Dibromoethane (EDB)	ug/L	ND	1.0	12/08/08 11:13	
1,2-Dichlorobenzene	ug/L	ND	1.0	12/08/08 11:13	
1,2-Dichloroethane	ug/L	ND	1.0	12/08/08 11:13	
1,2-Dichloroethene (Total)	ug/L	ND	1.0	12/08/08 11:13	
1,2-Dichloropropane	ug/L	ND	1.0	12/08/08 11:13	
1,3,5-Trimethylbenzene	ug/L	ND	1.0	12/08/08 11:13	
1,3-Dichlorobenzene	ug/L	ND	1.0	12/08/08 11:13	
1,3-Dichloropropane	ug/L	ND	1.0	12/08/08 11:13	
1,4-Dichlorobenzene	ug/L	ND	1.0	12/08/08 11:13	
2,2-Dichloropropane	ug/L	ND	1.0	12/08/08 11:13	
2-Butanone (MEK)	ug/L	ND	10.0	12/08/08 11:13	
2-Chlorotoluene	ug/L	ND	1.0	12/08/08 11:13	
2-Hexanone	ug/L	ND	10.0	12/08/08 11:13	
4-Chlorotoluene	ug/L	ND	1.0	12/08/08 11:13	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	10.0	12/08/08 11:13	
Acetone	ug/L	ND	10.0	12/08/08 11:13	
Benzene	ug/L	ND	1.0	12/08/08 11:13	
Bromobenzene	ug/L	ND	1.0	12/08/08 11:13	
Bromochloromethane	ug/L	ND	1.0	12/08/08 11:13	
Bromodichloromethane	ug/L	ND	1.0	12/08/08 11:13	
Bromoform	ug/L	ND	1.0	12/08/08 11:13	
Bromomethane	ug/L	ND	1.0	12/08/08 11:13	
Carbon disulfide	ug/L	ND	5.0	12/08/08 11:13	
Carbon tetrachloride	ug/L	ND	1.0	12/08/08 11:13	
Chlorobenzene	ug/L	ND	1.0	12/08/08 11:13	
Chloroethane	ug/L	ND	1.0	12/08/08 11:13	
Chloroform	ug/L	ND	1.0	12/08/08 11:13	
Chloromethane	ug/L	ND	1.0	12/08/08 11:13	
cis-1,2-Dichloroethene	ug/L	ND	1.0	12/08/08 11:13	
cis-1,3-Dichloropropene	ug/L	ND	1.0	12/08/08 11:13	
Dibromochloromethane	ug/L	ND	1.0	12/08/08 11:13	

Date: 12/10/2008 03:01 PM

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, Inc.
 9608 Loiret Blvd.
 Lenexa, KS 66219
 (913)599-5665

QUALITY CONTROL DATA

Project: BARNES PWS
 Pace Project No.: 6050658

METHOD BLANK: 418050 Matrix: Water
 Associated Lab Samples: 6050658001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Dibromomethane	ug/L	ND	1.0	12/08/08 11:13	
Dichlorodifluoromethane	ug/L	ND	1.0	12/08/08 11:13	
Ethylbenzene	ug/L	ND	1.0	12/08/08 11:13	
Hexachloro-1,3-butadiene	ug/L	ND	1.0	12/08/08 11:13	
Isopropylbenzene (Cumene)	ug/L	ND	1.0	12/08/08 11:13	
Methyl-tert-butyl ether	ug/L	ND	1.0	12/08/08 11:13	
Methylene chloride	ug/L	ND	1.0	12/08/08 11:13	
n-Butylbenzene	ug/L	ND	1.0	12/08/08 11:13	
n-Propylbenzene	ug/L	ND	1.0	12/08/08 11:13	
Naphthalene	ug/L	ND	10.0	12/08/08 11:13	
p-Isopropyltoluene	ug/L	ND	1.0	12/08/08 11:13	
sec-Butylbenzene	ug/L	ND	1.0	12/08/08 11:13	
Styrene	ug/L	ND	1.0	12/08/08 11:13	
tert-Butylbenzene	ug/L	ND	1.0	12/08/08 11:13	
Tetrachloroethene	ug/L	ND	1.0	12/08/08 11:13	
Toluene	ug/L	ND	1.0	12/08/08 11:13	
TOTAL BTEX	ug/L	ND	1.0	12/08/08 11:13	
trans-1,2-Dichloroethene	ug/L	ND	1.0	12/08/08 11:13	
trans-1,3-Dichloropropene	ug/L	ND	1.0	12/08/08 11:13	
Trichloroethene	ug/L	ND	1.0	12/08/08 11:13	
Trichlorofluoromethane	ug/L	ND	1.0	12/08/08 11:13	
Vinyl chloride	ug/L	ND	1.0	12/08/08 11:13	
Xylene (Total)	ug/L	ND	3.0	12/08/08 11:13	
1,2-Dichloroethane-d4 (S)	%	97	81-118	12/08/08 11:13	
4-Bromofluorobenzene (S)	%	104	85-119	12/08/08 11:13	
Dibromofluoromethane (S)	%	97	85-114	12/08/08 11:13	
Toluene-d8 (S)	%	98	82-114	12/08/08 11:13	

LABORATORY CONTROL SAMPLE: 418051

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	10	10.9	109	77-127	
1,1,1-Trichloroethane	ug/L	10	10.6	106	78-130	
1,1,2,2-Tetrachloroethane	ug/L	10	10.2	102	73-131	
1,1,2-Trichloroethane	ug/L	10	11.2	112	85-126	
1,1-Dichloroethane	ug/L	10	10.7	107	76-124	
1,1-Dichloroethene	ug/L	10	10.8	108	76-129	
1,1-Dichloropropene	ug/L	10	11.1	111	83-125	
1,2,3-Trichlorobenzene	ug/L	10	11.6	116	78-129	
1,2,3-Trichloropropane	ug/L	10	11.0	110	69-117	
1,2,4-Trichlorobenzene	ug/L	10	11.6	116	79-127	
1,2,4-Trimethylbenzene	ug/L	10	10.3	103	82-124	
1,2-Dibromo-3-chloropropane	ug/L	10	13.0	130	62-141	
1,2-Dibromoethane (EDB)	ug/L	10	10.9	109	85-124	
1,2-Dichlorobenzene	ug/L	10	9.2	92	85-123	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: BARNES PWS
 Pace Project No.: 6050658

LABORATORY CONTROL SAMPLE: 418051

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2-Dichloroethane	ug/L	10	10.3	103	77-129	
1,2-Dichloroethene (Total)	ug/L	20	21.0	105	81-127	
1,2-Dichloropropane	ug/L	10	10.7	107	82-121	
1,3,5-Trimethylbenzene	ug/L	10	9.9	99	85-122	
1,3-Dichlorobenzene	ug/L	10	9.5	95	84-121	
1,3-Dichloropropane	ug/L	10	10.1	101	86-121	
1,4-Dichlorobenzene	ug/L	10	9.5	95	83-121	
2,2-Dichloropropane	ug/L	10	11.6	116	47-154	
2-Butanone (MEK)	ug/L	25	25.1	101	64-126	
2-Chlorotoluene	ug/L	10	9.2	92	83-125	
2-Hexanone	ug/L	25	28.9	116	65-128	
4-Chlorotoluene	ug/L	10	9.6	96	84-121	
4-Methyl-2-pentanone (MIBK)	ug/L	25	26.5	106	64-121	
Acetone	ug/L	25	25.6	102	52-139	
Benzene	ug/L	10	10.6	106	87-117	
Bromobenzene	ug/L	10	9.7	97	83-126	
Bromochloromethane	ug/L	10	9.6	96	82-129	
Bromodichloromethane	ug/L	10	10.6	106	75-127	
Bromoform	ug/L	10	11.0	110	64-133	
Bromomethane	ug/L	10	10	100	21-188	
Carbon disulfide	ug/L	10	11.8	118	53-120	
Carbon tetrachloride	ug/L	10	12.1	121	76-131	
Chlorobenzene	ug/L	10	9.8	98	85-120	
Chloroethane	ug/L	10	8.8	88	69-126	
Chloroform	ug/L	10	10.3	103	79-126	
Chloromethane	ug/L	10	6.7	67	44-118	
cis-1,2-Dichloroethene	ug/L	10	10.4	104	79-128	
cis-1,3-Dichloropropene	ug/L	10	11.1	111	76-122	
Dibromochloromethane	ug/L	10	11.3	113	74-121	
Dibromomethane	ug/L	10	10.6	106	75-130	
Dichlorodifluoromethane	ug/L	10	4.7	47	12-132	
Ethylbenzene	ug/L	10	10.4	104	84-123	
Hexachloro-1,3-butadiene	ug/L	10	11.9	119	71-144	
Isopropylbenzene (Cumene)	ug/L	10	8.8	88	72-107	
Methyl-tert-butyl ether	ug/L	10	9.9	99	69-115	
Methylene chloride	ug/L	10	10.2	102	74-132	
n-Butylbenzene	ug/L	10	9.9	99	80-126	
n-Propylbenzene	ug/L	10	9.8	98	83-123	
Naphthalene	ug/L	10	8.7J	87	61-150	
p-Isopropyltoluene	ug/L	10	9.9	99	82-118	
sec-Butylbenzene	ug/L	10	10.1	101	84-121	
Styrene	ug/L	10	9.9	99	84-128	
tert-Butylbenzene	ug/L	10	9.6	96	83-124	
Tetrachloroethene	ug/L	10	9.8	98	83-126	
Toluene	ug/L	10	10.5	105	81-124	
TOTAL BTEX	ug/L		61.8			
trans-1,2-Dichloroethene	ug/L	10	10.6	106	80-130	
trans-1,3-Dichloropropene	ug/L	10	10.2	102	75-122	

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REPORT OF LABORATORY ANALYSIS

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Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: BARNES PWS
Pace Project No.: 6050658

LABORATORY CONTROL SAMPLE: 418051

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Trichloroethene	ug/L	10	10.6	106	80-130	
Trichlorofluoromethane	ug/L	10	9.7	97	65-113	
Vinyl chloride	ug/L	10	9.7	97	59-124	
Xylene (Total)	ug/L	30	30.3	101	83-125	
1,2-Dichloroethane-d4 (S)	%			106	81-118	
4-Bromofluorobenzene (S)	%			102	85-119	
Dibromofluoromethane (S)	%			101	85-114	
Toluene-d8 (S)	%			101	82-114	





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(913)599-5665

QUALIFIERS

Project: BARNES PWS
Pace Project No.: 6050658

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

BATCH QUALIFIERS

Batch: MSV/18481

[1] A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

R1 RPD value was outside control limits.



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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: BARNES PWS
Pace Project No.: 6050658

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
6050658001	BARNES WW	EPA 300.0	WETA/8508		
6050658001	BARNES WW	EPA 504.1	OEXT/15115	EPA 504.1	GCSV/6219
6050658001	BARNES WW	EPA 5030B/8260	MSV/18481		



AppendixC:

**Results from the AGEM Laboratory for Dual Analyses of Samples
Collected at Barnes in October 2008 and for Quality Control Samples**

TABLE C.1 Analytical results for samples and replicates collected at Barnes in October 2008 and for quality control samples.

Sample Date	Location	Depth (ft BGL)	Sample	Analysis Type	Concentration (µg/L)		
					Carbon Tetrachloride	Chloroform	Methylene Chloride
10/22/08	MW1D	139.85-159.4	BAMW1D-W-27720	Primary	ND ^a	ND	ND
10/22/08	MW1D	139.85-159.4	BAMW1DDUP-W-27750	Replicate	ND	ND	ND
10/23/08	MW10D	115-125	BAMW10D-W-27731	Primary	4.4	0.6 J ^b	ND
10/23/08	MW10D	115-125	BAMW10D-W-27731DUP	Duplicate	4.5	0.5 J	ND
10/22/08	MW13S	112-122	BAMW13S-W-27738	Primary	20	1.6	ND
10/22/08	MW13S	112-122	BAMW13SDUP-W-27751	Replicate	23	1.8	ND
10/22/08	MW17	120-130	BAMW17-W-27746	Primary	0.7 J	ND	ND
10/22/08	MW17	120-130	BAMW17-W-27746DUP	Duplicate	0.6 J	ND	ND
10/22/08	QC	–	BAQCIR-W-27752	Rinsate after MW13D	ND	ND	ND
10/22/08	QC	–	BAQCIR-W-27753	Rinsate after MW17	ND	ND	ND
10/22/08	QC	–	BAQCTB-W-27754	Trip blank	ND	ND	ND
10/23/08	QC	–	BAQCTB-W-27755	Trip blank	ND	ND	ND
10/24/08	QC	–	BAQCTB-W-27756	Trip blank	ND	0.4 J	ND

^a ND, contaminant not detected at an instrument detection limit of 0.1 µg/L.

^b Qualifier J indicates an estimated concentration below the method quantitation limit of 1.0 µg/L.

Appendix D:

Sample Documentation from TestAmerica Laboratories, Inc.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

November 6, 2008

TestAmerica Laboratories, Inc.

Mr. Clyde Dennis
Argonne National Laboratory
9700 S. Cass Avenue
Building 203, Office B149
Argonne, IL 60439

Re: Laboratory Project No. 21005
Case: BARNES; SDG: 128393

Dear Mr. Dennis:

Enclosed are analytical results for samples that were received by TestAmerica Burlington on October 24th, 2008. Laboratory identification numbers were assigned, and designated as follows:

<u>Lab ID</u>	<u>Client Sample ID</u>	<u>Sample Date</u>	<u>Sample Matrix</u>
	Received: 10/24/08 ETR No: 128393		
772906	BAMW3D-W-27722	10/22/08	WATER
772907	BAMW17-W-27746	10/22/08	WATER
772908	BAMW7-W-27727	10/23/08	WATER
772909	BAMW11S-W-27732	10/23/08	WATER
772910	BAPWS2-W-27748	10/23/08	WATER
772911	BAQCTB-W-27755	10/23/08	WATER
772912	VHBLK01	10/24/08	WATER

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal. The samples, as received, were not acid preserved. On that basis the laboratory did provide for the analytical work to be performed within seven days of sample collection.

In order to accommodate field length limitations in processing the data summary forms, the laboratory did, in certain instances, abbreviate the sample identifier. The electronically formatted data provides for the full sample identifier.

SOM01.2 Volatile Organics (Trace Level Water)

A storage blank was prepared for volatile organics analysis, and stored in association with the

SDG: 128393

TestAmerica Burlington

Page 1.1 of 179

storage of the samples. That storage blank, identified as VHBLK01, was carried through the holding period with the samples, and analyzed.

Each of the analyses associated with the sample set exhibited an acceptable internal standard performance. There was an acceptable recovery of each deuterated monitoring compound (DMC) in the analysis of the method blank associated with the analytical work, and in the analysis of the storage blank associated with the sample set. The analysis of the samples in this sample set did meet the technical acceptance criteria specific to DMC recoveries, although not all DMC recoveries were within the control range in each analysis. The technical acceptance criteria does provide for the recovery of up to three DMCs to fall outside of the control range in the analysis of field samples. The recoveries of 2-butanone-d₅ and 2-hexanone-d₅ were elevated in the analysis of several of the field samples. Matrix spike and matrix spike duplicate analyses were not performed on samples in this sample set. A trace concentration of acetone was identified in the analysis of the method blank associated with the analytical work. The concentration of acetone in that analysis was below the established reporting limit, and the analysis did meet the technical acceptance criteria for a compliant method blank analysis. A trace concentration of acetone was identified in the analysis of the storage blank associated with the sample set. The concentration of acetone in that analysis was below the established reporting limit, and the analysis did meet the technical acceptance criteria for a compliant storage blank analysis. Present in the method blank and storage blank analyses was a non-target constituent that represents a compound that is related to the DMC formulation. The fact that the presence of this compound is not within the laboratory's control is at issue. The derived results for that compound have been qualified with an "X" qualifier to reflect the source of the contamination.

The responses for each target analyte met the relative standard deviation criterion in each initial calibration. The response for each target analyte met the percent difference criterion in the continuing calibration check acquisition. The response for each target analyte met the 50.0 percent difference criterion in the closing calibration check acquisition.

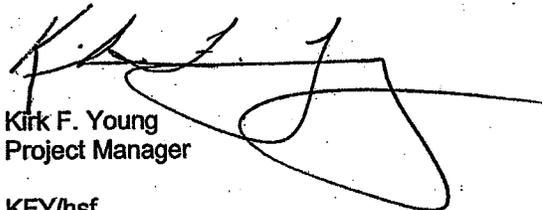
The primary quantitation mass for methylcyclohexane that is specified in the Statement of Work is mass 83. The laboratory did identify a contribution to mass 83 from 1,2-dichloropropane-d₆, one of the deuterated monitoring compounds (DMCs). The laboratory did change the primary quantitation mass assignment to mass 55 for the quantification of methylcyclohexane.

Manual integration was employed in deriving certain of the analytical results. The values that have been derived from manual integration are qualified on the quantitation reports. Extracted ion current profiles for each manual integration are included in the data package, and further documented in the Sample Preparation section of this submittal.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.

If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,



Kirk F. Young
Project Manager

KFY/hsf
Enclosure

TestAmerica Burlington Data Qualifier Definitions

Organic

- U:** Compound analyzed but not detected at a concentration above the reporting limit.
- J:** Estimated value.
- N:** Indicates presumptive evidence of a compound. This flag is used only for tentatively identified compounds (TICs) where the identification of a compound is based on a mass spectral library search.
- P:** SW-846: The relative percent difference for detected concentrations between two GC columns is greater than 40%. Unless otherwise specified the higher of the two values is reported on the Form I.
- CLP SOW: Greater than 25% difference for detected concentrations between two GC columns. Unless otherwise specified the lower of the two values is reported on the Form I.
- C:** Pesticide result whose identification has been confirmed by GC/MS.
- B:** Analyte is found in the sample and the associated method blank. The flag is used for tentatively identified compounds as well as positively identified compounds.
- E:** Compounds whose concentrations exceed the upper limit of the calibration range of the instrument for that specific analysis.
- D:** Concentrations identified from analysis of the sample at a secondary dilution.
- A:** Tentatively identified compound is a suspected aldol condensation product.
- X,Y,Z:** Laboratory defined flags that may be used alone or combined, as needed. If used, the description of the flag is defined in the project narrative.

Inorganic/Metals

- E:** Reported value is estimated due to the presence of interference.
- N:** Matrix spike sample recovery is not within control limits.
- * Duplicate sample analysis is not within control limits.
- B:** The result reported is less than the reporting limit but greater than the instrument detection limit.
- U:** Analyte was analyzed for but not detected above the reporting limit.

Method Codes:

P ICP-AES
MS ICP-MS
CV Cold Vapor AA
AS Semi-Automated Spectrophotometric

FOA009:02.18.08:4
TestAmerica Burlington



FedEx # 8389 2393 1370

6155

MATRIX: Water		Shipping Container:	
RECEIVING LAB: Test America		Shipping Info:	
PROJECT/SITE: Barnes KS		Field Contact (Name & Temporary Phone): Bob Sedivy (402) 465-9021	
SAMPLER(S) (Signature)		ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*	
		ANALYSIS	
DATE OF COLLECTION		REMARKS	
SAMPLE ID NUMBER(S)			
Number of containers			
Oct 22, 2008	BAMW3D-W-27722	2	2x 40 mL for VOC
Oct 22, 2008	BAMW17-W-27746	2	2x 40 mL for VOC
Oct 23, 2008	BAMW7-W-27727	2	2x 40 mL for VOC
Oct 23, 2008	BAMW15-W-27732	2	
Oct 23, 2008	BAPWS2-W-27748	2	
Oct 23, 2008	BAGCTB-W-27755	2	2x 40 mL for VOC

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks
[Signature]	10-23-08	17:22	[Signature]	10/21/08		
[Signature]			[Signature]	10/30		

FOR LAB USE ONLY	
Y	N
<input checked="" type="checkbox"/>	<input type="checkbox"/>

*A sample is under custody if:

- It is in your possession; or,
- It is in your view, after having been in your possession; or,
- It was in your possession and you locked it up; or,
- It is in a designated secure area.

Argonne National Laboratory, Applied Geosciences & Environmental Mgt. Group, Environmental Science Division, 9700 S. Cass Avenue, Argonne, IL 60439



**Supportive Documentation – SOM01.2
Volatiles – Trace**

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

AMW11SW27732

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772909
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772909
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

SOM01.2

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

AMW11SW27732

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772909
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772909
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
79-01-6	Trichloroethene		0.50	U
108-87-2	Methylcyclohexane		0.50	U
78-87-5	1,2-Dichloropropane		0.50	U
75-27-4	Bromodichloromethane		0.50	U
10061-01-5	cis-1,3-Dichloropropene		0.50	U
108-10-1	4-Methyl-2-pentanone		5.0	U
108-88-3	Toluene		0.99	U
10061-02-6	trans-1,3-Dichloropropene		0.50	U
79-00-5	1,1,2-Trichloroethane		0.50	U
127-18-4	Tetrachloroethene		0.50	U
591-78-6	2-Hexanone		5.0	U
124-48-1	Dibromochloromethane		0.50	U
106-93-4	1,2-Dibromoethane		0.50	U
108-90-7	Chlorobenzene		0.50	U
100-41-4	Ethylbenzene		0.50	U
95-47-6	o-Xylene		0.50	U
179601-23-1	m,p-Xylene		0.50	U
100-42-5	Styrene		0.50	U
75-25-2	Bromoform		0.50	U
98-82-8	Isopropylbenzene		0.50	U
79-34-5	1,1,2,2-Tetrachloroethane		0.50	U
541-73-1	1,3-Dichlorobenzene		0.50	U
106-46-7	1,4-Dichlorobenzene		0.50	U
95-50-1	1,2-Dichlorobenzene		0.50	U
96-12-8	1,2-Dibromo-3-chloropropane		0.50	U
120-82-1	1,2,4-Trichlorobenzene		0.50	U
87-61-6	1,2,3-Trichlorobenzene		0.50	U

SOM01.2

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BAMW17W27746

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772907
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772907
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 ‡ Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
75-71-8	Dichlorodifluoromethane		0.50	U
74-87-3	Chloromethane		0.50	U
75-01-4	Vinyl chloride		0.50	U
74-83-9	Bromomethane		0.50	U
75-00-3	Chloroethane		0.50	U
75-69-4	Trichlorofluoromethane		0.50	U
75-35-4	1,1-Dichloroethane		0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		0.50	U
67-64-1	Acetone		1.9	JB
75-15-0	Carbon disulfide		0.50	U
79-20-9	Methyl acetate		0.50	U
75-09-2	Methylene chloride		0.50	U
156-60-5	trans-1,2-Dichloroethene		0.50	U
1634-04-4	Methyl tert-butyl ether		0.50	U
75-34-3	1,1-Dichloroethane		0.50	U
156-59-2	cis-1,2-Dichloroethene		0.50	U
78-93-3	2-Butanone		5.0	U
74-97-5	Bromochloromethane		0.50	U
67-66-3	Chloroform		0.50	U
71-55-6	1,1,1-Trichloroethane		0.50	U
110-82-7	Cyclohexane		0.50	U
56-23-5	Carbon tetrachloride		0.50	U
71-43-2	Benzene		0.50	U
107-06-2	1,2-Dichloroethane		0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

SOM01.2

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BAMW17W27746

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772907
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772907
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
79-01-6	Trichloroethene	0.50	U	
108-87-2	Methylcyclohexane	0.50	U	
78-87-5	1,2-Dichloropropane	0.50	U	
75-27-4	Bromodichloromethane	0.50	U	
10061-01-5	cis-1,3-Dichloropropene	0.50	U	
108-10-1	4-Methyl-2-pentanone	5.0	U	
108-88-3	Toluene	0.50	U	
10061-02-6	trans-1,3-Dichloropropene	0.50	U	
79-00-5	1,1,2-Trichloroethane	0.50	U	
127-18-4	Tetrachloroethene	0.50	U	
591-78-6	2-Hexanone	5.0	U	
124-48-1	Dibromochloromethane	0.50	U	
106-93-4	1,2-Dibromoethane	0.50	U	
108-90-7	Chlorobenzene	0.50	U	
100-41-4	Ethylbenzene	0.50	U	
95-47-6	o-Xylene	0.50	U	
179601-23-1	m,p-Xylene	0.50	U	
100-42-5	Styrene	0.50	U	
75-25-2	Bromoform	0.50	U	
98-82-8	Isopropylbenzene	0.50	U	
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U	
541-73-1	1,3-Dichlorobenzene	0.50	U	
106-46-7	1,4-Dichlorobenzene	0.50	U	
95-50-1	1,2-Dichlorobenzene	0.50	U	
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U	
120-82-1	1,2,4-Trichlorobenzene	0.50	U	
87-61-6	1,2,3-Trichlorobenzene	0.50	U	

SOM01.2

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
BAMW3DW27722

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772906
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772906
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/kg)	ug/L
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

SOM01.2

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BAMW3DW27722

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772906
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772906
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
79-01-6	Trichloroethene		0.50	U
108-87-2	Methylcyclohexane		0.50	U
78-87-5	1,2-Dichloropropane		0.50	U
75-27-4	Bromodichloromethane		0.50	U
10061-01-5	cis-1,3-Dichloropropene		0.50	U
108-10-1	4-Methyl-2-pentanone		5.0	U
108-88-3	Toluene		0.50	U
10061-02-6	trans-1,3-Dichloropropene		0.50	U
79-00-5	1,1,2-Trichloroethane		0.50	U
127-18-4	Tetrachloroethene		0.50	U
591-78-6	2-Hexanone		5.0	U
124-48-1	Dibromochloromethane		0.50	U
106-93-4	1,2-Dibromoethane		0.50	U
108-90-7	Chlorobenzene		0.50	U
100-41-4	Ethylbenzene		0.50	U
95-47-6	o-Xylene		0.50	U
179601-23-1	m,p-Xylene		0.50	U
100-42-5	Styrene		0.50	U
75-25-2	Bromoform		0.50	U
98-82-8	Isopropylbenzene		0.50	U
79-34-5	1,1,2,2-Tetrachloroethane		0.50	U
541-73-1	1,3-Dichlorobenzene		0.50	U
106-46-7	1,4-Dichlorobenzene		0.50	U
95-50-1	1,2-Dichlorobenzene		0.50	U
96-12-8	1,2-Dibromo-3-chloropropane		0.50	U
120-82-1	1,2,4-Trichlorobenzene		0.50	U
87-61-6	1,2,3-Trichlorobenzene		0.50	U

SOM01.2

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BAMW7W27727

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772908
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772908
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/kg)	ug/L
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethane	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	1.2	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

SOM01.2

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BAMW7W27727

Lab Name: TESTAMERICA BURLINGTON

Contract: 21005

Lab Code: STLV Case No.: BARNES

Mod. Ref No.:

SDG No.: 128393

Matrix: (SOIL/SED/WATER) Water

Lab Sample ID: 772908

Sample wt/vol: 25.0 (g/mL) mL

Lab File ID: 772908

Level: (TRACE/LOW/MED) TRACE

Date Received: 10/24/2008

% Moisture: not dec.

Date Analyzed: 10/27/2008

GC Column: DB-624 ID: 0.53 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
79-01-6	Trichloroethene		0.50	U
108-87-2	Methylcyclohexane		0.50	U
78-87-5	1,2-Dichloropropane		0.50	U
75-27-4	Bromodichloromethane		0.50	U
10061-01-5	cis-1,3-Dichloropropene		0.50	U
108-10-1	4-Methyl-2-pentanone		5.0	U
108-88-3	Toluene		0.50	U
10061-02-6	trans-1,3-Dichloropropene		0.50	U
79-00-5	1,1,2-Trichloroethane		0.50	U
127-18-4	Tetrachloroethene		0.50	U
591-78-6	2-Hexanone		5.0	U
124-48-1	Dibromochloromethane		0.50	U
106-93-4	1,2-Dibromoethane		0.50	U
108-90-7	Chlorobenzene		0.50	U
100-41-4	Ethylbenzene		0.50	U
95-47-6	o-Xylene		0.50	U
179601-23-1	m,p-Xylene		0.50	U
100-42-5	Styrene		0.50	U
75-25-2	Bromoform		0.50	U
98-82-8	Isopropylbenzene		0.50	U
79-34-5	1,1,2,2-Tetrachloroethane		0.50	U
541-73-1	1,3-Dichlorobenzene		0.50	U
106-46-7	1,4-Dichlorobenzene		0.50	U
95-50-1	1,2-Dichlorobenzene		0.50	U
96-12-8	1,2-Dibromo-3-chloropropane		0.50	U
120-82-1	1,2,4-Trichlorobenzene		0.50	U
87-61-6	1,2,3-Trichlorobenzene		0.50	U

SOM01.2

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BAPWS2W27748

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLIV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772910
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772910
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
75-71-8	Dichlorodifluoromethane	0.50	U	
74-87-3	Chloromethane	0.50	U	
75-01-4	Vinyl chloride	0.50	U	
74-83-9	Bromomethane	0.50	U	
75-00-3	Chloroethane	0.50	U	
75-69-4	Trichlorofluoromethane	0.50	U	
75-35-4	1,1-Dichloroethene	0.50	U	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U	
67-64-1	Acetone	5.0	U	
75-15-0	Carbon disulfide	0.50	U	
79-20-9	Methyl acetate	0.50	U	
75-09-2	Methylene chloride	0.50	U	
156-60-5	trans-1,2-Dichloroethene	0.50	U	
1634-04-4	Methyl tert-butyl ether	0.50	U	
75-34-3	1,1-Dichloroethane	0.50	U	
156-59-2	cis-1,2-Dichloroethene	0.50	U	
78-93-3	2-Butanone	5.0	U	
74-97-5	Bromochloromethane	0.50	U	
67-66-3	Chloroform	0.50	U	
71-55-6	1,1,1-Trichloroethane	0.50	U	
110-82-7	Cyclohexane	0.50	U	
56-23-5	Carbon tetrachloride	1.4	U	
71-43-2	Benzene	0.50	U	
107-06-2	1,2-Dichloroethane	0.50	U	

Report 1,4-Dioxane for Low-Medium VOA analysis only

SOM01.2

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
BAPWS2W27748

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772910
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772910
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
79-01-6	Trichloroethene		0.50	U
108-87-2	Methylcyclohexane		0.50	U
78-87-5	1,2-Dichloropropane		0.50	U
75-27-4	Bromodichloromethane		0.50	U
10061-01-5	cis-1,3-Dichloropropene		0.50	U
108-10-1	4-Methyl-2-pentanone		5.0	U
108-88-3	Toluene		0.50	U
10061-02-6	trans-1,3-Dichloropropene		0.50	U
79-00-5	1,1,2-Trichloroethane		0.50	U
127-18-4	Tetrachloroethene		0.50	U
591-78-6	2-Hexanone		5.0	U
124-48-1	Dibromochloromethane		0.50	U
106-93-4	1,2-Dibromoethane		0.50	U
108-90-7	Chlorobenzene		0.50	U
100-41-4	Ethylbenzene		0.50	U
95-47-6	o-Xylene		0.50	U
179601-23-1	m,p-Xylene		0.50	U
100-42-5	Styrene		0.50	U
75-25-2	Bromoform		0.50	U
98-82-8	Isopropylbenzene		0.50	U
79-34-5	1,1,2,2-Tetrachloroethane		0.50	U
541-73-1	1,3-Dichlorobenzene		0.50	U
106-46-7	1,4-Dichlorobenzene		0.50	U
95-50-1	1,2-Dichlorobenzene		0.50	U
96-12-8	1,2-Dibromo-3-chloropropane		0.50	U
120-82-1	1,2,4-Trichlorobenzene		0.50	U
87-61-6	1,2,3-Trichlorobenzene		0.50	U

SOM01.2

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BAQCTBW27755

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772911
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772911
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
75-71-8	Dichlorodifluoromethane	0.50	U	
74-87-3	Chloromethane	0.50	U	
75-01-4	Vinyl chloride	0.50	U	
74-83-9	Bromomethane	0.50	U	
75-00-3	Chloroethane	0.50	U	
75-69-4	Trichlorofluoromethane	0.50	U	
75-35-4	1,1-Dichloroethene	0.50	U	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U	
67-64-1	Acetone	5.0	U	
75-15-0	Carbon disulfide	0.50	U	
79-20-9	Methyl acetate	0.50	U	
75-09-2	Methylene chloride	0.50	U	
156-60-5	trans-1,2-Dichloroethene	0.50	U	
1634-04-4	Methyl tert-butyl ether	0.50	U	
75-34-3	1,1-Dichloroethane	0.50	U	
156-59-2	cis-1,2-Dichloroethene	0.50	U	
78-93-3	2-Butanone	5.0	U	
74-97-5	Bromochloromethane	0.50	U	
67-66-3	Chloroform	0.50	U	
71-55-6	1,1,1-Trichloroethane	0.50	U	
110-82-7	Cyclohexane	0.50	U	
56-23-5	Carbon tetrachloride	0.50	U	
71-43-2	Benzene	0.50	U	
107-06-2	1,2-Dichloroethane	0.50	U	

Report 1,4-Dioxane for Low-Medium VOA analysis only

SOM01.2

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BAQCTBW27755

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772911
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772911
 Level: (TRACE/LOW/MED) TRACE Date Received: 10/24/2008
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
79-01-6	Trichloroethene		0.50	U
108-87-2	Methylcyclohexane		0.50	U
78-87-5	1,2-Dichloropropane		0.50	U
75-27-4	Bromodichloromethane		0.50	U
10061-01-5	cis-1,3-Dichloropropene		0.50	U
108-10-1	4-Methyl-2-pentanone		5.0	U
108-88-3	Toluene		0.50	U
10061-02-6	trans-1,3-Dichloropropene		0.50	U
79-00-5	1,1,2-Trichloroethane		0.50	U
127-18-4	Tetrachloroethene		0.50	U
591-78-6	2-Hexanone		5.0	U
124-48-1	Dibromochloromethane		0.50	U
106-93-4	1,2-Dibromoethane		0.50	U
108-90-7	Chlorobenzene		0.50	U
100-41-4	Ethylbenzene		0.50	U
95-47-6	o-Xylene		0.50	U
179601-23-1	m,p-Xylene		0.50	U
100-42-5	Styrene		0.50	U
75-25-2	Bromoform		0.50	U
98-82-8	Isopropylbenzene		0.50	U
79-34-5	1,1,2,2-Tetrachloroethane		0.50	U
541-73-1	1,3-Dichlorobenzene		0.50	U
106-46-7	1,4-Dichlorobenzene		0.50	U
95-50-1	1,2-Dichlorobenzene		0.50	U
96-12-8	1,2-Dibromo-3-chloropropane		0.50	U
120-82-1	1,2,4-Trichlorobenzene		0.50	U
87-61-6	1,2,3-Trichlorobenzene		0.50	U

SOM01.2

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VHBLK01

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772912
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772912
 Level: (TRACE/LOW/MED) TRACE Date Received:
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	2.0	JB
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

SOM01.2

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VHBLK01

Lab Name: TESTAMERICA BURLINGTON Contract: 21005
 Lab Code: STLV Case No.: BARNES Mod. Ref No.: SDG No.: 128393
 Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 772912
 Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 772912
 Level: (TRACE/LOW/MED) TRACE Date Received:
 % Moisture: not dec. Date Analyzed: 10/27/2008
 GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
 Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/kg)	ug/L	
79-01-6	Trichloroethene	0.50	U	
108-87-2	Methylcyclohexane	0.50	U	
78-87-5	1,2-Dichloropropane	0.50	U	
75-27-4	Bromodichloromethane	0.50	U	
10061-01-5	cis-1,3-Dichloropropene	0.50	U	
108-10-1	4-Methyl-2-pentanone	5.0	U	
108-88-3	Toluene	0.50	U	
10061-02-6	trans-1,3-Dichloropropene	0.50	U	
79-00-5	1,1,2-Trichloroethane	0.50	U	
127-18-4	Tetrachloroethene	0.50	U	
591-78-6	2-Hexanone	5.0	U	
124-48-1	Dibromochloromethane	0.50	U	
106-93-4	1,2-Dibromoethane	0.50	U	
108-90-7	Chlorobenzene	0.50	U	
100-41-4	Ethylbenzene	0.50	U	
95-47-6	o-Xylene	0.50	U	
179601-23-1	m,p-Xylene	0.50	U	
100-42-5	Styrene	0.50	U	
75-25-2	Bromoform	0.50	U	
98-82-8	Isopropylbenzene	0.50	U	
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U	
541-73-1	1,3-Dichlorobenzene	0.50	U	
106-46-7	1,4-Dichlorobenzene	0.50	U	
95-50-1	1,2-Dichlorobenzene	0.50	U	
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U	
120-82-1	1,2,4-Trichlorobenzene	0.50	U	
87-61-6	1,2,3-Trichlorobenzene	0.50	U	

SOM01.2

Appendix E:

Results of City of Barnes Sampling of Public Wells in 1986-2008

FEDERAL ID	STATE ID	SYSTEM NAME	FAILITY NAME	COLLECTION DATE	ANALYTE CODE	ANALYTE NAME	RESULT	UNIT OF MEASURE	COMMENTS
KS2020110	B4500	BARNES, CITY OF	TP001	8/3/2008	2982	CARBON TETRACHLORIDE	0.89	UG/L	WELL 2
KS2020110	B4500	BARNES, CITY OF	TP002	7/14/2008	2982	CARBON TETRACHLORIDE	0		WELL 3
KS2020110	B4500	BARNES, CITY OF	TP001	7/14/2008	2982	CARBON TETRACHLORIDE	1.3	UG/L	WELL 2
KS2020110	B4500	BARNES, CITY OF	TP002	7/11/2005	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL 3
KS2020110	B4500	BARNES, CITY OF	TP001	7/11/2005	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL 2
KS2020110	B4500	BARNES, CITY OF	TP002	7/15/2002	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL #3
KS2020110	B4500	BARNES, CITY OF	TP001	7/15/2002	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL #2
KS2020110	B4500	BARNES, CITY OF	TP002	7/9/2001	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL #3
KS2020110	B4500	BARNES, CITY OF	TP001	7/9/2001	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL #2
KS2020110	B4500	BARNES, CITY OF	TP002	7/11/2000	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL #3
KS2020110	B4500	BARNES, CITY OF	TP001	7/11/2000	2982	CARBON TETRACHLORIDE	0.5	UG/L	Sample taken at WELL #2
KS2020110	B4500	BARNES, CITY OF	TP002	7/12/1999	2982	CARBON TETRACHLORIDE	1.7	UG/L	Sample taken at WELL #3
KS2020110	B4500	BARNES, CITY OF	TP001	7/12/1999	2982	CARBON TETRACHLORIDE	1.2	UG/L	Sample taken at WELL #2
KS2020110	B4500	BARNES, CITY OF	TP001	8/4/1998	2982	CARBON TETRACHLORIDE	1.5	UG/L	Sample taken at CITY OF BARNES SAMPL
KS2020110	B4500	BARNES, CITY OF	TP002	8/27/1997	2982	CARBON TETRACHLORIDE	0		Sample taken at CITY OF BARNES- WEL
KS2020110	B4500	BARNES, CITY OF	TP001	8/27/1997	2982	CARBON TETRACHLORIDE	0.9	UG/L	Sample taken at CITY OF BARNES- WEL
KS2020110	B4500	BARNES, CITY OF	TP002	8/13/1996	2982	CARBON TETRACHLORIDE	0.5	UG/L	Sample taken at SAMPLING TAP AT WELL
KS2020110	B4500	BARNES, CITY OF	TP001	8/13/1996	2982	CARBON TETRACHLORIDE	1.3	UG/L	Sample taken at SAMPLING TAP AT WELL
KS2020110	B4500	BARNES, CITY OF	TP001	7/25/1995	2982	CARBON TETRACHLORIDE	1.1	UG/L	Sample taken at BARNESWELL #2
KS2020110	B4500	BARNES, CITY OF	TP002	5/3/1995	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL #3 00005272
KS2020110	B4500	BARNES, CITY OF	TP001	5/3/1995	2982	CARBON TETRACHLORIDE	0.5	UG/L	Sample taken at WELL #2 00040848
KS2020110	B4500	BARNES, CITY OF	WELL 03	8/12/1991	2982	CARBON TETRACHLORIDE	0		Sample taken at 480 FT W OF MAIN ST
KS2020110	B4500	BARNES, CITY OF	WELL 02	8/12/1991	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL LOCATED IN THE
KS2020110	B4500	BARNES, CITY OF	WELL 03	1/30/1989	2982	CARBON TETRACHLORIDE	0		Sample taken at 480 FT W OF MAIN ST
KS2020110	B4500	BARNES, CITY OF	WELL 02	1/30/1989	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL LOCATED IN THE
KS2020110	B4500	BARNES, CITY OF	WELL 03	9/2/1988	2982	CARBON TETRACHLORIDE	0		Sample taken at 480 FT W OF MAIN ST
KS2020110	B4500	BARNES, CITY OF	WELL 02	9/2/1988	2982	CARBON TETRACHLORIDE	0		Sample taken at WELL LOCATED IN THE
KS2020110	B4500	BARNES, CITY OF	WELL 03	7/7/1987	2982	CARBON TETRACHLORIDE	2.1	UG/L	Sample taken at 480 FT W OF MAIN ST
KS2020110	B4500	BARNES, CITY OF	WELL 02	7/7/1987	2982	CARBON TETRACHLORIDE	2.5	UG/L	Sample taken at WELL LOCATED IN THE
KS2020110	B4500	BARNES, CITY OF	WELL 03	4/8/1986	2982	CARBON TETRACHLORIDE	0.5	UG/L	Sample taken at 480 FT W OF MAIN ST
KS2020110	B4500	BARNES, CITY OF	WELL 02	4/8/1986	2982	CARBON TETRACHLORIDE	2.1	UG/L	Sample taken at WELL LOCATED IN THE



Environmental Science Division

Argonne National Laboratory
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U.S. DEPARTMENT OF
ENERGY

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