Burns & McDonnell
SINCE 1898

Chicago Heights Blvd VOC Plume
St. Louis County, Missouri
MOSFN0703551
SR Reference 5

April 13, 2001

Mr. R. Lance Livesay
Missouri Department of Natural Resources
Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102

Re: Phase II-Off-Site Monitoring Well Installation
PerkinElmer, Missouri Metals Site, Overland, Missouri

Dear Mr. Livesay:

The following letter summarizes the results of the Phase II off-site bedrock monitoring well installation and sampling activities conducted by Burns & McDonnell near the PerkinElmer Missouri Metals Site (site) located in Overland, Missouri. The bedrock monitoring well installation and sampling activities were conducted to determine the extent of contamination present in the shallow bedrock unit downgradient from the site.

WELL INSTALLATION AND COMPLETION

Drilling Activities

On February 26 through March 1, 2001, Burns & McDonnell personnel provided oversight during the installation of four bedrock monitoring wells in the residential area near the site (see Figure 1). Roberts Environmental Drilling, Inc. (Roberts) of Millstadt, Illinois provided drilling and monitoring well installation services. Each boring was advanced through the overburden and bedrock using hollow stem auger (HSA) drilling and continuous sampling techniques. Burns & McDonnell personnel recorded a continuous log of subsurface materials encountered in each boring by observing soil samples. Copies of the boring logs and field notes are given in Attachment 1.

The targeted zone for each monitoring well was the siltstone unit located just below the overburden at the site. Each monitoring well was installed by advancing an 8.75-inch diameter borehole to total depth. The targeted depth for each monitoring well was similar to GMW-19 and GMW-20 located just south of the site (see Figure 1). Monitoring wells GMW-19 and GMW-20 were completed near the base of the targeted siltstone unit at a depth of approximately 34 feet below ground surface (ft., bgs). The actual total depth for each newly installed monitoring well was determined in the field by examining continuous soil samples.

In order to ensure proper placement of the well screen, each boring was over-drilled to a total depth of 38 to 42 feet. The dry shale formation, which serves as an aquitard, was penetrated by approximately 5 feet in each boring. Based on drill-cuttings, the siltstone unit transitioned into a

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shale unit at approximately 34 to 37 ft., bgs. In order to place the well screen within the siltstone unit, each boring was backfilled with approximately 4 to 6 feet of bentonite chips.

After allowing the bentonite chips to hydrate for 1 hour, approximately 0.5 foot of fine sand was placed on top of the bentonite chips before setting the well. This resulted in total depths of approximately 33 to 38 ft., bgs for the four new wells. Due to time constraints, Missouri Department of Natural Resources (MDNR) personnel waived the required 1 hour waiting period for bentonite hydration for 3 of the 4 wells.

Well Completion

Monitoring well construction diagrams are included on each boring log (see Attachment 1). Each monitoring well consisted of schedule 40, 2-inch PVC, threaded screen and riser. Each well was completed with 5 feet of 0.01-inch slot PVC well screen and a slip end cap. Following placement of the well screen and casing, a sand filter pack was tremied into place to the fill the annular space to approximately 1 to 3 feet above the top of the well screen. Approximately 3 feet of bentonite chips were placed on top of the sand filter pack and allowed to hydrate for one hour. After allowing the bentonite seal to hydrate, a high solids bentonite grout was tremied into the remaining annular space to approximately 1 ft., bgs.

After the bentonite chips had hydrated and the bentonite grout had cured overnight, each well was completed with a flush-mounted, 8-inch well vault secured in concrete. A lockable expandable plug was placed in the top of the riser pipe to prevent debris and surface water from entering the well.

WELL DEVELOPMENT AND SAMPLING

Monitoring Well Development

Since no water was introduced to any of the boreholes during drilling, the required development volume for each monitoring well was 3-times the well volume measured prior to development. The required volume of water was removed from each monitoring well by air lifting. Water quality parameters of temperature, pH, and specific conductivity were measured during development and recorded in the field logbook by Burns & McDonnell personnel (see Attachment 1). Water quality parameters stabilized within ten percent before development was completed

The only exception to the above was GMW-21, which contained approximately 20 feet of groundwater following well completion. During development, GMW-21 became dry before the required volume of water was removed. After allowing more water to accumulate in the well, GMW-21 was surged with a bailer and then bailed until dry again. A total of approximately 6 gallons of groundwater was bailed from GMW-21 prior to sample collection. This volume was sufficient to remove groundwater from the well casing and the surrounding sand filter pack. Groundwater representative of the target formation was allowed to accumulate in the well to

sample collection. A total of approximately 7 gallons of groundwater has been removed from GMW-21 to date and the well continues to recharge at a slow rate. The slow rate of recharge may be caused by the water-bearing zone being located near the bottom of the well screen.

Monitoring Well Sampling

GMW-19 through GMW-24 were sampled on March 2, 2001. GMW-21 through GMW-24 were sampled immediately after development (see above). Burns & McDonnell personnel attempted to purge three well volumes of groundwater from wells GMW-19 and GMW-20 prior to sample collection. Due to slow well recharge, GMW-19 and GMW-20 were purged until dry and then sampled. Water quality parameters of temperature, pH, and specific conductivity were measured and recorded in the field logbook during purging and prior to sampling for each well (see Attachment 1). Water quality parameters stabilized within ten percent before samples were collected.

Each groundwater sample was collected in two 40-ml vials and placed in a cooler with ice. A trip blank was also included with the samples for QA/QC analysis. Each sample container was properly labeled and shipped to the laboratory under proper Chain-of-Custody procedures. The laboratory analyzed each sample for halogenated VOCs using USEPA Method 8021B.

WATER LEVEL MEASUREMENTS

Water level measurements were collected from all on-site and off-site monitoring wells on March 6, 2001. The aquifer was allowed to stabilize from well installation and sampling activities for approximately 48 hours before water levels were measured. The static groundwater elevation in each monitoring well was measured using a decontaminated water level indicator. The water level measurements were collected to determine the overall groundwater flow direction in the area. The piezometric surface elevation at each monitoring well is illustrated in Figure 2. The general direction of groundwater flow for the aquifer within the siltstone unit is northwest to southeast. The overlying silty-clay (loess) formation has the same general groundwater flow direction.

A cross-section (see Figure 3) has been included with this report to illustrate the existing subsurface conditions in the off-site area. Cross-Section A-A' progresses along line A-A' (see Figure 1) from northwest to southeast. On-site monitoring well GMW-16 and all of the off-site monitoring wells are projected onto the cross-section to display lithology contacts, groundwater elevation, screened interval, and total depth elevation. The water-bearing siltstone unit and the underlying shale unit (an aquitard) dip to the southeast. The cross-section shows that each well was screened within the siltstone unit, below the silty-clay formation.

RESULTS

The groundwater analytical results are summarized in Table 1. A Burns & McDonnell chemist performed a QA/QC analysis of the laboratory data, and no data required qualification as a result

of this review (see Attachment 2). The results indicate detections of trichloroethene (TCE) in GMW-19 through GMW-24, and detections of tetrachloroethene (PCE) in each of these wells except GMW-20. The TCE and PCE concentrations for the off-site wells are illustrated in Figure 4.

The results also indicate detections of cis-1,2-dichloroethene (DCE) (a daughter product of PCE and TCE) in GMW-19, GMW-20, and GMW-24, and an estimated detection of cis-1,2-DCE in GMW-23. Estimated detections of methylene chloride were also reported for GMW-21 and GMW-23, but this analyte is a common laboratory contaminant, and likely not present in the groundwater at the site.

The results of this investigation indicate that the extent of the plume within the shallow bedrock unit downgradient from the site has been defined with the newly installed monitoring wells. The laboratory results indicate that the three outer monitoring wells (GMW-22, GMW-23, & GMW-24) are located at the margins of the plume, and thus, there is no need for further plume delineation in the area at this time.

If you have any questions or comments, please contact me at (816) 822-3224.

Sincerely,

Tom Zychinski
Project Manager

STATE OF MISSOURI
THOMAS J. ZYCHINSKI
RG 0741
REGISTERED GEOLOGIST

Attachments

Cc: Jack Healy, PerkinElmer, Inc.
Keith Rosenstiel, PerkinElmer, Inc.

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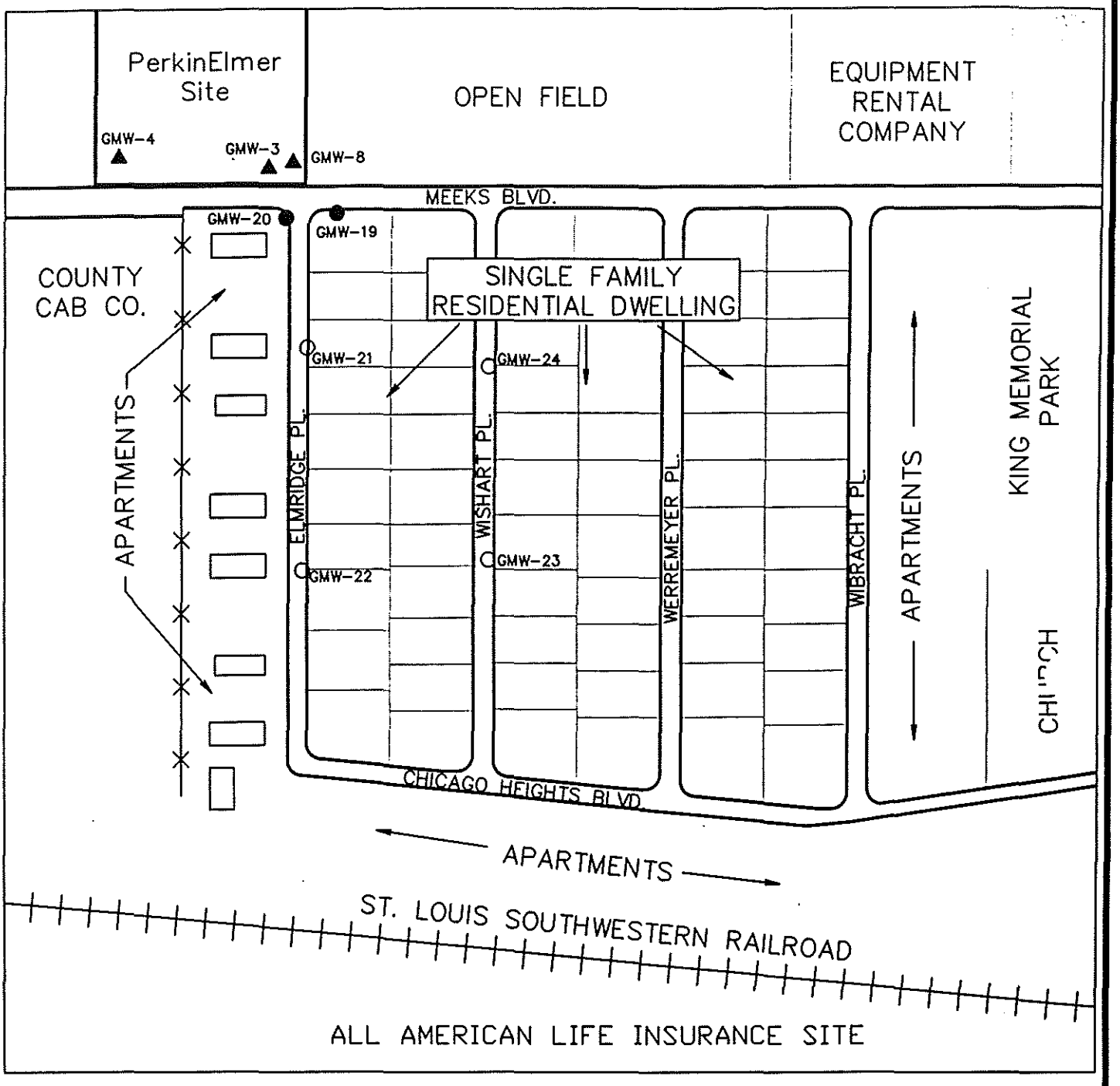
Tables

Table 1
GROUNDWATER SAMPLING RESULTS
Phase II Off Site Monitoring Wells
PerkinElmer, Missouri Metals Site
March 2001

Contaminant	Units	Monitoring Well					
		GMW-19	GMW-20	GMW-21	GMW-22	GMW-23	GMW-24
Methylene Chloride	µg/L	ND(500)	ND(50)	**37 J**	ND(1)	**0.6 J**	ND(1)
TCE	µg/L	**4300**	**1700**	**360**	**6**	**26**	**17**
cis-1,2-DCE	µg/L	**1200**	**400**	ND(50)	ND(1)	**0.8 J**	**2**
PCE	µg/L	**260 J**	ND(50)	**170**	**2**	**8**	**4**

Notes:
J - estimated value, below reporting limit
ND(1000) - Not detected(analyte reporting limit)

Figures



LEGEND

- ▲ Existing Shallow Monitoring Well
- ● Existing Deep Monitoring Well
- ○ New Deep Monitoring Well

NORTH

200 0 200 400

SCALE IN FEET

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Figure 1
MONITORING WELL LOCATION PLAN
PerkinElmer
Missouri Metals Site
Overland, Missouri

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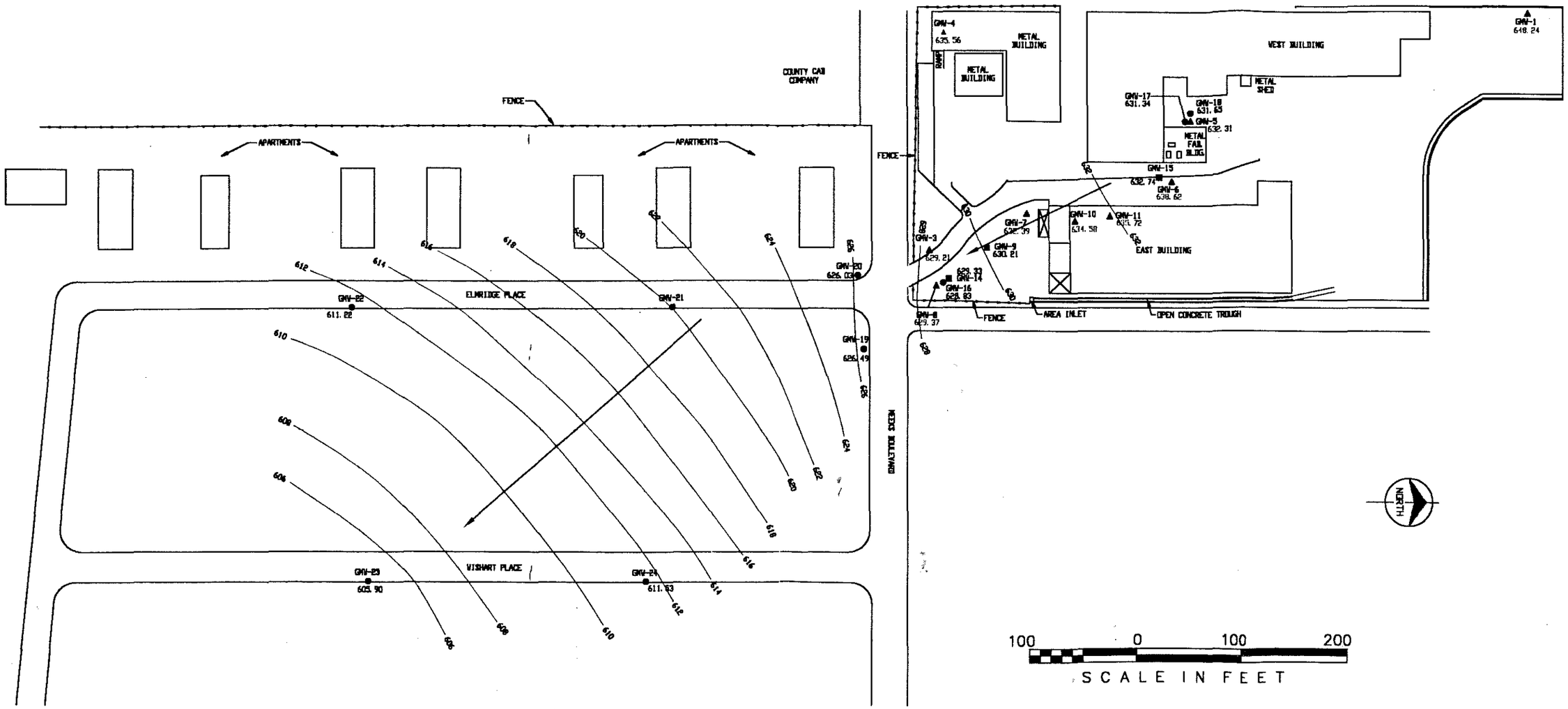

LEGEND

▲ 648.24 SHALLOW WELLS: SCREENED IN LOESS
PIEZOMETRIC SURFACE ELEVATION IN LOESS UNIT (FT)

■ INTERMEDIATE WELLS: SCREENED IN LOWER PORTION OF LOESS AND/OR UPPER PORTION OF SILTSTONE

● 626.49 DEEP WELLS: SCREENED IN DEEPER PORTION OF SILTSTONE
PIEZOMETRIC SURFACE ELEVATION IN SILTSTONE UNIT (FT)

NOTE: GMW-18 IS SCREENED IN UPPER PORTION OF SILTSTONE BUT FILTER PACK EXTENDS TO LOWER PORTION OF LOESS

← GROUNDWATER FLOW DIRECTON

608 GROUNDWATER CONTOUR

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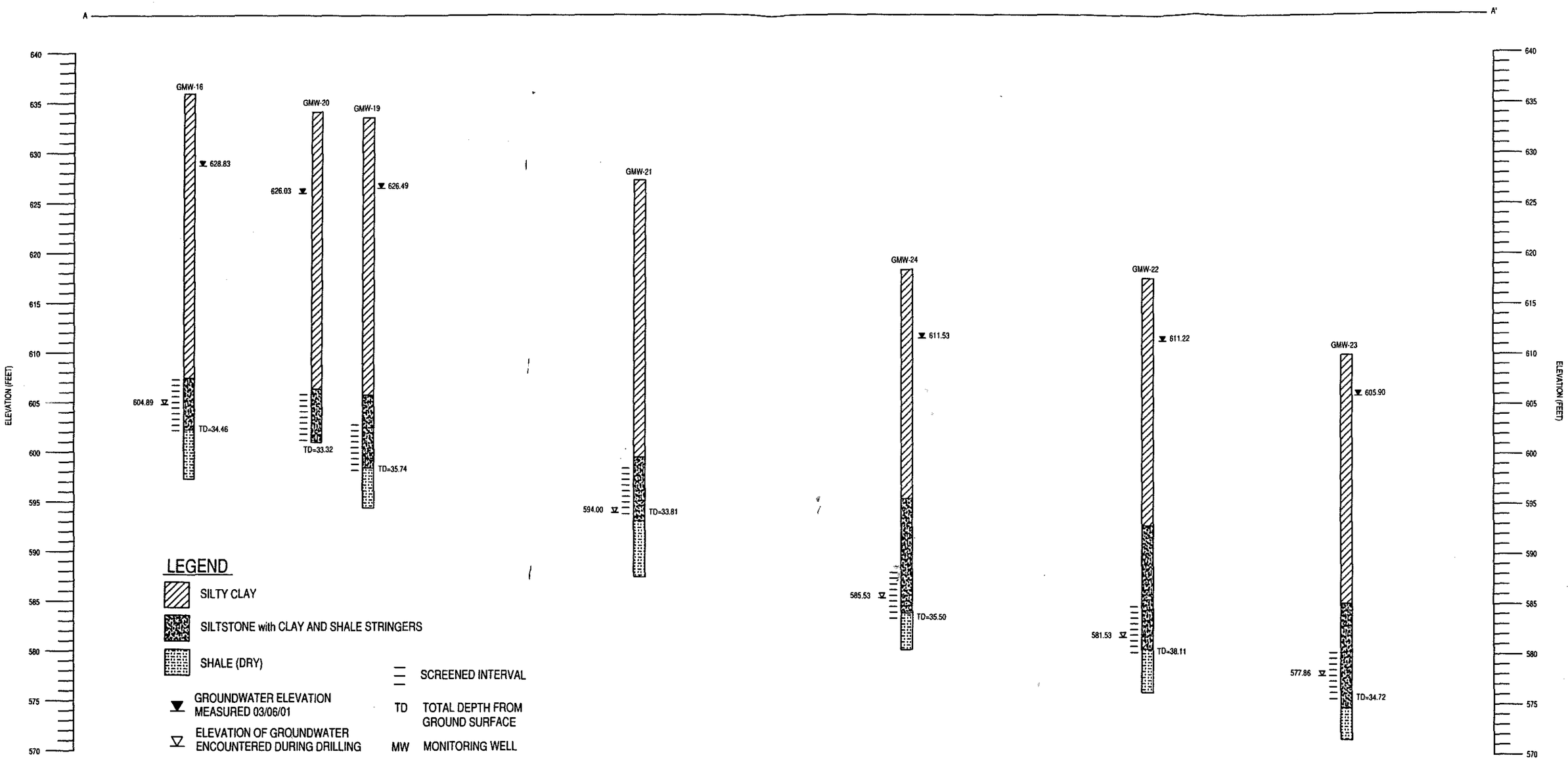
Figure 2
PIEZOMETRIC SURFACE ELEVATION IN SILTSTONE UNIT
MARCH 2001
PerkinElmer
Missouri Metals Site
Overland, Missouri

NORTHWEST

LOOKING NORTHEAST

SOUTHEAST



VERTICAL SCALE

10 0 10 20

SCALE IN FEET

HORIZONTAL SCALE

50 0 50 100

SCALE IN FEET

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Figure 3
CROSS-SECTION A-A'
PerkinElmer
Missouri Metals Site
Overland, Missouri

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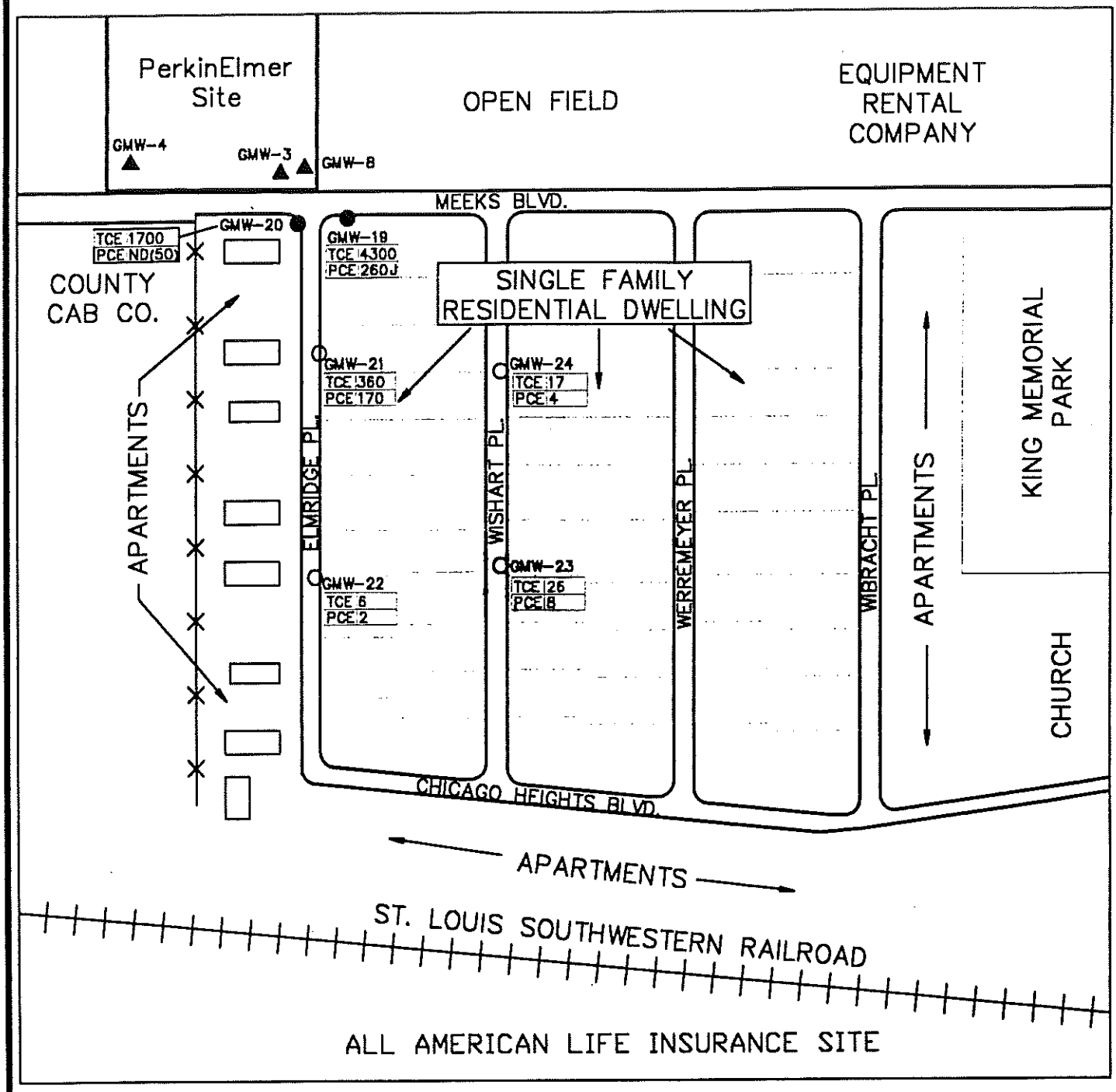

LEGEND

- ▲ Existing Shallow Monitoring Well
- ● Existing Deep Monitoring Well
- ○ New Deep Monitoring Well
- TCE 4300 / PCE 260 — Trichloroethene and Tetrachloroethene Concentration (ug/L)

NORTH

200 0 200 400

SCALE IN FEET

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Figure 4
VOC CONCENTRATIONS IN GROUNDWATER
MARCH 2001
PerkinElmer
Missouri Metals Site
Overland, Missouri

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ATTACHMENT 1

Boring Logs
Field N s

Drilling Log

Project Name: DKI	Project Number: 26682	Boring Number: GMW-21
Ground Elevation:	Location: 1476 Elmridgdc Place	Page: 1 of 3
Air Monitoring Equipment: 580B OVM		Total Footage: 40'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	8.75-inch	26.3	13.7	14	—

Drilling Company: Roberts-Environ. Drilling	Driller (s): Joe Cox, Joey Brown
Drilling Rig:	Type of Sampler: CME Continuous Sampler/Split-Spoon
Date: 2/26/01 To: 2/26/01	Field Observer (s): John Hesemann

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	Silty-clay, damp, medium stiff, dark yellowish-brown (10YR-4/4), non plastic				0910				0	
1				3'/3.5'		CS 1				
2	becomes greenish-gray (5BG-5/1), ~~medium plastic~~ mottled black, medium plastic, with some concrete, glass, and brick debris						0	0	0	
3					0911				0	
4					0917					
5									0	
6		CL		1'/5'		CS 2	0	0	0	
7										
8					0920					
9					0927					
10	becomes gray (5Y-5/1), with some FeO staining					CS 3				
11				0.5'/5'			0	0		
12										
13					0929					
14					0940					

BZ=Breathing Zone BH=Bore Hole S=Sample

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11/11/1992

Form WCI-OP2-1

Drilling Log Continuation

Boring Number GMW-21
Project Name PKI
Page 2 of 3
Project Number 26682
Date 2/26/01

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
15	Silty-clay, moist, soft, brown (10YR-5/3), medium to highly plastic, with some FeO staining and trace very fine sand								0	water in CME sampler
16				1.5'/5'		CS 4	0	0	0	
17										
18					0941					
19	with light gray silt lenses	CL			0947				0	
20						CS 5				
21				1.5'/5'			0	0	0	
22										
23					0948					Switching to split-spoon sampling due to low recov. w/ CME sampler
24	stiff, gray (N-6), medium plastic with fractured SILTSTONE fragments: gray and red, and FeO staining		4 9 8 9	0.8/2	1002 1007	SS 6	0	0	0 0	
25										
26			2 4 6 9	1.8'/2'	1012 1013	SS 7	0	0	0 0	rocky drilling at 24 ft.
27	SHALE: dark reddish-brown (10R-3/4), mottled light gray, ~~extremely~~ very stiff, damp, extremely weathered, weak									
28	SILTSTONE: pale greenish yellow (10Y-8/2), hard, dry, mod. weathered, weak, with red and yellow streaking, trace very fine sand, and lenticular bedding		4 10 17 20	1.6'/2'	1018 1021	SS 8	0	0	0 0 0	
29										
30			4 6 13 32	1.8'/2'	1031	SS 9	0	0	0 0 0 0	
31										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

11/11/1992

Drilling Log Continuation

Boring Number GMW-21
Page 3 of 3
Project Name PKI
Project Number 26682
Date 2/26/01

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	— Same as Above —				1033					
32	SHALE: pale olive (10Y-6/2), silty, dry, hard, mod. weathered, weak		10 26 50/4"	16"/16"	1041	SS 10	0	0	0	
33	SILTSTONE: dark reddish brown (10R-3/4), dry, hard, mod. weathered, weak, with some FeO staining and slickensides				1044				0	
34	SHALE: pale olive (10Y-6/2), silty, dry, hard, moderately weathered, weak, with trace very fine sand		35 50/5"	11"/11"	1050	SS 11	0	0	0	
35					1055				0	
36	@34.2': silt lens, wet, soft		10 16 25 50/4"	18"/22"	1105	SS 12	0	0	0	
37					1110				0	
38	with red lenses		27 50/4"	10"/10"	1118	SS 13	0	0	0	
39	becomes grayish red (10Y-3/4)				1120				0	
			50/6"	0/6"		SS 14				
40	Bottom of Hole									
41	GMW-21									
42	2" PVC; Flush mount well vault; concrete; 1'; 4.5'; Bentonite Grout; 26'; Hydrated Bentonite Chips; 29'; 29.5'; Sand Filter Pack; 34.5'; Slip Cap; 35'; 40'									
43										
44										
45										
46										
47										
48										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log

Project Name: PKI	Project Number: 26682	Boring Number: GMW-22
Ground Elevation:	Location: 1436 Elmridge Place	Page: 1 of 4
Air Monitoring Equipment: 580 B OVM		Total Footage: 42

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	8.75 inch	26.6	15.4	16	0

Drilling Company: Roberts Environ. Drilling	Driller (s): Joe Cox, Joey Brown
Drilling Rig:	Type of Sampler: CME Continuous Sampler / split spoon
Date: 2/27/01 To: 2/27/01	Field Observer (s): John Hesemann

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Silty-clay, damp, medium stiff, dark yellowish brown (10YR-4/4), trace plasticity, with some FeO staining	CL		2.3'/4'	0959	CS 1	0		0	
2									0	
3	Sand, poorly-graded, fine, clean (sewer backfill)	SP								
4	Clayey-silt, damp, soft, gray (2.5Y-5/1), non plastic, mottled olive brown	ML			0956					
5					1001				0	
6	Silty-clay, damp, stiff, dark grayish brown (2.5Y-4/2), medium plastic, with lenticular bedding			2.9'/5'		CS 2	0		0	
7									0	
8										
9	becomes medium stiff, yellowish brown (10YR-5/4), with some FeO staining	CL			1003					
10					1009				0	
11				5'/5'		CS 3			0	
12							0	0	0	
13	becomes very stiff, dark yellowish brown (10YR-4/6), heavily FeO stained (lower % silt)								0	
14					1011				0	

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

11/11/1992

Form WCI-OP2-1

Drilling Log Continuation

Boring Number GMW-22
Project Name PKI
Page 2 of 4
Project Number 26682
Date 2/27/01

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	Silty-clay, damp, medium stiff, yellowish brown (10Y-5/4), medium plastic, with lenticular bedding, FeO and MnO_2 staining	CL		5'/5'	1016	CS 4	0	0	0	
15									0	
16									0	
17									0	
18	becomes heavily MnO_2 stained								0	
19					1018				0	
					1024					
20				3'/3'		CS 5	0		0	Rocky drilling at 20.5'
21	Clayey-gravel, damp, medium dense, coarse grained chert and siltstone gravel	GC			1039				0	
22	@21.8': becomes fine to medium grained		11 10 12 14	1.8'/2'	1049	SS 6	0		0	Auger/CME sampler refusal at 22'. Switch over to split-spoon sampling
23	clayey-silt, dry, hard, greenish-gray (10Y-6/1), non-plastic, with some FeO and MnO_2 staining	ML			1051				0	
24	SHALE: reddish brown (10YR-3/4), dry to damp, very stiff to hard, moderately weathered, weak		4 7 10 15	2'/2'	1057	SS 7	0	0	0	
25	SILTSTONE: light olive brown (2.5Y-5/6), ~~dry, hard~~, mottled greenish gray, dry, hard, extremely weathered, weak, with FeO staining and trace very fine sand				1100				0	
26			7 16 30 42	2'/2'	1106	SS 8	0		0	
27	@26.6': becomes reddish brown (10YR-3/4), moderately weathered				1108				0	
28			13 18 19 26	0/2'	1115	SS 9				
29					1117					
30	becomes light olive brown (5Y-5/6)				1126					
31										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log Continuation

Boring Number GMW-22
Project Name PKI
Page 3 of 4
Project Number 26682
Date 2/27/01

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SILTSTONE: light olive brown (5Y-5/6), dry, hard, moderately weathered, weak		12 32 50/6"	11/1.5'	1131	SS 10	0		0	
32	becomes dusky yellow (5Y-6/4), with trace very fine sand		9 30 50/6"	1.5'/1.5'	1138 1141	SS 11	0	0	0	
33										
34			9 30 30 37	1.8'/2'	1151 1153	SS 12	0	0	0	
35										
36	becomes damp with wet seams, light olive brown (5Y-5/6)		8 16 12 22	1.4'/2'	1200 1204	SS 13	0		0	water in sampler
37	SHALE: light olive brown (5Y-5/6), dry, hard, moderately weathered, weak, with FeO staining									
38			15 50/5"	9"/11"	1212 1215	SS 14	0			
39										
40	becomes dark yellowish orange (10YR-6/6) slightly weathered, moderately strong, with reddish brown streaking		8 20 42 30	0.8'/2'		SS 16	0			1339 water @ 24'
41										
42	Bottom of Hole									
43										
44										

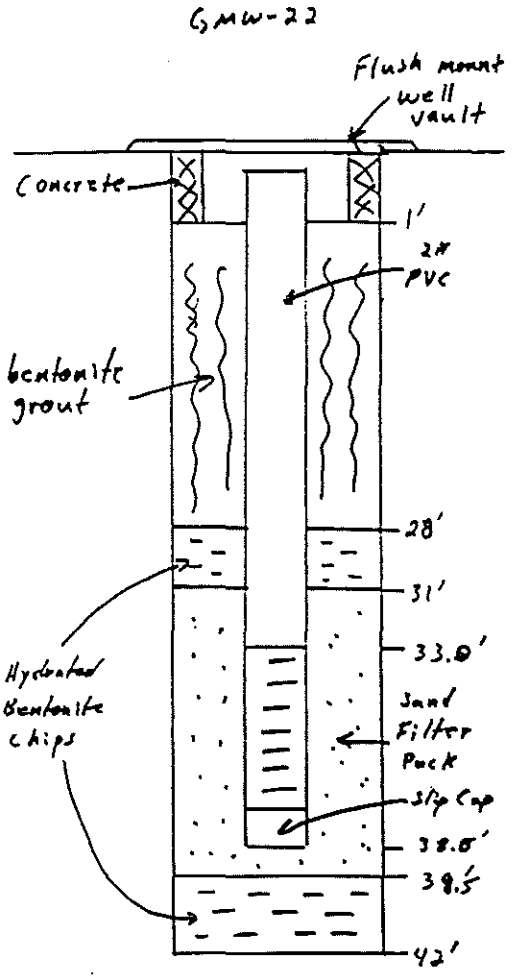
BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log Continuation

Project Name PKI	Boring Number GMW-22
Project Number 2[illegible]682	Page 4 of 4
	Date 2/27/01

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels



BZ=Breathing Zone BH=Bore Hole S=Sample

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Form WCI-OP2-3

Drilling Log

Project Name: PKI	Project Number: 26682	Boring Number: GMW-23
Ground Elevation:	Location: 1438 Wishart Place	Page 1 of 3
Air Monitoring Equipment: 580 B OVM		Total Footage: 38.7

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	8.25"	~~38.7~~ 24	14.7	12	0

Drilling Company: Roberts Environ. Drilling	Driller (s): Joe Cox, Joey Brown
Drilling Rig:	Type of Sampler: CME Continuous sampler/split spoon
Date: 2/28/01 To: 2/28/01	Field Observer (s): John Hesemann

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	Silty-clay FILL, damp, black, with crushed rock, brick, and glass debris	FILL			0937					
1				3.5'/3.5'		CS 1	0		0	
2	Silty-clay, damp, ~~medi~~ soft, light olive brown (2.5Y-5/6), medium plastic								0	
3					0940				0	
					0946					
4									0	
5									0	
	5.4': becomes light brownish gray (2.5Y-6/2) with ~~#~~ FeO and MnO_2 staining and lenticular bedding	CL		2.8'/5'		CS 2	0		0	
7										
8	becomes medium stiff				0947					
					0957					
9									0	
10	becomes ~~light olive brown~~ soft, light olive brown (2.5Y-5/6)					CS 3	0	0	0	
11				5'/5'					0	
12									0	
13	becomes light brownish gray (2.5Y-6/2)				0959				0	
14					1004					

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

11/11/1992

Form WCI-OP2-1

Drilling Log Continuation

Boring Number GMW-23
Project Name PKI
Page 2 of 3
Project Number 26682
Date 2/28/01

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
15	Silty-clay, damp, medium stiff, light brownish gray (2.5Y-6/2), medium plastic with lenticular bedding, FeO and MnO_2 staining					CS 4			0	
16				5'/5'			0		0	
17		CL							0	
18					1006				0	
19					1015				0	
20						CS 5			0	
21				5'/5'			0		0	
22	Clayey-gravel, ~~me~~ damp, medium dense, coarse grained with some coarse sand	GC							0	
23					1019				0	
24	SHALE: light greenish gray (5G-8/1) with yellow and red streaking, damp, medium stiff				1029					
25	SILSTONE: dark reddish brown, dry, ~~slightly weathered~~ blocky structure (10R-3/4)					CS 6				
26	moderately weathered, moderately strong, with			5'/5'			0	0		
27	yellow streaking									
28					1033					
29					1049	SS 7				Switch over to split spoons
30			50/5"	0/5"	1052					
31					1100					

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log Continuation

Boring Number GMW-23

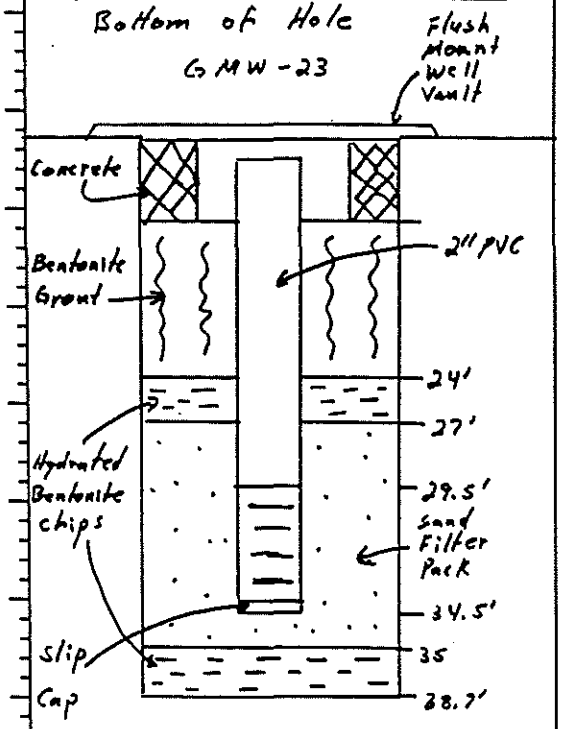
Project Name PKI

Page 3 of 3

Project Number 26682

Date 2/28/01

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
32	SILTSTONE: dark yellowish orange (10YR-6/6), dry, blocky structure, moderately weathered, moderately strong, with red staining		50/5"	0/5"	1105	SS 8	0			
33	@ 33': becomes highly fractured, weak		50/6"	6"/6"	1112 1115	SS 9	0			
34	@ 33.2': 2" damp seam									
35			10 23 38 40	2'/2'	1131 1133	SS 10	0			
36	SHALE: dark yellowish orange (10YR-6/6), silty, dry, hard, moderately weathered, weak, with some slickensides									
37	@ 37': becomes greenish gray (5GY-6/1)		8 50/6"	1'/1'	1139 1144	SS 11	0			
38			50/2"	2"/2"		SS-12				
39	LIMESTONE: yellowish gray (5Y-7/2), fractured, moderately weathered, strong									water in sampler and bore hole
40	Bottom of Hole GMW-23									
41										
42										



BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log

Project Name: PKI	Project Number: 26682	Boring Number: GMW-24
Ground Elevation:	Location: 1470 Wishart	Page: 1 of 3
Air Monitoring Equipment: 580 B OVM		Total Footage: 38.5

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	8.75-inch	17.5	21	8	0

Drilling Company: Roberts Environ. Drilling	Driller (s): Joe Cox, Joey Brown
Drilling Rig:	Type of Sampler: ~~Cont~~ CME continuous sampler ~~Split spoon~~
Date: 3/1/01 To: 3/1/01	Field Observer (s): John Hesemann

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	silty-clay FILL, damp, stiff, dark grayish brown (2.5Y-4/2), medium plastic, with roots, and glass debris	FILL		3.5'/3.5'	0900	CS 1	0		0	
2	silty-clay and asphalt FILL								0	
3	Silty-clay, damp, medium stiff, light olive brown (2.5Y-5/3), medium plastic, with FeO and MnO_2 staining, and lenticular bedding								0	
4									0	
5				2.8'/5'		CS 2			0	
6	becomes soft, light brownish gray (2.5Y-6/2)	CL					0		0	
7									0	
8										
9									0	
10									0	
11				5'/5'		CS 3			0	
12	Clayey-silt, damp, medium stiff, yellowish brown (10YR-5/4), trace to medium plastic, with FeO and MnO_2 staining, and trace very fine sand	ML					0	0	0	
13									0	water coming in borehole
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

11/11/1992

Form WCI-OP2-1

Drilling Log Continuation

Boring Number GMW-24

Project Name PKI

Page 2 of 3

Project Number 26652

Date 3/1/01

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
15	Silty-clay, damp, medium stiff, yellowish brown (10YR-5/4), trace plasticity, with FeO and MnO_2 staining, and fine sand	CL		5'/5'		CS 4	0	0	0	water in sampler
16									0	
17									0	
18	SHALE: greenish gray (10Y-6/1), damp, very stiff, moderately weathered, weak, with FeO staining, and some brown silt lenses								0	
19									0	
20	@19.5': becomes heavily FeO			5'/5'		CS 5	0		0	
21	@20.5': 0.5' chert gravel zone								0	
22									0	
23	becomes silty								0	
24	SILTSTONE: light greenish gray (5GY-7/1), dry, slightly weathered, moderately strong, with FeO staining									
25	@24': becomes dark yellowish orange (10YR-6/6), moderately weathered, weak, with red streaking			5'/5'		CS 6	0			
26										
27										
28	SHALE: greenish gray (10GY-6/1), dry, hard, silty, moderately weathered, moderately strong, with yellow ~~stron~~ streaking									
29										
30										
31										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

Drilling Log Continuation

Boring Number GMW-24

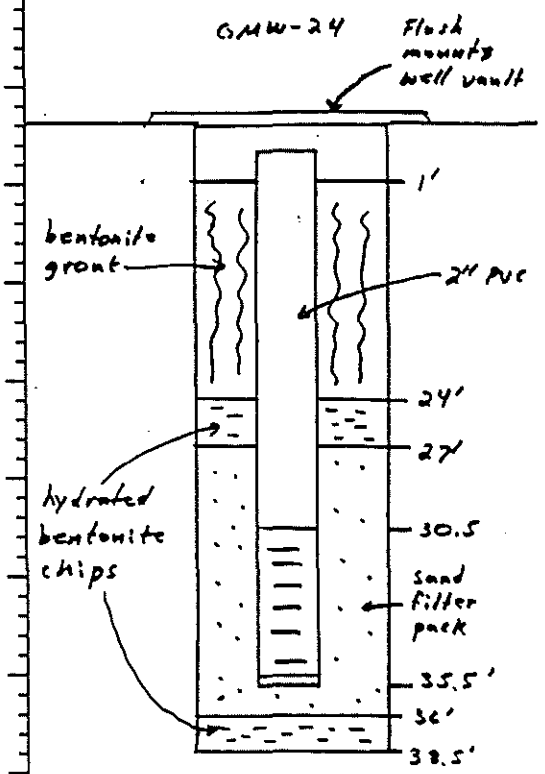
Project Name PKI

Page 3 of 3

Project Number 26682

Date 3/1/01

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	– Same as above –					CS				
32	with ~~red~~ dark reddish brown siltstone lenses and			5'/5'		7	0			
33	slickensides									
34	SILTSTONE: dark yellowish orange (10YR-6/6), wet, highly fractured, moderately weathered, moderately strong									
35	SHALE: ~~dark yellowish orange (10YR-6/6), wet, highly fractured, moderately weathered, moderately~~			5'/5'		CS 8	0			
36										
37	dark reddish brown (10R-3/4), ~~hard,~~ dry, hard, moderately weathered, ~~moderately str~~									
38	weak, with yellow streaking				1030					
39	Bottom of Hole									
40										



BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Waste Consultants, Inc.

3/6/01 26682 J. Hesemann

Well #	DTW	TD	Time
GMW-19	7.12		~~1103~~ 1113
GMW-20	8.09		~~1108~~ 1117
GMW-21	31.39		1121
GMW-22	6.31		1127
GMW-23	3.84		1135
GMW-24	6.79		1140
GMW-3	6.62		1030

Replaced locks on new wells with Abus locks. The location of GMW-10 is incorrect. ~~Shoul~~ Well is approx. 5 ft. north of Pickle Room.

1150 John H. off-site.

3/7/01 26682 J. Hesemann

1148 John H on site. Weather is clear with light wind, ~~Appro~~ ~ 40°.

Well #	DTW	TD	Time
GMW-21	31.27	33.50	1159 ⇒ Pressure on J-Plug.
GMW-22	6.38	37.40	1215
GMW-23	3.90	~~34.18~~ 34.46	1224
GMW-24	6.84	34.85	1231

TD measurements corrected by 0.28 ft to compensate for distance from needle to end of probe.

1252 Place Abus locks on GMW-14 and GMW-16.

1310 Off-site for lunch

1340 Back on-site

1400 Surged GMW-21 with bailer for 20 minutes and bailed approx. 1 gal from well. ~~until~~ Dry after bailing.

3/2/01 26682 J. Hesemann

Well #	temp (°F)	pH	cond (ms)	PV (gal) ~~Flow~~	Time
GMW-19	61.2	7.5	0.60	4.4	1329
Dry @ 8 gals	61.3	7.3	0.60	~~8.9~~ 13.2	1336

1340 Collect sample GMW-19. Water was clear and became light brown.

1405 Collect sample GMW-21. Water was clear and became brown.

1420 Drain purge water into 55-gal drum on-site
John H. off-site.

3/6/01 26682 J. Hesemann

0850 John H. on site. Weather is clear with light wind, ~ 30°. Unlock all in residential area for surveyors.

Well #	DTW	TD	Time
GMW-1	2.68		0930
GMW-4	5.98		1023
GMW-5	13.98		0938
GMW-6	3.86		0954
GMW-7	5.93		1040
GMW-8	6.54		1046
GMW-9	7.29		1042
GMW-10	8.48		1012
GMW-11	7.43		1010
GMW-14	6.90		1052
GMW-15	9.57		1000
GMW-16	7.17		1048
GMW-17	14.95		0936
GMW-18	14.52		0935

3/2/01 26682 J. Hesemann

1135 Roberts completing GMW-23 & GMW-24.

1223 Roberts finished completing wells.

1237 Joey w/ Roberts off-site.

Well #	PV (gal)	temp (°F)	pH	cond. (mS)	Time
GMW-22	5.2	55.4	6.6	0.40	0905
	10.4	56.5	6.7	0.40	0919
	15.6	56.1	7.0	0.40	0932

0940 Collect sample GMW-22. Water was reddish brown and became cloudy.

Well #	PV	temp (°F)	pH	cond. (mS)	Time
GMW-23	5.1	57.8	7.1	0.80	0955
	10.2	58.1	7.5	0.70	1003
	15.3	59.4	7.7	0.70	1009

1012 Collect sample GMW-23. Water was yellowish-brown and became clear to cloudy.

3/2/01 26682 J. Hesemann

Well #	PV (gal)	temp (°F)	pH	cond. (mS)	Time
GMW-24	4.7	58.3	7.9	0.70	1026
	9.4	58.4	7.8	0.60	1044
	14.1	58.6	7.9	0.60	1109

1111 Collect sample GMW-24. Water was reddish brown and became cloudy.

Well #	PV (gal)	temp (°F)	pH	cond. (mS)	Time
GMW-20	3.5	61°	7.3	0.80	1259
Dry @ 5.5 gal	7.0	60.7	7.4	0.80	1303
	10.6				

1306 Collect sample GMW-20. Water was clear and became light brown.

Well #

3/1/01 26682 J. Hesemann

1445 Finished grouting well and cleaning up site. Moving equipment to decon. pad

1510 Roberts setting up to decon. rig and equipment. John H. off-site.

3/2/01 26682 J. Hesemann

0820 John H. on site. Weather is breezy, overcast, ~40°. Joey w/ Roberts on site at GMW-21

Well #	DTW	TD	PV	Time
GMW-21	13.47	33.22	9.9	0830
GMW-22	6.15	37.40	15.6	0857
GMW-23	4.03	34.63	15.3	0949
GMW-24	6.61	34.85	14.1	1019
GMW-19	9.21	35.52	13.2	1317
GMW-20	12.02	33.15	10.6	1245

Well #	PV (gal)	temp (°F)	pH	cond. (mS)	Time
GMW-21	3.3	53.8	5.4	1.30	0845
Dry at 6 gals	~~dry~~ 9.9	61.5	7.1	1.00	1354

- Well dry @ 3.3 gal. Will return to continue purging.

1132 Well is dry again at 3.8 gal. Will return to purge again later.

2/28/01 26682 J. Hesemann

1503 Roberts grouting GMW-23.

1540 Lance Livesay off-site. Roberts cleaning up at site.

1555 Roberts preparing to decon. John H. off-site.

3/1/01 26682 J. Hesemann

0825 John H. on-site. Weather is overcast, ~~clear~~ calm, ~30°. Roberts (Joe & Joey) on site. Moving to 1470 Wishart to drill GMW-24.

0840 Calibrate PID.

0915 ~~Lance~~ Tom Zychinski on site.

0930 Lance Livesay (MDNR) on site.

1030 Complete drilling GMW-24 at 38.5'.

1050 Lance Livesay (MDNR) off site. Roberts placing bentonite and pulling augers.

1118 Roberts setting well.

~~1200~~ 1145 Off-site for lunch break

1325 Back on site.

1340 Tom Z. off-site. Roberts pulling augers and preparing to grout GMW-24.

2/27/01 26682 J. Hesemann

1430 Mike with DGLS off-site. Roberts constructing well.

1500 John H. checking utilities for next well

1530 Roberts has sand and bentonite chips in place. ~~pre~~ Augers are out of hole. Preparing to grout.

1615 Grouting complete. Area cleaned up. Moving equipment to decon. pad. Lance Livesay off-site.

1630 Roberts setting up to decon. and filling water tank.

1640 John H. off-site.

2/28/01 26682 J. Hesemann

0820 John H. on-site. Weather is overcast, calm, ~30°.

0825 J. & Joey w/ Roberts on site. Start Completing GMW-22.

0835 Lance Livesay (MDNR) on site.

0905 Finished completing GMW-22. Moving to 1438 Wishart to drill GMW-23.

0920 Calibrate PID

0932 Mike Siemens (MO-DGLS) on site.

0937 Begin drilling GMW-23.

1144 Complete drilling of GMW-23 at 38.5 ft.

1221 Off-site for lunch break.

1315 Back on-site. Roberts will back fill with bentonite chips to 35' bgs.

1340 Mike Siemens off-site. Roberts constructing well.

1451 Sand and bentonite are in place. Augers are out of hole.

2/26/01 26682 J. Hesemann

1320 Set 2" PVC well with 5 feet of screen.

1350 Set sand filter pack to 29 feet.

1400 Set bentonite chips to 26 feet.

1508 ~~Wi~~ Finished grouting well in place. Will let grout set over night before completing well.

1518 Cleaning up site.

1525 Lance Livesay off-site.

1530 Setting up decon. pad and filling water tank.

1605 Deconing augers.

1615 John H. off-site.

2/27/01 26682 J. Hesemann

0755 John H. on-site. Weather is overcast, with light breeze and snow, ~ 30°.

0805 Calibrate PID. Snow becoming heavier and changing to sleet and rain.

0826 Roberts (Joe & Joey) on site.

0835 Roberts will complete GMW-21 first.

0930 GMW-21 complete. Setting up to drill GMW-22.

0930 Mike Siemens with MO-DGLS on-site.

0959 Begin drilling GMW-22

1230 Off-site for lunch break.

1350 Complete GMW-22 at 42 ft. Will backfill w/ bentonite chips to 39 ft.

1425 Chips are in place. will hydrate in groundwater. Mike and Lance agree we can construct well without waiting 1 hour.

2/26/01 26682 J. Hesemann

0815 John H. on-site. Weather is clear, calm, ~35°. Checking utilities and property at site of first MW to be installed (GMW-21) at 1476 Elmridge Pl.

~~0830~~ Locate sewer, gas, and water service line.

0830 Calibrate PID.

0850 Joey Brown and Joe Cox of Roberts Drilling on-site.

0910 Begin drilling GMW-21.

1000 Lance Livesay (MDNR) on site.

1130 Complete GMW-21 at 40'.

1150 ~~Be~~ Begin bringing bottom of hole up to 35' w/ bentonit chips. Water in hole will hydrate.

1224 Chips are set. Break for lunch.

1315 Back on site. ~~Chips~~ Will place 6 inches of sand on top of chips and set well.

ATTACHMENT 2

QA/QC Memorandum
Laboratory Analytical Results

Burns & McDonnell
SINCE 1898

Date: March 22, 2001

To: Tom Zychinski

From: Christine Rice – Burns & McDonnell

Re: QA/QC Review of Analytical Data
Project Number (36682-PKI)

Groundwater samples were collected from 6 wells on March 2, 2001. The samples were analyzed by Southwest Laboratory of Oklahoma, Inc. of Broken Arrow, Oklahoma for halogenated volatile organic compounds (VOCs) by SW-846 Method 8021B.

The sample results were reviewed for the Level III parameters listed on the attached checklist. The checklist items were examined for any method-specific requirements. Data qualifiers, when appropriate, were added to the data as recommended in *National Functional Guidelines for Organic Data Review* (NFGO, 1999). The quality assurance/quality control (QA/QC) review results are discussed below.

1. Chain-of-Custody – The chain-of-custody (COC) forms were signed by the relinquisher and the receiver.

2. Requested Analyses Completed – All analyses were performed as requested on COCs.

3. Holding Times – All samples were analyzed within the method-required holding times.

4. Sample Preservation – All samples were received at 0.9 degrees Celsius. This was less than the required temperature range of 2 to 6 degrees Celsius. However, because the samples were received by the laboratory in the liquid form, there was no detrimental affect on the samples. No qualifiers were added.

5. Laboratory Method Blanks – The method blanks contained no detections of target analytes.

6. Trip Blanks – Trip Blank TB/GW contained 1,1,2-trichloroethane at 1 µg/L. Because the associated samples did not contain similar detections of 1,1,2-trichloroethane, the samples were unaffected and no qualifiers were added.

7. Surrogates – Surrogates are added for organic analyses. Surrogates are compounds not normally found in the environment that are added (spiked) into samples and analyzed for percent recovery (REC). Maximum and minimum limits on the REC are set by the laboratory for the method used.

   All surrogate RECs were within QC limits.

8. Laboratory Control Samples/Laboratory Control Sample Duplicate (LCS/LCSD) – LCS/LCSD contains a matrix similar to that of the sample that has been spiked with

known concentrations of target analytes. The LCS/LCSD is prepared and analyzed by the same method as the samples. As a measure of analytical accuracy, the results of the LCS are compared against the known analyte concentrations in the spike to determine REC. As a measure of precision, the LCS and LCSD results are compared against each other for reproducibility. The purpose of the LCS/LCSD is to determine the performance of the laboratory with respect to analyte recovery, independent of field sample matrix interference.

All LCS/LCSD RECs and relative percent differences (RPDs) were within the QC limits.

9. Matrix Spike/Matrix Spike Duplicates (MS/MSD) – MS/MSDs are typically run for organic analyses. A sample is split into three portions (original, MS and MSD), and a known amount of a target analyte is added (spiked) to two portions (MS and MSD) of the sample. The results of these two portions are compared with each other for reproducibility using the relative percent difference (RPD). They are also compared against the unspiked portion of the sample for REC of the spike.

   The VOC MS/MSD was performed on Sample GMW-19/GW. The MS RECs for 1,1,2-trichloroethane (79 percent) and 1,2-dichlorobenzene (81 percent) fell slightly below the QC minimums of 80 and 83 percent, respectively. Because the LCS/LCSD RECs for these analytes were within the QC limits, the problem appears to be limited to the MS/MSD. NFGO does not require qualification of VOC data based solely upon the MS/MSD results. Therefore, no qualifiers were added and the VOC results should be used as reported by the laboratory.

10. Field Duplicate Results – No Field duplicates were required for this sampling event.

11. Detection and Quantitation Limits – The VOC results of Sample GMW-19/GW were diluted by a factor of 500, and the VOC results of Samples GMW-20/GW and GMW-21/GW were diluted by a factor of 50. These dilutions were required to bring target analyte concentrations into the linear range of the instrument calibration and/or to compensate for matrix interference.

12. Conclusion – No qualifiers were added to the data. As such, the results of this review indicate that the data are valid for use in reporting the results of this investigation.

Attachment

Organic Data Validation Checklist

SDG No.:	45949	Site:	Perkin Elmer
Project Name:	PKI	Laboratory:	Southwest
Project No.:	26682-3.20.30	Analysis Type:	VOCs by 8021B

Instructions:

1. Initial and date this form at the start and end of review for this SDG.
2. Place a check mark in the "NA" column when the review item was not applicable.
3. When review of a checklist item is complete, place a check mark in the "Reviewed" column.
4. Place an "NS" designation in the "Reviewed" column when applicable data were not supplied.
5. Place a check mark or an "NR" in the "Qualified" column if related data did or did not require qualification, respectively.
6. See "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," February 1993, for validation purposes.
7. Level IV review is generally performed on 5-10% of all sample results; actual percentage is project specific.
8. Place a check mark in the box at the beginning of the Level IV section if no associated raw data were reviewed.

	NA	Reviewed	Qualified	Comments
Level III Review Item				
Signed Chain-of-Custody Available		X	NR	
Requested Analyses Completed		X	NR	
Holding Times Met		X	NR	
Sample Preservation Acceptable		X	NR	Samples were received at 0.9 degrees Celsius. No detriment to samples. No qualifiers.
Laboratory Method Blank Results		X	NR	
Field Blank Results	X			
Trip Blank Results (VOC only)		X	NR	TB/GW detected 1,1,2-trichloroethane at 1 µg/L. No samples contained similar detection. No qualifiers.
Surrogate Recoveries		X	NR	
Laboratory Control Sample Results		X	NR	
MS/MSD Results		X	NR	On GMW-19/GW. 1,1,2-Trichloroethane MS=79% (80-123%) and 1,2-Dichlorobenzene MS=81% (83-117%). No qualifiers.
Field Duplicates	X			
Quantitation Limits		X	NR	GMW-19/GW DF=500; GMW-20/GW DF=50; GMW-21/GW DF=50
Level IV Review Item		= Summary Sheets Only		
GC/MS Tuning				
Initial Calibrations				
Continuing Calibrations				
Internal Standards				
Enhanced Level IV Review Item				
Compound Identification				
Compound Quantitation				

Date Started/ Reviewer:	03/22/2001 C. Rice	Date Completed/ Reviewer:	03/22/2001 C. Rice

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

March 15, 2001

Mr. Todd Zychinski
Burns and McDonnell Waste Consultants
9400 Ward Parkway
Kansas City, MO 64114

Project: **PKI/26682**
Project No.: **26682**
SWLO ID: 45949.01 – 45949.07

Dear Mr. Zychinski

Enclosed please find the Level II tabular report for the above referenced samples, received in our laboratory on March 3, 2001.

Thank you for choosing Southwest Labs. If in your review you should have any questions or require additional information, do not hesitate to call.

Sincerely,

Randy Staggs
Project Officer

RES/jt

Enclosures

"We certify that the following test report meets all required NELAC reporting standards as specified in NELAC 5.13, July 1, 1999. Any deviation or variance is noted in the case narrative(s)."
"Estimated Uncertainties regarding these analyses are presented in the Quality Control Section of this report."

1700 West Albany • Broken Arrow, OK 74012-1421 • Office (918) 251-2858 • Fax (918) 251-2599

Request for Chemical Analysis and Chain of Custody Record

2

Burns & McDonnell Waste Consultants, Inc.
9400 Ward Parkway
Kansas City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Attention: ~~John Hes~~ T. Bychinski

Laboratory: Southwest Labs, Inc.
Address: 1700 West Albany
City/State/Zip: Broken Arrow, OK 74012
Telephone: (918) 251-2858

Document Control No.:

Lab. Reference No. or Episode No.:

Project Number: 26682 Project Name: PKI

Site, Group, or SWMU Name:

Sample Number: Sample Point	Sample Designator	Sample Event: Round	Sample Event: Year	Sample Depth (in feet): From	Sample Depth (in feet): To	Sample Collected: Date	Sample Collected: Time	Matrix: Liquid	Matrix: Solid	Matrix: Gas	Composite	Grab	Number of Containers	Analysis: Halogenated VOCs 8021B	Remarks
GMW-19	GW					3/2/01	1340	X				X	2	X	
GMW-20							1306								
GMW-21							1405								
GMW-22							0940								
GMW-23							1012								
GMW-24							1111					X			
TB								X						X	

0.90

Sampler (signature)

Sampler (signature)

Special Instructions:

Relinquished By: 1. (signature) Date/Time 3/2/01 Received By: (signature) Date/Time

Relinquished By: 2. (signature) Date/Time Received By: (signature) Date/Time 3/3/01 9:20

Condition of Shipping Container: Good [ ] Fair [ ] Poor [ ]

Ice Present in Container: Yes [ ] No [ ]

Comments:

61996 Form WCI-OP

COOLER RECEIPT / SAMPLE LOG-IN SHEET

COOLER RECEIPT / SAMPLE LOG-IN SHEET (115-ATT2.WB1) / SWL-GA-115 REV 5.0 / GA-115-CRLOGIN-F

LAB NAME: SOUTHWEST LABORATORY OF OKLAHOMA

PAGE 1 OF 1

RECEIVED BY (PRINT NAME): JANET FITZGERALD

RECEIVED BY (SIGNATURE): Janet Fitzgerald

LOGGED IN BY (SIGNATURE): Janet Fitzgerald

REC'D DATE 03/03/01

TIME REC'D 09:20

LOG-IN DATE 2001-03-03 10:08

PROJECT: PKI/26682

EPISODE: 45949

SAMPLE DELIVERY GROUP:45949

Client Sample #	Sample Fraction @	Assigned LAB#	Cooler I.D.	pH Check	ACID/ BASE LOT#	REMARKS: CONDITION OF SAMPLE SHIPMENT, ETC.
GWM-19 GW	V	45949.01	03/03/01-1	N		0.9c
GWM-20 GW		45949.02	03/03/01-1	N		0.9c
GWM-21 GW		45949.03	03/03/01-1	N		0.9c
GWM-22 GW		45949.04	03/03/01-1	N		0.9c
GWM-23 GW		45949.05	03/03/01-1	N		0.9c
GWM-24 GW		45949.06	03/03/01-1	N		0.9c
TB GW	V	45949.07	03/03/01-1	N		0.9c

Remarks

1. CUSTODY SEAL(S): Present/Absent
   Intact/ Broken
2. CUSTODY SEALS NOS.: N/A
3. CHAIN-OF CUSTODY. Present/Absent
   Sealed In Plastic? Yes/ No
   Taped To Lid? Yes/ No
   Properly Filled Out (Ink, Signed, ETC.)? Yes/ No
4. AIRBILL AirBill/ Sticker Present/Absent
5. AIRBILL NO: 805282533119
6. COOLER CONDITIONS
   Enough Ice? Yes/ No
   Type of Ice? Wet
   Type of Packing? Bubble Wrap
7. SAMPLE TAGS Present/Absent
8. SAMPLE CONDITION: Intact/ Broken*/ Leaking
   Bottles Sealed In Separate Plastic Bags? Yes/ No
   Correct Containers Used For Tests Indicated? Yes/ No
   Correct Preservative? Yes/ No
   Sufficient Sample? Yes/ No
   Labels Complete (I.D., Date, Time, Signature, Preservative? Yes/ No
   VOA Samples Without Bubbles? Yes/ No~
9. Does Information on Custody Records,Labels,Tags Agree? Yes/ No*
10. RAD SCREEN WITH GIEGER COUNTER? Yes/ No
11. P.O. Called? Yes/ No

* Contact PO and attach record of resolution

@ Sample Fractions: B=SV GC/MS, V= VOA GC/MS or GC, P=Pesticide,H=Herbicide, D=Dioxin, A=Air, I=Inorganics, C=Cyanide, M=Metals, R=Radiochemistry.

~ Note samples with bubbles under remarks section.

SOUTHWEST LABORATORY OF OKLAHOMA
1700 West Albany, Suite A / Broken Arrow, OK 74012
918-251-2858

SDG NARRATIVE

March 15, 2001

CLIENT: B&MC

SDG No.: 45949

VOLATILE FRACTION

Seven water samples plus an MS/MSD were submitted for Volatile Organic Analysis. The samples were analyzed by GC based on Method 8021B for the halogenated compounds.

No major problems occurred during the analyses of these samples. Second column confirmation performed upon client request. GWM-19 GW, GWM-20 GW and GWM-21 GW required dilution due to the high levels of target compounds.

Blanks: No problems.

Surrogates: No problems.

Laboratory Control Spikes: No problems

Matrix Spikes: 1,1,2-Trichloroethene and 1,2 dichlorobenzene recoveries were low in the MS. As all other QC were acceptable and neither of these compounds were detected in the samples no action was taken.

James Whittaker

James G. Whittaker
Volatile Section Supervisor

March 15, 2001

SWLO Qualifier Flags

METHODOLOGY

SM	=	Standard Methods. 18th Edition. 1992
EPA	=	#EPA600 / 4-79-020. March 1985
SW	=	EPA Methodology, "#SW846". Final Update III. June. 1997

GENERAL QUALIFIER FLAGS

B	=	Analyte is detected in blank as well as sample
J	=	Estimated value: concentration is below limit of quantitation
T	=	Trace amount
U	=	Not detected
>	=	Concentration greater than value reported
E	=	Compound exceeds calibration range
D	=	Sample dilution run or surrogates diluted out Sample run at secondary dilution
I	=	Not quantifiable due to matrix interference
*	=	Surrogate outside of QC limits on both original and re-analysis
P	=	Pesticide Aroclor Flag used when >25% difference between two GC columns. The lower of the two values is reported.

TPH 8015

1	=	Analysis shows miscellaneous peaks, which cannot be identified as any specific pattern. Response factor for nearest eluting hydrocarbon standard was used to calculate concentration.
2	=	Pattern is similar to, but not identical to standard.
3	=	May be a weathered gasoline.

APPENDIX IX SEMIVOLATILES

1	=	Detected as Diphenylamine
2	=	Coelute on GC Column

TCLP SEMIVOLATILES

1	=	1-methyl phenol
2	=	Compounds Co-elute (3 & 4-methylphenol)
3	=	Combination of O, M, & P Cresols

DIOXINS

X	=	EMPC (Estimated Maximum Possible Concentration)
I *	=	EMPC – ether interference

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/29/01	DATA FILE:	X7062.D
SAMPLE ID:	GWM-19 GW	SAMPLE MATRIX:	WATER
SWOK ID:	45949.01	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	
DATE ANALYZED:	03/14/01	DILUTION:	500
BLANK ID:	X010314A		

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	500	500	U
VINYL CHLORIDE	500	500	U
BROMOMETHANE	500	500	U
CHLOROETHANE	500	500	U
TRICHLOROFLUOROMETHANE	500	500	U
1,1-DICHLOROETHENE	500	500	U
METHYLENE CHLORIDE	500	500	U
trans-1,2-DICHLOROETHENE	500	500	U
1,1-DICHLOROETHANE	500	500	U
cis-1,2-DICHLOROETHENE	500	1200	
CHLOROFORM	500	500	U
1,1,1-TRICHLOROETHANE	500	500	U
CARBON TETRACHLORIDE	500	500	U
1,2-DICHLOROETHANE	500	500	U
TRICHLOROETHENE	500	4300	
1,2-DICHLOROPROPANE	500	500	U
BROMODICHLOROMETHANE	500	500	U
2-CHLOROETHYL VINYL ETHER	500	500	U
cis-1,3-DICHLOROPROPENE	500	500	U
trans-1,3-DICHLOROPROPENE	500	500	U
1,1,2-TRICHLOROETHANE	500	500	U
TETRACHLOROETHENE	500	260	J
DIBROMOCHLOROMETHANE	500	500	U
1,2-DIBROMOETHANE	500	500	U
CHLOROBENZENE	500	500	U
BROMOFORM	500	500	U
1,1,2,2-TETRACHLOROETHANE	500	500	U
1,3-DICHLOROBENZENE	500	500	U
1,4-DICHLOROBENZENE	500	500	U
1,2-DICHLOROBENZENE	500	500	U

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/29/01	DATA FILE:	X7062.D
SAMPLE ID:	GWM-19 GW	SAMPLE MATRIX:	WATER
SWOK ID:	45949.01	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	
DATE ANALYZED:	03/14/01	DILUTION:	500
BLANK ID:	X010314A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	77%
2-BROMOCHLOROBENZENE	(71-123)	82%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/29/01 DATA FILE: X7052.D

SAMPLE ID: GWM-20 GW SAMPLE MATRIX: WATER
SWOK ID: 45949.02 METHOD REFERENCE: 8021
DATE RECEIVED: 03/03/01 PROJECT:
DATE ANALYZED: 03/14/01 DILUTION: 50
BLANK ID: X010313A

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	50	50	U
VINYL CHLORIDE	50	50	U
BROMOMETHANE	50	50	U
CHLOROETHANE	50	50	U
TRICHLOROFLUOROMETHANE	50	50	U
1,1-DICHLOROETHENE	50	50	U
METHYLENE CHLORIDE	50	50	U
trans-1,2-DICHLOROETHENE	50	50	U
1,1-DICHLOROETHANE	50	50	U
cis-1,2-DICHLOROETHENE	50	400	
CHLOROFORM	50	50	U
1,1,1-TRICHLOROETHANE	50	50	U
CARBON TETRACHLORIDE	50	50	U
1,2-DICHLOROETHANE	50	50	U
TRICHLOROETHENE	50	1700	
1,2-DICHLOROPROPANE	50	50	U
BROMODICHLOROMETHANE	50	50	U
2-CHLOROETHYL VINYL ETHER	50	50	U
cis-1,3-DICHLOROPROPENE	50	50	U
trans-1,3-DICHLOROPROPENE	50	50	U
1,1,2-TRICHLOROETHANE	50	50	U
TETRACHLOROETHENE	50	50	U
DIBROMOCHLOROMETHANE	50	50	U
1,2-DIBROMOETHANE	50	50	U
CHLOROBENZENE	50	50	U
BROMOFORM	50	50	U
1,1,2,2-TETRACHLOROETHANE	50	50	U
1,3-DICHLOROBENZENE	50	50	U
1,4-DICHLOROBENZENE	50	50	U
1,2-DICHLOROBENZENE	50	50	U

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/29/01	DATA FILE:	X7052.D
SAMPLE ID:	GWM-20 GW	SAMPLE MATRIX:	WATER
SWOK ID:	45949.02	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	
DATE ANALYZED:	03/14/01	DILUTION:	50
BLANK ID:	X010313A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	77%
2-BROMOCHLOROBENZENE	(71-123)	80%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/29/01 DATA FILE: X7053.D

SAMPLE ID: GWM-21 GW SAMPLE MATRIX: WATER
SWOK ID: 45949.03 METHOD REFERENCE: 8021
DATE RECEIVED: 03/03/01 PROJECT:
DATE ANALYZED: 03/14/01 DILUTION: 50
BLANK ID: X010313A

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	50	50	U
VINYL CHLORIDE	50	50	U
BROMOMETHANE	50	50	U
CHLOROETHANE	50	50	U
TRICHLOROFLUOROMETHANE	50	50	U
1,1-DICHLOROETHENE	50	50	U
METHYLENE CHLORIDE	50	37	J
trans-1,2-DICHLOROETHENE	50	50	U
1,1-DICHLOROETHANE	50	50	U
cis-1,2-DICHLOROETHENE	50	50	U
CHLOROFORM	50	50	U
1,1,1-TRICHLOROETHANE	50	50	U
CARBON TETRACHLORIDE	50	50	U
1,2-DICHLOROETHANE	50	50	U
TRICHLOROETHENE	50	360	
1,2-DICHLOROPROPANE	50	50	U
BROMODICHLOROMETHANE	50	50	U
2-CHLOROETHYL VINYL ETHER	50	50	U
cis-1,3-DICHLOROPROPENE	50	50	U
trans-1,3-DICHLOROPROPENE	50	50	U
1,1,2-TRICHLOROETHANE	50	50	U
TETRACHLOROETHENE	50	170	
DIBROMOCHLOROMETHANE	50	50	U
1,2-DIBROMOETHANE	50	50	U
CHLOROBENZENE	50	50	U
BROMOFORM	50	50	U
1,1,2,2-TETRACHLOROETHANE	50	50	U
1,3-DICHLOROBENZENE	50	50	U
1,4-DICHLOROBENZENE	50	50	U
1,2-DICHLOROBENZENE	50	50	U

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/29/01	DATA FILE:	X7053.D
SAMPLE ID:	GWM-21 GW	SAMPLE MATRIX:	WATER
SWOK ID:	45949.03	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	
DATE ANALYZED:	03/14/01	DILUTION:	50
BLANK ID:	X010313A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	72%
2-BROMOCHLOROBENZENE	(71-123)	79%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/29/01 DATA FILE: X7048.D

SAMPLE ID: GWM-22 GW SAMPLE MATRIX: WATER
SWOK ID: 45949.04 METHOD REFERENCE: 8021
DATE RECEIVED: 03/03/01 PROJECT:
DATE ANALYZED: 03/13/01 DILUTION: 1
BLANK ID: X010313A

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	1	1	U
VINYL CHLORIDE	1	1	U
BROMOMETHANE	1	1	U
CHLOROETHANE	1	1	U
TRICHLOROFLUOROMETHANE	1	1	U
1,1-DICHLOROETHENE	1	1	U
METHYLENE CHLORIDE	1	1	U
trans-1,2-DICHLOROETHENE	1	1	U
1,1-DICHLOROETHANE	1	1	U
cis-1,2-DICHLOROETHENE	1	1	U
CHLOROFORM	1	1	U
1,1,1-TRICHLOROETHANE	1	1	U
CARBON TETRACHLORIDE	1	1	U
1,2-DICHLOROETHANE	1	1	U
TRICHLOROETHENE	1	6	
1,2-DICHLOROPROPANE	1	1	U
BROMODICHLOROMETHANE	1	1	U
2-CHLOROETHYL VINYL ETHER	1	1	U
cis-1,3-DICHLOROPROPENE	1	1	U
trans-1,3-DICHLOROPROPENE	1	1	U
1,1,2-TRICHLOROETHANE	1	1	U
TETRACHLOROETHENE	1	2	
DIBROMOCHLOROMETHANE	1	1	U
1,2-DIBROMOETHANE	1	1	U
CHLOROBENZENE	1	1	U
BROMOFORM	1	1	U
1,1,2,2-TETRACHLOROETHANE	1	1	U
1,3-DICHLOROBENZENE	1	1	U
1,4-DICHLOROBENZENE	1	1	U
1,2-DICHLOROBENZENE	1	1	U

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/29/01	DATA FILE:	X7048.D
SAMPLE ID:	GWM-22 GW	SAMPLE MATRIX:	WATER
SWOK ID:	45949.04	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	
DATE ANALYZED:	03/13/01	DILUTION:	1
BLANK ID:	X010313A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	79%
2-BROMOCHLOROBENZENE	(71-123)	83%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/29/01 DATA FILE: X7049.D

SAMPLE ID: GWM-23 GW SAMPLE MATRIX: WATER
SWOK ID: 45949.05 METHOD REFERENCE: 8021
DATE RECEIVED: 03/03/01 PROJECT:
DATE ANALYZED: 03/13/01 DILUTION: 1
BLANK ID: X010313A

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	1	1	U
VINYL CHLORIDE	1	1	U
BROMOMETHANE	1	1	U
CHLOROETHANE	1	1	U
TRICHLOROFLUOROMETHANE	1	1	U
1,1-DICHLOROETHENE	1	1	U
METHYLENE CHLORIDE	1	0.6	J
trans-1,2-DICHLOROETHENE	1	1	U
1,1-DICHLOROETHANE	1	1	U
cis-1,2-DICHLOROETHENE	1	0.8	J
CHLOROFORM	1	1	U
1,1,1-TRICHLOROETHANE	1	1	U
CARBON TETRACHLORIDE	1	1	U
1,2-DICHLOROETHANE	1	1	U
TRICHLOROETHENE	1	26	
1,2-DICHLOROPROPANE	1	1	U
BROMODICHLOROMETHANE	1	1	U
2-CHLOROETHYL VINYL ETHER	1	1	U
cis-1,3-DICHLOROPROPENE	1	1	U
trans-1,3-DICHLOROPROPENE	1	1	U
1,1,2-TRICHLOROETHANE	1	1	U
TETRACHLOROETHENE	1	8	
DIBROMOCHLOROMETHANE	1	1	U
1,2-DIBROMOETHANE	1	1	U
CHLOROBENZENE	1	1	U
BROMOFORM	1	1	U
1,1,2,2-TETRACHLOROETHANE	1	1	U
1,3-DICHLOROBENZENE	1	1	U
1,4-DICHLOROBENZENE	1	1	U
1,2-DICHLOROBENZENE	1	1	U

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/29/01	DATA FILE:	X7049.D
SAMPLE ID:	GWM-23 GW	SAMPLE MATRIX:	WATER
SWOK ID:	45949.05	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	
DATE ANALYZED:	03/13/01	DILUTION:	1
BLANK ID:	X010313A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	79%
2-BROMOCHLOROBENZENE	(71-123)	79%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/29/01 DATA FILE: X7050.D

SAMPLE ID: GWM-24 GW SAMPLE MATRIX: WATER
SWOK ID: 45949.06 METHOD REFERENCE: 8021
DATE RECEIVED: 03/03/01 PROJECT:
DATE ANALYZED: 03/13/01 DILUTION: 1
BLANK ID: X010313A

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	1	1	U
VINYL CHLORIDE	1	1	U
BROMOMETHANE	1	1	U
CHLOROETHANE	1	1	U
TRICHLOROFLUOROMETHANE	1	1	U
1,1-DICHLOROETHENE	1	1	U
METHYLENE CHLORIDE	1	1	U
trans-1,2-DICHLOROETHENE	1	1	U
1,1-DICHLOROETHANE	1	1	U
cis-1,2-DICHLOROETHENE	1	2	
CHLOROFORM	1	1	U
1,1,1-TRICHLOROETHANE	1	1	U
CARBON TETRACHLORIDE	1	1	U
1,2-DICHLOROETHANE	1	1	U
TRICHLOROETHENE	1	17	
1,2-DICHLOROPROPANE	1	1	U
BROMODICHLOROMETHANE	1	1	U
2-CHLOROETHYL VINYL ETHER	1	1	U
cis-1,3-DICHLOROPROPENE	1	1	U
trans-1,3-DICHLOROPROPENE	1	1	U
1,1,2-TRICHLOROETHANE	1	1	U
TETRACHLOROETHENE	1	4	
DIBROMOCHLOROMETHANE	1	1	U
1,2-DIBROMOETHANE	1	1	U
CHLOROBENZENE	1	1	U
BROMOFORM	1	1	U
1,1,2,2-TETRACHLOROETHANE	1	1	U
1,3-DICHLOROBENZENE	1	1	U
1,4-DICHLOROBENZENE	1	1	U
1,2-DICHLOROBENZENE	1	1	U

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/29/01	DATA FILE:	X7050.D
SAMPLE ID:	GWM-24 GW	SAMPLE MATRIX:	WATER
SWOK ID:	45949.06	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	
DATE ANALYZED:	03/13/01	DILUTION:	1
BLANK ID:	X010313A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	82%
2-BROMOCHLOROBENZENE	(71-123)	79%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/29/01 DATA FILE: X7047.D

SAMPLE ID: TB GW SAMPLE MATRIX: WATER
SWOK ID: 45949.07 METHOD REFERENCE: 8021
DATE RECEIVED: 03/03/01 PROJECT:
DATE ANALYZED: 03/13/01 DILUTION: 1
BLANK ID: X010313A

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	1	1	U
VINYL CHLORIDE	1	1	U
BROMOMETHANE	1	1	U
CHLOROETHANE	1	1	U
TRICHLOROFLUOROMETHANE	1	1	U
1,1-DICHLOROETHENE	1	1	U
METHYLENE CHLORIDE	1	1	U
trans-1,2-DICHLOROETHENE	1	1	U
1,1-DICHLOROETHANE	1	1	U
cis-1,2-DICHLOROETHENE	1	1	U
CHLOROFORM	1	1	U
1,1,1-TRICHLOROETHANE	1	1	U
CARBON TETRACHLORIDE	1	1	U
1,2-DICHLOROETHANE	1	1	U
TRICHLOROETHENE	1	1	U
1,2-DICHLOROPROPANE	1	1	U
BROMODICHLOROMETHANE	1	1	U
2-CHLOROETHYL VINYL ETHER	1	1	U
cis-1,3-DICHLOROPROPENE	1	1	U
trans-1,3-DICHLOROPROPENE	1	1	U
1,1,2-TRICHLOROETHANE	1	1	
TETRACHLOROETHENE	1	1	U
DIBROMOCHLOROMETHANE	1	1	U
1,2-DIBROMOETHANE	1	1	U
CHLOROBENZENE	1	1	U
BROMOFORM	1	1	U
1,1,2,2-TETRACHLOROETHANE	1	1	U
1,3-DICHLOROBENZENE	1	1	U
1,4-DICHLOROBENZENE	1	1	U
1,2-DICHLOROBENZENE	1	1	U

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/29/01	DATA FILE:	X7047.D
SAMPLE ID:	TB GW	SAMPLE MATRIX:	WATER
SWOK ID:	45949.07	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	
DATE ANALYZED:	03/13/01	DILUTION:	1
BLANK ID:	X010313A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	77%
2-BROMOCHLOROBENZENE	(71-123)	80%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA, INC
1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-259

QUALITY CONTROL SECTION

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/13/01 DATA FILE: X7040.D

SAMPLE ID: X010313A SAMPLE MATRIX: WATER
SWOK ID: X010313A METHOD REFERENCE: 8021
DATE RECEIVED: PROJECT:
DATE ANALYZED: 03/13/01 DILUTION: 1

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	1	1	U
VINYL CHLORIDE	1	1	U
BROMOMETHANE	1	1	U
CHLOROETHANE	1	1	U
TRICHLOROFLUOROMETHANE	1	1	U
1,1-DICHLOROETHENE	1	1	U
METHYLENE CHLORIDE	1	1	U
trans-1,2-DICHLOROETHENE	1	1	U
1,1-DICHLOROETHANE	1	1	U
cis-1,2-DICHLOROETHENE	1	1	U
CHLOROFORM	1	1	U
1,1,1-TRICHLOROETHANE	1	1	U
CARBON TETRACHLORIDE	1	1	U
1,2-DICHLOROETHANE	1	1	U
TRICHLOROETHENE	1	1	U
1,2-DICHLOROPROPANE	1	1	U
BROMODICHLOROMETHANE	1	1	U
2-CHLOROETHYL VINYL ETHER	1	1	U
cis-1,3-DICHLOROPROPENE	1	1	U
trans-1,3-DICHLOROPROPENE	1	1	U
1,1,2-TRICHLOROETHANE	1	1	U
TETRACHLOROETHENE	1	1	U
DIBROMOCHLOROMETHANE	1	1	U
1,2-DIBROMOETHANE	1	1	U
CHLOROBENZENE	1	1	U
BROMOFORM	1	1	U
1,1,2,2-TETRACHLOROETHANE	1	1	U
1,3-DICHLOROBENZENE	1	1	U
1,4-DICHLOROBENZENE	1	1	U
1,2-DICHLOROBENZENE	1	1	U

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/13/01	DATA FILE:	X7040.D
SAMPLE ID:	X010313A	SAMPLE MATRIX:	WATER
SWOK ID:	X010313A	METHOD REFERENCE:	8021
DATE RECEIVED:		PROJECT:	
DATE ANALYZED:	03/13/01	DILUTION:	1

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	78%
2-BROMOCHLOROBENZENE	(71-123)	85%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/13/01

LCS FILE ID: X7041.D
SAMPLE MATRIX: WATER
DATE ANALYZED: 03/13/01

LCSD FILE ID: X7042.D
METHOD REFERENCE: 8021
PROJECT:

LABORATORY CONTROL SPIKE/SPIKE DUPLICATE RECOVERY

PARAMETER	SPIKE ADDED ug/L	LCS % REC.	LCSD % REC.	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
CHLOROMETHANE	20	96	96	1	13	50-133
VINYL CHLORIDE	20	96	94	1	14	60-126
BROMOMETHANE	20	105	108	2	16	59-117
CHLOROETHANE	20	96	96	1	17	65-128
TRICHLOROFLUOROMETHANE	20	98	98	1	22	66-133
1,1-DICHLOROETHENE	20	98	97	1	17	78-128
METHYLENE CHLORIDE	20	86	86	1	12	70-128
trans-1,2-DICHLOROETHENE	20	98	97	1	13	77-123
1,1-DICHLOROETHANE	20	98	95	4	12	77-[illegible]
cis-1,2-DICHLOROETHENE	20	98	96	2	15	75-[illegible]
CHLOROFORM	20	96	96	1	13	71-123
1,1,1-TRICHLOROETHANE	20	98	94	3	13	77-125
CARBON TETRACHLORIDE	20	96	93	4	16	76-124
1,2-DICHLOROETHANE	20	100	100	1	13	75-127
TRICHLOROETHENE	20	94	92	2	13	76-124
1,2-DICHLOROPROPANE	20	104	100	4	12	75-121
BROMODICHLOROMETHANE	20	94	94	1	13	75-121
2-CHLOROETHYL VINYL ETHER	20	104	116	10	35	71-131
cis-1,3-DICHLOROPROPENE	20	102	100	3	15	77-124
trans-1,3-DICHLOROPROPENE	20	108	106	2	15	75-123
1,1,2-TRICHLOROETHANE	20	94	94	1	16	78-127
TETRACHLOROETHENE	20	88	86	2	11	80-121
DIBROMOCHLOROMETHANE	20	106	106	0	15	73-123
1,2-DIBROMOETHANE	20	112	110	1	15	75-125
CHLOROBENZENE	20	96	94	2	13	80-124
BROMOFORM	20	98	95	3	15	70-123
1,1,2,2-TETRACHLOROETHANE	20	95	93	2	16	71-129
1,3-DICHLOROBENZENE	20	90	89	2	14	78-123
1,4-DICHLOROBENZENE	20	89	87	2	17	79-123
1,2-DICHLOROBENZENE	20	88	86	2	14	78-125

* = VALUE OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/13/01	DATA FILE:	X7041.D
SAMPLE ID:	LCS	SAMPLE MATRIX:	WATER
SWOK ID:	LCS (8-032-5)	METHOD REFERENCE:	8021
DATE RECEIVED:		PROJECT:	
DATE ANALYZED:	03/13/01	DILUTION:	1
BLANK ID:	X010313A		

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	1	19	
VINYL CHLORIDE	1	19	
BROMOMETHANE	1	21	
CHLOROETHANE	1	19	
TRICHLOROFLUOROMETHANE	1	20	
1,1-DICHLOROETHENE	1	20	
METHYLENE CHLORIDE	1	17	
trans-1,2-DICHLOROETHENE	1	20	
1,1-DICHLOROETHANE	1	20	
cis-1,2-DICHLOROETHENE	1	20	
CHLOROFORM	1	19	
1,1,1-TRICHLOROETHANE	1	20	
CARBON TETRACHLORIDE	1	19	
1,2-DICHLOROETHANE	1	20	
TRICHLOROETHENE	1	19	
1,2-DICHLOROPROPANE	1	21	
BROMODICHLOROMETHANE	1	19	
2-CHLOROETHYL VINYL ETHER	1	21	
cis-1,3-DICHLOROPROPENE	1	20	
trans-1,3-DICHLOROPROPENE	1	22	
1,1,2-TRICHLOROETHANE	1	19	
TETRACHLOROETHENE	1	18	
DIBROMOCHLOROMETHANE	1	21	
1,2-DIBROMOETHANE	1	22	
CHLOROBENZENE	1	19	
BROMOFORM	1	20	
1,1,2,2-TETRACHLOROETHANE	1	19	
1,3-DICHLOROBENZENE	1	18	
1,4-DICHLOROBENZENE	1	18	
1,2-DICHLOROBENZENE	1	18	

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/13/01	DATA FILE:	X7041.D
SAMPLE ID:	LCS	SAMPLE MATRIX:	WATER
SWOK ID:	LCS (8-032-5)	METHOD REFERENCE:	8021
DATE RECEIVED:		PROJECT:	
DATE ANALYZED:	03/13/01	DILUTION:	1
BLANK ID:	X010313A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	95%
2-BROMOCHLOROBENZENE	(71-123)	94%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/13/01 DATA FILE: X7042.D

SAMPLE ID: LCSD SAMPLE MATRIX: WATER
SWOK ID: LCSD (8-032-5) METHOD REFERENCE: 8021
DATE RECEIVED: PROJECT:
DATE ANALYZED: 03/13/01 DILUTION: 1
BLANK ID: X010313A

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	1	19	
VINYL CHLORIDE	1	19	
BROMOMETHANE	1	22	
CHLOROETHANE	1	19	
TRICHLOROFLUOROMETHANE	1	20	
1,1-DICHLOROETHENE	1	19	
METHYLENE CHLORIDE	1	17	
trans-1,2-DICHLOROETHENE	1	19	
1,1-DICHLOROETHANE	1	19	
cis-1,2-DICHLOROETHENE	1	19	
CHLOROFORM	1	19	
1,1,1-TRICHLOROETHANE	1	19	
CARBON TETRACHLORIDE	1	19	
1,2-DICHLOROETHANE	1	20	
TRICHLOROETHENE	1	18	
1,2-DICHLOROPROPANE	1	20	
BROMODICHLOROMETHANE	1	19	
2-CHLOROETHYL VINYL ETHER	1	23	
cis-1,3-DICHLOROPROPENE	1	20	
trans-1,3-DICHLOROPROPENE	1	21	
1,1,2-TRICHLOROETHANE	1	19	
TETRACHLOROETHENE	1	17	
DIBROMOCHLOROMETHANE	1	21	
1,2-DIBROMOETHANE	1	22	
CHLOROBENZENE	1	19	
BROMOFORM	1	19	
1,1,2,2-TETRACHLOROETHANE	1	19	
1,3-DICHLOROBENZENE	1	18	
1,4-DICHLOROBENZENE	1	17	
1,2-DICHLOROBENZENE	1	17	

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/13/01	DATA FILE:	X7042.D
SAMPLE ID:	LCSD	SAMPLE MATRIX:	WATER
SWOK ID:	LCSD (8-032-5)	METHOD REFERENCE:	8021
DATE RECEIVED:		PROJECT:	
DATE ANALYZED:	03/13/01	DILUTION:	1
BLANK ID:	X010313A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	97%
2-BROMOCHLOROBENZENE	(71-123)	94%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/14/01 DATA FILE: X7058.D

SAMPLE ID: X010314A SAMPLE MATRIX: WATER
SWOK ID: X010314A METHOD REFERENCE: 8021
DATE RECEIVED: PROJECT:
DATE ANALYZED: 03/14/01 DILUTION: 1

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	1	1	U
VINYL CHLORIDE	1	1	U
BROMOMETHANE	1	1	U
CHLOROETHANE	1	1	U
TRICHLOROFLUOROMETHANE	1	1	U
1,1-DICHLOROETHENE	1	1	U
METHYLENE CHLORIDE	1	1	U
trans-1,2-DICHLOROETHENE	1	1	U
1,1-DICHLOROETHANE	1	1	U
CHLOROFORM	1	1	U
1,1,1-TRICHLOROETHANE	1	1	U
CARBON TETRACHLORIDE	1	1	U
1,2-DICHLOROETHANE	1	1	U
TRICHLOROETHENE	1	1	U
1,2-DICHLOROPROPANE	1	1	U
BROMODICHLOROMETHANE	1	1	U
2-CHLOROETHYL VINYL ETHER	1	1	U
cis-1,3-DICHLOROPROPENE	1	1	U
trans-1,3-DICHLOROPROPENE	1	1	U
1,1,2-TRICHLOROETHANE	1	1	U
TETRACHLOROETHENE	1	1	U
DIBROMOCHLOROMETHANE	1	1	U
CHLOROBENZENE	1	1	U
BROMOFORM	1	1	U
1,1,2,2-TETRACHLOROETHANE	1	1	U
1,3-DICHLOROBENZENE	1	1	U
1,4-DICHLOROBENZENE	1	1	U
1,2-DICHLOROBENZENE	1	1	U

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/14/01	DATA FILE:	X7058.D
SAMPLE ID:	X010314A	SAMPLE MATRIX:	WATER
SWOK ID:	X010314A	METHOD REFERENCE:	8021
DATE RECEIVED:		PROJECT:	
DATE ANALYZED:	03/14/01	DILUTION:	1

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	86%
2-BROMOCHLOROBENZENE	(71-123)	90%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/14/01

LCS FILE ID: X7061.D
SAMPLE MATRIX: WATER
DATE ANALYZED: 03/14/01

METHOD REFERENCE: 8021
PROJECT:

LABORATORY CONTROL SPIKE RECOVERY

PARAMETER	SPIKE ADDED ug/L	LCS % REC.	RECOVERY LIMITS
CHLOROMETHANE	20	111	50-133
VINYL CHLORIDE	20	94	60-126
BROMOMETHANE	20	77	59-117
CHLOROETHANE	20	96	65-128
TRICHLOROFLUOROMETHANE	20	95	66-133
1,1-DICHLOROETHENE	20	92	78-128
METHYLENE CHLORIDE	20	80	70-128
trans-1,2-DICHLOROETHENE	20	90	77-123
1,1-DICHLOROETHANE	20	90	77-125
CHLOROFORM	20	88	71-123
1,1,1-TRICHLOROETHANE	20	90	77-125
CARBON TETRACHLORIDE	20	89	76-124
1,2-DICHLOROETHANE	20	90	75-127
TRICHLOROETHENE	20	86	76-124
1,2-DICHLOROPROPANE	20	94	75-121
BROMODICHLOROMETHANE	20	104	75-121
2-CHLOROETHYL VINYL ETHER	20	84	71-131
cis-1,3-DICHLOROPROPENE	20	98	77-124
trans-1,3-DICHLOROPROPENE	20	97	75-123
1,1,2-TRICHLOROETHANE	20	80	78-127
TETRACHLOROETHENE	20	86	80-121
DIBROMOCHLOROMETHANE	20	93	73-123
CHLOROBENZENE	20	88	80-124
BROMOFORM	20	81	70-123
1,1,2,2-TETRACHLOROETHANE	20	82	71-129
1,3-DICHLOROBENZENE	20	84	78-123
1,4-DICHLOROBENZENE	20	86	79-123
1,2-DICHLOROBENZENE	20	84	78-125

* = VALUE OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/14/01 DATA FILE: X7061.D

SAMPLE ID: LCS 2 SAMPLE MATRIX: WATER
SWOK ID: LCS (8-032-5) METHOD REFERENCE: 8021
DATE RECEIVED: PROJECT:
DATE ANALYZED: 03/14/01 DILUTION: 1
BLANK ID: X010314A

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	1	22	
VINYL CHLORIDE	1	19	
BROMOMETHANE	1	15	
CHLOROETHANE	1	19	
TRICHLOROFLUOROMETHANE	1	19	
1,1-DICHLOROETHENE	1	18	
METHYLENE CHLORIDE	1	16	
trans-1,2-DICHLOROETHENE	1	18	
1,1-DICHLOROETHANE	1	18	
CHLOROFORM	1	18	
1,1,1-TRICHLOROETHANE	1	18	
CARBON TETRACHLORIDE	1	18	
1,2-DICHLOROETHANE	1	18	
TRICHLOROETHENE	1	17	
1,2-DICHLOROPROPANE	1	19	
BROMODICHLOROMETHANE	1	21	
2-CHLOROETHYL VINYL ETHER	1	17	
cis-1,3-DICHLOROPROPENE	1	20	
trans-1,3-DICHLOROPROPENE	1	19	
1,1,2-TRICHLOROETHANE	1	16	
TETRACHLOROETHENE	1	17	
DIBROMOCHLOROMETHANE	1	19	
CHLOROBENZENE	1	18	
BROMOFORM	1	16	
1,1,2,2-TETRACHLOROETHANE	1	16	
1,3-DICHLOROBENZENE	1	17	
1,4-DICHLOROBENZENE	1	17	
1,2-DICHLOROBENZENE	1	17	

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/14/01	DATA FILE:	X7061.D
SAMPLE ID:	LCS	SAMPLE MATRIX:	WATER
SWOK ID:	LCS (8-032-5)	METHOD REFERENCE:	8021
DATE RECEIVED:		PROJECT:	
DATE ANALYZED:	03/14/01	DILUTION:	1
BLANK ID:	X010314A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	89%
2-BROMOCHLOROBENZENE	(71-123)	85%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE: 03/15/01

CLIENT SAMPLE ID: GWM-19 GW
MS FILE ID: X7063.D
SAMPLE MATRIX: WATER
DATE ANALYZED: 03/14/01

LAB SAMPLE ID: 45949.01
MSD FILE ID: X7064.D
METHOD REFERENCE: 8021
PROJECT: PKI/26682

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

PARAMETER	SPIKE ADDED ug/L	SAMPLE CONC. ug/L	MS % REC.	MSD % REC.	RPD	QC LIMITS RPD	QC LIMITS RECOVER
CHLOROMETHANE	20	0	92	93	1	16	31-14
VINYL CHLORIDE	20	0	90	90	0	22	51-13
BROMOMETHANE	20	0	95	93	2	20	52-12
CHLOROETHANE	20	0	91	84	8	20	49-14
TRICHLOROFLUOROMETHANE	20	0	92	89	3	23	56-13
1,1-DICHLOROETHENE	20	0	87	88	1	14	74-13
METHYLENE CHLORIDE	20	0	77	80	4	19	63-13
trans-1,2-DICHLOROETHENE	20	0	91	89	2	15	[illegible] 12
1,1-DICHLOROETHANE	20	0	91	89	2	13	[illegible] 12
CHLOROFORM	20	0	88	90	2	19	75-12
1,1,1-TRICHLOROETHANE	20	0	90	92	3	14	77-12
CARBON TETRACHLORIDE	20	0	86	87	1	22	76-12
1,2-DICHLOROETHANE	20	0	89	93	4	17	77-12
TRICHLOROETHENE	20	8	82	84	1	20	63-14
1,2-DICHLOROPROPANE	20	0	92	96	3	18	79-1[illegible]
BROMODICHLOROMETHANE	20	0	84	87	3	13	77-1[illegible]
2-CHLOROETHYL VINYL ETHER	20	0	133	79	52	182	0-1[illegible]
cis-1,3-DICHLOROPROPENE	20	0	92	94	3	18	77-12
trans-1,3-DICHLOROPROPENE	20	0	94	98	4	20	81-12
1,1,2-TRICHLOROETHANE	20	0	79*	85	7	15	80-12
TETRACHLOROETHENE	20	1	80	83	4	16	73-12
DIBROMOCHLOROMETHANE	20	0	88	93	6	15	78-1[illegible]
CHLOROBENZENE	20	0	85	87	2	20	82-1[illegible]
BROMOFORM	20	0	78	82	6	16	74-1[illegible]
1,1,2,2-TETRACHLOROETHANE	20	0	81	87	7	24	51-1[illegible]
1,3-DICHLOROBENZENE	20	0	83	86	3	19	82-1[illegible]
1,4-DICHLOROBENZENE	20	0	83	89	7	19	78-1[illegible]
1,2-DICHLOROBENZENE	20	0	81*	85	4	16	83-1[illegible]

* = VALUE OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/15/01	DATA FILE:	X7063.D
SAMPLE ID:	GWM-19 GWMS	SAMPLE MATRIX:	WATER
SWOK ID:	45949.01MS	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	PKI/26682
DATE ANALYZED:	03/14/01	DILUTION:	500
BLANK ID:	X010314A		

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	500	9200	
VINYL CHLORIDE	500	9000	
BROMOMETHANE	500	9500	
CHLOROETHANE	500	9100	
TRICHLOROFLUOROMETHANE	500	9200	
1,1-DICHLOROETHENE	500	8700	
METHYLENE CHLORIDE	500	7700	
trans-1,2-DICHLOROETHENE	500	9100	
1,1-DICHLOROETHANE	500	9100	
CHLOROFORM	500	8800	
1,1,1-TRICHLOROETHANE	500	9000	
CARBON TETRACHLORIDE	500	8600	
1,2-DICHLOROETHANE	500	8900	
TRICHLOROETHENE	500	12000	
1,2-DICHLOROPROPANE	500	9200	
BROMODICHLOROMETHANE	500	8400	
2-CHLOROETHYL VINYL ETHER	500	13000	
cis-1,3-DICHLOROPROPENE	500	9200	
trans-1,3-DICHLOROPROPENE	500	9400	
1,1,2-TRICHLOROETHANE	500	7900	
TETRACHLOROETHENE	500	8200	
DIBROMOCHLOROMETHANE	500	8800	
CHLOROBENZENE	500	8500	
BROMOFORM	500	7800	
1,1,2,2-TETRACHLOROETHANE	500	8100	
1,3-DICHLOROBENZENE	500	8300	
1,4-DICHLOROBENZENE	500	8300	
1,2-DICHLOROBENZENE	500	8100	

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/15/01	DATA FILE:	X7063.D
SAMPLE ID:	GWM-19 GWMS	SAMPLE MATRIX:	WATER
SWOK ID:	45949.01MS	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	PKI/26682
DATE ANALYZED:	03/14/01	DILUTION:	500
BLANK ID:	X010314A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	91%
2-BROMOCHLOROBENZENE	(71-123)	88%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/15/01	DATA FILE:	X7064.D
SAMPLE ID:	GWM-19 GWMSD	SAMPLE MATRIX:	WATER
SWOK ID:	45949.01MSD	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	PKI/26682
DATE ANALYZED:	03/14/01	DILUTION:	500
BLANK ID:	X010314A		

RESULTS REPORTED IN ug/L OR PARTS PER BILLION (PPB)

PARAMETER	QUANTITATION LIMIT	RESULTS	Q
CHLOROMETHANE	500	9300	
VINYL CHLORIDE	500	9000	
BROMOMETHANE	500	9300	
CHLOROETHANE	500	8400	
TRICHLOROFLUOROMETHANE	500	8900	
1,1-DICHLOROETHENE	500	8800	
METHYLENE CHLORIDE	500	8000	
trans-1,2-DICHLOROETHENE	500	8900	
1,1-DICHLOROETHANE	500	8900	
CHLOROFORM	500	9000	
1,1,1-TRICHLOROETHANE	500	9200	
CARBON TETRACHLORIDE	500	8700	
1,2-DICHLOROETHANE	500	9300	
TRICHLOROETHENE	500	12000	
1,2-DICHLOROPROPANE	500	9600	
BROMODICHLOROMETHANE	500	8700	
2-CHLOROETHYL VINYL ETHER	500	7900	
cis-1,3-DICHLOROPROPENE	500	9400	
trans-1,3-DICHLOROPROPENE	500	9800	
1,1,2-TRICHLOROETHANE	500	8500	
TETRACHLOROETHENE	500	8600	
DIBROMOCHLOROMETHANE	500	9300	
CHLOROBENZENE	500	8700	
BROMOFORM	500	8200	
1,1,2,2-TETRACHLOROETHANE	500	8700	
1,3-DICHLOROBENZENE	500	8600	
1,4-DICHLOROBENZENE	500	8900	
1,2-DICHLOROBENZENE	500	8500	

SOUTHWEST LABORATORY OF OKLAHOMA
GAS CHROMATOGRAPHY LABORATORY

REPORT DATE:	03/15/01	DATA FILE:	X7064.D
SAMPLE ID:	GWM-19 GWMSD	SAMPLE MATRIX:	WATER
SWOK ID:	45949.01MSD	METHOD REFERENCE:	8021
DATE RECEIVED:	03/03/01	PROJECT:	PKI/26682
DATE ANALYZED:	03/14/01	DILUTION:	500
BLANK ID:	X010314A		

QA/QC SURROGATE RECOVERIES

2-BROMO-1-CHLOROPROPANE	(72-119)	93%
2-BROMOCHLOROBENZENE	(71-123)	87%

U = NOT DETECTED
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS, FAILED TWICE