10/12/12

CZ-087-70607
8.1

FINAL

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99
Revised 11/8/00

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: Former Van Waters & Rogers Facility (UNIVAR USA Inc.)
Facility Address: 2041 Mosley Avenue, Wichita, Kansas
Facility EPA ID #: KSD000809715

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), **been considered** in this EI determination?

   X If yes - check here and continue with #2 below.

   ____ If no - re-evaluate existing data, or

   ____ if data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e.,

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RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria [e.g., Maximum Contaminant Levels (MCLs), the maximum permissible level of a contaminant in water delivered to any user of a public water system under the Safe Drinking Water Act]) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

   X If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

   _____ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

   _____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): Administrative file (EPA/KDHE, et. al.) references used in this EI determination include: **1)** April 2012 Groundwater Sampling Data Submittal (former Van Waters & Rogers Inc.) Mosley Avenue, North Industrial Corridor, Wichita, Kansas, May 14, 2012; **2)** 2009 Technical Memorandum UNIVAR USA Inc., (Formerly Van Waters and Rogers, Inc.) Mosley Avenue, North Industrial Corridor, Wichita, Kansas, July 2009; **3)** Technical Memorandum and Data Report (Revision 1), UNIVAR USA Inc., Facility, April 2006; **4)** Remedial Investigation Report (Revision 2), UNIVAR USA, Inc., August 2005; **5)** Technical Memorandum and Data Report, December 2004 Groundwater Sampling, UNIVAR USA Inc., Facility, February 2005; **6)** Revised Remedial Investigation Report, UNIVAR USA Inc., March 31, 2005; **7)** Draft Remedial Investigation Report, Van Waters & Rogers Inc., Mosley Avenue Facility, Wichita, Kansas, March 29, 1999; and, **8)** Attached charts and figures.

These reports show that the site has gone through various environmental investigation phases, collecting soil (near and subsurface) and several rounds of groundwater samples. These investigations include three iterations of the Remedial Investigation (RI) and various Technical Memoranda. TCE values historically have been above the Maximum Contaminate Level (MCL). Contaminants detected in groundwater include: 1,1-Dichloroethane (1,1-DCA), 1,1-Dichloroethene (1,1-DCE), Cis-1,2-Dichloroethene (Cis-1,2-DCE), Tetrachloroethylene (PCE), Trichloroethene (TCE), and Vinyl chloride. In the most recent ground water sampling event (April 24-25, 2012) the only parameters detected above MCLs were TCE (MCL = 5.0 ug/L), ranging from a low of 1.9 micrograms per liter (ug/L) (below MCL) to a high of 25.4 ug/L, and vinyl chloride (MCL = 2ug/L) ranging from a low of 1.1 ug/L (below MCL) to a high of 6.3 ug/L. The 6.3 ug/L of vinyl chloride was in monitoring well MW-2S which is located on the upgradient property boundary. No other parameters were detected in the most recent groundwater sampling data above MCLs. Depth to water is approximately 13 feet below ground surface or an average elevation of 1296.32 feet above mean sea level.

Footnotes:

[1]"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

   _X_ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

   ____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

   ____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): Administrative file (EPA/KDHE, et. al.) references used in this EI determination include: 1) April 2012 Groundwater Sampling Data Submittal (former Van Waters & Rogers Inc.) Mosley Avenue, North Industrial Corridor, Wichita, Kansas, May 14, 2012; 2) 2009 Technical Memorandum UNIVAR USA Inc., (Formerly Van Waters and Rogers, Inc.) Mosley Avenue, North Industrial Corridor, Wichita, Kansas, July 2009; 3) Technical Memorandum and Data Report (Revision 1), UNIVAR USA Inc., Facility, April 2006; 4) Remedial Investigation Report (Revision 2), UNIVAR USA, Inc., August 2005; 5) Technical Memorandum and Data Report, December 2004 Groundwater Sampling, UNIVAR USA Inc., Facility, February 2005; 6) Revised Remedial Investigation Report, UNIVAR USA Inc., March 31, 2005; 7) Draft Remedial Investigation Report, Van Waters & Rogers Inc., Mosley Avenue Facility, Wichita, Kansas, March 29, 1999; and, 8) Attached charts and figures.

The assessment of whether or not groundwater contaminant migration is under control is impacted by the overall location context of the site. The site is located in the Northern Industrial Corridor (NIC) Wichita, Kansas, and as such, there are numerous undifferentiated contaminated groundwater plumes coursing in, around and/or through the Former Van Waters and Rogers facility. Contaminants detected onsite in groundwater historically include: 1,1-DCA (high of 10 ug/L, MCL of 5ug/L), 1,1-DCE (high of 55 ug/L, MCL of 7 ug/L), Cis-1,2-DCE (high of 190 ug/L, MCL of 70 ug/L), Tetrachloroethylene (high of 11 ug/L, MCL of 5 ug/L), Trichloroethene (high of 760 ug/L, MCL of 5 ug/L), and Vinyl chloride (high of 96 ug/L, MCL of 2 ug/L). In the most recent ground water sampling event (April 24-25, 2012) onsite the only parameters detected above MCLs were TCE, ranging from a low of 1.9 ug/L (below MCL) to a high of 25.4 ug/L, and vinyl chloride ranging from a low of 1.1 ug/L (below MCL) to a high of 6.3 ug/L. The 6.3 ug/L of vinyl chloride was in monitoring well MW-2S which is located on the upgradient property boundary. No other parameters were detected in the most recent groundwater sampling data above MCLs at the facility. Contaminant levels coming onto the site are too high to show where site derived contamination ends. With the reduced level of contaminants across the site, EPA and KDHE believe that the migration of contaminated groundwater from the Facility has stabilized. The overall drop in contaminant levels onsite is being used to assess migration due to the fact surrounding properties have their own impacts. Offsite upgradient monitoring well data is included in the attachments.

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

_____ If yes - continue after identifying potentially affected surface water bodies.

__X__ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): It is unlikely that site-derived contaminants are discharging to surface water bodies (for example, streams, creeks, ponds, etc.) due to the absence of such water bodies in close downgradient proximity to the site. Contaminants detected in groundwater include: 1,1-DCA, 1,1-DCE, Cis-1,2-DCE, Tetrachloroethylene, Trichloroethene, and Vinyl chloride. Administrative file (EPA/KDHE, et. al.) references used in this EI determination include: **1)** April 2012 Groundwater Sampling Data Submittal (former Van Waters & Rogers Inc.) Mosley Avenue, North Industrial Corridor, Wichita, Kansas, May 14, 2012; **2)** 2009 Technical Memorandum UNIVAR USA Inc., (Formerly Van Waters and Rogers, Inc.) Mosley Avenue, North Industrial Corridor, Wichita, Kansas, July 2009; **3)** Technical Memorandum and Data Report (Revision 1), UNIVAR USA Inc., Facility, April 2006; **4)** Remedial Investigation Report (Revision 2), UNIVAR USA, Inc., August 2005; **5)** Technical Memorandum and Data Report, December 2004 Groundwater Sampling, UNIVAR USA Inc., Facility, February 2005; **6)** Revised Remedial Investigation Report, UNIVAR USA Inc., March 31, 2005; **7)** Draft Remedial Investigation Report, Van Waters & Rogers Inc., Mosley Avenue Facility, Wichita, Kansas, March 29, 1999; and, **8)** Attached charts and figures.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

   NA If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

   NA If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

   NA If unknown - enter "IN" status code in #8.

Rationale and Reference(s):_____

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

NA If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

NA If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

NA If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):_____

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

   _X_ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

   ____ If no - enter "NO" status code in #8.

   ____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s): Any final solution [very likely including monitored natural attenuation (MNA) with land use controls] for the facility will include routine groundwater monitoring (consistent with State and/or Federal guidance and/or standard operating procedures and/or policy: See Attached KDHE, Bureau of Environmental Remediation Policy, Monitored Natural Attenuation, March 30, 2001.), assessing the effectiveness and protectiveness of the selected remedy. The facility is following the KDHE MNA Policy. The facility will be adhering to the MNA performance monitoring requirements. Selected wells will be designated for monitoring as part of the final remedy selection process.

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

X YES - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the **Former Van Waters & Rogers** facility, EPA ID # **KSD000809715**, located at **2041 Mosley Avenue, Wichita, Kansas**

Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

____ IN - More information is needed to make a determination. **See Question #3.**

Completed by (signature) Amber Whisnant Date 07/05/12
(print) Amber Whisnant
(title) RCRA Project Manager

Supervisor (signature) Jeff Johnson Date 07/05/12
(print) Jeff Johnson
(title) Chief, KNRP Section
EPA Region 7

Completed by (signature) _____ Date _____
(print) _____
(title) _____

Supervisor (signature) _____ Date _____
(print) _____
(title) _____
(EPA Region or State) _____

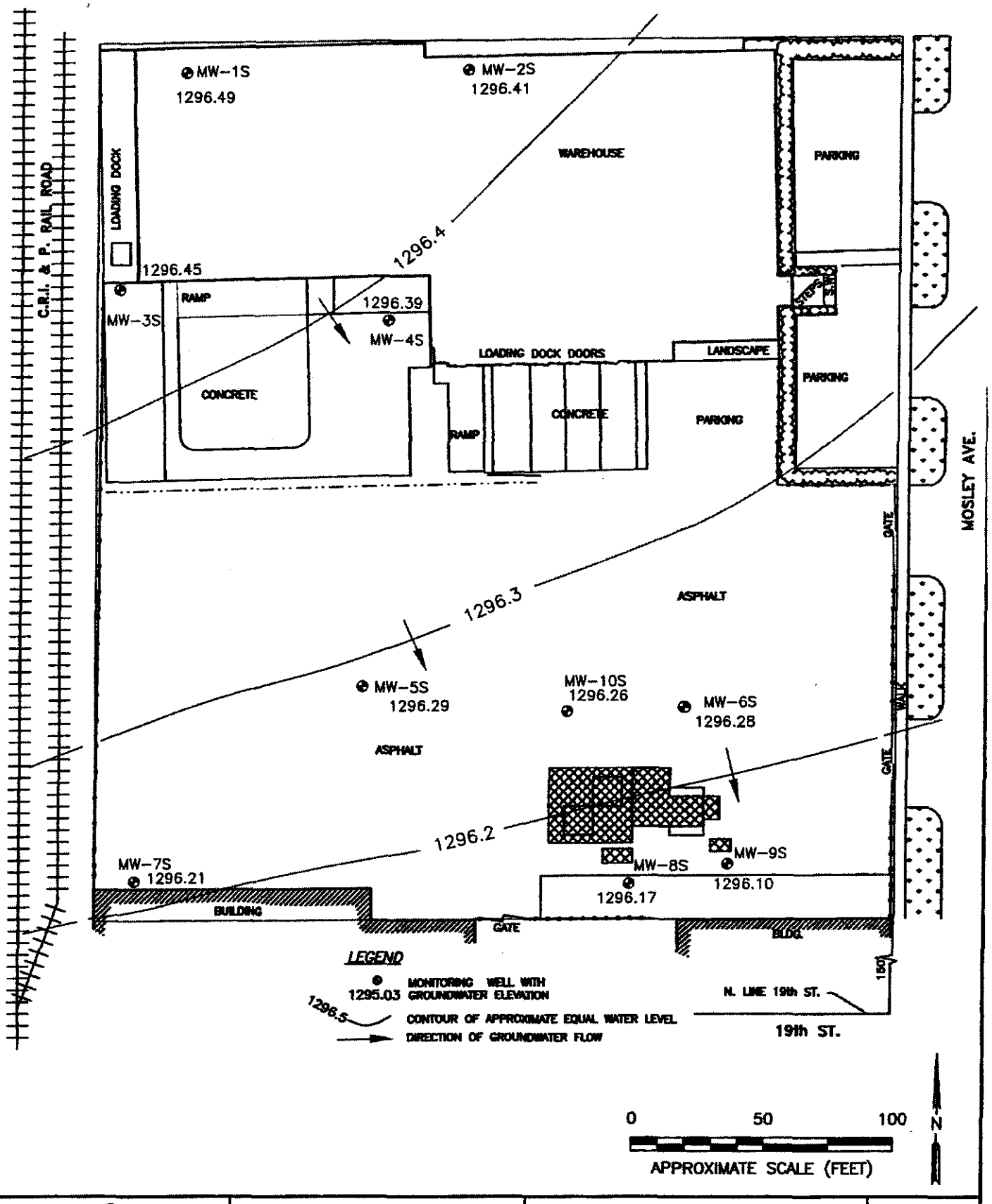
Locations where References may be found:

KDHE and EPA Region 7 Offices

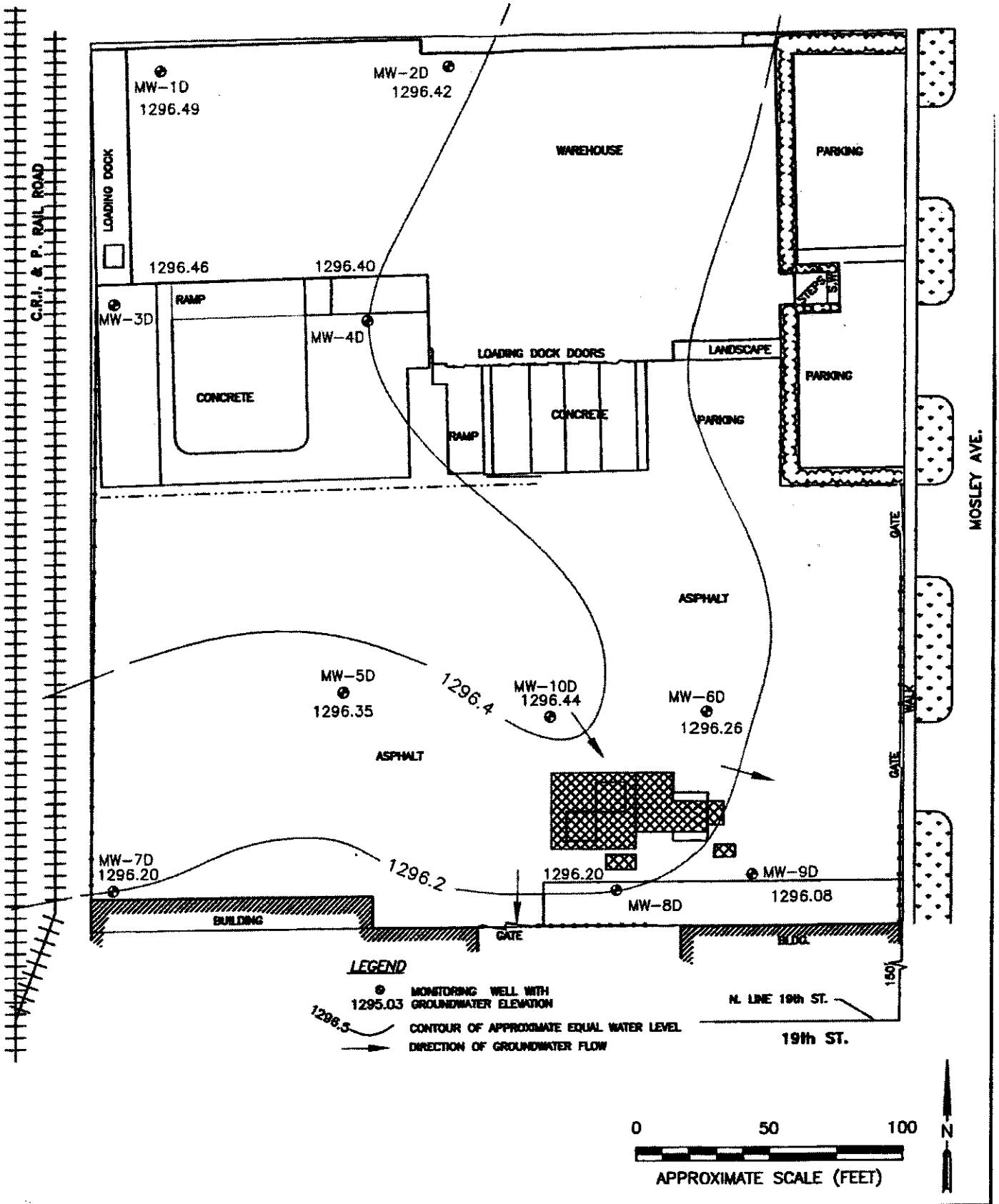
Contact telephone and e-mail numbers

(name) _____
(phone #) _____
(e-mail) _____

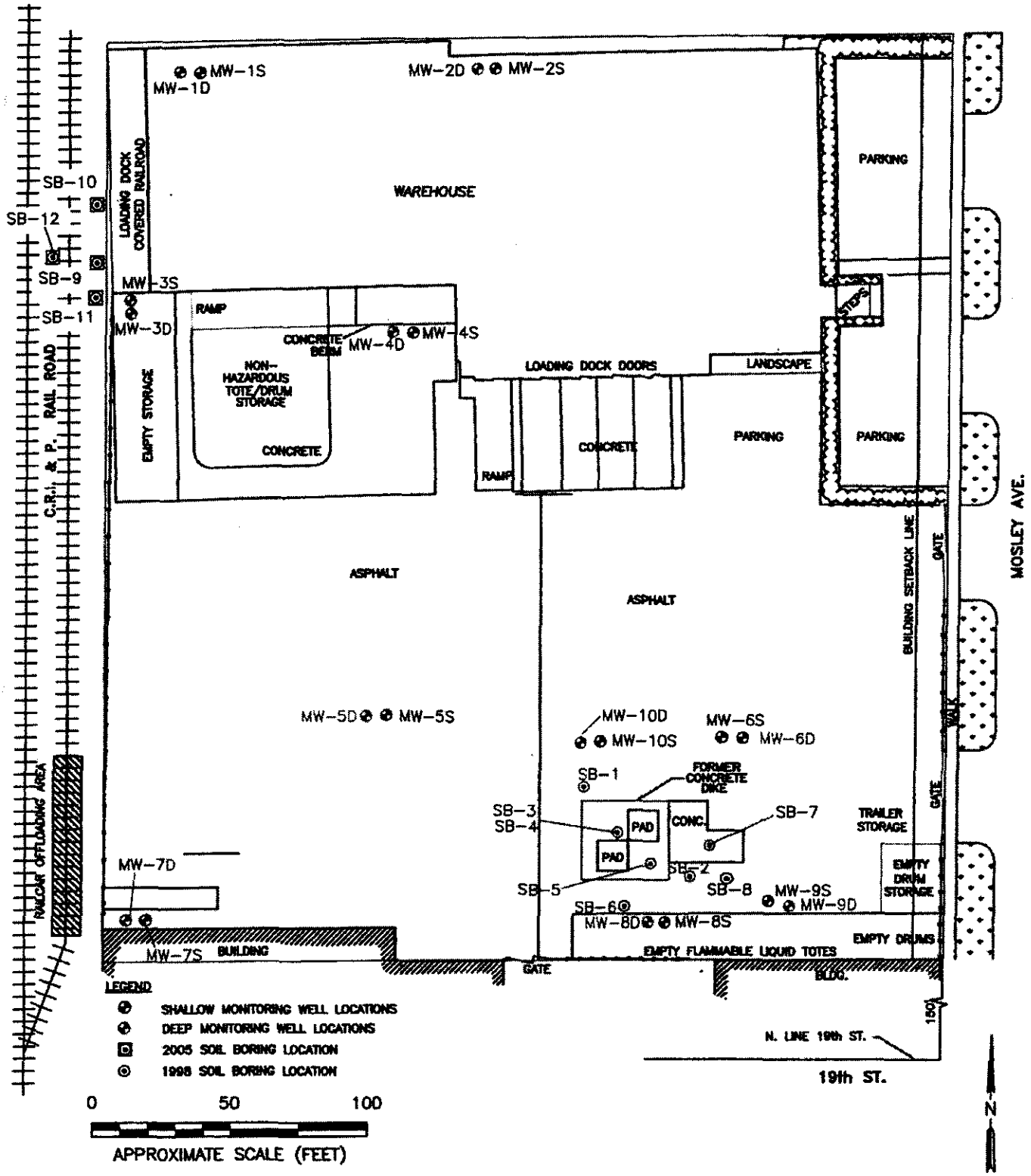
ATTACHMENTS



UNIVAR	UNIVAR USA INC. MOSLEY AVENUE WICHITA, KANSAS	POTENTIOMETRIC SURFACE SHALLOW WELLS APRIL 24, 2012	FIGURE: 1
		APPROVED BY: AJP	DATE: 5-4-12



UNIVAR	UNIVAR USA INC. MOSLEY AVENUE WICHITA, KANSAS	POTENTIOMETRIC SURFACE DEEP WELLS APRIL 24, 2012	FIGURE: 2
		APPROVED BY: AJP	DATE: 5-7-12



UNIVAR USA INC.
WICHITA KANSAS

FACILITY LAYOUT MAP

CHECKED T.SULLIVAN	DATE 9-29-10
FILENAME: Univar Basemap 5-09	FIGURE 1

FIGURE 6
Deep Average Groundwater Data - TCE
(1997-2001-2004-Recent)

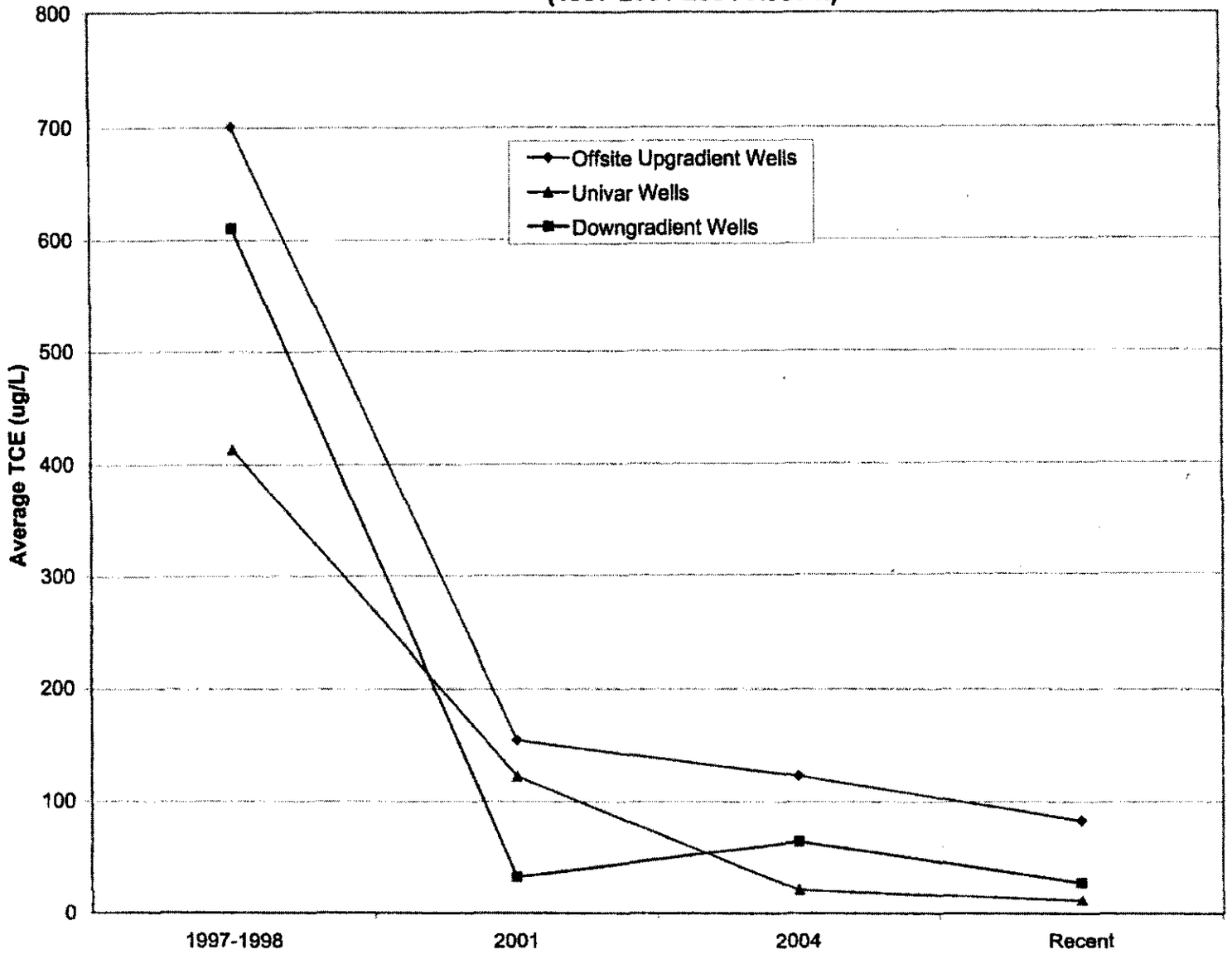


FIGURE 5
Deep Average Groundwater Data - Combined VOCs
(1997-2001-2004-Recent)

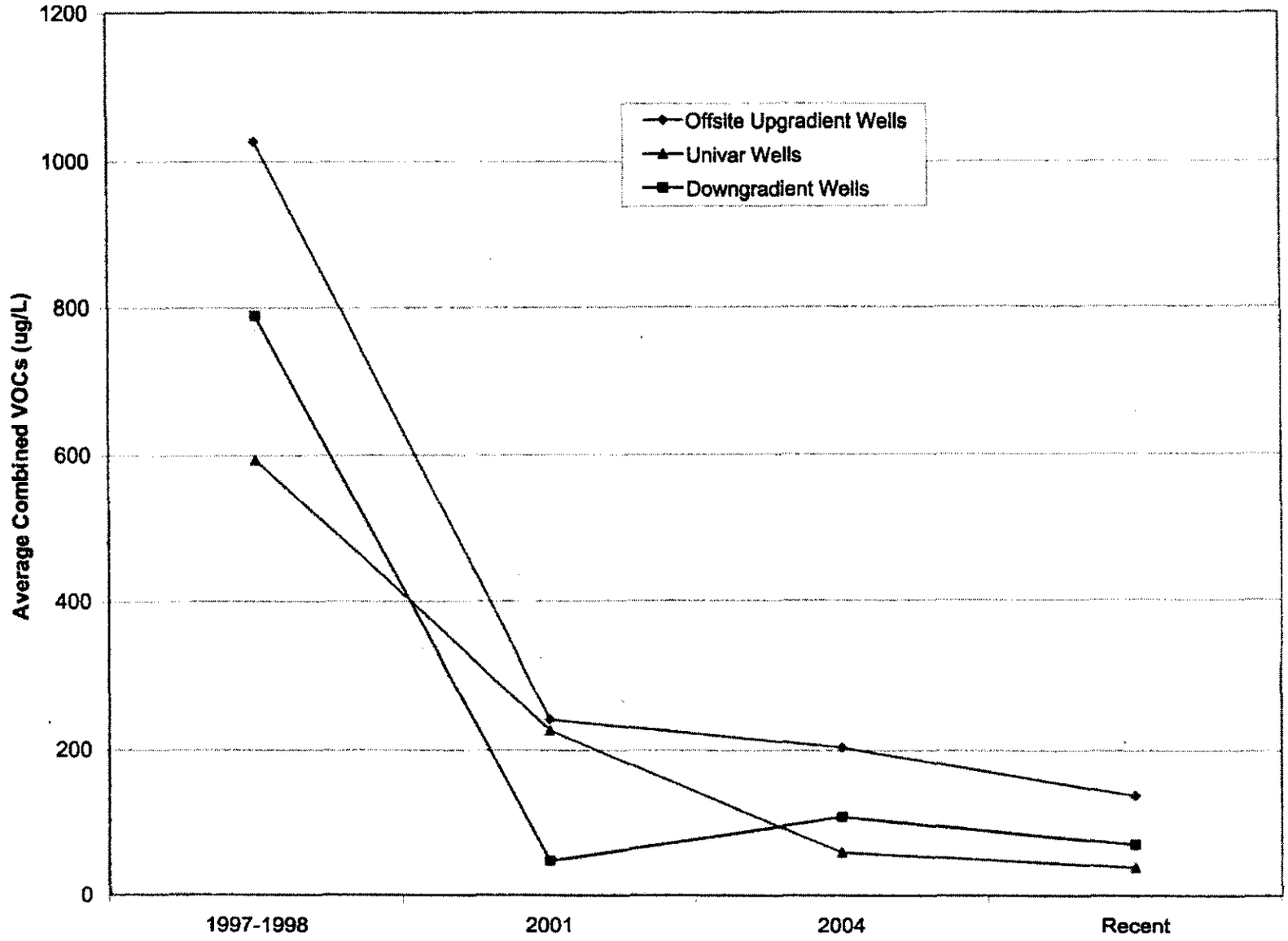
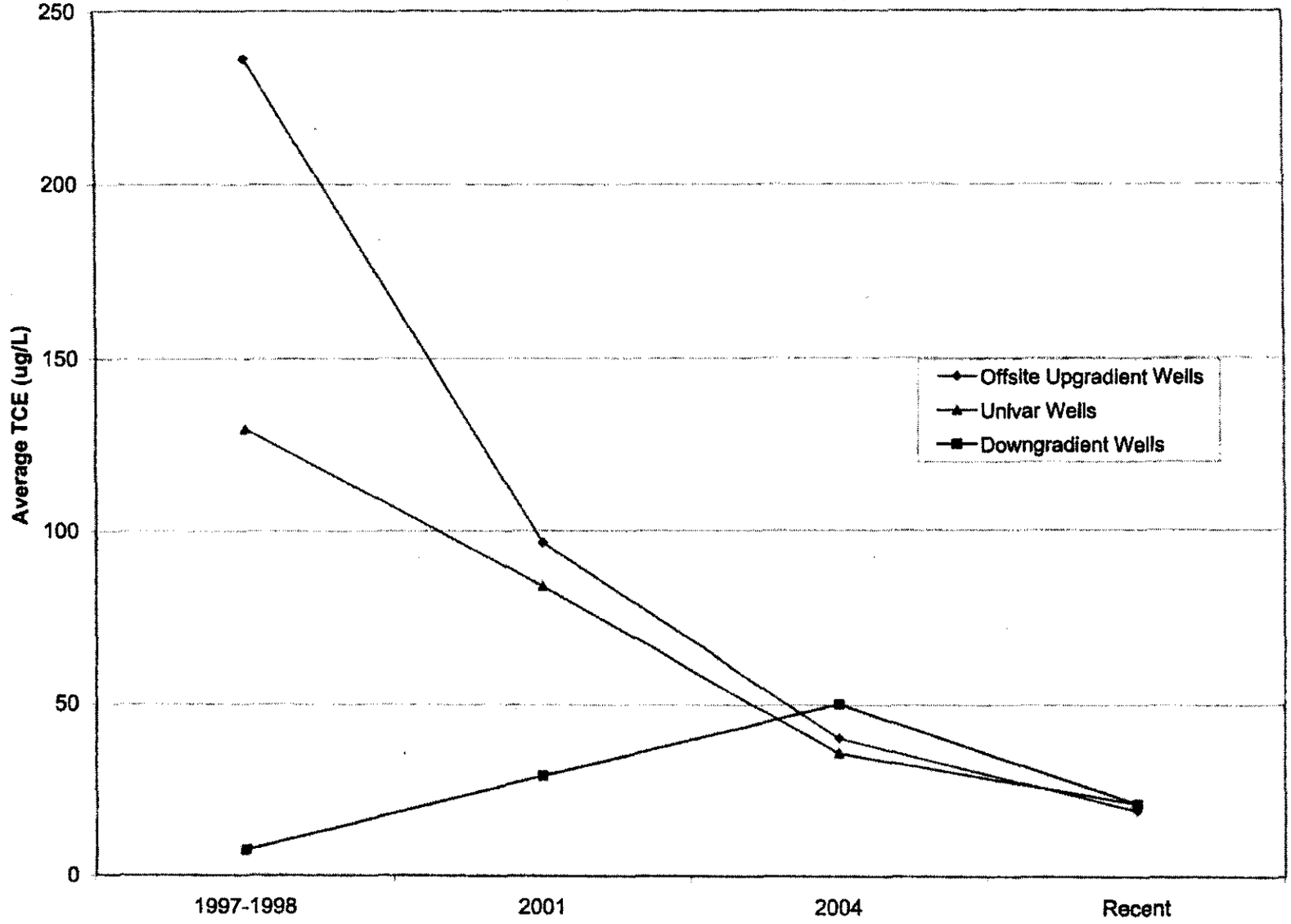
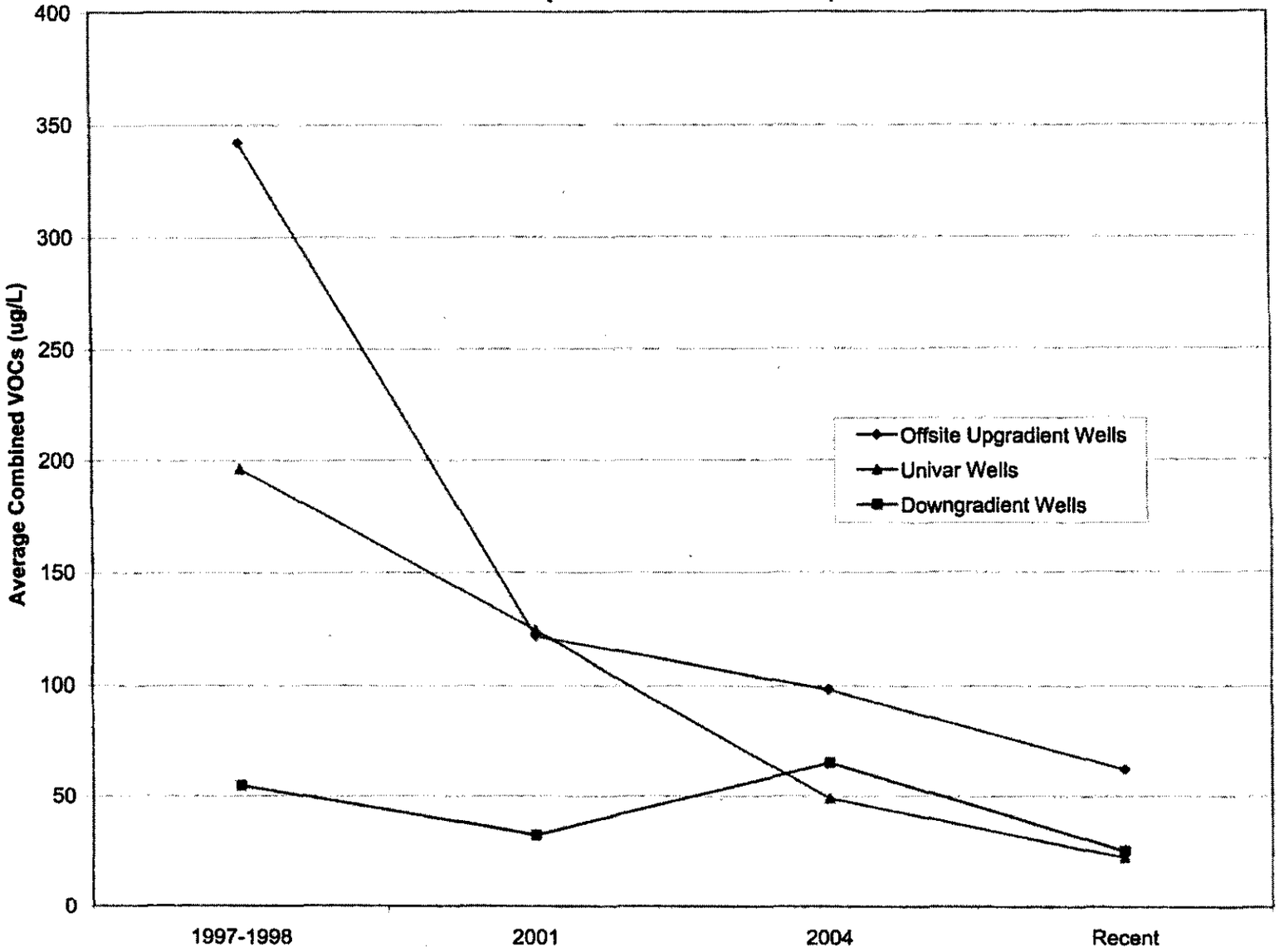


FIGURE 4
Shallow Average Groundwater Data - TCE
(1997-2001-2004-Recent)



Univar USA Inc., Wichita, KS

FIGURE 3
Shallow Average Groundwater Data - Combined VOCs
(1997-2001-2004-Recent)



Univar USA Inc., Wichita, KS

TABLE 3
NIC Groundwater VOC Data Near Univar,
Univar USA Inc., Wichita, KS

2004 NIC Data Near Univar

		Shallow		Deep	
		Combined[1]	TCE	Combined[1]	TCE
Offsite Upgradient Locations	NMW-40	122	73	197	110
	NMW-6	ND	ND	87	26
	WND-21	74	7	323	230
	Average:	98	40	202	122
Univar Onsite Locations	MW-1	4.4	3.2	82	28
	MW-2	1.8	ND	77	28
	MW-3	54	52	NA	NA
	MW-4	11.7	5.7	25	25
	MW-5	66	47	42	29
	MW-6	40	14	NA	NA
	MW-7	8.8	5.1	70	13
	MW-8	108.4	83	67	27
	MW-9	68.3	62	91	9.3
	MW-10	32.7	17	NA	NA
	Average:	49	36	59	21
Offsite Downgradient Locations	WND-39	65	50	108	64
	Average:	65	50	108	64
Offsite Sidegradient Locations	NMW-08	119	62	157	91
	NMW-39	128	6	210	110
	Average:	124	34	184	101

Recent NIC Data Near Univar (12/07 to 4/09)

		Shallow		Deep	
		Combined[1]	TCE	Combined[1]	TCE
Offsite Upgradient Locations	NMW-40	60	27	124	70
	NMW-6	ND	ND	98.3	38.5
	WND-21	64	11	187	139
	Average:	62	19	136	83
Univar Onsite Locations	MW-1	17.3	2.2	36.8	7
	MW-2	15	3.2	42.1	9.1
	MW-3	9	9	37.9	11.4
	MW-4	16.9	4.3	39.6	10.4
	MW-5	24.2	10.8	36.3	11
	MW-6	11.5	6.9	38.4	8.9
	MW-7	21.2	8.3	44.7	16.6
	MW-8	37	25.8	43.3	13.3
	MW-9	34.9	18.7	43	13.5
	MW-10	21.7	11.6	25.6	5.9
	Average:	22	12	39	11
Offsite Downgradient Locations	WND-39	25	21	70	27
	Average:	25	21	70	27
Offsite Sidegradient Locations	NMW-08	142	64	306	202
	NMW-39	97	1	79	37
	Average:	120	33	193	120

1 = Combined TCE, PCE, total 1,2-DCE, and VC
All concentrations in micrograms per liter (ug/L) or parts per billion (ppb)
PCE=tetrachloroethene
TCE=trichloroethene
DCE=dichloroethene
VC=vinyl chloride
NA=not available, not sampled or well not installed at that time

TABLE 3
NIC Groundwater VOC Data Near Univar, Univar USA Inc., Wichita, KS

1997-1998 NIC Data Near Univar

		Shallow		Deep	
		Combined[1]	TCE	Combined[1]	TCE
Offsite Upgradient Locations	GPA 12-8	466.1	350	806	520
	GPA 12-9	159.8	94	1125	790
	GP 35-4	716.7	490	1308	890
	GP 48-7	24	10	867	600
	Average:	342	236	1027	700
Univar Locations	MW-1	304.9	150	806	530
	MW-2	ND	ND	916	660
	MW-3	117.4	110	NA	NA
	MW-4	100	62	653	440
	MW-5	161	31	490	350
	MW-6	120.8	82	NA	NA
	MW-7	122	100	584	420
	MW-8	237	180	620	450
	MW-9	362	270	431	290
	MW-10	237	180	241	160
	Average:	196	129	593	413
Offsite Downgradient Locations	WND-39	54.4	7.4	787.7	610
	Average:	54	7	788	610
Offsite Sidegradient Locations	GP 47-1	57.7	70	761.7	550
	GP 47-2	275	190	919	710
	Average:	166	130	840	630

Note: The offsite upgradient GP locations are one-time geoprobe groundwater sampling locations only used for the applicable dates.

2001 NIC Data Near Univar

		Shallow		Deep	
		Combined[1]	TCE	Combined[1]	TCE
Offsite Upgradient Locations	NMW-40	302	190	228	150
	NMW-6	2.1	ND	153	80
	WND-21	59	2.9	340	230
	Average:	121	96	240	153
Univar Locations	MW-1	75	25	223	94
	MW-2	9.7	ND	178	85
	MW-3	53.2	50	NA	NA
	MW-4	185.2	82	218	110
	MW-5	110	77	285	170
	MW-6	187	120	NA	NA
	MW-7	66	46	157	91
	MW-8	217	130	289	170
	MW-9	211	140	228	130
	MW-10	NA	NA	NA	NA
	Average:	124	84	225	121
Offsite Downgradient Locations	WND-39	32	29	47	32
	Average:	32	29	47	32
Offsite Sidegradient Locations	NMW-08	217	130	385	230
	NMW-39	441	37	511	220
	Average:	329	84	448	225

1 = Combined TCE, PCE, total 1,2-DCE, and VC
All concentrations in micrograms per liter (ug/L) or parts per billion (ppb)
PCE=tetrachloroethene
TCE=trichloroethene
DCE=dichloroethene
VC=vinyl chloride
NA=not available, not sampled or well not installed at that time

BUREAU OF ENVIRONMENTAL REMEDIATION POLICY

MONITORED NATURAL ATTENUATION

BER POLICY # BER-RS-042
DATE: March 30, 2001
Revised 12/18/2005
TOTAL PAGES: 5

Bureau Manager: _____ **Date:** 12/30/05

Remedial Section Chief: _____ **Date:** 12/27/05

ARS Section Chief: _____ **Date:** 1-4-06

Storage Tank Section Chief: _____ **Date:** 1/3/06

REVISIONS

Revisor: C. Carey and D. DeCarlo **Date of Revision: 12/18/2005**

ORIGINATOR

Originator: Rick Bean **Date:** 3/30/2001

BUREAU OF ENVIRONMENTAL REMEDIATION POLICY

MONITORED NATURAL ATTENUATION

BER POLICY # BER-RS-042
DATE: March 30, 2001
Revised 12/18/2005
TOTAL PAGES: 5

The Kansas Department of Health and Environment - Bureau of Environmental Remediation (KDHE-BER) is committed to evaluating and considering proposals for Monitored Natural Attenuation (MNA) of certain contaminants at suitable contaminated sites across Kansas. KDHE-BER remains fully committed to the goal of protecting human health and the environment by: reducing the volume and toxicity of contaminants, hazardous substances, or pollutants through treatment; restoring contaminated ground water to its most beneficial uses preventing the uncontrolled migration of contaminated ground water; preventing the degradation of surface water quality by contaminated ground water; and protecting all other environmental resources in Kansas. MNA is a remedial alternative that may be evaluated and compared with other applicable remedies at a contaminated site. MNA is not a default remedy; KDHE-BER considers MNA to be an alternative means of achieving remediation goals in certain circumstances where all applicable statutory and regulatory requirements are met by MNA and where site-specific conditions are conducive to MNA. KDHE-BER does not allow the further degradation of contaminated media through MNA.

United States Environmental Protection Agency (USEPA) OSWER Directive 9200.4-17P serves as the basis for KDHE-BER's MNA policy and should be referenced. If the contaminant of concern is a chlorinated solvent, the USEPA document "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater" (EPA/600/R-98/128) should also be consulted. BER Policy # BER-RS-042 provides further clarification of additional KDHE-BER requirements to the guidance provided by EPA Directive 9200.4-17P.

The term MNA as used in the EPA Directive and the KDHE-BER policy refers to the reliance on natural attenuation processes to achieve site-specific remediation objectives within the context of a carefully controlled and monitored site cleanup approach and within a time frame that is reasonable compared to other more active methods. The "natural attenuation processes" that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil and/or groundwater. These in-situ processes include: biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants.

All approvals for MNA shall be made on a site-specific basis in accordance with this policy by the KDHE Project Manager, Program Manager, and Section Chief. The Bureau Director may also be consulted in the approval process. Ultimately, the Secretary of KDHE has the authority to require cleanup and determine the manner of that cleanup at contaminated sites in Kansas.

Criteria for Determining When MNA May Be Appropriate: A proposal for MNA must be submitted to KDHE-BER and must evaluate in writing each of the following:

1) Threat to Human Health - The proposal shall document that MNA will not pose an unacceptable risk to human health. All potential current and future targets/exposure receptors must be identified and demonstrated not to be impacted or threatened. MNA will not be approved in situations where public or private drinking water wells have been impacted or are threatened to be impacted above human health-based goals as defined by the Risk-based Standards for Kansas (RSK) Manual. MNA of soil will not be approved when surface soil contaminant concentrations exceed the human health-based goals, as defined by the RSK Manual and amendments thereto, and when access to the site is unrestricted. MNA may not be approved in cases where the persistence of degradation products presents a greater risk than the parent contaminant(s).

2) Degradation of Ground Water - The proposal shall document that MNA will not allow continued degradation of ground water quality. The MNA proposal must demonstrate that the ground water contaminant plume is stable or shrinking and that no additional migration of contamination is occurring. MNA of soils is not appropriate where downward leaching of the contaminants in the soil column may contaminate ground water to levels above the ground water goals for the site. KDHE has calculated soil concentrations that are generally protective of ground water; these soil concentrations are included in the RSK Manual.

3) Degradation of Surface Water - The proposal shall evaluate the potential for degradation of surface water quality via surface runoff or ground water discharge to surface water. MNA is not an acceptable remedial approach for sites where contamination is already impacting or threatening surface water quality.

4) Threat to Other Potential Receptors - The proposal shall determine if there will be an impact to wildlife, vegetation, domestic animals, or farm stock. This should include an evaluation of potential migration to off-site locations through underground trenches, tile lines, storm water and other drainage systems.

5) Time Frame and Cost - The proposal shall provide documentation that MNA will achieve the site cleanup goals, as determined by KDHE-BER, within a reasonable time frame and in a cost-effective manner when compared to other viable corrective action alternatives for the site. The costs of implementing MNA, including long-term monitoring, financial assurance, and a contingency plan, shall be fully evaluated and compared with the costs of other remediation strategies that meet the site cleanup goals in a shorter time frame.

6) Property Control - The proposal must document that the responsible party owns all impacted property or is otherwise able to exert legal control over uses of such property. Plumes that impact other parties' properties shall not be considered for MNA unless each property owner grants permission in writing or there is a local ordinance to prevent human exposure to off-site contaminants including appropriate land use controls.

7) Resource Management – The current and projected demand for the affected resource over the time period that the remedy is in use may influence KDHE's decision to approve MNA at a contaminated site.

Site Characterization To Determine If Site Is Suitable For MNA: The suitability of a site for MNA must be demonstrated on the basis of site-specific physical and chemical properties. Decisions to employ MNA as a remedy or remedy component should be documented thoroughly with site-specific data. The characterization requirements for each site may vary based on site-specific parameters such as contaminant levels, site-specific clean-up goals, and the potential for contaminants to degrade in the site hydrogeological setting. Any deviations from the requirements listed below must be approved by the KDHE-BER Project Manager, Program Manager, and Section Chief and must be documented in writing. Site characterization requirements are:

1) A KDHE-approved investigation report that includes:

a) Identification and characterization of all potential source areas, including identification of all chemicals of concern, mechanisms of release, estimation of the quantities of release, and whether these releases are ongoing or inactive;

b) Delineation and characterization of the full lateral and vertical extent of contamination for each of the impacted environmental media at the site;

c) Characterization of the environmental setting, including regional and local geology, hydrogeology, and hydrology; particularly as those site physical characteristics pertain to contaminant transport and fate mechanisms for the site or affect the evaluation, selection and design of cleanup alternatives for the site;

2) Historical ground water and soil chemistry data that clearly demonstrate a decreasing trend of contaminant mass and/or concentration over time at appropriate monitoring or sampling points must be provided. The site data must demonstrate that further degradation of the aquifer is not occuring. The plume must be demonstrated to be stable or diminishing in vertical and lateral extent. Four consecutive quarterly sampling episodes from the same monitoring wells are required, at a minimum, to begin to make such evaluation.

3) Hydrogeologic and geochemical data must be collected to demonstrate the MNA processes active at the site and the rate at which such processes are reducing contaminant concentrations. Specific parameters including but not limited to those listed below, should be evaluated to demonstrate the efficacy of MNA. "Evaluation" can consist of demonstrating that a specific parameter is not applicable to the site; for instance, hydrogen data may not be necessary at sites where vinyl chloride is not expected to be a daughter product in the degradation pathway, or is being detected at the concentrations expected under the site conditions.

a) dissolved oxygen
b) soil and groundwater pH
c) redox potential
d) temperature
e) alkalinity
f) sulfate
g) sulfide
h) methane

i) ethane/ethene
j) total organic carbon
k) chloride
l) iron
m) nitrogen
n) nitrate
o) nitrite
p) carbon dioxide
q) manganese
r) hydrogen
s) conductivity
t) concentration of the contaminant(s) of concern and daughter products of contaminant decay
u) microorganisms present
v) any others, as appropriate for site-specific conditions and contaminant(s)

KDHE may require that characterization include sampling for contaminants that are not site COCs but could alter the rate of COC degradation if present.

4) Data from microcosm studies.

Monitoring Requirements: A monitoring plan is required for any MNA site. The monitoring plan shall include monitoring procedures, which will confirm that: 1) degradation mechanisms remain active; 2) contaminant mass, volume and area are decreasing over time; and 3) contaminant decreases are due to attenuation and not migration of contaminants. At a minimum, the contaminant concentrations shall be monitored at a frequency approved by the department and based on documented site-specific information to establish that concentrations are decreasing over time. Monitoring will be required until contaminant levels reach site cleanup goals and KDHE-BER approved post-cleanup verification sampling is completed.

Other Requirements:

1) A **Source Control Plan** must be developed, approved by KDHE-BER, and implemented by the voluntary or potentially responsible party to address active source areas or hot spots before or while MNA is being implemented. Hot spots include areas where free product or high concentrations of contaminants are present in soil and/or ground water.

2) A **contingency plan** must be developed and approved by KDHE-BER for remediation/control of the uncontrolled portion of the contaminated plume in the event that MNA proves ineffective. The contingency plan should identify monitoring criteria that would require initiation of the contingency plan. For example, the contingency plan would be implemented if it is determined that the plume is continuing to migrate and/or impacting or threatening potential receptors and/or is violating KDHE's position on degradation of ground water and surface water.

3) **Environmental Use Controls** (EUCs) also known as Institutional controls, may be required on all impacted property at which MNA is approved as the remedy. The EUCA must restrict future land use and inform all future landowners of the nature of environmental conditions present at the property.

4) The KDHE-BER may determine that **financial assurance** is required for the EUCA and MNA action to implement the contingency plan in the case that the voluntary or responsible party is not financially able to perform the required actions. The Project Manager, Program Manager, and Section Chief must approve all financial assurance instruments.

In summary, KDHE-BER's decision to implement MNA at a contaminated site will be based on appropriate site characterization, KDHE-BER approved site-specific cleanup goals, legal control of the impacted property/ies, and the successful implementation of measures to control all sources and/or hot spots. Additionally, the progress of MNA towards site cleanup goals must be carefully monitored and compared with expectations to ensure that it will meet those cleanup goals within a time frame that is reasonable compared to time frames associated with other potential site remedies. Contingencies, EUCAs, and financial assurances will be required by KDHE-BER at some sites to assure that MNA meets the agency's expectations. Approval of MNA as a remedial approach does not waive KDHE's right to seek any Natural Resource Damages.