FOURTH FIVE-YEAR REVIEW REPORT

For the
Chemplex Site, Clinton County, Iowa

June 5, 2014

PREPARED BY:

U.S. Environmental Protection Agency
Region 7
Lenexa, Kansas

Approved by:

Cecilia Tapia, Director
Superfund Division

Date: 6-5-14

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Chemplex Site – Clinton, Iowa

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LIST OF ABBREVIATIONS

ACC/GCC	ACC Chemical Company and Getty Chemical Company
AOA	Area of Attainment
ARARs	Applicable or Relevant and Appropriate Requirements
BNA	Base-Neutral/Acid
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	Chemical of Concern
DAC	Debutanized Aromatic Compound
DCE	Dichloroethene
DNAPL	Dense Non-aqueous Phase Liquid
EKI	Erler and Kalinowski, Inc.
EPA	U.S. Environmental Protection Agency
Equistar	Equistar Chemicals, LP, current operators of the polyethylene manufacturing facility. Also may be referred to herein as Lyondell or LyondellBasell
ESD	Explanation of Significant Differences
EW	Extraction Well
IDNR	Iowa Department of Natural Resources
LGE	Landfill Gas Extraction
LNAPL	Light Non-aqueous Phase Liquid
Lyondell	Lyondell or LyondellBasell, current operators of the polyethylene manufacturing plant. Also may be referred to herein as Equistar
MCL	Maximum Contaminant Level
MW	Monitoring Well
MWH	Montgomery Watson Harza
NAPL	Non-aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbons
PCE	Tetrachloroethene, also called Tetrachloroethylene or Perchloroethylene
PME Plan	Performance Monitoring Evaluation Plan
POC	Point of Compliance
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SOW	Statement of Work
SVE	Soil Vapor Extraction
TBCs	To-Be-Considered guidelines

LIST OF ABBREVIATIONS

TCE	Trichloroethylene or Trichloroethene
TI Waiver	Technical Impracticability Waiver
TI Zone	Technical Impracticability Zone
µg/L	micrograms per liter
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

The Chemplex Superfund Site (Site) is a non-National Priorities List (NPL) site located in Clinton County, Iowa, in portions of Sections 19, 20, 29 and 30 within Township 81 North, Range 6 East. The former Chemplex facility is situated 1.5 miles northwest of the city of Camanche and 5.5 miles west of the city of Clinton on the south side of U.S. Highway 30. The former Chemplex facility, currently operated by Equistar, manufactures high and low density polyethylene from chemical stocks and began operation in 1968. A number of areas of concern at the Site were identified during previous investigations. The Site consists of the former Chemplex facility, an adjacent landfill, and surrounding areas where the contaminants have come to be located.

The remedy selected in the 1989 Record of Decision (ROD) included a groundwater extraction and treatment system to address the contaminated groundwater, which constitutes Operable Unit 1 (OU 1) of the Site. At the time of the 1989 ROD, the nature and extent of groundwater contamination had not been fully defined. The 1991 Explanation of Significant Differences (ESD) expanded the groundwater extraction and treatment remedy for OU 1 to address all areas of concern. Construction and shakedown of the groundwater extraction and treatment system for OU 1 was accomplished with the signing of the Preliminary Closeout Report on September 14, 1995. The remedy selected in the 1993 ROD included a landfill gas extraction system and capping for the landfill area to address contaminated soils and wastes, which constitutes Operable Unit 2 (OU 2) of the Site. Remedial construction for OU 2 was documented in a report by ACC Chemical Company and Getty Chemical Company (ACC/GCC) dated December 31, 1998.

In April 2008, a Statement of Additional Work was issued outlining a performance test of a proposed revised remedy for OU 1 referred to as exposure control. Based on the evaluation of the performance testing results, in 2012 the U.S. Environmental Protection Agency issued an Amendment to the Record of Decision (ROD Amendment) which amended the OU 1 groundwater remedy from a groundwater extraction and treatment type remedy to an exposure control type remedy. The exposure control type remedy includes westward extension of the city of Camanche water line with connection of designated residences, expansion of the groundwater monitoring network, localized treatment of tetrachloroethene (PCE) "hot spots", and institutional controls including environmental covenants and a well control ordinance by the city of Camanche. The revised remedy also established a Technical Impracticability Zone, within which certain Applicable or Relevant and Appropriate Requirements (ARARs) are waived. ARARs are not waived outside of this zone.

The first five-year review was signed on June 9, 1999. The trigger for this fourth five-year review was the signing of the third Five-Year Review Report on June 5, 2009.

The determination has been made that the OU 1 remedy and OU 2 remedy as selected by the EPA are protective of both human health and the environment. Because the remedial actions at all OUs are protective, the Site is protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Chemplex Company		
EPA ID: IAD045372836 (OU 1), IAD984600312 (OU 2)		
Region: 7	**State:** IA	**City/County:** Clinton/Clinton County

SITE STATUS	
NPL Status: Superfund Alternative	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA **If "Other Federal Agency" was selected above, enter Agency name:** Click here to enter text.
Author name (Federal or State Project Manager): Brian R. Zurbuchen / Nancy Swyers
Author affiliation: U.S. EPA Region 7
Review period: 10/1/2013 – 6/1/2014
Date of site inspection: 11/13/13
Type of review: Statutory
Review number: 4
Triggering action date: 6/5/2009
Due date *(five years after triggering action date)*: 6/5/2014

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU 2
Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1	Issue Category: Operations and Maintenance

Five-Year Review Summary Form (continued)

	Issue: Hot-Spot Treatment Evaluation			
	Recommendation: ACC/GCC to evaluate results from Fall 2013 hot-spot treatment event and report to EPA. Additional hot-spot treatment may be implemented in the future based on review and evaluation of future groundwater monitoring results.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	ACC/GCC	EPA	2/15

Sitewide Protectiveness Statement (if applicable)	
Protectiveness Determination: Protective	*Addendum Due Date (if applicable):* Click here to enter date.
Protectiveness Statement: "The remedy at OU 1 is protective of human health and the environment in the short term because human and ecological exposure to Chemicals of Concern (COCs) in groundwater and surface water above unacceptable levels is being prevented by institutional controls and expansion of the public water system supply. So long as the site use does not change and the implemented engineering and institutional controls are properly maintained, the remedy is predicted to be protective in the long term. The remedy at OU 2 is protective in the short term because human and ecological exposure to COCs in soil above unacceptable levels is being prevented through maintaining the caps and vegetative covers. So long as the site use does not change and the implemented engineering and institutional controls are properly maintained, the remedy is predicted to be protective in the long term. Because the remedial actions at all OUs are protective, the site is protective of human health and the environment.	

1. INTRODUCTION

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of these reviews are documented in Five-Year Review Reports. Five-Year Review Reports also describe issues identified during the review and outline recommendations to address these issues. The EPA (also referred to as "the Agency") is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Section 121(c) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR section 300.430(f)(4)(ii) states that:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Region 7 of the EPA has conducted a five-year review of the remedial actions implemented at the Chemplex Site in Clinton County, Iowa. This review was conducted from October 2013 through May 2014. This report documents the results of the review.

This is the fourth five-year review for the Site. The triggering action for this review is the signature date of the third five-year review, which was June 5, 2009. The current five-year review is required because hazardous substances, pollutants, or contaminants remain on the site above levels that allow for unlimited use and unrestricted exposure. This five-year review covers both Operable Unit 1 (OU 1) and Operable Unit 2 (OU 2) of the Site. OU 1 pertains to Site groundwater and OU 2 pertains to Site soil and waste material. In Site documents, OU 1 and OU 2 are commonly referred to as the "First Operable Unit" and the "Second Operable Unit."

2. SITE CHRONOLOGY

A chronology of Site events is provided in Table 1. This chronology extends from 1968, the year the former Chemplex polyethylene manufacturing facility (hereinafter referred to as the "former Chemplex facility" or "facility") began operation, to the end of 2013.

3. BACKGROUND

The Site is a non-NPL site located in Clinton County, Iowa, in portions of Sections 19, 20, 29 and 30 within Township 81 North, Range 6 East. The former Chemplex facility is situated 1.5 miles northwest of the city of Camanche and 5.5 miles west of the city of Clinton on the south side of U.S. Highway 30 (Figure 1).

ACC Chemical Company and Getty Chemical Company (ACC/GCC) built the original polyethylene manufacturing facility in the late 1960s and owned and operated it, under the Chemplex name, through 1984. Since that time, the majority of the former Chemplex facility has been owned by a succession of owners. One exception is the 7-acre landfill area on the west side of the former Chemplex facility and a portion of the land located southwest of the facility that continues to be owned by ACC/GCC. The former Chemplex facility is currently owned by Equistar Chemicals, LP, and operated by LyondellBasell, which continues to manufacture high and low density polyethylene from chemical stocks. It is still also known under the previous name of Equistar. The names "Equistar," "Lyondell," and "LyondellBasell" may be used interchangeably in this report and in other project documents to identify the current plant operator.

The Site consists of the former Chemplex facility, an adjacent landfill, and surrounding areas where the contaminants have come to be located.

3.1. Physical Characteristics

Surface topography around the former Chemplex facility generally slopes down to the south, with two natural streams on the east and west sides of the Site (the Eastern and Western Unnamed Tributaries; see Figure 1). Both of these streams flow to the south and empty into Rock Creek, approximately 2,500 feet south of the facility, which in turn flows into the Mississippi River.

3.2. Land and Resource Use

The former Chemplex facility is located northwest of the city of Camanche and west of the city of Clinton in a predominantly agricultural area between U.S. Highway 30 and 21st Street (also called Hawkeye Road). The former PCS Nitrogen facility, also known as Hawkeye Chemical and later Arcadian, is a former fertilizer manufacturing plant located southeast of the former Chemplex facility on the south side of 21st Street (Figure 1). The Todtz Farm Superfund site is located approximately one mile south of the former Chemplex facility. The areas adjacent to and south of the former Chemplex facility are zoned for industrial use.

3.2.1. Site Geology

The stratigraphic layers of importance at the Site, from the ground surface downward, consist of (1) unconsolidated sediment (i.e., Overburden); (2) several fractured Silurian-era dolomite rock layers, and (3) shale of the Ordovician-era Maquoketa Formation.

The Overburden at the Site consists of loess, glacial drift material, and older alluvial sediments. During the Quaternary age, advancing glaciers eroded most of the alluvial sediments. Loess and glacial drift

were deposited that consist predominantly of mixed clay and silt with sand and gravel stringers. Remnants of the alluvial sediments can be found filling ancient stream channels and depressions carved in the bedrock at the base of the Overburden. The alluvium, consisting of gravel, cobbles, or boulders, is referred to as the basal sand and gravel. The basal sand and gravel is present mainly in the southwestern area of the Site. The Overburden ranges in thickness from less than 1 foot along the Western Unnamed Tributary adjacent to the polyethylene plant to approximately 90 feet in areas south of 21st Street.

The Overburden lies unconformably on a sequence of Silurian-era dolomite bedrock that has been categorized into three groups of geologic formations: 1) the Scotch Grove Formation, 2) the Hopkinton Formation, and 3) the Blanding, Tete des Morts, and Mosalem Formations (Figure 2-1).

Scotch Grove Formation – This formation ranges in thickness from 19 to 140 feet across the Site. Based on geophysical testing, the Scotch Grove Formation has been differentiated into the Upper Scotch Grove, which is highly weathered and porous, and the Lower Scotch Grove, which is fractured but not weathered.

Hopkinton Formation – This formation lies below the Scotch Grove Formation, is encountered at depths of approximately 90 to 150 feet below ground surface (bgs), and varies in thickness from 70 to 110 feet. It is composed of the Picture Rock, Farmers Creek, and Lower Hopkinton Members. The Picture Rock Member is a gray, fine-grained dolomite rock that ranges from 10 to 30 feet thick. The Picture Rock Member is less permeable than either the overlying Scotch Grove Formation or the underlying Farmers Creek Member, and therefore is considered to be an aquitard. The Farmers Creek Member is 15 to 20 feet thick and is extremely porous due to fossil molds and solution cavities and holes, called vugs. Regionally it is the most consistently groundwater-productive stratum in the Silurian-era bedrock sequence, although the weathered portions of the Scotch Grove are generally more productive at the Site. The 40- to 60-feet thick Lower Hopkinton Member is generally porous and contains cavities.

Blanding, Tete des Morts, and Mosalem Formations – The Blanding Formation underlies the Hopkinton Formation. The top of the Blanding Formation is located approximately 190 to 250 feet bgs and is typically 20 to 40 feet thick. It consists of dolomite rock with abundant chert nodules and seams. Locally, chert may make up as much as 50 percent of the Blanding Formation. The Tete des Morts and Mosalem Formations lie beneath the Blanding Formation and are encountered at depths of approximately 200 to 270 feet bgs. Their combined thickness is about 10 feet. Because these formations are thin and relatively deep, they are typically not differentiated from the Blanding Formation in illustrations of the conceptual model. Dolomite rock in the Tete des Morts and Mosalem Formations contains chert nodules and shale seams, and is typically very dense.

The Silurian-era dolomite bedrock sequences discussed above lie unconformably on the Brainard Shale of the Ordovician-era Maquoketa Formation. The Maquoketa Formation is a massive sequence of shale that has very low permeability and ranges in thickness from 114 to 275 feet. The massive, dense shales of the Maquoketa Formation are considered a regional aquiclude.

3.2.2. Site Hydrogeology

Groundwater occurs at the Site in both the overburden and the underlying bedrock layers, with the groundwater potentiometric surface typically situated in the overburden at depths of 1 to 8 feet. In

general, groundwater flows toward the south, with higher gradients in the areas near the Eastern and Western Unnamed Tributaries. In the vicinity of the tributaries, flow directions tend to be oriented more toward the west and east, in the direction of the respective tributaries.

Principal flow paths for groundwater in the overburden are the sand and gravel stringers in the loess and glacial drifts, and the basal sand and gravel in the southwestern area of the Site. Investigations have demonstrated that groundwater in the overburden exfiltrates into the Eastern and Western Unnamed Tributaries, with groundwater providing much of the baseflow in these streams during dry periods. Groundwater in the West Region of the Site generally flows to the southwest, and groundwater in the East Region flows to the southeast. Groundwater velocity in the overburden has been estimated at 24 feet per year (ft/yr). Groundwater vertical hydraulic gradients within the overburden are upward near the Western and Eastern Unnamed Tributaries, consistent with the findings that groundwater recharges these tributaries. Elsewhere at and near the Site, groundwater vertical hydraulic gradients within the overburden are downward.

The bedrock water-bearing zones are usually confined, with the groundwater potentiometric surface typically situated within the overburden. The Eastern and Western Unnamed Tributaries also appear to affect groundwater flow in the shallower bedrock zones. Groundwater flow in the bedrock is skewed to the south near these tributaries. Groundwater velocity in the bedrock under pre-pumping conditions has been reported to vary from an estimated 1.5 ft/yr in the Picture Rock layer to 76 ft/yr in the Upper Scotch Grove layer. Recharge of Silurian-era bedrock in Iowa results primarily from precipitation that infiltrates through the overburden. Downward groundwater flow through bedrock occurs at the Site given the average annual rainfall of 36 inches and the existence of naturally-downward vertical hydraulic gradients between the overburden and bedrock throughout much of the Site plus recharge from upgradient areas. Even though all formations in the Silurian-era bedrock sequence are hydraulically interconnected, downward volatile organic compound (VOC) transport via groundwater is inhibited by the Picture Rock layer, which exhibits lower permeability than the other bedrock strata. Downward vertical gradients have been measured in the Site's east region. Such gradients are measured in the east region both across the Picture Rock layer and between the bedrock layers underlying the Picture Rock. In contrast, vertical gradients in the west region bedrock are near-neutral.

3.3. History of Contamination

Polyethylene wastes from the former Chemplex facility operations were disposed of at several locations within the facility, resulting in impacts to soil and groundwater. Components of these wastes included chlorinated hydrocarbons, particularly tetrachloroethene, also called perchloroethylene (PCE); benzene, toluene, ethylbenzene, and xylenes (collectively referred to as BTEX); and polynuclear aromatic hydrocarbons (PAHs). Areas of disposal or release, shown on Figure 3, include the following:

- Landfill Area,
- Debutanized Aromatic Compound (DAC) Storage and Truck Loading Area,
- Polishing Basin,
- Former Waste Storage Areas, and
- DAC Spill Area.

A brief description and history of each of these areas is presented below.

3.3.1. Landfill Area

The Landfill Area, which is no longer an active waste disposal area, is located near the west-central boundary of the fenced portion of the former Chemplex facility and covers approximately seven acres. The Landfill Area was used for disposal of various wastes generated at the former Chemplex polyethylene manufacturing facility, including demolition debris and water treatment sludge. From about 1968 to 1978, PCE was used from time to time at the former Chemplex facility to clear clogged piping. The spent PCE was disposed of in the Landfill Area.

3.3.2. DAC Storage and Truck Loading Area

The DAC Storage and Truck Loading Area is an active operation area that has been in use since the inception of facility operations in 1968. DAC is a by-product of the polyethylene production process that has a high benzene content. The area contains aboveground storage tanks, a transfer pump station, a truck loading area, and a rail tank car loading area. In the past, this area was not paved or otherwise protected from surface water infiltration. As a result, infiltration of chemical-containing surface water led to soil and groundwater impacts at this location. Subsequent paving and soil compaction have reduced the potential for surface water infiltration.

3.3.3. Polishing Basin

This area is currently used by Equistar as a tertiary process water treatment unit that receives process water from a biological treatment unit. The Polishing Basin was originally constructed with a clay liner in 1968 and was historically used as a process water settling pond. In 1974, during dredging of the pond, the clay liner was damaged, causing contaminants to leach into the underlying soil. In 1982, the Polishing Basin was drained, revealing the damage to the clay liner from the 1974 dredging.

The Polishing Basin was subsequently rebuilt with a new liner system consisting of compacted clay, bentonite, and a high-density polyethylene liner. An underlying leachate collection system was also installed. Shallow groundwater collection systems are located downgradient of the Polishing Basin consisting of several french drains and collection sumps. Portions of these shallow groundwater extraction systems, operated by Equistar, were in operation at the end of 2013.

3.3.4. Former Waste Storage Areas

Wastewater treatment plant sludges and polyethylene process wastes were stored in several areas, including Waste Pile F, Container Storage Area H-2, and Surface Impoundments B, C, and D (see Figure 3). All of the wastes and sludges from these areas were ultimately excavated and disposed offsite, with the excavations given vegetative covers and warning signs as precautionary measures.

3.3.5. DAC Spill Area

In 1982, a line from the plant's DAC Storage Tank ruptured, spilling approximately 37,000 gallons of DAC into the bermed area around the tank. Although most of the spilled material was contained in the bermed area and recovered, approximately 1,500 gallons escaped through a rainwater drainage pipe. Approximately 1,000 gallons of the 1,500 gallons that escaped was recovered. The remaining 500 gallons flowed south in a drainage ditch that eventually drained into the Western Unnamed Tributary.

The DAC Spill Area includes the DAC Storage Tank, the bermed area for the tank, and the drainage ditch adjacent to the bermed area.

3.4. Initial Response

The Site was identified as a potentially uncontrolled hazardous waste site and was proposed for the NPL on October 15, 1984. In accordance with the Resource Conservation and Recovery Act (RCRA) deferral policy, in 1991 the Site was removed from the list of sites being proposed for the NPL. The Site is being addressed as a Superfund Alternative site. Table 1 lists major Site events.

3.4.1. OU 1

Pursuant to Section 106(a) of CERCLA, 42 U.S.C. 9606(a), and Section 3013 of RCRA, as amended, 42 U.S.C. 6934, on September 8, 1987, the EPA entered into a Consent Order with several Potentially Responsible Parties (PRPs), including USI (now Equistar) and ACC/GCC, to investigate the Landfill Area and the DAC Storage and Truck Loading Area.

This investigation and previous investigations were summarized in the June 1989 Remedial Investigation and Feasibility Study (RI/FS). With this information and other documents available in the Administrative Record file, the EPA issued the first Record of Decision (ROD) for the Site on September 27, 1989.

3.4.2. OU 2

At the time the ROD for OU 1 was issued in 1989, the EPA determined that there was not sufficient information concerning the nature and extent of soil contamination at the Site to select a remedy for soil cleanup. Therefore, on December 28, 1989, the EPA entered into an Administrative Order on Consent with the PRPs to conduct an RI/FS on these soils, designated as OU 2. This Administrative Order on Consent was issued pursuant to Sections 104(b) and 122(d) of CERCLA, 42 U.S.C. 9604(b) and 9622(d).

The RI/FS for OU 2 was completed in December 1992. The EPA issued a ROD for OU 2 on May 12, 1993.

3.5. Basis for Taking Action

3.5.1. OU 1

An assessment of the non-cancer and excess lifetime cancer risks from exposure to contaminated soil and groundwater was performed in 1989 and presented as an Endangerment Assessment. This risk characterization formed part of the basis for taking remedial actions that were called for in the September 27, 1989 ROD for OU 1. The OU 1 ROD[1] documented that both non-cancer risks and excess lifetime cancer risks from exposure to the contaminants in the groundwater were above acceptable thresholds. For worker exposure to surface soils in the DAC Area and for child exposure to surface water, the non-cancer risks represented a Hazard Index of less than 1, and excess lifetime cancer risks were in the acceptable risk range. The OU 1 ROD also stated that there did not appear to be an adverse ecological impact from the Site.

Updated human health and ecological risk assessments were prepared in 2006 as discussed in the Updated Focused Feasibility Study. Scenarios evaluated as part of the human health risk assessment included downgradient residents using groundwater for domestic use, child residents wading in Rock Creek, and downgradient residents exposed to intrusion of vapors from groundwater. The cancer risks were in the acceptable risk range and the Hazard Index was acceptable (i.e., less than 1) for the scenarios of child residents wading in Rock Creek and downgradient residents exposed to intrusion of vapors from groundwater.

Cancer risks and excess lifetime cancer risks for the scenario of downgradient residents using groundwater for domestic use exceeded acceptable thresholds.

The 2006 ecological risk assessment indicated that there did not appear to be an adverse ecological impact from the Site, based on comparisons of surface water VOC concentrations with potentially-applicable water quality criteria.

3.5.2. OU 2

The primary objective for the OU 2 remedial action was to reduce the mass of contaminants potentially available for release into groundwater. Potential risks from exposure to contaminated soils and wastes were discussed in the Chemplex OU 2 ROD.

The OU 2 baseline risk assessment[2] concluded that there would not be unacceptable non-cancer or excess lifetime cancer risks posed by exposure to the onsite soils and wastes. Potential non-cancer risks

[1] The risk assessment evaluated the following indicator chemicals: antimony, benzene, chloroform, 1,2-dichlorethene, ethylbenzene, PAHs, styrene, PCE, TCE, and toluene. The OU 1 risk assessment evaluated the following pathways: (a) inhalation of fugitive dust in the DAC Area by workers, (b) inadvertent ingestion of surface soil in the DAC Area by workers, (c) dermal contact with surface soil in the DAC area by on-site workers, and (d) dermal contact with surface water in the intermittent tributary to Rock Creek by children.

[2] The OU 2 ROD evaluated four receptors: (a) an on-site worker, (b) a trespasser, (c) an off-site receptor, and (d) an on-site construction worker. COCs were VOCs and PAHs.

were determined to represent a Hazard Index of less than 1, and the potential cancer risks were determined to be less than an excess lifetime cancer risk of 10^{-4} (i.e., risks were within the range that the EPA typically considers to be acceptable). Existing conditions at the Site were also determined to be protective of potential ecological receptors.

4. REMEDIAL ACTIONS

4.1. Remedy Selection

4.1.1. OU 1

The selected remedy was groundwater extraction and treatment for the Landfill Area and the DAC Storage and Truck Loading Area. This ROD was later modified by an Explanation of Significant Differences (ESD) dated July 26, 1991, to include groundwater extraction and treatment from other areas of the Site.

Based on the potential risks of exposure to contaminants identified in the on-site groundwater, the focus of the 1989 ROD was protecting potential groundwater receptors. The ROD, which focused on the Landfill and DAC Areas, states that:

> "The purpose of this operable unit remedial action is to mitigate the movement of the contaminated groundwater from this site and to permanently treat, destroy and dispose of contaminants found in these groundwater plumes. Also, this operable unit should protect the nearby downgradient private drinking water wells from these contaminated plumes prior to implementation of the final remedial action for this site."

The ESD modified the 1989 ROD to implement a site-wide groundwater remedy that included a point of compliance (POC) boundary. The remedial objectives were further defined during the RD as follows:

- extract highly-contaminated groundwater within the POC boundary that was not related to non-aqueous phase liquid (NAPL) source areas to the extent appropriate to expedite completion of the Remedial Action,
- extract groundwater with the goal that the cleanup standards specified in the OU 1 Consent Decree (CD) are met in the non-complying areas downgradient of the POC boundary, referred to as the Areas of Attainment (AOA),
- extract light non-aqueous phase liquid (LNAPL) where feasible and where such recovery would reduce contaminant migration downgradient of the POC,
- prevent further vertical migration of dense non-aqueous phase liquid (DNAPL) into the bedrock aquifer,
- prevent further horizontal chemical migration into areas outside the POC boundary,
- lower the groundwater table in areas of source soils to assist the Chemplex OU 2 Remedial Action, and
- treat extracted groundwater so that effluent concentrations comply with levels specified in the National Pollutant Discharge Elimination System (NPDES) permit.

As described in Section 4.2.1 of this report, the remedy selected in the ROD was subsequently amended by the EPA's Amendment to the Record of Decision (ROD Amendment) issued December 26, 2012. The 2012 ROD Amendment changed the groundwater remedy from groundwater extraction and treatment to an enhanced exposure control remedy.

The ROD Amendment dated December 2012 modified the remedial action objectives (RAOs) to reflect current conditions at the Site:

- RAO 1: Prevent human exposure to VOCs in groundwater and accessible surface waters at levels greater than a cumulative Hazard Index[3] of 1.0 for non-carcinogenic risks and a cumulative incremental lifetime cancer risk[4] exceeding the range of 10^{-4} (one in ten thousand) to 10^{-6} (one in one million).

- RAO 2: Limit exposure by potential ecological receptors in Rock Creek and downgradient surface waters to:

    - PCE at levels exceeding 98 micrograms per liter (µg/L);

    - Trichloroethene (TCE) at levels exceeding 80 µg/L;

    - 1,2-Dichloroethene (1,2-DCE) at levels exceeding 590 µg/L; and

    - Vinyl chloride at levels exceeding 930 µg/L.

- RAO 3: Prevent migration of site-related chemicals of concern (COCs), above the health-based concentrations described in RAO 1, to those portions of downgradient areas where groundwater is being used as a potable water supply.

4.1.2. OU 2

The 1993 ROD selected a remedy of capping and construction of a soil vapor extraction (SVE) system for the Landfill area; establishment of vegetative covers in other designated areas of the former Chemplex facility; and implementation of institutional controls in the areas of concern. The ROD for OU 2 addressed contaminated soils and wastes that presented a threat to human health and the environment from direct exposure or from indirect exposure through migration of contaminants into groundwater. Together, the OU 1 and OU 2 remedies were intended to address all human health and environmental risks identified at the Site. The remedial objectives for OU 2 were:

- reduction of carcinogenic risks to on-site workers and construction workers from direct dermal and inhalation exposure to soil to a risk level of approximately 10^{-6} or less, and

[3] The Hazard Index is defined as the sum of the "Hazard Quotients", or estimated non-carcinogenic risks, for each VOC to which an individual may be exposed in the form of groundwater or surface water. Each VOC's contribution to the Hazard Index is the estimated potential dosage divided by the "reference dose" for drinking water exposures and other oral exposures, or by the "reference concentration", for inhalation exposures.

[4] Carcinogenic risks are estimated by multiplying the projected dosage for each VOC by either (1) the Cancer Slope Factor, for drinking water exposures and other oral exposures, or (2) the Unit Risk Factor, for inhalation exposures.

- reduction of contaminant migration into groundwater to the extent practicable, consistent with the OU 1 groundwater remedy.

4.2. Remedy Implementation

4.2.1. OU 1

In the OU 1 CD entered into with the United States on November 7, 1991, ACC/GCC agreed to perform the OU 1 Remedial Design/Remedial Action (RD/RA) and pay past costs. The RD, conducted in conformance with the 1989 ROD, was approved by the EPA on February 2, 1994.

The original OU 1 remedy as selected in the 1989 ROD, as modified in the 1991 ESD, selected a site-wide, comprehensive groundwater remedy, and defined groundwater containment and attainment areas. The remedy included the following components:

- Institutional Controls;
- Groundwater Extraction/Plume Containment;
- NAPL Management;
- Groundwater Treatment and Discharge;
- Construction, Operation, and Maintenance of the Remedy;
- Verification and Monitoring System; and a
- Contingent Technical Impracticability Waiver for the Area of Attainment.

The main component of the remedy was a groundwater extraction and treatment system that began operating in 1994. The system consisted of 51 extraction wells (EWs) screened at various depths in the soil overburden and underlying bedrock layers.

While the system was in operation, extracted groundwater was conveyed to the Chemplex groundwater treatment system in two process streams. One stream, anticipated to contain both PAHs and VOCs, was labeled the Base-Neutral/Acid (BNA) Stream. The other stream, anticipated to contain only VOCs, was referred to as the VOC Stream. The BNA and VOC Streams were passed through separate air stripping towers to remove VOCs. The BNA Stream also flowed through aqueous-phase granular activated carbon to remove PAHs. After treatment, the two streams were combined and discharged to the Mississippi River through a permitted outfall shared with the neighboring Equistar polyethylene plant.

Equistar continued to operate and maintain the several french drain and wick well remediation systems located south and southeast of the Polishing Basin. Extracted groundwater was treated within Equistar's in-plant wastewater treatment system and discharged under the plant's NPDES permit.

Pursuant to the 1991 CD, ACC/GCC implemented this remedy until the EPA issued the ROD Amendment in December 2012. Operation of the existing groundwater recovery and treatment system

was suspended during the remedy performance test from 2008 to 2012. The 2012 ROD Amendment modified the remedy in order to more effectively protect human health and the environment in light of residual VOCs believed to be present in fractured bedrock and the naturally-occurring biological reductive dehalogenation that has been observed in Site groundwater. The revised remedy includes the following components:

- Surface water and groundwater sampling and gauging using an expanded monitoring well network.
- Contingency measures if detected contaminant concentrations exceed certain trigger levels.
- Institutional controls consisting of:
  - environmental covenants prohibiting construction of potable water supply wells screened above the Maquoketa Formation in the area south of the former Chemplex facility.
  - a city of Camanche ordinance that requires connection of new water services to the city municipal water system in locations where municipal water main connections are available.
- Shutdown and decommissioning of the existing groundwater extraction and treatment system.
- Localized hot spot treatment with a strong oxidant such as permanganate or with an electron donor such as vegetable oil or lactose solution as determined in discussions with the EPA as appropriate based on monitoring data.
- Extension of the city of Camanche municipal water line along 9th Street and 31st Avenue, and connection of designated residences to this extension.
- Establishment of a Technical Impracticability Zone, within which certain groundwater cleanup standards, called Applicable or Relevant and Appropriate Requirements (ARARs), are subject to a technical impracticability waiver (TI Waiver), including selected Maximum Contaminant Levels (MCLs) for drinking water.

These components are discussed in more detail below. As of the preparation of this Five-Year Review Report, ACC/GCC and the EPA are negotiating a modification to the 1991 CD to document the revised remedy approach set forth in the 2012 ROD Amendment. Once signed by all parties, the modification to the 1991 CD will be filed with the Federal District Court.

4.2.1.1. Institutional Controls

Institutional controls are administrative and legal measures restricting the potential use of chemical-containing groundwater until cleanup goals are achieved. The Iowa Department of Natural Resources (IDNR) placed the Site on the Iowa registry of hazardous waste sites. This registry requires placement of a state notice on the affected deeds preventing land transfer or change in land use without state approval.

Pursuant to the 1991 CD, ACC/GCC, Quantum (now Equistar), and the City of Clinton, who were owners of properties within the Chemplex site and the AOA at that time, were required to record

restrictive covenants and access easements with the County Recorder of Deeds. As discussed in the 2004 Five-Year Review Report, the initial restrictive covenants were recorded by the Clinton County Recorder's office on August 21, 2001. Those covenants prohibited the construction, maintenance and use of any wells for drinking water supply or irrigation, with the exception of the existing Equistar production wells, which are screened below the Maquoketa Formation.

As shown on Figure 4, environmental covenants and a city of Camanche ordinance have been put in place to implement the land use restriction requirements of the December 2012 ROD Amendment. These environmental covenants encompass the former Chemplex facility, including the now-inactive Chemplex Landfill, plus immediately-downgradient areas along the south side of 21st Street. The following ordinance and environmental covenants have been put in place:

- City of Camanche Public Water Supply Ordinance: On May 5, 2009, the City of Camanche adopted ordinance number 697 restricting the use of existing water supply wells and prohibiting construction of new wells within city limits, except for groundwater quality monitoring wells.

- Environmental Covenants: Environmental covenants were established on certain properties, including most of the Equistar polyethylene plant, the Cross Roads Land Development, LLC (Cross Roads) property to the southeast that encompasses the former PCS Nitrogen fertilizer plant, and the Chemplex Landfill and other lands owned by ACC/GCC southwest of the Site. These covenants were recorded with Clinton County on October 31, 2008 (for ACC/GCC lands other than the Chemplex Landfill), October 10, 2011 (for the Chemplex Landfill), October 1, 2009 (for the Cross Roads property), and September 26, 2012 (Equistar). The covenants include the following land use restrictions:

    - a prohibition on the construction of groundwater supply wells screened above the Maquoketa Formation for human consumption, livestock watering, or irrigation of gardens or agricultural crops except for fiber crops;

    - a requirement that all new groundwater wells constructed to depths penetrating the Maquoketa Formation and screened within the underlying layers must be properly sealed to the satisfaction of the EPA and IDNR;

    - a requirement that written permission be obtained from IDNR, and notice provided to the EPA, prior to abandoning or removing a groundwater well from the Chemplex groundwater monitoring network;

    - a prohibition on residential land use;

    - a prohibition on (1) the extraction of water from dewatering wells or sumps and (2) any activity that may interfere with monitoring or remedial actions required by the EPA; and

    - a requirement that property access be provided to the EPA, IDNR, ACC/GCC and their authorized representatives to conduct monitoring and other activities required by the EPA or IDNR to fulfill CD requirements.

Boundaries of the environmental covenants and the city of Camanche well ordinance are shown on Figure 4.

4.2.1.2. Hot-Spot Treatment

With hot-spot treatment, a strong oxidant such as permanganate, or an electron donor such as vegetable oil or lactate, is applied to the targeted groundwater area through injection into wells. A pilot test of hot spot treatment was performed in select wells with application of permanganate or vegetable oil in 2009, with post-treatment monitoring continuing into 2010. The pilot test indicates that both materials are effective in mitigating local areas with elevated PCE concentrations in groundwater. A second hot-spot treatment injection was performed during fall 2013 using sodium lactate in one monitoring well, permanganate in two monitoring wells, and vegetable oil in one monitoring well. The initial post-monitoring data was collected in November 2013. Additional post-treatment monitoring will occur during 2014.

Under the revised remedy described in the 2012 ROD Amendment, areas for hot spot treatment are to be identified on a case-by-case basis after evaluating data from the groundwater monitoring network. The EPA and ACC/GCC will discuss each year's monitoring data during February or March of each year, considering concentration trends and the sampling locations within the monitoring network. Whenever ACC/GCC and the EPA identify an area for hot spot or multiple hot spot treatments, ACC/GCC will submit a work plan identifying injection locations, the planned oxidant or electron donor, a schedule for performing the work, and a proposal for follow-up monitoring. ACC/GCC has prepared a draft document titled "Technical Memorandum: Hot Spot Evaluation Guidelines" which has been reviewed and accepted by the EPA and IDNR. This plan will be incorporated into the modification to the 1991 CD for OU 1, which the EPA and ACC/GCC are currently negotiating.

4.2.1.3. Water Line Extension

As part of the revised remedy, an extension to the city of Camanche municipal water line was constructed westward to connect designated residences located potentially downgradient of the Site. The objective of these connections to the city water system was to reduce the potential for future PCE exposure by residents previously using private water supply wells.

This extension was constructed during 2009 and 2010. For properties connecting to the extended waterline, residential water supply wells were decommissioned in accordance with state procedures. Under the city of Camanche ordinance number 697, no new water supply wells can be constructed on these properties as described in Section 4.2.1.1. A total of 20 properties have connected to the expanded water system, including all identified residences along 31st Avenue, located south (potentially downgradient) of the contaminated groundwater plumes. The extent of the water line extension is shown on Figure 5.

4.2.1.4. Technical Impracticability Zone

A component of the revised remedy selected in the 2012 ROD Amendment for OU 1 was the establishment of a Technical Impracticability Zone (TI Zone), the boundaries of which are illustrated on Figure 5. Within this TI Zone, chemical-specific ARARs, including MCLs, are subject to a technical

impracticability waiver, or TI waiver. The TI waiver has no effect on chemical-specific ARARs outside the TI Zone.

The TI Zone replaces the POC Boundary that was established as part of the 1991 ESD for OU 1.

4.2.1.5. Surface Water and Groundwater Monitoring

Pursuant to the 1991 CD for OU 1, ACC/GCC was required to implement a groundwater monitoring network. ACC/GCC prepared a Performance Monitoring Evaluation Plan (PME Plan) dated November 1993. ACC/GCC modified the PME Plan in October 2008 to update several of the monitoring requirements in support of the performance testing of the groundwater alternative that would later be described in the 2012 Updated Focused Feasibility Study. In late 2013, ACC/GCC prepared a draft updated PME Plan that reflected the revised remedy documented in the 2012 ROD Amendment. The EPA and IDNR have reviewed the draft PME Plan. ACC/GCC has revised the Plan accordingly, which will be incorporated into a modification to the 1991 CD for OU 1.

Monitoring currently includes semiannual site-wide gauging of water levels and semiannual sampling of groundwater and surface water samples collected at designated locations. Sampling locations are monitored for VOCs, with selected monitoring points also monitored for PAHs. Table 3 summarizes the monitoring plan under the current PME Plan Addendum No. 4.

4.2.1.6.Contingency Measures

In the event that the remedy selected in the 2012 ROD Amendment fails to perform as anticipated, contingency measures will be implemented as appropriate to mitigate potential exposure to contaminated groundwater or surface water. Criteria triggering evaluation of contingency measures, along with schedules and procedures for implementation, are described in the Contingency Plan. This Plan was originally prepared in September 2008 by ACC/GCC, who revised it in 2013 (EKI, 2013g). The EPA and IDNR have reviewed and provided comments on this Plan. ACC/GCC has revised the Plan accordingly, which will be incorporated into a modification to the 1991 CD for OU 1.

Examples of potential contingency measures include, but are not limited to, increasing monitoring frequency, construction of new monitoring wells, hot spot treatment, surface stream warning signs or aeration, additional connections to the city of Camanche water line, and/or vapor sampling at downgradient residences.

4.2.1.7. Shutdown and Decommissioning of Groundwater Extraction and Treatment System

The existing groundwater extraction and treatment system was shut down in September 2008 for performance testing of the revised groundwater remedy, and remains shut down in accordance with the 2012 ROD Amendment. Decommissioning of the system's extraction wells has not been performed to date.

4.2.2. OU 2

Under the CD for OU 2, entered into on February 6, 1995, ACC/GCC agreed to perform the RD/RA at the OU 2 Study Areas. The RD, conducted in conformance with the 1993 ROD for OU 2, was approved by the EPA on December 18, 1996.

The major components of the OU 2 remedy, which were implemented in the areas shown on Figure 3, include the following:

- groundwater level suppression, SVE, warning signs, and capping in the Chemplex Landfill Area;
- warning signs and capping with stone and concrete at the H-2 Area of the DAC Storage and Loading Area;
- placement of riprap covers, vegetative covers, and warning signs along 21st Street near the Equistar Polishing Basin;
- excavation and proper disposal of accumulated sludges, and establishment and maintenance of vegetative covers and warning signs in the Previous Basin Area, Former Waste Pile F, and Surface Impoundments B and D;
- institutional controls; and
- five-year reviews.

ACC/GCC commenced and completed construction of these components in April 1997 and January 1998, respectively. The SVE system, also referred to as the Landfill Gas Extraction (LGE) System, included a blower, 55 vapor extraction wells, and a catalytic oxidizer to treat extracted vapors.

The Statement of Work in the 1995 CD for OU 2 (OU 2 SOW) established two categories of shutdown criteria for the LGE System:

- Concentration-based criteria, evaluated by comparing the concentrations of Target Compounds (i.e., BTEXs and PCE) in a given well or well cluster with pre-startup concentrations; and
- A time-based criterion, evaluated by comparing the cumulative time of active extraction at a given well or group of wells. The time-based criterion was considered to have been met after four years of cumulative active extraction at each well or well group.

As described in the OU 2 SOW, the LGE System could be shut down upon satisfying either one of the concentration-based or time-based shutdown criteria. As of April 9, 2003, the four-year time-based shutdown criterion was approved as having been met at all vapor extraction wells, allowing permanent shutdown of the LGE System on that date. LNAPL recovery from the LGE wells also ceased. The EPA completed the Remedial Action Report for OU 2 on August 30, 2005.

As required by the OU 2 CD, ACC/GCC continues to inspect and monitor the OU 2 Study Areas as follows:

- Landfill Area:
  - Annual inspections of the Chemplex Landfill cap and access roads
  - Annual inspections of the Landfill surface water management system
  - Quarterly inspections of the Landfill fencing and warning signs

- Area H-2:
  - Annual inspections of stone and concrete cap
  - Annual inspections of warning sign

- Previous Basin, Former Waste Pile F, and Surface Impoundments B and D:
  - Annual inspections of vegetative cover, with replanting of specific bare spots
  - Annual inspections of warning signs

- Areas Adjacent to Polishing Basin:
  - Annual inspections of riprap and vegetative cover
  - Annual inspections of warning signs

As outlined in the OU 2 CD, these inspections and necessary repairs will continue until the inspection period of thirty years is completed.

4.2.3. Operation and Maintenance (O&M) Costs

During 2013, the total OU 1 and OU 2 O&M cost, including monitoring, is anticipated to total approximately $680,000, not including costs for hot spot treatment which are considered to be non-routine outlays. The ROD Amendment anticipated O&M costs of $19.7 million over 30 years, for an average annual cost of $660,000. Costs in 2013 included consulting work associated with the development of work plans associated with both the 2012 ROD Amendment and the modification to the 1991 CD (currently being negotiated). For this reason, it is anticipated that project costs will decrease in future years, once the modification to the 1991 CD is finalized and lodged by the Department of Justice, which is expected to occur in 2014.

5. PROGRESS SINCE LAST REVIEW

The previous (2009) Five-Year Review report (EPA, 2009) concluded the following:

- The OU-1 remedy currently protects human health and the environment. There are no human receptors of drinking water identified as having consumed concentrations of chemicals of concern from the Site above standards based on drinking water standards developed under the Safe Drinking Water Act. Existing Site conditions are also considered safe for ecological receptors. However, in order for the remedy to be protective in the long term, actions need to be taken to ensure protectiveness. Specifically, the performance test required by the Additional Work provision of the CD including implementation of environmental covenants, groundwater monitoring with contingencies, expansion of the Camanche water supply system, and hot spot treatment of the most highly contaminated groundwater must be completed to ensure that groundwater contamination does not adversely affect downgradient receptors. After completion of the performance test, the EPA will evaluate whether further remedial actions are needed; and

- The OU-2 remedy is protective of human health and the environment.

Because the remedial actions at all OUs are currently protective, this Site is currently protective of human health and the environment. However, additional actions need to be taken to ensure long-term protectiveness of the Site, as described above. To ensure long-term protectiveness, the report listed four recommendations:

(1) ACC/GCC, the EPA, IDNR, and relevant property owners need to work to resolve remaining issues related to establishing environmental covenants.

(2) ACC/GCC needs to conduct groundwater monitoring according to the approved 2008 PME Plan and Contingency Plan with EPA oversight.

(3) The city of Camanche and ACC/GCC need to construct an expansion of the Camanche public water supply and hook up downgradient receptors.

(4) ACC/GCC must test potential technologies for groundwater hot spot treatment.

The implementation status of these four recommendations is updated below.

5.1. Recommendation 1: Resolve Remaining Issues and Implement Environmental Covenants

As part of the revised remedy documented in the 2012 ROD Amendment, the use restrictions discussed in the previous (2009) Five Year Review report were implemented as described in Section 4.2.1.1:

- City of Camanche Public Water Supply Ordinance: On May 5, 2009, the city of Camanche adopted ordinance number 697, restricting the use of existing water supply wells and prohibiting construction of new wells within designated portions of the city, except for groundwater quality monitoring wells. Boundaries for the ordinance are shown on Figure 4.

- Environmental Covenants: Environmental covenants were established for the Chemplex facilty and certain downgradient properties, including the Equistar polyethylene plant, the Cross Roads property which encompasses the former PCS Nitrogen fertilizer plant, and the Chemplex Landfill and other lands owned by ACC/GCC. These environmental covenants were recorded with Clinton County for the following areas:

    - ACC/GCC property, other than the Chemplex Landfill: October 31, 2008
    - Former Chemplex Landfill: October 10, 2011
    - Cross Roads property: October 1, 2009
    - Equistar property: September 26, 2012

  Boundaries for the environmental covenants are shown on Figure 4. Note that the area of the covenant for the former Chemplex Landfill is not differentiated from the area covered by the ACC/GCC covenant.

5.2. Recommendation 2: Conduct Groundwater Monitoring in Accordance with Approved 2008 PME Plan and Contingency Plan

Groundwater monitoring was conducted as described in the 2008 PME Plan and subsequent PME Plan Addenda. Groundwater monitoring results are documented in the quarterly progress reports and the semiannual monitoring reports. Ongoing monitoring included periodic groundwater level monitoring and groundwater and surface water quality sampling and analysis at frequencies specified in the 2008 PME Plan. The results from these monitoring events are discussed in Section 6.4.3.

Results from this ongoing monitoring were compared with the trigger levels described in the 2013 Contingency Plan. During the period since the last five-year review, from 2009 through 2013, none of the trigger levels was exceeded in any groundwater or surface water samples.

5.3. Recommendation 3: Construct Expansion to City of Camanche Water Supply and Connect Downgradient Private Water Well Users

During 2009 and 2010, the extension of the city of Camanche municipal water system was constructed to serve designated residences located south of the Site. Construction of this waterline extension, including erection of two new 250,000-gallon capacity water tanks, was funded by ACC/GCC. A total of 20 properties were connected to the expanded water system, and the existing private wells at these properties were decommissioned. The extent of the pipeline extension is shown on Figure 5.

As described in the previous five-year review, the goal of this waterline extension was to limit the risk of potential future residential exposure to groundwater containing COCs. These potentially downgradient properties had been using private wells for their water supply, thereby creating a potential path for human exposure to Site COCs in the future.

5.4. Recommendation 4: Test Potential Technologies for Hot Spot Treatment

Both permanganate, a strong oxidant, and an emulsified vegetable oil solution, serving as a supplemental electron donor, were tested during a field-scale hot spot treatment pilot study conducted by ACC/GCC in 2009. Both treatment agents were found to be effective for reducing locally-elevated PCE

concentrations. Field activities were summarized in a 2009 report prepared by Montgomery Watson Harza (MWH) titled "Hot Spot Pilot Test Field Activities Summary". Subsequent evaluation reports included the "Hot Spot Pilot Test 6-Month Progress Report" dated May 5, 2010, and the "Hot Spot Pilot Test Evaluation Report" dated December 2010. A second hot spot treatment event was implemented in the Fall of 2013.

The Fall 2013 groundwater monitoring event conducted in November 2013 indicated contaminant concentrations were reduced in the monitoring wells where the hot spot treatment was conducted. The performance of the hot spot treatment will continue to be monitored in 2014.

5.5. Summary of Results of Implemented Actions

The actions performed to address Recommendations 1 through 4 from the 2009 Five-Year Review have been implemented and achieved their intended purpose.

6. FIVE-YEAR REVIEW PROCESS

6.1. Administrative Components

The current five-year review was conducted by Brian Zurbuchen of EPA Region 7, Remedial Project Manager (RPM) for the Chemplex site. Other members of the EPA Region 7 staff who contributed to this review include Nancy Swyers (former RPM for the Site), David Hoefer of the Office of Regional Counsel, Bill Pedicino, Greg McCabe, and Catherine Wooster-Brown of the Data Integration and Support Branch, and Ben Washburn of the Office of Public Affairs. Cal Lundberg of the IDNR assisted in the review as the representative of the state of Iowa.

6.2. Community Involvement

On February 19, 2014, a display ad was placed in the Clinton Herald that a five-year review was to be conducted. This notice provided information on how to contact the EPA to provide input. The ad encourages community members to ask questions and report any concerns about the site. As of March 19, 2014, no inquiries have been received with regard to this five-year review.

Soon after approval of this fourth Five-Year Review Report, a notice will be placed in the same newspaper announcing that the report is complete, and that it is available to the public at the Camanche Public Library in Camanche, Iowa and at the EPA, Region 7 office.

6.3. Document Review

This five-year review included a review of relevant documents such as quarterly progress reports and semiannual monitoring reports submitted by ACC/GCC since the Third Five-Year Review Report dated June 2009. Other documents that were reviewed include (a) reports related to the hot spot pilot test, and (b) other documents pertinent to the amended remedy, such as the Updated Focused Feasibility Study, the Proposed Plan, and the ROD Amendment.

6.4. Data Review and Evaluation

6.4.1. Site O&M

As required by the OU 1 CD and the Amended OU 1 CD, MWH on behalf of ACC/GCC has been performing O&M. This work includes preparing monthly operating reports and a quarterly compendium of NPDES monitoring results. These monthly and quarterly operating reports are included within the routine quarterly reports submitted to the EPA and IDNR.

6.4.2. Extraction and Treatment System Monitoring

The existing groundwater extraction and treatment system was shut down September 2008. Although the groundwater extraction and treatment system has not been operating since, ACC/GCC has kept the NPDES permit active. IDNR issued the first NPDES permit on June 20, 1994, with renewals authorized by the state of Iowa in June 1999 and September 2008. ACC/GCC has regularly submitted NPDES renewal applications at the appropriate times. IDNR's permitting group has not always been able to

respond in a timely manner due to staffing resources; however, in these cases, IDNR has indicated that the existing permit remains active pending review of the new permit application. ACC/GCC applied to again renew the NPDES permit in February 2013. NPDES reports continue to be sent to IDNR quarterly in accordance with the existing NPDES permit.

6.4.3. Groundwater and Surface Water Sampling

ACC/GCC was required to perform groundwater and surface water sampling in accordance with the PME Plan approved in October 2008 and associated addenda, the most recent of which is Addendum 4 dated March 2013. Table 3 summarizes the PME Plan and Addendum 4 requirements. A revised PME Plan was prepared in late 2013 and will address sampling requirements for 2014 and future years.

ACC/GCC currently monitors for VOCs in designated extraction and monitoring wells twice annually, as well as at designated surface water sampling locations. Table 5 compiles water quality sampling results from wells south of 21st Street (Hawkeye Rd) and downgradient of the former Chemplex facility that had analyte concentrations exceeding cleanup standards during the 2013 monitoring events.

Figures 6 through 11 depict the locations of monitoring and former extraction wells sampled during 2013. These figures have data boxes compiling historical concentrations of PCE, the primary COC at the Chemplex site. The six figures show results from wells screened in the Overburden, Upper Scotch Grove, Lower Scotch Grove, Farmers Creek, Lower Hopkinton, and Blanding water-bearing zones.

As indicated in Table 5, VOC concentrations in 17 downgradient monitoring wells were above cleanup goals during 2013. All 17 wells are located within the TI Zone (Figure 5), where cleanup goals and other ARARs have been waived as described in the ROD Amendment. These wells are discussed below. This discussion divides the Chemplex site and downgradient areas into a "West Region" and an "East Region" as shown on Figures 6 through 11.

During the 2009 to 2013 period, groundwater concentrations did not exceed any of the levels that would trigger contingency actions under the Contingency Plan (Table 8).

6.4.3.1. PCE Concentrations in West Region Groundwater

In the West Region, ten wells located in the area south of 21st Street / Hawkeye Road and downgradient of the former Chemplex facility were found to have contained PCE concentrations that exceeded cleanup standards in May and/or November 2013. All of these wells are located within the bounds of the TI Zone.

6.4.3.2. PCE Concentrations in East Region Groundwater

In the East Region, seven wells located in the area south of 21st Street / Hawkeye Road and downgradient of the former Chemplex facility were found to have PCE concentrations that exceeded cleanup standards in May and/or November 2013. All of these wells are located within the bounds of the TI Zone.

6.4.3.3. Concentrations of Other VOCs in Groundwater

As indicated in Table 5 and on Figures 13a and 13b, November 2013 concentrations of TCE, cis-1,2-DCE, 1,1-DCE, and vinyl chloride each exceeded cleanup standards in at least one of the downgradient groundwater wells. TCE, cis-1,2-DCE, and vinyl chloride are biodegradation breakdown products from the microbial reductive dechlorination of PCE. Groundwater trends of PCE breakdown products tend to mirror PCE concentration trends.

6.4.3.4. VOC Concentrations in Surface Water

Table 6 and Figure 12 summarize surface water sampling results from 2009 through 2013. As noted in Table 6, PCE and cis-1,2-DCE, along with low concentrations of TCE, trans-1,2-DCE, benzene, 1,1-DCE, and vinyl chloride, have been detected at location SW-1, which is the Western Unnamed Tributary at its crossing under 21st Street. Increases in VOC concentrations have been noted at SW-1 since 2008, although measurements remain well below surface water trigger levels.

Trace concentrations of cis-1,2-DCE and PCE, below the laboratory reporting limit of 0.5 µg/L, have been detected at location SW-2, which is the Eastern Unnamed Tributary at its crossing under 21st Street. Low concentrations of PCE, cis-1,2-DCE, benzene, and TCE have been detected at location SW-3, in Rock Creek just downstream of its confluence with the Western Unnamed Tributary. Only sporadic detections of VOCs have been detected at location SW-4, in Rock Creek just downstream of its confluence with the Eastern Unnamed Tributary.

All concentrations were well below trigger levels for contingency actions under the Contingency Plan (Table 6).

6.4.3.5. VOC Concentrations in Munck Residential Well

ACC/GCC has sampled the Munck residential well on a voluntary basis (see Figure 1). From 2009 through 2013, no VOCs were detected, with the exception of trace detections of methylene chloride (also known as dichloromethane), which is a common laboratory contaminant that has frequently been detected in trip blanks.

6.4.3.6. VOC Concentrations in Equistar Production Wells

ACC/GCC samples four of the Equistar production wells every two years. Table 4 summarizes these results. No valid VOC detections were reported in any of the Equistar production wells during sampling events in 2009, 2011, and 2013.

6.4.3.7. PAH Concentrations

Table 7 compiles PAH concentrations detected from 2009 through 2013 in groundwater and surface water samples. PAHs were not found above cleanup levels in any sample and in general have been detected only sporadically in groundwater and only at low levels in surface water. PAH sampling required by the PME Plans and associated addenda is now limited to surface water location SW-1 (annually) and to the four designated Equistar production wells (biennially). When the Munck residential well is sampled, PAHs are also analyzed in that sample.

6.4.4. Groundwater Level Gauging

As specified in the PME Plans, water-level gauging is conducted to evaluate the groundwater potentiometric surface, lateral gradients and flow directions, and local vertical head differences between stratigraphic units. Gauging events are currently semiannual, in the second and fourth quarters; location and frequency is reviewed during data review meetings with the EPA. The routine monitoring reports prepared by ACC/GCC summarize these gauging events, including potentiometric surface contour maps for the Upper Scotch Grove, the Lower Scotch Grove, and the Farmers Creek layers. Figures 14 through 16 show the potentiometric groundwater surface contours from the gauging event in November 2013.

The potentiometric surface contours are interpolated from the field groundwater level data coupled with groundwater flow simulation results from the Chemplex three-dimensional groundwater flow model and contouring using the Surfer program.

Following the September 2008 shutdown of the groundwater extraction system, water level gauging has continued. In general, the piezometric surface has smoothed since 2008, due to the surface no longer being locally deformed by the cones of depression induced about the extraction wells of the groundwater extraction system.

6.4.4.1. Vertical Head Differences

Figures 17 through 28 present vertical head differences across the relatively low-permeability Picture Rock layer for selected monitoring well pairs. These pairs were originally designated in the 1993 PME Plan for evaluating the potential for mobilizing possible residual DNAPL during recovery system startup.

As shown on Figures 17 through 21, vertical head differences across the Picture Rock in the West Region remained close to neutral under pre-pumping, pumping, and post-pumping conditions at monitoring well (MW)-13, MW-27, and MW-71 well pairs. At MW-18, the pumping increased the upward gradient a near neutral gradient during the pre- and post-pumping conditions. At MW-26, the pumping appears to have slightly reduced the small upward gradient observed during the pre- and post-pumping conditions.

Figures 22 through 28 indicate that under pre- and post-pumping conditions there are strong, naturally downward head gradients across the Picture Rock in portions of the Site's East Region. Downward head differences have been present during groundwater extraction, persisting, although at a lower magnitude, after extraction from the Farmers Creek bedrock layer was suspended in 2005. Head differences in the East Region have continued to be downward after the September 2008 groundwater extraction system shutdown.

ACC/GCC also monitors vertical head differences between the Farmers Creek layer and the underlying Lower Hopkinton layer. Figures 29 and 30 show vertical head difference graphs for two Farmers Creek/Lower Hopkinton well pairs in the West Region, while Figures 31 through 33 illustrate vertical head differences for three adjacent Farmers Creek/Lower Hopkinton well pairs in the East Region.

As shown on Figures 29 through 33, post-shutdown vertical head differences between the Farmers Creek and the Lower Hopkinton formations in the West and East Regions remained close to neutral under pre-pumping, pumping, and post-pumping conditions. Note that for those well pairs where an extraction well was one of the wells monitored, the assessment above is only appropriate for times at which the extraction well was not operating. For example, there is an extremely high downward gradient observed when EW-14c is operating. However, outside of the times the EW-14c itself is operating, the vertical head differences between the Farmers Creek Member and the Lower Hopkinton Formation is close to neutral during pre- and post-pumping conditions, as well as under pumping conditions when other extraction wells are operating.

6.5. Site Inspection and/or Interviews

Nancy Swyers, the EPA's former RPM for the Chemplex site through March 2014, inspected the Site on November 13, 2013. Participating in the inspection were John Hintermeister (MWH's local operations subcontractor, former treatment plant Chief Operator) and Melodie Carr of Equistar. A checklist from the 2001 Five-Year Review guidance was consulted. This completed checklist is included as Appendix A. A photographic log of pictures taken during the inspection is furnished as Appendix B.

The purpose of the inspection was to obtain on-site information pertinent to the Five-Year Review assessment of remedy protectiveness. The inspection encompassed the former Chemplex Landfill and other OU 2 Study Areas and the Groundwater Treatment Building. Inspection of the OU 2 Study Areas within the Equistar plant was facilitated by Melodie Carr.

The inspection also included a tour of the completed extension of the Camanche municipal water system and new water towers. This portion of the inspection was facilitated by Tom Roth and Dave Rickertsen of the city of Camanche. The city of Camanche indicated that construction of the municipal water system extension and storage tanks went well, and that the system operates properly. No major issues have recently been raised by connected residents.

The conclusion of the inspection is that the OU 2 Study Areas and the now-inactive Treatment Building are well-maintained and secured. Treatment plant records were readily available and up to date. The extension of the city of Camanche water system is operating properly. No land use changes have occurred either within the Site or adjacent to the Site since the last Five-Year Review.

7. TECHNICAL ASSESSMENT

This technical assessment addresses the three questions laid out in the EPA's July 2001 Comprehensive Five-Year Review Guidance to assess remedy protectiveness. For this technical assessment, the Decision Documents are considered to be the 2012 ROD Amendment for OU 1 and the 1993 ROD for OU 2.

7.1. Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Yes. As described below, the remedy is functioning as intended by the Decision Documents.

The review of site documents, ARARs, risk assumptions and the results of site inspections indicate that the remedy is functioning as intended by the Decision Documents in the following ways:

- The remedy is meeting RAO 1 of preventing human exposure to VOCs in groundwater and accessible surface waters at levels greater than a cumulative Hazard Index of 1.0 for non-carcinogenic risks and a cumulative incremental lifetime cancer risk exceeding the range of 10^{-4} to 10^{-6}. To date, VOC concentrations in downgradient groundwater and accessible surface water have been below the trigger levels that would warrant actions under the 2013 Contingency Plan.

- The remedy is meeting RAO 2 of limiting exposure by potential ecological receptors in Rock Creek and downgradient surface waters to PCE at levels exceeding 98 µg/L, TCE at levels exceeding 80 µg/L, 1,2-DCE at levels exceeding 590 µg/L, and vinyl chloride at levels exceeding 930 µg/L. To date, surface water concentrations of these analytes have been well below these trigger levels (Table 6).

- The remedy is meeting RAO 3 of preventing migration of site-related COCs, above the health-based concentrations described in RAO 1, to those portions of downgradient areas where groundwater is being used as a potable water supply. To date, VOC concentrations in groundwater wells have been below trigger levels set forth in the 2013 Contingency Plan.

- The institutional controls required by the ROD and ROD Amendment have been implemented to help prevent exposure to impacted groundwater and surface water.

- The westward extension of the Camanche municipal water system and the removal of private water wells at potentially-downgradient residences have provided protection against human exposure to groundwater containing COCs.

- Hot spot treatment of locally-elevated PCE concentrations was found to be successful during the 2009 pilot test. A second round of hot spot treatment was performed on selected wells during the Fall of 2013. The initial results of the November 2013 Fall groundwater sampling event indicate a reduction in COCs. Performance monitoring of the hot spot treatment will continue.

- The annual inspections of the OU 2 Study Areas performed by ACC/GCC have been effective in maintaining the integrity of the caps and vegetative covers implemented under the OU 2 remedial action.

ACC/GCC continues to monitor the status of the groundwater plumes and continues to submit groundwater sampling reports and progress reports to the EPA. Ongoing groundwater and surface monitoring will document that human health and the environment continue to be protected by the remedy.

7.2. Question B – Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Changes in Standards and To-Be-Considered Guidelines (TBCs)

- *Have there been changes to risk-based cleanup levels or standards identified as Applicable or Relevant and Appropriate Requirements (ARARs) in the ROD that call into question the protectiveness of the remedy?*

    - Table 2 of this Five Year Review report contains the groundwater cleanup levels that were revised at the time of the December 2012 ROD Amendment. These revised cleanup levels generally meet the EPA's health-based screening levels for tapwater at the 1×10^{-6} potential excess cancer risk level, or a hazard index equal to 1 for non-carcinogens. The exception to this is naphthalene. The 1×10^{-5} potential excess cancer risk level of 1.4 µg/l is the cleanup level for naphthalene used for this Site because there have been downgradient detections of naphthalene that are believed to not be attributed to the Site (see footnote f of Table 2). The 1×10^{-5} potential excess cancer risk is still within the acceptable risk range of 1×10^{-4} to 1×10^{-6}. The EPA's Regional Screening Values can be found at the following web address: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.html.

    - Table 8 of this Five Year Review report compares concentrations of COCs with trigger levels established in the Contingency Plan. During the 2009 to 2013 period, groundwater concentrations did not exceed any levels that would trigger contingency actions under the Contingency Plan. Higher concentrations of COC are detected in the upgradient areas of the Site but the plume concentrations remain stable. Continued groundwater and surface water monitoring as well as hot spot treatment to address elevated groundwater concentrations in the plume will continue to ensure that the remedy remains protective.

    - The surface water trigger levels (see below) for the contaminants of concern (COCs) proposed in the Final Chemplex Feasibility Study (FS) (2007) are still appropriate:

        TCE—80 µg/L
        PCE—98 µg/L
        cis-1,2-DCE—590 µg/L
        vinyl chloride—25 µg/L

- *Are there newly promulgated standards that call into question the protectiveness of the remedy?*

    - We are not aware of any newly promulgated standards that call into question the protectiveness of the remedy.

- *Have TBCs used in selecting cleanup levels at the site changed in a way that could affect the protectiveness of the remedy?*

    - We are not aware of the use of TBCs in selecting cleanup levels for the Site.

Changes in Exposure Pathways

- *Has land use or expected land use on or near the Site changed (e.g., industrial to residential, commercial to residential)?*

    - We are not aware of any land use changes or potential land use changes at the Site.

- *Have any human health or ecological routes of exposure or receptors changed or been newly identified (e.g., dermal contact where none previously existed, new populations or species identified on site or near the site) that could affect the protectiveness of the remedy?*

    - The human health risk assessor commented on the potential impact of the vapor intrusion pathway at the Panther Logistics building. The Five Year Review team members reviewed and evaluated the data near the building. The building is located near overburden MW-107A. The groundwater concentrations of PCE in that well have been less than 2 µg/l. Based on the low concentrations of PCE in that well, the team decided that the groundwater concentrations in that area are not high enough to be of concern for the vapor intrusion pathway.

    - We are not aware of any changed or new ecological routes of exposure.

- *Are there newly identified contaminants or contaminant sources?*

    - We are not aware of any newly identified contaminants or contaminant sources. Recent data do not show any new contaminants or contaminant sources.

- *Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents (e.g., byproducts not evaluated at the time of remedy selection)?*

    - We are not aware of any unanticipated toxic byproducts.

    - In accordance with the 2012 PME Plan, a surface water sample was collected at SW-1 and analyzed for Polycyclic Aromatic Hydrocarbons (PAHs). Results were below surface water ecological screening levels.

- *Have physical site conditions (e.g., changes in anticipated direction or rate of groundwater flow) or the understanding of these conditions (e.g., changes in anticipated direction or rate of groundwater flow) changed in a way that could affect the protectiveness of the remedy?*

    - No, we are not aware of any changed physical site conditions that affect the remedy. The OU1 and OU2 RODs concluded that groundwater suppression; capping; a SVE system

for the landfill area; establishment of vegetative covers in other areas of the site; and institutional controls in all areas would remove/reduce/cover COCs in the soils and the groundwater. These systems are in place and as long as they are maintained regularly, the physical site conditions should remain protective.

Changes in Toxicity and Other Contaminant Characteristics

- *Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy?*
    - Table 5 of the December, 2012 ROD Amendment contains the revised cleanup levels, which are based on the latest toxicity information available to the EPA. With the exception of naphthalene (see comment above), these revised cleanup levels generally meet the EPA's health-based screening levels for tapwater at the 1×10^{-6} potential excess cancer risk level, or a hazard index equal to one for non-carcinogens.
- *Have other contaminant characteristics changed in a way that could affect protectiveness of the remedy?*
    - We are not aware of any other changes to contaminant characteristics that could impact the protectiveness of the remedy.

Changes in Risk Assessment Methods

- *Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?*
    - The EPA has significantly revised several of its risk assessment methodologies since the signing of the original ROD in 1989. However, these revisions generally do not impact the protectiveness of the remedy.

7.3. Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

- *Are there impacts from natural disasters (e.g., a 100-year flood)?*
    - We are not aware of any natural disasters that have occurred on this Site.
- *Has any other information come to light which could affect the protectiveness of the remedy?*
    - We are not aware of any other information which could affect the protectiveness of the remedy.
- *Have newly found ecological risks been found?*
    - No.

8. ISSUES

As noted, PCE concentrations have increased in Site groundwater monitoring wells during the 2009 to 2013 period. Four of these wells were selected for localized hot spot treatment during the Fall of 2013. The effectiveness of this latest hot spot treatment is currently being monitored. ACC/GCC will submit a report describing the results of this hot spot treatment event to the EPA following the collection of one year of analytical data, with reporting anticipated for early 2015. Periodic PCE hot-spot treatment injections are available as contingency measures as part of the OU 1 remedy as described in the 2013 Contingency Plan.

9. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendations and Follow-up Actions	Responsible Party	Oversight Agency	Mile-stone Date	Affects Protectiveness (Y/N)	
					Current	Future
Hot Spot Treatment Evaluation	ACC/GCC to evaluate results from Fall 2013 hot spot treatment event and report to the EPA. Additional hot spot treatment may be implemented in the future based on the review and evaluation of future groundwater monitoring results.	ACC/GCC	EPA	2/2015	N	N

10. PROTECTIVENESS STATEMENT

The OU 1 remedy is protective of human health and the environment.

The OU 2 remedy is protective of human health and the environment.

Because the remedial actions at all OUs are protective, the site is protective of human health and the environment.

11. NEXT REVIEW

The next five-year review for the Chemplex site is tentatively scheduled for June 2019, five years from the date of this review.

12. REFERENCES

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Tables

TABLE 1

Chronology of Site Events

Chemplex Site -- Clinton, Iowa

Date	Operable Unit	Event or Submittal
1968		Chemplex facility started operation
10/15/1984		Proposed for National Priorities List (NPL)
09/08/1987		Consent Order for Remedial Investigation/Feasibility Study (RI/FS)
09/27/1989	OU 1	Record of Decision (ROD) Issued
12/28/1989	OU 2	Administrative Order on Consent (AOC) for RI/FS
02/11/1991		Withdrawn from list of sites proposed for the NPL
07/26/1991	OU 1	Explanation of Significant Differences (ESD) issued by EPA
11/07/1991	OU 1	Consent Decree (CD) for Remedial Design/Remedial Action (RD/RA) entered
05/12/1993	OU 2	ROD issued by EPA
11/01/1993	OU 1	Performance Monitoring Evaluation (PME) Plan submitted to EPA
02/02/1994	OU 1	RD completed
05/31/1994	OU 1	RA construction began
Dec. 1994	OU 1	Groundwater extraction and treatment system begins active operation
02/06/1995	OU 2	CD for RD/RA entered
02/16/1995	OU 1	Groundwater extraction achieves full startup with all extraction wells online
09/14/1995	OU 1	Preliminary Close Out Report signed
12/18/1996	OU 2	RD completed
Feb. 1998	OU 2	Landfill Gas Extraction (LGE) System begins active operation
06/09/1999		First Five Year Review issued by EPA
04/09/2003	OU 2	Soil Vapor Extraction system ceased operation, with EPA approval
06/09/2004		Second Five Year Review issued by EPA
Nov. 2005	OU 1	Suspension of groundwater extraction from Landfill Wells and Farmers Creek Wells, with EPA approval
20 July 2007	OU 1	ACC/GCC submits Final Focused Feasibility Study Report (FFFS)
04/09/2008	OU 1	EPA issues Statement of Additional Work (SOAW) and conditionally approves shutting down the groundwater extraction system, subject to completion of actions and documents outlined in the SOAW.
Apr. 2008	OU 1	ACC/GCC performs baseline groundwater sampling.
July 2008	OU 1	Revised PME Plan submitted
09/26/2008	OU 1	EPA approves shutdown of groundwater extraction system and placement into long-term standby service for remedy performance testing.
03/17/2009	OU 1	Hot Spot Pilot Test Work Plan submitted
06/05/2009		Third Five-Year Review issued by EPA
05/05/2010	OU 1	Hot Spot Pilot Test Six-month Progress Report submitted
Fall 2010	OU 1	City of Camanche waterline extension and all residential connections completed
12/21/2010	OU 1	Hot Spot Pilot Test Evaluation Report submitted
02/08/2012	OU 1	Updated Focused Feasibility Study Report for OU 1 (UFFS) submitted
02/17/2012	OU 1	Proposed Plan for revised remedy issued by EPA
02/27/2012	OU 1	Public meeting to discuss Proposed Plan for revised remedy
12/26/2012	OU 1	ROD Amendment issued by EPA

Table 2

Groundwater Cleanup Goals

Chemplex Site – Clinton, Iowa

Compound	Former Groundwater Cleanup Goals as of 1999 (ug/L) (a)	New Groundwater Cleanup Goals (ug/L) in ROD Amendment	Notes
Volatile Organic Compounds			
Benzene	1	5	(h)
1,2-Dichlorobenzene	600	600	
1,1-Dichloroethene	7	7	(h)
1,2-Dichloroethene (sum of cis and trans isomers)	70	-- (b)	(b),(h)
cis-1,2-Dichloroethene	--	70	(h)
trans-1,2-Dichloroethene	--	100	
Ethylbenzene	700	700	
Methylene Chloride	5	5	(c)
Styrene	100	100	
1,1,2,2-Tetrachloroethane	0.2	-- (d)	
Tetrachloroethene	5	5	(h)
Toluene	2,000	1,000	
1,1,1-Trichloroethane	200	200	
Trichloroethene	3	5	(h)
Vinyl Chloride	0.015	2	(h)
Xylenes	10,000	10,000	
Polynuclear Aromatic Hydrocarbons			
Benzo(a)pyrene	0.2	0.2	(e)
Naphthalene	20	1.4	(f)
Metals			
Antimony	3	6	
Arsenic	0.03	10	(g)
Barium	2,000	2,000	

Notes:

(a) Cleanup Goals are as shown in the Five Year Report for the Chemplex Site, dated 9 June 1999 and prepared by the U. S. Environmental Protection Agency, Region 7. The groundwater cleanup goals for the then-current remedy were established based on Chapter 133 of the Iowa Administrative Code, which became effective in 1989. These provisions set forth a hierarchical approach to set "action levels" that, if exceeded, would require identification of the nature and extent of a release. These action levels were not intended by the Iowa Department of Natural Resources to be established as cleanup levels. The hierarchy to select action levels was: (1) select the Lifetime Health Advisory Level (HAL), if one exists; (2) if no HAL exists, select the Negligible Cancer Risk Level (NRL); and (3) if no HAL or NRL exists, select the drinking water Maximum Contaminant Level (MCL). Under current regulatory practice in the State of Iowa, MCLs are now commonly applied for "protected" groundwater sources.

(b) The Consent Decree for the Chemplex First Operable Unit, dated September 1990, set forth a Groundwater Cleanup Standard of 70 micrograms per liter (ug/L) for total 1,2-Dichloroethene (Total 1,2-DCE) based on the then-current Health Advisory Level (HAL). This standard was established for the total of the cis and trans isomers because the analytical instruments at that time could not readily separate and report the two isomers individually. Because modern instruments can report the concentration of each isomer, and because both isomers now have Federal Drinking Water Maximum Contaminant Levels (MCLs), a Groundwater Cleanup Goal will be established for each isomer that is equal to its MCL. A cleanup goal for Total 1,2-DCE is thus no longer needed.

Table 2
Groundwater Cleanup Goals
Chemplex Site – Clinton, Iowa

(c) Methylene chloride has been sporadically detected in Site groundwater analyses. These detections of methylene chloride, a common laboratory contaminant, in Chemplex groundwater are believed to result from laboratory contamination in view of repeated detections of this analyte in trip and field blanks collected during Site sampling events. Methylene chloride will continue to be evaluated in the Chemplex groundwater monitoring network.

(d) 1,1,2,2-tetrachloroethane was not detected above the current cleanup standard, and therefore does not appear to be a chemical of concern at this Site. This analyte's cleanup standard has thus been deleted.

(e) Benzo(a)pyrene is a polynuclear aromatic hydrocarbon (PAH) associated with historic releases of debutanized aromatic concentrate (DAC), a byproduct of ethylene production. As PAHs such as benzo(a)pyrene are generally less mobile in groundwater compared with volatile organic compounds (VOCs), their distribution at the Chemplex Site is not as widespread as PCE and its daughter products. Benzo(a)pyrene has occasionally been found in groundwater downgradient of the DAC management area of the polyethylene plant.

(f) Naphthalene is a PAH associated with historic releases of DAC and potentially with wastes disposed of in the Chemplex Landfill. The 1990 Consent Decree used the HAL for naphthalene, 20 ug/L, as a surrogate for establishment of cleanup standards for a number of non-carcinogenic PAHs. EPA has not established an MCL for naphthalene. EPA has now determined that naphthalene may be a carcinogen, and has set a concentration of 1.4 ug/L, equivalent to a risk level of one-in-one hundred thousand (10^{-5}), as a presumptive groundwater cleanup goal. As PAHs such as naphthalene are generally less mobile in groundwater compared with VOCs, their distribution at the Chemplex Site is not as widespread as PCE and its daughter products. Naphthalene has occasionally been found at levels below 20 ug/L but above 1.4 ug/L in groundwater immediately downgradient of the DAC management area. Naphthalene has also been occasionally detected above 1.4 ug/L in the far downgradient area of the Chemplex groundwater monitoring network. Given this analyte's limited mobility and the lack of a discernible naphthalene plume emanating from the plant area, it is not believed these far downgradient detections result from past plant operations.

(g) Arsenic has been detected at the Chemplex Site at concentrations greater than the Proposed Groundwater Cleanup Goal. However, high background levels of arsenic are typical in Iowa. The Chemplex Site is not a confirmed source of metals, including arsenic. With EPA's concurrence, arsenic and other metals are no longer routinely sampled in Site groundwater.

(h) Groundwater cleanup standard is subject to a TI waiver within the TI Zone.

Abbreviations:

HAL = Health Advisory Level
MCL = Maximum Contaminant Level
NRL = Negligible Risk Level
ug/L = micrograms per liter

TABLE 3
Summary of Sampling Required by the 2013 PME Plan and PME Plan Addendum 4
Chemplex Site -- Clinton, Iowa

Sampling Location	2013 Frequency (1)	Required Analyses	Last Sampling Event
3	Semiannual	VOCs	18 to 20 November 2013
ARC MW-200B	Semiannual	VOCs	18 to 20 November 2013
ARC MW-200C	Semiannual	VOCs	18 to 20 November 2013
ARC MW-200D	Semiannual	VOCs	18 to 20 November 2013
ARC MW-201B	Annual	VOCs	6 to 8 May 2013
ARC MW-201C	Annual	VOCs	6 to 8 May 2013
ARC MW-205B	Annual	VOCs	6 to 8 May 2013
ARC MW-205C	Annual	VOCs	6 to 8 May 2013
ARC MW-205D	Annual	VOCs	6 to 8 May 2013
ARC MW-206B	Annual	VOCs	6 to 8 May 2013
ARC MW-207B	Annual	VOCs	6 to 8 May 2013
ARC MW-207C	Annual	VOCs	6 to 8 May 2013
ARC MW-208B	Annual	VOCs	6 to 8 May 2013
ARC MW-208C	Annual	VOCs	6 to 8 May 2013
ARC MW-209BC	Semiannual	VOCs	18 to 20 November 2013
ARC MW-211C	Semiannual	VOCs	18 to 20 November 2013
DG-16	Annual	VOCs	6 to 8 May 2013
DG-18B	Semiannual	VOCs	18 to 20 November 2013
DG-21B	Semiannual	VOCs	18 to 20 November 2013
DG-21C	Semiannual	VOCs	18 to 20 November 2013
EW-3a	Annual	VOCs	6 to 8 May 2013
EW-6c	Annual	VOCs	6 to 8 May 2013
EW-7a	Semiannual	VOCs	18 to 20 November 2013
EW-7b	Annual	VOCs	6 to 8 May 2013
EW-11a	Annual	VOCs	6 to 8 May 2013
EW-11b	Annual	VOCs	6 to 8 May 2013
EW-11c	Annual	VOCs	6 to 8 May 2013
EW-13b	Annual	VOCs	6 to 8 May 2013
EW-14b	Annual	VOCs	6 to 8 May 2013
EW-14c	Semiannual	VOCs	18 to 20 November 2013
MUNCK (2)	Annual	VOCs, PAHs	6 to 8 May 2013
MW-18B	Annual	VOCs	6 to 8 May 2013
MW-18C	Semiannual	VOCs	18 to 20 November 2013
MW-53A	Semiannual	VOCs	18 to 20 November 2013
MW-57-1	Semiannual	VOCs	18 to 20 November 2013
MW-70	Annual	VOCs	6 to 8 May 2013
MW-73	Semiannual	VOCs	18 to 20 November 2013
MW-82B	Annual	VOCs	6 to 8 May 2013
MW-82C	Annual	VOCs	6 to 8 May 2013
MW-85B	Annual	VOCs	6 to 8 May 2013
MW-85C	Annual	VOCs	6 to 8 May 2013
3	Semiannual	VOCs	18 to 20 November 2013
MW-94A	Annual	VOCs	6 to 8 May 2013

TABLE 3
Summary of Sampling Required by the 2013 PME Plan and PME Plan Addendum 4
Chemplex Site -- Clinton, Iowa

Sampling Location	2013 Frequency (1)	Required Analyses	Last Sampling Event
MW-97A	Semiannual	VOCs	18 to 20 November 2013
MW-97C	Annual	VOCs	6 to 8 May 2013
MW-99A	Semiannual	VOCs	18 to 20 November 2013
MW-103B	Semiannual	VOCs	18 to 20 November 2013
MW-103C	Semiannual	VOCs	18 to 20 November 2013
MW-103D	Semiannual	VOCs	18 to 20 November 2013
MW-104B	Annual	VOCs	6 to 8 May 2013
MW-104C	Annual	VOCs	6 to 8 May 2013
MW-105B	Semiannual	VOCs	18 to 20 November 2013
MW-105C	Semiannual	VOCs	18 to 20 November 2013
MW-106A	Semiannual	VOCs	18 to 20 November 2013
MW-106B	Semiannual	VOCs	18 to 20 November 2013
MW-106C	Semiannual	VOCs	18 to 20 November 2013
MW-107A	Semiannual	VOCs	18 to 20 November 2013
MW-107B	Semiannual	VOCs	18 to 20 November 2013
MW-107C	Semiannual	VOCs	18 to 20 November 2013
MW-108B	Annual	VOCs	6 to 8 May 2013
MW-108C	Annual	VOCs	6 to 8 May 2013
MW-109B	Semiannual	VOCs	18 to 20 November 2013
MW-109C	Semiannual	VOCs	18 to 20 November 2013
MW-110B	Annual	VOCs	6 to 8 May 2013
MW-112A	Annual	VOCs	6 to 8 May 2013
MW-113A	Semiannual	VOCs	18 to 20 November 2013
MW-116A	Semiannual	VOCs	18 to 20 November 2013
MW-117B	Annual	VOCs	6 to 8 May 2013
MW-117C	Semiannual	VOCs	18 to 20 November 2013
MW-118C	Annual	VOCs	6 to 8 May 2013
MW-119A	Semiannual	VOCs	18 to 20 November 2013
MW-119B	Semiannual	VOCs	18 to 20 November 2013
MW-119C	Semiannual	VOCs	18 to 20 November 2013
MW-120A	Annual	VOCs	6 to 8 May 2013
MW-120B	Annual	VOCs	6 to 8 May 2013
MW-121A	Annual	VOCs	6 to 8 May 2013
MW-121B	Annual	VOCs	6 to 8 May 2013
MW-121C	Annual	VOCs	6 to 8 May 2013
MW-122A	Annual	VOCs	6 to 8 May 2013
MW-122B	Annual	VOCs	6 to 8 May 2013
MW-122C	Annual	VOCs	6 to 8 May 2013
MW-129A	Semiannual	VOCs	18 to 20 November 2013
3	Semiannual	VOCs	18 to 20 November 2013
SW-1	Semiannual	VOCs, PAHs	18 to 20 November 2013
SW-2	Semiannual	VOCs, PAHs	18 to 20 November 2013
SW-3	Semiannual	VOCs, PAHs	18 to 20 November 2013

TABLE 3
Summary of Sampling Required by the 2013 PME Plan and PME Plan Addendum 4
Chemplex Site -- Clinton, Iowa

Sampling Location	2013 Frequency (1)	Required Analyses	Last Sampling Event
SW-4	Semiannual	VOCs, PAHs	18 to 20 November 2013
WELL 1Q	Once	VOCs	6 to 8 May 2013
WELL 4Q	Once	VOCs	6 to 8 May 2013
WELL 6Q	Once	VOCs	6 to 8 May 2013
WELL 7Q	Once	VOCs	6 to 8 May 2013

Notes:

(1) Sampling frequency as indicated in the 2013 PME Plan Addendum 4, dated 26 April 2013.
Annual - location to be sampled once, in Spring 2013.
Semiannual - locations to be sampled twice, in Spring and Fall 2013.
Once - location to be sampled once in 2013 (sampled in odd-numbered years only).

(2) ACC/GCC may sample residential wells from time to time on a voluntary basis. The Munck residential well was sampled on this basis in 2013, and is anticipated to be sampled again in 2014

Abbreviations:

EPA = Environmental Protection Agency, Region 7
PME = Performance Monitoring Evaluation

TABLE 4

Summary of VOCs Detected in Equistar Production Wells - 2009 through 2013

Chemplex Site -- Clinton, Iowa

Sample Location	Sample Date (b)	Concentration in ug/L (a)				
		cis-1,2-Dichloroethene	Methylene Chloride (c)	Tetrachloroethene	Trichloroethene	All Other VOCs
WELL 1Q	5/14/2009	0.5 U	0.5 U	0.5 U	0.5 U	ND
	5/25/2011	0.5 U	8.1 UB	0.5 U	0.5 U	ND
	5/8/2013	0.5 U	0.5 U	0.5 U	0.5 U	ND
WELL 4Q	5/14/2009	0.5 U	0.5 U	0.5 U	0.5 U	ND
	5/25/2011	0.5 U	5.6 UB	0.5 U	0.5 U	ND
	5/8/2013	0.5 U	0.5 U	0.5 U	0.5 U	ND
WELL 6Q	5/14/2009	0.5 U	0.5 U	0.5 U	0.5 U	ND
	5/25/2011	0.5 U	5.1 UB	0.5 U	0.5 U	ND
	5/8/2013	0.5 U	0.5 U	0.5 U	0.5 U	ND
WELL 7Q	5/14/2009	0.5 U	0.5 U	0.5 U	0.5 U	ND
	5/25/2011	0.5 U	4.9 UB	0.5 U	0.5 U	ND
	5/8/2013	0.5 U	0.5 U	0.5 U	0.5 U	ND

Abbreviations:

ND = Not Detected. ug/L = micrograms per liter. VOC = volatile organic compound.

Notes:

(a) A "U" following the value indicates that the analyte was not detected above the method detection limit indicated. A "UB" following the value indicates that the analyte was detected at a similar concentration in a blank, and therefore the analyte is considered to be not detected.

(b) Under the 2008 Performance Monitoring Evaluation Plan and subsequent addenda, the Equistar Production Wells are sampled only in odd-numbered years and thus were not sampled in 2010 and 2012.

TABLE 5

Wells Downgradient of the Equistar Property with Detected Chemical Concentrations Exceeding Cleanup Goals during 2013 Sampling Events (a)

Chemplex Site -- Clinton, Iowa

Screened Layer	Site Region	Well ID	Analyte Exceeding Cleanup Standard	Cleanup Goal (ug/L)	May 2013 Detected Concentration (ug/L)	November 2013 Detected Concentration (ug/L)
Overburden	West	3	PCE	5	450	640
			TCE	5	21	25
		MW-53A	PCE	5	190	88
			TCE	5	16	15
Upper Scotch Grove	West	DG-21B	PCE	5	20	23
			TCE	5	6.8	11
		EW-7a	PCE	5	980	1000
			TCE	5	28	35
		EW-11a	1,1-DCE	7	11	-
			cis-1,2-DCE	70	130	-
			PCE	5	100	-
			TCE	5	53	-
			VC	2	2.3	-
		MW-97A	PCE	5	6	25
	East	MW-106A	PCE	5	43	62
Lower Scotch Grove	West	DG-21C	PCE	5	14	16
			TCE	5	5.7	8.3
		MW-110B	PCE	5	8.7/11 (b)	-
	East	MW-106B	PCE	5	7.2	8.2
		MW-107B	PCE	5	19	22
		MW-109B	cis-1,2-DCE	70	170	<0.5
			PCE	5	1100	<0.5
			TCE	5	55	<0.5
Farmers Creek	West	MW-97C	PCE	5	51	-
		EW-11b	PCE	5	110	-
			TCE	5	42	-
	East	MW-106C	PCE	5	160	4.2
			TCE	5	8.6	<0.5
		MW-107C	PCE	5	24	24
		MW-109C	PCE	5	740	<1
			TCE	5	33	<1
			cis-1,2-DCE	70	110	<1

Abbreviations:

1,1-DCE = 1,1-dichloroethene TCE = trichloroethene cis-1,2-DCE = cis-1,2-dichloroethene ug/L = micrograms per liter

PCE = tetrachloroethene VC = vinyl chloride

Notes:

(a) For purposes of this Table, "downgradient of the Site" is considered to be south of 21st Street (also known as Hawkeye Road).

(b) Duplicate samples were collected.

TABLE 6

Summary of VOCs Detected in Surface Water - January 2009 through November 2013

Chemplex Site – Clinton, Iowa

Sample ID (c)	Sample Date	Concentration in ug/L (a) (b)												
		Acetone (d)	Benzene	Butanone (d)	Chloromethane	1,1-Dichloroethene	**cis-1,2-Dichloroethene**	Trans-1,2-Dichloroethene	Methylene Chloride	**Tetrachloroethene**	Toluene	**Trichloroethene**	Trichlorotrifluoroethane	**Vinyl Chloride**
Surface Water Trigger Level		-	-	-	-	-	**590**	-	-	**98**	-	**80**	-	**25**
SW-1	5/11/2009	6.9 U	**0.3 J**	5 U	0.5 U	0.5 U	**9.2**	0.5 U	0.5 U	**4.3**	0.5 U	**1.8**	0.5 U	0.5 U
SW-1 (DUP)	5/11/2009	5 U	**0.32 J**	5 U	0.5 U	0.5 U	**9.4**	0.5 U	0.5 U	**4.1**	0.5 U	**2**	0.5 U	0.5 U
SW-1	8/4/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	**9.4**	0.5 U	0.5 U	**3**	0.5 U	**0.9**	0.5 U	0.5 U
SW-1 (DUP)	8/4/2009	5.2 U	0.5 U	5 U	0.5 U	0.5 U	**9.2**	0.5 U	0.5 U	**2.5**	0.5 U	**0.86**	0.5 U	0.5 U
SW-1	11/3/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	**11**	0.5 U	0.25 J	**5.1**	0.5 U	**1.4**	0.5 U	**0.27 J**
SW-1 (DUP)	11/3/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	**11**	0.5 U	0.28 J	**4.9**	0.5 U	**1.2**	0.5 U	**0.28 J**
SW-1	5/13/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	**9.7**	0.5 U	0.71 UB	**4.6**	0.5 U	**0.8**	0.5 U	**0.43 J**
SW-1 (DUP)	5/13/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	**9.4**	0.5 U	1.3 UB	**4.7**	0.5 U	**0.72**	0.5 U	**0.5**
SW-1	11/2/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	**23**	0.5 U	0.78 UB	**2.1**	0.5 U	**0.9**	0.5 U	**0.73**
SW-1 (DUP)	11/2/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	**23**	0.5 U	0.5 U	**2.6**	0.5 U	**0.9**	0.5 U	**0.74**
SW-1	5/24/2011	2.9 J	0.5 U	5 U	0.5 U	0.5 U	**16 J**	0.5 U	0.54 UB	1.7 UB	0.5 U	**0.56**	0.5 U	**0.45 J**
SW-1 (DUP)	5/24/2011	2.5 J	0.5 U	5 U	0.5 U	0.5 U	**15**	0.5 U	0.52 UB	**1.7**	0.5 U	**0.61**	0.5 U	**0.56**
SW-1	11/9/2011	5 U	0.5 U	5 U	0.5 U	0.5 U	**12**	0.5 U	33 UB	**4.2**	0.5 U	**0.99**	0.5 U	**0.89**
SW-1 (DUP)	11/9/2011	5 U	0.5 U	5 U	0.5 U	0.5 U	**13**	0.5 U	16 UB	**4.4**	0.5 U	**1.0**	0.5 U	**0.98**
SW-1	5/2/2012	5 U	0.5 U	5 U	0.5 U	0.5 U	**28**	0.5 U	5.7 B	**5.2**	0.5 U	**1.7**	0.5 U	**0.97**
SW-1 (DUP)	5/2/2012	5 U	0.5 U	5 U	0.5 U	0.5 U	**27**	0.5 U	4.6 B	**4.8**	0.5 U	**1.5**	0.5 U	**0.88**
SW-1	10/31/2012	2.3 J	0.5 U	5 U	0.5 U	0.5 U	**56**	**0.3 J**	2.1 UB	**1.9**	0.5 U	**1.4**	0.5 U	**1.8**
SW-1 (DUP)	10/31/2012	2.1 J	0.5 U	5 U	0.5 U	0.5 U	**54**	**0.32 J**	0.33 UB	**2.0**	0.5 U	**1.4**	0.5 U	**1.7**
SW-1	5/7/2013	5 U	0.5 U	5 U	0.5 U	0.5 U	**33**	0.5 U	0.5 U	**7.2**	0.5 U	**2.5**	0.5 U	**0.93**
SW-1 (DUP)	5/7/2013	5 U	0.5 U	5 U	0.5 U	0.5 U	**31**	0.5 U	0.5 U	**7.2**	0.5 U	**2.2**	0.5 U	**0.93**
SW-1	11/20/2013	5 U	0.5 U	5 U	0.5 U	**0.3 J**	**93**	**0.41 J**	0.5 U	**1.9**	0.5 U	**1.3**	0.5 U	**2.4**
SW-1 (DUP)	11/20/2013	5 U	0.5 U	5 U	0.5 U	0.5 U	**100**	**0.53**	0.5 U	**1.6**	0.5 U	**1.4**	0.5 U	**2.6**
SW-2	5/11/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	**0.23 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-2	8/5/2009	4 U	0.5 U	4 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-2	11/4/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.25 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-2	5/12/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.22 UB	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

TABLE 6

Summary of VOCs Detected in Surface Water - January 2009 through November 2013

Chemplex Site – Clinton, Iowa

Sample ID (c)	Sample Date	Concentration in ug/L (a) (b)												
		Acetone (d)	Benzene	Butanone (d)	Chloromethane	1,1-Dichloroethene	**cis-1,2-Dichloroethene**	Trans-1,2-Dichloroethene	Methylene Chloride	**Tetrachloroethene**	Toluene	**Trichloroethene**	Trichlorotrifluoroethane	**Vinyl Chloride**
Surface Water Trigger Level		-	-	-	-	-	**590**	-	-	**98**	-	**80**	-	**25**
SW-2	11/2/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-2	5/24/2011	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-2	11/9/2011	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	16 UB	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-2	5/2/2012	R	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.56 UB	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-2	10/30/2012	2.3 J	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.67**	0.5 U	0.5 U	0.5 U	0.5 U
SW-2	5/7/2013	5 U	0.5 U	5 U	0.5 U	0.5 U	**0.37 J**	0.5 U	0.5 U	**0.39 J**	0.5 U	0.5 U	0.5 U	0.5 U
SW-2	11/19/2013	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.44 J**	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	5/11/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	**0.67**	0.5 U	0.5 U	**0.35 J**	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	8/4/2009	6 U	0.5 U	4 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	11/4/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	**1.8**	0.5 U	0.35 J	**1.5**	0.5 U	**0.29 J**	0.5 U	0.5 U
SW-3	5/12/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.88 UB	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	11/2/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	**0.75**	0.5 U	0.5 U	**1.5**	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	5/24/2011	3.5 J	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.85 UB	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	11/9/2011	2.7 J	0.51	5 U	0.5 U	0.5 U	0.44 J	0.5 U	19 UB	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	5/2/2012	5 U	0.5 U	5 U	0.5 U	0.5 U	**0.37 J**	0.5 U	3.4 UB	**0.4 J**	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	10/30/2012	2.7 J	0.5 U	5 U	0.5 U	0.5 U	**0.89**	0.5 U	0.5 U	**1.5**	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	5/7/2013	5 U	0.5 U	5 U	0.5 U	0.5 U	**0.76**	0.5 U	0.5 U	**0.61**	0.5 U	0.5 U	0.5 U	0.5 U
SW-3	11/20/2013	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.37 J**	0.5 U	0.5 U	0.5 U	0.5 U
SW-4	5/11/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-4	8/5/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-4	11/4/2009	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-4	5/12/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.58 UB	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-4	11/2/2010	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.21 J**	0.5 U	0.5 U	0.5 U
SW-4	5/24/2011	3.2 J	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-4	11/9/2011	5 U	**0.36 J**	5 U	0.5 U	0.5 U	**0.34 J**	0.5 U	27 UB	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-4	5/2/2012	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.42 UB	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

TABLE 6

Summary of VOCs Detected in Surface Water - January 2009 through November 2013

Chemplex Site – Clinton, Iowa

Sample ID (c)	Sample Date	Concentration in ug/L (a) (b)												
		Acetone (d)	Benzene	Butanone (d)	Chloromethane	1,1-Dichloroethene	**cis-1,2-Dichloroethene**	Trans-1,2-Dichloroethene	Methylene Chloride	**Tetrachloroethene**	Toluene	**Trichloroethene**	Trichlorotrifluoroethane	**Vinyl Chloride**
Surface Water Trigger Level		-	-	-	-	-	**590**	-	-	**98**	-	**80**	-	**25**
SW-4	10/31/2012	2.9 J	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SW-4	5/7/2013	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.54**	0.5 U	0.5 U	0.5 U
SW-4	11/19/2013	5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes:

(a) Only VOCs that have been detected using U.S. Environmental Protection Agency (EPA) Method 8260 insurface water samples SW-1 through SW-4 are shown in this table. Naphthalene, which is a semivolatile organic compound (SVOC) that has been historically detected in surface water samples at trace levels using EPA Method 8270, has not been detected using EPA Method 8260 and is therefore not shown in this table.

(b) **Boldface** type indicates concentration was detected above method detection limit and represents a valid detection.
"B" following value indicates that the analyte was detected in the method blank and therefore the measured result may be invalid or may be biased high.
"J" following value indicates that the analyte was detected at the concentration shown, but that the value was greater than the method detection limit, and less than the laboratory practical quantitation limit.
"R" following value indicates that the value was rejected based on a data validation evaluation.
"U" following value indicates that the analyte was not detected above the method detection limit indicated.
"UB" indicates the analyte was qualified not detected because it was detected at a similar concentration in a blank.

(c) SW-1 was collected from the Western Un-Named Tributary (West Trib) at its crossing under 21st Street. SW-2 was collected from the Eastern Un-Named Tributary (East Trib). SW-3 was collected at Rock Creek, just downstream of its confluence with the West Trib. SW-4 was collected at Rock Creek, just downstream of its confluence with the East Trib.

(d) This analyte is a common laboratory contaminant. Therefore, sporadic measurements at low levels are not consideredto be valid detections.

Abbreviations:

-- = not analyzed
ug/L = micrograms per liter
DUP = duplicate
VOC = volatile organic compound

TABLE 7

Summary of PAHs Detected in Groundwater and Surface Water - January 2009 through November 2013

Chemplex Site -- Clinton, Iowa

Sample ID	Sample Date	Concentration in µg/L (a)															
		Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphalene	Phenanthrene	Pyrene
Groundwater Cleanup Goal (ug/L)		-	-	-	-	0.2	-	-	-	-	-	-	-	-	1.4	-	-
Groundwater Well Locations																	
Munck Well	5/14/2009	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	5/12/2010	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.019 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.027 J**	**0.025 J**	0.05 U
	5/24/2011	**0.048 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	**0.032 J**	0.05 U	0.48 B	0.054 UB	0.05 U
	5/2/2012	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.018 J**	0.05 U	0.05 U	0.05 U	0.05 U
	5/7/2013	0.071	0.066	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.059	0.05 U	**0.089 J**	0.05 U	0.05 U
WELL 1Q	5/14/2009	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	5/25/2011	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UB	0.05 UB	0.05 U
	5/8/2013	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U	0.05 U	0.05 U
WELL 4Q	5/14/2009	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	5/25/2011	**0.016 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	**0.018 J**	0.05 U	0.05 UB	0.05 UB	0.05 U
	5/8/2013	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U	0.05 U	0.05 U
WELL 6Q	5/14/2009	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	5/25/2011	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UB	0.05 UB	0.05 U
	5/8/2013	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U	0.05 U	0.05 U
WELL 7Q	5/14/2009	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	5/25/2011	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UB	0.05 UB	0.05 U
	5/8/2013	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U	0.05 U	0.05 U
Surface Water Locations																	
SW-1	5/11/2009	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ
	5/11/2009	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ
	8/4/2009	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 UJ	5 U	5 U	5 UJ	5 U	5 U	5 U
	8/4/2009	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 UJ	5 U	5 U	5 UJ	5 U	5 U	5 U
	11/3/2009	**0.18**	**0.2**	**0.039 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.098**	0.05 U	**0.32**	**0.082**	0.05 U
	11/3/2009	**0.056**	**0.068**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.2**	**0.043 J**	0.05 U

TABLE 7

Summary of PAHs Detected in Groundwater and Surface Water - January 2009 through November 2013

Chemplex Site -- Clinton, Iowa

Sample ID	Sample Date	Concentration in µg/L (a)															
		Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphalene	Phenanthrene	Pyrene
Groundwater Cleanup Goal (ug/L)		-	-	-	-	0.2	-	-	-	-	-	-	-	-	1.4	-	-
SW-1	5/13/2010	**0.032 J**	**0.043 J**	0.05 U	0.05 U	0.05 U	0.05 U	**0.015 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.046 J**	**0.034 J**	0.05 U
	5/13/2010	**0.027 J**	**0.037 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.029 J**	**0.026 J**	0.05 U
	11/2/2010	**0.029 J**	**0.029 J**	0.05 U	0.05 U	**0.016 J**	**0.02 J**	0.20 UB	**0.018 J**	0.05 U	0.20 UB	0.05 U	0.05 U	0.20 UB	**0.021 J**	**0.035 J**	0.05 UJ
	11/2/2010	**0.037 J**	**0.038 J**	0.05 U	0.05 U	**0.022 J**	0.05 UJ	0.20 UB	0.05 UJ	0.05 U	0.20 UB	0.05 U	0.05 U	0.20 UB	**0.032 J**	**0.044 J**	**0.018 J**
	5/24/2011	**0.043 J**	**0.062**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.12 UB	0.50 UB	0.05 U
	5/24/2011	**0.054**	**0.06**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	**0.02 J**	0.05 U	0.46 B	0.50 UB	0.05 U
	11/9/2011	**0.045 J**	**0.10**	**0.018 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.022 J**	**0.03 J**	0.05 U	0.20 UB	0.21 B	**0.025 J**
	11/9/2011	**0.055**	**0.11**	**0.016 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.024 J**	**0.024 J**	0.05 U	0.20 UB	0.099 UB	**0.023 J**
	5/2/2012	**0.1 J**	**0.16 J**	**0.031 J**	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	**0.052 J**	0.05 UJ	**0.022 J**	**0.038 J**	0.05 UJ
	5/2/2012	**0.063**	**0.13**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.015 U	**0.02 J**	0.05 U
	10/31/2012	**0.03 J**	**0.12**	**0.023 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.028 J**	0.05 U	**0.32 J**	0.077 UB	0.05 U
	10/31/2012	**0.036 J**	**0.13**	**0.029 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.032 J**	0.05 U	**0.25 J**	0.063 UB	0.05 U
	5/7/2013	**0.075**	**0.18**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U	0.05 U	0.05 U
	5/7/2013	**0.073**	**0.17**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U	0.05 U	0.05 U
	11/20/2013	0.05 U	**0.073**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U	0.05 U	0.05 U
	11/20/2013	0.05 U	**0.069**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U	0.05 U	0.05 U

Abbreviations:

-- = not analyzed
DUP = duplicate
ug/L = micrograms per liter
PAH = polynuclear aromatic hydrocarbon
VOC = volatile organic compound

Notes:

(a) **Boldface** type indicates concentration was detected above method detection limit and is regarded as a valid detection.

TABLE 7

Summary of PAHs Detected in Groundwater and Surface Water - January 2009 through November 2013

Chemplex Site -- Clinton, Iowa

"B" following value indicates that the analyte was detected in the method blank and therefore the measured result may be invalid or may be biased high.
"J" following value indicates that the analyte was detected at the concentration shown, but that the value was greater than the method detection limit, and less than the laboratory practical quantitation limit.
"R" following value indicates that the value was rejected based on a data validation evaluation.
"U" following value indicates that the analyte was not detected above the method detection limit indicated.
"UB" indicates the analyte was qualified not detected because it was detected at a similar concentration in a blank.

TABLE 8

Comparison of VOCs in Groundwater with Trigger Levels

January 2009 through November 2013

Chemplex Site -- Clinton, Iowa

Monitoring Zone and Sample ID		Maximum Concentration, 2009-2013 (ug/L) (a)			
		PCE	TCE	cis-1,2-DCE	VC
Contingency Well Zone	**Trigger Level:**	**10**	**10**	**140**	**1**
ARC MW-201B		**0.55**	0.5 U	0.5 U	0.5 U
ARC MW-201C		**0.46 J**	0.5 U	0.5 U	0.5 U
ARC MW-205B		**0.26 J**	0.5 U	0.5 U	0.5 U
ARC MW-205C		0.5 U	0.5 U	0.5 U	0.5 U
ARC MW-205D		0.5 U	0.5 U	0.5 U	0.5 U
ARC MW-206B		**0.51**	0.5 U	0.5 U	0.5 U
ARC MW-211C		**6.1**	**0.33 J**	**1.1**	0.5 U
MW-105B		**4.8**	0.5 U	**0.42 J**	0.5 U
MW-105C		**3.7**	0.5 U	**0.21 J**	0.5 U
MW-117B		0.5 U	0.5 U	0.5 U	0.5 U
MW-117C		**1.0**	**0.32 J**	0.5 U	0.5 U
Heightened Awareness Zone	**Trigger Level:**	**10**	**10**	**140**	**1**
ARC MW-207B		0.5 U	0.5 U	0.5 U	0.5 U
ARC MW-207C		**0.62**	0.5 U	0.5 U	0.5 U
ARC MW-208B		0.5 U	0.5 U	0.5 U	0.5 U
ARC MW-208C		0.5 U	0.5 U	0.5 U	0.5 U
ARC MW-209BC		**1.2**	0.5 U	0.5 U	0.5 U
MW-104B		0.5 U	0.5 U	0.5 U	0.5 U
MW-104C		0.5 U	0.5 U	0.5 U	0.5 U
MW-120A		0.5 U	0.5 U	0.5 U	0.5 U
MW-120B		0.5 U	0.5 U	0.5 U	0.5 U
MW-122A		0.5 U	0.5 U	0.5 U	0.5 U
MW-122B		0.5 U	0.5 U	0.5 U	0.5 U
MW-122C		0.5 U	0.5 U	0.5 U	0.5 U
Expedited Contingency Zone	**Trigger Level:**	**5**	**5**	**70**	**0.5**
MW-119A		**1.3**	0.5 U	0.5 U	0.5 U
MW-119B		**3.3**	**0.45 J**	0.5 U	0.5 U
MW-119C		**2.4**	0.5 U	0.5 U	0.5 U
MW-121A		0.5 U	0.5 U	0.5 U	0.5 U
MW-121B		0.5 U	0.5 U	0.5 U	0.5 U
MW-121C		**0.33 J**	0.5 U	0.5 U	0.5 U

Notes:

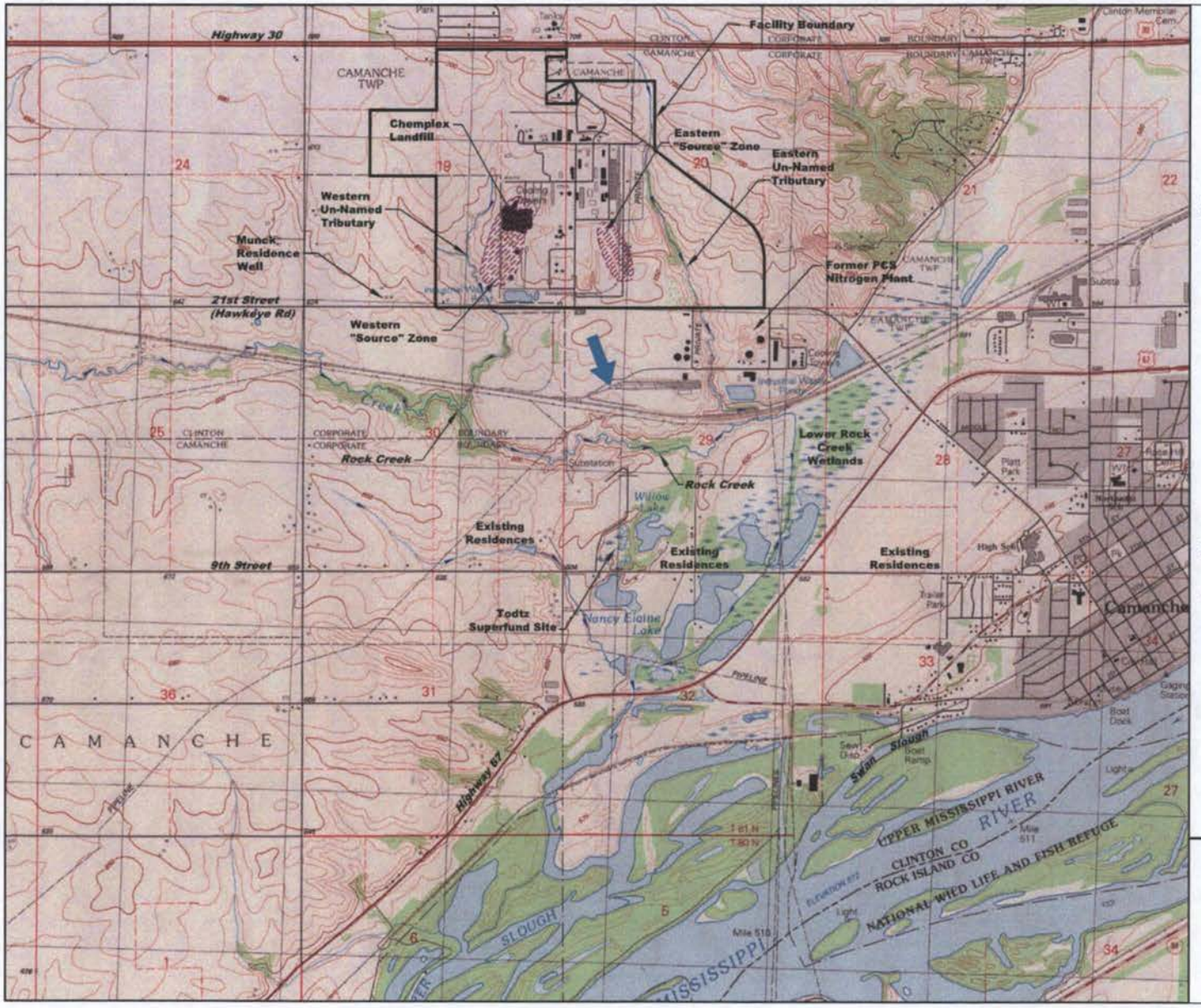
(a) "J" following value indicates that the analyte was detected at the concentration shown, but that the value was greater than the laboratory method detection limit and less than the laboratory practical quantitation limit.
"U" following value indicates that the analyte was not detected above the laboratory practical quantitation limit indicated.

(b) **Boldface** type indicates that the analyte was detected above the method detection limit and represents a valid detection.

Abbreviations:

ug/L = micrograms per liter
cis-1,2-DCE = cis-1,2-dichloroethene
PCE = tetrachlorethene
TCE = trichloroethene VC = vinyl chloride

Figures



N

0 2000 4000

(Approximate Scale in Feet)

Legend:

- Facility Boundary
- Assumed General Groundwater Gradient Direction
- Creek Flow Direction
- Estimated Source Zone

Notes:

1. All locations are approximate.
2. Basemap source: USGS 7.5 minute series topographic map, Camanche Quadrangle, Iowa-Illinois, 1991.

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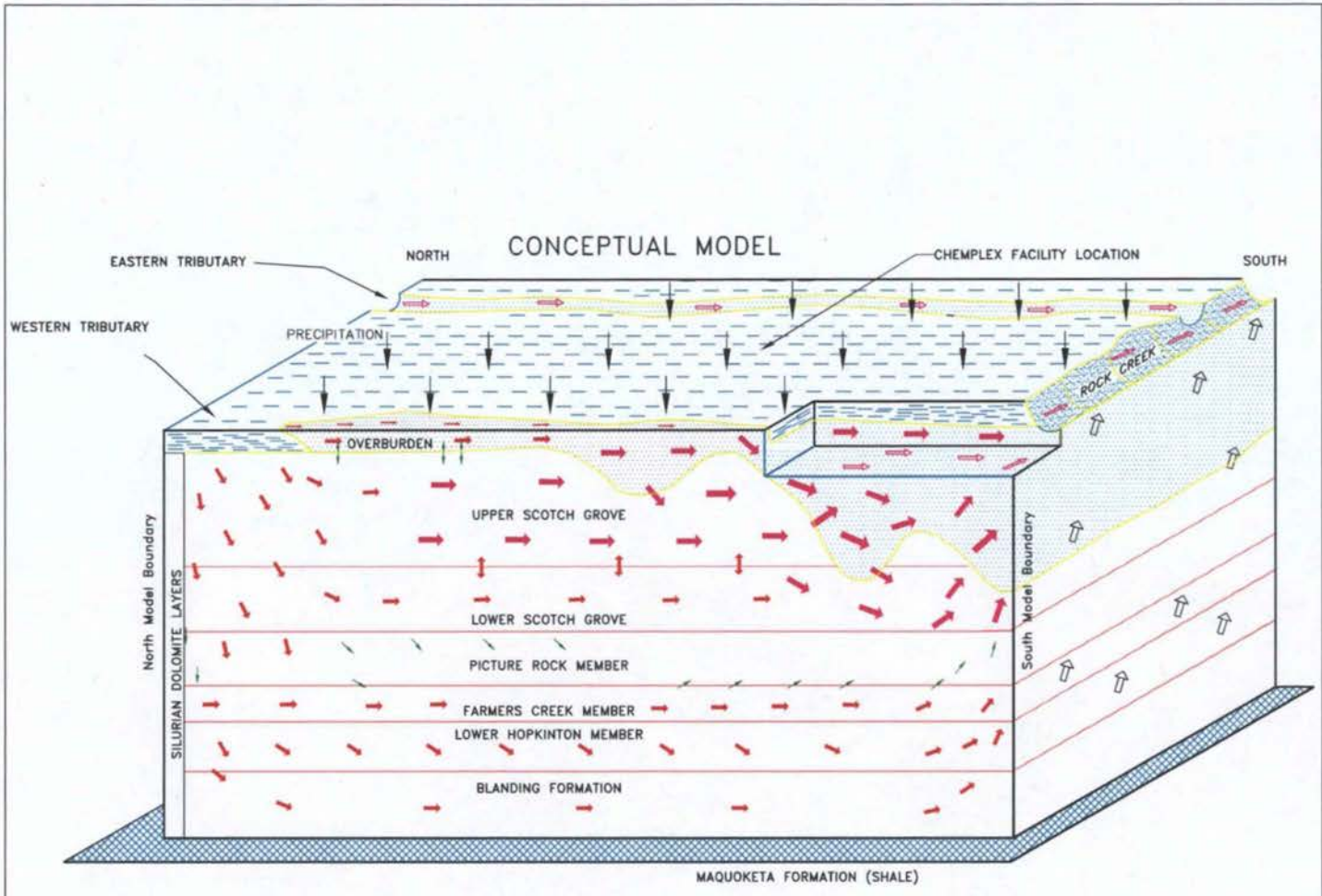
Chemplex Site and Vicinity Map

Chemplex Site
Clinton, Iowa
April 2014
EKI 890052.73
Figure 1



N

0 2000 4000

(Approximate Scale in Feet)

Legend:

- Arrow indicates the direction of Groundwater Flow (its size is proportional to the magnitude of Groundwater Flow)
- Creek Bottom Sediments
- Sand Deposits
- Silt/Clay Deposits
- Two-Headed Arrow indicates Flow Direction Changes throughout year.

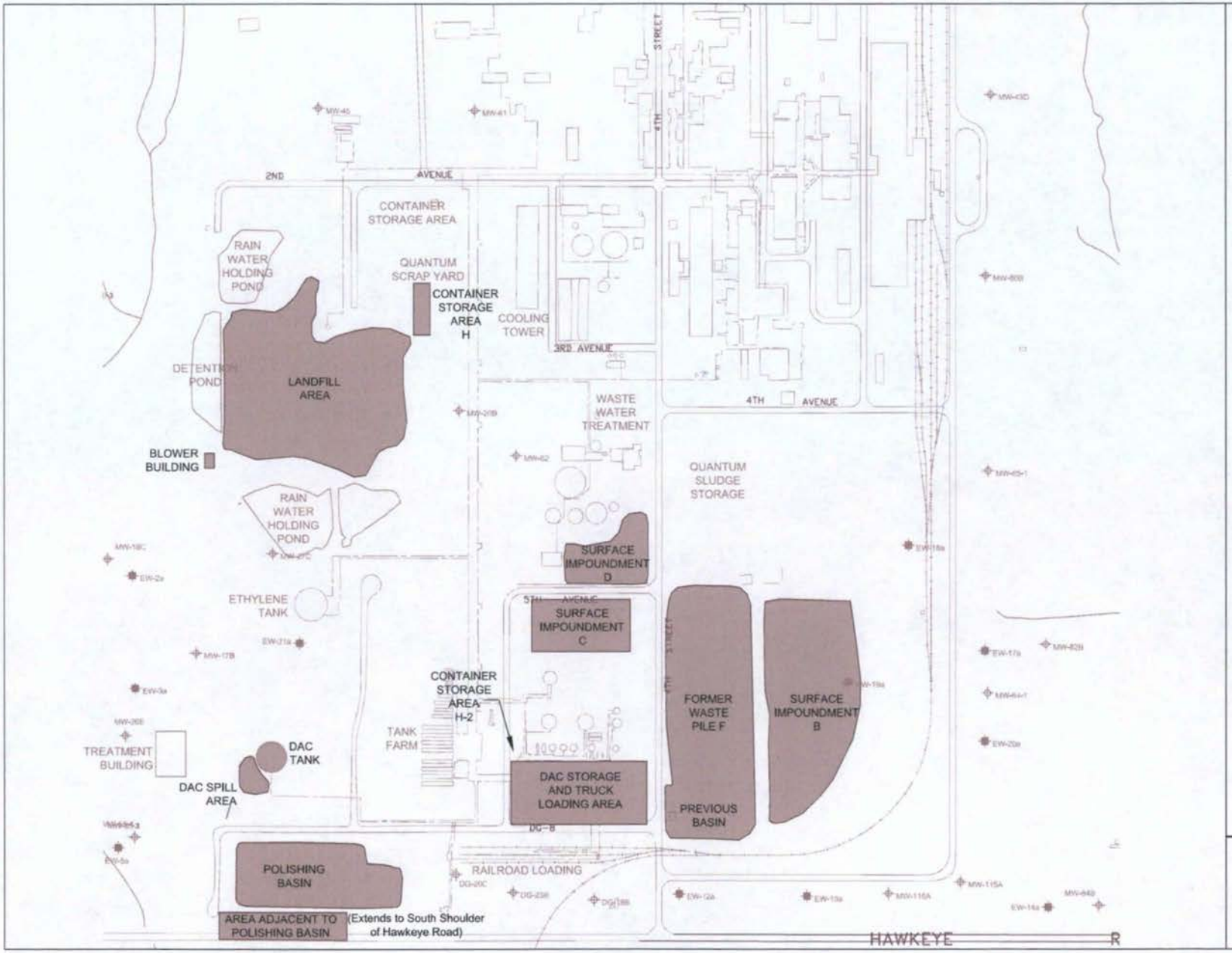
Notes:

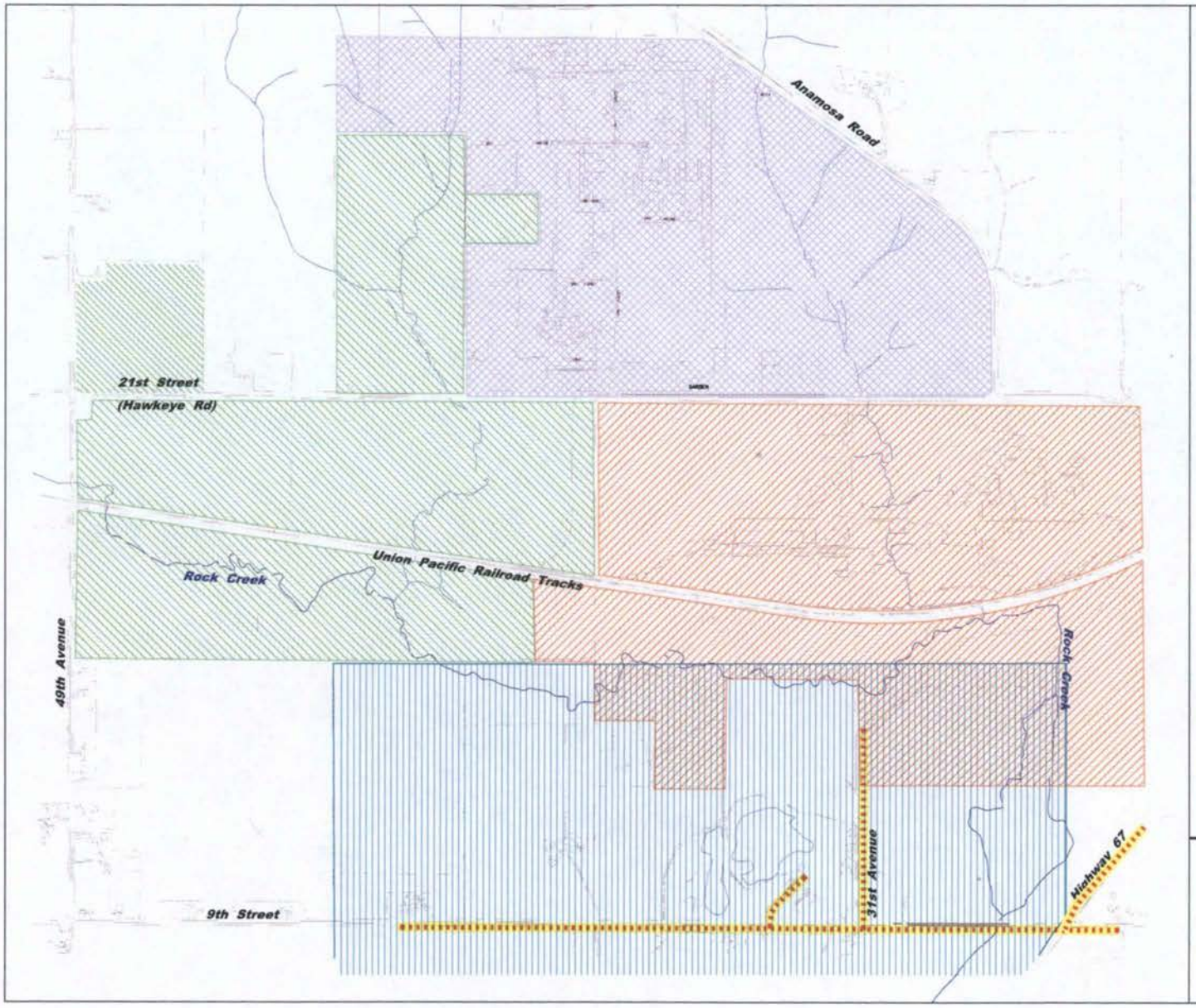
1. All locations are approximate.
2. All dimensions shown are NOT to scale.
3. Groundwater flow directions and magnitudes may vary depending upon rainfall infiltration rates.

Erler & Kalinowski, Inc.

Conceptual Model

Chemplex Site
Clinton, Iowa
December 2013
EKI 890052.73
Figure 2


2ND AVENUE
CONTAINER STORAGE AREA
RAIN WATER HOLDING POND
QUANTUM SCRAP YARD
CONTAINER STORAGE AREA H
COOLING TOWER
3RD AVENUE
DETENTION POND
LANDFILL AREA
WASTE WATER TREATMENT
4TH AVENUE
BLOWER BUILDING
RAIN WATER HOLDING POND
QUANTUM SLUDGE STORAGE
SURFACE IMPOUNDMENT D
ETHYLENE TANK
SURFACE IMPOUNDMENT C
CONTAINER STORAGE AREA H-2
FORMER WASTE PILE F
SURFACE IMPOUNDMENT B
TANK FARM
TREATMENT BUILDING
DAC TANK
DAC SPILL AREA
DAC STORAGE AND TRUCK LOADING AREA
PREVIOUS BASIN
POLISHING BASIN
RAILROAD LOADING
AREA ADJACENT TO POLISHING BASIN
(Extends to South Shoulder of Hawkeye Road)
HAWKEYE
N
0
300
600
(Approximate Scale in Feet)
Legend:
Monitoring Well
Former Extraction Well (Inactive)
Notes:
1. All locations are approximate.
2. "Quantum" was the previous operator of the polyethylene manufacturing facility. The current operator is Equistar.
Erler & Kalinowski, Inc.
OU-2 Site Plan and On-Site Areas of Potential Concern
Chemplex Site First OU
Clinton, Iowa
December 2013
EKI 890052.73
Figure 3



N

0 1000 2000

(Approximate Scale In Feet)

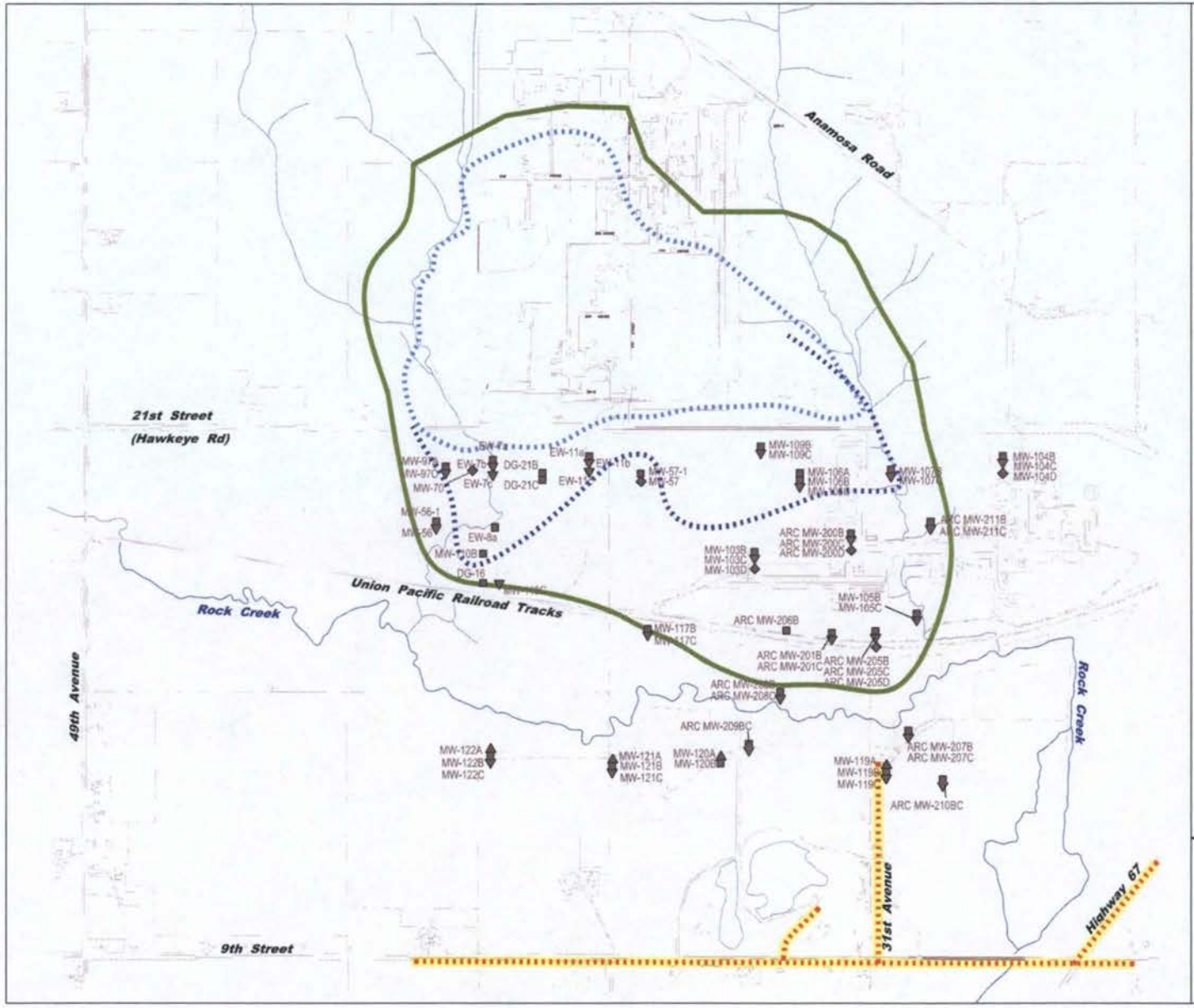
Legend:

- Municipal Water System Extension
- Area of ACC/GCC Environmental Covenant
- Area of Equistar Environmental Covenant
- Area of Crossroads Environmental Covenant
- Area of Camanche Ordinance

Erler & Kalinowski, Inc.

Environmental Covenants and Ordinance Area Boundaries

Chemplex Site, First OU
Clinton, Iowa
December 2013
EKI 890052.73
Figure 4



N

0 1000 2000

(Approximate Scale in Feet)

Legend:

- Municipal Water System Extension
- 2011 PCE Contour (5 ug/L)
- 1992 PCE Contour (10 ug/L)
- Technical Impracticability Zone Boundary

Monitoring Network Wells South of 21st Street:

- Scotch Grove Well
- Farmers Creek or Lower Hopkinton Well
- Well Screened in Both Scotch Grove and Farmers Creek
- Blanding Well

Notes:

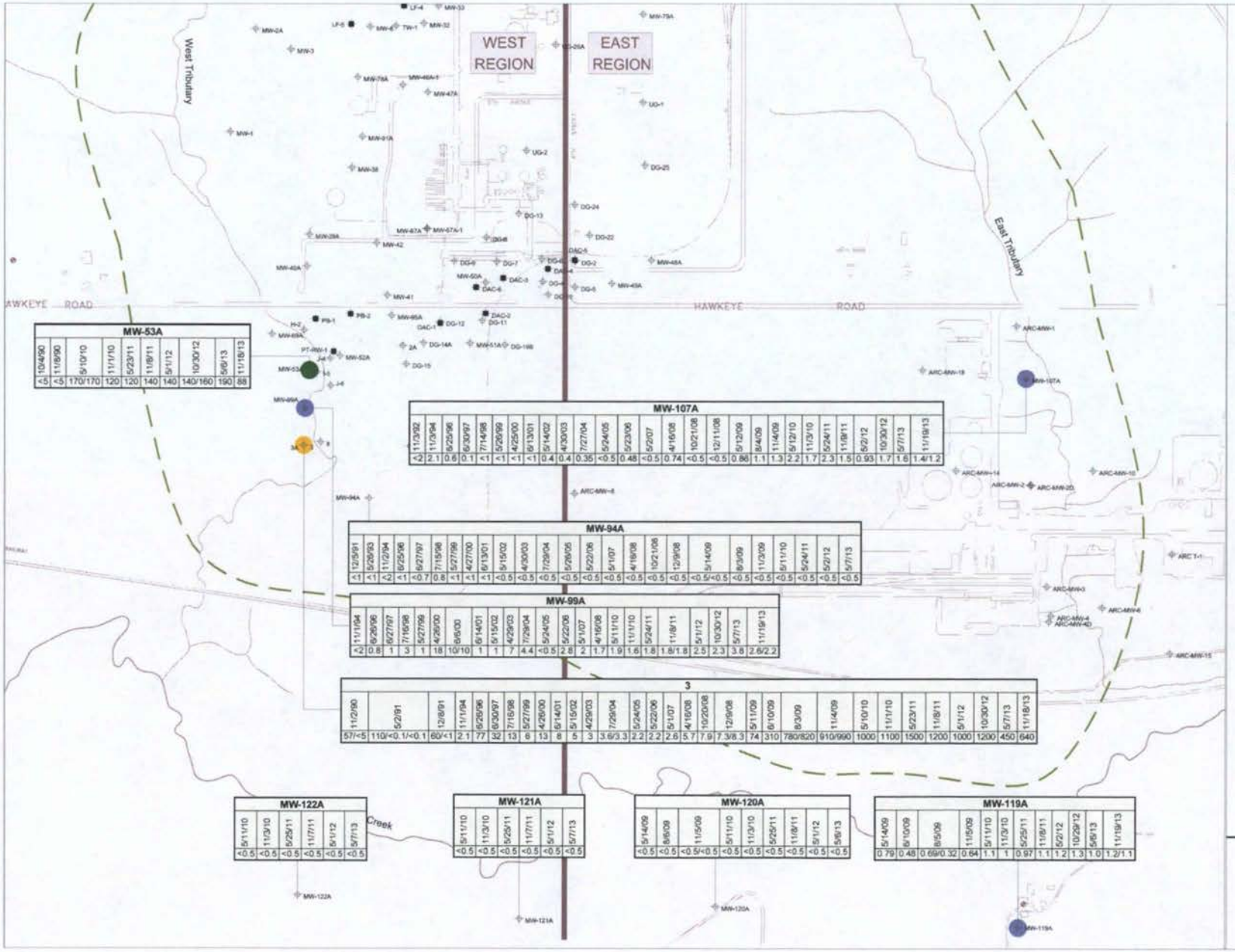
1. For clarity, only bedrock wells that are part of the PME Plan monitoring program and are south of 21st Street are shown.

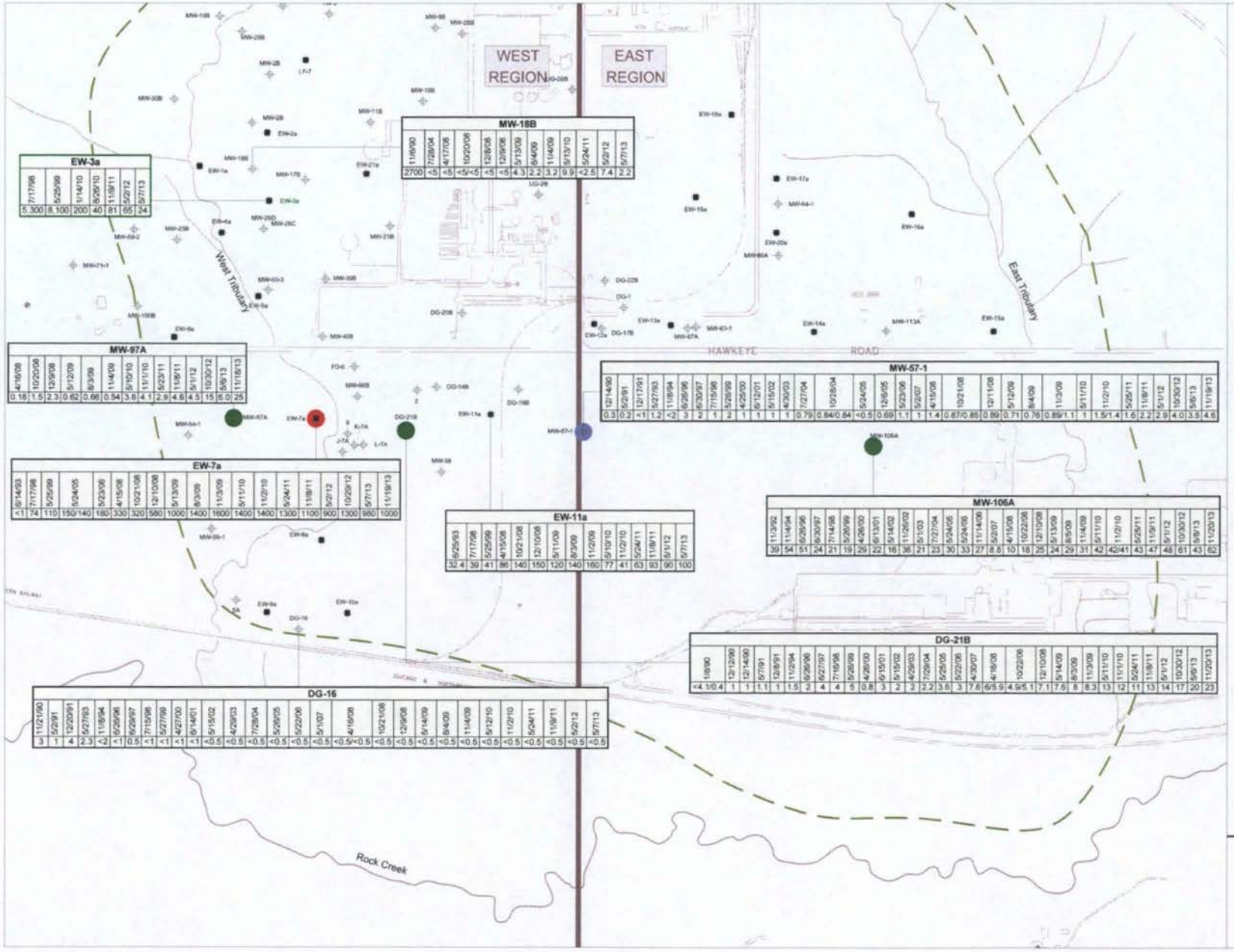
Erler & Kalinowski, Inc.

Technical Impacticability Zone Boundary

Chemplex Site, First OU
Clinton, Iowa
December 2013
EKI 890052.73

Figure 5


WEST REGION
EAST REGION
West Tributary
East Tributary
HAWKEYE ROAD
MW-53A
11/0/90 | <5 | 11/8/90 | <5 | 5/10/10 | 170/170 | 11/1/10 | 120 | 5/23/11 | 120 | 11/8/11 | 140 | 5/1/12 | 140 | 10/30/12 | 140/160 | 5/6/13 | 190 | 11/18/13 | 88
MW-107A
11/3/92 | <2 | 11/3/94 | 2.1 | 6/25/96 | 0.6 | 6/30/97 | 0.1 | 7/14/98 | <1 | 5/26/99 | <1 | 14/25/00 | <1 | 6/13/01 | <1 | 5/14/02 | 0.4 | 4/30/03 | 0.4 | 7/27/04 | 0.35 | 5/24/05 | <0.5 | 5/23/06 | 0.48 | 5/2/07 | <0.5 | 4/16/08 | 0.74 | 10/21/08 | <0.5 | 12/11/08 | <0.5 | 5/12/09 | 0.88 | 8/4/09 | 1.1 | 11/4/09 | 1.3 | 5/12/10 | 2.2 | 11/3/10 | 1.7 | 5/24/11 | 2.3 | 11/8/11 | 1.5 | 5/2/12 | 0.93 | 10/30/12 | 1.7 | 5/7/13 | 1.6 | 11/19/13 | 1.4/1.2
MW-94A
12/5/91 | <1 | 5/26/93 | <1 | 11/2/94 | <2 | 6/25/96 | <1 | 6/27/97 | <0.7 | 7/15/98 | 0.8 | 5/27/99 | <1 | 4/27/00 | <1 | 6/13/01 | <1 | 5/15/02 | <0.5 | 4/30/03 | <0.5 | 7/29/04 | <0.5 | 5/26/05 | <0.5 | 5/22/06 | <0.5 | 5/1/07 | <0.5 | 4/16/08 | <0.5 | 10/21/08 | <0.5 | 12/9/08 | <0.5 | 5/14/09 | <0.5/<0.5 | 8/3/09 | <0.5 | 11/3/09 | <0.5 | 5/11/10 | <0.5 | 5/24/11 | <0.5 | 5/2/12 | <0.5 | 5/7/13 | <0.5
MW-99A
11/1/94 | <2 | 6/26/96 | 0.8 | 6/27/97 | 1 | 7/16/98 | 3 | 5/27/99 | 1 | 4/26/00 | 18 | 6/6/00 | 10/10 | 6/14/01 | 1 | 5/15/02 | 1 | 4/29/03 | 7 | 7/29/04 | 4.4 | 5/24/05 | <0.5 | 5/22/06 | 2.8 | 5/1/07 | 2 | 4/16/08 | 1.7 | 5/11/10 | 1.9 | 11/1/10 | 1.6 | 5/24/11 | 1.8 | 11/8/11 | 1.8/1.8 | 5/1/12 | 2.5 | 10/30/12 | 2.3 | 5/7/13 | 3.8 | 11/19/13 | 2.6/2.2
3
11/2/90 | 57/<5 | 5/2/91 | 110/<0.1/<0.1 | 12/8/91 | 60/<1 | 11/1/94 | 2.1 | 6/26/96 | 77 | 6/30/97 | 32 | 7/16/98 | 13 | 5/27/99 | 6 | 4/26/00 | 13 | 6/14/01 | 8 | 5/15/02 | 5 | 4/29/03 | 3 | 7/29/04 | 3.6/3.3 | 5/24/05 | 2.2 | 5/22/06 | 2.2 | 5/1/07 | 2.6 | 4/16/08 | 5.7 | 10/20/08 | 7.9 | 12/9/08 | 7.3/8.3 | 5/11/09 | 74 | 6/10/09 | 310 | 8/3/09 | 780/820 | 11/4/09 | 910/990 | 5/10/10 | 1000 | 11/1/10 | 1100 | 5/23/11 | 1500 | 11/8/11 | 1200 | 5/1/12 | 1000 | 10/30/12 | 1200 | 5/7/13 | 450 | 11/18/13 | 640
MW-122A
5/11/10 | <0.5 | 11/3/10 | <0.5 | 5/25/11 | <0.5 | 11/7/11 | <0.5 | 5/1/12 | <0.5 | 5/7/13 | <0.5
MW-121A
5/11/10 | <0.5 | 11/3/10 | <0.5 | 5/25/11 | <0.5 | 11/7/11 | <0.5 | 5/1/12 | <0.5 | 5/7/13 | <0.5
MW-120A
5/14/09 | <0.5 | 8/6/09 | <0.5 | 11/5/09 | <0.5/<0.5 | 5/11/10 | <0.5 | 11/3/10 | <0.5 | 5/25/11 | <0.5 | 11/8/11 | <0.5 | 5/1/12 | <0.5 | 5/6/13 | <0.5
MW-119A
5/14/09 | 0.79 | 6/10/09 | 0.48 | 8/5/09 | 0.69/0.32 | 11/5/09 | 0.64 | 5/11/10 | 1.1 | 11/3/10 | 1 | 5/25/11 | 0.97 | 11/8/11 | 1.1 | 5/2/12 | 1.2 | 10/29/12 | 1.3 | 5/6/13 | 1.0 | 11/19/13 | 1.2/1.1
N
0
500
1000
(Approximate Scale in Feet)
Legend:
Technical Impracticability Zone Boundary
Monitoring Well
Former Extraction Well (Inactive)
November 2013 PCE Concentration Greater Than or Equal to 1,000 µg/L
November 2013 PCE Concentration Between 100 and 1,000 µg/L
November 2013 PCE Concentration Between 10 and 100 µg/L
November 2013 PCE Concentration Less than 10 µg/L
Notes:
1. All locations are approximate.
2. Groundwater extraction from this stratum began in December 1994 and was suspended on 29 September 2008.
Erler & Kalinowski, Inc.
PCE Concentrations (ug/L) Detected in Groundwater Samples from Overburden Through 2013
Chemplex Site First OU
Clinton, Iowa
March 2014
EKI 890052.73
Figure 6



N

0 500 1000

(Approximate Scale in Feet)

Legend:

- Technical Impracticability Zone Boundary
- Monitoring Well
- Former Extraction Well (Inactive)
- Former Extraction Well Injected with Vegetable Oil in July 2009
- November 2013 PCE Concentration Greater Than or Equal to 1,000 µg/L
- November 2013 PCE Concentration Between 100 and 1,000 µg/L
- November 2013 PCE Concentration Between 10 and 100 µg/L
- November 2013 PCE Concentration Less than 10 µg/L

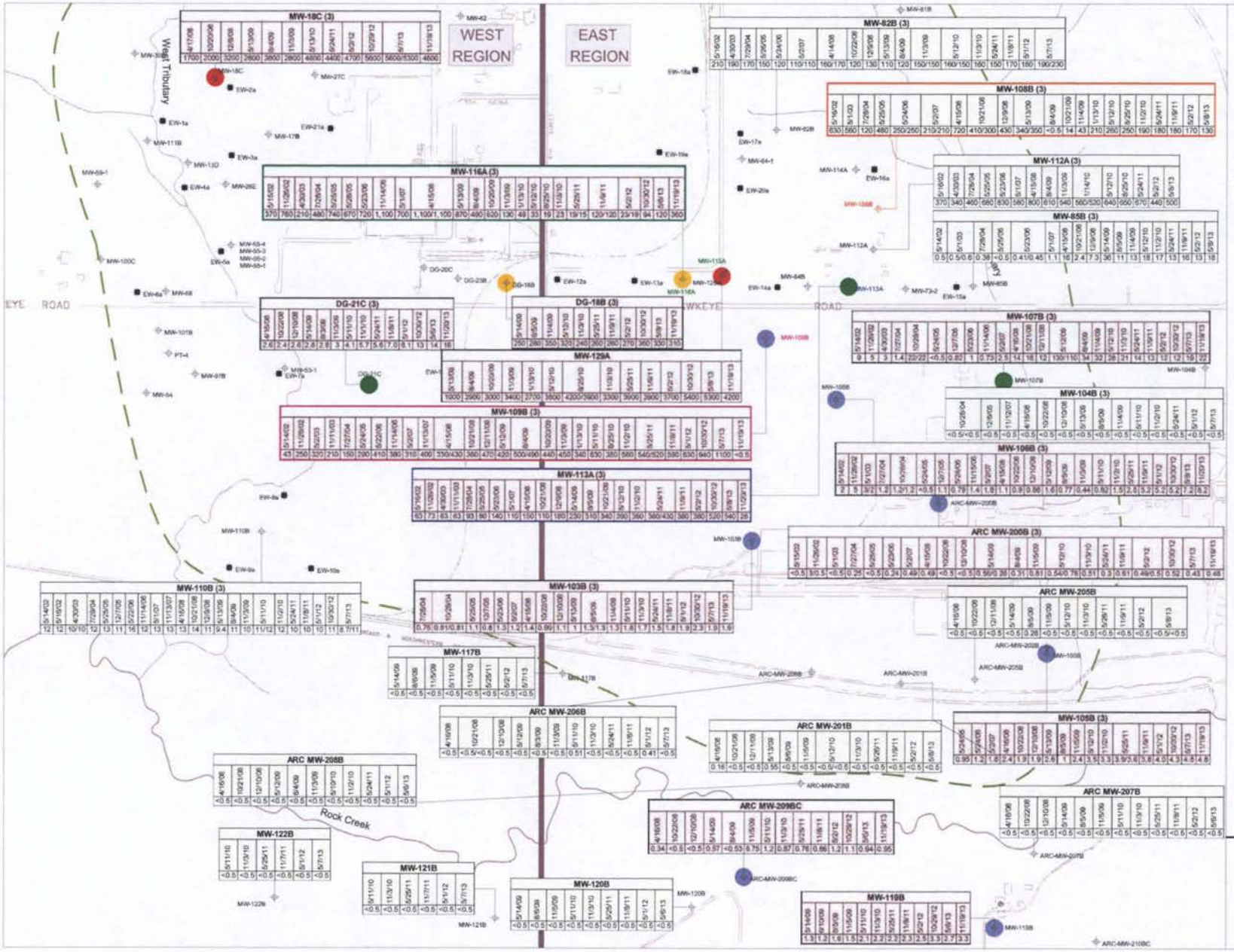
Notes:

1. All locations are approximate.
2. Groundwater extraction from this stratum began in February 1995 and was suspended on 29 September 2008.

Erler & Kalinowski, Inc.

PCE Concentrations (ug/L)
Detected In Groundwater Samples From
Upper Scotch Grove Through 2013

Chemplex Site First OU
Clinton, Iowa
March 2014
EKI 890052.73
Figure 7



N

0 500 1000

(Approximate Scale in Feet)

Legend:

- Technical Impracticability Zone Boundary
- Monitoring Well
- Former Extraction Well (Inactive)
- Monitoring Well Injected with Permanganate in July 2009
- Monitoring Well Injected with Vegetable Oil in July 2009
- Monitoring Well Injected with Vegetable Oil in October 2013
- Monitoring Well Injected with Permanganate in October 2013
- November 2013 PCE Concentration Greater Than or Equal to 1,000 µg/L
- November 2013 PCE Concentration Between 100 and 1,000 µg/L
- November 2013 PCE Concentration Between 10 and 100 µg/L
- November 2013 PCE Concentration Less than 10 µg/L

Notes:

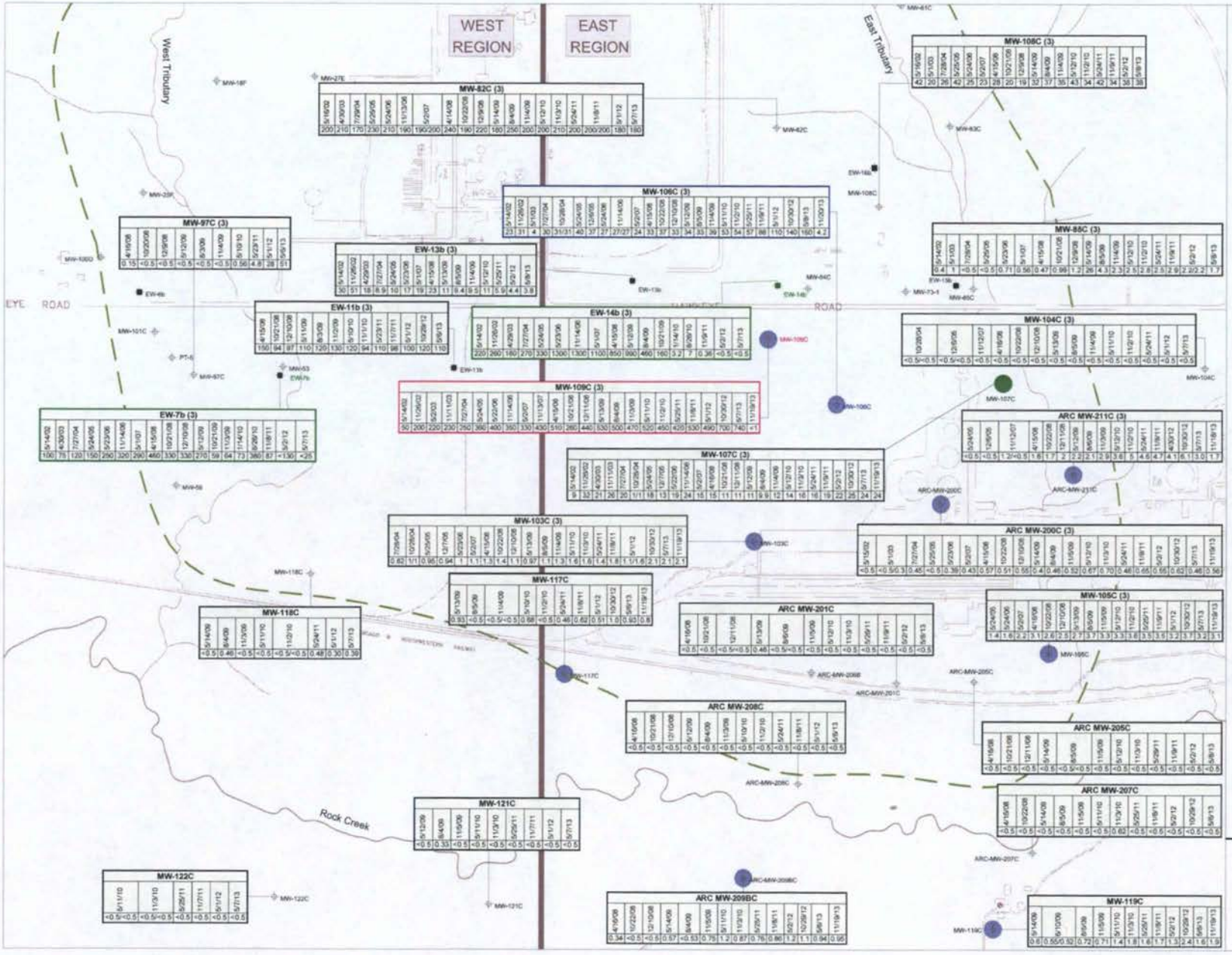
1. All locations are approximate.
2. Groundwater extraction from the overlying Upper Scotch Grove stratum began in February 1995 and was suspended on 29 September 2008.
3. Due to figure readability issues, only data since January 2002 are shown on this figure. Please refer to previous sampling reports for data prior to January 2002.

Erler & Kalinowski, Inc.

PCE Concentrations (ug/L)
Detected in Groundwater Samples From
Lower Scotch Grove Through 2013

Chemplex Site First OU
Clinton, Iowa
March 2014
EKI 890052.73

Figure 8



Notes:

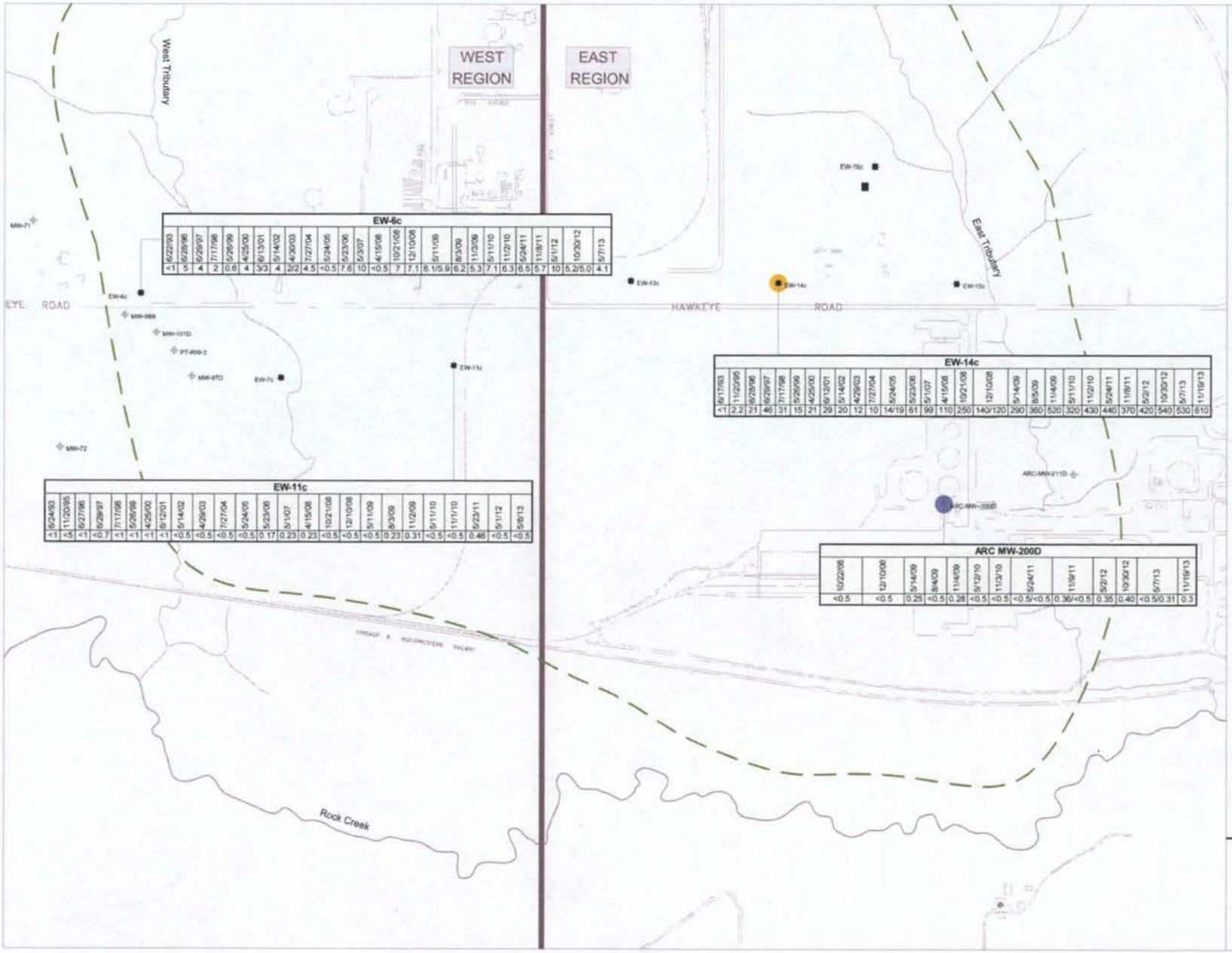
1. All locations are approximate.
2. Groundwater extraction from the Farmers Creek stratum began in September 1995 and was suspended on 8 November 2005.
3. Due to figure readability issues, only data since January 2002 are shown on this figure. Please refer to previous sampling reports for data prior to January 2002.
4. The reported analytical data from wells MW-107B and MW-107C for samples collected on 28 October 2004 are suspected to be switched. The shown concentration is as reported by the laboratory.

Erler & Kalinowski, Inc.

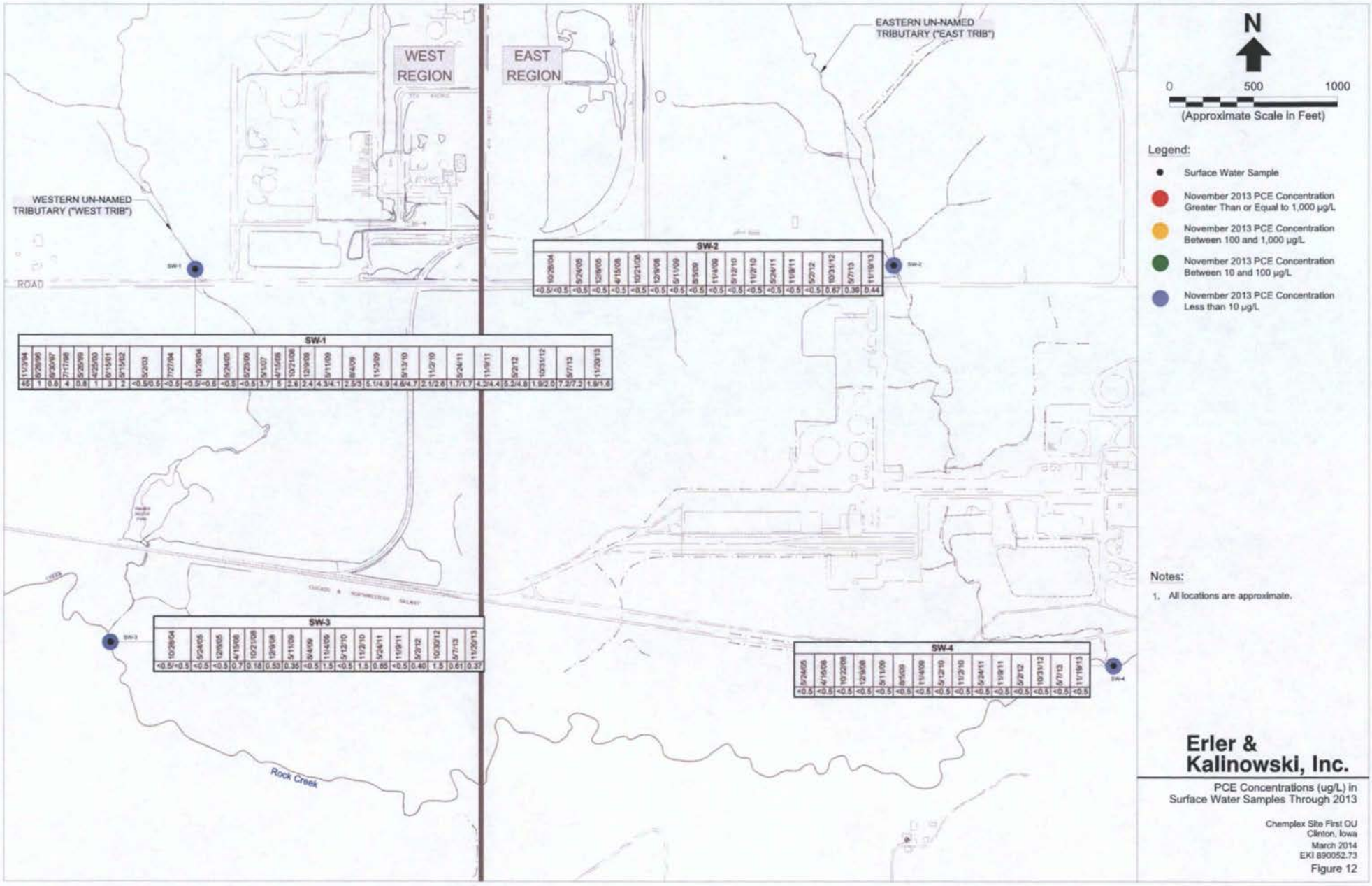
PCE Concentrations (ug/L)
Detected in Groundwater Samples
From Farmers Creek Through 2013

Chemplex Site First OU
Clinton, Iowa
March 2014
EKI 890052.73

Figure 9


WEST REGION
EAST REGION
West Tributary
East Tributary
HAWKEYE ROAD
Rock Creek
MW-71
EW-6c
MW-72
EW-11c
EW-13c
EW-14c
EW-15c
EW-16c
ARC-MW-200D
ARC-MW-211D
MW-98B
MW-101D
PT-RW-3
MW-97D
EW-7c
EW-6c
EW-11c
6/24/93 <1
11/20/95 <5
6/27/96 <1
6/29/97 <0.7
7/17/98 <1
5/26/99 <1
4/25/00 <1
5/12/01 <1
5/14/02 <0.5
4/29/03 <0.5
7/27/04 <0.5
5/24/05 <0.5
5/23/06 0.17
5/1/07 0.23
4/15/08 0.23
10/21/08 <0.5
12/10/08 <0.5
5/11/09 <0.5
9/3/09 0.23
11/2/09 0.31
5/11/10 <0.5
11/11/10 <0.5
5/23/11 0.46
5/1/12 <0.5
5/8/13 <0.5
EW-14c
6/17/93 <1
11/20/95 2.2
6/28/96 21
6/29/97 46
7/17/98 31
5/26/99 15
4/25/00 21
6/12/01 29
5/14/02 20
4/29/03 12
7/27/04 10
5/24/05 14/19
5/23/06 61
5/1/07 99
4/15/08 110
10/21/08 250
12/10/08 140/120
5/14/09 290
8/5/09 360
11/4/09 520
5/11/10 320
11/2/10 430
5/24/11 440
11/8/11 370
5/2/12 420
10/30/12 540
5/7/13 530
11/19/13 610
ARC MW-200D
10/22/08 <0.5
12/10/08 <0.5
5/14/09 0.25
8/4/09 <0.5
11/4/09 0.28
5/12/10 <0.5
11/3/10 <0.5
5/24/11 <0.5/<0.5
11/9/11 0.36/<0.5
5/2/12 0.35
10/30/12 0.40
5/7/13 <0.5/0.31
11/19/13 0.3
N
0 500 1000
(Approximate Scale in Feet)
Legend:
Technical Impracticability Zone Boundary
Monitoring Well
Former Extraction Well (Inactive)
November 2013 PCE Concentration Greater Than or Equal to 1,000 µg/L
November 2013 PCE Concentration Between 100 and 1,000 µg/L
November 2013 PCE Concentration Between 10 and 100 µg/L
November 2013 PCE Concentration Less than 10 µg/L
Notes:
1. All locations are approximate.
2. Groundwater extraction from this stratum began on 18 November 1995 and was suspended on 17 March 1999.
Erler & Kalinowski, Inc.
PCE Concentrations (ug/L)
Detected in Groundwater Samples
From Lower Hopkinton Through 2013
Chemplex Site First OU
Clinton, Iowa
March 2014
EKI 890052.73
Figure 10

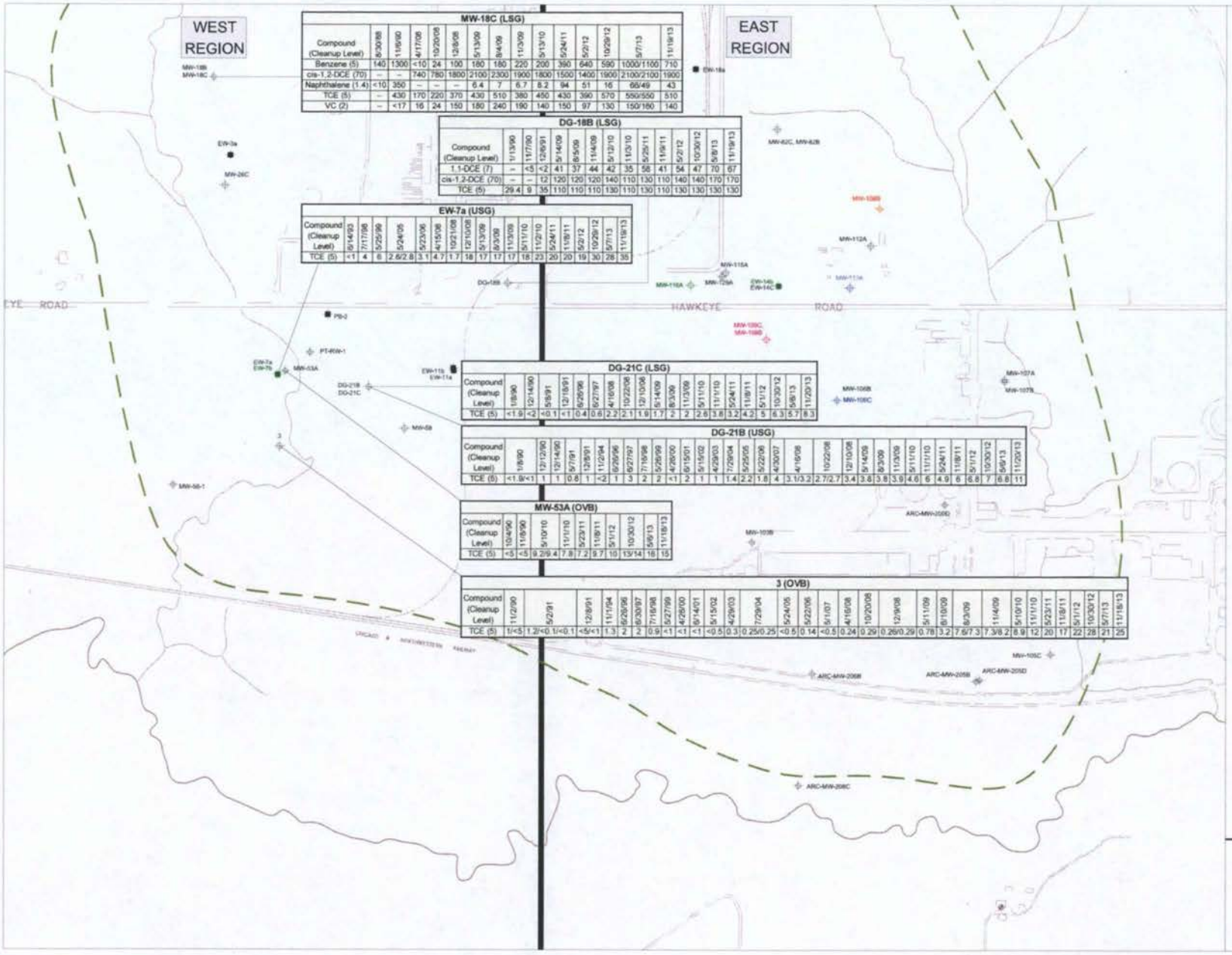

WEST REGION
EAST REGION
West Tributary
East Tributary
Rock Creek
HAWKEYE ROAD
MW-55-1
MW-102E
MW-70
MW-57
MW-64D
MW-65D
MW-73
MW-104D
MW-103D
MW-105D
ARC-MW-205D
MW-70
11/9/90 5/9/91 12/19/91 5/13/98 6/5/06 11/4/09 5/13*10 5/23/11 4/30/12 5/8/13
<5 0.6 <1 2.2 >2 1.8 1.9 1.7 1.6 1.5
MW-73
12/13/90 5/9/91 11/13/91 11/9/94 6/27/96 6/27/97 7/15/98 5/25/99 4/26/00 6/13/01 5/16/02 5/1/03 7/28/04 5/25/05 5/23/06 5/2/07 4/15/08 10/21/08 12/9/08 5/14/09 8/4/09 11/4/09 5/12/10 11/2/10 5/25/11 11/9/11 5/2/12 10/30/12 5/8/13 11/19/13
>2 >2 <1 <2 <1 <0.7 <1 <1 <1 2 3 3 4.9 5.6 8.2 8.1 6.8 6.4 7.1 6.2/6.0 7.1 7.3 8 8.4 7.9 7.7 7.1 8.4 7.6 7.7
MW-103D
1/22/92 11/5/92 7/28/04 5/14/09 6/10/09 8/6/09 11/5/09 5/13/10 5/25/11 11/9/11 5/2/12 10/30/12 5/8/13 11/20/13
<1 <2 <0.5 1.7 0.93 <0.5 <0.5 2.3 2.3 2.4 2.9 1.1 3.9 3.0
ARC MW-205D
4/15/08 10/22/08 12/11/08 5/13/09 8/5/09 11/5/09 5/12/10 5/26/11 5/2/12 5/8/13
<0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5/<0.5 <0.5
N
0 500 1000
(Approximate Scale in Feet)
Legend:
Technical Impracticability Zone Boundary
Monitoring Well
Former Extraction Well (Inactive)
November 2013 PCE Concentration Greater Than or Equal to 1,000 µg/L
November 2013 PCE Concentration Between 100 and 1,000 µg/L
November 2013 PCE Concentration Between 10 and 100 µg/L
November 2013 PCE Concentration Less than 10 µg/L
Notes:
1. All locations are approximate.
2. Groundwater extraction from the overlying Lower Hopkinton Stratum began on 18 November 1995 and was suspended on 17 March 1999.
Erler & Kalinowski, Inc.
PCE Concentrations (ug/L) Detected in Groundwater Samples From Blanding Through 2013
Chemplex Site First OU
Clinton, Iowa
March 2014
EKI 890052.73
Figure 11



Erler & Kalinowski, Inc.

PCE Concentrations (ug/L) in Surface Water Samples Through 2013

Chemplex Site First OU
Clinton, Iowa
March 2014
EKI 890052.73
Figure 12



MW-18C (LSG)

Compound (Cleanup Level)	8/30/88	11/9/90	4/17/06	10/20/06	12/8/06	5/13/09	8/4/09	11/3/09	5/13/10	5/24/11	5/2/12	10/29/12	5/7/13	11/19/13
Benzene (5)	140	1300	<10	24	100	180	180	220	200	390	640	590	1000/1100	710
cis-1,2-DCE (70)	–	–	740	780	1800	2100	2300	1900	1800	1500	1400	1900	2100/2100	1900
Naphthalene (1.4)	<10	350	–	–	–	6.4	7	6.7	8.2	94	51	16	66/49	43
TCE (5)	–	430	170	220	370	430	510	380	450	430	390	570	550/550	510
VC (2)	–	<17	16	24	150	180	240	190	140	150	97	130	150/160	140

DG-18B (LSG)

Compound (Cleanup Level)	1/13/90	11/7/90	12/6/91	5/14/09	8/5/09	11/4/09	5/12/10	11/3/10	5/25/11	11/9/11	5/2/12	10/30/12	5/8/13	11/19/13
1,1-DCE (7)	–	<5	<2	41	37	44	42	35	56	41	54	47	70	67
cis-1,2-DCE (70)	–	–	12	120	120	120	140	110	130	110	140	140	170	170
TCE (5)	29.4	9	35	110	110	110	130	110	130	110	130	130	130	130

EW-7a (USG)

Compound (Cleanup Level)	6/14/93	7/17/96	5/20/99	5/24/05	9/23/06	4/15/08	10/21/08	12/10/08	9/13/09	8/3/09	11/3/09	5/11/10	11/2/10	5/24/11	11/8/11	5/2/12	10/29/12	5/7/13	11/19/13
TCE (5)	<1	4	6	2.6/2.8	3.1	4.7	1.7	18	17	17	17	18	23	20	20	19	30	28	35

DG-21C (LSG)

Compound (Cleanup Level)	1/8/90	12/14/90	5/8/91	12/18/91	6/26/96	6/27/97	4/16/08	10/22/08	12/10/08	5/14/09	8/3/09	11/3/09	5/11/10	11/1/10	5/24/11	11/8/11	5/1/12	10/30/12	5/8/13	11/20/13
TCE (5)	<1.9	<2	<0.1	<1	0.4	0.6	2.2	2.1	1.9	1.7	2	2	2.6	3.8	3.2	4.2	5	6.3	5.7	8.3

DG-21B (USG)

Compound (Cleanup Level)	1/8/90	12/12/90	12/14/92	9/7/91	12/8/91	11/2/94	6/26/96	6/27/97	7/16/98	5/26/99	4/26/00	6/15/01	6/15/02	4/29/03	7/29/04	5/25/05	5/22/06	4/30/07	4/16/08	10/22/08	12/10/08	5/14/09	8/3/09	11/3/09	5/11/10	11/1/10	5/24/11	11/8/11	5/1/12	10/30/12	5/6/13	11/20/13
TCE (5)	<1.9/<1	1	1	0.8	1	<2	1	3	2	2	<1	<1	1	1	1.4	2.2	1.8	4	3.1/3.2	2.7/2.7	3.4	3.8	3.8	3.9	4.6	6	4.9	6	6.8	7	6.8	11

MW-53A (OVB)

Compound (Cleanup Level)	10/4/90	11/8/90	3/10/10	11/1/10	5/23/11	11/8/11	5/1/12	10/30/12	5/6/13	11/18/13
TCE (5)	<5	<5	9.2/9.4	7.8	7.2	9.7	10	13/14	16	15

J (OVB)

Compound (Cleanup Level)	11/2/90	5/2/91	12/8/91	11/1/94	6/26/96	6/30/97	7/16/98	5/27/99	4/26/00	6/14/01	5/15/02	4/29/03	7/29/04	5/24/05	5/22/06	5/1/07	4/16/08	10/20/08	12/9/08	5/11/09	6/10/09	8/3/09	11/4/09	5/10/10	11/1/10	5/23/11	11/8/11	5/1/12	10/30/12	5/7/13	11/18/13
TCE (5)	1/<5	1.2/<0.1	<5/<1	1.3	2	2	0.9	<1	<1	<1	<0.5	0.3	0.25/0.25	<0.5	0.14	<0.5	0.24	0.29	0.26/0.29	0.78	3.2	7.6/7.3	7.3/8.2	8.9	12	20	17	22	28	21	25

N

0 500 1000

(Approximate Scale in Feet)

Legend:

- Technical Impracticability Zone Boundary
- Monitoring Well
- Former Extraction Well (Inactive)
- Monitoring Well Injected with Permanganate in July 2009
- Monitoring Well Injected with Vegetable Oil in July 2009
- Former Extraction Well Injected with Vegetable Oil in July 2009
- Monitoring Well Injected with Lactate or Vegetable Oil in October 2013
- Monitoring Well Injected with Permanganate in October 2013

Abbreviations:

cis-1,2-DCE = cis-1,2-dichloroethene
DCE = dichloroethene
TCE = trichloroethene
VC = vinyl chloride

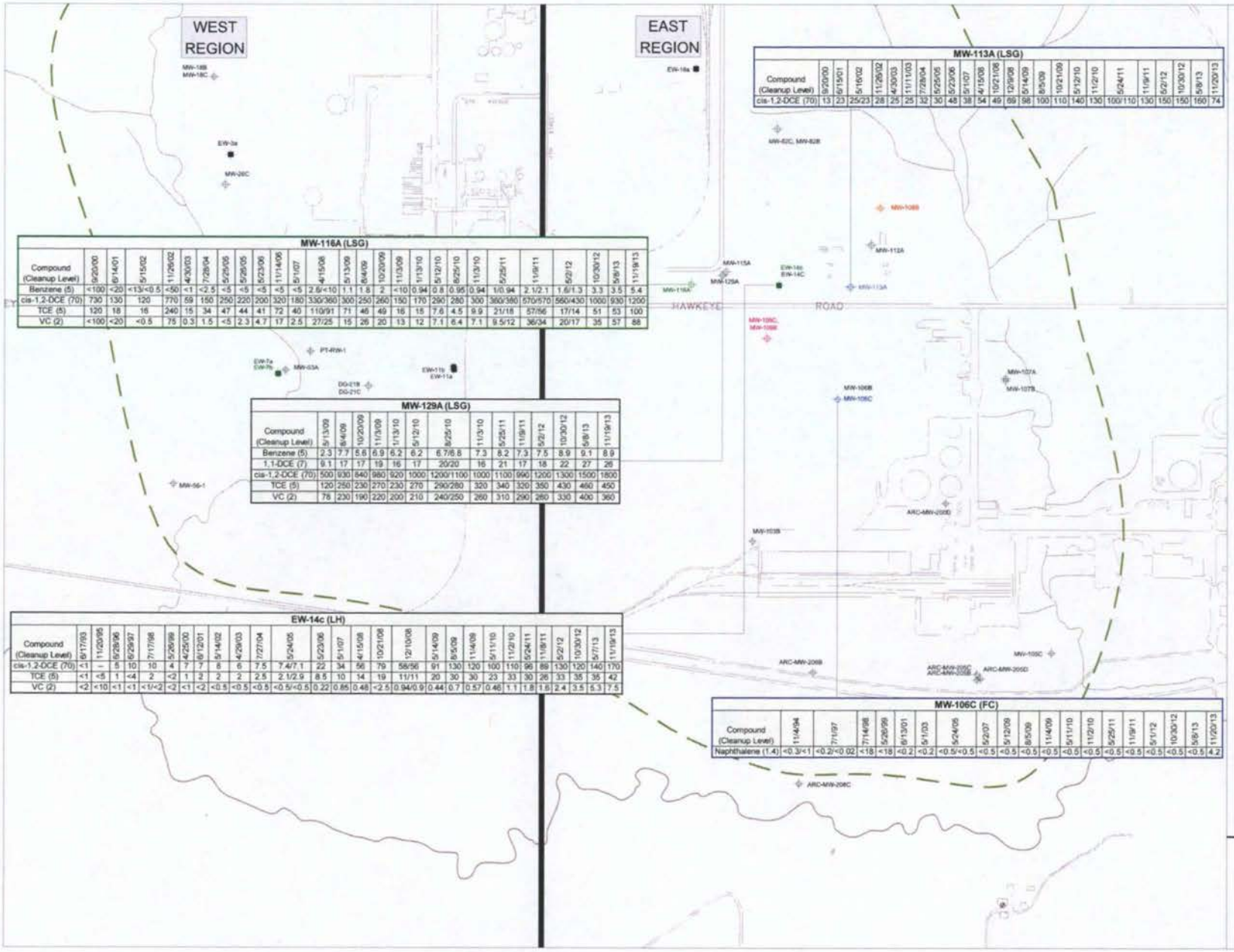
Notes:

1. All locations are approximate.
2. All concentrations are in ug/L. Concentrations from November 2013 above cleanup goals are shown on this map.
3. The remedial goal for each compound is shown in parentheses next to the compound's name.
4. The screened formation for each well is shown in parentheses next to the Well ID:
   - USG = Upper Scotch Grove
   - LSG = Lower Scotch Grove
   - FC = Farmers Creek
   - LH = Lower Hopkinton
   - OVB = Overburden
5. Due to figure readability issues, only data since January 2002 are shown on this figure. Please refer to previous sampling reports for data prior to January 2002.

Erler & Kalinowski, Inc.

Concentrations of Chemicals Other Than PCE Detected Above Cleanup Goals Through 2013 - West Region

Chemplex Site First OU
Clinton, Iowa
March 2014
EKI 890052.73
Figure 13a



MW-116A (LSG)

Compound (Cleanup Level)	9/20/00	6/14/01	5/15/02	11/26/02	4/30/03	7/28/04	5/26/05	5/26/05	5/23/06	11/14/06	5/1/07	4/15/08	5/13/09	6/4/09	10/20/09	11/3/09	11/3/10	5/12/10	6/25/10	11/3/10	5/25/11	11/8/11	5/2/12	10/30/12	5/8/13	11/19/13
Benzene (5)	<100	<20	<13/<0.5	<50	<1	<2.5	<5	<5	<5	<5	<5	2.6/<10	1.1	1.8	2	<10	0.94	0.8	0.95	0.94	1/0.94	2.1/2.1	1.6/1.3	3.3	3.5	5.4
cis-1,2-DCE (70)	730	130	120	770	59	150	250	220	200	320	180	330/360	300	250	260	150	170	290	280	300	360/380	570/570	560/430	1000	930	1200
TCE (5)	120	18	16	240	15	34	47	44	41	72	40	110/91	71	46	49	16	15	7.6	4.5	9.9	21/18	57/56	17/14	51	53	100
VC (2)	<100	<20	<0.5	75	0.3	1.5	<5	2.3	4.7	17	2.5	27/25	15	26	20	13	12	7.1	6.4	7.1	9.5/12	36/34	20/17	35	57	88

MW-129A (LSG)

Compound (Cleanup Level)	5/13/09	6/4/09	10/20/09	11/3/09	1/13/10	5/12/10	6/25/10	11/3/10	5/25/11	11/8/11	5/2/12	10/30/12	5/8/13	11/19/13
Benzene (5)	2.3	7.7	5.6	6.9	6.2	6.2	6.7/6.8	7.3	8.2	7.3	7.5	8.9	9.1	8.9
1,1-DCE (7)	9.1	17	17	19	16	17	20/20	16	21	17	18	22	27	26
cis-1,2-DCE (70)	500	930	840	980	920	1000	1200/1100	1000	1100	990	1200	1300	1500	1800
TCE (5)	120	250	230	270	230	270	290/280	320	340	320	350	430	460	450
VC (2)	78	230	190	220	200	210	240/250	260	310	290	280	330	400	360

EW-14c (LH)

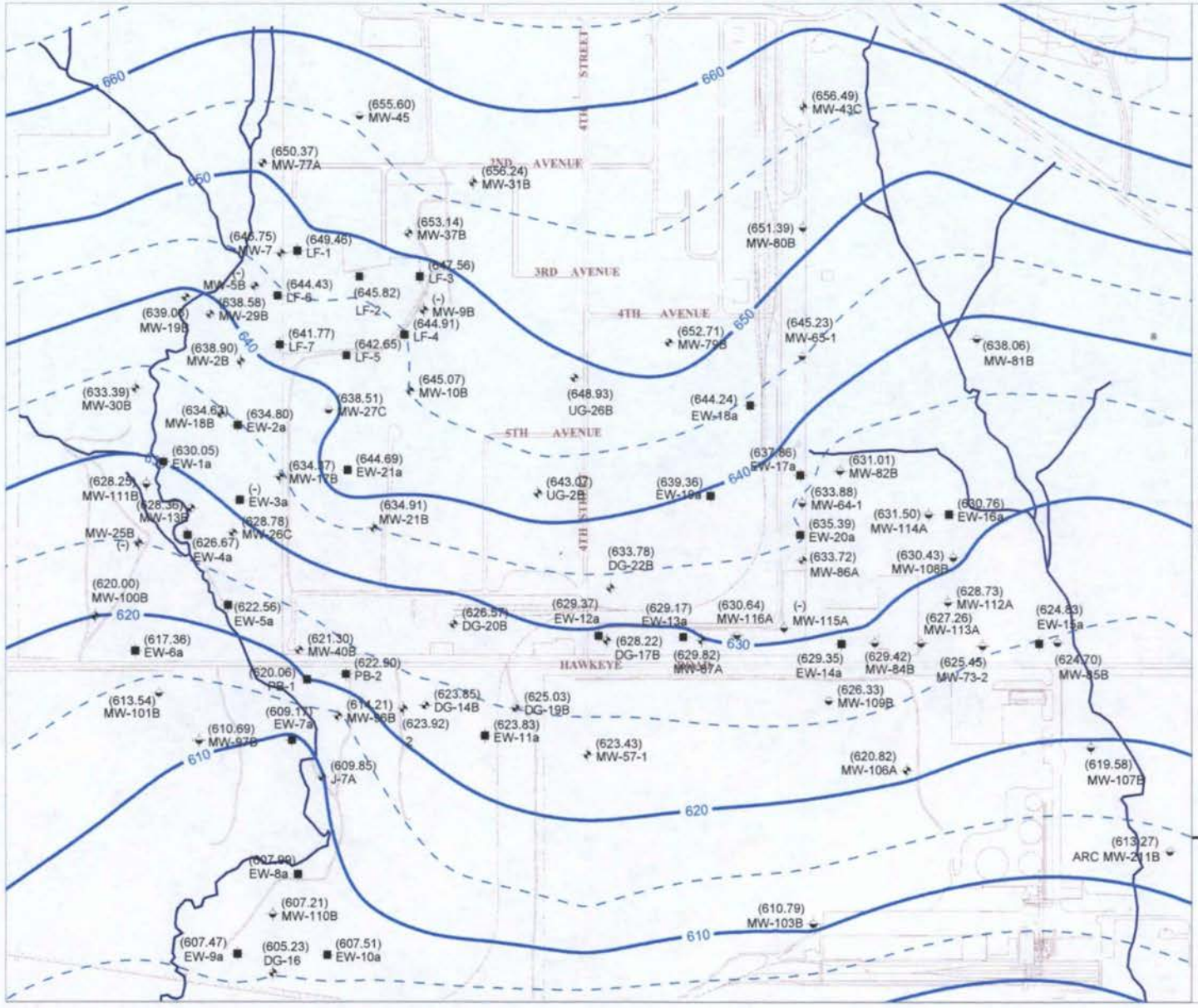
Compound (Cleanup Level)	9/17/93	11/20/95	6/28/96	6/29/97	7/17/98	5/26/99	4/25/00	6/12/01	5/14/02	4/29/03	7/27/04	5/24/05	5/23/06	5/1/07	4/15/08	10/21/08	12/10/08	3/14/09	9/5/09	11/4/09	5/11/10	11/2/10	5/24/11	11/8/11	5/2/12	10/30/12	5/7/13	11/19/13
cis-1,2-DCE (70)	<1	-	5	10	10	4	7	7	6	6	7.5	7.4/7.1	22	34	56	79	58/56	91	130	120	100	110	96	89	130	120	140	170
TCE (5)	<1	<5	1	<4	2	<2	1	2	2	2	2.5	2.1/2.9	8.5	10	14	19	11/11	20	30	30	23	33	30	26	33	35	35	42
VC (2)	<2	<10	<1	<1	<1/<2	<2	<1	<2	<0.5	<0.5	<0.5	<0.5/<0.5	0.22	0.85	0.48	<2.5	0.94/0.9	0.44	0.7	0.57	0.48	1.1	1.8	1.6	2.4	3.5	5.3	7.5

MW-113A (LSG)

Compound (Cleanup Level)	9/20/00	6/15/01	5/16/02	11/26/02	4/30/03	11/11/03	7/28/04	5/25/05	5/23/06	5/1/07	4/15/08	10/21/08	12/9/08	5/14/09	8/5/09	10/21/09	5/12/10	11/2/10	5/24/11	11/9/11	5/2/12	10/30/12	5/8/13	11/20/13
cis-1,2-DCE (70)	13	23	25/23	28	25	25	32	30	48	38	54	49	69	98	100	110	140	130	100/110	130	150	150	160	74

MW-106C (FC)

Compound (Cleanup Level)	11/4/94	7/1/97	7/14/98	5/26/99	6/13/01	5/1/03	5/24/05	5/2/07	5/12/09	8/5/09	11/4/09	5/11/10	11/2/10	5/25/11	11/8/11	5/1/12	10/30/12	5/8/13	11/20/13
Naphthalene (1.4)	<0.3/<1	<0.2/<0.02	<18	<18	<0.2	<0.2	<0.5/<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.2



N

0 500 1,000

(Approximate Scale in Feet)

Legend:

- Upper Scotch Grove Extraction Well
- Upper Scotch Grove Monitoring Well
- Lower Scotch Grove or Picture Rock Monitoring Well
- 660 — Groundwater Elevation Contour in Feet Above Mean Sea Level
- (637.65) — Groundwater Elevation in Feet Above Mean Sea Level, Measured in Wells on 18 November 2013

Notes:

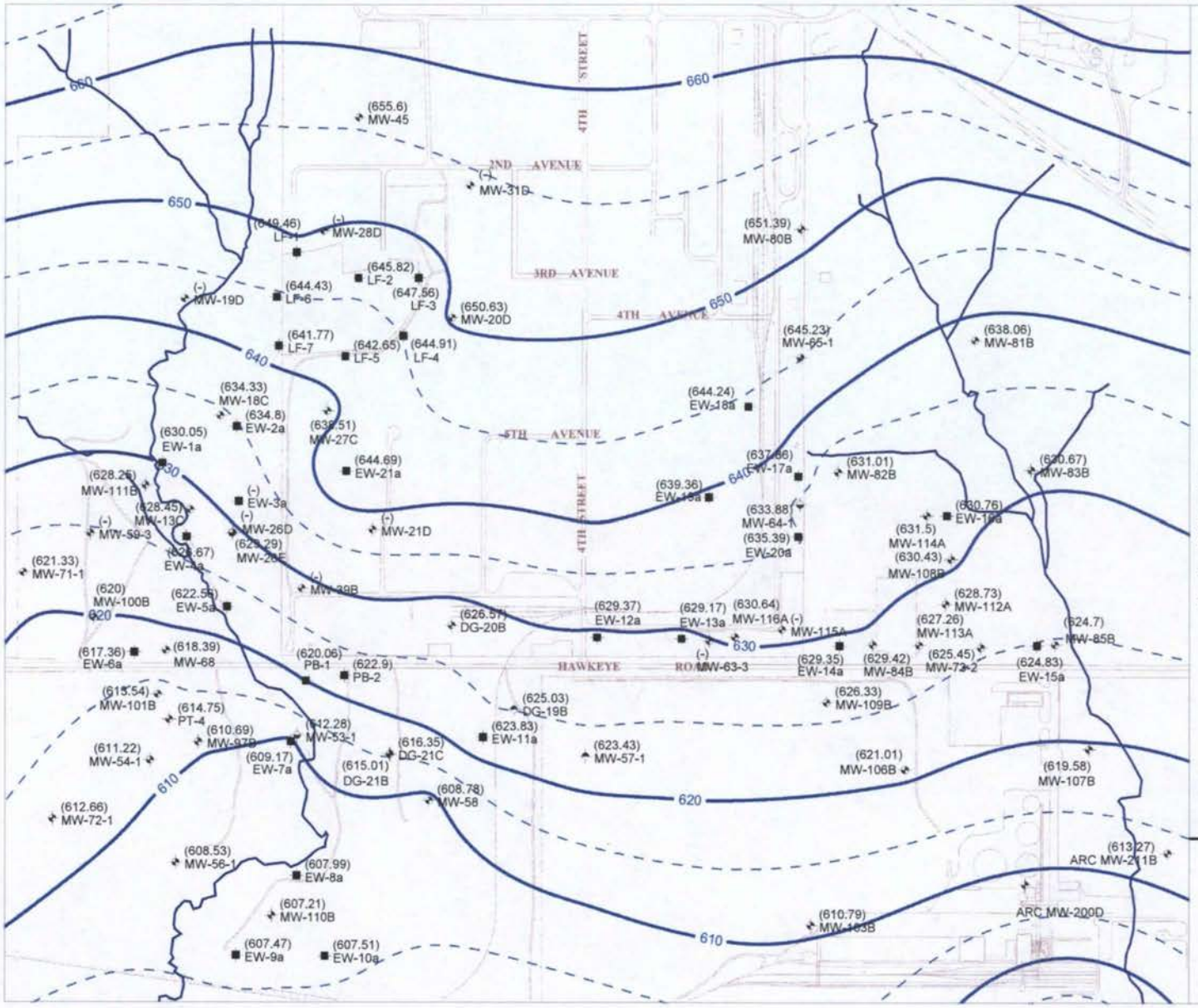
1. All locations are approximate.
2. Contour Interval: 5 feet.
3. On 29 September 2008, groundwater extraction in the Upper Scotch Grove Unit was discontinued.
4. Some wells displayed are screened in underlying or overlying formations, as indicated by the well symbols.
5. Groundwater elevations marked with a greater-than sign (>) were artesian or flowing artesian on the date of measurement.

Erler & Kalinowski, Inc.

Upper Scotch Grove Formation
November 2013 Potentiometric Surface

Chemplex Site, First OU
Clinton, IA
January 2014
EKI 890052.64

Figure 14



N

0 500 1,000

(Approximate Scale in Feet)

Legend:

- Upper Scotch Grove Extraction Well
- Lower Scotch Grove Monitoring Well
- Upper Scotch Grove Monitoring Well
- Picture Rock Monitoring Well
- 660 — Groundwater Elevation Contour in Feet Above Mean Sea Level
- (637.65) — Groundwater Elevation in Feet Above Mean Sea Level, Measured in Wells on 18 November 2013

Notes:

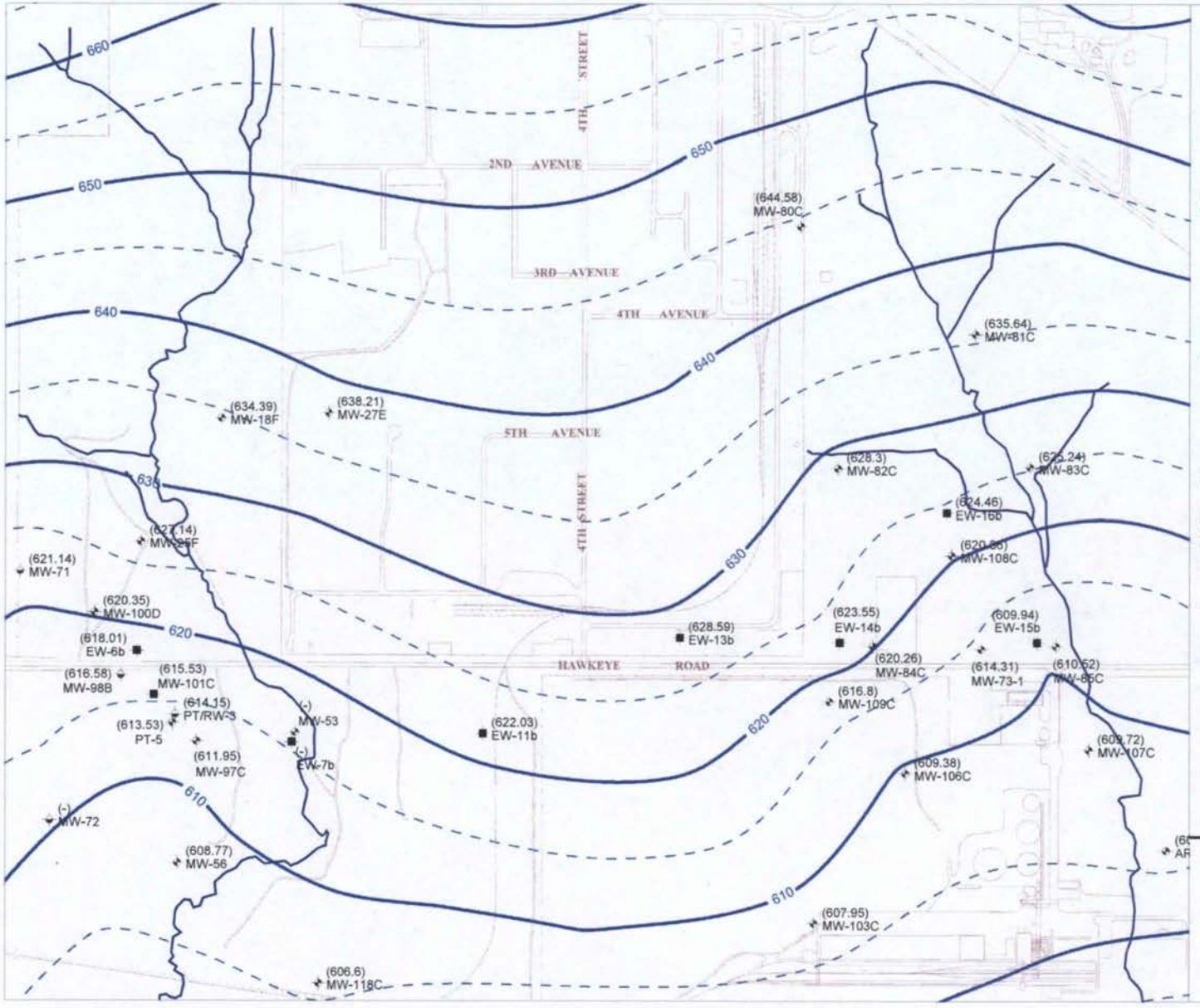
1. All locations are approximate.
2. Contour Interval: 5 feet.
3. On 29 September 2008, groundwater extraction in the Upper Scotch Grove Unit was discontinued.
4. Some wells displayed are screened in underlying or overlying formations, as indicated by the well symbols.
5. Groundwater elevations marked with a greater-than sign (>) were artesian or flowing artesian on the date of measurement.

Erler & Kalinowski, Inc.

Lower Scotch Grove Formation
November 2013 Potentiometric Surface

Chemplex Site, First OU
Clinton, IA
January 2014
EKI 890052.64

Figure 15

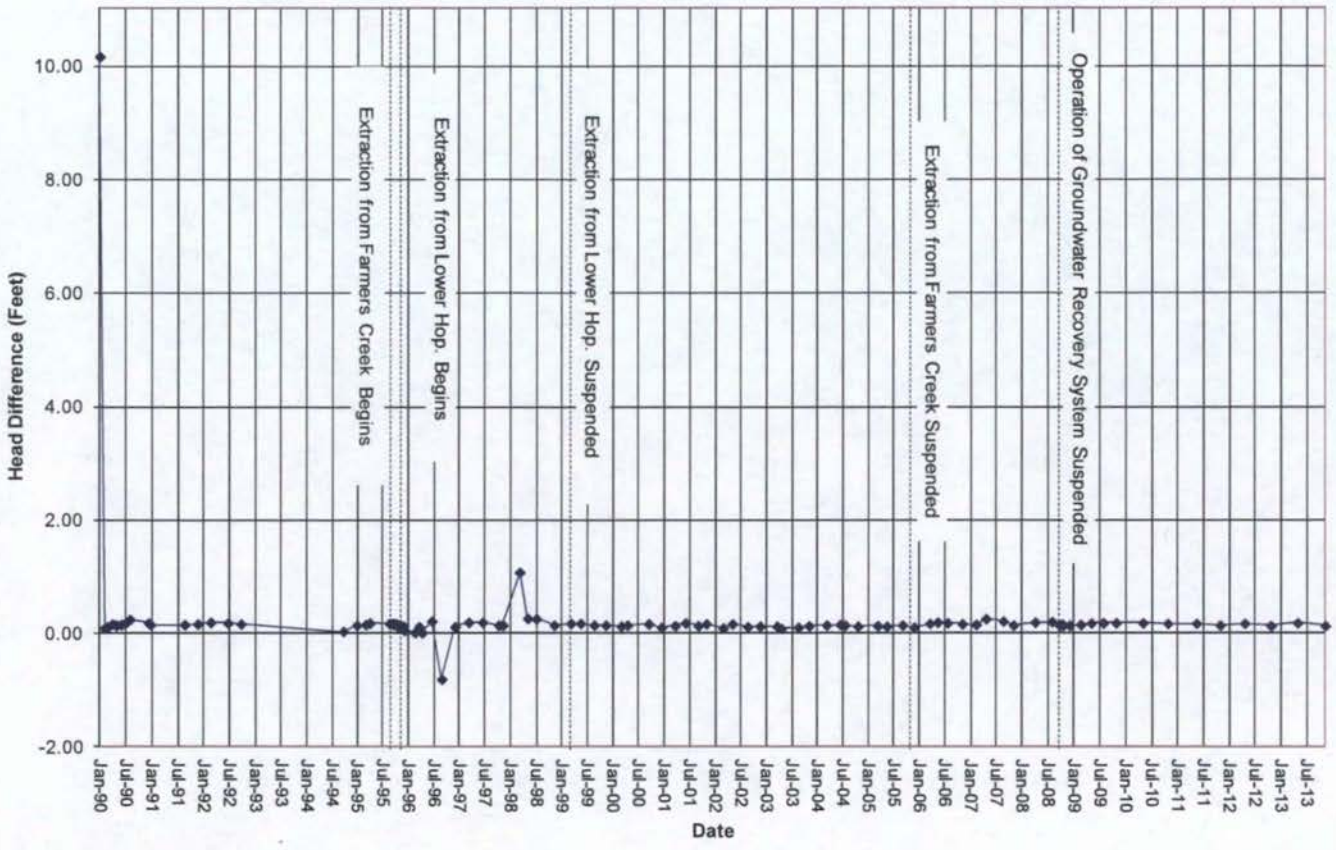


Erler & Kalinowski, Inc.

Farmers Creek Unit
November 2013 Potentiometric Surface

Chemplex Site, First OU
Clinton, IA
January 2014
EKI 890052.64

Figure 16



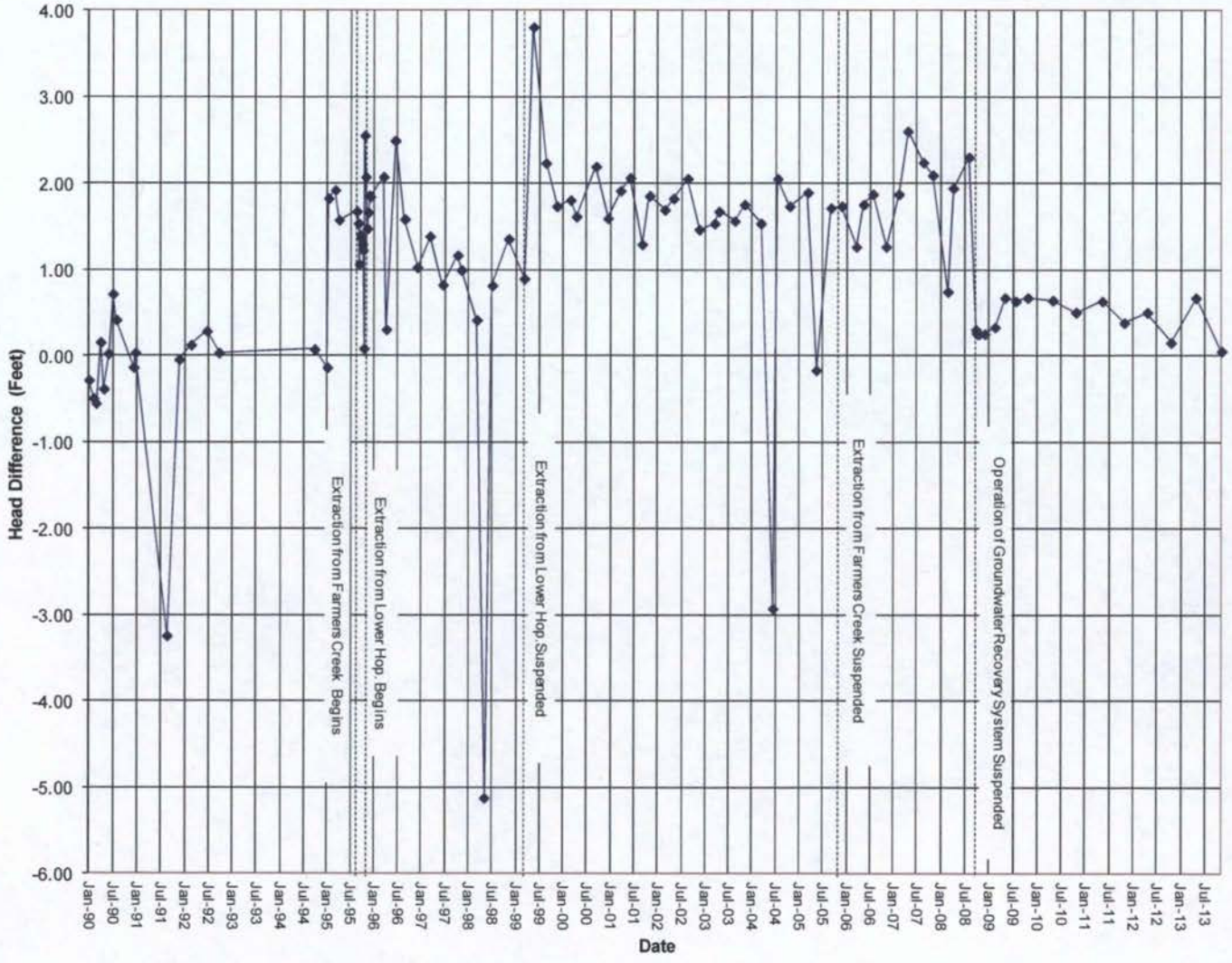
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-13C and Picture Rock well MW-13D. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-13C/MW-13D

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 17



Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-18C and Farmers Creek well MW-18F. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-18C/MW-18F

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 18

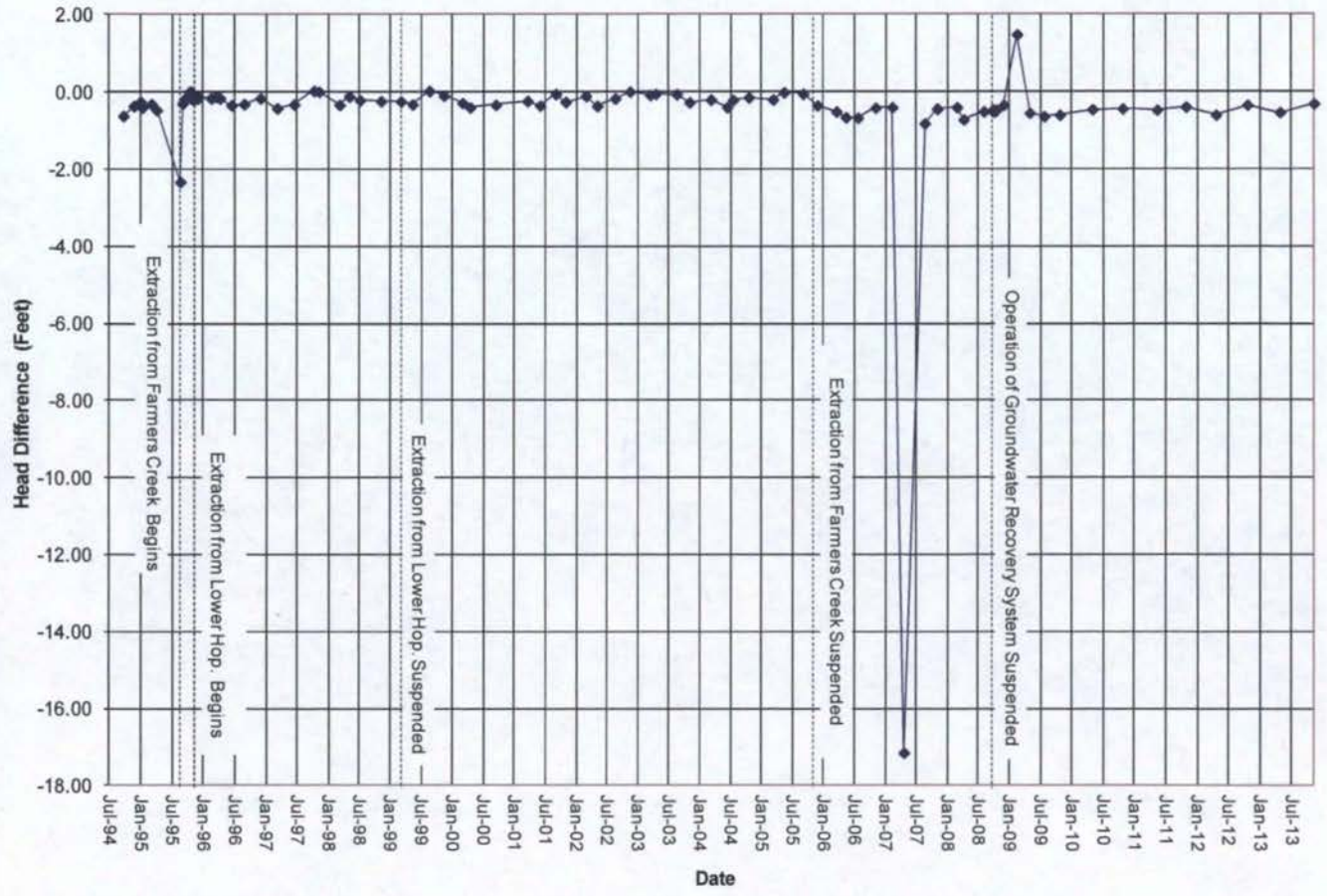
Notes:

1. Head difference shown is the difference between the groundwater elevation at Upper Scotch Grove well MW-26C and Picture Rock well MW-26E. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-26C/MW-26E

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 19



Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-27C and Farmers Creek well MW-27E. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-27C/MW-27E

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 20

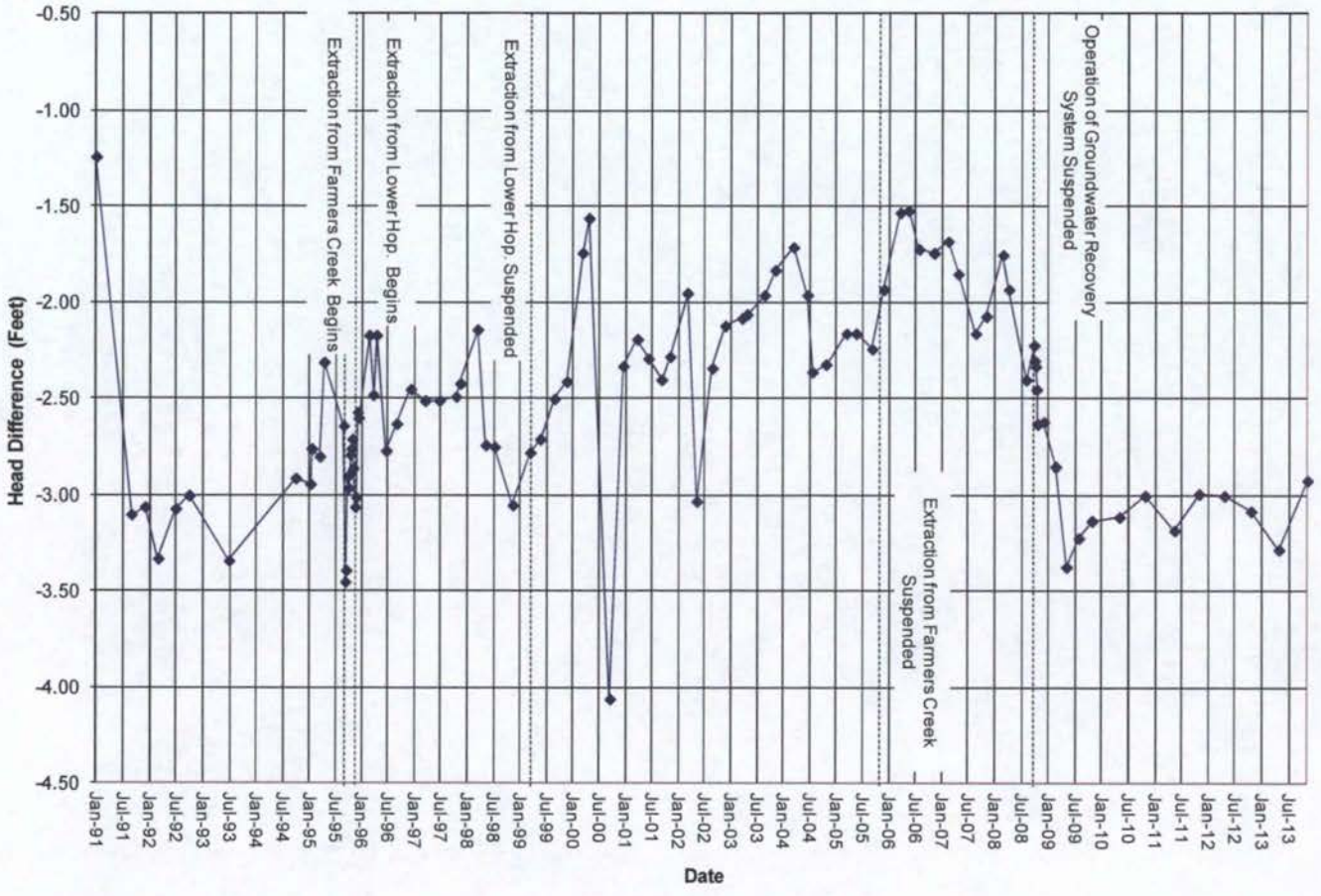
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-71-1 and Lower Hopkinton well MW-71. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-71-1/MW-71

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 21



Notes:

1. Head difference shown is the difference between the groundwater elevation at Picture Rock well MW-64-1 and Blanding well MW-64. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in
East Region Monitoring Well Pair
MW-64-1/MW-64

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 22

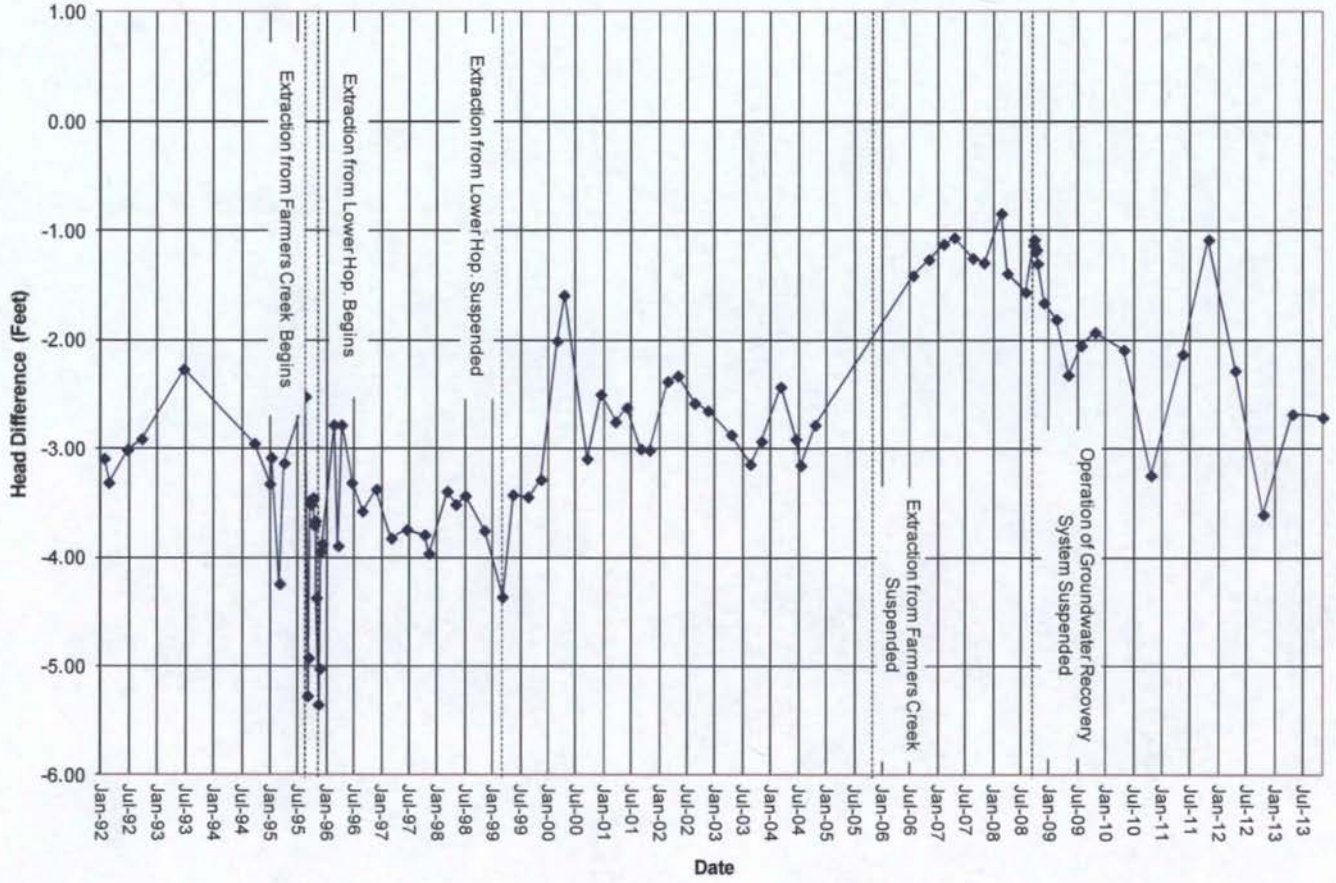
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-65-1 and Blanding well MW-65. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in East Region Monitoring Well Pair MW-65-1/MW-65

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 23



Notes:

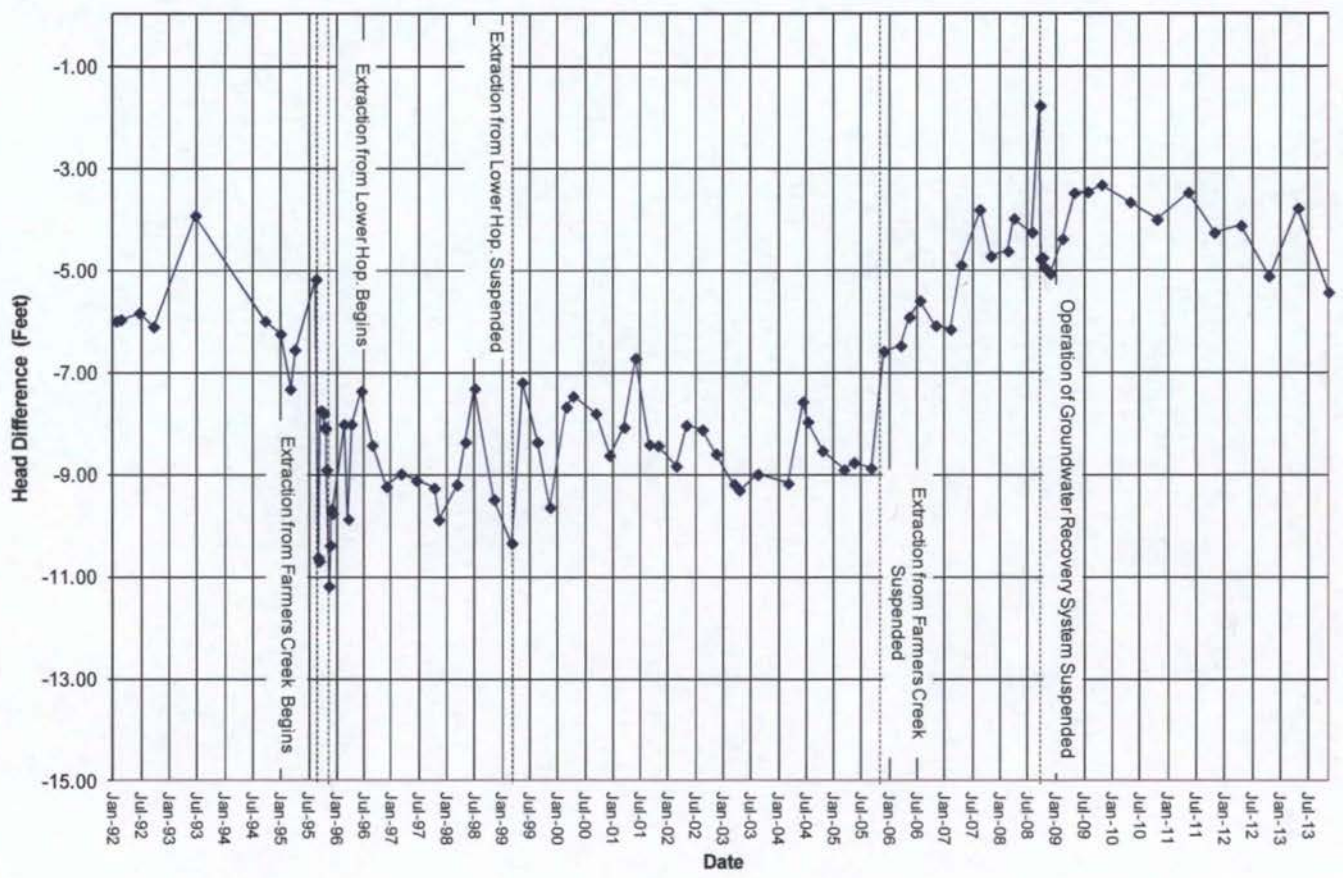
1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-82B and Farmers Creek well MW-82C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

2. Head differences for First, Second, Third, and Fourth Quarters 2005, and First and Second Quarters 2006 are unavailable as Well MW-82B was not gauged due to an obstruction in the well.

Erler & Kalinowski, Inc.

Historic Head Difference in
East Region Monitoring Well Pair
MW-82B/MW-82C

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 24



Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-83B and Farmers Creek well MW-83C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in East Region Monitoring Well Pair MW-83B/MW-83C

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 25

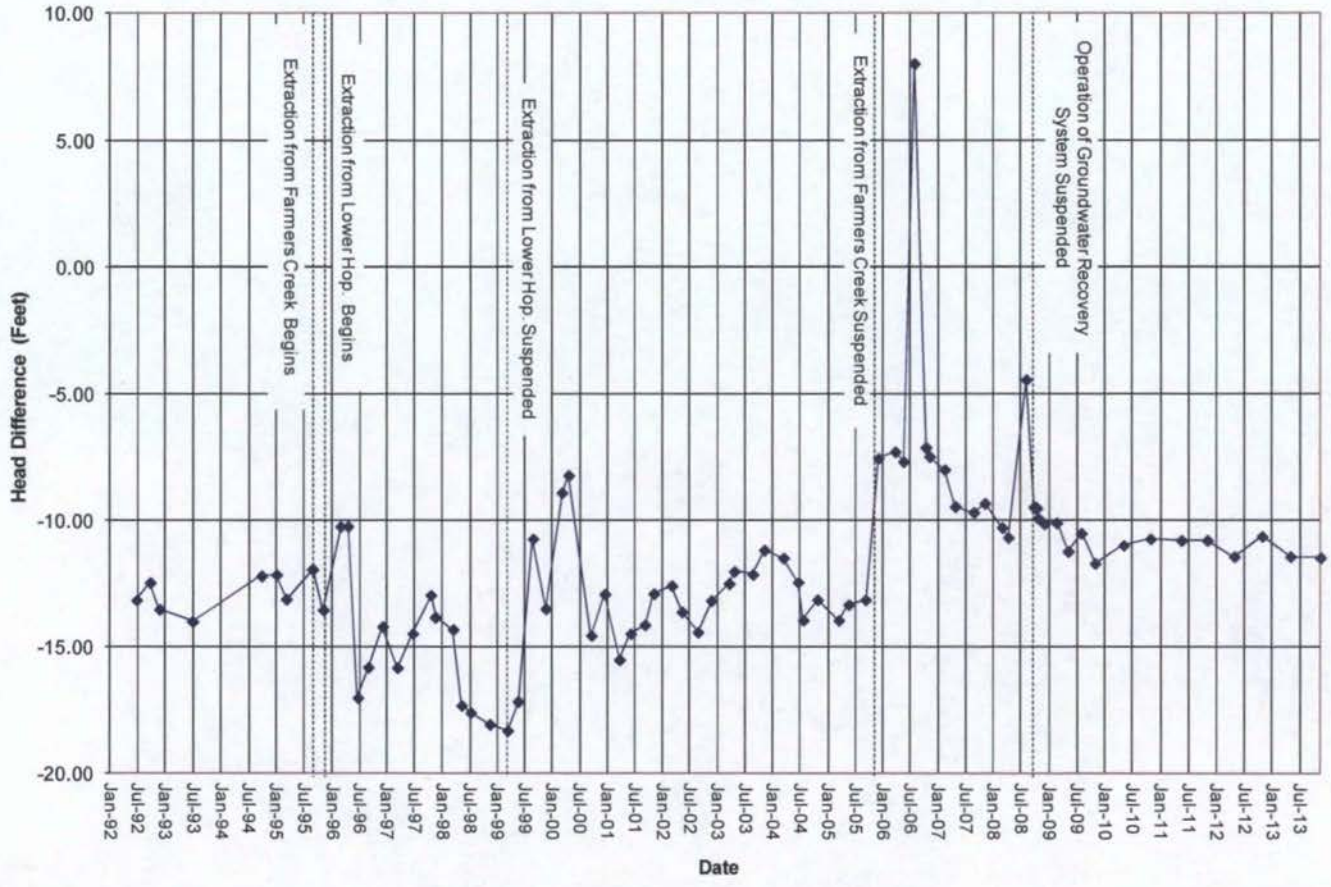
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-84B and Farmers Creek well MW-84C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in East Region Monitoring Well Pair MW-84B/MW-84C

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 26



Notes:

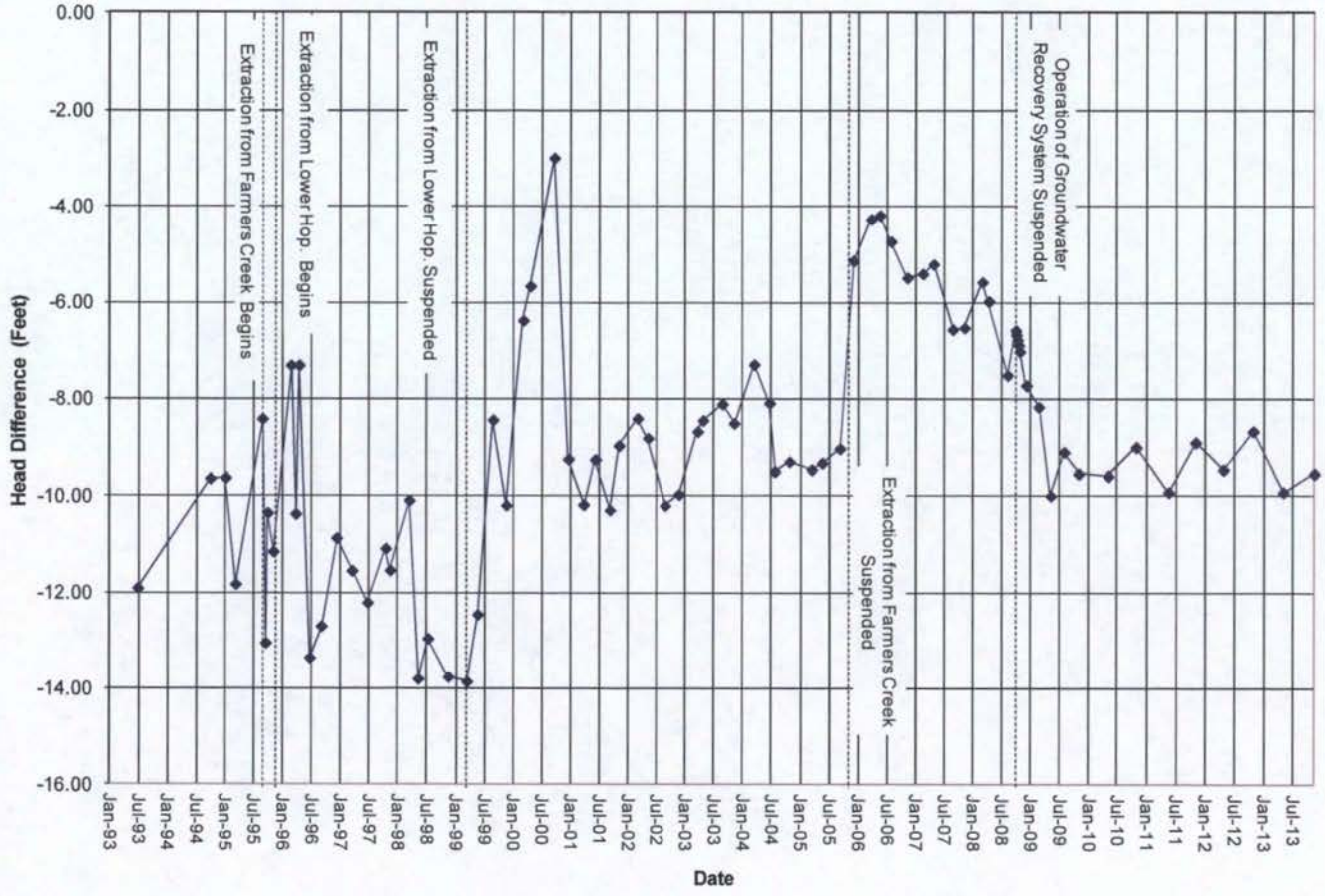
1. Head difference shown is the difference between the groundwater elevation at Upper Scotch Grove well MW-106A and Farmers Creek well MW-106C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

2. An uncharacteristically large upward gradient was observed during the Third Quarter 2006 gauging event on 1 August 2006. Causes for this spike were unknown. Water levels were measured again in October 2006. The large upward gradient was unconfirmed.

Erler & Kalinowski, Inc.

Historic Head Difference in
East Region Monitoring Well Pair
MW-106A/MW-106C

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 27



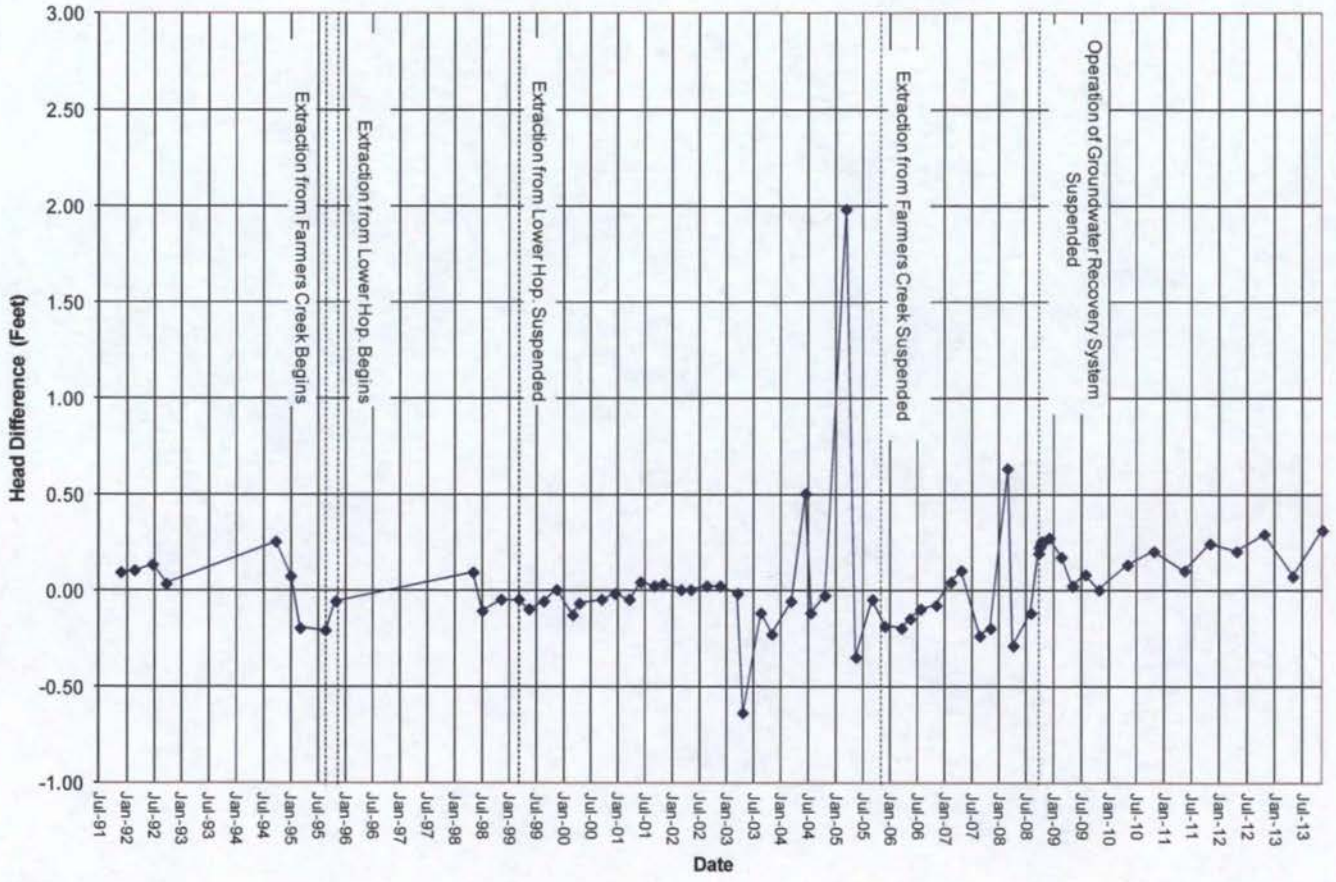
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-109B and Farmers Creek well MW-109C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in
East Region Monitoring Well Pair
MW-109B/MW-109C

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 28



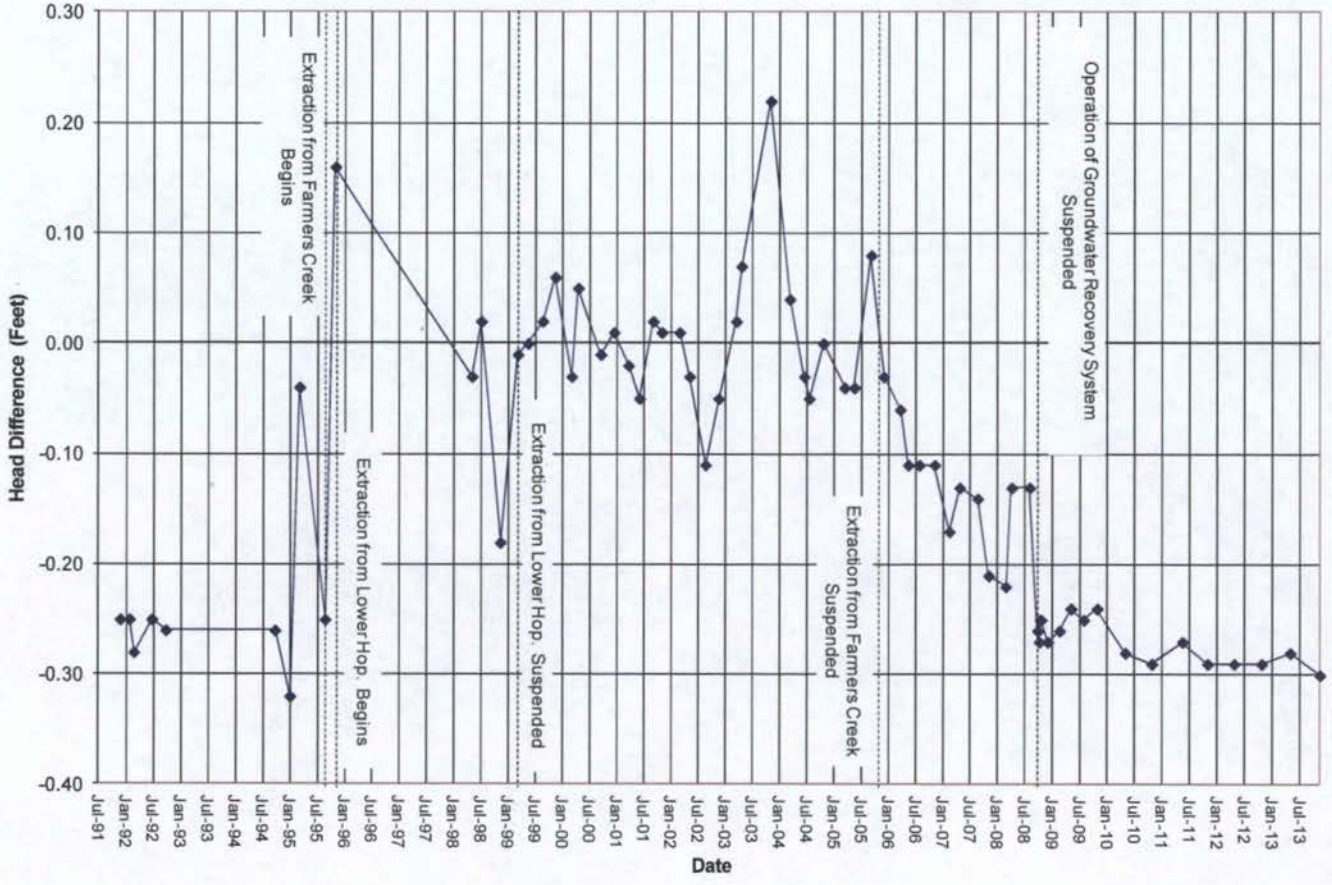
Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-101C and Lower Hopkinton well MW-101D. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-101C/MW-101D

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 29



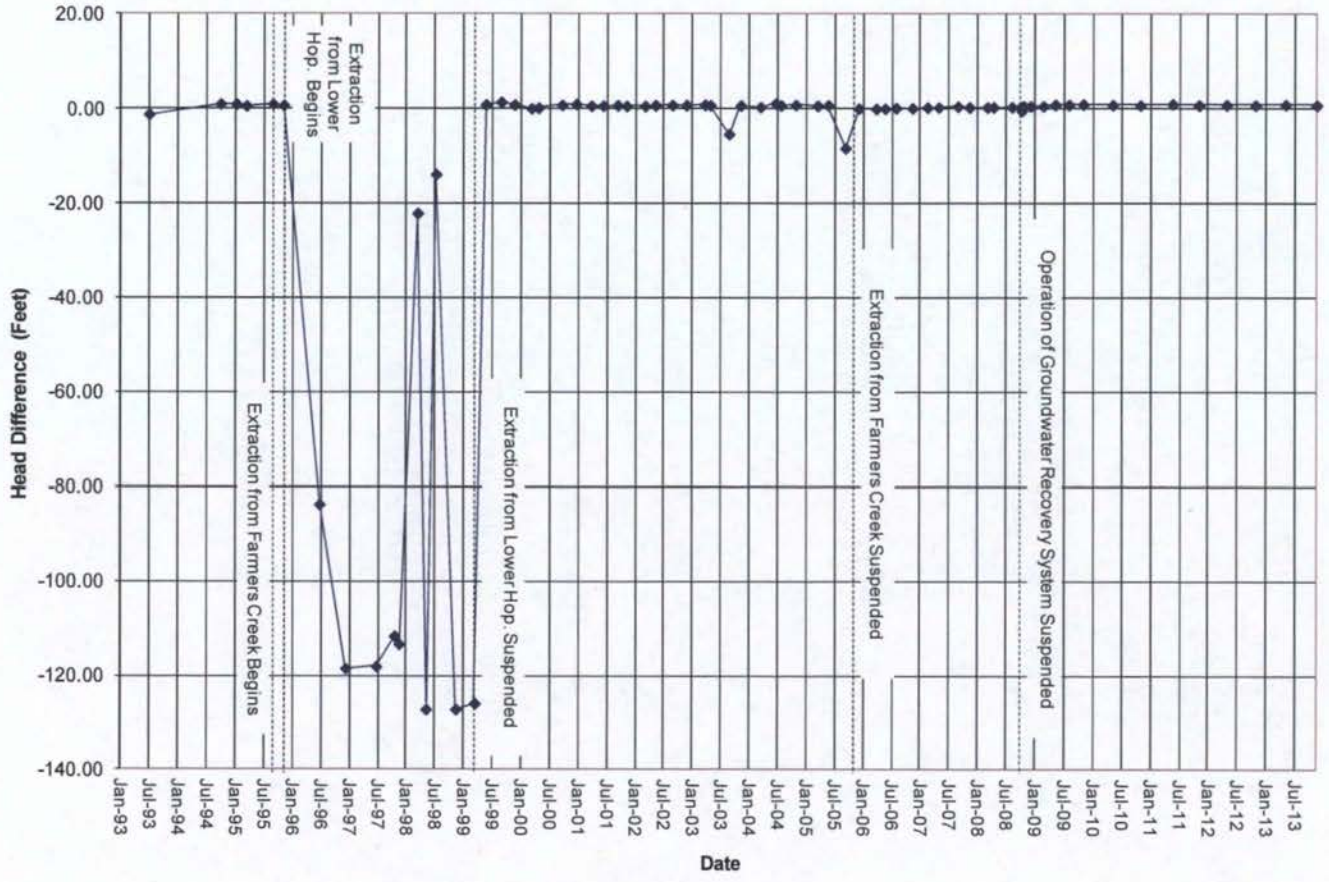
Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-97C and Lower Hopkinton well MW-97D. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in
West Region Monitoring Well Pair
MW-97C/MW-97D

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 30



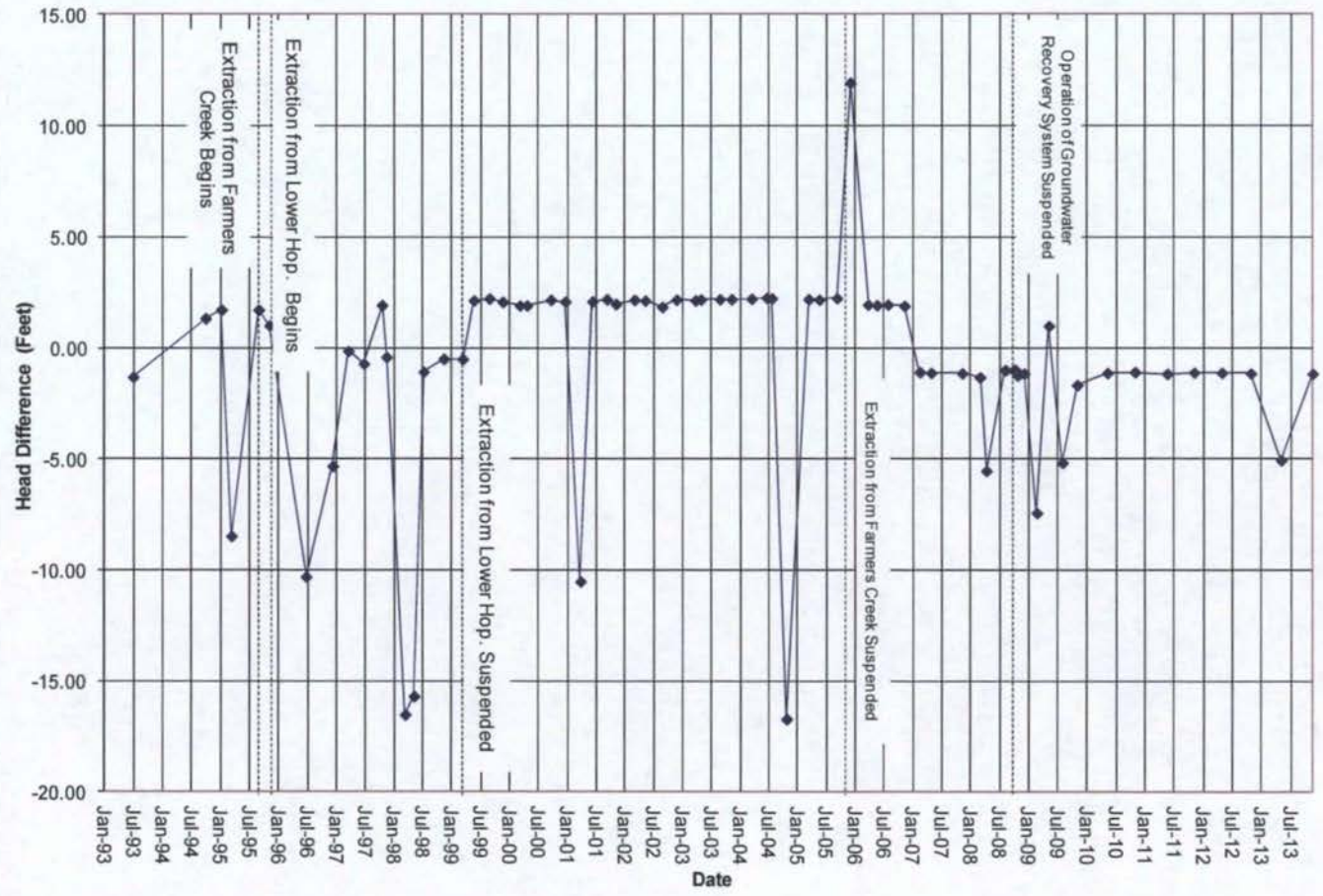
Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-84C and the adjacent Lower Hopkinton well EW-14c. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in Adjacent East Region Wells MW-84C/EW-14c

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 31



Notes:

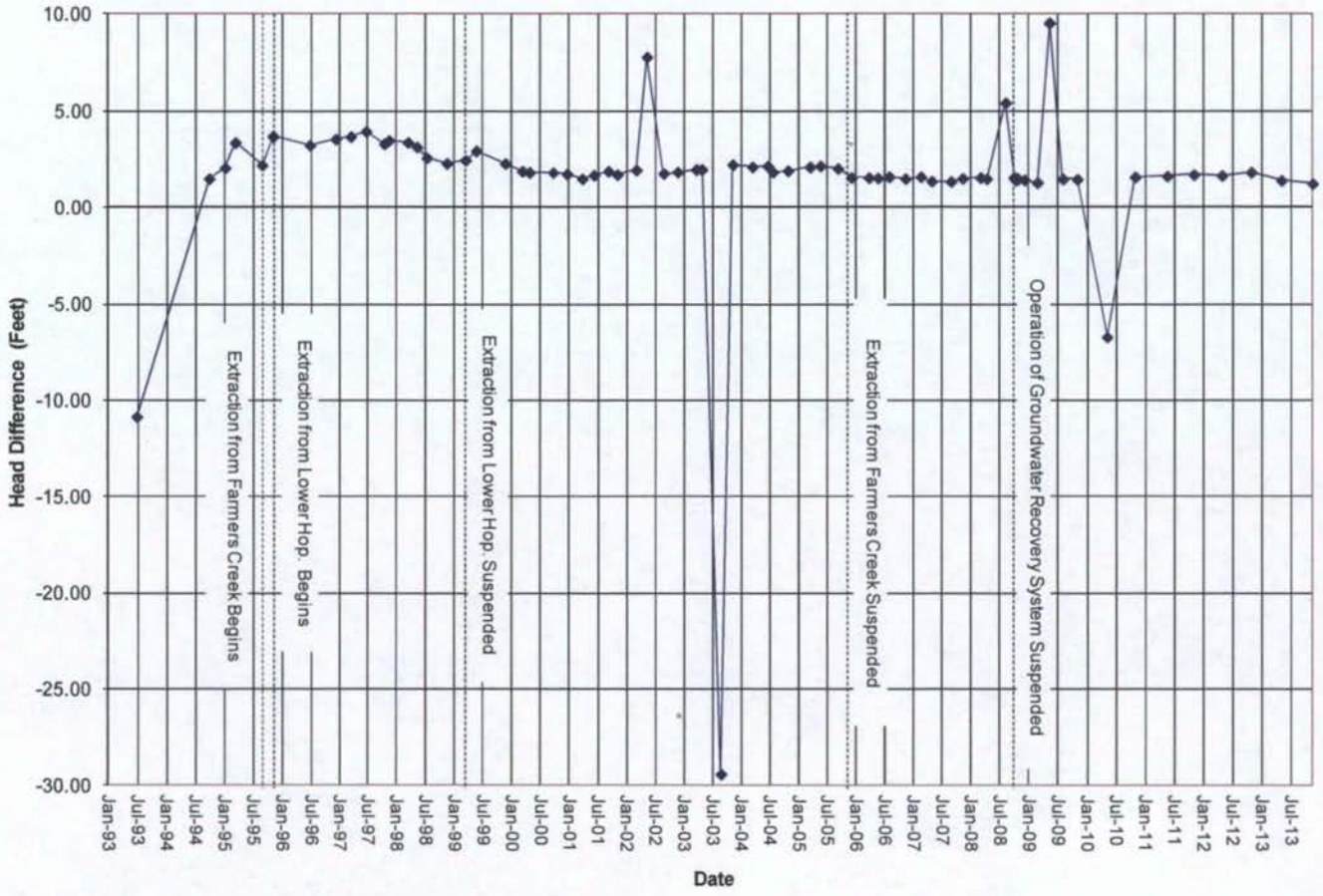
1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-85C and the adjacent Lower Hopkinton well EW-15c. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

2. The head difference for 30 August 2007 was not calculated because Well MW-85C was obstructed at six feet below the ground surface and the water level in this well was therefore not measured.

Erler & Kalinowski, Inc.

Historic Head Difference in Adjacent East Region Wells MW-85C/EW-15c

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 32



Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-108C and the adjacent Lower Hopkinton well EW-16c. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

2. The pump at inactive extraction well EW-16c was exercised on 28 August 2003, temporarily causing an uncharacteristically large downward gradient. As a result, the head difference shown for August 28 on this figure does not represent the ambient head difference between wells MW-108 and EW-16c.

Erler & Kalinowski, Inc.

Historic Head Difference in Adjacent East Region Wells MW-108C/EW-16c

Chemplex Site
Clinton, Iowa
March 2014
EKI 890052.73
Figure 33

Appendix A

Inspection Checklist

OSWER No. 9355.7-03B-P

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Chemplex	**Date of inspection:** 11/13/2013
Location and Region: Clinton/Camanche, IA	**EPA ID:** IAD045372536
Agency, office, or company leading the five-year review: EPA	**Weather/temperature:** Clear and cold, 36°F

Remedy Includes: (Check all that apply)

- ✓ Landfill cover/containment
- ✓ Access controls
- ✓ Institutional controls
- Groundwater pump and treatment - Standby
- Surface water collection and treatment
- Other _____
- ✓ Monitored natural attenuation
- Groundwater containment
- Vertical barrier walls

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** John Hintermeister (Name) Operations Manager (Title) 11/13/2013 (Date)
   Interviewed (at site) at office by phone Phone no. 563-593-5085
   Problems, suggestions; Report attached _____

2. **O&M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

OSWER No. 9355.7-03B-P

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency City of Camanche
Contact Tom Roth — City Administrator — 11/13/13 — 563-259-8342
Name — Title — Date — Phone no.
Problems; suggestions; Report attached ACC/GCC clearly met the objectives that were mutually agreed upon regarding the extension of water and related improvements to private system

Agency City of Camanche
Contact Dave Rickertsen — Public Works Director — 11/13/13 — 563-259-9410
Name — Title — Date — Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ — _____ — _____ — _____
Name — Title — Date — Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ — _____ — _____ — _____
Name — Title — Date — Phone no.
Problems; suggestions; Report attached _____

4. **Other interviews** (optional) Report attached.

OSWER No. 9355.7-03B-P

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	**O&M Documents**			
	O&M manual	Readily available	Up to date	N/A
	As-built drawings	Readily available	Up to date	N/A
	Maintenance logs	Readily available	Up to date	N/A
	Remarks: Shutdown 5 years ago. All documents still available.			
2.	**Site-Specific Health and Safety Plan**	Readily available	Up to date	N/A
	Contingency plan/emergency response plan	Readily available	Up to date	N/A
	Remarks: Still in treatment plant. Updated at shutdown			
3.	**O&M and OSHA Training Records**	Readily available	Up to date	(N/A)
	Remarks			
4.	**Permits and Service Agreements**			
	Air discharge permit	Readily available	Up to date	N/A
	Effluent discharge – NPDES	Readily available	Up to date	N/A
	Waste disposal, POTW	Readily available	Up to date	N/A
	Other permits	Readily available	Up to date	N/A
	Remarks: Haven't had discharge since shutdown. Purge water from sampling goes to Equistar's treatment			
5.	**Gas Generation Records**	Readily available	Up to date	(N/A)
	Remarks			
6.	**Settlement Monument Records**	Readily available	Up to date	(N/A)
	Remarks			
7.	**Groundwater Monitoring Records**	Readily available	Up to date	(N/A)
	Remarks: Kept by MWH, not here.			
8.	**Leachate Extraction Records**	Readily available	Up to date	N/A
	Remarks			
9.	**Discharge Compliance Records**			
	Air	Readily available	Up to date	N/A
	Water (effluent)	Readily available	Up to date	N/A
	Remarks: Not since 2008			
10.	**Daily Access/Security Logs**	Readily available	Up to date	(N/A)
	Remarks			

OSWER No. 9355.7-03B-P

IV. O&M COSTS

1. **O&M Organization**
   State in-house — Contractor for State
   ✓ PRP in-house — (Contractor for PRP)
   Federal Facility in-house — Contractor for Federal Facility
   Other One person

2. **O&M Cost Records** – Included in 5 Year Review Report - minimal
   Readily available — Up to date
   Funding mechanism/agreement in place
   Original O&M cost estimate_____ Breakdown attached

   Total annual cost by year for review period if available

   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS (Applicable) N/A

A. Fencing

1. **Fencing damaged** — Location shown on site map — Gates secured — N/A
   Remarks No damage.

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A
   Remarks During Equistar's Turnaround period, 2 signs were missing. They will be replaced in April 2014.

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C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (e.g., self-reporting, drive by): As needed, On site
Frequency: 2-3 times per week
Responsible party/agency: PRP
Contact: John Hunsmeister

Name	Title	Date	Phone no.

Reporting is up-to-date — (Yes) No N/A
Reports are verified by the lead agency — (Yes) No N/A

Specific requirements in deed or decision documents have been met — (Yes) No N/A
Violations have been reported — Yes No (N/A)
Other problems or suggestions: Report attached
More traffic on road, due to Railport that is ongoing.

2. **Adequacy** — ICs are adequate — ICs are inadequate — N/A
Remarks: Some future measures, ie. security fencing may be necessary as road traffic increases

D. General

1. **Vandalism/trespassing** — Location shown on site map — No vandalism evident
Remarks: Not an issue right now

2. **Land use changes on site** (N/A)
Remarks

3. **Land use changes off site** (N/A)
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads (Applicable) N/A

1. **Roads damaged** — Location shown on site map — Roads adequate — N/A
Remarks: Have put layer of gravel on road in 2012

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B. Other Site Conditions

Remarks

VII. LANDFILL COVERS (Applicable) N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map (Settlement not evident)
Areal extent____ Depth____
Remarks Annual inspection - If seen, it gets fixed.

2. **Cracks** Location shown on site map (Cracking not evident)
Lengths____ Widths____ Depths____
Remarks

3. **Erosion** Location shown on site map Erosion not evident
Areal extent____ Depth____
Remarks See #1, Erosion gets fixed at least annually

4. **Holes** Location shown on site map (Holes not evident)
Areal extent____ Depth____
Remarks All part of annual

5. **Vegetative Cover** Grass Cover properly established No signs of stress
Trees/Shrubs (indicate size and locations on a diagram)
Remarks Cut back trees and shrubs every couple of 3 years depending on rainfall. Will be done in 2014

6. **Alternative Cover (armored rock, concrete, etc.)** (N/A)
Remarks

7. **Bulges** Location shown on site map (Bulges not evident)
Areal extent____ Height____
Remarks

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8.	**Wet Areas/Water Damage**	Wet areas/water damage not evident		
	Wet areas	Location shown on site map	Areal extent_____	
	Ponding	Location shown on site map	Areal extent_____	
	Seeps	Location shown on site map	Areal extent_____	
	Soft subgrade	Location shown on site map	Areal extent_____	
	Remarks_____			
9.	**Slope Instability**	Slides	Location shown on site map	No evidence of slope instability
	Areal extent_____			
	Remarks_____			
B. Benches		Applicable	N/A	
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	**Flows Bypass Bench**	Location shown on site map	N/A or okay	
	Remarks_____			
2.	**Bench Breached**	Location shown on site map	N/A or okay	
	Remarks_____			
3.	**Bench Overtopped**	Location shown on site map	N/A or okay	
	Remarks_____			
C. Letdown Channels		Applicable	N/A – Part of Annual Inspection	
	(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	**Settlement**	Location shown on site map	No evidence of settlement	
	Areal extent_____	Depth_____		
	Remarks_____			
2.	**Material Degradation**	Location shown on site map	No evidence of degradation	
	Material type_____	Areal extent_____		
	Remarks_____			
3.	**Erosion**	Location shown on site map	No evidence of erosion	
	Areal extent_____	Depth_____		
	Remarks_____			

4. **Undercutting** Location shown on site map (No evidence of undercutting)
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ (No obstructions)
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
(No evidence of excessive growth)
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations (Applicable) N/A All are shutdown

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled (Good condition)
Evidence of leakage at penetration Needs Maintenance
(N/A)
Remarks All part of annual inspection

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled (Good condition)
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled (Good condition)
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells** Landfill Gas
(Properly secured/locked) Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance (N/A)
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed (N A)
Remarks_____

E. Gas Collection and Treatment Applicable (N/A)

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable (N/A)

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable (N/A)

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

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H. Retaining Walls Applicable (N/A)

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable (N/A) Runoff goes to wetland and tributary

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable (N/A)

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

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IX. GROUNDWATER/SURFACE WATER REMEDIES (Applicable) N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines (Applicable) N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks All extraction wells were pulled in 2005 after shutdown. Pumps/downpipes. Nothing was capped or filled.

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   (Good condition) Needs Maintenance
   Remarks Still operational but shutdown

3. **Spare Parts and Equipment**
   (Readily available) (Good condition) Requires upgrade Needs to be provided
   Remarks Still here

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable (N/A)

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks

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C. Treatment System Applicable N/A – Still here, just shutdown

1. **Treatment Train** (Check components that apply)
   - Metals removal
   - Oil/water separation
   - Bioremediation
   - Air stripping
   - Carbon adsorbers
   - Filters
   - Additive (e.g., chelation agent, flocculent)
   - Others
   - Good condition
   - Needs Maintenance
   - ✓ Sampling ports properly marked and functional
   - ✓ Sampling/maintenance log displayed and up to date
   - ✓ Equipment properly identified
   - Quantity of groundwater treated annually 135 Million Gallons to Standby
   - Quantity of surface water treated annually
   - Remarks

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - N/A
   - Good condition
   - Needs Maintenance
   - Remarks

3. **Tanks, Vaults, Storage Vessels**
   - N/A
   - Good condition
   - Proper secondary containment
   - Needs Maintenance
   - Remarks

4. **Discharge Structure and Appurtenances**
   - N/A
   - Good condition
   - Needs Maintenance
   - Remarks Polishing Basin next door

5. **Treatment Building(s)**
   - N/A
   - Good condition (esp. roof and doorways)
   - Needs repair
   - ✓ Chemicals and equipment properly stored
   - Remarks Still have chemicals for sampling door - peroxide + muriatic acid

6. **Monitoring Wells** (pump and treatment remedy)
   - Properly secured/locked
   - Functioning
   - Routinely sampled
   - Good condition
   - All required wells located
   - Needs Maintenance
   - N/A
   - Remarks Repairs are made every quarter. PM does quarterly report that gets submitted to EPA

D. Monitoring Data

1. Monitoring Data
   - Is routinely submitted on time
   - Is of acceptable quality

2. Monitoring data suggests:
   - Groundwater plume is effectively contained
   - Contaminant concentrations are declining

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D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   (Properly secured/locked) Functioning (Routinely sampled) (Good condition)
   All required wells located Needs Maintenance N/A
   Remarks: Repairs are made to wells if necessary.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. NA.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Appendix B

Inspection Photographs

List of Pictures:

Waterline Location

1. 9th Street facing west
2. 31st Street facing north
3. City Hall water tower
4. Highway 67 water tower

Landfill Area

5. Landfill 1 – Entrance facing north
6. Landfill 2 – Entrance to NS access facing north
7. Landfill 3 – Upper area facing east
8. Landfill 4 – Upper area facing north
9. Landfill 5 – LF-6 facing west
10. Landfill 6 – MW-7 facing south

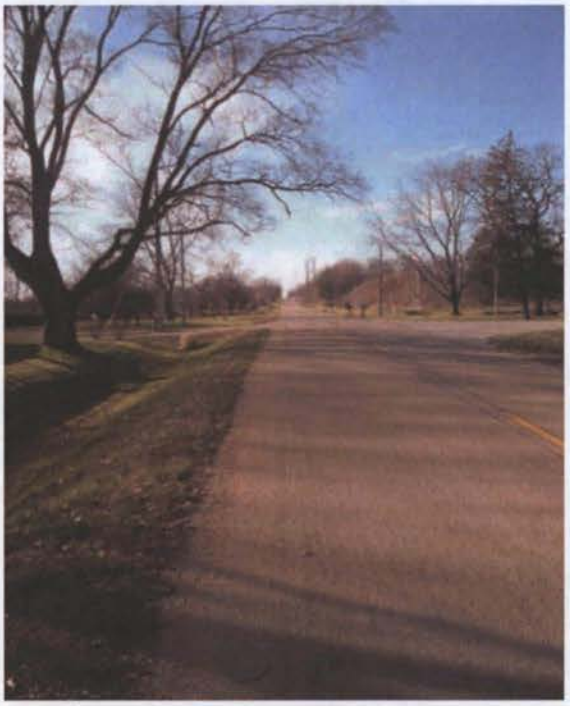

Photo #1	**Description: 9th Street facing west**
Date: 13-Nov-13	**Site: Chemplex Company, Clinton, Iowa**

Photo #2	**Description: 31st Street facing north**
Date: 13-Nov-13	**Site: Chemplex Company, Clinton, Iowa**

Photo #3	**Description: City Hall water tower**
Date	**Site: Chemplex Company, Clinton, Iowa**

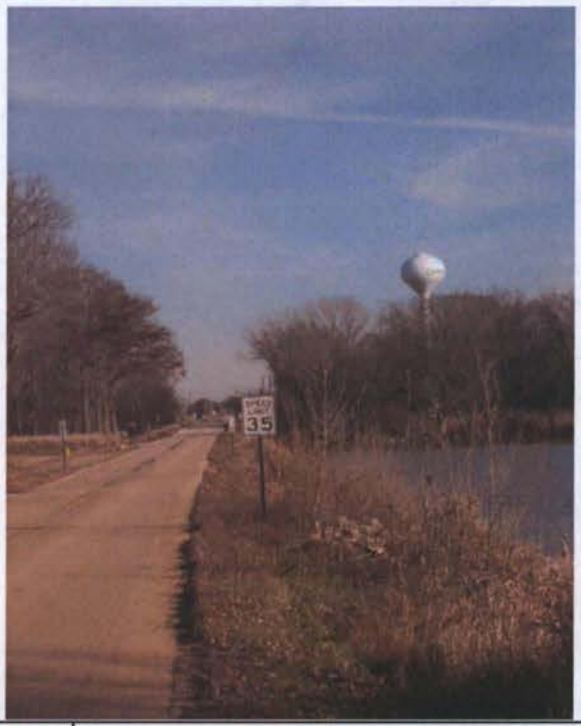

Photo #4	**Description: Highway 67 water tower.**
Date: 13-Nov-13	**Site: Chemplex Company, Clinton, Iowa**

Photo #5	Description: Entrance facing north
Date	Site: Chemplex Company, Clinton, Iowa

Photo #6	Description: Entrance to NS access facing north
Date	Site: Chemplex Company, Clinton, Iowa

Photo #7	**Description: Upper area facing east**
Date: 13-Nov-13	**Site: Chemplex Company, Clinton, Iowa**

Photo #8	**Description: Upper area facing north**
Date: 13-Nov-13	**Site: Chemplex Company, Clinton, Iowa**

Photo #9	**Description: LF-6 facing west**
13-Nov-13	**Site: Chemplex Company, Clinton, Iowa**

Photo #10	**Description: MW-7 facing south**
Date: 13-Nov-13	**Site: Chemplex Company, Clinton, Iowa**