FOURTH FIVE-YEAR REVIEW REPORT FOR CLEBURN STREET WELL SUPERFUND SITE GRAND ISLAND, HALL COUNTY, NEBRASKA

Prepared by

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Date

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Appendices

List of Abbreviations, Acronyms, and Definitions

ARAR	Applicable or Relevant and Appropriate Requirement
AS/SVE	air sparge/soil vapor extraction
Bgs	below ground surface
cis-1,2 DCE	*cis*-1,2 dichloroethene
COC	contaminant of concern
COPC	contaminant of potential concern
EPA	U.S. Environmental Protection Agency
FYR	five-year review
HI	Hazard Index
IC	institutional control
ISCO	in-situ chemical oxidation
ISTR	in-situ thermal remediation
LNAPL	light non-aqueous phase liquid
LTRA	long term response action
LUCs	land use controls
MCL	Maximum Contaminant Level
mg/kg	milligram per kilogram
MNA	monitored natural attenuation
NDEQ	Nebraska Department of Environmental Quality
O&M	operation and maintenance
OHM	One Hour Martinizing facility
OU	operable unit
PCE	tetrachloroethene
PDI	pre-design investigation
PRP	potentially responsible party
RA	remedial action
RAO	Remedial Action Objective
RD	remedial design
RI	remedial investigation
ROD	Record of Decision
RG	remediation goal
RME	reasonable maximum exposure
RPM	Remedial Project Manager
SVE	soil vapor extraction
1,1,1-TCA	1,1,1-trichloroethane
TCE	trichloroethene
UPRR	Union Pacific Railroad
USACE	United States Army Corps of Engineers, Kansas City District
VI	vapor intrusion
VIMS	vapor intrusion mitigation system
VISL	vapor intrusion screening level

VOC	volatile organic compound
µg/kg	microgram per kilogram
µg/L	microgram per liter
$\mu g/m^3$	microgram per cubic meter

1.0 Introduction

The purpose of a five-year review, or FYR, is to evaluate the implementation and performance of a remedy to determine whether the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of FYRs are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act Section 121(c), consistent with the National Contingency Plan (40 Code of Federal Regulations Section 300.430(f)(ii)), and considering EPA policy.

This is the fourth FYR for the Cleburn Street Well Superfund Site. The triggering action for this statutory review is the completion date of the previous FYR, which was signed on August 21, 2013. The FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

The Site consists of five Operable Units, or OUs:

- OU1: One-Hour Martinizing (Soils)
- OU2: One-Hour Martinizing (Groundwater)
- OU3: Liberty Cleaners (Soil and Groundwater)
- OU4: Ideal Cleaners (Soil and Groundwater)
- OU5: Soil and Groundwater at the Former Nebraska Solvent Company

OU1 achieved remedial action objectives and will not be evaluated in this FYR. OUs 02 through 05 will be addressed in this FYR.

The Cleburn Street FYR was led by David Wennerstrom, EPA Remedial Project Manager, or RPM. Participants included Dan Nicoski, Kelly Schumacher, and Catherine Wooster-Brown (EPA); and James Lyons, Kelly Peterson, Catherine Forget, Brian Roberts, and Fred Molloy, U.S. Army Corps of Engineers, Kansas City District, or USACE. The Union Pacific Railroad, or UPRR, the potentially responsible party, or PRP, for OU5, was notified of the initiation of the FYR. The review began on August 25, 2017.

Background

The Cleburn Street Well Superfund Site, or Site, is located within the urban setting of Grand Island, Nebraska. Grand Island's 2016 census reports a population of 51,517. The Site is situated in central Nebraska, approximately two miles north of the Wood River and approximately seven miles northeast of the Platte River. The Site encompasses a portion of the downtown area of Grand Island and is surrounded by a variety of light industries, commercial businesses and residential dwellings. Surface runoff is controlled by man-made features typically present in a city (storm sewers/gutters) and is eventually discharged into the Wood River.

The Site consists of four distinct volatile organic compound, or VOC, release areas located within the central portion of the city of Grand Island, Nebraska. Three of the source areas are locations of

commercial dry-cleaning businesses: One-Hour Martinizing, or OHM, OUs 1 and 2; Ideal Cleaners, OU3; and Liberty Cleaners, OU4. The fourth release area is the location of the former Nebraska Solvent Distribution Company, OU5. The Site Location Map provided in Appendix G (Figure 1-1) depicts the locations of the four source areas within Grand Island.

The EPA is performing cleanup actions relating to the dry cleaner operations at OUs 1 through 4; and the UPRR, as owner of the Nebraska Solvent Distribution Company property and a PRP, is performing the cleanup actions for OU5. The EPA initially established OU1 with the 1996 Record of Decision, or ROD, to address soil and groundwater contamination at all three dry cleaner locations; however, the Site was later subdivided into OUs 1 through 4, as indicated above. The former solvent company became OU5.

Land and Resource Use

The Site is located in an urban setting consisting of a mix of single-family residential units, light manufacturing and retail shops. Land use over the past 15 years, as indicated by the previous FYRs, appears to have remained relatively unchanged.

OUs 1 and 2, the former OHM, are located on a property which includes a structure with concrete slab-on-grade construction. The former OHM dry cleaner building is currently being used temporarily as an office space by the EPA during the implementation of the in-situ thermal remediation remedy for OU2. A used tire shop operates in an adjacent building. The immediate vicinity of the former OHM predominantly consists of commercial businesses; however, residential properties are also present.

OU3, the former Liberty Cleaners, is situated in a predominately residential area consisting of a large concrete paved parking lot and a tire maintenance business that now operates at the property.

OU4, Ideal Cleaners, is an operating business located in a predominantly residential area.

OU5, former Nebraska Solvent Company, consists of two parcels (east and west) on property owned by the UPRR. The west parcel is occupied, is covered with soil fill and not paved. Buildings in the east parcel are used by the City of Grand Island and Mid-Plains Construction; UPRR owns the land. Grand Island City Electric uses a building to store and maintain trucks and equipment, and Mid-Plains Construction uses a building for offices and storage space. OU5 is located in an area which is predominantly commercial.

Groundwater Use

The state of Nebraska has designated the aquifer impacted by the Cleburn Street Well Site as a Class GA Groundwater Supply. Class GA Groundwater is a groundwater supply which is currently being used as a public drinking water supply or is proposed to be used as a public drinking water supply. The contamination detected caused the state of Nebraska to designate the Site as a Remedial Action Class 1, requiring the "most extensive remedial action measures" to clean up the groundwater to drinking water quality suitable for all beneficial uses.

Refer to Appendix C for further discussion of the Site physical characteristics.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Cleburn Street Well Site		
EPA ID: NED981499312		
Region: 7	**State:** NE	**City/County:** Cleburn/Hall

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the Site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA
Author name (Federal or State Project Manager): David Wennerstrom
Author affiliation: EPA Region 7
Review period: August 2017 – August 2018
Date of site inspection: February 5-6, 2018
Type of review: Statutory
Review number: 4
Triggering action date: August 21, 2013
Due date *(five years after triggering action date)*: August 21, 2018

2.0 Response Action Summary

2.1 Basis for Taking Action

Contamination at the Site was first discovered in March 1986 when the Nebraska Department of Health detected tetrachloroethene, or PCE, at the Cleburn Street public drinking water supply well. The EPA became involved in 1987 and conducted a preliminary assessment with subsequent site investigations resulting in the identification of four separate source areas: three dry cleaning facilities – OHM, Liberty Cleaners, and Ideal Cleaners; and a former solvent distribution company, Nebraska Solvent Company. These source areas are all within an approximate 1,960 feet radius of the Cleburn Street well, which is located near the intersection of Cleburn Street and North Front Street.

The EPA follow-on investigations identified significant PCE and trichloroethene, or TCE, contamination (as well as other VOCs) in soil and groundwater at the OHM and former solvent distribution location. The release of hazardous substances resulted in the contamination above maximum contaminant levels, or MCLs, of the aquifer providing potable water to the city of Grand Island. This necessitated the abandonment of the Cleburn Street public water supply well and subsequently the abandonment of both the Lincoln and Pine Street public supply wells, also located in the area.

2.1.1 Human Health Risk Assessments

Three human health risk assessments have been completed. The first assessment, completed in conjunction with the 1993 Cleburn Street Well Site Remedial Investigation, or RI, Report, evaluated risk at the three dry cleaner properties. Current groundwater exposures are not likely because city residents have access to city water and are not known to be using private wells; and soil contamination is below ground and is not accessible for direct contact exposures. Although residents are not believed to be currently exposed to contamination, the risk assessment evaluated several potential exposure pathways. Future residents could be exposed to contaminated groundwater via ingestion, inhalation, and direct contact if private wells are installed and used in place of city water; and future development could also result in direct contact, ingestion, and inhalation exposures to contaminated soils.

Evaluating the three dry cleaner sites, the first risk assessment determined that residential use of contaminated groundwater from the OHM source area presented the highest estimated risks for both cancer and noncancer health effects, with an estimated excess cancer risk of $2x10^{-1}$ and a noncancer hazard index, or HI, of 700. This risk includes all exposure pathways associated with drinking water including ingestion, inhalation, and dermal contact. Both PCE and TCE substantially contribute to this risk. The carcinogenic risk associated with exposure to soil at the OHM source was low with an estimated excess cancer risk of $2x10^{-7}$.

The second risk assessment was conducted for OU5 in 1998 and is presented in the 2000 OU5 RI Report. The risk assessment focused on health effects for current and future on-site workers, workers at adjacent properties, and future on-site residents. Since contamination at OU5 is almost completely confined to depths below the ground surface, current on-site and off-site workers do not have direct contact with soil or groundwater. The only potential pathway for the current on-site worker is inhalation of VOCs emanating from soil gas into indoor breathing air. In addition to the inhalation pathway, the future on-site worker and/or resident may be exposed to contaminated groundwater in the unlikely event that a commercial or industrial well was to be installed. Future construction workers could potentially

be exposed to chemicals in soil via incidental ingestion, dermal contact, and inhalation of volatiles and dust. This 1998 risk assessment estimated an excess cancer risk of $2x10^{-2}$ for an adult resident scenario and a HI of 200 for an off-site child resident scenario. The OU5 estimated cancer and noncancer risks are based upon exposure to groundwater and are driven by PCE.

The third risk assessment, conducted in support of the 2011 OU2 Focused RI, assessed risk associated with the OHM site. Using the reasonable maximum exposure, or RME, scenario for exposures to subslab soil gas via vapor intrusion, or VI, an excess cancer risk of $8xl0^{-2}$ and an HI of 38 were determined for the current and future industrial worker; and an excess cancer risk of $5x10^{-1}$ and an HI of 450 were determined for the future child and adult resident (EPA, 2012). All of these levels are well above their protective risk values. For the adult and child, the chemicals that are the drivers for carcinogenic risk are benzene, bromodichlroromethane, carbon tetrachloride, chloroform, dibromochloromethane, ethylbenzene, naphthalene, PCE, and TCE. The noncarcinogenic hazard drivers are carbon tetrachloride, chloroform, and PCE. The highest cancer risks occur from ingestion and dermal exposure to groundwater used as tap water and inhalation of indoor air as estimated from subslab soil gas; the highest noncancer hazards occur from ingestion and inhalation exposure to groundwater used as tap water and inhalation of indoor air. For occupants of the former OHM building, under RME conditions, an unacceptable cancer risk of $4x10^{-4}$ is based on modeled indoor air concentrations from soil gas; however, the risk associated with measured indoor air is $2x10^{-7}$. The risk driver is PCE via inhalation of indoor air based on modeled soil gas concentrations. No unacceptable noncancer hazard was identified.

2.1.2 Ecological Risk Assessments

A screening level ecological risk assessment was performed during the 1998 and 1999 Cleburn Baseline Risk Assessment Addendum. It was determined that there were no ecological exposure pathways.

2.2 Response Actions

The Response Actions identified in the Records of Decision, or RODs, for OU1-OU4 are presented in Section 2.2.1; the Response Actions for OU5, identified in the 2001 ROD and 2009 ROD Amendment, are presented in Section 2.2.2.

2.2.1 Operable Units 1 through 4 Response Actions

- OU1 Soils at OHM
- OU2 Groundwater at OHM
- OU3 Soil and Groundwater at Liberty Cleaners
- OU4 Soil and Groundwater at Ideal Cleaners

Based on the potential future risks associated with drinking contaminated water including ingestion, inhalation, and dermal contact, the EPA implemented a non time-critical removal action in August 1993 to address the most highly contaminated groundwater at the OHM source area. The action included installation of a groundwater extraction well near the OHM source area with discharge piping connected to the sanitary sewer. Groundwater was extracted at a rate of approximately 50 gallons per minute and discharged directly to the sanitary sewer for treatment at the city's publicly-owned treatment works.

This containment action continued until a permanent groundwater extraction and treatment system, or GETS, was constructed in 1998 in accordance with the selected OU2 remedy in the 1996 ROD.

The initial ROD for the Site was signed in June 1996. It is noted that this ROD references OU1 as encompassing all three dry cleaner locations (OHM, Liberty Cleaners, and Ideal Cleaners). Later, these sites were differentiated into OUs 1 through 4. The 2012 ROD Amendment addresses OU2 (groundwater) contamination associated with the OHM property.

2.2.1.1 Remedial Action Objectives (OUs 1-4)

The remedial action objective, or RAO, for groundwater (OUs 2, 3 and 4), defined in the 1996 ROD, is restoration of the shallow aquifer to its designated use as a drinking water source. The 1996 ROD Decision Summary states:

- The general RAO for groundwater which provides for the protection of human health includes the prevention or minimization of ingestion of groundwater having a carcinogenic risk greater than $1x10^{-6}$ and/or a HI for noncarcinogens greater than 1. The specific remediation goals, or RGs, which would achieve this objective are the MCLs for the primary contaminants of concern, or COCs. The RAO for groundwater which is protective of the environment involves the restoration of groundwater quality to below MCLs for all COCs which have MCLs.

The following RAO for OU1, OU3, and OU4 soils is defined in the 1996 ROD:

- The RAO for soil which is protective of human health includes the prevention or minimization of direct contact with soils having a carcinogenic risk greater than 1×10^{-6}, and/or an HI for noncarcinogens greater than 1. The specific RGs which would achieve this objective have not been established. However, the agency's soil screening levels for the COCs will be used as a guideline to determine the level of protectiveness achieved by the remedial action. The soil RAO also includes the prevention of migration of contaminants from soil that would result in groundwater contamination in excess of the MCLs.

The 2012 ROD Amendment (OU2 groundwater) included the RAOs from the 1996 ROD; however, the ROD Amendment added two additional RAOs:

- Prevent exposure through inhalation of vapors that exceed acceptable risk levels; and
- Contain and prevent or minimize further migration of the groundwater contaminant plume.

2.2.1.2 Cleanup Levels (OUs 1-4)

Specific RGs for soil were not established in the 1996 ROD. However, in 2004, the EPA established a site-specific cleanup goal of 0.89 milligrams per kilogram, or mg/kg, for PCE, and 0.053 mg/kg for TCE. The memos between the EPA and the Nebraska Department of Environmental Quality, or NDEQ, detailing the derivation of the soil cleanup levels are included in Appendix L.

OU2 COCs identified in the 2012 ROD Amendment are PCE, TCE, carbon tetrachloride and chloroform. Cleanup goals for these COCs, per the ROD Amendment, are presented in Table 2-5.

Table 2-5: 2012 ROD Amendment Cleanup Goals for Soil and Groundwater (OU2)

Contaminant of Concern	Soil Cleanup Goal (mg/kg)	Groundwater Cleanup Goal, MCL (µg/L)
PCE	0.890	5
TCE	0.053	5
carbon tetrachloride	--	5
chloroform	--	80

Notes: mg/kg – milligram per kilogram
µg/L – microgram per liter
MCL – maximum contaminant level
-- – no established cleanup goal

2.2.1.3 Remedy Components in the RODs (OUs 1-4)

The selected remedies for OU1 (OHM soils) and OU2 (OHM groundwater), as described in the 1996 ROD, are:

- Monitoring of groundwater, discharged treated water, and air emissions;
- Institutional controls, or ICs, to restrict groundwater use;
- Extraction of subsurface contaminants using soil vapor extraction, or SVE;
- Treatment of extracted vapors by carbon adsorption;
- Extraction of groundwater containing contaminants above MCLs; and
- Treatment of extracted groundwater by on-site air stripping.

The selected remedies for OU3 (Liberty Cleaners) and OU4 (Ideal Cleaners) are:

- Natural attenuation and groundwater monitoring for ten years;
- ICs to restrict groundwater use and prevent exposures; and
- Contingency action: In-situ treatment of source soils by SVE and carbon adsorption.

The 2012 ROD Amendment addresses OU2 (groundwater) contamination associated with the OHM property. The ROD Amendment Declaration states that the RGs for COCs detected in shallow subsurface soils have been achieved by operation of the SVE system installed per the 1996 ROD. However, a change to the groundwater remedy for OU2 was required due to remaining residual source contamination located within the layer of saturated silt/silty sand at a depth corresponding to the groundwater-soil interface.

The major components of the selected amended remedy, as described in the ROD Amendment, include the following:

- In-situ thermal treatment of groundwater and saturated subsurface soils at the contaminant source area;
- Long-term treatment of the groundwater contaminant plume via in situ chemical and/or enhanced biological remediation until the cleanup levels in groundwater for the COCs have been attained and verified;

- Periodic groundwater monitoring until the groundwater has achieved the cleanup levels for COCs in the area;
- Periodic vapor intrusion monitoring until the groundwater has achieved the cleanup levels for the COCs in the area; and
- Installation of additional groundwater monitoring wells and/or sampling of additional public and private wells, if needed, to further determine the extent of the COC contamination, evaluate treatment processes and/or ensure protection of public health.

2.2.1.4 Status of Implementation (OUs 1-4)

The remedial designs, or RDs, for OUs 1 and 2 actions selected in the 1996 ROD were completed in September 1997, and the remedies were constructed and operating by October 1998. Following the first year of operation, a joint inspection was conducted by the EPA and NDEQ; and the remedies were determined to be operational and functional on October 29, 1999. The OU2 remedy was determined to be operational and functional on February 8, 2000 and began the ten-year long term response action, or LTRA, period.

OU1

The OU1 SVE system was operated by NDEQ for a period of approximately four years between 1998 and 2002, and for an additional year from April 2005 through early 2006. In April 2006, NDEQ notified the EPA of its position that the OU1 remedy was complete because soil vapor concentrations had reached asymptotic levels and no further mass removal was being achieved by the SVE system. As a part of the Source Investigation (HGL, 2007), soil samples were collected from seven locations from within the footprint of the building in the vadose zone, less than 24 feet below ground surface. All soil samples exhibited PCE concentrations less than the site-specific cleanup level of 0.89 mg/kg. In a letter dated February 22, 2007, the EPA agreed that the OU1 remedy had achieved its intended purpose of addressing source soils.

Due to a concern with potential vapor intrusion occurring in buildings overlying the OHM plume, the EPA continued to operate the SVE system intermittently (a few days out of every 2-3 week period) from January 2008 through July 2011, and then continuously from July 2011 through February 2012 to effectively mitigate this concern. In 2012, a vapor intrusion system was installed and the SVE system was not further utilized.

OU2

The OU2 GET system consisted of three groundwater extraction wells and a tray air stripper with chemical cleaning system. The groundwater extraction wells and four of the vapor extraction wells are in the frontage road adjacent to the former OHM dry cleaning facility, and one vapor extraction well and the remediation equipment and controls are housed in a pre-engineered building. The GET system has been inactive since December 2009, when a pilot study for in-situ chemical oxidation, or ISCO, treatment of groundwater in the source area was initiated. Performance sampling events conducted after the last ISCO injection in March 2010 through May 2011 indicated that contaminant levels in monitoring well samples in the source area had decreased from pre-injection levels. However, analytical results from subsequent sampling events indicated that concentrations of PCE had rebounded to pre-ISCO injection levels.

The Work Plan for the in-situ thermal remediation, or ISTR, portion of the amended remedy, to address source area contamination, was completed in 2017. Appendix G, Figure 2-1 from the 2017 Work Plan shows the existing and proposed monitoring wells at OU2, and the PCE contaminant plume based on 2015 data. Appendix G, Figure 2-2 shows the proposed ISTR well field layout. Construction of the ISTR system was initiated in the spring of 2018 and startup of the system began in the summer of 2018. The ISTR system is scheduled to operate through 2018.

OU3 and OU4

The RDs for OUs 3 and 4 were completed in June 1997. The remedial action, or RA, included the installation of two downgradient monitoring wells at each OU and six quarterly monitoring events. The final RA Report for OUs 3 and 4 was approved on July 14, 1999. The remedies for OUs 3 and 4 were turned over to the state for operation and maintenance, or O&M, on September 10, 1999.

Institutional Controls

ICs implemented at the Site are summarized in Table 2-6. Ordinance No. 8363 contains a provision that it shall remain in effect for an initial term of 25 years, with an option of extending it if groundwater contamination persists beyond that timeframe. The 25-year period will expire on or about February 16, 2023, unless extended by the city's mayor and city council. A copy of the ordinance is provided in Appendix I.

Table 2-6: Summary of Implemented ICs

Media	ICs Needed	ICs Called for in the Decision Documents [1]	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	Area-Wide	Restricted groundwater use for human consumption, new well registration and permitting requirements	City Ordinance No. 8363 established Groundwater Control Area No. 1 February 1998

Note: ICs were included as remedy components in the 1996 ROD (OUs 1-4) and the 2001 ROD (OU5)

2.2.1.5 Systems Operations/Operation & Maintenance (OUs 1-4)

OU2

The SVE system and GET system have been inactive over this FYR period as the amended OU2 remedy is being designed and implemented. O&M activities over the FYR period have been limited to groundwater sampling to support the OU2 amended remedy design and evaluate the vapor intrusion pathway. Specifically, semi-annual groundwater monitoring events were conducted in 2012 and 2013. The 2012 sampling event also included VI sampling. Subslab and indoor VI samples were collected from the former dry cleaner facility, the adjacent commercial building to the west, the SVE remediation system building, and a residence to the south. Pre-design investigations conducted in 2014 included

subsurface soil and groundwater profile sampling to document current contaminant levels in soil and groundwater, and geotechnical conditions to support the RD for the 2012 ROD amendment remedy. Annual groundwater sampling events were conducted in 2014 and 2015.

OU3 and OU4

Over the FYR period, four monitoring wells (two shallow, two deep) at OU3 were sampled in 2012 and 2015. The two OU3 shallow monitoring wells were sampled in 2017. The monitoring wells at OU4 were last sampled in 2012.

2.2.2 Operable Unit No. 5 Response Actions

The ROD for OU5 was signed in September 2001. OU5 encompasses contaminated soils and groundwater at the Nebraska Solvent Company location. The 2009 OU5 ROD Amendment addresses untreated soils in the west parcel of the Nebraska Solvent Company property.

2.2.2.1 Remedial Action Objectives (OU5)

The RAOs addressing the OU5 contaminated soils and groundwater as stated in the 2001 ROD are to:

- Reduce or eliminate further contamination of the groundwater from the source;
- Restore the aquifer to drinking water standards within a reasonable time frame;
- Prevent further migration of groundwater contamination; and
- Reduce or eliminate sporadic polluting of the aquifer surface.

The RAO of the 2009 ROD Amendment required reduction of VOC concentrations in soils to concentrations meeting site-specific closure requirements as listed in Table 2-8 in Section 2.2.2.2.

2.2.2.2 Cleanup Levels (OU5)

COCs identified in the 2001 OU5 ROD are PCE, TCE, *cis*-1,2-dichloroethene, or *cis*-1,2-DCE, xylenes, toluene, ethylbenzene and benzene. Table 2-7 provides the MCLs associated with each COC. No cleanup levels were directly established for soils in the 2001 ROD; however, modeling was used to determine soil cleanup concentrations such that soils will not be a source of groundwater contamination exceeding COCs. The 2009 ROD Amendment established closure concentrations of VOCs in soils for the west parcel excavation area. (Table 2-8).

Table 2-7. OU5 COC Cleanup Levels for Groundwater (2001 ROD)

Contaminant of Concern	Environmental Media	Maximum Contaminant Level
tetrachloroethene	Groundwater	5 µg/L
trichloroethene	Groundwater	5 µg/L
cis-1,2-dichloroethene	Groundwater	70 µg/L
xylenes	Groundwater	10,000 µg/L
toluene	Groundwater	1,000 µg/L
ethylbenzene	Groundwater	700 µg/L
benzene	Groundwater	5 µg/L
LNAPL hydrocarbon	Groundwater	Sheen – no observable sheen

Notes: µg/L – microgram per liter

Table 2-8 OU5 ROD and ROD Amendment Soil Remediation Goals

Contaminant of Concern	Risk-Based Soil Cleanup Level (mg/kg) Protective of Groundwater[1]
1,1,1-trichloroethane	28.1
1,1-dichloroethene	0.0006
1,2,4-trimethylbenzene	11.1
1,3,5-trimethylbenzene	6.9
benzene	0.2
cis-1,2-dichloroethene	3.2
ethylbenzene	43.2
methylene chloride	0.37
tetrachloroethene	0.656
toluene	75.5
trans-1,2-dichloroethene	3.6
trichloroethene	0.17
vinyl chloride	0.12
xylenes	S<

Notes:
[1] Calculations for soil cleanup levels protective of leaching to groundwater (MCLs) presented in RD Work Plan
S< = Soil cleanup level was based on soil/water partitioning and the estimated soil ore water concentrations required to exceed the groundwater MCL as soil pore water leaches to groundwater. However, the calculated soil ore water concentration required to exceed a groundwater MCL was greater than the chemical solubility. Therefore, it is not possible to exceed groundwater MCLs for this chemical by leaching from soil to groundwater based on current assumptions and existing subsurface conditions.
mg/kg = milligram per kilogram

2.2.2.3 Remedy Components in the ROD (OU5)

The major components of the selected remedy for OU5 as described in the 2001 ROD are:

- The construction and operation of a single phase SVE system to remove PCE, TCE and *cis*-1,2-DCE contained in the soils;
- The construction and operation of an air sparging, or AS, system to address PCE, TCE and *cis*-1,2-DCE in the groundwater and toluene, xylenes, ethylbenzene and benzene floating atop the groundwater;
- Regularly scheduled soil, air, and groundwater monitoring;
- Light non-aqueous phase liquid, or LNAPL, removal by bailing during all monitoring activities preceding, during, and after completion of remediation;
- ICs in the form of deed restrictions to prohibit groundwater use and improper subsurface construction on the UPRR properties; and
- Continuation of city of Cleburn Institutional Control Ordinance No. 8363 which prohibits groundwater wells in the vicinity of OU5.

As described in the 2009 OU5 ROD Amendment Declaration, the selected remedy enhances the 2001 ROD air sparge/soil vapor extraction, or AS/SVE, remedy and includes:

- Excavation and thermal desorption of the contaminated shallow soil (4 to 5 feet) in the west parcel of the Site;
- Reducing the concentrations of soil COCs to concentrations within the site-specific closure requirements;
- Meeting federal and state standards, requirements, criteria or limitations that are determined to be applicable and relevant or appropriate requirements; and
- Restoring Site grade and surfacing to preconstruction conditions using the thermally treated soil and new soil if necessary.

2.2.2.4 Status of Implementation (OU5)

The RD for the OU5 AS/SVE systems was completed in January 2004, and construction was completed by August 2004. The RD and RA were performed pursuant to a consent decree entered on September 20, 2002, between the EPA and UPRR. An RA report was signed in September 2004 marking the start of O&M for OU5.

Since OU5 was the final remedy for the Site, a preliminary close-out report was prepared following completion of construction activities for the OU5 remedy. Construction completion for the Site occurred on September 14, 2004.

The AS/SVE system initially ran continuously and then in pulsed operation. In 2010, the system had reached asymptotic influent vapor concentrations and was determined to be ineffective at remediating shallow (0-4 feet below ground surface) silty vadose zone soils. The AS/SVE system was dismantled and abandoned in September 2010.

Pursuant to the 2009 ROD amendment, in November and December 2010 approximately 1,564 tons of west parcel shallow contaminated soils were excavated, treated on site via low-temperature thermal desorption, and backfilled after verification that treated soils met Site closure criteria. These excavated soils were the 0-4 feet below ground surface silty soils which had been ineffectively treated by the SVE system. LNAPL bailing activities were also abandoned during this action due to the absence of measurable LNAPL in several consecutive monitoring events.

An ISCO treatment pilot study (modified Fenton's reagent) of the west parcel area occurred during December 2010 and October 2011. The injections were performed in accordance with the October 2010 Chemical Injection Work Plan. Potassium permanganate injections were performed as a polishing step in the same area in November through December 2011.

A soil sampling and soil gas investigation below the concrete floor of the City Electric Department building was completed in September 2012. Based on the detected concentrations above the TCE and PCE screening levels in the soil gas samples, evaluation of indoor air was recommended. In May and June 2013, a VI investigation was conducted at the City Electric Department building and the adjacent Mid-Plains Construction building. Vapor intrusion mitigation system, or VIMS, diagnostic testing was conducted at these buildings in 2014. Installation of VIMS at both buildings was completed in January 2016. Quarterly monitoring of VIMS operation was initiated in May 2016.

In addition to the investigations at the City Electric and Mid-Plains Construction buildings, investigations were conducted to evaluate the potential for vapor intrusion at nearby residential properties. No VI- related contaminants of potential concern, or COPCs, were identified.

Institutional Controls

ICs restricting groundwater usage and improper subsurface construction, in the form of a deed restriction, is a requirement of the 2001 OU5 ROD. The city of Grand Island has enacted an ordinance restricting both the use of groundwater and the installation of new groundwater drinking supply wells. (Refer to Table 2-6 in Section 2.2.1.4.) This ordinance may expire on or about February 16, 2023, unless renewed by the city's mayor and city council. A copy of the ordinance is provided in Appendix I.

Media	ICs Needed	ICs Called for in the Decision Documents (1)	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	UPRR	Restricted groundwater use for human consumption, new well registration and permitting requirements	City Ordinance No. 8363 established Groundwater Control Area No. 1 February 1998

2.2.2.5 Systems Operations/Operation & Maintenance (OU5)

As of 2017, quarterly groundwater monitoring events from 12 monitoring wells continue at OU5. Quarterly VIMS monitoring, initiated in 2016, continues at the City Electric Department building and the adjacent Mid-Plains Construction building. Maintenance of the VIMS is performed by the UPRR contractor.

3.0 Progress Since Last Review

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

Table 3-1: Protectiveness Determinations/Statements from the 2013 FYR

OU #	Protectiveness Determination	Protectiveness Statement
OU1 Soils at OHM	Protective	The remedy at OU1 is protective of human health and the environment.
OU2 Groundwater at OHM	Short-term Protective	The OU2 remedy protects human health and the environment in the short term due to land use controls, or LUCs, and the continuous operation of the SVE system. For the remedy to be protective in the long term, the following actions need to be taken: 1) activate the GET system to provide plume containment, 2) implement the amended remedy as described in the OU2 ROD Amendment; 3) conduct periodic VI monitoring; and, 4) if source reduction fails to permanently reduce VI, implement a VI mitigation system that directly acts upon subslab soil-gas vapors as opposed to the SVE system designed to remediate vadose zone soil.
OU3 Soil and Groundwater at Liberty Cleaners	Short-term Protective	The OU3 remedy protects human health and the environment in the short term due to LUCs preventing exposure to contaminated groundwater. However, to be protective in the long term, the MNA remedy needs to be reevaluated to include resampling all four monitoring wells, assessing the adequacy of existing plume delineation and adding wells as needed.
OU4 Soil and Groundwater at Ideal Cleaners	Protective	The remedy at OU4 is protective of human health and the environment.
OU5 Soil and Groundwater at Former Nebraska Solvent Company	*Protectiveness Deferred *Revised Protectiveness Determination provided in the FYR Addendum	A protectiveness determination of the remedy at OU5 cannot be made until further information is obtained with respect to the VI pathway. To make a protectiveness determination, the following activities need to be conducted: conduct subslab soil gas and indoor air sampling for the VOCs at both the City Electric Department building and the Mid-Plains Construction buildings, and provide appropriate VI mitigation as required. It is expected that implementation of the VI investigation (subslab and indoor air sampling for VOCs) may be implemented within 12 months, at which time a protectiveness determination will be made.
Sitewide	Deferred	A protectiveness determination at the Site cannot be made until further information is obtained with respect to the VI pathway. To make a protectiveness determination, the following activities need to be conducted: conduct subslab soil gas and indoor air sampling for the VOCs at both the City Electric Department building and the Mid-Plains Construction buildings, and provide appropriate VI mitigation as required. It is expected that implementation of the VI investigation (subslab and indoor air sampling for VOCs) may be implemented within 12 months, at which time a protectiveness determination will be made.

A FYR Addendum (EPA, 2015) was completed to address the issues and the deferred protectiveness determination for OU5. The protectiveness determination from the FYR Addendum is listed in Table 3-2.

Table 3-2: Protectiveness Determinations/Statements from the 2015 FYR Addendum

OU #	Protectiveness Determination	Protectiveness Statement
OU5 Soil and Groundwater at Former Nebraska Solvent Company	Deferred	VI investigation has been completed and the mitigation systems have been designed and scheduled for installation by the end of 2015. With respect to groundwater, the remedy continues to be protective of human health and the environment due to LUCs. The OU5 overall protectiveness statement will be deferred until such time asthe VI systems are installed and operational.

Progress addressing the protectiveness issues identified in the 2013 FYR and the 2015 FYR Addendum are discussed in Table 3-3.

Table 3-3: Status of Issues and Recommendations from the 2013 FYR and 2015 Addendum

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
2	OU2 has no active plume containment.	Turn on GET system prior to implementing OU2 amended remedy to contain groundwater contaminant plume.	Considered But Not Implemented	GET system was not reactivated. The Work Plan for the ISTR portion of the amended remedy, to address source area contamination, was completed in 2017. Installation and startup of the ISTR system began in 2018.	1/31/2021
2	OU2 east-southeast plume boundary is not delineated.	Install additional monitoring wells south-southeast of the Cleburn Street well to more fully define the groundwater contaminant plume.	Considered But Not Implemented	The ISTR RD includes the installation of 8 new monitoring wells (4 shallow and 4 deep wells). Wells are proposed within and just downgradient of the treatment zone. Wells to delineate the downgradient portion of the plume are not	January 2021

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
				proposed. Groundwater plume delineation will be conducted after ISTR is completed to support design of the amended groundwater remedy.	
3	OU3 groundwater MNA remedy is not functioning as intended; PCE may be increasing in the downgradient shallow well; plume may extend beyond monitoring network.	Reevaluate OU3 remedy; resample all four monitoring wells to verify 2012 results; assess adequacy of existing delineation of plume and add wells as needed.	Completed	Four OU3 monitoring wells (two shallow, two deep) were sampled in 2015. The two shallow monitoring wells were sampled in 2017. Sampling will continue and MNA remedy will continue to be evaluated.	2017
5	Emerging 1,4-dioxane may be an OU5 potential COC. Previous investigations have not assessed 1,4-dioxane's presence at the Site.	Assess OU5 groundwater for the presence of 1,4-dioxane by using an analyte-specific methodology (to achieve an appropriate detection limit).	Completed	Site-wide groundwater sampling for 1,4-Dioxane was included in the June 2013 quarterly event, with results provided in Table 1 of the August 2013 monthly report. The sampling was conducted as a one-time event. No further work was required.	8/1/2013
5	The VI pathway has not been evaluated.	Conduct subslab soil gas and indoor air sampling for VOCs at both the City Electric Department building and the Mid-Plains Construction buildings and provide appropriate VI mitigation as required.	Completed	VI investigations completed at the City Electric Department building and the Mid-Plains Construction building (2013). Completed VIMS installation at both buildings on January 2016.	January 2016

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
				VI investigation completed at one residential property in March 2016. No VI related COPCs identified – no further action warranted.	
5	Groundwater concentrations of COC exceed MCLs.	Continue either ISCO treatments or an alternative remedy if groundwater COC concentrations do not stabilize at less than MCLs. Continue monitoring progress of the ISCO treatment process towards permanently reducing groundwater COC concentrations to levels less than corresponding MCLs.	Addressed in the Next FYR	Additional groundwater investigations are planned. Additional ISCO or alternative treatments may be proposed based on the findings of the investigation. Monitoring progress continues on a quarterly basis and COC concentrations continue to show reductions as indicated in the groundwater monitoring reports.	NA
5	COC toxicity values may have changed.	Re-evaluate risk associated with those COCs having increased toxicity "values" prior to determining remedy complete to ensure that achieved cleanup levels are protective.	Addressed in Next FYR	Toxicity values for the COCs have changed. Evaluation of COC toxicity values will be performed prior to a remedy complete determination.	

4.0 Five-Year Review Process

4.1 Community Notification, Involvement, and Site Interviews

4.1.1 Community Notification and Involvement

A public notice was made available by a newspaper posting in the Grand Island Independent on 9/29/2017, stating that there was a FYR and inviting the public to submit any comments to the EPA. A copy of the public notice is included in Appendix J. The results of the review and the report will be made available to the public through an internet-based repository at the following website:

https://www.epa.gov/superfund/search-superfund-five-year-reviews

Site historical information is located at:

https://www.epa.gov/superfund/cleburnstreetwell

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedies that have been implemented to date. The results of these interviews are summarized in Section 4.1.2.

4.1.2 Site Interviews

No interview questionnaires were distributed for the Site OUs. However, during the site inspection conducted on February 5, 2018, the status of activities at OU5 was discussed with Amer Safadi, EPA RPM; Kevin Peterbus, UPRR (OU5 PRP); Randy Leiser and Travis Burdett, Grand Island City Electric Department; Thomas Dolton, Mid-Plains Construction; and Hoyt Sutphin, CH2MHill (OU5 consultant).

Mr. Peterbus (UPRR) indicated that he participates in semi-annual calls/meetings to review the status of the OU5 project. Mr. Safadi said that the EPA has been satisfied with the coordination with the UPRR. Mr. Leiser (city of Grand Island) indicated that he is satisfied with the coordination efforts of the EPA and the CH2MHill consultant. Coordination with the consultant has minimized impacts to the operations at the City Electric Department Building. Mr. Leiser discussed proposed modifications to the city building and indicated that he would coordinate with CH2MHill regarding potential impacts to the installed VIMS. Mr. Leiser requested copies of the VIMS operational reports to better apprise his staff on the status of the systems and operating conditions in the facility. The owner of Mid-Plains Construction, the facility located adjacent to the City Electric Department Building, indicated that he had no concerns related to the installed VIMS and the ongoing remediation efforts at OU5.

Additionally, the owner of Ideal Cleaners (OU4) was interviewed during the site inspection. The owner indicated that he was aware of the wells located at the Site and acknowledged that coordination with the EPA had occurred during past monitoring events.

4.2 Data Review

4.2.1 Operable Unit No. 2 (Groundwater at One-Hour Martinizing)

During the FYR period, routine groundwater sampling and analysis was performed in January 2013, July 2013, July 2014, and July 2015. Data reviewed for OU2 consisted of groundwater monitoring reports submitted by the EPA's contractor for January 2013 and July 2015, and Pre-Design/Remedial Design Investigation, or PDI, reports of the 2014 and August 2015 sampling phases. The OU2 monitoring well locations are shown on Appendix G, Figure 4-6, with the PCE plume shown on Appendix G, Figures 4-7 and 4-8. PCE has increased in wells MW102AA, Cleburn Street Well, and MW-2B, while remaining stable in former injection well IW-6 (located within the former OHM building in the source area). The groundwater monitoring data are included in Appendix F, Table 4-3. A graphical representation of PCE analytical results over time for IW-6, MW-102AA, MW-2B, and the Cleburn Street Well are provided in Appendix H, Graphs 4-1 through 4-4. The Mann Kendall Trend analysis for these wells is shown in Appendix H, Graph 4-5. The area of increasing PCE concentrations in the source area is currently undergoing remediation with ITSR. In addition, PCE concentrations are

also increasing in the downgradient Cleburn Street Well. As such, vapor instrusion is a concern and needs to be investigated.

Groundwater samples were collected from direct push temporary wells during the PDI sampling conducted in 2014 through 2016. The direct push locations are shown on Appendix G, Figures 4-1 and 4-2, with analytical results presented in Appendix F, Tables 4-4 and 4-5. The PDI results indicated that concentrations of PCE contamination in groundwater appeared to be migrating away from the source area. The highest concentration detected was collected below North Eddy Street at 110,000 micrograms per liter, or µg/L. Groundwater samples from five locations in Eddy Street also had concentrations of PCE greater than 2,000 µg/L, exceeding the one percent solubility for PCE and suggesting the potential presence of a non-aqueous phase liquid. A three dimensional model of the PCE groundwater plume is in Appendix G, Figures 4-9, 4-10, and 4-11. The groundwater plume downgradient of the source area requires additional investigation which will be conducted to support the groundwater remedial design. In 2018, four monitoring wells were installed downgradient to support this design investigation.

In January 2013, while the SVE system was shut down, 7 indoor air samples (including one duplicate), 13 subslab samples (including 2 duplicates), and one background air sample were collected from the former dry cleaner facility; an adjacent billiard hall to the west (currently a used tire store); and the remediation system building. Sample locations are shown on Appendix G, Figure 4-12. Benzene, naphthalene and PCE were detected above the risk screening level in the indoor air samples, but only PCE was detected in the subslab samples. PCE was detected in the indoor air sample in the former billiard hall above the risk screening level. Sample results are shown in Appendix F, Tables 4-6 and 4-7, and PCE-specific results are also shown on Appendix G, Figure 4-12.

For the design of the new remedial system, soil samples were collected during four rounds of sampling from 2014 to 2016 as part of the PDI to identify the extent of soil contamination requiring remediation. The highest soil concentration was detected at 25,000 micrograms per kilogram, or µg/kg, at 25 to 30 feet below ground surface just east of the former OHM building in soil boring SB 513 (Appendix F, Table 4-1, and Appendix G, Figure 4-1). The 2015 sampling further delineated PCE soil contamination above the cleanup goal extending past North Eddy Street (Appendix F, Table 4-2, and Appendix G, Figure 4-2). A three-dimensional model of the PCE soil contamination is included on Appendix G, Figures 4-3, 4-4, and 4-5. These soils are within the footprint being addressed by the ISTR system.

4.2.2 Operable Unit No. 3 (Soil and Groundwater at Liberty Cleaners)

During the FYR period, groundwater sampling and analysis was performed twice; four monitoring wells were sampled in 2015, and the two shallow monitoring wells in 2017 and 2018. Monitoring well locations are shown on Appendix G, Figure 4-13. Data reviewed for OU3 consisted of groundwater monitoring reports submitted by NDEQ's contractor. The reports reviewed included data from 2004 to the present, allowing relatively long-term contaminant trends to be established.

Since 2004, PCE has not been detected in the two deep monitoring wells (MW-1B and MW-1D), and they were not sampled during the 2017 sampling event. PCE was detected in the shallow monitoring wells (MW-1A and MW-1C) at concentrations between 3 and 16.4 µg/L. PCE is decreasing in the upgradient well (MW-1C). PCE showed a stable trend in the downgradient well (MW-1A) across the last four events, but is increasing when all the results since April 1998 are considered. Monitoring well MW-1A is the only well that has not reached the groundwater cleanup levels. The groundwater

monitoring data for OU3 is shown in Appendix F, Table 4-8. A graphical representation of PCE analytical results over time for MW-1A and MW-1C are provided in Appendix H, Graph 4-6. The Mann Kendall Trend analysis for these wells is shown in Appendix H, Graph 4-7. NDEQ will continue to sample groundwater for OU3.

4.2.3 Operable Unit No. 4 (Soil and Groundwater at Ideal Cleaners)

Monitoring wells for OU4 were not sampled during the FYR period. Appendix G, Figure 4-14; Appendix F, Table 4-9; and Appendix H, Graph 4-8 show data and trends from 2012. It is recommended that additional data be collected from the OU4 wells to have sufficient data to support a remedial action completion determination for this OU.

4.2.4 Operable Unit No. 5 (Soil and Groundwater at the Former Nebraska Solvent Company)

Groundwater Monitoring

The OU5 groundwater monitoring well network is shown on Appendix G, Figure 4-15. During the FYR period, groundwater sampling and analysis for PCE, TCE and *cis*-1,2-DCE were performed quarterly by the PRP. It was noted that the sampling program does not include analysis for vinyl chloride, a microbial degradation product of TCE in groundwater. Inclusion of vinyl chloride in the OU5 monitoring plan is recommended. Data reviewed consisted of groundwater monitoring reports from 2013 to September 2017. Twelve monitoring wells are sampled quarterly as of 2017. The groundwater monitoring data from 2013 through 2017 is shown in Appendix F, Table 4-10. The monitoring well locations and 2017 analytical results are shown on Appendix G, Figure 4-16.

Groundwater monitoring data indicate that the source area concentrations of TCE, PCE and *cis*-1,2-DCE are decreasing, however the contamination level in the downgradient side of the plume has no trend or is increasing. The highest concentrations of PCE, TCE and *cis*-1,2-DCE continue to be detected at MWN-10A, in the center of the source location. The highest detection of PCE was 1,140 µg/L at MWN-10A in June 2013; the concentration has decreased to 30.4 µg/L in September 2017. *Cis*-1,2-DCE has decreased from a high of 33,900 µg/L in March 2014 to 4,130 µg/L in September 2017. Cleanup levels for groundwater have not been reached for PCE at three monitoring wells, for TCE at one monitoring well, and for *cis*-1,2-DCE at one monitoring well. The other COCs listed in the 2001 ROD were included in the groundwater monitoring at the PRP's direction. Graphical representations of PCE, TCE, and *cis*-1,2-DCE analytical results over time for the OU5 monitoring wells are provided in Appendix H, Graphs 4-9 through 4-17. The Mann Kendall Trend analysis for PCE, TCE, and *cis*-1,2-DCE in select OU5 monitoring wells (MWN-1A, MWN-2, MWN-3B, MWN-5, MWN-6A, MWN-7, and MWN-10A) is shown in Appendix H, Graph 4-18 through 4-20. It is recommended that additional efforts be conducted to consider more aggressive remediation options and additional downgradient sampling to bound the downgradient edge of the plume.

Vapor Intrusion Investigations

From September 2012 through June 2013, samples were collected from within and beneath the City Electric building and Mid-Plains Construction building. Analytical results and sample locations from the 2012/2013 investigations are presented in Appendix F, Tables 4-11 through 4-14, and Appendix G, Figures 4-17 through 4-22.

PCE and TCE were detected in the soil, groundwater (grab sample from SB-14), and subslab soil vapor samples collected beneath the City Electric building. PCE and TCE concentrations in the shallow soil beneath the City Electric building were one and two orders of magnitude greater than the concentrations detected from the nearest sidewall confirmation sample (NW-02C) from the 2010 soil excavation (53,800 µg/kg and 1,400 µg/kg beneath the City Electric building vs. 510 µg/kg and 398 µg/kg from the sidewall of the excavation). The source of the impacted soil beneath the City Electric building was not identified. Nonetheless, the PCE and TCE concentrations beneath the buildings indicate that there is a subsurface source for vapor intrusion into the building. PCE (34.3 µg/L) and *cis*-1,2-DCE (182 µg/L) were detected in the groundwater grab sample collected from boring SB-14.

PCE and TCE were detected above their respective target concentrations in the subslab vapor and indoor air within the buildings. Together, the concentrations of PCE and TCE within the subslab soil vapor and indoor air, and the lack of identified indoor air sources, indicate that vapor intrusion is complete, with no indoor sources identified and ambient air concentrations less than detected indoor air concentrations. Additional investigation and/or mitigation measures were recommended. Based on the results of the 2012/2013 investigations, additional investigations were conducted in 2015 (CH2MHill, 2015e).

Analytical results and sample locations from the 2015 investigation are presented in Appendix F, Tables 4-15 and 4-16, and Appendix G, Figures 4-23 and 4-24. The investigation results defined the lateral extent of shallow soil impacts beneath the floor slab of the City Electric building to a 5,000 square foot area (100 feet by 50 feet) with the depth of the soil impacts limited to less than two feet beneath the slab. The area is shown as red dots for SB-22 through SB-26 on Figure 4-23 in Appendix G. The investigation concluded that soil vapor impacts identified within the City Electric building and the Mid-Plains Construction building appear to be originating from both the impacted groundwater at depth and the shallow impacted soil horizon beneath the floor slab. It is recommended that additional characterization efforts be taken to determine whether soils are impacting groundwater and indoor air and if remediation may be more effective.

Soil gas samples were also collected at 1210 West North Front Street and the right-of-way to assess potential vapor intrusion at neighboring residences. The investigations did not identify any vapor intrusion concerns for these residences (CH2MHill, 2016b).

Based on the findings of the VI investigations, VIMS were installed at the City Electric Department building and the adjacent Mid-Plains Construction building in January 2016 (Appendix G, Figures 4-25 and 4-26). Indoor air was sampled in June 2016, December 2016, and June 2017. PCE was detected in one June 2016 sample above the Industrial Indoor Air Screening Level at 246 micrograms per cubic meter, or µg/m^3, in the City Electric Department building. The PCE concentration during the next two sampling events was two orders of magnitude lower. The indoor air sampling results for the City Electric building and the Mid-Plains Construction building are shown in Appendix F, Tables 4-17 and 4-18.

4.3 Site Inspection

The inspection of the Site was conducted on 2/5/2018. In attendance were Amer Safadi, EPA RPM; Brian Roberts and James Lyons, USACE; Kevin Peterbus, UPRR (OU5 PRP); Randy Leiser and Travis Burdett, Grand Island City Electric Department; and Hoyt Sutphin, CH2MHill (OU5 consultant). The

purpose of the inspection was to assess the protectiveness of the remedies. The Site Inspection Checklist is provided in Appendix D. Photographs taken during the site inspection are included in Appendix E.

OU 2 – The building associated with the former One-Hour Martinizing Dry Cleaner was not occupied/open during the site inspection. While snowy conditions made it difficult to locate monitoring wells at the Site, there were no indications of disturbances in the road on the northeast side of the Site or evidence that any of the wells are not functional. The ISTR RA activities were not initiated at the time of the inspection. No issues impacting current and/or future protectiveness were observed.

OU3 – The former Liberty Cleaners site is now a maintenance/tire facility (Miller Tire Pros). Monitoring wells MW-1A and MW-1B were located and appeared serviceable. MW-1C and MW-1D were not visible due to snowy conditions. No issues impacting current and/or future protectiveness were observed.

OU4 – The area around Ideal Cleaners was observed. MW-4A (west side of the building), and MW-4C and MW-4D (both located east of the building on the south side of West 1st Street), were located. The property owner was interviewed. No issues impacting current and/or future protectiveness were observed.

OU5 – The site inspection included walking the perimeters of the Grand Island City Electric Department and the Mid-Plains Construction buildings and observing the installed VIMS. A summary of discussions conducted during the site inspection with representatives of the Grand Island City Electric Department and the owner of Mid-Plains Construction is in Section 4.1.2. VIMS were operating and system components were in good condition. No issues impacting current and/or future protectiveness were observed.

5.0 Technical Assessment

5.1 Operable Unit No. 2 (Groundwater at One-Hour Martinizing)

5.1.1 Question A: Is the remedy functioning as intended by the decision documents?

The ISTR system to address OU2 source area contamination is under construction, and following treatment, achievement of the cleanup levels for COCs in the source area is expected. Upon completion, the downgradient plume will be delineated to support design of the groundwater amended remedy. In the interim, the IC discussed in Section 2.2.1.4 is in place to prevent groundwater consumption.

5.1.1.1 Operable Unit No. 2 Remedial Action Performance

The previous remedial action system, the GET system, has been inactive since 2009. The new ISTR system is currently under construction.

The 2018 Remedial Action Work Plan for the ISTR system also includes the installation of eight additional monitoring wells and closing 17 wells currently included in the groundwater monitoring network. The four new wells were installed in the summer of 2018 in the source area in the center of the plume. Four new wells were installed in the summer of 2018 downgradient of the plume to support the design of the amended groundwater remedy.

5.1.1.2 Operable Unit No. 2 System Operations/O&M

O&M is limited to groundwater monitoring. As discussed in Section 4.2.2, groundwater sampling was conducted in July 2013, July 2014, and July 2015. This activity will be discontinued and additional groundwater sampling for this OU will be conducted to support the remedial design.

5.1.1.3 Operable Unit No. 2 Implementation of Institutional Controls and Other Measures

Site-wide ICs are in place and are discussed in Section 2.2.1.4.

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

The toxicity of TCE has increased, especially via the inhalation pathway. Groundwater contaminated with VOCs has migrated towards off-site buildings and the vapor intrusion pathway needs to be assessed.

5.1.2.1 Changes in Standards and To-Be-Considered Criteria

The groundwater RGs for OUs 2 through 4 are based on the MCLs and remain unchanged, as shown in Table 5-1 in Appendix F. As described earlier in the RAO section of this report, prevention of inhalation of unacceptable vapors was added as an objective in the 2012 ROD amendment, but no specific RG was identified. Therefore, changes in toxicity assessment for the COCs related to the VI pathway and the inhalation of vapors will be addressed under "Changes in Toxicity and Other Contaminant Characteristics", Section 5.2.2.2, and "Changes in Exposure Pathways", Section 5.2.2.4.

The soil RGs are based on the groundwater MCLs that have not changed. Therefore, there were no changes that could affect the protectiveness of the remedy. The soil RGs were calculated in 2003 by NDEQ and reviewed by the EPA in 2004, using calculations included in Appendix L. The 2012 ROD Amendment reiterates these RGs, which were 0.89 mg/kg for PCE and 0.053 mg/kg for TCE. They are summarized in Appendix F, Table 5-2.

5.1.2.2 Changes in Toxicity and Other Contaminant Characteristics

The groundwater and soil RGs were discussed in Section 5.2.2.1. The RGs are based on the MCLs for groundwater, and the protection of groundwater is based on the MCL for soil. The RGs are not impacted by changes in toxicity and do not require a toxicity evaluation.

The 2012 ROD Amendment included vapor intrusion as a RAO, but did not set specific RGs. Changes in inhalation toxicity values of all COCs are summarized in Appendix F, Table 5-3. There have been some increases in toxicity as noted in the table. Of the four COCs for OUs 1-4, only PCE and TCE have had increases in toxicity since the 2012 ROD addendum. TCE is now considered more toxic in cancer and non-cancer endpoints for both ingestion and inhalation pathways. These toxicity changes are relevant to the new RAO of protection of human health via the inhalation pathway. Specific RGs for air were not established in the 2012 ROD Amendment, but a summary of the 2013 and current air screening levels and action levels are discussed below in Section 5.2.2.4. While the primary site contaminant is PCE, it is important to consider the impact of the toxicity changes of TCE.

5.1.2.3 Changes in Risk Assessment Methods

The EPA has significantly revised its dermal risk assessment guidance since the completion of the original risk assessment. A different approach is currently used when estimating the potential health risks from inhalation of VOCs during household use of contaminated groundwater (i.e., bathing, showering, cooking, etc.) (EPA, 2009). In addition, standard default exposure factors were updated in 2014 (EPA, 2014). Furthermore, the EPA has developed and implemented risk assessment guidance which evaluates the vapor intrusion pathway. Despite these changes in risk assessment methodology, the protectiveness of the remedy is not expected to be adversely affected.

5.1.2.4 Changes in Exposure Pathways

Several exposure pathway issues are discussed in this section for OU2. ICs prevent exposure to groundwater. Similarly, there is minimal potential for direct contact with subsurface soil being addressed by ISTR. However, the VI pathway may be impacting the protectiveness of the remedy. The pathway was re-evaluated in the human health risk assessment conducted as part of the Focused OU2 RI, and as stated above, concluded that OU2 had potential unacceptable exposures via this pathway. To address the new remedial action objectives for inhalation defined in the 2012 ROD Amendment, there was a 2013 vapor intrusion evaluation of indoor air for the OHM building and the connected buildings and the results are summarized in Appendix F, Table 4-6. The receptors at this location would have the greatest potential to be impacted by VI. Currently, there are no occupants in the former OHM building, thus the potential exposure pathway is incomplete.

The 2013 indoor air investigation also evaluated other locations near the former OHM building. The area labeled as the billiard hall is now a used tire store and exceeded the screening levels of 10.2 $\mu g/m^3$ for PCE in indoor air. As noted on Appendix G, Figure 4-12, the detected level of PCE increased from 2012 to 2013. Similarly, potentially unacceptable VI risk may exist east of Eddy Street at the auto sales business and the thrift store, neither of which were evaluated as a part of the 2013 investigation.

As described in Section 5.2.2.2, the changes in toxicity of TCE are related to the evaluation of this pathway. The reporting limits of TCE were greater than the screening levels in 100% of the samples analyzed in the 2013 investigation. Therefore, although TCE may have been present, it was reported as not detected. The subslab contamination of PCE was significantly elevated in the investigation report. Appendix F, Table 5-4 compares the current screening levels for PCE and TCE in indoor air from the May 2018 Regional Screening Levels table (USEPA, 2018b). The table also presents the action levels for TCE based on the 2016 EPA Region 7 Action Levels for TCE Memorandum (USEPA Region VII, 2016). The action level for commercial workers is 6 $\mu g/m^3$, which is higher than the 2013 screening value of 0.43 $\mu g/m^3$; however, it is an action level instead of a screening level, meaning that some action should be taken if there are current receptors. The reason that the EPA has issued unique guidance on TCE is detailed in Appendix M and briefly summarized here:

> "It is assumed that an exposure to TCE at any time during an approximate three-week period in early pregnancy could result in one or more types of cardiac malformations. Thus, the critical exposure period of concern used to evaluate the potential for heart defects and derive action levels for TCE is one day. Any exceedance of the TCE action level indicates a potential imminent threat to human health. Region 7 should expedite early or interim actions(s) to eliminate, reduce and/or control the hazards posed by the site as quickly as possible." (USEPA Region VII, 2016)

The FYR data review section and Appendix G, Figure 4-9 indicate that the groundwater plume is not bounded downgradient. Therefore there may be a change in receptors with a complete VI pathway based on the migration of the groundwater plume. The potential for VI exposure may affect the businesses east of Eddy Street (downgradient) and at the tire store directly west of the source area. A VI assessment downgradient will be conducted.

5.1.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness of the remedy.

5.2 Operable Unit No. 3 (Soil and Groundwater at Liberty Cleaners)

5.2.1 Question A: Is the remedy functioning as intended by the decision documents?

Although groundwater exceeding MCLs is limited to one shallow well, concentrations are not decreasing. ICs preventing groundwater use are in place as described in Section 2.2.1.4.

5.2.1.1 Operable Unit No. 3 Remedial Action Performance

According to the groundwater monitoring, contamination in the upgradient shallow well (MW-1C) is decreasing and has reached the MCLs. Additional data collection is recommended to confirm the groundwater RAOs have been achieved. Concentrations in the downgradient well (MW-1A) were stable during the FYR period, but show an increasing trend when all results since April 1998 are considered. As such, MNA is not achieving the RAO at OU3. As indicated by the 2017 PCE result in MW-1A of 16.4 µg/L (MCL is 5 µg/L), the MNA remedy has not yet shown a decrease in contamination to the MCL in all wells. In addition, there are no downgradient wells to monitor the extent of the groundwater contamination.

5.2.1.2 Operable Unit No. 3 System Operations/O&M

NDEQ is responsible for O&M of the groundwater monitoring network. Monitoring wells observed during the site inspection appeared to be functional.

5.2.1.3 Operable Unit No. 3 Implementation of Institutional Controls and Other Measures

Site-wide ICs are in place and are discussed in Section 2.2.1.4.

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

The exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the time of the remedy remain protective.

5.2.2.1 Changes in Standards and To-Be-Considered Criteria

The groundwater RGs for OUs 2 through 4 are based on the MCLs and remain unchanged, as shown in Table 5-1 in Appendix F.

5.2.2.2 Changes in Toxicity and Other Contaminant Characteristics

There have been some toxicity changes since the ROD, but none that affect the protectiveness of the remedy at OU3.

5.2.2.3 Changes in Risk Assessment Methods

Section 2.1.1 discusses changes in risk assessment methodology; however the changes do not impact the protectiveness of the remedy.

5.2.2.4 Changes in Exposure Pathways

The maximum groundwater concentration of PCE detected in OU3 well MW-1A during this FYR period was 49.4 µg/L in 2012. To ensure that this Site was protective for the VI pathway, the USEPA VISL model was run at a groundwater site-specific temperature of 16 °C and the results are included in Appendix K. The results show that, at a groundwater concentration of 50 µg/L, the VI pathway has a potential excess cancer risk of $5x10^{-7}$ and non-cancer hazard of 0.1. Both are less than the acceptable risk range, and thus will not impact the protectiveness of the remedy.

5.2.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness of the remedy.

5.3 Operable Unit No. 4 (Soil and Groundwater at Ideal Cleaners)

5.3.1 Question A: Is the remedy functioning as intended by the decision documents?

The OU4 remedy is functioning as intended by the ROD and groundwater ICs are in place as described in Section 2.2.1.4. Additional data will be collected at this OU to support a groundwater response action completion determination.

5.3.1.1 Operable Unit No. 4 Remedial Action Performance

Groundwater samples were last collected in 2012. The EPA will evaluate existing data and determine whether the data set is sufficient to document response action completion.

5.3.1.2 Operable Unit No. 4 System Operations/O&M

NDEQ is responsible for O&M of the groundwater monitoring network. Monitoring wells observed during the site inspection appeared to be functional.

5.3.1.3 Operable Unit No. 4 Implementation of Institutional Controls and Other Measures

Site-wide ICs are in place and are discussed in Section 2.2.1.4.

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

All cleanup goals are still valid. The exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the time of the remedy selection are still valid.

5.3.2.1 Changes in Standards and To-Be-Considered Criteria

Groundwater RGs for OUs 2 through 4 are based on the MCLs and remain unchanged, as shown in Table 5-1 in Appendix F.

5.3.2.2 Changes in Toxicity and Other Contaminant Characteristics

Although there has been a change in PCE and TCE toxicity as described in Section 5.2.2.2, the changes do not impact the protectiveness of the remedy.

5.3.2.3 Changes in Risk Assessment Methods

Section 2.1.1 discusses changes in risk assessment methodology, however the changes do not impact the protectiveness of the remedy.

5.3.2.4 Changes in Exposure Pathways

There are no changes in exposure pathways, and no new contaminants identified. The VI pathway is not complete due to the lack of detected contaminants at the Site.

5.3.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness of the remedy.

5.4 Operable Unit No. 5 (Soil and Groundwater at the Former Nebraska Solvent Company)

5.4.1 Question A: Is the remedy functioning as intended by the decision documents?

All components of the OU5 remedy have been implemented. The soil remedy (AS/SVE) and soil excavation activities have been completed and soil cleanup levels have been achieved. VIMS systems are implemented and are effectively addressing indoor air concerns at on-site buildings. Groundwater cleanup levels have not been achieved, but additional efforts are recommended to consider more aggressive remediation options and additional downgradient sampling to bound the downgradient edge of the plume. Groundwater ICs are in place as described in Section 2.2.1.4.

5.4.1.1 Operable Unit No. 5 Remedial Action Performance

All components of the OU5 remedy selected in the ROD have been implemented. While PCE, TCE and *cis*-1,2-DCE concentrations have decreased within the West Parcel area during the FYR period, they have increased or been stable in the downgradient monitoring wells. COC concentrations have shown a decreasing trend in monitoring well MWN-10A; however the well continues to have the highest levels of PCE, TCE and *cis*-1-2-DCE at the Site. (Supplemental Source Area Investigation Summary Report, August 2016). Additional efforts are recommended to consider more aggressive remediation options and additional downgradient sampling to bound the downgradient edge of the plume

The VIMS was completed in January 2016 and has operated since then. The performance of the system is monitored and reported quarterly. PCE was detected in one indoor air sample above the Industrial Indoor Air Screening Level after the system was started, however it was determined to be from a separate unrelated indoor source (spray solvent), and has been lower during the two following sampling events. TCE has not been detected above the Industrial Indoor Air Screening Level since the VIMS system has been operational. Although the VIMS systems are mitigating the indoor air pathway, soil sampling during the VI investigation indicated that contaminated soils may remain under the building, serving as a continued potential source for indoor air issues and elevated groundwater concentrations. Additional subslab soils investigations are recommended to evaluate potential impacts to groundwater and indoor air.

Opportunities for Optimization

No opportunities were identified to improve performance of the VIMS. It is recommended to add vinyl chloride to the groundwater monitoring program to evaluate PCE, TCE, and all possible degradation products.

5.4.1.2 Operable Unit No. 5 System Operations/O&M

O&M of the VIMS, which includes routine maintenance and quarterly monitoring, is conducted by the PRP. It is recommended that VI sampling be expanded to include residential properties downgradient to continue to confirm that no vapor mitigation activities are necessary. Maintenance of site monitoring wells is conducted by the PRP contractor.

5.4.1.3 Operable Unit No. 5 Implementation of Institutional Controls and Other Measures

Site-wide ICs are in place and are discussed in Section 2.2.1.4.

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

The groundwater RGs have not changed, nor has land use changed significantly. VI pathways identified during the previous FYR at the City Electric building and the Mid-Plains Construction building have been evaluated and corrective action implemented to eliminate unacceptable risks to current receptors. However, since groundwater contamination remains above the MCLs, potential VI exposure risks associated with the contaminated groundwater plume exist at the Site.

5.4.2.1 Changes in Standards and To-Be-Considered Criteria

As demonstrated in Appendix F, Table 5-5, the groundwater RGs are based on MCLs. The soil RGs are based on the groundwater MCLs that have not changed. Therefore, there were no changes that could affect the protectiveness of the remedy. The soil RGs were calculated in 2003 by NDEQ, and reviewed by the EPA in 2004, using calculations included in Appendix L. The 2009 ROD Amendment reiterates these RGs, which are summarized in Appendix F, Table 5-6.

5.4.2.2 Changes in Toxicity and Other Contaminant Characteristics

A more detailed assessment of the changes in TCE toxicity is discussed in section 5.2.2.2 and 5.2.2.4 and in Appendix F, Table 5-3. To summarize, TCE is now more toxic via inhalation for cancer and non-cancer, and it has been determined that TCE has the ability to cause an adverse effect during a very small exposure duration. However, the vapor screening levels developed as part of the 2015 Shallow Impacted Soil and Residential VI Summary shown in Appendix F, Table 5-7 were developed after the change in TCE toxicity, so there is no significant impact to the protectiveness of the remedy.

EPA Region 7 has established guidance for TCE action levels for commercial workers at 6 $\mu g/m^3$ and 2 $\mu g/m^3$ for residential exposures. The residential screening value is shown in Appendix F, Table 5-7. If future TCE sampling results in screening exceedances, the EPA will evaluate interim actions to eliminate, reduce, and /or control the hazards posed by sites. Residential homes at the OU5 Site have been tested and are protective via the VI pathway, there is no current impact on the protectiveness of the remedy.

5.4.2.3 Changes in Risk Assessment Methods

Section 5.2.2.3 discusses changes in risk assessment methodology, however the changes do not impact the protectiveness of the remedy.

5.4.2.4 Changes in Exposure Pathways

The ROD amendment at OU5 does not address the VI pathway although many steps have been taken on site to address this new exposure pathway. The risk assessments completed at OU5 are summarized in section 2.1.2. Section 4.2.4 includes a discussion of VI investigations conducted and the construction of VIMS completed since the last FYR.

Since the last FYR, both the increased inhalation toxicity of TCE and the new focus on the movement of subsurface vapors into buildings have increased the potential for unacceptable exposures to on-site receptors via the VI pathway. Additionally, the EPA has established an action level for TCE that is described in the 2016 EPA Region 7 Action Levels for TCE Memorandum included in Appendix M. Appendix F, Table 5-7 shows the indoor air VI screening levels at OU5 compared to the 2018 indoor air VI screening levels calculated with the EPA VISL calculator, and concludes that there are no significant differences. Therefore, the indoor air VI screening levels in use at the Site are protective.

The FYR data review section and Appendix G, Table 4-12 indicate that the groundwater plume is not bounded downgradient. Therefore, there may be a change in receptors with a complete VI pathway

based on the migration of the groundwater plume. The potential for VI exposure may affect the downgradient structures. A vapor intrusion assessment downgradient is recommended.

1,1,1-TCA is a solvent present at the Site. 1-4-dioxane is a likely carcinogen and is known to be used as a stabilizer in 1,1,1-TCA. Groundwater monitoring at OU5 with analysis for 1,4-dioxane was done in a sampling event in June 2013. 1,4-dioxane was detected at estimated concentrations of 2.6 J µg/L in well MWN-3B, and 1.3 J µg/L in MWN-10A. 1,4-dioxane was not detected above the method detection limit of 0.45 ug/L in the remaining 10 monitoring wells. However, 1,1,1-TCA has been reported at OU5 at groundwater concentrations ranging from 5 to 1,200 µg/L, suggesting that 1,4-dioxane may continue to be present. It is recommended that 1,4 dioxane monitoring continue.

5.4.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness of the remedy.

6.0 Issues/Recommendations

<table>
<tr><th colspan="5">Issues/Recommendations</th></tr>
<tr><td colspan="5">OU(s) without Issues/Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td colspan="5">04</td></tr>
<tr><td colspan="5">Issues and Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td>OU2</td><td colspan="4">Issue Category: Other – Potential VI pathway</td></tr>
<tr><td></td><td colspan="4">Issue: Vapor intrusion risks have not been adequately quantified in areas outside of the ISTR planned locations and in the migrating downgradient plume.</td></tr>
<tr><td></td><td colspan="4">Recommendation: Evaluate potential for VI risk at properties to the east / southeast of the primary source of contamination and the tire shop immediately west of the OHM building.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>EPA</td><td>EPA</td><td>12/30/2019</td></tr>
</table>

OU3	Issue Category: Monitoring and Remedy Performance			
	Issue: Downgradient plume delineation incomplete			
	Recommendation: Evaluate plume conditions including a downgradient plume delineation. PCE in MW1A was stable during FYR period but concentrations remain above the MCL. Consider remedy effectiveness based on results.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	NDEQ	NDEQ	8/28/2019

OU5	Issue Category: Remedy Performance			
	Issue: Groundwater monitoring data indicate that the source area concentrations of TCE, PCE and *cis*-1,2-DCE are decreasing but remain above MCLs. Contamination levels in the downgradient side of the plume have no trend or are increasing.			
	Recommendation: Continue either ISCO treatments or an alternative remedy and continue monitoring progress of treatment processes towards permanently reducing groundwater COC concentrations to levels less than corresponding MCLs.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	8/21/2019

OU5	Issue Category: Other			
	Issue: VI risks have not been adequately quantified in areas downgradient of the defined plume area.			
	Recommendation: Evaluate potential for VI risk at downgradient of defined plume area.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	8/21/2019

6.1 Other Findings

In addition, the following recommendations were identified during the FYR that may improve performance of the remedy, but do not affect current and/or future protectiveness:

- Determine whether OU3 groundwater data is sufficient to support remedial action completion in the upgradient shallow monitoring well and two deep wells. If insufficient, collect additional samples.

- Determine whether OU4 groundwater data is sufficient to support remedial action completion. If determined to be sufficient, document completion of the OU4 remedy. If determined to be insufficient, work with NDEQ to collect additional samples to support the remedial action completion. This evaluation will be targeted for completion by December 31, 2018.

- As noted in Section 4.2.5 and 5.5.2.4, investigations conducted at OU5 in 2015 defined the lateral extent of shallow soil impacts beneath the floor slab of the City Electric building. The 2010 soil excavation, which removed and treated on-site soils to the 2009 ROD Amendment cleanup goal, may have left soil contamination on site that contributes to unacceptable inhalation concentrations. A VIMS was installed at both the City Electric building and Mid-Plains Construction building in 2016 to address the VI impacts, and groundwater contamination at OU5 continues to be monitored and evaluated. However, reports reviewed during the FYR did not indicate whether the remaining area of soil contamination beneath the City Electric building may impact the performance of the VIMS or affect remediation of the Site groundwater. Recommend a focused RI for soils under the City Electric building and ascertain whether additional source control and mitigation is necessary.

- The residential homes at the OU5 Site have been tested and are protective via the VI pathway at this time. But periodic VI sampling to ensure protectiveness is recommended.

- The sampling program for OU5 does not include analysis for vinyl chloride, a microbial degradation product of TCE in groundwater. Evaluate the potential for vinyl chloride contamination at the Site and revise the sampling program as necessary.

- The sampling program for OU5 does not include analysis for 1,4 dioxane, a stabilizer for site contaminant 1, 1, 1, TCA which is present on site. Evaluate the potential for 1,4 dioxane contamination at the Site and revise the sampling program as necessary.

- Due to the possible expiration of the city's IC ordinance in February 2023, a comprehensive review of the effectiveness of the ordinance is recommended, including records of the city building inspection department; IC enforcement actions; the tracking system for well permits issued, if any; the geographic scope of the Groundwater Control Area; and changes in land use at the Site.

7.0 Protectiveness Statements

Protectiveness Statement(s)		
Operable Unit: **OU2 (Groundwater at One-Hour Martinizing)**	*Protectiveness Determination:* Protectiveness Deferred	*Planned Addendum Completion Date:* 12/30/2019
Protectiveness Statement: A protectiveness determination of the remedy at OU2 cannot be made at this time until further information is obtained. To make a protectiveness determination, the following actions need to be completed: Conduct VI monitoring to determine whether VI mitigation is needed. It is expected that these actions will take approximately 15 months to complete, at which time a protectiveness determination will be made.		
Operable Unit: **OU3 (Soil and Groundwater at Liberty Cleaners**	*Protectiveness Determination:* Short-term Protective	*Planned Addendum Completion Date:* NA
Protectiveness Statement: The remedy at OU3 currently protects human health and the environment because land use controls prevent exposure to contaminated groundwater. However, for the remedy to be protective in the long-term, plume delineation needs to be conducted.		
Operable Unit: **OU4 (Soil and Groundwater at Ideal Cleaners)**	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* NA
Protectiveness Statement: The remedy at OU4 is protective of human health and the environment. All components of the remedy have been implemented.		
Operable Unit: **OU5 (Soil and Groundwater at the Former Nebraska Solvent Company**	*Protectiveness Determination:* Short-term Protective	*Planned Addendum Completion Date:* NA
Protectiveness Statement: The remedy at OU5 currently protects human health and the environment because land use controls prevent exposure to contaminated groundwater, and implemented VI mitigation systems address VI risks at the Grand Island City Electric and the Mid-Plains Construction buildings. However, for the remedy to be protective in the long-term, ISCO treatment or an alternative remedy needs to be implemented to address groundwater COC concentrations above MCLs.		

Sitewide Protectiveness Statement	
Protectiveness Determination: Protectiveness Deferred	*Planned Addendum Completion Date:* 12/30/2019
Protectiveness Statement: A protectiveness determination of the remedy at OU2 cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions: Conduct VI monitoring to determine whether VI mitigation is necessary. It is expected that these actions will take approximately 15 months to complete, at which time a protectiveness determination will be made.	

8.0 Next Review

The next five-year review report for the Cleburn Street Superfund Site is required five years from the completion date of this review.

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Appendix B
Site Chronology

Event	Date
PCE discovered in city water supply	March 1986
Cleburn Street well disconnected from water supply system	April 1986
Preliminary Assessment completed	December 1987
Site Inspection completed	December 1987
EPA conducts soil gas survey in Grand Island	1988
EPA conducts search for Potentially Responsible Parties	1990-1992
HRS Package	February 1991
Site proposed for NPL	July 1991
RI/FS started	September 1991
Removal Assessment completed	December 1991
Final listing on NPL	October 1992
Engineering Evaluation/Cost Analysis completed	April 1993
Phase I and II of the RI completed	May 1993
Action Memorandum signed/RA started	August 1993
Phase III of the RI completed	December 1993
OUs 1-4 Treatability Study completed	July 1994
Lincoln Street Well taken off-line	May 1995
OUs 1-4 FS completed	July 1995
OUs 1-4 signed ROD	June 17, 1996
OUs 1 and 2 completed RD	September 1997
OUs 1 and 2 started RA	December 1997
OU5 Initial RI field work conducted	April 1998
OU5 RAR submitted	June 1998
OU5 LNPL first detected in west parcel during 1st quarter, 1999	Oct. 1999
OUs 1 and 2 determined Operational and Functional	October 1999
OU1 enters Operation and Maintenance and transferred to NDEQ	February 2000
OU2 enters LTRA phase	February 2000
OU5 Final FS Report submitted	December 2000
OU5 ROD signed	September 9, 2001

Event	Date
First FYR complete	September 2003
OU5 RA implementation start	June 2004
Construction complete (site wide)	September 2004
OU5 permanganate injection program approved by EPA/NDEQ	2006
OU1 SVE System shut down; GAC treatment tanks removed by NDEQ	September 2006
OU2 Source Area Investigation	November 2006
OU1 Operation and Maintenance complete	February 2007
Remedial Systems Rehabilitation complete	August 2007
Assessment of the Primary Source Area	August 2007
OU5 AS/SVE systems turned off for an assessment	November 2007
OUs 1 & 2 EPA begins operating SVE System (pulsed operation)	January 2008
OU2 comprehensive hydrogeologic investigation	May 2008
Second FYR completed	August 2008
OU5 ROD Amendment signed	March 3, 2009
OU2 well installation and evaluation of the silt layer	April 2009
OU2 ISCO Pilot Study for the downgradient plume	July - Sep 2009
OU2 ISCO Pilot Study for the source area	Dec 2009 - July 2010
OU2 expanded groundwater profile sampling	July 2010
OU5 supplemental investigation using DPT to scope the second phase of potassium permanganate injection	July 2010
OU1 time critical RA soil removal	May 2010
OU1 VI monitoring	Aug/Sep 2010
OU5 AS/SVE wells and treatment system are abandoned	Sep 2010
OU5 west parcel shallow soil removal/thermal treatment	Sep/Nov 2010
OU5 LNAPL monitoring points abandoned	Nov 2010
OU5 Modified Fenton's injection	Jan 2011
OU5 Confirmation screening samples collected to assess effectiveness of the Modified Fenton's injection	April 2011
OU5 Phase II Modified Fenton's injection conducted	Dec 2010 – Oct 2011
OU5 soil/soil-gas investigation at City Electric Department building	Sep 2012

Event	Date
OUs 1-4 signed Record of Decision Amendment	September 12, 2012
OU5 VI Investigation at City Electric Department and Mid Plains Construction buildings	Sept. 2012-June 2013
Third FYR completed	August 2013
Addendum to the Third FYR (OU5)	September 2013
OU2 Pre-design investigations to support ISTR RD	Oct. 2014
OU5 Soils delineation at City Electric Building and Residential VI Investigation	May 2015
OU5 VIMS installations at City Electric Department and Mid Plains Construction buildings complete	Jan. 2016
OU5 Residential VI investigation	Mar. 2016
OU2 Final ISTR RA Work Plan and 100% RD Report	Feb. 2018

Appendix C
Physical Characteristics

The Site is located in the Great Plains physiographic province in the middle of the Platte River Basin. Surface topography is generally flat with natural surface drainage flowing in a northeasterly direction. The Platte River flows from southwest to northeast and is situated approximately seven miles south of Grand Island.

Hydrology

Regionally, the State of Nebraska is drained by the Missouri River system. The Missouri River has the Platte River as its major Nebraska tributary. The City of Grand Island is located in the central portion of the Platte River Basin. Approximately seven miles to the southeast of the city is the Platte River which flows from the southwest to the northeast. Site surface runoff is controlled by such urban features as gutters and storm sewers. Runoff is discharged to the Wood River, two miles south of the site, which flows to the northeast and eventually into the main channel of the Platte River approximately ten miles northeast of the site. Average grade across the site is reported as 0.05 percent (HGL, 2011).

Geology

Hall County lies adjacent to the north-south axis of the Salina Basin, which extends from central Nebraska into north-central Kansas. The thickest sedimentary rock accumulations in Nebraska are found within the Salina Basin. Typically, the Hall County area is underlain by approximately 30 to 430 ft of unconsolidated Pleistocene-age deposits lying unconformably on the Pierre Shale, or the Niobrara Formation where the Pierre Shale is absent. The unconsolidated deposits are stream-deposited sands and gravels containing thick, regionally discontinuous layers of clay and silt. Gravel beds occur within this unit and can be as thick as 10 ft. The unconsolidated deposits (in descending order from the surface) are: alluvial sands and gravels of the Grand Island Formation (approximately 60 to 70 ft in thickness); a low-permeability, alluvial silty clay of the Fullerton Formation (approximately 5 to 15 ft in thickness); and, alluvial sands and gravels of the Holdrege Formation (up to 200 ft in thickness) (HGL, 2011).

Specific to OU2, the Grand Island Formation was found to generally consist of sands and gravels to a depth of 28 ft below ground surface (bgs), a silt/silty sand unit from approximately 28 ft to 39 ft bgs, and sands and gravels to a depth of approximately 90 ft bgs. Within the sands and gravels are deposits of silty sands and occasional thin clayey sand layers and sandy clay layers. The Fullerton Formation, which consists of very stiff, slightly moist, greenish-gray clay with low to medium plasticity, is found at approximately 90 ft bgs. Appendix B provides figures depicting lithology [Figures 2.1 through 2.3 (HGL, 2011)].

At OU5, shallow soil consists of silts to a depth of approximately three to five ft overlying medium to coarse-grained alluvial sands. Below five ft, the geology is similar to OU2, in that the alluvial material extends approximately 85 to 90 ft bgs and locally contains thin clay layers.

Hydrogeology

The principal source of groundwater underlying the region occurs as an unconfined water table within the alluvial sands and gravels of the Grand Island Formation, with an average depth to

water being generally 20 ft bgs (HGL, 2011). Regionally the water table aquifer extends to the top of the Fullerton Formation, having a total thickness of about 70 ft. The predominant regional groundwater flow direction within the water table aquifer is to the east-northeast. Horizontal gradients of four to seven ft per mile have been measured in the area (Woodward-Clyde, 1997 and 1998; URSGWCFS, 1999).

Reviewed figures depicting water table data indicate that the principal direction of groundwater flow in the vicinity of the Site is to the east-southeast. Refer to Appendix B (Figure 4 [HGL, 2012]) for a typical figure depicting groundwater table isocontours derived from OU2 data collected in July 2012. Refer to Appendix C (Figure 2 [CH2MHILL, 2012]) for a typical figure depicting groundwater table isocontours derived from OU5 data collected in December 2012.

Groundwater flow at OUs 3 and 4 are inferred to flow in the same east-southeast direction. Only two groundwater monitoring wells are present for each monitored interval, and therefore, a true groundwater flow direction is not obtainable from the data at these OUs.

Appendix D
Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: Cleburn Street Well Site	**Date of inspection:** February 5, 2018
Location and Region: Grand Island, NE, Region 7	**EPA ID:** NED981499312
Agency, office, or company leading the five-year review: U.S. EPA Region 7	**Weather/temperature:** Clear, 18 Degrees F., snow covered

Remedy Includes: (Check all that apply)

Landfill cover/containment
Access controls
X Institutional controls
Groundwater pump and treatment
Surface water collection and treatment
X Monitored natural attenuation
Groundwater containment
Vertical barrier walls
X Other In-situ thermal treatment (not yet implemented for OU2), vapor intrusion mitigation (VIMS) f for OU5

Attachments: X Inspection team roster attached Γ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
Name Title Date
Interviewed Γ at site Γ at office Γ by phone Phone no. _____
Problems, suggestions; Γ Report attached _____
_____

2. **O&M staff** Hoyt Sutphin (CH2MHill) Sr. Project Manager 2/5/2018
Name Title Date
Interviewed **X** at site at office by phone Phone no. _____
Problems, suggestions; Γ Report attached

Mr. Sutphin provided an overview of the VIMS at the City Electric and Mid-Plains Construction Buildings. Systems have been operating without issues. Following the briefing, Mr. Sutphin provided a tour of the VIMS. Mr. Sutphin indicated that CH2MHill is evaluating treatment approaches to address the site groundwater contamination.

. **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 _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Γ Report attached _____
_____

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

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

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

4. **Other interviews** (optional)

The status of activities at OU5 were discussed with Amer Safadi, EPA RPM; Kevin Peterbus, Union Pacific Railroad (OU5 PRP); Randy Leiser and Travis Burdett, Grand Island City Electric Department; Thomas Dolton, Mid Plains Construction.

Mr. Peterbus (UPRR) indicated that he participates in semi-annual calls/meetings to review the status of the OU 5 project. Mr. Safadi said that EPA has been satisfied with the coordination with UPRR. Mr. Leiser (City of Grand Island) indicated that he is satisfied with the coordination efforts of EPA and the CH2MHill consultant. Coordination with the consultant has kept impacts to the operations at the City Electric Department Building to a minimum. Mr. Leiser discussed proposed modifications to the City building and indicated that he would coordinate with CH2MHill regarding potential impacts to the installed VIMS. Mr. Leiser requested copies of the VIMS operational reports in order to better apprise his staff on the status of the systems and operating conditions in the facility. The owner of Mid Plains Construction, the facility located adjacent to the City Electric Department Building, indicated that he had no concerns related to the installed VIMS and the ongoing remediation efforts at OU5.

Additionally, the owner of Ideal Cleaners (OU4) was interviewed during the site inspection.
The owner indicated that he was aware of the wells located at the site and acknowledged that coordination with EPA had occurred during past monitoring events.

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

1. **O&M Documents**
   - **X** O&M manual — **X** Readily available — Γ Up to date — Γ N/A
   - As-built drawings — Γ Readily available — Γ Up to date — Γ N/A
   - Maintenance logs — Γ Readily available — Γ Up to date — Γ N/A

   Remarks

2. **Site-Specific Health and Safety Plan** — **X** Readily available — **X** Up to date — Γ N/A
   - Γ Contingency plan/emergency response plan — Γ Readily available — Γ Up to date — Γ N/A

   Remarks

3. **O&M and OSHA Training Records** — Γ Readily available — Γ Up to date — **X** N/A

   Remarks

4. **Permits and Service Agreements**
   - Γ Air discharge permit — Γ Readily available — Γ Up to date — **X** N/A
   - Γ Effluent discharge — Γ Readily available — Γ Up to date — **X** N/A
   - Γ Waste disposal, POTW — Γ Readily available — Γ Up to date — **X** N/A
   - Γ Other permits_____ — Γ Readily available — Γ Up to date — **X** N/A

   Remarks

5. **Gas Generation Records** — Γ Readily available — Γ Up to date — **X** N/A

   Remarks

6. **Settlement Monument Records** — Γ Readily available — Γ Up to date — **X** N/A

   Remarks

7. **Groundwater Monitoring Records** — **X** Readily available — Γ Up to date — Γ N/A

   Remarks Maintained at the EPA Region 7 office.

8. **Leachate Extraction Records** — Γ Readily available — Γ Up to date — **X** N/A

   Remarks

9. **Discharge Compliance Records**
   - Γ Air — Γ Readily available — Γ Up to date — **X** N/A
   - Γ Water (effluent) — Γ Readily available — Γ Up to date — **X** N/A

   Remarks

10. **Daily Access/Security Logs** — Γ Readily available — Γ Up to date — **X** N/A

    Remarks

IV. O&M COSTS

1. **O&M Organization**

Γ State in-house Γ Contractor for State
Γ PRP in-house **X** Contractor for PRP (CH2MHill for UPRR at OU5)
Γ Federal Facility in-house **X** Contractor for Federal Facility
□ Other _____

2. **O&M Cost Records**

Γ Readily available Γ Up to date
Γ Funding mechanism/agreement in place
Original O&M cost estimate _____ Γ Breakdown attached

O&M costs are not reported in the FYR.

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS **X** Applicable Γ N/A

A. Fencing

1. **Fencing damaged** Γ Location shown on site map □ Gates secured **X** N/A

Remarks _____

B. Other Access Restrictions

1. **Signs and other security measures** Γ Location shown on site map **X** N/A

Remarks _____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented	Γ Yes	□ No	**X** N/A
Site conditions imply ICs not being fully enforced	Γ Yes	□ No	**X** N/A

Type of monitoring (*e.g.*, self-reporting, drive by)
Groundwater use ordnance enforcement by the City of Grand Island

Reporting is up-to-date	Γ Yes	Γ No	**X** N/A
Reports are verified by the lead agency	Γ Yes	Γ No	**X** N/A
Specific requirements in deed or decision documents have been met	**X** Yes	Γ No	□ N/A
Violations have been reported	Γ Yes	Γ No	**X** N/A

Other problems or suggestions: Γ Report attached

2. **Adequacy** **X** ICs are adequate □ ICs are inadequate Γ N/A

_____
_____
_____

D. General

1. **Vandalism/trespassing** Γ Location shown on site map **X** No vandalism evident
   Remarks _____

2. **Land use changes on site** □ N/A
   Remarks: OU 3 (Former Liberty Cleaners) is now a tire repair/replacement garage. The west end building at OU5 is leased by Mid-Plains Construction.

3. **Land use changes off site** x N/A
   Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads Γ Applicable x N/A

1. **Roads damaged** Γ Location shown on site map Γ Roads adequate Γ N/A
   Remarks _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS Applicable **X** N/A

A. Landfill Surface

1. **Settlement** (Low spots) Γ Location shown on site map Γ Settlement not evident
   Areal extent_____ Depth_____
   Remarks _____

2. **Cracks** Γ Location shown on site map Γ Cracking not evident
   Lengths_____ Widths_____Depths_____
   Remarks _____

3. **Erosion** Γ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks _____

4. **Holes** Γ Location shown on site map Γ Holes not evident
   Areal extent_____ Depth_____
   Remarks _____

5. **Vegetative Cover** Γ Grass Γ Cover properly established Γ No signs of stress
   Γ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

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

7. **Bulges** Γ Location shown on site map □ Bulges not evident
Areal extent_____ Height_____
Remarks_____

8. **Wet Areas/Water Damage** Γ Wet areas/water damage not evident
Γ Wet areas Γ Location shown on site map Areal extent_____
□ Ponding Γ Location shown on site map Areal extent_____
Γ Seeps Γ Location shown on site map Areal extent_____
Γ Soft subgrade Γ Location shown on site map Areal extent_____
Remarks_____

9. **Slope Instability** Γ Slides Γ Location shown on site map □ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches Γ Applicable **X** 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** Γ Location shown on site map Γ N/A or okay
Remarks_____

2. **Bench Breached** Γ Location shown on site map Γ N/A or okay
Remarks_____

3. **Bench Overtopped** Γ Location shown on site map Γ N/A or okay
Remarks_____

C. Letdown Channels Γ Applicable **X** N/A
(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** Γ Location shown on site map Γ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** Γ Location shown on site map Γ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** Γ Location shown on site map Γ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

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

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

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

D. Cover Penetrations □ Applicable **X** N/A

1. **Gas Vents** Γ Active Γ Passive
Γ Properly secured/locked Γ Functioning Γ Routinely sampled Γ Good condition
Γ Evidence of leakage at penetration Γ Needs Maintenance
□ N/A
Remarks_____

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

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

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

5. **Settlement Monuments** Γ Located Γ Routinely surveyed □ N/A
Remarks_____

E. Gas Collection and Treatment Applicable **X** N/A

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

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

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

F. Cover Drainage Layer Γ Applicable **X** N/A

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

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

G. Detention/Sedimentation Ponds Γ Applicable **X** N/A

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

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

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

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

H. Retaining Walls Γ Applicable **X** N/A

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

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

I. Perimeter Ditches/Off-Site Discharge □ Applicable **X** N/A

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

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

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

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

VIII. VERTICAL BARRIER WALLS Applicable **X** N/A

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

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

IX. GROUNDWATER/SURFACE WATER REMEDIES □ Applicable Γ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines Γ Applicable **X** N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Γ Good condition Γ All required wells properly operating Γ Needs Maintenance Γ N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Γ Good condition Γ Needs Maintenance
   Remarks_____

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

B. Surface Water Collection Structures, Pumps, and Pipelines Γ Applicable **X** N/A

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

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

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

C. Treatment System Γ Applicable **X** N/A

1. **Treatment Train** (Check components that apply)
   Γ Metals removal Γ Oil/water separation Γ Bioremediation
   Γ Air stripping Γ Carbon adsorbers
   Γ Filters_____
   Γ Additive (*e.g.*, chelation agent, flocculent)_____
   Γ Others_____
   Γ Good condition Γ Needs Maintenance
   Γ Sampling ports properly marked and functional
   Γ Sampling/maintenance log displayed and up to date
   Γ Equipment properly identified
   Γ Quantity of groundwater treated annually_____
   Γ Quantity of surface water treated annually_____
   Remarks_____

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

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

4. **Discharge Structure and Appurtenances**
   Γ N/A Γ Good condition Γ Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   Γ N/A Γ Good condition (esp. roof and doorways) Γ Needs repair
   Γ Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
Γ Properly secured/locked Γ Functioning Γ Routinely sampled Γ Good condition
Γ All required wells located Γ Needs Maintenance Γ N/A
Remarks_____

D. Monitoring Data **X** Applicable Γ N/A

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

2. Monitoring data suggests:
Γ Groundwater plume is effectively contained X Contaminant concentrations are declining
Refer to the Data Evaluation Section in the FYR for discussion of monitoring data.

D. Monitored Natural Attenuation **X** Applicable □ N/A

1. **Monitoring Wells** (natural attenuation remedy)
x Properly secured/locked Γ Functioning Γ Routinely sampled Γ Good condition
Γ All required wells located Γ Needs Maintenance Γ N/A
Remarks: Observed wells appeared to be secured and undamaged (refer to inspection photos). All wells were not located during the inspection due to weather conditions. EPA RPM did not indicate any issues with the monitoring well network for the OUs.

X. OTHER REMEDIES

The VIMS at OU5 were observed during the inspection (refer to inspection photographs). Systems appeared to be in good condition. No operational issues reported. O&M reports have been routinely prepared.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Refer to the discussion of the implementation status of each OU in the Five-Year Review text.

B. Adequacy of O&M

O&M of the OU5 VIMS is ongoing and is adequate. No other OUs have current O&M requirements.

C. Early Indicators of Potential Remedy Problems

No issues were observed during the site inspection.

D. Opportunities for Optimization

No opportunities for optimization were noted during the site inspection.

Site Inspection Team Roster

Personnel	Representing	Phone Number
Brian Roberts	U.S. Army Corps of Engineers	816-389-3892
James Lyons	U.S. Army Corps of Engineers	816-389-3477
Amer Safadi	EPA Region 7	913-551-7825

Appendix E
Photographs

Photo 1 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: Southeast
Description: OU1, Former OHM Facility. The western edge of the proposed OU2 In-situ thermal remediation (ISTR) treatment area will extend into the northwest portion of the former OHM building and parking area.

Photo 2 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: Southeast
Description: OU1, Former OHM Facility. The proposed OU2 In-situ thermal remediation (ISTR) treatment area begins in the northwest portion of the former OHM building, crosses the adjacent access road and Eddy Street (recessed street), and extends into the parking area on the north side of the business to the southeast.

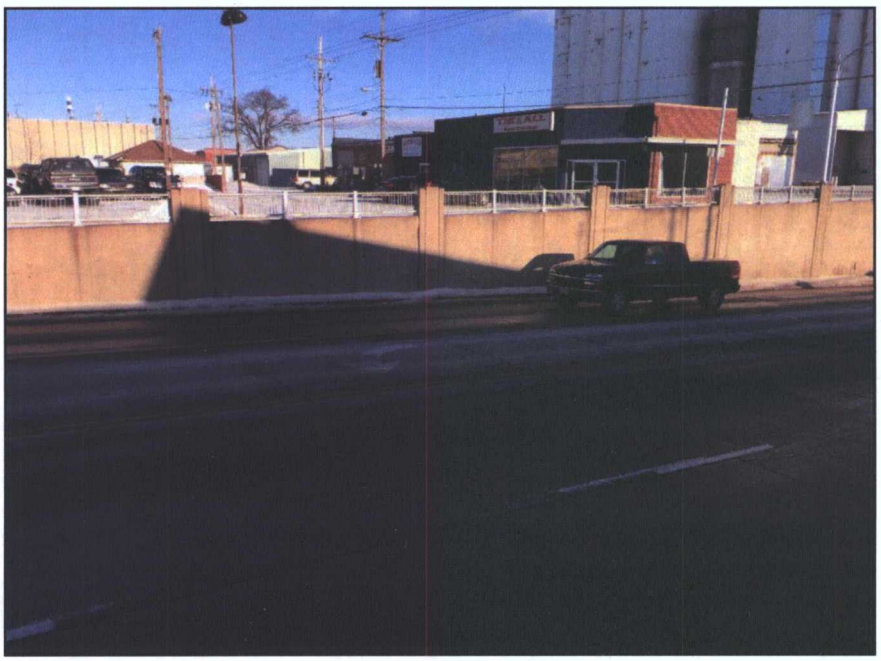


Photo 3 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: Southeast
Description: The central portion of the proposed OU 2 ISTR treatment area in Eddy Street. Treatment area will extend into the parking area on the north side of the business to the southeast.

Photo 4 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: South
Description: Flush mount MW-2A on the east side of the former OHM facility

Photo 5 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: North
Description: OU3, Former Liberty Cleaner Facility

Photo 6 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: Northeast
Description: OU3. East side of the former Liberty cleaner facility. MWs 1A and 1B are located near the dumpster on the right side of the photograph.

Photo 7 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: North
Description: OU3, Former Liberty Cleaner Facility. MWs 1A and 1B.

Photo 8 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: Northwest
Description: OU4, Ideal Cleaner facility. MWs-4C and 4D are located near the "Stop" sign. Ideal Cleaner facility is located northwest across the street.

Photo 9 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: Northwwest
Description: OU4, Ideal Cleaner facility. MWs-4C and 4D

Photo 10 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: North
Description: OU4, Ideal Cleaner facility. MW-4A on the southwest side of the building.

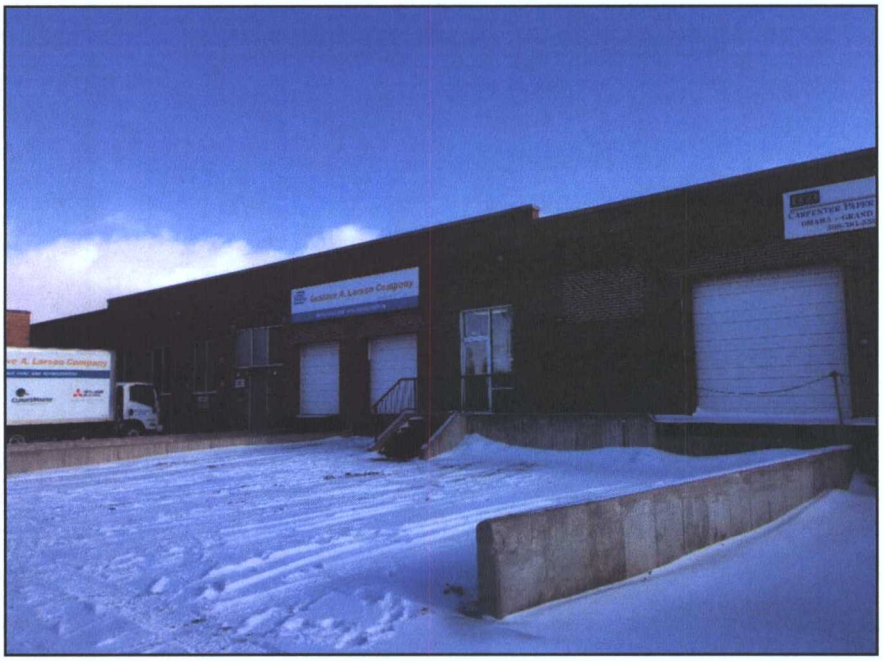


Photo 11 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: East
Description: Mid Plains Construction building at the OU5 Former Solvent Facility. The adjacent Grand Island City Electric building is to the east (left side of the photograph).

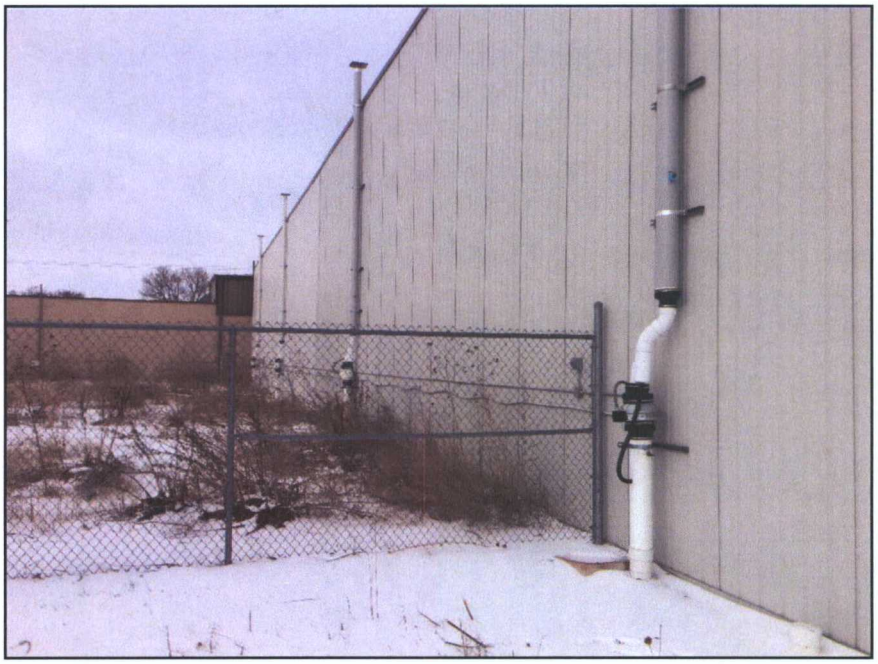


Photo 12 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: North
Description: OU5. West side of the City Electric Building South Wing. VI mitigation fans with exhaust to roof.

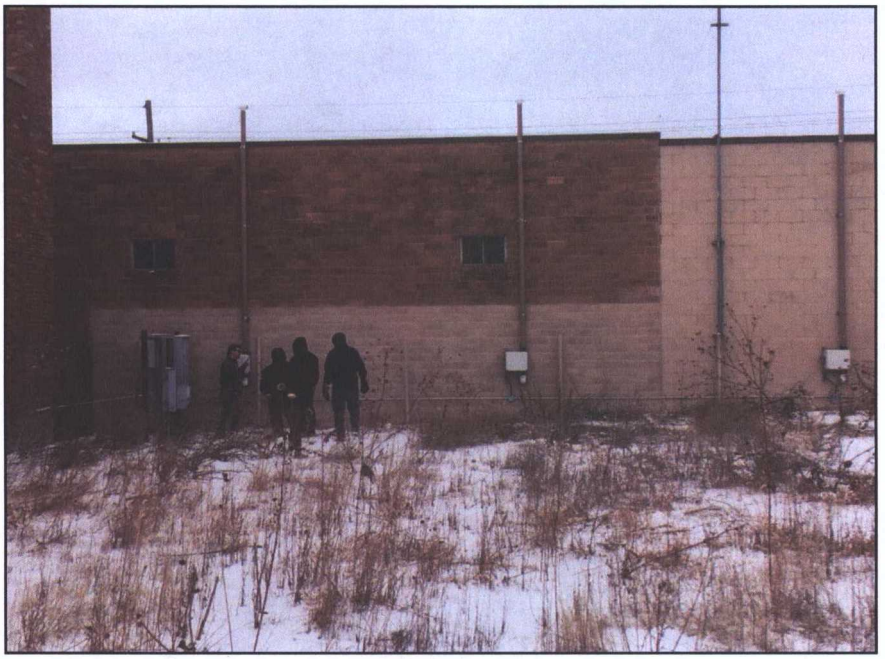


Photo 13 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: North
Description: OU5. Open area between the City Electric building South wing and the Mid-Plains Construction building. Exterior VI mitigation fans with exhaust to roof.

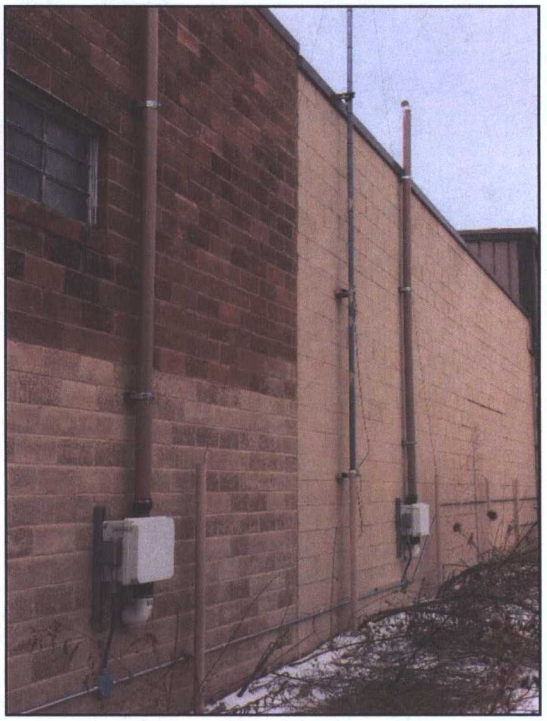


Photo 14 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: Northeast
Description: OU5. South wall of the City Electric building. Exterior VI mitigation fans with exhaust to roof.

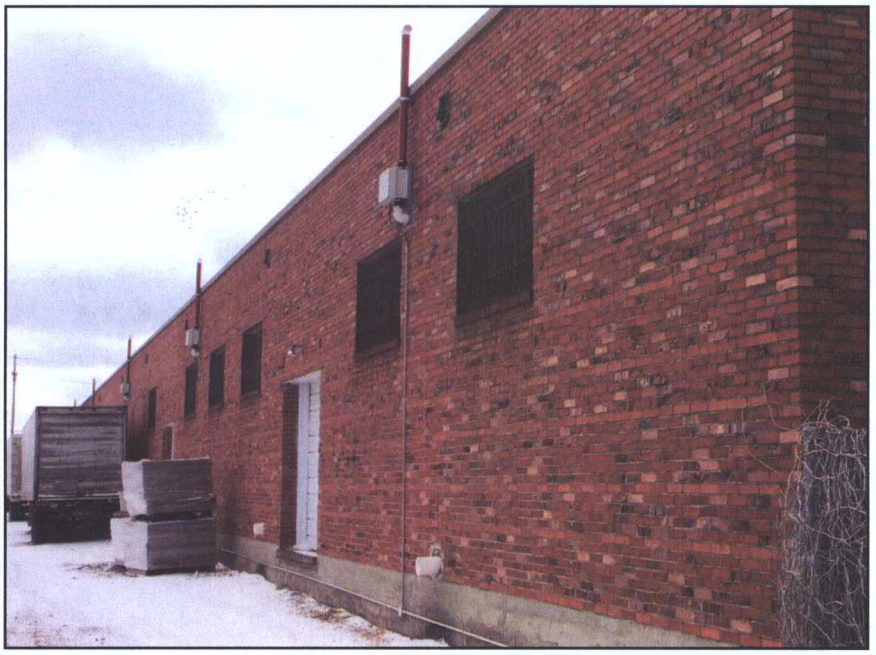


Photo 15 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: Southwest
Description: OU5. South exterior of the Mid Plains Construction building. Exterior VI mitigation fans with exhaust to roof.

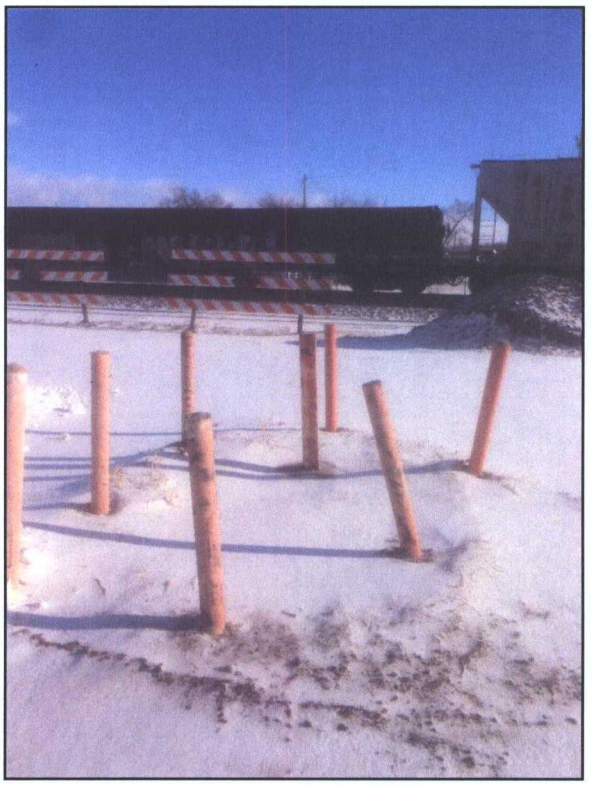


Photo 16 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: South
Description: OU5. MWs 1A and 1B southwest of the City Electric building.

Photo 17 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: North
Description: OU5. MW10A/10B located in the open area between the City Electric and mid Plains Construction buildings.

Photo 18 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: Northeast
Description: OU5. VI mitigation system piping in the City Electric building.

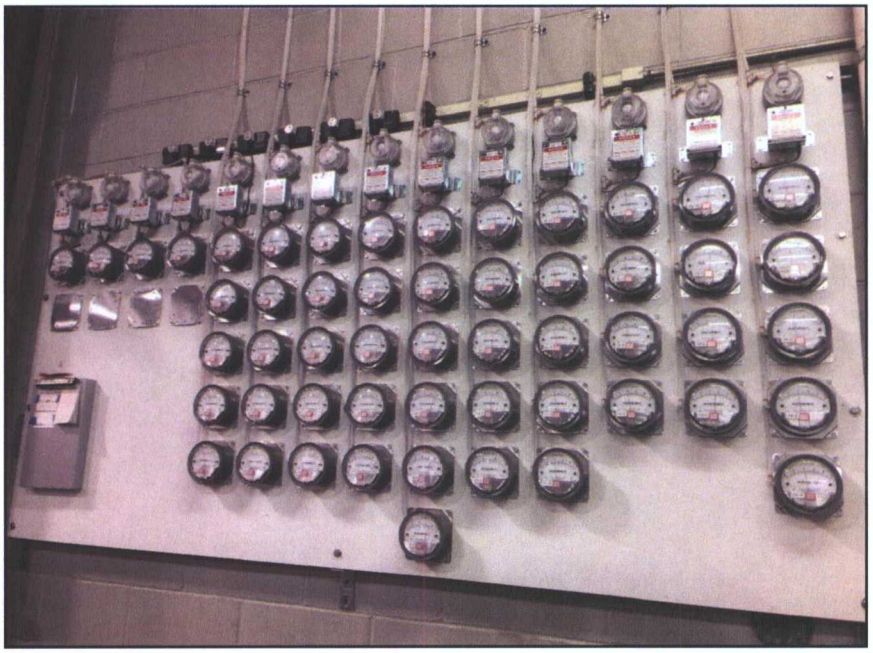


Photo 19 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: South
Description: OU5. VI mitigation system monitoring panel in the City Electric building.

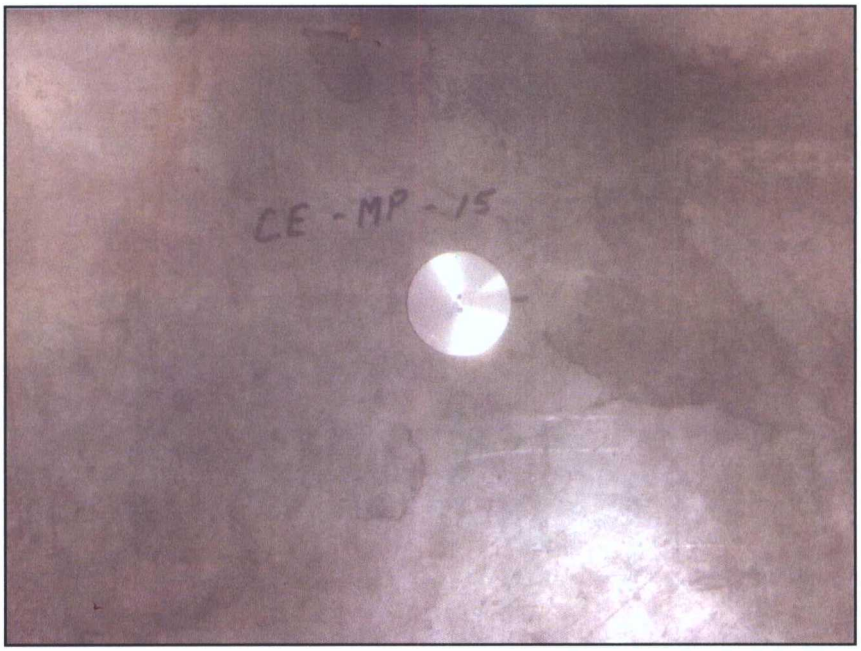


Photo 20 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: NA
Description: OU5. Typical VI system pressure monitoring port in the City Electric building.

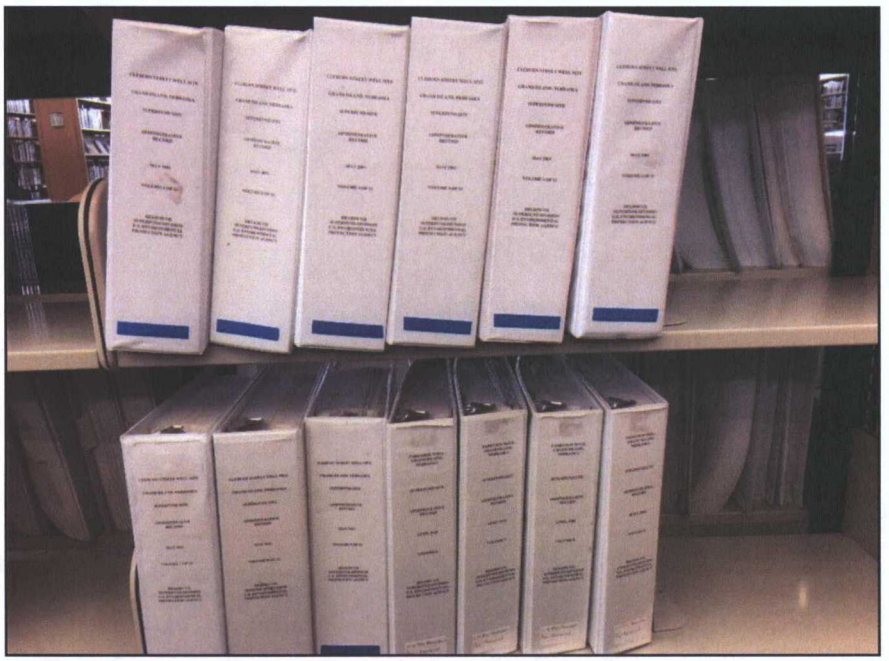


Photo 21 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: NA
Description: The Administrative Record for the Cleburn Street Project is located at the Grand Island Public Library.

Photo 22 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: NA
Description: The Administrative Record for the Cleburn Street Project is located at the Grand Island Public Library. Document are a mix of hard copies and digital files.

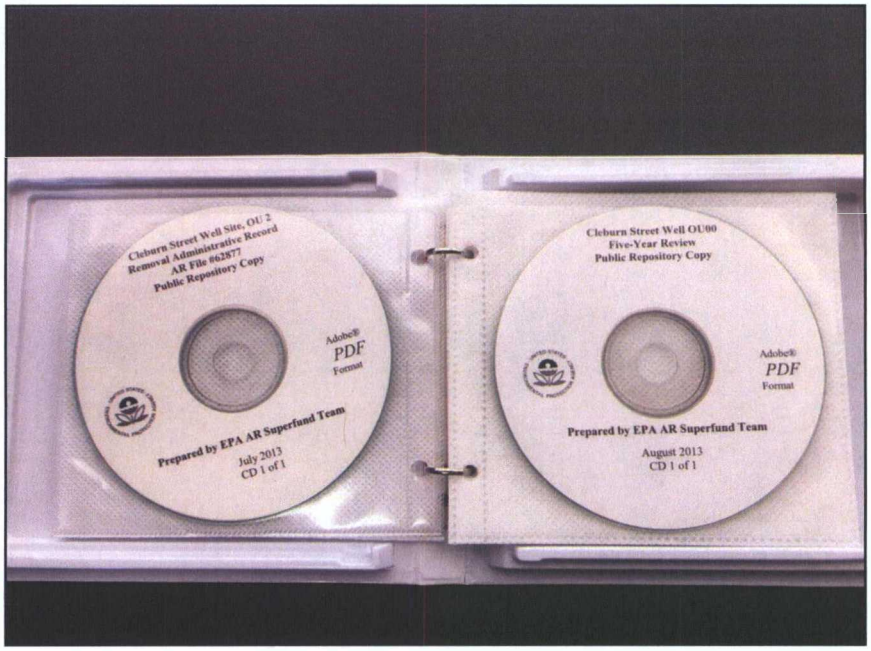


Photo 23 **Date:** Feb 5, 2017
Location: Cleburn Street Well Site, Grand Island, NE
Direction: NA
Description: The Administrative Record for the Cleburn Street Project is located at the Grand Island Public Library. The more recent documents are maintained as digital files.

Appendix F
TABLES

TABLE 4-1

VOC Analytical Results - Soil Samples - October 2014

OU1 Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification	EPA RSL	SB-501-5-10		SB-501-10-15		SB-501-15-20		SB-501-20-25				SB-501-25-30		SB-501-30-35		SB-501-35-40		SB-502-10-15		SB-502-15-20		SB-502-20-25				SB-502-25-30	
Lab Sample Identification		6584-51		6584-52		6584-53		6584-54		6584-54-FD		6584-56		6584-57		6584-58		6584-59		6584-60		6584-61		6584-61-FD		6584-63	
Sample Date		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014	
Volatile Organic Compounds (µg/kg)																											
1,1,1-Trichloroethane	8,100,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,1,2,2-Tetrachloroethane	600	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,1,2-Trichloroethane	1,100	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,1,2-Trichlorotrifluoroethane	40,000,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,1-Dichloroethane	3,600	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,1-Dichloroethene	230,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,2,3-Trichlorobenzene	49,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,2,4-Trichlorobenzene	24,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,2-Dibromo-3-Chloropropane	5.3	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,2-Dibromoethane	36	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,2-Dichlorobenzene	1,800,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,2-Dichloroethane	460	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,2-Dichloropropane	1,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,3-Dichlorobenzene	NE	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
1,4-Dichlorobenzene	2,600	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
2-Butanone	27,000,000	8.7	U	8.1	U	8.5	U	8.7	U	8.1	U	10	U	8.2	U	8.2	U	8.6	U	12	U	440	U	410	U	440	U
2-Hexanone	200,000	8.7	U	8.1	U	8.5	U	8.7	U	8.1	U	10	U	8.2	U	8.2	U	8.6	U	12	U	440	U	410	U	440	U
4-Methyl-2-Pentanone	5,300,000	8.7	U	8.1	U	8.5	U	8.7	U	8.1	U	10	U	8.2	U	8.2	U	8.6	U	12	U	440	U	410	U	440	U
Acetone	61,000,000	8.7	U	**11**		**12**		**9.3**		**13**		10	U	8.2	U	8.2	U	8.6	U	**21**		440	U	410	U	480	U
Benzene	1,200	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Bromodichloromethane	290	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Bromoform	67,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Bromomethane	6,800	4.4	UJ	4.1	UJ	4.2	UJ	4.3	UJ	4.0	UJ	5.1	UJ	4.1	UJ	4.1	UJ	4.3	U	5.8	U	220	U	200	U	220	U
Carbon Disulfide	770,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Carbon Tetrachloride	650	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Chlorobenzene	280,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Chloroethane	14,000,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Chloroform	320	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Chloromethane	110,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
cis-1,2-Dichloroethene	160,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	**48**		4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
cis-1,3-Dichloropropene	NE	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Cyclohexane	6,500,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	**10**		4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Dibromochloromethane	730	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Dichlorodifluoromethane	87,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Ethyl Benzene	5,800	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Isopropylbenzene	1,900,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
m and/or p-Xylene	560,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Methyl Acetate	78,000,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Methyl tert-butyl ether	47,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Methylcyclohexane	NE	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	**29**		4.1	U	**11**		4.3	U	5.8	U	220	U	200	U	220	U
Methylene Chloride	57,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
o-Xylene	650,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Styrene	6,000,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	UJ	200	UJ	220	UJ
Tetrachloroethene	24,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	**2,200**	J	4.3	U	5.8	U	**1,900**		**4,600**		**2,200**	
Toluene	4,900,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
trans-1,2-Dichloroethene	1,600,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
trans-1,3-Dichloropropene	NE	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Trichloroethene	940	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	**29**		4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Trichlorofluoromethane	730,000	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Vinyl Chloride	59	4.4	U	4.1	U	4.2	U	4.3	U	4.0	U	5.1	U	4.1	U	4.1	U	4.3	U	5.8	U	220	U	200	U	220	U
Total Organic Carbon (percent)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DNAPL Screening Result	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-1 (Continued)

VOC Analytical Results - Soil Samples - October 2014

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification	EPA RSL	SB-502-30-35		SB-503-10-15		SB-503-15-20		SB-503-20-25		SB-503-25-30		SB-503-30-35		SB-504-10-15		SB-504-15-20				SB-504-20-25		SB-504-25-30		SB-504-30-35		SB-505-10-15	
Lab Sample Identification		6584-64		6584-65		6584-66		6584-67		6584-68		6584-69		6584-70		6584-71		6584-71-FD		6584-73		6584-74		6584-75		6584-76	
Sample Date		10/6/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/8/2014	
Volatile Organic Compounds (µg/kg)																											
1,1,1-Trichloroethane	8,100,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,1,2,2-Tetrachloroethane	600	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,1,2-Trichloroethane	1,100	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,1,2-Trichlorotrifluoroethane	40,000,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,1-Dichloroethane	3,600	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,1-Dichloroethene	230,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,2,3-Trichlorobenzene	49,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,2,4-Trichlorobenzene	24,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,2-Dibromo-3-Chloropropane	5.3	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,2-Dibromoethane	36	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,2-Dichlorobenzene	1,800,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,2-Dichloroethane	460	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,2-Dichloropropane	1,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,3-Dichlorobenzene	NE	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
1,4-Dichlorobenzene	2,600	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
2-Butanone	27,000,000	490	U	8.9	U	7.5	U	8.8	U	8.3	U	8.9	U	8.0	U	8.7	U	9.2	U	8.7	U	7.6	U	7.9	U	8.5	U
2-Hexanone	200,000	490	U	8.9	U	7.5	U	8.8	U	8.3	U	8.9	U	8.0	U	8.7	U	9.2	U	8.7	U	7.6	U	7.9	U	8.5	U
4-Methyl-2-Pentanone	5,300,000	490	U	8.9	U	7.5	U	8.8	U	8.3	U	8.9	U	8.0	U	8.7	U	9.2	U	8.7	U	7.6	U	7.9	U	8.5	U
Acetone	61,000,000	490	U	**20**		**11**		**10**		**21**		**20**		**9.5**		8.7	U	**10**		8.7	U	7.6	U	7.9	U	**11**	
Benzene	1,200	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Bromodichloromethane	290	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Bromoform	67,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Bromomethane	6,800	250	U	4.4	UJ	3.7	UJ	4.4	UJ	4.2	UJ	4.5	UJ	4.0	UJ	4.4	UJ	4.6	UJ	4.4	UJ	3.8	UJ	3.9	UJ	4.2	UJ
Carbon Disulfide	770,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Carbon Tetrachloride	650	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Chlorobenzene	280,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Chloroethane	14,000,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Chloroform	320	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Chloromethane	110,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
cis-1,2-Dichloroethene	160,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	**22**		**57**		4.2	U
cis-1,3-Dichloropropene	NE	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Cyclohexane	6,500,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	**12**		3.9	U	4.2	U
Dibromochloromethane	730	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Dichlorodifluoromethane	87,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Ethyl Benzene	5,800	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Isopropylbenzene	1,900,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
m and/or p-Xylene	560,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Methyl Acetate	78,000,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Methyl tert-butyl ether	47,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Methylcyclohexane	NE	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Methylene Chloride	57,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
o-Xylene	650,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Styrene	6,000,000	250	UJ	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Tetrachloroethene	24,000	**480**		**10**		3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	**17**		**78**		**7.7**	
Toluene	4,900,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
trans-1,2-Dichloroethene	1,600,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
trans-1,3-Dichloropropene	NE	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Trichloroethene	940	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	**53**		**41**		4.2	U
Trichlorofluoromethane	730,000	250	U	4.4	U	3.7	U	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	U	3.8	U	3.9	U	4.2	U
Vinyl Chloride	59	250	U	4.4	U	3.7	UJ	4.4	U	4.2	U	4.5	U	4.0	U	4.4	U	4.6	U	4.4	UJ	3.8	U	3.9	U	4.2	U
Total Organic Carbon (percent)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DNAPL Screening Result	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-1 (Continued)
VOC Analytical Results - Soil Samples - October 2014
Cleburn Street Well Site
Grand Island, Nebraska

Sample Identification	EPA RSL	SB-505-15-20		SB-505-20-25		SB-505-25-30		SB-505-30-35		SB-506-10-15		SB-506-15-20		SB-506-20-25		SB-506-25-30		SB-506-30-35		SB-507-20-25				SB-507-25-30		SB-507-30-35	
Lab Sample Identification		6584-77		6584-78		6584-79		6584-80		6584-81		6584-82		6584-83		6584-84		6584-85		6584-86		6584-86-FD		6584-88		6584-89	
Sample Date		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014	
Volatile Organic Compounds (µg/kg)																											
1,1,1-Trichloroethane	8,100,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,1,2,2-Tetrachloroethane	600	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,1,2-Trichloroethane	1,100	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,1,2-Trichlorotrifluoroethane	40,000,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,1-Dichloroethane	3,600	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,1-Dichloroethene	230,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,2,3-Trichlorobenzene	49,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,2,4-Trichlorobenzene	24,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,2-Dibromo-3-Chloropropane	5.3	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,2-Dibromoethane	36	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,2-Dichlorobenzene	1,800,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,2-Dichloroethane	460	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,2-Dichloropropane	1,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,3-Dichlorobenzene	NE	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
1,4-Dichlorobenzene	2,600	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
2-Butanone	27,000,000	8.6	U	7.6	U	8.1	U	400	U	8.3	U	8.4	U	500	U	500	U	2,300	U	8.3	U	9.2	U	750	U	2,700	U
2-Hexanone	200,000	8.6	U	7.6	U	8.1	U	400	U	8.3	U	8.4	U	500	U	500	U	2,300	U	8.3	U	9.2	U	750	U	2,700	U
4-Methyl-2-Pentanone	5,300,000	8.6	U	7.6	U	8.1	U	400	U	8.3	U	8.4	U	500	U	500	U	2,300	U	8.3	U	9.2	U	750	U	2,700	U
Acetone	61,000,000	**17**		**11**		**8.3**		400	U	8.3	U	**9.2**		690	U	520	U	2,900	U	**17**		9.2	U	750	U	2,700	U
Benzene	1,200	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Bromodichloromethane	290	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Bromoform	67,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Bromomethane	6,800	4.3	UJ	3.8	UJ	4.0	UJ	200	U	4.1	UJ	4.2	UJ	250	U	250	U	1,200	U	4.1	UJ	4.6	UJ	380	U	1,400	U
Carbon Disulfide	770,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Carbon Tetrachloride	650	4.3	U	3.8	U	**40**		200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Chlorobenzene	280,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Chloroethane	14,000,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Chloroform	320	4.3	U	3.8	U	**21**		200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Chloromethane	110,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
cis-1,2-Dichloroethene	160,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
cis-1,3-Dichloropropene	NE	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Cyclohexane	6,500,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	**2,300**		1,400	U
Dibromochloromethane	730	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Dichlorodifluoromethane	87,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Ethyl Benzene	5,800	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	**2,800**		1,400	U
Isopropylbenzene	1,900,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	**870**		1,400	U
m and/or p-Xylene	560,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	**15,000**		1,400	U
Methyl Acetate	78,000,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Methyl tert-butyl ether	47,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Methylcyclohexane	NE	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	**11,000**		1,400	U
Methylene Chloride	57,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	**440**		1,400	U
o-Xylene	650,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	**8,200**		1,400	U
Styrene	6,000,000	4.3	U	3.8	U	4.0	U	200	UJ	4.1	U	4.2	U	250	UJ	250	UJ	1,200	UJ	4.1	U	4.6	U	380	UJ	1,400	UJ
Tetrachloroethene	24,000	4.3	U	3.8	U	**7.2**		**380**		4.1	U	4.2	U	**1,800**		**2,600**		**5,800**		**4.6**		4.6	U	380	U	**16,000**	
Toluene	4,900,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	**1,400**		1,400	U
trans-1,2-Dichloroethene	1,600,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
trans-1,3-Dichloropropene	NE	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Trichloroethene	940	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Trichlorofluoromethane	730,000	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	U	4.6	U	380	U	1,400	U
Vinyl Chloride	59	4.3	U	3.8	U	4.0	U	200	U	4.1	U	4.2	U	250	U	250	U	1,200	U	4.1	UJ	4.6	UJ	380	U	1,400	U
Total Organic Carbon (percent)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DNAPL Screening Result	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Negative	--	Negative	--	Positive	--	--	--

TABLE 4-1 (Continued)
VOC Analytical Results - Soil Samples - October 2014
Cleburn Street Well Site
Grand Island, Nebraska

Sample Identification	EPA RSL	SB-507-35-40		SB-508-20-25		SB-508-25-30		SB-508-30-35		SB-508-35-40		SB-509-25-30		SB-509-30-35		SB-509-35-40				SB-510-20-25		SB-510-25-30		SB-510-30-35		SB-510-35-40	
Lab Sample Identification		6584-90		6584-91		6584-92		6584-93		6584-94		6584-107		6584-108		6584-109		6584-109-FD		6584-111		6584-112		6584-113		6584-114	
Sample Date		10/8/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/10/2014		10/10/2014		10/10/2014		10/10/2014		10/11/2014		10/11/2014		10/11/2014		10/11/2014	
Volatile Organic Compounds (µg/kg)																											
1,1,1-Trichloroethane	8,100,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,1,2,2-Tetrachloroethane	600	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,1,2-Trichloroethane	1,100	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,1,2-Trichlorotrifluoroethane	40,000,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,1-Dichloroethane	3,600	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,1-Dichloroethene	230,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,2,3-Trichlorobenzene	49,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,2,4-Trichlorobenzene	24,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,2-Dibromo-3-Chloropropane	5.3	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,2-Dibromoethane	36	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,2-Dichlorobenzene	1,800,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,2-Dichloroethane	460	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,2-Dichloropropane	1,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,3-Dichlorobenzene	NE	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
1,4-Dichlorobenzene	2,600	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
2-Butanone	27,000,000	400	U	620	U	590	U	700	U	8.1	U	500	U	510	U	420	U	400	U	450	U	8.5	U	8.8	U	8.0	U
2-Hexanone	200,000	400	U	620	U	590	U	700	U	8.1	U	500	U	510	U	420	U	400	U	450	U	8.5	U	8.8	U	8.0	U
4-Methyl-2-Pentanone	5,300,000	400	U	620	U	590	U	700	U	8.1	U	500	U	510	U	420	U	400	U	450	U	8.5	U	8.8	U	8.0	U
Acetone	61,000,000	400	U	620	U	590	U	700	U	8.1	U	500	U	510	U	420	U	400	U	450	U	8.5	U	**14**		8.0	U
Benzene	1,200	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Bromodichloromethane	290	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Bromoform	67,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Bromomethane	6,800	200	U	310	U	300	U	350	U	4.0	UJ	250	U	260	U	210	U	200	U	220	U	4.2	UJ	4.4	UJ	4.0	UJ
Carbon Disulfide	770,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Carbon Tetrachloride	650	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Chlorobenzene	280,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Chloroethane	14,000,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Chloroform	320	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Chloromethane	110,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
cis-1,2-Dichloroethene	160,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
cis-1,3-Dichloropropene	NE	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Cyclohexane	6,500,000	200	U	310	U	300	U	**760**		4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Dibromochloromethane	730	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Dichlorodifluoromethane	87,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Ethyl Benzene	5,800	200	U	**690**		300	U	**700**		4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Isopropylbenzene	1,900,000	200	U	310	U	300	U	**730**		4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
m and/or p-Xylene	560,000	200	U	**3,600**		300	U	**3,300**		4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Methyl Acetate	78,000,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Methyl tert-butyl ether	47,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Methylcyclohexane	NE	200	U	**860**		300	U	**6,200**		4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Methylene Chloride	57,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
o-Xylene	650,000	200	U	**1,600**		300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Styrene	6,000,000	200	UJ	310	UJ	300	UJ	350	UJ	4.0	U	250	UJ	260	UJ	210	UJ	200	UJ	220	UJ	4.2	U	4.4	U	4.0	U
Tetrachloroethene	24,000	**310**		310	U	300	U	350	U	4.0	U	**1,000**		**1,700**		**520**		**1,300**		**3,800**		**27**		**36**		**39**	
Toluene	4,900,000	200	U	**860**		300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
trans-1,2-Dichloroethene	1,600,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
trans-1,3-Dichloropropene	NE	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Trichloroethene	940	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Trichlorofluoromethane	730,000	200	U	310	U	300	U	350	U	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	U	4.4	U	4.0	U
Vinyl Chloride	59	200	U	310	UJ	300	UJ	350	UJ	4.0	U	250	U	260	U	210	U	200	U	220	U	4.2	UJ	4.4	UJ	4.0	UJ
Total Organic Carbon (percent)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DNAPL Screening Result	NE	Positive	--	Positive	--	--	--	Positive	--	Positive	--	Negative	--	--	--	Negative	--	Negative	--	Positive	--	--	--	Negative	--	Positive	--

TABLE 4-1 (Continued)

VOC Analytical Results - Soil Samples - October 2014

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification	EPA RSL	SB-511-5-10		SB-511-10-15		SB-511-15-20		SB-511-20-25		SB-511-25-30		SB-511-30-35		SB-511-35-40		ASB-512-20-25		ASB-512-25-30		ASB-512-30-35		ASB-512-35-40		ASB-512-40-45		SB-513-5-10	
Lab Sample Identification		6584-95		6584-96		6584-97		6584-98		6584-99		6584-100		6584-101		6584-102		6584-103		6584-104		6584-105		6584-106		6584-1	
Sample Date		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/10/2014	
Volatile Organic Compounds (µg/kg)																											
1,1,1-Trichloroethane	8,100,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,1,2,2-Tetrachloroethane	600	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,1,2-Trichloroethane	1,100	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,1,2-Trichlorotrifluoroethane	40,000,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,1-Dichloroethane	3,600	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,1-Dichloroethene	230,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,2,3-Trichlorobenzene	49,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,2,4-Trichlorobenzene	24,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,2-Dibromo-3-Chloropropane	5.3	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,2-Dibromoethane	36	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,2-Dichlorobenzene	1,800,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,2-Dichloroethane	460	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,2-Dichloropropane	1,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,3-Dichlorobenzene	NE	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
1,4-Dichlorobenzene	2,600	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
2-Butanone	27,000,000	9.0	U	9.5	U	7.8	U	650	U	650	U	750	U	9.5	U	8.4	U	8.7	U	10	U	8.0	U	8.5	U	9.8	U
2-Hexanone	200,000	9.0	U	9.5	U	7.8	U	650	U	650	U	750	U	9.5	U	8.4	U	8.7	U	10	U	8.0	U	8.5	U	9.8	U
4-Methyl-2-Pentanone	5,300,000	9.0	U	9.5	U	7.8	U	650	U	650	U	750	U	9.5	U	8.4	U	8.7	U	10	U	8.0	U	8.5	U	9.8	U
Acetone	61,000,000	**20**		**21**		**24**		650	U	650	U	750	U	9.5	U	**11**		**15**		**13**		**9.7**		**11**		9.8	U
Benzene	1,200	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Bromodichloromethane	290	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Bromoform	67,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Bromomethane	6,800	4.5	UJ	4.8	UJ	3.9	UJ	330	U	330	U	370	U	4.8	UJ	4.2	UJ	4.4	UJ	5.0	UJ	4.0	UJ	4.3	UJ	4.9	UJ
Carbon Disulfide	770,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Carbon Tetrachloride	650	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Chlorobenzene	280,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Chloroethane	14,000,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Chloroform	320	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Chloromethane	110,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
cis-1,2-Dichloroethene	160,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
cis-1,3-Dichloropropene	NE	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Cyclohexane	6,500,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Dibromochloromethane	730	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Dichlorodifluoromethane	87,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Ethyl Benzene	5,800	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Isopropylbenzene	1,900,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
m and/or p-Xylene	560,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Methyl Acetate	78,000,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Methyl tert-butyl ether	47,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Methylcyclohexane	NE	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Methylene Chloride	57,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
o-Xylene	650,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Styrene	6,000,000	4.5	U	4.8	U	3.9	U	330	UJ	330	UJ	370	UJ	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Tetrachloroethene	24,000	**6.6**		**8.0**		**7.4**		**3,700**		**870**		**2,900**		**97**		**9.8**		**15**		5.0	U	**64**		**9.9**		4.9	U
Toluene	4,900,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
trans-1,2-Dichloroethene	1,600,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
trans-1,3-Dichloropropene	NE	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Trichloroethene	940	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Trichlorofluoromethane	730,000	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Vinyl Chloride	59	4.5	U	4.8	U	3.9	U	330	U	330	U	370	U	4.8	U	4.2	U	4.4	U	5.0	U	4.0	U	4.3	U	4.9	U
Total Organic Carbon (percent)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	U
DNAPL Screening Result	NE	--	--	--	--	Negative	--	--	--	--	--	Negative	--	Negative	--	Negative	--	--	--	Negative	--	--	--	Negative	--	--	--

TABLE 4-1 (Continued)
VOC Analytical Results - Soil Samples - October 2014
Cleburn Street Well Site
Grand Island, Nebraska

Sample Identification	EPA RSL	SB-513-10-15		SB-513-10-15		SB-513-15-20		SB-513-20-25		SB-513-25-30		SB-513-30-35		SB-513-35-40		SB-514-5-10		SB-514-10-15		SB-514-15-20		SB-514-20-25		SB-514-25-30		SB-514-30-35	
Lab Sample Identification		6584-2		6584-2-FD		6584-4		6584-5		6584-6		6584-7		6584-8		6584-115		6584-116		6584-117		6584-118		6584-119		6584-120	
Sample Date		10/10/2014		10/10/2014		10/10/2014		10/10/2014		10/10/2014		10/10/2014		10/10/2014		10/11/2014		10/11/2014		10/11/2014		10/11/2014		10/11/2014		10/11/2014	
Volatile Organic Compounds (µg/kg)																											
1,1,1-Trichloroethane	8,100,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,1,2,2-Tetrachloroethane	600	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,1,2-Trichloroethane	1,100	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	UJ	250	U	260	U	260	U
1,1,2-Trichlorotrifluoroethane	40,000,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,1-Dichloroethane	3,600	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,1-Dichloroethene	230,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,2,3-Trichlorobenzene	49,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,2,4-Trichlorobenzene	24,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,2-Dibromo-3-Chloropropane	5.3	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,2-Dibromoethane	36	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,2-Dichlorobenzene	1,800,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,2-Dichloroethane	460	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,2-Dichloropropane	1,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,3-Dichlorobenzene	NE	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
1,4-Dichlorobenzene	2,600	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
2-Butanone	27,000,000	8.8	U	7.4	U	10	U	9.4	U	2,300	U	5,200	U	450	U	8.6	U	8.3	U	8.3	U	510	U	520	U	510	U
2-Hexanone	200,000	8.8	U	7.4	U	10	U	9.4	U	2,300	U	5,200	U	450	U	8.6	U	8.3	U	8.3	U	510	U	520	U	510	U
4-Methyl-2-Pentanone	5,300,000	8.8	U	7.4	U	10	U	9.4	U	2,300	U	5,200	U	450	U	8.6	U	8.3	U	8.3	U	510	U	520	U	510	U
Acetone	61,000,000	8.8	U	**7.8**		10	U	**12**		2,300	U	5,200	U	450	U	**10**		**10**		**18**		510	U	520	U	510	U
Benzene	1,200	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Bromodichloromethane	290	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Bromoform	67,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Bromomethane	6,800	4.4	UJ	3.7	UJ	5.1	UJ	4.7	U	1,100	U	2,600	U	230	U	4.3	UJ	4.2	UJ	4.2	UJ	250	U	260	U	260	U
Carbon Disulfide	770,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Carbon Tetrachloride	650	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Chlorobenzene	280,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Chloroethane	14,000,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Chloroform	320	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Chloromethane	110,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
cis-1,2-Dichloroethene	160,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
cis-1,3-Dichloropropene	NE	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	UJ	250	U	260	U	260	U
Cyclohexane	6,500,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Dibromochloromethane	730	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Dichlorodifluoromethane	87,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Ethyl Benzene	5,800	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Isopropylbenzene	1,900,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
m and/or p-Xylene	560,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Methyl Acetate	78,000,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Methyl tert-butyl ether	47,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Methylcyclohexane	NE	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Methylene Chloride	57,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
o-Xylene	650,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Styrene	6,000,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	UJ	2,600	UJ	230	UJ	4.3	U	4.2	U	4.2	U	250	UJ	260	UJ	260	UJ
Tetrachloroethene	24,000	4.4	U	3.7	U	5.1	U	**70**		**25,000**		**12,000**		**540**		4.3	U	4.2	U	4.2	U	**2,400**		**900**		**610**	
Toluene	4,900,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
trans-1,2-Dichloroethene	1,600,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
trans-1,3-Dichloropropene	NE	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	UJ	250	U	260	U	260	U
Trichloroethene	940	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Trichlorofluoromethane	730,000	4.4	U	3.7	U	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	U	4.2	U	4.2	U	250	U	260	U	260	U
Vinyl Chloride	59	4.4	UJ	3.7	UJ	5.1	U	4.7	U	1,100	U	2,600	U	230	U	4.3	UJ	4.2	UJ	4.2	UJ	250	U	260	U	260	U
Total Organic Carbon (percent)	NE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	--	--	--	--	--	--	--	--	--	--	--	--
DNAPL Screening Result	NE	--	--	--	--	--	--	Nagative	--	Negative	--	Negative	--	Negative	--	--	--	--	--	--	--	Negative	--	Negative	--	Negative	--

TABLE 4-1 (Continued)

VOC Analytical Results - Soil Samples - October 2014

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification	EPA RSL	SB-514-35-40		SB-515-5-10		SB-515-10-15		SB-515-15-20		SB-515-15-20		SB-515-20-25		SB-515-25-30		SB-515-30-35		SB-515-35-40		ASB-516-20-25		ASB-516-20-25		ASB-516-25-30		ASB-516-30-35	
Lab Sample Identification		6584-121		6584-9		6584-10		6584-11		6584-11-FD		6584-13		6584-14		6584-15		6584-16		6584-132		6584-132-FD		6584-134		6584-135	
Sample Date		10/11/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/13/2014		10/13/2014		10/13/2014		10/13/2014	
Volatile Organic Compounds (µg/kg)																											
1,1,1-Trichloroethane	8,100,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,1,2,2-Tetrachloroethane	600	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,1,2-Trichloroethane	1,100	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,1,2-Trichlorotrifluoroethane	40,000,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,1-Dichloroethane	3,600	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,1-Dichloroethene	230,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,2,3-Trichlorobenzene	49,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,2,4-Trichlorobenzene	24,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,2-Dibromo-3-Chloropropane	5.3	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,2-Dibromoethane	36	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,2-Dichlorobenzene	1,800,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,2-Dichloroethane	460	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,2-Dichloropropane	1,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,3-Dichlorobenzene	NE	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
1,4-Dichlorobenzene	2,600	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
2-Butanone	27,000,000	12		7.1	U	8.4	U	9.4	U	9.5	U	440	U	480	U	560	U	450	U	8.7	U	9.1	U	8.8	U	8.4	U
2-Hexanone	200,000	9.3	U	7.1	U	8.4	U	9.4	U	9.5	U	440	U	480	U	560	U	450	U	8.7	U	9.1	U	8.8	U	8.4	U
4-Methyl-2-Pentanone	5,300,000	9.3	U	7.1	U	8.4	U	9.4	U	9.5	U	440	U	480	U	560	U	450	U	8.7	U	9.1	U	8.8	U	8.4	U
Acetone	61,000,000	9.3	U	7.1	U	8.4	U	9.4	U	9.5	U	440	U	480	U	560	U	450	U	21		9.1	U	15		12	
Benzene	1,200	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Bromodichloromethane	290	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Bromoform	67,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Bromomethane	6,800	4.6	UJ	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Carbon Disulfide	770,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Carbon Tetrachloride	650	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Chlorobenzene	280,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Chloroethane	14,000,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Chloroform	320	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Chloromethane	110,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
cis-1,2-Dichloroethene	160,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
cis-1,3-Dichloropropene	NE	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Cyclohexane	6,500,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Dibromochloromethane	730	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Dichlorodifluoromethane	87,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Ethyl Benzene	5,800	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Isopropylbenzene	1,900,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
m and/or p-Xylene	560,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Methyl Acetate	78,000,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Methyl tert-butyl ether	47,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Methylcyclohexane	NE	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Methylene Chloride	57,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
o-Xylene	650,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Styrene	6,000,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	UJ	240	UJ	280	UJ	220	UJ	4.3	U	4.5	U	4.4	U	4.2	U
Tetrachloroethene	24,000	170		3.5	U	4.2	U	6.2		5.2		1,600		2,000		2,500		1,400		21		8.1		900	J	4.2	U
Toluene	4,900,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
trans-1,2-Dichloroethene	1,600,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
trans-1,3-Dichloropropene	NE	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Trichloroethene	940	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Trichlorofluoromethane	730,000	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Vinyl Chloride	59	4.6	U	3.5	U	4.2	U	4.7	U	4.7	U	220	U	240	U	280	U	220	U	4.3	U	4.5	U	4.4	U	4.2	U
Total Organic Carbon (percent)	NE	--	--	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	--	--	--	--	--	--	--	--
DNAPL Screening Result	NE	Negative	--	--	--	--	--	--	--	--	--	Negative	--	Negative	--	Negative	--	Postive	--	Negative	--	Negative	--	--	--	Positive	--

TABLE 4-1 (Continued)

VOC Analytical Results - Soil Samples - October 2014

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification	EPA RSL	ASB-516-35-40		ASB-516-40-45		ASB-517-20-25		ASB-517-25-30		ASB-517-30-35		ASB-517-35-40		ASB-517-40-45		SB-518-5-10		SB-518-10-15		SB-518-15-20		SB-518-20-25		SB-518-25-30	
Lab Sample Identification		6584-136		6584-137		6584-25		6584-26		6584-27		6584-28		6584-29		6584-30		6584-31		6584-32		6584-33		6584-34	
Sample Date		10/13/2014		10/13/2014		10/14/2014		10/14/2014		10/14/2014		10/14/2014		10/14/2014		10/14/2014		10/14/2014		10/14/2014		10/14/2014		10/14/2014	
Volatile Organic Compounds (µg/kg)																									
1,1,1-Trichloroethane	8,100,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,1,2,2-Tetrachloroethane	600	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,1,2-Trichloroethane	1,100	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,1,2-Trichlorotrifluoroethane	40,000,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,1-Dichloroethane	3,600	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,1-Dichloroethene	230,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,2,3-Trichlorobenzene	49,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,2,4-Trichlorobenzene	24,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,2-Dibromo-3-Chloropropane	5.3	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,2-Dibromoethane	36	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,2-Dichlorobenzene	1,800,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,2-Dichloroethane	460	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,2-Dichloropropane	1,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,3-Dichlorobenzene	NE	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
1,4-Dichlorobenzene	2,600	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
2-Butanone	27,000,000	8.0	U	7.5	U	9.4	U	8.7	U	8.7	U	8.1	U	7.9	U	8.5	U	8.4	U	8.7	U	430	U	490	U
2-Hexanone	200,000	8.0	U	7.5	U	9.4	U	8.7	U	8.7	U	8.1	U	7.9	U	8.5	U	8.4	U	8.7	U	430	U	490	U
4-Methyl-2-Pentanone	5,300,000	8.0	U	7.5	U	9.4	U	8.7	U	8.7	U	8.1	U	7.9	U	8.5	U	8.4	U	8.7	U	430	U	490	U
Acetone	61,000,000	**9.4**		**11**		**22**		**10**		**14**		**23**		7.9	U	**28**		8.4	U	**26**		430	U	490	U
Benzene	1,200	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Bromodichloromethane	290	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Bromoform	67,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Bromomethane	6,800	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Carbon Disulfide	770,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Carbon Tetrachloride	650	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Chlorobenzene	280,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Chloroethane	14,000,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Chloroform	320	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Chloromethane	110,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
cis-1,2-Dichloroethene	160,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
cis-1,3-Dichloropropene	NE	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Cyclohexane	6,500,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Dibromochloromethane	730	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Dichlorodifluoromethane	87,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Ethyl Benzene	5,800	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Isopropylbenzene	1,900,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
m and/or p-Xylene	560,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Methyl Acetate	78,000,000	4.0	U	3.8	U	**20**		4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Methyl tert-butyl ether	47,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Methylcyclohexane	NE	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Methylene Chloride	57,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
o-Xylene	650,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Styrene	6,000,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	UJ	240	UJ
Tetrachloroethene	24,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	**7.3**		3.9	U	4.2	U	4.2	U	4.3	U	**3,600**		**4,400**	
Toluene	4,900,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
trans-1,2-Dichloroethene	1,600,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
trans-1,3-Dichloropropene	NE	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Trichloroethene	940	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Trichlorofluoromethane	730,000	4.0	U	3.8	U	4.7	U	4.3	U	4.4	U	4.1	U	3.9	U	4.2	U	4.2	U	4.3	U	220	U	240	U
Vinyl Chloride	59	4.0	UJ	3.8	U	4.7	U	4.3	UJ	4.4	U	4.1	UJ	3.9	UJ	4.2	UJ	4.2	UJ	4.3	UJ	220	U	240	U
Total Organic Carbon (percent)	NE	--	--	--	--	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
DNAPL Screening Result	NE	--	--	Positive	--	Negative	--	--	--	Negative	--	--	--	Positive	--	--	--	--	--	--	--	Negative	--	Negative	--

TABLE 4-1 (Continued)

VOC Analytical Results - Soil Samples - October 2014

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification	EPA RSL	SB-518-30-35				SB-518-35-40		ASB-519-20-25		ASB-519-25-30				ASB-519-30-35		ASB-519-35-40		ASB-519-40-45		SB-520-20-25		SB-520-25-30		SB-520-30-35		SB-520-35-40	
Lab Sample Identification		6584-35		6584-35-FD		6584-37		6584-126		6584-127		6584-127-FD		6584-129		6584-130		6584-131		6584-38		6584-39		6584-40		6584-41	
Sample Date		10/14/2014		10/14/2014		10/14/2014		10/12/2014		10/12/2014		10/12/2014		10/13/2014		10/13/2014		10/13/2014		10/14/2014		10/14/2014		10/14/2014		10/14/2014	
Volatile Organic Compounds (µg/kg)																											
1,1,1-Trichloroethane	8,100,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,1,2,2-Tetrachloroethane	600	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,1,2-Trichloroethane	1,100	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,1,2-Trichlorotrifluoroethane	40,000,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,1-Dichloroethane	3,600	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,1-Dichloroethene	230,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,2,3-Trichlorobenzene	49,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,2,4-Trichlorobenzene	24,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,2-Dibromo-3-Chloropropane	5.3	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,2-Dibromoethane	36	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,2-Dichlorobenzene	1,800,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,2-Dichloroethane	460	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,2-Dichloropropane	1,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,3-Dichlorobenzene	NE	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
1,4-Dichlorobenzene	2,600	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
2-Butanone	27,000,000	750	U	540	U	490	U	8.4	U	7.8	U	8.1	U	8.1	U	7.8	U	8.0	U	8.3	U	7.8	U	**14**		8.4	U
2-Hexanone	200,000	750	U	540	U	490	U	8.4	U	7.8	U	8.1	U	8.1	U	7.8	U	8.0	U	8.3	U	7.8	U	8.4	U	8.4	U
4-Methyl-2-Pentanone	5,300,000	750	U	540	U	490	U	8.4	U	7.8	U	8.1	U	8.1	U	7.8	U	8.0	U	8.3	U	7.8	U	8.4	U	8.4	U
Acetone	61,000,000	750	U	540	U	490	U	8.4	U	**8.4**		**9.6**		**11**		**13**		8.0	U	**12**		**14**		8.4	U	8.4	U
Benzene	1,200	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Bromodichloromethane	290	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Bromoform	67,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Bromomethane	6,800	370	U	270	U	250	U	4.2	UJ	3.9	UJ	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	UJ	4.2	U	4.2	U
Carbon Disulfide	770,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	UJ	4.2	U	4.2	U
Carbon Tetrachloride	650	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Chlorobenzene	280,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Chloroethane	14,000,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	UJ	4.2	U	4.2	U
Chloroform	320	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Chloromethane	110,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	UJ	4.2	U	4.2	U
cis-1,2-Dichloroethene	160,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
cis-1,3-Dichloropropene	NE	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Cyclohexane	6,500,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Dibromochloromethane	730	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Dichlorodifluoromethane	87,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	UJ	4.2	U	4.2	U
Ethyl Benzene	5,800	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Isopropylbenzene	1,900,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
m and/or p-Xylene	560,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Methyl Acetate	78,000,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	**4.4**		4.2	U	4.2	U
Methyl tert-butyl ether	47,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Methylcyclohexane	NE	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Methylene Chloride	57,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
o-Xylene	650,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Styrene	6,000,000	370	UJ	270	UJ	250	UJ	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Tetrachloroethene	24,000	**680**		**760**		**710**		4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	**43**		**97**	
Toluene	4,900,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
trans-1,2-Dichloroethene	1,600,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
trans-1,3-Dichloropropene	NE	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Trichloroethene	940	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Trichlorofluoromethane	730,000	370	U	270	U	250	U	4.2	U	3.9	U	4.1	U	4.0	U	3.9	U	4.0	U	4.2	U	3.9	U	4.2	U	4.2	U
Vinyl Chloride	59	370	U	270	U	250	U	4.2	UJ	3.9	UJ	4.1	U	4.0	U	3.9	U	4.0	U	4.2	UJ	3.9	UJ	4.2	U	4.2	U
Total Organic Carbon (percent)	NE	0.1	U	0.1	U	0.1	U	--	--	--	--	--	--	--	--	--	--	--	--	0.1	U	0.1	U	**0.116**	J	0.1	UJ
DNAPL Screening Result	NE	Negative	--	Negative	--	Negative	--	Negative	--	--	--	--	--	Negative	--	--	--	Negative	--	Negative	--	--	--	Positive	--	Positive	--

TABLE 4-1 (Continued)

VOC Analytical Results - Soil Samples - October 2014

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification	EPA RSL	SB-521-5-10		SB-521-10-15		SB-521-15-20		SB-521-20-25		SB-521-25-30		SB-521-30-35				SB-521-35-40		SB-522-20-25		SB-522-25-30		SB-522-30-35		SB-522-35-40	
Lab Sample Identification		6584-17		6584-18		6584-19		6584-20		6584-21		6584-22		6584-22-FD		6584-24		6584-122		6584-123		6584-124		6584-125	
Sample Date		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014	
Volatile Organic Compounds (µg/kg)																									
1,1,1-Trichloroethane	8,100,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,1,2,2-Tetrachloroethane	600	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,1,2-Trichloroethane	1,100	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,1,2-Trichlorotrifluoroethane	40,000,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,1-Dichloroethane	3,600	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,1-Dichloroethene	230,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,2,3-Trichlorobenzene	49,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,2,4-Trichlorobenzene	24,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,2-Dibromo-3-Chloropropane	5.3	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,2-Dibromoethane	36	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,2-Dichlorobenzene	1,800,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,2-Dichloroethane	460	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,2-Dichloropropane	1,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,3-Dichlorobenzene	NE	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
1,4-Dichlorobenzene	2,600	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
2-Butanone	27,000,000	9.2	U	8.5	U	8.7	U	430	U	490	U	540	U	520	U	650	U	8.1	U	9.4	U	7.4	U	8.3	U
2-Hexanone	200,000	9.2	U	8.5	U	8.7	U	430	U	490	U	540	U	520	U	650	U	8.1	U	9.4	U	7.4	U	8.3	U
4-Methyl-2-Pentanone	5,300,000	9.2	U	8.5	U	8.7	U	430	U	490	U	540	U	520	U	650	U	8.1	U	9.4	U	7.4	U	8.3	U
Acetone	61,000,000	**9.9**		8.5	U	8.7	U	430	U	490	U	540	U	520	U	650	U	**11**		**12**		**24**		**11**	
Benzene	1,200	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Bromodichloromethane	290	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Bromoform	67,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Bromomethane	6,800	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	UJ	4.7	UJ	3.7	UJ	4.1	UJ
Carbon Disulfide	770,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Carbon Tetrachloride	650	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Chlorobenzene	280,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Chloroethane	14,000,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Chloroform	320	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Chloromethane	110,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
cis-1,2-Dichloroethene	160,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
cis-1,3-Dichloropropene	NE	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Cyclohexane	6,500,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Dibromochloromethane	730	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Dichlorodifluoromethane	87,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Ethyl Benzene	5,800	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Isopropylbenzene	1,900,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
m and/or p-Xylene	560,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Methyl Acetate	78,000,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Methyl tert-butyl ether	47,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Methylcyclohexane	NE	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Methylene Chloride	57,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
o-Xylene	650,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Styrene	6,000,000	4.6	U	4.3	U	4.4	U	220	UJ	240	UJ	270	UJ	260	UJ	330	UJ	4.1	U	4.7	U	3.7	U	4.1	U
Tetrachloroethene	24,000	4.6	U	4.3	U	4.4	U	**2,000**		**2,000**		**900**		**1,300**		**370**		4.1	U	4.7	U	3.7	U	**30**	
Toluene	4,900,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
trans-1,2-Dichloroethene	1,600,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
trans-1,3-Dichloropropene	NE	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Trichloroethene	940	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Trichlorofluoromethane	730,000	4.6	U	4.3	U	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	U	4.1	U
Vinyl Chloride	59	4.6	UJ	4.3	UJ	4.4	U	220	U	240	U	270	U	260	U	330	U	4.1	U	4.7	U	3.7	UJ	4.1	UJ
Total Organic Carbon (percent)	NE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	--	--	--	--	--	--	--	--
DNAPL Screening Result	NE	--	--	--	--	--	--	Negative	--	Negative	--	Negative	--	Negative	--	Negative	--	Negative	--	--	--	Negative	--	Positive	--

TABLE 4-1 (Continued)

VOC Analytical Results - Soil Samples - October 2014
Cleburn Street Well Site
Grand Island, Nebraska

Sample Identification	EPA RSL	SB-523-20-25				SB-523-25-30		SB-523-30-35		SB-523-35-40	
Lab Sample Identification		6584-138		6584-138-FD		6584-140		6584-141		6584-142	
Sample Date		10/15/2014		10/15/2014		10/15/2014		10/15/2014		10/15/2014	
Volatile Organic Compounds (µg/kg)											
1,1,1-Trichloroethane	8,100,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,1,2,2-Tetrachloroethane	600	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,1,2-Trichloroethane	1,100	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,1,2-Trichlorotrifluoroethane	40,000,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,1-Dichloroethane	3,600	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,1-Dichloroethene	230,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,2,3-Trichlorobenzene	49,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,2,4-Trichlorobenzene	24,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,2-Dibromo-3-Chloropropane	5.3	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,2-Dibromoethane	36	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,2-Dichlorobenzene	1,800,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,2-Dichloroethane	460	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,2-Dichloropropane	1,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,3-Dichlorobenzene	NE	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
1,4-Dichlorobenzene	2,600	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
2-Butanone	27,000,000	8.4	U	8.8	U	9.1	U	7.8	U	8.6	U
2-Hexanone	200,000	8.4	U	8.8	U	9.1	U	7.8	U	8.6	U
4-Methyl-2-Pentanone	5,300,000	8.4	U	8.8	U	9.1	U	7.8	U	8.6	U
Acetone	61,000,000	**9.6**		**16**		9.1	U	7.8	U	**10**	
Benzene	1,200	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Bromodichloromethane	290	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Bromoform	67,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Bromomethane	6,800	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Carbon Disulfide	770,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Carbon Tetrachloride	650	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Chlorobenzene	280,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Chloroethane	14,000,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Chloroform	320	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Chloromethane	110,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
cis-1,2-Dichloroethene	160,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
cis-1,3-Dichloropropene	NE	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Cyclohexane	6,500,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Dibromochloromethane	730	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Dichlorodifluoromethane	87,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Ethyl Benzene	5,800	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Isopropylbenzene	1,900,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
m and/or p-Xylene	560,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Methyl Acetate	78,000,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Methyl tert-butyl ether	47,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Methylcyclohexane	NE	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Methylene Chloride	57,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
o-Xylene	650,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Styrene	6,000,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Tetrachloroethene	24,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Toluene	4,900,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
trans-1,2-Dichloroethene	1,600,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
trans-1,3-Dichloropropene	NE	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Trichloroethene	940	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Trichlorofluoromethane	730,000	4.2	U	4.4	U	4.6	U	3.9	U	4.3	U
Vinyl Chloride	59	4.2	U	4.4	U	4.6	UJ	3.9	U	4.3	U
Total Organic Carbon (percent)	NE	--	--	--	--	--	--	--	--	--	--
DNAPL Screening Result	NE	--	--	--	--	--	--	--	--	--	--

Notes:

Bold values denote detections

Shaded cells denote concentrations in exceedance of the RSL -- = field parameter not collected

DNAPL = dense non-aqueous phase liquid

EPA RSL = U.S. Environmental Protection Agency

Regional Screening level (Nov 2014)

J = estimated value

µg/kg = micrograms per kilogram

NE = No RSL established by EPA

U = Nondetect

UJ = Nondetect; reporting limit is estimated

TABLE 4-2

DPT Soil Sample Results (OU2 PDI) - August 2015

Cleburn Street Well Site
Grand Island, Nebraska

Location	Boring Identification	Sample ID	Sample Depth (ft bgs)	PCE (µg/kg)
North Eddy Street	NE-5	6908-7	17-18	5.1 U
		6908-8	22-23	5.0 U
		6908-9	27-28	4.8 U
		6908-10	32-33	5.5 U
		6908-11	37-38	4.8 U
		6908-12	42-43	4.5 U
North Eddy Street	NE-6	6908-1	22-23	**41**
		6908-2	27-28	**58**
		6908-3	32-33	5.1 U
		6908-4	37-38	7.5 U
		6908-5	42-43	5.0 U
		6908-6	47-48	5.3 U
North Side of TIK All Motors	EF-7	6908-43	22-23	5.1 U
		6908-44	27-28	**44**
		6908-45	32-33	**1,300**
		6908-46	37-38	**1,100**
		6908-47	42-43	**490**
		6908-48	47-48	**17**
Parking Lot North of TIK All Motors	EF-8	6908-31	22-23	**5.7 J**
		6908-32	27-28	**130**
		6908-33	32-33	**91**
		6908-34	37-38	**660 J**
		6908-35	42-43	**17**
		6908-36	47-48	6.5 U
North Side of Parish Thrift Store	EF-12	6908-25	22-23	5.2 U
		6908-26	27-28	5.2 U
		6908-27	32-33	6.1 U
		6908-28	37-38	6.6 U
		6908-29	42-43	9.0 U
		6908-30	47-48	5.1 U
East Side Parish Thrift Store	EF-13	6908-19	22-23	6.2 U
		6908-20	27-28	5.0 U
		6908-21	32-33	5.5 U
		6908-22	37-38	5.1 U
		6908-23	42-43	**22**
		6908-24	47-48	**42**

TABLE 4-2 (Continued)

DPT Soil Sample Results (OU2 PDI)- August 2015
Cleburn Street Well Site
Grand Island, Nebraska

Location	Boring Identification	Sample ID	Sample Depth (ft bgs)	PCE (µg/kg)
East Side of Parish Thrift Store	EF-14	6908-13	22-23	5.8 U
		6908-14	27-28	4.9 U
		6908-15	32-33	5.2 U
		6908-16	37-38	5.0 U
		6908-17	42-43	320 U
		6908-18	47-48	**64 J**
South Side of TIK All Motors	EF-15	6908-37	22-23	5.4 U
		6908-38	27-28	**12**
		6908-39	32-33	**49**
		6908-40	37-38	**35**
		6908-41	42-43	9.1 U
		6908-42	47-48	5.1 U

Notes:

Boldfaced PCE concentration is above the reporting limit.

Shaded PCE concentration exceeds the preliminary remediation goal of 890 µg/kg.

DPT	Direct-push technology
EF	East Frontage—indicates sample location within East Frontage Road or adjacent parking lot
ft bgs	Feet below ground surface
ID	Identification
J	Identification of the analyte is acceptable; the reported value is an estimate.
µg/kg	Micrograms per kilogram
NE	North Eddy—indicates sample location with North Eddy Street
PCE	Tetrachloroethene
TCE	Trichloroethene
U	Analyte not detected at or above the associated reporting limit.

TABLE 4-3

VOC Analytical Results -Groundwater Samples - July 2015 (OU2)

Cleburn Street Well Site

Grand Island, Nebraska

Well Identification	EPA MCL	Cleburn Street Well	MW-2A	MW-8A	MW-9A	MW-12A	MW-13A	MW-101AA	MW-102AA		MW-107AA
Sample Identification	(µg/L)	6840-20	6840-11	6840-22	6840-3	6840-12A	6840-9	6840-14	6840-6	6840-6-FD	Abandoned
Sample Date		7/15/2015	7/14/2015	7/15/2015	7/13/2015	7/14/2015	7/14/2015	7/14/2015	7/14/2014	7/14/2015	
Field Parameters											
Temperature (°Celsius)	NE	16.24	19.50	20.65	20.33	18.33	17.75	18.87	17.69	17.69	
pH	NE	7.11	6.30	6.24	6.37	6.48	6.59	6.22	7.01	7.01	
Specific Conductivity (µS/cm)	NE	774	1,528	678	588	419	822	1,068	4,328	4,328	
Turbidity (NTU)	NE	1.13	5.24	3.02	1.18	2.75	1.63	0.86	1.56	1.56	
Volatile Organic Compounds (µg/L)											
1,1,1-Trichloroethane	200	5.0 U	**17**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,1,2,2-Tetrachloroethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,1,2-Trichloroethane	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,1,2-Trichlorotrifluoroethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,1-Dichloroethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,1-Dichloroethene	7	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,2,3-Trichlorobenzene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,2,4-Trichlorobenzene	70	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,2-Dibromo-3-Chloropropane	0.2	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,2-Dibromoethane	0.05	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,2-Dichlorobenzene	600	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,2-Dichloroethane	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,2-Dichloropropane	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,3-Dichlorobenzene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
1,4-Dichlorobenzene	75	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
2-Butanone	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
2-Hexanone	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
4-Methyl-2-Pentanone	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Acetone	NE	10 U	**12**	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	
Benzene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Bromodichloromethane	80	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Bromoform	80	20 UJ	20 U	20 UJ	20 U	20 U	20 U	20 U	20 U	20 U	
Bromomethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Carbon Disulfide	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Carbon Tetrachloride	5	5.0 U	**59**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Chlorobenzene	100	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Chloroethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Chloroform	80	5.0 U	**5.4**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Chloromethane	NE	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
cis-1,2-Dichloroethene	70	5.0 U	5.0 U	5.0 U	5.0 U	**6.3**	5.0 U	5.0 U	5.0 U	5.0 U	
cis-1,3-Dichloropropene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Cyclohexane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Dibromochloromethane	80	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Dichlorodifluoromethane	NE	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	
Ethyl Benzene	700	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Isopropylbenzene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
m and/or p-Xylene	10,000	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Methyl Acetate	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Methyl tert-butyl ether	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Methylcyclohexane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Methylene Chloride	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Naphthalene	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
o-Xylene	10,000	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Styrene	100	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Tetrachloroethene	5	**140**	**56,000**	5.0 U	5.0 U	**260**	5.0 U	5.0 U	**150**	**140**	
Toluene	1,000	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
trans-1,2-Dichloroethene	100	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
trans-1,3-Dichloropropene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Trichloroethene	5	5.0 U	**23**	5.0 UJ	5.0 U	**120**	5.0 U	5.0 U	**36**	**34**	
Trichlorofluoromethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Vinyl Chloride	2	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	

TABLE 4-3 (Continued)

VOC Analytical Results -Groundwater Samples - July 2015 (OU2)

Cleburn Street Well Site

Grand Island, Nebraska

Well Identification	EPA MCL	MW-2B	MW-8B	MW-102BB	MW-105BB	MW-106BB	MW-107BB	MW-108BB	MW-106CC	ERT-14		ERT-15
Sample Identification	(µg/L)	6840-12	6840-19	6840-5	6840-21	6840-2	6840-1	6840-29	6840-4	6840-17	6840-17-FD	6840-15
Sample Date		7/14/2015	7/15/2015	7/14/2015	7/15/2015	7/13/2015	7/13/2015	7/16/2015	7/13/2015	7/15/2015	7/15/2015	7/15/2015
Field Parameters												
Temperature (°Celsius)	NE	18.58	20.44	17.01	19.26	17.68	18.67	21.07	18.41	16.61	16.61	16.40
pH	NE	6.39	6.49	6.28	6.23	6.32	6.20	6.47	6.49	6.37	6.37	5.98
Specific Conductivity (µS/cm)	NE	611	558	799	1,083	869	843	912	595	467	467	702
Turbidity (NTU)	NE	3.58	2.98	0.84	1.40	2.00	3.14	1.92	0.72	1.22	1.22	0.83
Volatile Organic Compounds (µg/L)												
1,1,1-Trichloroethane	200	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichlorotrifluoroethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	7	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichlorobenzene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	70	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dibromo-3-Chloropropane	0.2	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dibromoethane	0.05	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	600	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	75	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	NE	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	80	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	80	20 U	20 U	20 U	20 UJ	20 U	20 U	20 UJ	20 U	20 U	20 U	20 U
Bromomethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	100	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroform	80	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	70	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Cyclohexane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	80	10 U	10 U	10 U	10 U	10 U	12	10 U	10 U	10 U	10 U	10 U
Dichlorodifluoromethane	NE	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ
Ethyl Benzene	700	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
m and/or p-Xylene	10,000	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	10 U
Methyl Acetate	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert-butyl ether	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylcyclohexane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene Chloride	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Naphthalene	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
o-Xylene	10,000	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	100	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5	890	6.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	8.7	18
Toluene	1,000	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	100	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,3-Dichloropropene	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U
Trichlorofluoromethane	NE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl Chloride	2	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

TABLE 4-3 (Continued)
VOC Analytical Results - Groundwater Samples - July 2015 (OU2)
Cleburn Street Well Site
Grand Island, Nebraska

Well Identification	EPA MCL	DPE-1	DPE-2[1]	DPE-3[1]	DPE-4	IW-1[1]		IW-4[1]	IW-5	IW-6
Sample Identification	(µg/L)	6840-10	6840-23	6840-16	6840-13	6840-30	6840-30-FD	6840-32	6840-28	6840-33
Sample Date		7/14/2015	7/15/2015	7/15/2015	7/14/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015	7/16/2015
Field Parameters										
Temperature (°Celsius)	NE	18.58	17.23	17.59	17.07	17.46	17.46	16.16	17.89	17.26
pH	NE	6.37	9.24	7.40	9.75	6.32	6.32	6.53	6.18	6.42
Specific Conductivity (µS/cm)	NE	2,221	1,056	1,830	1,400	1,743	1,743	2,090	2,006	2,147
Turbidity (NTU)	NE	10.84	11.82	3.48	2.19	10.85	10.85	2.64	1.57	1.79
Volatile Organic Compounds (µg/L)										
1,1,1-Trichloroethane	200	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,1,2-Trichlorotrifluoroethane	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,1-Dichloroethane	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,1-Dichloroethene	7	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,2,3-Trichlorobenzene	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	70	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,2-Dibromo-3-Chloropropane	0.2	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,2-Dibromoethane	0.05	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,2-Dichlorobenzene	600	**5.1**	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,2-Dichloroethane	5	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,2-Dichloropropane	5	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,3-Dichlorobenzene	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
1,4-Dichlorobenzene	75	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
2-Butanone	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
2-Hexanone	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Acetone	NE	5.0 U	100 U	100 U	10 U	100 U	100 U	100 U	5.0 U	10 U
Benzene	5	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Bromodichloromethane	80	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Bromoform	80	5.0 U	200 UJ	200 U	20 U	200 UJ	200 UJ	200 UJ	20 UJ	20 UJ
Bromomethane	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Carbon Disulfide	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Carbon Tetrachloride	5	**130**	50 U	**170**	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Chlorobenzene	100	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Chloroethane	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Chloroform	80	**40**	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Chloromethane	NE	5.0 UJ	50 UJ	50 UJ	5.0 U	50 UJ	50 UJ	50 UJ	5.0 UJ	5.0 UJ
cis-1,2-Dichloroethene	70	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Cyclohexane	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Dibromochloromethane	80	10 U	100 U	100 U	10 U	100 U	100 U	100 U	10 U	10 U
Dichlorodifluoromethane	NE	5.0 UJ	50 UJ	50 UJ	5.0 UJ	50 UJ	50 UJ	50 UJ	5.0 UJ	5.0 UJ
Ethyl Benzene	700	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Isopropylbenzene	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
m and/or p-Xylene	10,000	10 U	100 U	100 U	10 U	100 U	100 U	100 U	10 U	10 U
Methyl Acetate	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Methyl tert-butyl ether	NE	10 U	100 U	100 U	10 U	100 U	100 U	100 U	10 U	10 U
Methylcyclohexane	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Methylene Chloride	5	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Naphthalene	NE	10 U	100 U	100 U	10 U	100 U	100 U	100 U	10 U	10 U
o-Xylene	10,000	5.0	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Styrene	100	5.0	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Tetrachloroethene	5	**61,000**	50 U	**29,000**	**3,400**	**98**	**100**	**4,600**	**31,000**	**30,000 J**
Toluene	1,000	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	100	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
trans-1,3-Dichloropropene	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Trichloroethene	5	5.0 U	50 UJ	50 U	5.0 U	50 UJ	50 UJ	50 UJ	**6.2 J**	5.0 UJ
Trichlorofluoromethane	NE	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U
Vinyl Chloride	2	5.0 U	50 U	50 U	5.0 U	50 U	50 U	50 U	5.0 U	5.0 U

TABLE 4-3 (Continued)
VOC Analytical Results - Groundwater Samples - July 2015 (OU2)
Cleburn Street Well Site
Grand Island, Nebraska

Well Identification	EPA MCL	IW-7	IW-8[1]	IW-9	IW-10[1]		Rinsate	Volatiles Trip Blank	
Sample Identification	(µg/L)	6840-35	6840-27	6840-24	6840-25	6840-25-FD	6840-34	6840-51-FB	6840-52-FB
Sample Date		7/16/2015	7/16/2015	7/15/2015	7/16/2015	7/16/2014	7/16/2015	7/13/2015	7/16/2015
Field Parameters									
Temperature (°Celsius)	NE	16.30	17.30	16.57	16.91	16.91	-	-	-
pH	NE	6.32	6.36	6.04	5.80	5.80	-	-	-
Specific Conductivity (µS/cm)	NE	1,644	1,266	1,439	1,189	1,189	-	-	-
Turbidity (NTU)	NE	5.45	29.1	1.60	7.90	7.90	-	-	-
Volatile Organic Compounds (µg/L)									
1,1,1-Trichloroethane	200	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,1,2-Trichlorotrifluoroethane	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,1-Dichloroethane	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,1-Dichloroethene	7	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,2,3-Trichlorobenzene	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	70	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,2-Dibromo-3-Chloropropane	0.2	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,2-Dibromoethane	0.05	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,2-Dichlorobenzene	600	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,2-Dichloroethane	5	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,2-Dichloropropane	5	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,3-Dichlorobenzene	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
1,4-Dichlorobenzene	75	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
2-Butanone	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
2-Hexanone	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Acetone	NE	10 U	100 U	5.0 U	100 U	100 U	10 U	10 U	10 U
Benzene	5	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Bromodichloromethane	80	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Bromoform	80	20 UJ	200 UJ	20.0 UJ	200 UJ	200 UJ	20 UJ	20 U	20 UJ
Bromomethane	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Carbon Disulfide	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Carbon Tetrachloride	5	**12**	50 U	**84**	**50**	**58**	5 U	5.0 U	5.0 U
Chlorobenzene	100	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Chloroethane	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Chloroform	80	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Chloromethane	NE	5.0 UJ	50 UJ	5.0 U	50 UJ	50 UJ	5 UJ	5.0 UJ	5.0 UJ
cis-1,2-Dichloroethene	70	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Cyclohexane	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Dibromochloromethane	80	10 U	100 U	10 U	100 U	100 U	10 U	10 U	10 U
Dichlorodifluoromethane	NE	5.0 UJ	50 UJ	5.0 UJ	50 UJ	50 UJ	5 UJ	5.0 UJ	5.0 UJ
Ethyl Benzene	700	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Isopropylbenzene	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
m and/or p-Xylene	10,000	10 U	100 U	10 U	100 U	100 U	10 U	10 U	10 U
Methyl Acetate	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Methyl tert-butyl ether	NE	10 U	100 U	10 U	100 U	100 U	10 U	10 U	10 U
Methylcyclohexane	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Methylene Chloride	5	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Naphthalene	NE	10 U	100 U	10 U	100 U	100 U	10 U	10 U	10 U
o-Xylene	10,000	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Styrene	100	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Tetrachloroethene	5	**30,000 J**	**45,000**	**43,000**	**65,000**	**62,000**	5 U	5.0 U	5.0 U
Toluene	1,000	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	100	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
trans-1,3-Dichloropropene	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Trichloroethene	5	5.0 UJ	50 UJ	**6.2 J**	50 UJ	50 UJ	5 UJ	5.0 U	5.0 UJ
Trichlorofluoromethane	NE	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U
Vinyl Chloride	2	5.0 U	50 U	5.0 U	50 U	50 U	5 U	5.0 U	5.0 U

Notes:

[1] Samples were reported at a 10X solution, with reporting limits raised 10X.

Bold values denote detections

Shaded cells denote concentrations in exceedance of the MCL

-- = This analyte was not sampled

°C = degrees Celsius

DPE = dual-phase extraction

EPA MCL = U.S. Environmental Protection Agency Maximum Contaminant Level

ERT = Environmental Response Team

FD = field duplicate

IW = injection well

J = estimated value

µg/L = micrograms per liter

µS/cm = microSiemens per centimeter

mg/L = milligrams per liter

mV = millivolts

MW = monitoring well

NE = No MCL established

NTU = Nephelometric Turbidity Unit

U = not detected

UJ = not detected; reporting limit is estimated

TABLE 4-4

VOC Analytical Results - Groundwater Samples - October 2014 (OU2 PDI)

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification		GW-501-20-24		GW-501-25-29		GW-501-30-34		GW-501-36-40		GW-502-15-19		GW-502-20-24		GW-502-25-29		GW-502-31-35				GW-503-15-19		GW-503-20-24		GW-503-25-29		GW-503-31-35			
Lab Sample Identification	EPA MCL	6584-216		6584-215		6584-214		6584-213		6584-221		6584-220		6584-219		6584-217		6584-217-FD		6584-226		6584-225		6584-224		6584-222		6584-222-FD	
Sample Date		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/6/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/7/2014	
Field Parameters																													
Temperature (°Celsius)	NE	19.08		19.19		18.31		18.37		19.31		17.97		17.25		21.14		21.14		19.20		18.31		17.22		20.16		20.16	
pH	NE	7.05		6.84		6.85		6.98		7.88		6.27		6.79		6.69		6.69		7.31		7.06		6.96		7.16		7.16	
Specific Conductivity (µS/cm)	NE	1,343		2,635		2,375		2,620		4,688		4,688		5,529		5,022		5,022		5,351		5,719		5,100		5,809		5,809	
Turbidity (NTU)	NE	4,068		3,507		Out of Range		3,024		Out of Range		Out of Range		1,885		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range	
Volatile Organic Compounds (µg/L)																													
1,1,1-Trichloroethane	200	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2-Trichloroethane	5	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2-Trichlorotrifluoroethane	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethane	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethene	7	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2,3-Trichlorobenzene	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2,4-Trichlorobenzene	70	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dibromo-3-Chloropropane	0.2	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dibromoethane	0.05	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichlorobenzene	600	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloroethane	5	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloropropane	5	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,3-Dichlorobenzene	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,4-Dichlorobenzene	75	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Butanone	NE	10	U	100	U	400	U	500	U	2,000	U	10,000	U	10,000	U	4,000	U	4,000	U	10	U	10	U	10	U	10	U	10	U
2-Hexanone	NE	10	U	100	U	400	U	500	U	2,000	U	10,000	U	10,000	U	4,000	U	4,000	U	10	U	10	U	10	U	10	U	10	U
4-Methyl-2-Pentanone	NE	10	U	100	U	400	U	500	U	2,000	U	10,000	U	10,000	U	4,000	U	4,000	U	10	U	10	U	10	U	10	U	10	U
Acetone	NE	10	U	100	U	400	U	500	U	2,000	U	10,000	U	10,000	U	4,000	U	4,000	U	10	U	10	U	**15**		10	U	10	U
Benzene	5	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromodichloromethane	80	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromoform	80	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromomethane	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Carbon Disulfide	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Carbon Tetrachloride	5	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chlorobenzene	100	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroethane	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroform	80	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloromethane	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
cis-1,2-Dichloroethene	70	**8.3**		**260**		200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
cis-1,3-Dichloropropene	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Cyclohexane	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Dibromochloromethane	80	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Dichlorodifluoromethane	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Ethyl Benzene	700	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Isopropylbenzene	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m and/or p-Xylene	10,000	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Methyl Acetate	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Methyl tert-butyl ether	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Methylcyclohexane	NE	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Methylene Chloride	5	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
o-Xylene	10,000	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Styrene	100	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Tetrachloroethene	5	**180**		**640**		**2,600**		**6,900**		**21,000**		**110,000**		**77,000**		**36,000**		**40,000**		5.0	U	5.0	U	**5.8**		**8.8**		**8.2**	
Toluene	1,000	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
trans-1,2-Dichloroethene	100	5.0	U	50	U	200	U	250	U	1,000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
trans-1,3-Dichloropropene	NE	5.0	U	50	U	200	U	250	U	1000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichloroethene	5	**13**		**210**		200	U	250	U	1000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichlorofluoromethane	NE	5.0	U	50	U	200	U	250	U	1000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Vinyl Chloride	2	5.0	U	50	U	200	U	250	U	1000	U	5,000	U	5,000	U	2,000	U	2,000	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Total Organic Carbon (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-4 (Continued)

VOC Analytical Results - Groundwater Samples - October 2014 (OU2 PDI)

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification	EPA MCL	GW-504-15-19		GW-504-20-24		GW-504-25-29		GW-504-31-35		GW-505-15-19		GW-505-20-24		GW-505-25-29		GW-505-31-35		GW-506-15-19		GW-506-20-24		GW-506-25-29		GW-506-31-35		GW-507-20-24		GW-507-25-29	
Lab Sample Identification		6584-230		6584-229		6584-228		6584-227		6584-234		6584-233		6584-232		6584-231		6584-238		6584-237		6584-236		6584-235		6584-243		6584-242	
Sample Date		10/7/2014		10/7/2014		10/7/2014		10/7/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014		10/8/2014	
Field Parameters																													
Temperature (°Celsius)	NE	20.49		19.50		17.83		18.78		17.31		16.44		15.97		15.72		18.78		18.76		20.75		19.78		18.20		19.03	
pH	NE	9.34		7.17		6.77		6.77		7.66		6.13		6.33		6.42		7.52		6.51		6.50		6.59		7.10		7.19	
Specific Conductivity (µS/cm)	NE	5,526		4,506		5,547		5,790		443		3,829		3,507		3,494		2,816		4,275		5,529		5,867		4,279		4,279	
Turbidity (NTU)	NE	Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range	
Volatile Organic Compounds (µg/L)																													
1,1,1-Trichloroethane	200	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,1,2,2-Tetrachloroethane	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,1,2-Trichloroethane	5	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,1,2-Trichlorotrifluoroethane	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,1-Dichloroethane	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,1-Dichloroethene	7	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,2,3-Trichlorobenzene	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,2,4-Trichlorobenzene	70	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,2-Dibromo-3-Chloropropane	0.2	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,2-Dibromoethane	0.05	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,2-Dichlorobenzene	600	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,2-Dichloroethane	5	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,2-Dichloropropane	5	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,3-Dichlorobenzene	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
1,4-Dichlorobenzene	75	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
2-Butanone	NE	50	U	50	U	500	U	4,000	U	50	U	100	U	500	U	4,000	U	500	U	5,000	U	2,000	U	1,000	U	100	U	500	U
2-Hexanone	NE	50	U	50	U	500	U	4,000	U	50	U	100	U	500	U	4,000	U	500	U	5,000	U	2,000	U	1,000	U	100	U	500	U
4-Methyl-2-Pentanone	NE	50	U	50	U	500	U	4,000	U	50	U	100	U	500	U	4,000	U	500	U	5,000	U	2,000	U	1,000	U	100	U	500	U
Acetone	NE	50	U	50	U	500	U	4,000	U	50	U	100	U	500	U	4,000	U	500	U	5,000	U	2,000	U	1,000	U	100	U	500	U
Benzene	5	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Bromodichloromethane	80	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Bromoform	80	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Bromomethane	NE	25	U	25	U	250	U	2,000	U	25	UJ	50	U	250	U	2,000	U	250	UJ	2,500	UJ	1,000	UJ	500	UJ	50	UJ	250	UJ
Carbon Disulfide	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Carbon Tetrachloride	5	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Chlorobenzene	100	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Chloroethane	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Chloroform	80	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Chloromethane	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
cis-1,2-Dichloroethene	70	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
cis-1,3-Dichloropropene	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Cyclohexane	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Dibromochloromethane	80	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Dichlorodifluoromethane	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Ethyl Benzene	700	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Isopropylbenzene	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
m and/or p-Xylene	10,000	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Methyl Acetate	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Methyl tert-butyl ether	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Methylcyclohexane	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Methylene Chloride	5	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
o-Xylene	10,000	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Styrene	100	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Tetrachloroethene	5	**890**		**690**		**4,500**		**25,000**		**400**		**1,300**		**5,100**		**37,000**		**7,900**		**67,000**		**26,000**		**14,000**		**890**		**4,000**	
Toluene	1,000	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
trans-1,2-Dichloroethene	100	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
trans-1,3-Dichloropropene	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Trichloroethene	5	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Trichlorofluoromethane	NE	25	U	25	U	250	U	2,000	U	25	U	50	U	250	U	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Vinyl Chloride	2	25	U	25	U	250	U	2,000	U	25	U	50	U	250	UJ	2,000	U	250	U	2,500	U	1,000	U	500	U	50	U	250	U
Total Organic Carbon (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-4 (Continued)

VOC Analytical Results - Groundwater Samples - October 2014 (OU2 PDI)

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification		GW-507-30-34		GW-507-36-40			GW-508-20-24		GW-508-25-29		GW-508-30-34		GW-508-36-40		GW-509-20-24		GW-509-25-29		GW-509-30-34		GW-509-36-40			SB-510-20-24[1]		SB-510-25-29	
Lab Sample Identification	EPA MCL	6584-241		6584-239		6584-239-FD	6584-247		6584-246		6584-245		6584-244		6584-256		6584-255		6584-254		6584-252		6584-252-FD		6584-260		6584-259	
Sample Date		10/8/2014		10/8/2014		10/8/2014	10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/10/2014		10/10/2014		10/10/2014		10/10/2014		10/10/2014		10/11/2014		10/11/2014	
Field Parameters																												
Temperature (°Celsius)	NE	17.63		19.01		19.01	17.20		16.99		17.42		16.77		16.39		16.38		16.16		17.35		17.35		-		16.62	
pH	NE	6.90		6.87		6.87	7.50		7.54		6.75		6.76		5.88		5.99		6.14		6.65		6.65		-		6.91	
Specific Conductivity (µS/cm)	NE	2,321		2,332		2,332	4,986		3,699		2,279		2,541		3,978		3,567		2,400		2,659		2,659		-		4,066	
Turbidity (NTU)	NE	Out of Range		Out of Range		Out of Range	Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		-		Out of Range	
Volatile Organic Compounds (µg/L)																												
1,1,1-Trichloroethane	200	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,1,2,2-Tetrachloroethane	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,1,2-Trichloroethane	5	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,1,2-Trichlorotrifluoroethane	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,1-Dichloroethane	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,1-Dichloroethene	7	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,2,3-Trichlorobenzene	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,2,4-Trichlorobenzene	70	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,2-Dibromo-3-Chloropropane	0.2	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,2-Dibromoethane	0.05	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,2-Dichlorobenzene	600	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,2-Dichloroethane	5	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,2-Dichloropropane	5	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,3-Dichlorobenzene	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
1,4-Dichlorobenzene	75	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
2-Butanone	NE	500	U	10	U	10	U	500	U	100	U	100	U	10	U	1,000	U	4,000	U	4,000	U	2,000	U	4,000	U	20	U	40	U
2-Hexanone	NE	500	U	10	U	10	U	500	U	100	U	100	U	10	U	1,000	U	4,000	U	4,000	U	2,000	U	4,000	U	20	U	40	U
4-Methyl-2-Pentanone	NE	500	U	10	U	10	U	500	U	100	U	100	U	10	U	1,000	U	4,000	U	4,000	U	2,000	U	4,000	U	20	U	40	U
Acetone	NE	500	U	10	U	10	U	500	U	100	U	100	U	11	U	1,000	U	4,000	U	4,000	U	2,000	U	4,000	U	20	U	40	U
Benzene	5	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Bromodichloromethane	80	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Bromoform	80	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Bromomethane	NE	250	UJ	5.0	U	5.0	U	250	U	50	UJ	50	UJ	5.0	UJ	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Carbon Disulfide	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Carbon Tetrachloride	5	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Chlorobenzene	100	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Chloroethane	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Chloroform	80	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Chloromethane	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
cis-1,2-Dichloroethene	70	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
cis-1,3-Dichloropropene	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Cyclohexane	NE	250	U	5.0	U	5.0	U	**420**		**76**		50	U	**11**		500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Dibromochloromethane	80	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Dichlorodifluoromethane	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Ethyl Benzene	700	250	U	5.0	U	5.0	U	**800**		**270**		**240**		**25**		500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Isopropylbenzene	NE	250	U	5.0	U	5.0	U	250	U	**60**		50	U	**9.9**		500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
m and/or p-Xylene	10,000	250	U	5.0	U	5.0	U	**4,300**		**1,300**		**970**		**41**		500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Methyl Acetate	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Methyl tert-butyl ether	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Methylcyclohexane	NE	250	U	**16**		**24**		**1,400**		**120**		**98**		**11**		500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Methylene Chloride	5	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
o-Xylene	10,000	250	U	5.0	U	5.0	U	**2,100**		**550**		50	U	**42**		500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Styrene	100	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Tetrachloroethene	5	**6,800**		**14**		**15**		**780**		**270**		50	U	5.0	U	**13,000**		**59,000**		**53,000**		**33,000**		**36,000**		**240**		**380**	
Toluene	1,000	250	U	5.0	U	5.0	U	**1,800**		**350**		50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
trans-1,2-Dichloroethene	100	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
trans-1,3-Dichloropropene	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Trichloroethene	5	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	**2,100**		2,000	U	1,000	U	2,000	U	10	U	20	U
Trichlorofluoromethane	NE	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	U	2,000	U	1,000	U	2,000	U	10	U	20	U
Vinyl Chloride	2	250	U	5.0	U	5.0	U	250	U	50	U	50	U	5.0	U	500	U	2,000	UJ	2,000	UJ	1,000	U	2,000	U	10	U	20	U
Total Organic Carbon (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-4 (Continued)

VOC Analytical Results - Groundwater Samples - October 2014 (OU2 PDI)

Cleburn Street Well Site
Grand Island, Nebraska

Sample Identification		SB-510-30-34		SB-510-36-40		ASB-512-25-29		ASB-512-30-34		ASB-512-35-39		ASB-512-41-45		ASB-516-25-29		ASB-516-30-34		ASB-516-35-39				ASB-516-41-45		ASB-517-25-29		ASB-517-30-34		ASB-517-35-39	
Lab Sample Identification	EPA MCL	6584-258		6584-257		6584-251		6584-250		6584-249		6584-248		6584-275		6584-274		6584-272		6584-272-FD		6584-271		6584-204		6584-203		6584-202	
Sample Date		10/11/2014		10/11/2014		10/9/2014		10/9/2014		10/9/2014		10/9/2014		10/13/2014		10/13/2014		10/13/2014		10/13/2014		10/13/2014		10/14/2014		10/14/2014		10/14/2014	
Field Parameters																													
Temperature (°Celsius)	NE	16.19		17.07		18.06		18.52		19.39		17.30		18.02		18.66		18.91		18.91		19.08		18.20		17.46		18.30	
pH	NE	7.15		7.23		8.87		6.76		6.57		6.81		9.28		6.53		6.57		6.57		6.99		6.64		6.67		6.49	
Specific Conductivity (µS/cm)	NE	2,501		2,481		3,505		3,199		2,589		2,751		4,807		4,763		2,582		2,582		2,549		3,935		7,223		4,372	
Turbidity (NTU)	NE	Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range	
Volatile Organic Compounds (µg/L)																													
1,1,1-Trichloroethane	200	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1,2-Trichloroethane	5	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1,2-Trichlorotrifluoroethane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1-Dichloroethane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1-Dichloroethene	7	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2,3-Trichlorobenzene	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2,4-Trichlorobenzene	70	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dibromo-3-Chloropropane	0.2	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dibromoethane	0.05	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dichlorobenzene	600	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dichloroethane	5	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dichloropropane	5	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,3-Dichlorobenzene	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,4-Dichlorobenzene	75	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
2-Butanone	NE	50	U	10	U	100	U	2,000	U	50	UJ	10	UJ	100	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U
2-Hexanone	NE	50	U	10	U	100	U	2,000	U	50	UJ	10	UJ	100	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U
4-Methyl-2-Pentanone	NE	50	U	10	U	100	U	2,000	U	50	UJ	10	UJ	100	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U
Acetone	NE	50	U	10	U	100	U	2,000	U	50	UJ	10	UJ	100	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U
Benzene	5	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Bromodichloromethane	80	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Bromoform	80	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Bromomethane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Carbon Disulfide	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Carbon Tetrachloride	5	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Chlorobenzene	100	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Chloroethane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Chloroform	80	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Chloromethane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
cis-1,2-Dichloroethene	70	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
cis-1,3-Dichloropropene	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Cyclohexane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Dibromochloromethane	80	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Dichlorodifluoromethane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Ethyl Benzene	700	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Isopropylbenzene	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
m and/or p-Xylene	10,000	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Methyl Acetate	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Methyl tert-butyl ether	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Methylcyclohexane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Methylene Chloride	5	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
o-Xylene	10,000	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Styrene	100	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Tetrachloroethene	5	**760**		**160**		**1,400**		**17,000**		**630**	J	5.0	UJ	**1,300**		**120**		5.0	U	5.0	U	5.0	U	**260**		5.0	U	5.0	U
Toluene	1,000	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
trans-1,2-Dichloroethene	100	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
trans-1,3-Dichloropropene	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Trichloroethene	5	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Trichlorofluoromethane	NE	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Vinyl Chloride	2	25	U	5.0	U	50	U	1,000	U	25	UJ	5.0	UJ	50	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Total Organic Carbon (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**1.09**		1	U	**1.04**	
Alkalinity (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**154**		**174**		**164**	

TABLE 4-4 (Continued)

VOC Analytical Results - Groundwater Samples - October 2014 (OU2 PDI)

Cleburn Street Well Site

Grand Island, Nebraska

Sample Identification		ASB-517-41-45		ASB-519-25-29		ASB-519-30-34		ASB-519-35-39		ASB-519-41-45		SB-520-20-24		SB-520-25-29		SB-520-30-34				SB-520-36-40		GW-522-20-24		GW-522-25-29		GW-522-30-34		GW-522-36-40			
Lab Sample Identification	EPA MCL	6584-201		6584-270		6584-269		6584-268		6584-267		6584-209		6584-208		6584-206		6584-206-FD		6584-205		6584-266		6584-265		6584-264		6584-262		6584-262-FD	
Sample Date		10/14/2014		10/13/2014		10/13/2014		10/13/2014		10/13/2014		10/15/2014		10/15/2014		10/15/2014		10/15/2014		10/15/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014		10/12/2014	
Field Parameters																															
Temperature (°Celsius)	NE	18.18		17.42		17.45		17.01		17.71		16.77		16.15		16.74		16.74		17.17		16.34		16.11		16.01		16.97		16.97	
pH	NE	6.60		7.84		6.56		6.40		5.48		7.53		7.11		6.78		6.78		6.56		6.71		5.86		6.28		7.10		7.10	
Specific Conductivity (µS/cm)	NE	4,794		3,848		3,409		2,849		2,592		3,447		3,886		2,806		2,806		618		1,969		2,023		2,859		2,808		2,808	
Turbidity (NTU)	NE	Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range		Out of Range	
Volatile Organic Compounds (µg/L)																															
1,1,1-Trichloroethane	200	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1,2-Trichloroethane	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1,2-Trichlorotrifluoroethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1-Dichloroethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,1-Dichloroethene	7	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2,3-Trichlorobenzene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2,4-Trichlorobenzene	70	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dibromo-3-Chloropropane	0.2	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dibromoethane	0.05	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dichlorobenzene	600	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dichloroethane	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,2-Dichloropropane	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,3-Dichlorobenzene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
1,4-Dichlorobenzene	75	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
2-Butanone	NE	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U
2-Hexanone	NE	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U
4-Methyl-2-Pentanone	NE	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U
Acetone	NE	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	20	U	10	U	10	U
Benzene	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Bromodichloromethane	80	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Bromoform	80	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Bromomethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Carbon Disulfide	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Carbon Tetrachloride	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Chlorobenzene	100	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Chloroethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Chloroform	80	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Chloromethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
cis-1,2-Dichloroethene	70	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
cis-1,3-Dichloropropene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Cyclohexane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Dibromochloromethane	80	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Dichlorodifluoromethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Ethyl Benzene	700	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Isopropylbenzene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
m and/or p-Xylene	10,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Methyl Acetate	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Methyl tert-butyl ether	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Methylcyclohexane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Methylene Chloride	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
o-Xylene	10,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Styrene	100	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Tetrachloroethene	5	5.0	U	**6.0**		5.0	U	5.0	U	5.0	U	**30**		**45**		**60**		**45**		**20**		**10**		**10**		**260**		**27**		**28**	
Toluene	1,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
trans-1,2-Dichloroethene	100	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
trans-1,3-Dichloropropene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Trichloroethene	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Trichlorofluoromethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Vinyl Chloride	2	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U
Total Organic Carbon (mg/L)	NE	1	U	--	--	--	--	--	--	--	--	1	U	1	U	1	U	1	U	**1.4**		--	--	--	--	--	--	--	--	--	--
Alkalinity (mg/L)	NE	**125**		--	--	--	--	--	--	--	--	**75.0**		**143**		**159**		**156**		**133**		--	--	--	--	--	--	--	--	--	--

TABLE 4-4 (Continued)
VOC Analytical Results - Groundwater Samples - October 2014 (OU2 PDI)
Cleburn Street Well Site
Grand Island, Nebraska

Sample Identification		GW-523-20-24		GW-523-25-29		GW-523-30-34		GW-523-36-40		Rinsate		Volatiles Trip Blank									
Lab Sample Identification	EPA MCL	6584-279		6584-278		6584-277		6584-276		6584-261		6584-327		6584-328		6584-329		6584-330		6584-331	
Sample Date		10/15/2014		10/15/2014		10/15/2014		10/15/2014		10/11/2014		10/6/2014		10/7/2014		10/9/2014		10/10/2014		10/13/2014	
Field Parameters																					
Temperature (°Celsius)	NE	19.13		18.89		19.87		18.77		-		-		-		-		-		-	
pH	NE	6.87		6.77		6.90		7.09		-		-		-		-		-		-	
Specific Conductivity (µS/cm)	NE	2,794		3,237		2,686		2,613		-		-		-		-		-		-	
Turbidity (NTU)	NE	Out of Range		Out of Range		Out of Range		Out of Range		-		-		-		-		-		-	
Volatile Organic Compounds (µg/L)																					
1,1,1-Trichloroethane	200	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2-Trichloroethane	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2-Trichlorotrifluoroethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethene	7	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2,3-Trichlorobenzene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2,4-Trichlorobenzene	70	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dibromo-3-Chloropropane	0.2	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dibromoethane	0.05	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichlorobenzene	600	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloroethane	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloropropane	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,3-Dichlorobenzene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,4-Dichlorobenzene	75	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Butanone	NE	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Hexanone	NE	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Methyl-2-Pentanone	NE	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Acetone	NE	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzene	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromodichloromethane	80	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromoform	80	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromomethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
Carbon Disulfide	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Carbon Tetrachloride	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chlorobenzene	100	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroform	80	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloromethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
cis-1,2-Dichloroethene	70	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
cis-1,3-Dichloropropene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Cyclohexane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Dibromochloromethane	80	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Dichlorodifluoromethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Ethyl Benzene	700	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Isopropylbenzene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m and/or p-Xylene	10,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Methyl Acetate	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Methyl tert-butyl ether	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Methylcyclohexane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Methylene Chloride	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
o-Xylene	10,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Styrene	100	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Tetrachloroethene	5	5.0	U	**5.9**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Toluene	1,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
trans-1,2-Dichloroethene	100	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
trans-1,3-Dichloropropene	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichloroethene	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichlorofluoromethane	NE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Vinyl Chloride	2	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Total Organic Carbon (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity (mg/L)	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

Field parameters were not collected due to lack of water.

Bold values denote detections

Shaded cells denote concentrations in exceedance of the MCL

-- = field parameter not collected

EPA MCL = U.S. Environmental Protection Agency Maximum Contaminant Level (Nov 2014) J = estimated value

µg/L = micrograms per liter

µS/cm = microSiemens per centimeter

mg/L = milligrams per liter

mV = millivolts

NTU = Nephelometric Turbidity Unit

NE = No MCL established by EPA

U = Nondetect

UJ = Nondetect; reporting limit is estimated

TABLE 4-5

DPT Groundwater Sample Results (OU2 PDI) - August 2015

Cleburn Street Well Site
Grand Island, Nebraska

Location	Boring Identification	Sample ID	Sample Depth (ft bgs)	PCE (µg/L)	
				EPA Lab	ML
North Eddy Street	NE-5	6908-112	15-20	5.0 U	NA
		6908-111	20-25	5.0 U	NA
		6908-110	25-30	5.0 U	NA
		6908-109	30-35	5.0 U	NA
		6908-108	35-40	5.0 U	NA
		6908-107	40-45	5.0 U	NA
North Eddy Street	NE-6	6908-106	20-25	370	NA
		6908-105	25-30	250	NA
		6908-104	30-35	5.0 U	NA
		6908-103	35-40	5.0 U	NA
		6908-102	40-45	5.0 U	NA
		6908-101	45-50	5.0 U	NA
North Side of TIK All Motors	EF-7	6908-152	20-25	4,700	NA
		6908-151	25-30	7,800	NA
		6908-150	30-35	2,000	NA
		6908-149	35-40	6,600	NA
		6908-148	40-45	1,700	NA
		6908-147	45-50	17	NA
Parking Lot North of TIK All Motors	EF-8	6908-142	20-25	590	NA
		6908-141	25-30	1,100	NA
		6908-140	30-35	1,700	NA
		6908-139	35-40	100 J	NA
		6908-138	40-45	30	NA
		6908-137	45-50	5.0 U	NA
North Side of Motor-Car Engineering (Near Overhead Garage Door)	EF-11	6908-162	20-25	220	NA
		6908-161	25-30	150	NA
		6908-160	30-35	890	NA
		6908-159	35-40	4,400	NA
		6908-158	40-45	540	NA
		6908-157	45-50	51	NA
North Side of Parish Thrift Store	EF-12	6908-130	20-25	20	NA
		6908-129	25-30	28	NA
		6908-128	30-35	89	NA
		6908-127	35-40	210	NA
		6908-126	40-45	140	NA
		6908-125	45-50	11	NA
East Side Parish Thrift Store	EF-13	6908-124	20-25	21	NA
		6908-123	25-30	29	NA
		6908-122	30-35	210	NA
		6908-121	35-40	220	NA
		6908-120	40-45	470	NA
		6908-119	45-50	29	NA
East Side of Parish Thrift Store	EF-14	6908-118	20-25	280	NA
		6908-117	25-30	290	NA
		6908-116	30-35	540	NA
		6908-115	35-40	620	NA
		6908-114	40-45	4,600	NA
		6908-113	45-50	2,900	NA

TABLE 4-5 (Continued)

DPT Groundwater Sample Results (OU2 PDI) - August 2015
Cleburn Street Well Site
Grand Island, Nebraska

Location	Boring Identification	Sample ID	Sample Depth (ft bgs)	PCE (µg/L)	
				EPA Lab	ML
South Side of TIK All Motors	EF-15	6908-136	20-25	26	NA
		6908-135	25-30	190 J	NA
		6908-134	30-35	61	NA
		6908-133	35-40	100	NA
		6908-132	40-45	6.0 U	NA
		6908-131	45-50	5.0 U	NA
Parking Lot North of TIK All Motors	EF-16	ML	20-25	NA	15
		ML	25-30	NA	21
		ML	30-35	NA	61
		6908-143/ML	35-40	35	82
		ML	40-45	NA	ND
		ML (Dup)	45-50	NA	ND (ND)
Parking Lot North of TIK All Motors	EF-17	ML	20-25	NA	1,030
		6908-169/ML	25-30	3,000	4,600JE
		6908-170/ML	30-35	1,900	7,100JE
		6908-171/ML	35-40	7,200	13,400JE
		6908-172/ML	40-45	2,700	7,300JE
		ML	45-50	12	NA
Parking Lot North of TIK All Motors	EF-18	ML	20-25	NA	12
		6908-144/ML	25-30	15	6
		ML	30-35	NA	4
		ML	35-40	NA	1
		ML	40-45	NA	ND
		ML	45-50	NA	ND
Parking Lot North of TIK All Motors	EF-19	ML	20-25	NA	49
		ML	25-30	NA	1,680
		6908-146/ML	30-35	620	826
		ML	35-40	NA	2,100
		ML	40-45	NA	30
		ML	45-50	NA	5
Parking Lot North of TIK All Motors	EF-20	6908-153/ML	20-25	660	346
		ML	25-30	NA	1,550
		ML	30-35	NA	256
		ML	35-40	NA	420
		ML	40-45	NA	16
		ML (Dup)	45-50	NA	ND (ND)
North Side of Parish Thrift Store	EF-22	ML	20-25	NA	147
		ML	25-30	NA	332
		ML	30-35	NA	1,440
		ML	35-40	NA	362
		ML	40-45	NA	376
		ML	45-50	NA	8
Alley Extension North of Parish Thrift Store	EF-23	ML	20-25	NA	ND
		ML	25-30	NA	1
		ML	30-35	NA	5
		ML	35-40	NA	12
		ML	40-45	NA	4
		ML	45-50	NA	3

TABLE 4-5 (Continued)

DPT Groundwater Sample Results (OU2 PDI) - August 2015
Cleburn Street Well Site
Grand Island, Nebraska

Location	Boring Identification	Sample ID	Sample Depth (ft bgs)	PCE (µg/L)	
				EPA Lab	ML
Northeast Corner of Parish Thrift Store	EF-24	ML	20-25	NA	2
		ML	25-30	NA	2
		ML	30-35	NA	4
		ML	35-40	NA	12
		6908-145/ML	40-45	13	13
		ML	45-50	NA	4
East Side of Parish Thrift Store	EF-25	ML	20-25	NA	162
		ML	25-30	NA	268
		ML	30-35	NA	950
		ML	35-40	NA	2,480
		ML	40-45	NA	2,660
		ML (Dup)	45-50	NA	2,030 (2,090)
Parking Lot North of TIK All Motors	EF-26	ML	20-25	NA	5,300JE
		6908-154/ML	25-30	14,000	16,300JE
		ML	30-35	NA	4,600JE
		6908-155/ML	35-40	5,000	11,000JE
		ML	40-45	NA	2,300
		ML	45-50	NA	265
Parking Lot North of TIK All Motors	EF-27	ML	20-25	NA	837
		ML	25-30	NA	2,400
		ML	30-35	NA	4,300JE
		6908-156/ML	35-40	5,200	8,000JE
		ML	40-45	NA	55
		ML	45-50	NA	4
Parking Lot North of TIK All Motors	EF-28	ML	20-25	NA	677
		ML	25-30	NA	1,480
		ML	30-35	NA	2,250
		ML	35-40	NA	2,600
		ML	40-45	NA	18
		ML (Dup)	45-50	NA	5 (6)
Parking Lot North of TIK All Motors	EF-29	6908-168	20-25	270	NA
		6908-167	25-30	390	NA
		6908-166	30-35	2,300	NA
		6908-165	35-40	4,700	NA
		6908-164	40-45	11	NA
		6908-163	45-50	7.0 U	NA
Parking Lot North of TIK All Motors	EF-30	ML	20-25	NA	287
		6908-173/ML	25-30	65	194
		ML	30-35	NA	22
		ML	35-40	NA	67
		ML	40-45	NA	7
		ML (Dup)	45-50	NA	ND (ND)
Equipment Rinsate	NA	6908-178	NA	5.0 U	NA
Field Blank	NA	6908-179-FB	NA	5.0 U	NA
Trip Blank	NA	6908-180-FB	NA	5.0 U	NA

TABLE 4-5 (Continued)

DPT Groundwater Sample Results (OU2 PDI) - August 2015
Cleburn Street Well Site
Grand Island, Nebraska

Notes:

Shaded cell indicates PCE concentration at or above 2,000 µg/L.

DPT	Direct-push technology
Dup	Duplicate sample analyzed by mobile laboratory
EF	East Frontage—indicates sample location within East Frontage Road or adjacent parking lot
FB	Field blank
ft bgs	Feet below ground surface
ID	Identification
J	Identification of the analyte is acceptable; the reported value is an estimate.
JE	Mobile laboratory result is an estimate; concentration exceeded the calibration curve
ML	Sample submitted to mobile laboratory
NA	Not applicable
NE	North Eddy—indicates sample location within North Eddy Street
µg/L	Micrograms per liter
PCE	Tetrachloroethene
U	Analyte not detected at or above the associated reporting limit

TABLE 4-6

VOC Analytical Results - Indoor Air Samples - January 2013 (OU2)
Cleburn Street Well Site
Grand Island, Nebraska

Location ID	EPA Residential RSL		IA-1				IA-2		IA-3		IA-4		IA-5		IA-6		AA-1	
Sample Identification			5912-1		5912-1-FD		5912-3		5912-4		5912-5		5912-6		5912-7		5912-8	
Sample Parameters	Carcinogenic SL	Noncarcinogenic SL																
Sample Start Date			1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013	
Sample Start Time			1447		1447		1450		1455		1459		1503		1510		1512	
Sample End Date			1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013	
Sample End Time			1330		1330		1333		1336		1338		1340		1441		1328	
Initial Pressure (in Hg vacuum)			29.0		28.0		27.5		27.0		25.0		29.0		28.0		27.5	
Final Pressure (in Hg vacuum)			8.0		8.0		4.0		3.5		3.0		5.5		3.0		3.0	
Volatile Organic Compounds (µg/m³)																		
1,1,1-Trichloroethane	NE	5,200	2.73	U	2.73	U	2.73	U	2.73	U	2.73	U	2.73	U	2.73	U	2.73	U
1,1,2,2-Tetrachloroethane	0.042	NE	3.43	U	3.43	U	3.43	U	3.43	U	3.43	U	3.43	U	3.43	U	3.43	U
1,1,2-Trichloroethane	0.15	0.21	2.73	U	2.73	U	2.73	U	2.73	U	2.73	U	2.73	U	2.73	U	2.73	U
1,1,2-Trichlorotrifluoroethane	NE	NE	3.83	U	3.83	U	3.83	U	3.83	U	3.83	U	3.83	U	3.83	U	3.83	U
1,1-Dichloroethane	1.5	NE	2.02	U	2.02	U	2.02	U	2.02	U	2.02	U	2.02	U	2.02	U	2.02	U
1,1-Dichloroethene	NE	210	1.98	U	1.98	U	1.98	U	1.98	U	1.98	U	1.98	U	1.98	U	1.98	U
1,2,4-Trichlorobenzene	NE	2.1	3.71	U	3.71	U	3.71	U	3.71	U	3.71	U	3.71	U	3.71	U	3.71	U
1,2,4-Trimethylbenzene	NE	7.3	**5.55**		**5.11**		**4.23**		**3.93**		**3.64**		**3.59**		2.46	U	2.46	U
1,2-Dibromoethane	0.0041	9.4	3.84	U	3.84	U	3.84	U	3.84	U	3.84	U	3.84	U	3.84	U	3.84	U
1,2-Dichlorobenzene	NE	210	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
1,2-Dichloroethane	0.094	7.3	2.02	U	2.02	U	2.02	U	2.02	U	2.02	U	2.02	U	2.02	U	2.02	U
1,2-Dichloropropane	0.24	4.2	2.31	U	2.31	U	2.31	U	2.31	U	2.31	U	2.31	U	2.31	U	2.31	U
1,3,5-Trimethylbenzene	NE	NE	2.46	U	2.46	U	2.46	U	2.46	U	2.46	U	2.46	U	2.46	U	2.46	U
1,3-Dichlorobenzene	NE	NE	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
2-Butanone (Methyl Ethyl Ketone)	NE	5,200	**1.62**		**3.77**		1.47	U	**2.62**		1.47	U	1.47	U	**3.01**		1.47	U
2-Hexanone	NE	31	2.05	U	2.05	U	2.05	U	2.05	U	2.05	U	2.05	U	2.05	U	2.05	U
2-Propanol	NE	7,300	**1140**		**924**		**1260**		**1130**		**985**		**548**		**227**		**1.92**	
4-Methyl-2-Pentanone	NE	3,100	2.05	U	2.05	U	2.05	U	2.05	U	2.05	U	2.05	U	2.05	U	2.05	U
Acetone	NE	32,000	**93.7**		**226**		**58.5**		**69.7**		**44.6**		**26.5**		**61.4**		**6.41**	
Benzene	0.31	31	**1.98**		**1.76**		**2.01**		**2.04**		**2.36**		**2.52**		**0.894**		**0.415**	
Bromodichloromethane	0.066	NE	3.35	U	3.35	U	3.35	U	3.35	U	3.35	U	3.35	U	3.35	U	3.35	U
Bromoform	2.2	NE	5.17	U	5.17	U	5.17	U	5.17	U	5.17	U	5.17	U	5.17	U	5.17	U
Bromomethane	NE	5.2	1.94	U	1.94	U	1.94	U	1.94	U	1.94	U	1.94	U	1.94	U	1.94	U
Carbon Disulfide	NE	730	1.56	U	1.56	U	1.56	U	1.56	U	1.56	U	1.56	U	1.56	U	1.56	U
Carbon Tetrachloride	0.41	100	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U
Chlorobenzene	NE	52	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
Chloroethane	NE	NE	1.32	U	1.32	U	1.32	U	1.32	U	1.32	U	1.32	U	1.32	U	1.32	U
Chloroform	0.11	100	2.44	U	2.44	U	2.44	U	2.44	U	2.44	U	2.44	U	2.44	U	2.44	U
Chloromethane	NE	94	1.03	U	1.03	U	1.03	U	1.03	U	1.03	U	1.03	U	1.03	U	1.03	U
cis-1,2-Dichloroethene	NE	NE	1.98	U	1.98	U	1.98	U	1.98	U	1.98	U	1.98	U	1.98	U	1.98	U
cis-1,3-Dichloropropene	NE	NE	2.27	U	2.27	U	2.27	U	2.27	U	2.27	U	2.27	U	2.27	U	2.27	U
Dibromochloromethane	0.09	NE	4.26	U	4.26	U	4.26	U	4.26	U	4.26	U	4.26	U	4.26	U	4.26	U
Ethyl Benzene	0.97	1,000	2.17	U	2.17	U	2.17	U	2.17	U	2.17	U	2.17	U	2.17	U	2.17	U
Heptane	NE	NE	2.05	U	2.05	U	2.05	U	2.05	U	**2.25**		**2.74**		2.05	U	2.05	U
Hexachlorobutadiene	0.11	NE	5.33	U	5.33	U	5.33	U	5.33	U	5.33	U	5.33	U	5.33	U	5.33	U
Hexane	NE	730	**4.47**		**6.24**		**4.37**		**7.47**		**5.14**		**6.31**		**2.08**		1.76	U
Isopropylbenzene (Cumene)	NE	420	2.46	U	2.46	U	2.46	U	2.46	U	2.46	U	2.46	U	2.46	U	2.46	U
m and/or p-Xylene	NE	100	**5.69**		**5.56**		**5.25**		**6.16**		**6.47**		**8.68**		4.34	U	4.34	U
Methylene Chloride	96	630	8.7	U	**33.2**		8.7	U	**30.4**		8.7	U	8.7	U	8.7	U	8.7	U
Naphthalene	0.072	3.1	2.62	U	2.62	U	2.62	U	2.62	U	2.62	U	**7.55**		2.62	U	2.62	U
o-Xylene	NE	100	2.17	U	2.17	U	2.17	U	2.17	U	2.17	U	**2.56**		2.17	U	2.17	U
Styrene	NE	1,000	2.13	U	2.13	U	2.13	U	2.13	U	2.13	U	2.13	U	2.13	U	2.13	U
Tetrachloroethene	9.4	42	**3.8**		**3.05**		**3.19**		**3.12**		**1.29**		0.41	U	**10.2**		0.41	U
Toluene	NE	5,200	**10.9**		**9.42**		**9.64**		**35.1**		**11.6**		**16**		**21.4**		1.88	U
trans-1,2-Dichloroethene	NE	63	**10.1**		**8.4**		**5.63**		**5.55**		1.98	U	1.98	U	1.98	U	1.98	U
trans-1,3-Dichloropropene	NE	NE	2.27	U	2.27	U	2.27	U	2.27	U	2.27	U	2.27	U	2.27	U	2.27	U
Trichloroethene	0.43	2.1	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
Vinyl Chloride	0.16	100	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U

Notes:

Bold values denote detections

Shaded cells denote concentrations in exceedance of the RSL

µg/m3 - micrograms per cubic meter

--This analyte was not sampled

in Hg vacuum - inches of mercury vacuum

U - Nondetect

NE - No RSL established by EPA

EPA Residential RSL - U.S. Environmental Protection Agency Residential Regional Screening Level for Air (Based on a hazard quotient of 1)

TABLE 4-7
VOC Analytical Results - Subslab Soil
Vapor Samples - January 2013
Cleburn Street Well Site
Grand Island, Nebraska

Location ID	EPA Screening Level[1]	SS-1		SS-2		SS-3			SS-4		SS-5		SS-6		SS-7		SS-8		SS-9		SS-10		SS-11	
Sample Identification		5912-101		5912-101-FD		5912-103		5912-104	5912-104-FD		5912-106		5912-107		5912-108		5912-109		5912-110		5912-111		5912-113		5912-112	
Sample Parameters																									
Sample Start Date		1/23/2013		1/23/2013		1/23/2012		1/23/2013	1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013	
Sample Start Time		1445		1445		1449		1452	1452		1454		1456		1458		1500		1503		1502		1530		1509	
Sample End Date		1/24/2013		1/24/2013		1/24/2013		1/24/2013	1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013	
Sample End Time		1331		1331		1333		1335	1335		1337		1335		1338		1339		1340		1339		1345		1442	
Initial Pressure (in Hg vacuum)		27.5		27.0		27.5		30.0	16.0		30.0		28.5		27.0		26.5		30.0		26.0		10.0		26.0	
Final Pressure (in Hg vacuum)		4.0		5.0		6.0		7.5	15.0		9.0		10.0		16.5		13.0		9.5		1.5		10.0		5.0	
Volatile Organic Compounds ($\mu g/m^3$)																									
1,1,1-Trichloroethane	52000	273	U	273	U	273	U	273 U	27.3	U	109	U	109	U	54.6	U	109	U	273	U	273	U	109	U	273	U
1,1,2,2-Tetrachloroethane	0.42	343	U	343	U	343	U	343 U	34.3	U	137	U	137	U	68.6	U	137	U	343	U	343	U	137	U	343	U
1,1,2-Trichloroethane	1.5	273	U	273	U	273	U	273 U	27.3	U	109	U	109	U	54.6	U	109	U	273	U	273	U	109	U	273	U
1,1,2-Trichlorotrifluoroethane	NE	383	U	383	U	383	U	383 U	38.3	U	153	U	153	U	76.6	U	153	U	383	U	383	U	153	U	383	U
1,1-Dichloroethane	15	202	U	202	U	202	U	202 U	20.2	U	80.8	U	80.8	U	40.4	U	80.8	U	202	U	202	U	80.8	U	202	U
1,1-Dichloroethene	2100	198	U	198	U	198	U	198 U	19.8	U	79.2	U	79.2	U	39.6	U	79.2	U	198	U	198	U	79.2	U	198	U
1,2,4-Trichlorobenzene	21	371	U	371	U	371	U	371 U	37.1	U	148	U	148	U	74.2	U	148	U	371	U	371	U	148	U	371	U
1,2,4-Trimethylbenzene	73	246	U	246	U	246	U	246 U	24.6	U	98.4	U	98.4	U	49.2	U	98.4	U	246	U	246	U	98.4	U	246	U
1,2-Dibromoethane	0.041	384	U	384	U	384	U	384 U	38.4	U	154	U	154	U	76.8	U	154	U	384	U	384	U	154	U	384	U
1,2-Dichlorobenzene	2100	300	U	300	U	300	U	300 U	30	U	120	U	120	U	60	U	120	U	300	U	300	U	120	U	300	U
1,2-Dichloroethane	0.94	202	U	202	U	202	U	202 U	20.2	U	80.8	U	80.8	U	40.4	U	80.8	U	202	U	202	U	80.8	U	202	U
1,2-Dichloropropane	2.4	231	U	231	U	231	U	231 U	23.1	U	92.4	U	92.4	U	46.2	U	92.4	U	231	U	231	U	92.4	U	231	U
1,3,5-Trimethylbenzene	NE	246	U	246	U	246	U	246 U	24.6	U	98.4	U	98.4	U	49.2	U	98.4	U	246	U	246	U	98.4	U	246	U
1,3-Dichlorobenzene	NE	300	U	300	U	300	U	300 U	30	U	120	U	120	U	60	U	120	U	300	U	300	U	120	U	300	U
2-Butanone (Methyl Ethyl Ketone)	52000	147	U	147	U	147	U	147 U	14.7	U	58.8	U	58.8	U	29.4	U	58.8	U	147	U	147	U	58.8	U	147	U
2-Hexanone	310	205	U	205	U	205	U	205 U	20.5	U	82	U	82	U	41	U	82	U	205	U	205	U	82	U	205	U
2-Propanol	73000	123	U	123	U	123	U	**508**	12.3	U	24.6	U	**691**		**441**		49.2	U	**2240000**		**3590**		**103**		**1100**	
4-Methyl-2-Pentanone	31000	205	U	205	U	205	U	205 U	20.5	U	82	U	82	U	41	U	82	U	205	U	205	U	82	U	205	U
Acetone	320000	119	U	119	U	119	U	119 U	11.9	U	47.6	U	47.6	U	23.8	U	47.6	U	119	U	119	U	47.6	U	119	U
Benzene	3.1	160	U	160	U	160	U	160 U	16	U	64	U	64	U	32	U	64	U	160	U	160	U	64	U	160	U
Bromodichloromethane	0.66	335	U	335	U	335	U	335 U	33.5	U	134	U	134	U	67	U	134	U	335	U	335	U	134	U	335	U
Bromoform	22	517	U	517	U	517	U	517 U	51.7	U	207	U	207	U	103	U	207	U	517	U	517	U	207	U	517	U
Bromomethane	52	194	U	194	U	194	U	194 U	19.4	U	77.6	U	77.6	U	38.8	U	77.6	U	194	U	194	U	77.6	U	194	U
Carbon Disulfide	7300	156	U	156	U	156	U	156 U	15.6	U	62.4	U	62.4	U	31.2	U	62.4	U	156	U	156	U	62.4	U	156	U
Carbon Tetrachloride	4.1	314	U	314	U	314	U	314 U	31.4	U	126	U	126	U	62.8	U	126	U	314	U	314	U	126	U	314	U
Chlorobenzene	520	230	U	230	U	230	U	230 U	23	U	92	U	92	U	46	U	92	U	230	U	230	U	92	U	230	U
Chloroethane	NE	132	U	132	U	132	U	132 U	13.2	U	52.8	U	52.8	U	26.4	U	52.8	U	132	U	132	U	52.8	U	132	U
Chloroform	1.1	244	U	244	U	244	U	244 U	**28**		97.6	U	97.6	U	48.8	U	97.6	U	244	U	244	U	97.6	U	**352**	
Chloromethane	940	103	U	103	U	103	U	103 U	10.3	U	41.2	U	41.2	U	20.6	U	41.2	U	103	U	103	U	41.2	U	103	U
cis-1,2-Dichloroethene	NE	198	U	198	U	198	U	198 U	19.8	U	79.2	U	79.2	U	39.6	U	79.2	U	198	U	198	U	79.2	U	198	U
cis-1,3-Dichloropropene	NE	227	U	227	U	227	U	227 U	22.7	U	90.8	U	90.8	U	45.4	U	90.8	U	227	U	227	U	90.8	U	227	U
Dibromochloromethane	0.9	426	U	426	U	426	U	426 U	42.6	U	170	U	170	U	85.2	U	170	U	426	U	426	U	170	U	426	U
Ethyl Benzene	9.7	217	U	217	U	217	U	217 U	21.7	U	86.8	U	86.8	U	43.4	U	86.8	U	217	U	217	U	86.8	U	217	U
Heptane	NE	205	U	205	U	205	U	205 U	20.5	U	82	U	82	U	41	U	82	U	205	U	205	U	82	U	205	U
Hexachlorobutadiene	1.1	533	U	533	U	533	U	533 U	53.3	U	213	U	213	U	107	U	213	U	533	U	533	U	213	U	533	U
Hexane	7300	176	U	176	U	176	U	176 U	17.6	U	70.4	U	70.4	U	35.2	U	70.4	U	176	U	176	U	70.4	U	176	U
Isopropylbenzene	4200	246	U	246	U	246	U	246 U	24.6	U	98.4	U	98.4	U	49.2	U	98.4	U	246	U	246	U	98.4	U	246	U

TABLE 4-7 (Continued)
VOC Analytical Results - Subslab Soil
Vapor Samples - January 2013
Cleburn Street Well Site
Grand Island, Nebraska

Location ID	EPA Screening Level[1]	SS-1		SS-2		SS-3			SS-4		SS-5		SS-6		SS-7		SS-8		SS-9		SS-10		SS-11	
Sample Identification		**5912-101**		**5912-101-FD**		**5912-103**		**5912-104**		**5912-104-FD**	**5912-106**		**5912-107**		**5912-108**		**5912-109**		**5912-110**		**5912-111**		**5912-113**		**5912-112**	
Sample Parameters																								
Sample Start Date		1/23/2013		1/23/2013		1/23/2012		1/23/2013		1/23/2013	1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013		1/23/2013	
Sample Start Time		1445		1445		1449		1452		1452	1454		1456		1458		1500		1503		1502		1530		1509	
Sample End Date		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013	1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013		1/24/2013	
Sample End Time		1331		1331		1333		1335		1335	1337		1335		1338		1339		1340		1339		1345		1442	
Initial Pressure (in Hg vacuum)		27.5		27.0		27.5		30.0		16.0	30.0		28.5		27.0		26.5		30.0		26.0		10.0		26.0	
Final Pressure (in Hg vacuum)		4.0		5.0		6.0		7.5		15.0	9.0		10.0		16.5		13.0		9.5		1.5		10.0		5.0	
Volatile Organic Compounds ($\mu g/m^3$)																								
m and/or p-Xylene	1000	434	U	434	U	434	U	434	U	43.4 U	174	U	174	U	86.8	U	174	U	434	U	434	U	174	U	434	U
Methylene Chloride	960	174	U	174	U	174	U	174	U	17.4 U	69.6	U	69.6	U	34.8	U	69.6	U	174	U	174	U	69.6	U	174	U
Naphthalene	0.72	262	U	262	U	262	U	262	U	26.2 U	105	U	105	U	52.4	U	105	U	262	U	262	U	105	U	262	U
o-Xylene	1000	217	U	217	U	217	U	217	U	21.7 U	86.8	U	86.8	U	43.4	U	86.8	U	217	U	217	U	86.8	U	217	U
Styrene	10000	213	U	213	U	213	U	213	U	21.3 U	85.2	U	85.2	U	42.6	U	85.2	U	213	U	213	U	85.2	U	213	U
Tetrachloroethene	94	**5010**		**5210**		**53600**		**4530**		**4620**	**1490**		**1800**		**1970**		**1530**		339	U	**801**		**2710**		**7610**	
Toluene	52000	188	U	188	U	188	U	188	U	18.8 U	75.2	U	75.2	U	37.6	U	75.2	U	188	U	188	U	75.2	U	188	U
trans-1,2-Dichloroethene	630	198	U	198	U	198	U	198	U	19.8 U	79.2	U	79.2	U	39.6	U	79.2	U	198	U	198	U	79.2	U	198	U
trans-1,3-Dichloropropene	NE	227	U	227	U	227	U	227	U	22.7 U	90.8	U	90.8	U	45.4	U	90.8	U	227	U	227	U	90.8	U	227	U
Trichloroethene	4.3	269	U	269	U	269	U	269	U	26.9 U	108	U	108	U	53.8	U	108	U	269	U	269	U	108	U	269	U
Vinyl Chloride	1.6	128	U	128	U	128	U	128	U	12.8 U	51.2	U	51.2	U	25.6	U	51.2	U	128	U	128	U	51.2	U	128	U

Notes:

Bold values denote detections

Shaded cells denote concentrations in exceedance of the RSL EPA Residential RSL - U.S. Environmental Protection Agency Residential Regional Screening Level for Air

[1] - The screening level for subslab soil vapor samples was directed to be 10 times the residential RSL by EPA.

$\mu g/m^3$ - micrograms per cubic meter

-- - This analyte was not sampled

inHg vacuum - inches of mercury vacuum

U - Nondetect

NE - No RSL established by EPA

TABLE 4-8
Groundwater Results for Tetrachloroethene
Operable Unit 3 - Liberty Cleaners
Cleburn Street Well Superfund Site, Grand Island, Nebraska

Monitoring Well	Screen Interval (ft bgs)	2004 PCE (µg/L)	2008 PCE (µg/L)	2012 PCE (µg/L)	2015 PCE (µg/L)	2018 PCE (µg/L)
Maximum Contaminant Level		5				
MW-1A	14.4 to 29.6	**14**	**12.7 / 12.6**[1]	**49.4**	**10**	**16.4**
MW-1B	76.7 to 86.4	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NS
MW-1C	13 to 28	**49**	**6.04**	4.29 / 3.96[1]	**6.2**	**3**
MW-1D	78.5 to 88.5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NS

Notes:

[1] Duplicate sample result. Concentration in bold exceed the maximum contaminant level.

ft bgs	feet below ground surface
MW	monitoring well
ND	analyte not detected (detection limit)
NS	monitoring well not sampled
PCE	tetrachloroethene
µg/L	microgram per liter

TABLE 4-9
Groundwater Results for Tetrachloroethene
Operable Unit 4 - Ideal Cleaners
Cleburn Street Well Superfund Site, Grand Island, Nebraska

Monitoring Well	Screen Interval (ft bgs)	2004 PCE (µg/L)	2008 PCE (µg/L)	2012 PCE (µg/L)
MCL = 5µg/L		5		
MW-4A	18.4 to 33.6	**6.8 / 6.5**[1]	4.76	ND (1.0)
MW-4C	17.5 to 32.5	ND (1.0)	ND (1.0)	ND (1.0)
MW-4D	85 to 95	ND (1.0)	ND (1.0)	ND (1.0)

Notes:

[1] Duplicate sample result. Concentration in bold exceed the maximum contaminant level.

ft bgs feet below ground surface
MW monitoring well
ND analyte not detected (detection limit)
PCE tetrachloroethene
µg/L microgram per liter
MCL Maximum Contaminant Level

TABLE 4-10
Groundwater Results for Chlorinated Volatile Organic Compounds
Operable Unit 5 - Former Nebraska Solvents (2013-2017)
Cleburn Street Well Superfund Site, Grand Island, Nebraska

Monitoring Well	MWN-1A			MWN-1B			MWN-2		
Screen Interval (ft bgs)	19.1 - 29.1			79.5 - 89.5			19.4 - 29.4		
Analyte	PCE	TCE	cDCE	PCE	TCE	cDCE	PCE	TCE	cDCE
Maximum Contaminant Level	5	5	70	5	5	70	5	5	70
Date									
Jun-13	1.7	0.29J	<1.0	<0.10	<1.0	<1.0	**20**	1.6	47.2
Sep-13	2	0.38J	<0.080	<0.10	<0.17	<0.080	**5.3**	0.40J	12.9
Dec-13	2.7	**5.5**	<0.080	<0.10	<0.17	<0.080	4.9	0.38J	11.2
Mar-14	4.1	**12.5**	<0.080	<0.10	<0.35J	<0.080	4.2	<0.58J	11.3
Jun-14	4.8	**15.8**	<0.080	<0.10	<0.17	<0.080	**9.7**	0.74J	28.8
Sep-14	1.9	<0.50	0.76J	<0.50	0.76J	0.76J	**8**	0.76J	26.8
Mar-15	2.1	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	3.1
Jun-15	2.4	0.28J	<0.080	<0.10	<0.17	<0.080	**7.1**	0.49J	18.9
Sep-15	2	0.17 J	<0.080	<0.10	<0.17	<0.080	1.8	<0.17	1.9
Dec-15	2.3	0.65J	<0.080	<0.10	<0.17	<0.080	**5**	0.39J	10.7
Jun-16	1.9	0.83J	<0.080	<0.10	<0.17	<0.080	4.6	0.39J	9.8
Dec-16	1.1	<0.17J	0.67J	<0.10	<0.17	0.33J	0.73J	<0.17	1.6
Jun-17	1.3	0.28J	<0.080	<0.10	<0.17	<0.080	4.2	0.26J	6.1
Sep-17	0.53J	<0.17	<0.080	<0.10	<0.17	<0.080	0.51J	<0.17	0.17J

TABLE 4-10 (Continued)
Groundwater Results for Chlorinated Volatile Organic Compounds
Operable Unit 5 - Former Nebraska Solvents (2013-2017) Cleburn Street Well
Superfund Site, Grand Island, Nebraska

Monitoring Well	MWN-3A			MWN-3B			MWN-5		
Screen Interval (ft bgs)	75.9 - 85.5			17.4 - 33			19.5 - 29.5		
Analyte	PCE	TCE	cDCE	PCE	TCE	cDCE	PCE	TCE	cDCE
Maximum Contaminant Level	5	5	70	5	5	70	5	5	70
Date									
Jun-13	<1.0	<1.0	<1.0	**11.6**	2.1	1.2	<1.0	<1.0	<1.0
Sep-13	0.17J	<0.17	<0.080	**8.9**	3.8	7.1	1.1	<0.17	<0.080
Dec-13	<0.17	<0.17	<0.080	**10.3**	4.7	6.8	0.88J	<0.17	0.15J
Mar-14	<0.10	<0.27J	<0.080	**10.8**	4.5	6.8	0.60J	<0.30J	<0.080
Jun-14	0.25J	<0.17	0.26J	**13.4**	4.5	7.3	0.80J	<0.17	0.26J
Sep-14	<0.50	<0.50	<0.50	**8.5**	3	3.7	0.55J	<0.50	<0.50
Mar-15	<0.50	<0.50	<0.50	**14.3J**	**6.7J**	9.8J	1.4	<0.50	<0.50
Jun-15	<0.21J	<0.17	<0.080	**21.1**	**9.9**	16.6	1.0J	<0.17	<0.080
Sep-15	0.24J	<0.17	<0.080	**20.2**	**10.1**	19	2.2	<0.17	<0.080
Dec-15	0.23J	<0.17	<0.080	**24.8**	**13.9**	22.6J	1.7	<0.17	<0.080
Jun-16	0.16J	<0.17	<0.080	**55.7**	**31.8**	53.2J	0.99J	<0.17J	<0.080
Dec-16	<0.10	<0.17	<0.080	**32.1**	**17.6**	47.4	2.7	<0.17	<0.080
Jun-17	0.26J	<0.17	<0.080	**69.2**	**49.1**	**106**	2	<0.17J	<0.080
Sep-17	0.84J	<0.17	<0.080	**18.4**	**7.3**	20.5	2.7	<0.17	<0.080

TABLE 4-10 (Continued)
Groundwater Results for Chlorinated Volatile Organic Compounds
Operable Unit 5 - Former Nebraska Solvents (2013-2017) Cleburn Street Well
Superfund Site,Grand Island, Nebraska

Monitoring Well	MWN-6A			MWN-6B			MWN-7		
Screen Interval (ft bgs)	19.2 - 29.2			79.4 - 89.4			19.4 - 29.4		
Analyte	PCE	TCE	cDCE	PCE	TCE	cDCE	PCE	TCE	cDCE
Maximum Contaminant Level	5	5	70	5	5	70	5	5	70
Date									
Jun-13	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**16.5**	0.19J	<1.0
Sep-13	0.24J	<0.17	<0.080	<0.10	<0.17	<0.080	**6.3**	<0.17	<0.080
Dec-13	0.28J	<0.17	<0.080	<0.10	<0.17	<0.080	**5.3**	<0.17	<0.080
Mar-14	0.34J	<0.26J	<0.080	<0.10	<0.26J	<0.080	**5.6**	<0.35J	<0.080
Jun-14	0.43J	<0.17	<0.080	<0.10	<0.17	<0.080	**6.4**	<0.17	<0.080
Sep-14	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**9.1**	<0.50	<0.50
Mar-15	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50
Jun-15	<0.46J	<0.17	<0.080	<0.10	<0.17	<0.080	**5.4**	<0.17	<0.080
Sep-15	0.36J	<0.17	<0.080	<0.10	<0.17	<0.080	**5.6**	<0.17	<0.080
Dec-15	0.41J	<0.17	<0.080	<0.10	<0.17	<0.080	**8.8**	<0.17	<0.080
Jun-16	0.42J	<0.17J	<0.080	<0.10J	<0.17J	<0.080	**13.6**	0.24J	0.42J
Dec-16	0.52J	<0.17	<0.080	<0.10	<0.17	<0.080	3.1	<0.17	<0.080
Jun-17	0.30J	<0.17J	<0.080	<0.10	<0.17J	<0.080	**10.5**	0.23J	0.48J
Sep-17	0.44J	<0.17	<0.080	<0.10J	<0.17J	<0.080J	**8.4**	<0.17	<0.80

TABLE 4-10 (Continued)
Groundwater Results for Chlorinated Volatile Organic Compounds
Operable Unit 5 - Former Nebraska Solvents (2013-2017) Cleburn Street Well
Superfund Site, Grand Island, Nebraska

Monitoring Well	MWN-10A			MWN-10B			MWN-14		
Screen Interval (ft bgs)	19.9 - 29.9			79.4 - 89.4			19.5 - 29.5		
Analyte	PCE	TCE	cDCE	PCE	TCE	cDCE	PCE	TCE	cDCE
Maximum Contaminant Level	5	5	70	5	5	70	5	5	70
Date									
Jun-13	**1140**	**112**	**13700**	<1.0	<1.0	1.6	<1.0	<1.0	<1.0
Sep-13	**1060**	**93.8**	**17700**	0.28J	<0.17	1.7	<0.10	<0.17	<0.080
Dec-13	**804**	**129J**	**28300**	<0.10	<0.17	<0.080	<0.10	<0.17	0.20J
Mar-14	**1080**	<226J	**33900**	<0.10	<0.22J	<0.80	<0.10	<0.30J	<0.80
Jun-14	**859**	**140J**	**28300**	<0.10	<0.17	<0.80	<0.10	<0.17	<0.80
Sep-14	**447**	<125	**20700**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Mar-15	**585**	<125	**24200**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Jun-15	**466**	**75.2**	**14200**	<0.10	<0.17	<0.80	<0.10	<0.17	<0.80
Sep-15	**428**	**59.1J**	**13700**	<0.10	<0.17	<0.80	<0.10	<0.17	<0.80
Dec-15	**371**	**64.7J**	**13600**	<0.10	<0.17	<0.80	<0.10	<0.17	<0.80
Jun-16	**582J**	**81.7J**	**20700J**	<0.10	<0.17	<0.80	<0.10	<0.17	<0.80
Dec-16	**235J**	<42.5	**8430**	<0.10	<0.17	<0.80	<0.10	<0.17	<0.80
Jun-17	**63.7**	<34.0	**8260**	<0.10	<0.17	<0.80	<0.10	<0.17	<0.80
Sep-17	**30.4J**	<8.5	**4130**	<0.10	<0.17	<0.80	<0.10	<0.17	<0.80

Notes:

Where duplicate samples were collected, the higher of the values is presented.
Concentration in bold exceed the maximum contaminant level.
< indicates analyte was not detected above the method detection limit

ft bgs	feet below ground surface
MW	monitoring well
PCE	tetrachloroethene
TCE	trichloroethene
cDCE	cis-1,2-dichloroethene
µg/L	microgram per liter
J	estimated result

TABLE 4-11
Soil Sample Results (OU5)
Cleburn Street Well Superfund Site, Grand Island, NE

Building	Sample ID	Location	Sample Date	Depth (ft bg)	PCE ug/kg	TCE ug/kg	cis-1,2-DCE ug/kg	Vinyl Chloride ug/kg	Ethylbenzene ug/kg	Toluene ug/kg	Xylenes (total) ug/kg
1219 W. North Front St.	SO-1555-SB1-6-7-120926	SB-1	09/26/12	6 - 7	< 4.9	< 4.9	< 4.9	--	< 4.9	< 4.9	< 4.9
1219 W. North Front St.	SO-1555-SB2-6-7-120927	SB-2	09/27/12	6 - 7	< 5.1	< 5.1	< 5.1	--	< 5.1	< 5.1	< 5.1
1219 W. North Front St.	SO-1555-SB2-11.5-12-120927	SB-2	09/27/12	11.5 - 12	10.8	< 4.6	< 4.6	--	< 4.6	< 4.6	< 4.6
1219 W. North Front St.	SO-1555-SB3-7-8-120927	SB-3	09/27/12	7 - 8	< 4.9	< 4.9	< 4.9	--	< 4.9	< 4.9	< 4.9
1219 W. North Front St.	SO-1555-SB3-10-10.5-120927	SB-3	09/27/12	10 - 10.5	< 5.1	< 5.1	< 5.1	--	< 5.1	< 5.1	< 5.1
1219 W. North Front St.	SO-1555-SB3-11.5-12-120927	SB-3	09/27/12	11.5 - 12	< 5.2	< 5.2	< 5.2	--	< 5.2	< 5.2	< 5.2
1219 W. North Front St.	SO-1555-SB4-2-2.5-120927	SB-4	09/27/12	2 - 2.5	**17,500**	99.3	268	--	< 6.0	< 6.0	< 6.0
1219 W. North Front St.	SO-1555-SB4-11.5-12-120927	SB-4	09/27/12	11.5 - 12	< 4.9	< 4.9	< 4.9	--	< 4.9	< 4.9	< 4.9
1219 W. North Front St.	SO-1555-SB5-10.5-11-120927	SB-5	09/27/12	10.5 - 11	< 5.3	< 5.3	< 5.3	--	< 5.3	< 5.3	< 5.3
1219 W. North Front St.	SO-1555-SB5-11.5-12-120927	SB-5	09/27/12	11.5 - 12	16.5	< 4.9	6.5	--	< 4.9	< 4.9	< 4.9
1219 W. North Front St.	SB6(1.5-2)-20130509	SB-6	05/09/13	1.5 - 2	**25,800**	80.9	171	< 2.6	< 2.6	< 2.6	< 2.6
1219 W. North Front St.	SB6(2.5-3)-20130509	SB-6	05/09/13	2.5 - 3	86.3	10.7	18.3	< 2.3	< 2.3	< 2.3	< 2.3
1219 W. North Front St.	SB6(3.5-4)-20130509	SB-6	05/09/13	3.5 - 4	7.1	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
1219 W. North Front St.	SB6(4.5-5)-20130509	SB-6	05/09/13	4.5 - 5	< 2.6 U	< 2.6	< 2.6	< 2.6	< 2.6	< 2.6	< 2.6
1219 W. North Front St.	SB7(1.5-2)-20130509	SB-7	05/09/13	1.5 - 2	**13,500**	113	210	< 3.4	< 3.4	< 3.4	< 3.4
1219 W. North Front St.	SB7(2.5-3)-20130509	SB-7	05/09/13	2.5 - 3	278	32.4	74.8	< 3.8	< 3.8	8.8	< 3.8
1219 W. North Front St.	SB7(3.5-4)-20130509	SB-7	05/09/13	3.5 - 4	223	24.6	47.7	< 4.7	< 4.7	< 4.7	< 4.7
1219 W. North Front St.	SB7(4.5-5)-20130509	SB-7	05/09/13	4.5 - 5	< 2.4 U	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4
1219 W. North Front St.	SB8(1.5-2)-20130509	SB-8	05/09/13	1.5 - 2	**53,800**	95.5	269	< 3.2	< 3.2	< 3.2	< 3.2
1219 W. North Front St.	SB8(2.5-3)-20130509	SB-8	05/09/13	2.5 - 3	48.5 J	7.9 J	17.0 J	2.3 UJ	2.3 UJ	2.3 UJ	2.3 UJ
1219 W. North Front St.	SB8(3.5-4)-20130509	SB-8	05/09/13	3.5 - 4	14.7 J	2.7 J	4.3 J	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
1219 W. North Front St.	SB8(4.5-5)-20130509	SB-8	05/09/13	4.5 - 5	5.8	< 2.6	< 2.6	< 2.6	< 2.6	< 2.6	< 2.6
1219 W. North Front St.	SB9(1.5-2)-20130509	SB-9	05/09/13	1.5 - 2	261	48	65.9	< 3.0	< 3.0	< 3.0	< 3.0
1219 W. North Front St.	SB9(2.5-3)-20130509	SB-9	05/09/13	2.5 - 3	**21,000**	92.8	205	< 3.1	< 3.1	< 3.1	< 3.1
1219 W. North Front St.	SB9(3.5-4)-20130509	SB-9	05/09/13	3.5 - 4	9.5 J	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
1219 W. North Front St.	SB9(4.5-5)-20130509	SB-9	05/09/13	4.5 - 5	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
1219 W. North Front St.	SB10(0.5-1)-20130509	SB-10	05/09/13	0.5 - 1	**14,900**	282	907 J	< 2.6	< 2.6	< 2.6	< 2.6
City Electric Building	SB10(1.5-2)-20130509	SB-10	05/09/13	1.5 - 2	**25,300**	101	279	< 2.6	< 2.6	< 2.6	< 2.6
City Electric Building	SB10(2.5-3)-20130509	SB-10	05/09/13	2.5 - 3	14.4 J	2.7 UJ	3.8 J	2.7 UJ	2.7 UJ	2.7 UJ	2.7 UJ
City Electric Building	SB10(3.5-4)-20130509	SB-10	05/09/13	3.5 - 4	13.9 J	3.9 J	7.7 J	2.3 UJ	2.3 UJ	2.3 UJ	2.3 UJ
City Electric Building	SB10(4.5-5)-20130509	SB-10	05/09/13	4.5 - 5	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
City Electric Building	SB11(1.5-2)-20130509	SB-11	05/09/13	1.5 - 2	**32,600**	83.9	236	< 2.0	< 2.0	< 2.0	< 2.0
City Electric Building	SB11(2.5-3)-20130509	SB-11	05/09/13	2.5 - 3	9.6	< 4.0 U	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
City Electric Building	SB11(3.5-4)-20130509	SB-11	05/09/13	3.5 - 4	20.4	< 3.1	3.9 J	< 3.1	< 3.1	< 3.1	< 3.1
City Electric Building	SB11(4.5-5)-20130509	SB-11	05/09/13	4.5 - 5	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3
City Electric Building	SB12(1.5-2)-20130509	SB-12	05/09/13	1.5 - 2	**24,900**	**1,400**	1,400	< 128	< 128	< 128	< 128
City Electric Building	SB12(2.5-3)-20130509	SB-12	05/09/13	2.5 - 3	8.3	< 2.5	4.5 J	< 2.5	< 2.5	< 2.5	< 2.5
City Electric Building	SB12(3.5-4)-20130509	SB-12	05/09/13	3.5 - 4	18.2	4.3 J	5.7 J	< 2.9	< 2.9	< 2.9	< 2.9
City Electric Building	SB12(4.5-5)-20130509	SB-12	05/09/13	4.5 - 5	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3
City Electric Building	SB13(1.5-2)-20130509	SB-13	05/09/13	1.5 - 2	**16,200**	**1,220**	1,880	< 126	< 126	< 126	< 126
City Electric Building	SB13(2.5-3)-20130509	SB-13	05/09/13	2.5 - 3	33.9	7	12.7	< 3.1	< 3.1	< 3.1	< 3.1
City Electric Building	SB13(3.5-4)-20130509	SB-13	05/09/13	3.5 - 4	23.3	5.6	10.5	< 2.2	< 2.2	< 2.2	< 2.2
City Electric Building	SB13(4.5-5)-20130509	SB-13	05/09/13	4.5 - 5	3.0 J	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3
City Electric Building	SB14(1.5-2)-20130509	SB-14	05/09/13	1.5 - 2	**11,800**	121	246	< 2.8	< 2.8	< 2.8	< 2.8
City Electric Building	SB14(2.5-3)-20130509	SB-14	05/09/13	2.5 - 3	29.2	8.1	17.8	< 2.2	< 2.2	< 2.2	< 2.2
City Electric Building	SB14(3.5-4)-20130509	SB-14	05/09/13	3.5 - 4	5.6 J	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8
City Electric Building	SB14(4.5-5)-20130509	SB-14	05/09/13	4.5 - 5	6.6	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
City Electric Building	SB14(21.5-22)-20130509	SB-14	05/09/13	21.5 - 22	< 2.7	< 2.7	< 2.7	< 2.7	< 2.7	< 2.7	< 2.7
1301 W. North Front St.	GL-SB1(4-4.5)-20130510	GL-SB-1	05/10/13	4 - 4.5	8.8	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4
1301 W. North Front St.	GL-SB1(6-6.5)-20130510	GL-SB-1	05/10/13	6 - 6.5	174	5	9.7	< 2.4	< 2.4	< 2.4	< 2.4
1301 W. North Front St.	GL-SB1(8-8.5)-20130510	GL-SB-1	05/10/13	8 - 8.5	< 2.6	< 2.6	< 2.6	< 2.6	< 2.6	< 2.6	< 2.6
1301 W. North Front St.	GL-SB2(4-4.5)-20130510	GL-SB-2	05/10/13	4 - 4.5	227	7.6	13.6	< 2.4	< 2.4	< 2.4	< 2.4
1301 W. North Front St.	GL-SB2(6-6.5)-20130510	GL-SB-2	05/10/13	6 - 6.5	81	< 2.9	8.2	< 2.9	< 2.9	< 2.9	< 2.9
1301 W. North Front St.	GL-SB2(8-8.5)-20130510	GL-SB-2	05/10/13	8 - 8.5	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4
1301 W. North Front St.	GL-SB3(4-4.5)-20130510	GL-SB-3	05/10/13	4 - 4.5	302	12.1	40.6	< 2.7	< 2.7	< 2.7	< 2.7
1301 W. North Front St.	GL-SB3(6-6.5)-20130510	GL-SB-3	05/10/13	6 - 6.5	165	5.8	30.7	< 2.5	< 2.5	< 2.5	< 2.5
1301 W. North Front St.	GL-SB3(8-8.5)-20130510	GL-SB-3	05/10/13	8 - 8.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
1301 W. North Front St.	GL-SB4(4-4.5)-20130510	GL-SB-4	05/10/13	4 - 4.5	19.9	< 2.1	< 2.1	< 2.1	< 2.1	< 2.1	< 2.1
1301 W. North Front St.	GL-SB4(6-6.5)-20130510	GL-SB-4	05/10/13	6 - 6.5	29.5	< 2.3	2.8 J	< 2.3	< 2.3	< 2.3	< 2.3
1301 W. North Front St.	GL-SB4(8-8.5)-20130510	GL-SB-4	05/10/13	8 - 8.5	7	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8
1301 W. North Front St.	GL-SB5(4-4.5)-20130510	GL-SB-5	05/10/13	4 - 4.5	157	6	24.9	< 2.2	< 2.2	< 2.2	< 2.2
1301 W. North Front St.	GL-SB5(6-6.5)-20130510	GL-SB-5	05/10/13	6 - 6.5	113	3.3 J	14.1	< 3.0	< 3.0	< 3.0	< 3.0
1301 W. North Front St.	GL-SB5(8-8.5)-20130510	GL-SB-5	05/10/13	8 - 8.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
		Risk-Based Soil Cleanup Level Protective of Groundwater:			656	170	3,200	NA	43,200	75,500	S>

Notes:

ft bg: feet below grade

cis-1,2-DCE: cis-1,2-dichloroethylene

PCE: tetrachloroethene

TCE: trichloroethene

ug/kg: micrograms per kilogram

<: analyte was not detected above the method detection limit

J: indicates that analyte concentration is estimated

UJ: not detected, associated reporting limit estimated

/ **##**: parent sample result / duplicate sample result

Bold and shaded: concentration is above the risk-based soil cleanup levels protective of groundwater

S<: Soil cleanup level based on soil/water partitioning and the estimated soil pore water concentrations required to exceed the groundwater MCL as soil pore water leaches to groundwater. However, the calcuated soil pore water concentration required to exceed a groundwater MCL was greater than the chemical solubility. Therefore, it is not possbile to exceed groundwater MCLs for this chemical by leaching from soil to groundwater based on current assumptions and existing subsurface conditions.

--: Not Analyzed

TABLE 4-12
Grab Groundwater Sample Results OU5)
Cleburn Street Well Superfund Site,
Grand Island, NE

Building	Sample ID	Location	Date	Ethylbenzene ug/L	PCE ug/L	TCE ug/L	cis-1,2-DCE ug/L	Vinyl Chloride ug/L	Toluene ug/L	Xylenes (total) ug/L
City Electric building	WG-SB14-20130509	SB-14	05/09/13	< 0.90	**34.3**	1.9 J	**182**	< 0.65	21.9	< 2.1
		Groundwater Remediation Goal (MCLs):		700	5	5	70	2	1,000	10,000

Notes:
ug/L: microgram per liter
<: analyte was not detected above the method detection limit
J: indicates that analyte concentration is estimated
/ ##: parent sample result / duplicate sample result
Bold and shaded: concentration is above the Groundwater Remediation Goal
cis-1,2-DCE: cis-1,2-dichloroethylene
PCE: tetrachloroethene
TCE: trichloroethene
City Electric: 1219 W. North Front Street, Grand Island, NE

TABLE 4-13
Subslab Soil Vapor Sample Results (OU5)
Cleburn Street Well Superfund Site
Grand Island, NE

Building	Sample ID	Location	Date	PCE ug/m^3	TCE ug/m^3	cis-1,2-DCE ug/m^3	Vinyl Chloride ug/m^3	Ethylbenzene ug/m^3	Toluene ug/m^3	m&p-Xylenes ug/m^3	o-Xylene ug/m^3
City Electric Building	GS-1555-SSV1-120926	SSV-1	09/26/12	**208,000**	**17,100**	19,800	--	< 1.6	3.8	4	< 1.6
City Electric Building	GS-1555-SSV2-120926	SSV-2	09/26/12	**229,000**	**31,200**	30,000	--	4.6	12.5	69.5	41.1
City Electric Building	GS-1555-SSV3-120926	SSV-3	09/26/12	**426,000**	**133,000**	63,000	--	< 1.6	3	< 3.2	< 1.6
City Electric Building	GS-1555-SSV4-120926	SSV-4	09/26/12	**105,000**	**30,700**	48,600	--	< 1.6	3.5	< 3.2	< 1.6
City Electric Building	GS-1555-SSV5-120926	SSV-5	09/26/12	**113,000**	**23,200**	45,600	--	2.7	3.4	4.9	2.7
City Electric Building	GS-1555-DUP1-120926	SSV-5	09/26/12	**73,300**	**17,000**	27,600	--	< 1.6	5.3	< 3.3	< 1.6
City Electric Building	SSV6-20130508	SSV-6	05/08/13	408	10.8	3.3	< 0.39	< 0.36	9.9	4.3 J	< 0.39
City Electric Building	SSV7-20130508	SSV-7	05/08/13	**7,870**	**487**	220	< 20.2	< 18.5	< 59.4	< 137	< 19.9
City Electric Building	SSV8-20130508	SSV-8	05/08/13	**64,200**	**1,890**	1,590	< 40.4	< 36.9	316	< 274	< 39.7
City Electric Building	SSV9-20130508 / SSV(DUP1)-20130508	SSV-9	05/08/13	**9,300 J / 3,410 J**	**1,480 J / 799 J**	5,090 J / 1,700 J	< 4.7 / < 37.4	4.3 UJ / 285 J	49.9 J / 514 J	< 31.8 / 388 J	< 4.6 / 728
City Electric Building	SSV10-20130508	SSV-10	05/08/13	**16,500**	**1,450**	924	< 77.8	< 71.2	< 229	< 528	< 76.6
City Electric Building	SSV12-20130508	SSV-12	05/08/13	**30,100**	**3,860**	3,380	< 77.8	< 71.2	< 229	< 528	< 76.6
City Electric Building	SSV13-20130508	SSV-13	05/08/13	**4,850**	**960**	1,250	< 37.4	< 34.3	< 110	< 254	< 36.9
1301 W. North Front St.	GL-SSV1-20130508	GL-SSV-1	05/08/13	**56,600**	**2,290**	1,670	< 0.25	< 0.23	< 0.74	< 1.7	< 0.25
1301 W. North Front St.	GL-SSV2-20130508	GL-SSV-2	05/08/13	**62,600**	**4,640**	2,290	< 323	< 296	< 951	< 2190	< 318
1301 W. North Front St.	GL-SSV3-20130508	GL-SSV-3	05/08/13	**616**	11.6	< 0.30	< 0.25	< 0.23	0.93 J	< 1.7	< 0.25
1301 W. North Front St.	GL-SSV4-20130508 / GL-SSV(DUP1)-20130508	GL-SSV-4	05/08/13	**772,000 J / 254,000 J**	**25,500 J / 11,000 J**	39,500 J / 14,400 J	< 1,200 / < 622	< 1,100 / < 570	< 3,530 / < 1,830	< 8,140 / < 4,230	< 1,180 / < 613
1301 W. North Front St.	GL-SSV5-20130508	GL-SSV-5	05/08/13	**7,950**	**993**	1,170	< 0.26	2.4	8.9	11.4	4.3
		Subslab Vapor Screening Level:		470	30	NA	28	49	220,000	4,400	4,400

Notes:

ug/m^3: micrograms per cubic meter
<: analyte was not detected above the method detection limi
J: indicates that analyte concentration is estimated
UJ: not detected, associated reporting limit estimated
/ ##: parent sample result / duplicate sample resul
Bold values indicate concentrations detected above the subslab vapor screening leve NA: no inhalation toxicity information
cis-1,2-DCE: cis-1,2-dichloroethylene
PCE: tetrachloroethene
TCE: trichloroethene
NA: no inhalation toxicity information

TABLE 4-14
Indoor and Ambient (Outdoor) Air Sample Results (OU5)
Cleburn Street Well Superfund Site
Grand Island, NE

Building	Sample Type	Sample ID	Location	Date	PCE ug/m^3	TCE ug/m^3	cis-1,2-DCE ug/m^3	Vinyl Chloride ug/m^3
City Electric Building	Indoor Air	IA(SSV6)-20130506	SSV-6	05/07/13	13	2.9	< 0.25	< 0.21
City Electric Building	Indoor Air	IA(SSV6)-20130625		06/26/13	8.4	1.7	< 0.39	< 0.33
City Electric Building	Indoor Air	IA(SSV7)-20130506	SSV-7	05/07/13	19.9	**3.7**	1.7 J	< 0.27
City Electric Building	Indoor Air	IA(SSV7)-20130625		06/26/13	8.4	0.79	< 0.26	< 0.22
City Electric Building	Indoor Air	IA(SSV8)-20130506	SSV-8	05/07/13	26.4	**10.6**	4.9 J	< 0.84
City Electric Building	Indoor Air	IA(SSV8)-20130625		06/26/13	**85.7**	**4.8**	5.9	< 0.23
City Electric Building	Indoor Air	IA(SSV9)-20130506 / IA(DUP1)-20130506	SSV-9	05/07/13	20.2 J / 38.7 J	< 1.7 / < 2.0	4.6 J / < 1.1	< 0.81 / < 0.95
City Electric Building	Indoor Air	IA(SSV9)-20130625 / IA(DUP1)-20130625		06/26/13	24.7 / 25.1	**8.4 J / 2.2 J**	2.2 / 2.5	< 0.25 / < 0.21
City Electric Building	Indoor Air	IA(SSV10)-20130506	SSV-10	05/07/13	15.3	**10.3**	< 0.99	< 0.84
City Electric Building	Indoor Air	IA(SSV10)-20130625		06/26/13	7.6	< 0.85	0.53	< 0.40
City Electric Building	Indoor Air	IA(SSV11)-20130506	SSV-11	05/07/13	15.3	**10.0**	< 0.95	< 0.81
City Electric Building	Indoor Air	IA(SSV11)-20130625		06/26/13	20.7	1.1	1.1	< 0.21
City Electric Building (east side)	Ambient (Outdoor) Air	AA1-20130506	AA-1	05/07/13	**93.4**	< 0.61	< 0.34	< 0.29
City Electric Building (east side)	Ambient (Outdoor) Air	AA1-20130625		06/26/13	< 0.56	< 0.44	< 0.25	< 0.21
City Electric Building (north side)	Ambient (Outdoor) Air	AA2-20130506	AA-2	05/07/13	2.4	**3.1**	< 0.25	< 0.21
City Electric Building (north side)	Ambient (Outdoor) Air	AA2-20130625		06/26/13	< 0.58	1.1	< 0.26	< 0.22
City Electric Building (NE of bldg)	Ambient (Outdoor) Air	AA3-20130625	AA-3	06/26/13	32.2	**42**	3.3	< 0.21
1301 W. North Front St.	Indoor Air	IA(MPC1)-20130626	MPC-1	06/27/13	8.8	2.7	< 0.26	< 0.22
1301 W. North Front St.	Indoor Air	IA(MPC2)-20130626	MPC-2	06/27/13	28.5	**5.6**	< 0.24	< 0.20
1315 W. North Front St.	Indoor Air	IA(MPC3)-20130626	MPC-3	06/27/13	15.8	< 0.44	< 0.25	< 0.21
1315 W. North Front St.	Indoor Air	IA(MPC4)-20130626	MPC-4	06/27/13	42.8	2.5	< 0.28	< 0.24
1319 W. North Front St.	Indoor Air	IA(MPC5)-20130626	MPC-5	06/27/13	12.4	< 2.5	< 1.4	< 1.2
1319 W. North Front St.	Indoor Air	IA(MPC6)-20130626 / IA(DUP2)-20130626	MPC-6	06/27/13	6.9 / 6.8	< 0.50 / < 0.41	< 0.28 / < 0.23	< 0.24 / < 0.19
331 N. Jefferson St.	Indoor Air	IA(MPC7)-20130626	MPC-7	06/27/13	1.4	0.45	< 0.24	< 0.20
331 N. Jefferson St.	Indoor Air	IA(MPC8)-20130626	MPC-8	06/27/13	2.5	< 0.52	< 0.29	< 0.25
331 N. Jefferson St. (west side)	Ambient (Outdoor) Air	AA4-20130626	AA-4	06/27/13	< 0.56	< 0.44	< 0.25	< 0.21
1319 W. North Front St. (north side)	Ambient (Outdoor) Air	AA5-20130626	AA-5	06/27/13	< 0.56	< 0.44	< 0.25	< 0.21
			Target Indoor Air Concentration:		47	3	NA	2.8

Notes:

ug/m^3: micrograms per cubic meter
Bold values indicate concentrations detected above the target indoor air concentration NA: no inhalation toxicity information
<: analyte was not detected above the method detection limit
J: indicates that analyte concentration is estimated
/ ##: parent sample result / duplicate sample result
cis-1,2-DCE: cis-1,2-dichloroethylene
PCE: tetrachloroethene
TCE: trichloroethene
NA: no inhalation toxicity information

Table 4-15
Summary of Soil Analytical Results, May 2015 (OU5)
Cleburn Street Well Superfund Site
Grand Island, Nebraska

				PCE	TCE	cis-1,2-DCE
Risk-Based Soil Cleanup Level Protective of Groundwater[a]:				**656**	**170**	**3,200**
Boring ID	**Sample Name**	**Date**	**Depth**	**ug/kg**	**ug/kg**	**ug/kg**
SB-15	SB-15-(1-2)-2015	5/20/2015	1 - 2 ft BGS	16	< 2.6	< 2.6
SB-15	SB-15-(2-3)-2015	5/20/2015	2 - 3 ft BGS	13.1	< 3.4	< 3.4
SB-15	SB-15-(3-4)-2015	5/20/2015	3 - 4 ft BGS	< 2.4	< 2.4	< 2.4
SB-15	SB-15-(4-5)-2015	5/20/2015	4 - 5 ft BGS	< 2.6	< 2.6	< 2.6
SB-16	SB-16-(1-2)-2015	5/20/2015	1 - 2 ft BGS	64.3	5.1	25.4
SB-16	SB-16-(2-3)-2015	5/20/2015	2 - 3 ft BGS	16.4	< 2.7	4.8 J
SB-16	SB-16-(3-4)-2015	5/20/2015	3 - 4 ft BGS	< 2.7	< 2.7	< 2.7
SB-16	SB-16-(4-5)-2015	5/20/2015	4 - 5 ft BGS	< 2.5	< 2.5	< 2.5
SB-17	SB-17-(1-2)-2015	5/20/2015	1 - 2 ft BGS	27.6	2.5 J	9.1
SB-17	SB-17-(2-3)-2015	5/20/2015	2 - 3 ft BGS	< 3.0	< 3.0	< 3.0
SB-17	SB-17-(3-4)-2015	5/20/2015	3 - 4 ft BGS	< 2.5	< 2.5	< 2.5
SB-17	SB-17-(4-5)-2015	5/20/2015	4 - 5 ft BGS	< 2.6	< 2.6	< 2.6
SB-18	SB-18-(1-2)-2015	5/20/2015	1 - 2 ft BGS	63	4.9	15.9
SB-18	SB-18-(2-3)-2015	5/20/2015	2 - 3 ft BGS	143	12.1	102
SB-18	SB-18-(3-4)-2015	5/20/2015	3 - 4 ft BGS	2.5 J	< 2.3	< 2.3
SB-18	SB-18-(4-5)-2015	5/20/2015	4 - 5 ft BGS	< 2.5	< 2.5	< 2.5
SB-19	SB-19-(1-2)-2015	5/20/2015	1 - 2 ft BGS	63.3	4.5 J	31.5
SB-19	SB-19-(2-3)-2015	5/20/2015	2 - 3 ft BGS	7.3	< 2.7	< 2.7
SB-19	SB-19-(3-4)-2015	5/20/2015	3 - 4 ft BGS	3.4 J	< 2.4	< 2.4
SB-19	SB-19-(4-5)-2015	5/20/2015	4 - 5 ft BGS	8.1	< 2.5	< 2.5
SB-20	SB-20-(1-2)-2015	5/19/2015	1 - 2 ft BGS	41.5	5.2 J	39.7
SB-20	SB-20-(2-3)-2015	5/19/2015	2 - 3 ft BGS	2.5 J	< 2.4	< 2.4
SB-20	SB-20-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.5	< 2.5	< 2.5
SB-20	SB-20-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.5	< 2.5	< 2.5
SB-21	SB-21-(1-2)-2015	5/19/2015	1 - 2 ft BGS	< 2.8	< 2.8	< 2.8
SB-21	SB-21-(2-3)-2015	5/19/2015	2 - 3 ft BGS	< 2.5	< 2.5	< 2.5
SB-21	SB-21-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.4	< 2.4	< 2.4
SB-21	SB-21-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.5	< 2.5	< 2.5
SB-22	SB-22-(1-2)-2015	5/19/2015	1 - 2 ft BGS	**15,200**	**2,020**	**4,470**
SB-22	SB-22-(2-3)-2015	5/19/2015	2 - 3 ft BGS	22.5	2.8 J	29.9
SB-22	SB-22-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.3	< 2.3	< 2.3
SB-22	SB-22-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.4	< 2.4	< 2.4
SB-23	SB-23-(1-2)-2015	5/19/2015	1 - 2 ft BGS	**51,500**	72.8	**6,230**
SB-23	SB-23-(2-3)-2015	5/19/2015	2 - 3 ft BGS	24.7	2.8 J	38.7
SB-23	SB-23-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.5	< 2.5	< 2.5
SB-23	SB-23-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.4	< 2.4	< 2.4
SB-24	SB-24-(1-2)-2015	5/19/2015	1 - 2 ft BGS	**2,070**	91.6	234
SB-24	SB-24-(2-3)-2015	5/19/2015	2 - 3 ft BGS	45.1	4.1 J	68.5
SB-24	SB-24-(3-4)-2015	5/19/2015	3 - 4 ft BGS	61.3	5.6 J	107
SB-24	SB-24-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.4	< 2.4	< 2.4
SB-25	SB-25-(1-2)-2015	5/19/2015	1 - 2 ft BGS	**30,300**	**1,410**	1,360
SB-25	SB-25-(2-3)-2015	5/19/2015	2 - 3 ft BGS	105	10.5	96.6
SB-25	SB-25-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.5	< 2.5	< 2.5
SB-25	SB-25-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.5	< 2.5	< 2.5

Table 4-15 (Continued)
Summary of Soil Analytical Results, May 2015 (OU5)
Cleburn Street Well Superfund Site
Grand Island, Nebraska

				PCE	TCE	cis-1,2-DCE
Risk-Based Soil Cleanup Level Protective of Groundwater[a]:				**656**	**170**	**3,200**
Boring ID	**Sample Name**	**Date**	**Depth**	**ug/kg**	**ug/kg**	**ug/kg**
SB-26	SB-26-(1-2)-2015	5/19/2015	1 - 2 ft BGS	**22,000**	**1,050**	2,670
SB-26	SB-26-(2-3)-2015	5/19/2015	2 - 3 ft BGS	254	19.4	175
SB-26	SB-26-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.4	< 2.4	< 2.4
SB-26	SB-26-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.4	< 2.4	< 2.4
SB-27	SB-27-(1-2)-2015	5/19/2015	1 - 2 ft BGS	19.4	< 2.6	15.4
SB-27	SB-27-(2-3)-2015	5/19/2015	2 - 3 ft BGS	< 2.6	< 2.6	< 2.6
SB-27	SB-27-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.4	< 2.4	< 2.4
SB-27	SB-27-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.6	< 2.6	< 2.6
SB-28	SB-28-(1-2)-2015	5/19/2015	1 - 2 ft BGS	20.6	3.3 J	16.5
SB-28	SB-28-(2-3)-2015	5/19/2015	2 - 3 ft BGS	3.7 J	< 2.4	< 2.4
SB-28	SB-28-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.4	< 2.4	< 2.4
SB-28	SB-28-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.4	< 2.4	< 2.4
SB-29	SB-29-(1-2)-2015	5/19/2015	1 - 2 ft BGS	50	< 3.3	< 3.3
SB-29	SB-29-(2-3)-2015	5/19/2015	2 - 3 ft BGS	3.7 J	< 2.2	< 2.2
SB-29	SB-29-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.5	< 2.5	< 2.5
SB-30	SB-30-(1-2)-2015	5/19/2015	1 - 2 ft BGS	< 2.7	< 2.7	< 2.7
SB-30	SB-30-(2-3)-2015	5/19/2015	2 - 3 ft BGS	< 2.3	< 2.3	< 2.3
SB-30	SB-30-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.3	< 2.3	< 2.3
SB-30	SB-30-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.4	< 2.4	< 2.4
SB-31	SB-31-(1-2)-2015	5/19/2015	1 - 2 ft BGS	< 2.4	< 2.4	< 2.4
SB-31	SB-31-(2-3)-2015	5/19/2015	2 - 3 ft BGS	< 2.6	< 2.6	< 2.6
SB-31	SB-31-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.5	< 2.5	< 2.5
SB-31	SB-31-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 3.5	< 3.5	< 3.5
SB-32	SB-32-(1-2)-2015	5/18/2015	1 - 2 ft BGS	< 2.6	< 2.6	< 2.6
SB-32	SB-32-(2-3)-2015	5/18/2015	2 - 3 ft BGS	4.9 J	< 2.6	< 2.6
SB-32	SB-32-(3-4)-2015	5/18/2015	3 - 4 ft BGS	< 2.4	< 2.4	< 2.4
SB-32	SB-32-(4-5)-2015	5/18/2015	4 - 5 ft BGS	< 2.5	< 2.5	< 2.5
SB-33	SB-33-(1-2)-2015	5/19/2015	1 - 2 ft BGS	4.0 J	< 2.4	< 2.4
SB-33	SB-33-(2-3)-2015	5/19/2015	2 - 3 ft BGS	< 2.2	< 2.2	< 2.2
SB-33	SB-33-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.5	< 2.5	< 2.5
SB-33	SB-33-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.5	< 2.5	< 2.5
SB-34	SB-34-(1-2)-2015	5/19/2015	1 - 2 ft BGS	< 2.4	< 2.4	< 2.4
SB-34	SB-34-(2-3)-2015	5/19/2015	2 - 3 ft BGS	< 2.3	< 2.3	< 2.3
SB-34	SB-34-(3-4)-2015	5/19/2015	3 - 4 ft BGS	< 2.6	< 2.6	< 2.6
SB-34	SB-34-(4-5)-2015	5/19/2015	4 - 5 ft BGS	< 2.6	< 2.6	< 2.6
SB-35	SB-35-(1-2)-2015	5/18/2015	1 - 2 ft BGS	3.0 J	< 2.1	< 2.1
SB-35	SB-35-(2-3)-2015	5/18/2015	2 - 3 ft BGS	< 2.3	< 2.3	< 2.3
SB-35	SB-35-(3-4)-2015	5/18/2015	3 - 4 ft BGS	< 2.5	< 2.5	< 2.5
SB-35	SB-35-(4-5)-2015	5/18/2015	4 - 5 ft BGS	< 2.4	< 2.4	< 2.4

Notes:

<: indicates analyte was not detected above the reporting limit

a: Calculations for soil cleanup levels protective of leaching to groundwater (MCLs) were presented in Remedial Design Work Plan prepared by the RETEC Group Inc. on April 11, 2003.

Bold values indicate concentrations above the risk-based soil cleanup levels protective of groundwater

cis-1,2-DCE: cis-1,2-dichloroethylene

Gray shading indicates concentrations detected above the reporting limit

J: indicates that analyte concentration is estimated

PCE: Tetrachloroethylene

TCE: Trichloroethylene

ug/kg: micrograms per kilogram

TABLE 4-16
Summary of Subslab Vapor and Soil Gas Results Analytical Results, SSV-8 and SG-1 (OU5)
Cleburn Street Well Superfund Site
Grand Island, Nebraska

Boring ID	Sample Name	Date	Depth	PCE ug/m^3	TCE ug/m^3	cis-1,2-DCE ug/m^3	Vinyl chloride ug/m^3
SSV-8	SSV8-20130508	5/8/2013	subslab	64,200	1,890	1,590	< 40.4
SG-1	SG1-(10)-2015	5/20/2015	10 ft BGS	137,000	5,450	189,000	< 125
SG-1	SG1-(19)-2015	5/20/2015	19 ft BGS	109,000	6,430	499,000	< 242

Notes:

<: indicates analyte was not detected above the reporting limit cis-1,2-DCE:

cis-1,2-dichloroethylene

ft BGS: feet below ground surface

PCE: Tetrachloroethylene

subslab: sample was collected immediately below the slab

TCE: Trichloroethylene

ug/m^3: micrograms per cubic meter

TABLE 4-17
Indoor and Ambient Air Sample Results for the City Electric Building
Cleburn Street Well Superfund Site
Grand Island, Nebraska

Sample Location	Sample Type	Analyte:	PCE	TCE	PCE	TCE	PCE	TCE
		Industrial Indoor Air Screening Level[1]:	180	8.8	180	8.8	180	8.8
		Units	June 29, 2016		December 14, 2016		June 28, 2017	
IA-CE-1	Indoor Air	µg/m^3	4.5	0.37 U	1.4	0.46 U	0.47 U	0.46 U
IA-CE-2	Indoor Air	µg/m^3	7.5	0.44 U	1.4	0.43 U	0.45 U	0.44 U
IA-CE-3	Indoor Air	µg/m^3	24.5	0.46 U	5.3	0.44 U	0.47 U	0.46 U
IA-CE-4	Indoor Air	µg/m^3	143	0.51 U	3.2 J	0.44 U	0.69 J	0.43 U
IA-CE-4	Indoor Air	µg/m^3	NA	NA	5.3 J	0.44 U	1.2 J	0.43 U
IA-CE-5	Indoor Air	µg/m^3	**246**	0.46 U	4.6	0.44 U	0.45 U	0.44 U
IA-CE-6	Indoor Air	µg/m^3	12.3	0.46 U	6.3	0.92	0.49 U	0.48 U
AA-CE-1	Ambient Air	µg/m^3	2.2	0.46 U	96.4	0.48 U	0.45 U	0.44 U

Notes:

1: United States Environmental Protection Agency (USEPA) Vapor Intrusion Screening (VISL) Calculator, Version 3.5.1, May 2016.

Industiral VISLs based on lower value of Target Cancer Risk Level = 1 x 10^{-5} or Target Non-Cancer Hazard Quotient = 1.

PCE: Tetrechloroethene

TCE: Trichloroethene

bold: detected concentration exceeds industrial VISL

J: Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit or qualified due to variability in field duplicate results

NA: not applicable; location used for duplicate sample

U: not detected above the method detection limit

µg/m^3: microgram per cubic meter

TABLE 4-18
Indoor and Ambient Air Sample Results for the Mid Plains Construction Building
Cleburn Street Well Superfund Site
Grand Island, Nebraska

Sample Location	Sample Type	Analyte:	PCE	TCE	PCE	TCE	PCE	TCE
		Industrial Indoor Air Screening Level[1]:	180	8.8	180	8.8	180	8.8
		Units	June 29, 2016		December 14, 2016		June 28, 2017	
IA-MPC-1	Indoor Air	$\mu g/m^3$	1.1 J	0.97	3.6	0.43 U	0.49 U	0.48 U
IA-MPC-2	Indoor Air	$\mu g/m^3$	0.91 J	1.2	0.43 U	0.47 J	0.45 U	0.44 U
IA-MPC-3	Indoor Air	$\mu g/m^3$	1.4	0.57 J	11.9	0.46 U	0.40 U	0.40 U
IA-MPC-4	Indoor Air	$\mu g/m^3$	0.91 J	0.44 U	67.4	0.47 J	5.6	0.46 U
IA-MPC-5	Indoor Air	$\mu g/m^3$	0.76 J	0.44 U	0.45 U	0.44 U	1.6	0.40 U
IA-MPC-6	Indoor Air	$\mu g/m^3$	0.82 J	0.43 U	0.43 U	0.43 U	2.9	0.46 U
IA-MPC-6	Indoor Air	$\mu g/m^3$	0.45 U	0.44 U	NA	NA	NA	NA
IA-MPC-7	Indoor Air	$\mu g/m^3$	0.73 J	0.46 U	0.43 U	0.43 U	0.49 U	0.48 U
IA-MPC-8	Indoor Air	$\mu g/m^3$	0.60 J	0.44 U	0.41 U	0.41 U	0.45 U	0.44 U
AA-MPC-1	Ambient Air	$\mu g/m^3$	0.45 U	0.44 U	0.40 U	0.40 U	0.75 U	0.74 U

Notes:

1: United States Environmental Protection Agency (USEPA) Vapor Intrusion Screening (VISL) Calculator, Version 3.5.1, May 2016.

Industiral VISLs based on lower value of Target Cancer Risk Level = 1×10^{-5} or Target Non-Cancer Hazard Quotient = 1.

PCE: Tetrechloroethene

TCE: Trichloroethene

bold: detected concentration exceeds industrial VISL

J: Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit or qualified due to variability in field duplicate results

NA: not applicable; location used for duplicate sample

U: not detected above the method detection limit

$\mu g/m^3$: microgram per cubic meter

TABLE 5-1
Changes in Groundwater Remediation (OUs 1-4)
Goals Cleburn Street Well Site
Grand Island, Hall County, Nebraska

Contaminant of Concern	MCL in ROD[1]	Current MCL	Change?
tetrachloroethene	5 µg/L	5 µg/L	NO
trichloroethene	5 µg/L	5 µg/L	NO
carbon tetrachloride	5 µg/L	5 µg/L	NO
chloroform	80 µg/L	80 µg/L[2]	NO

1) OU 1-4 2012 ROD Amendment (USEPA, 2012b).
2) Chloroform itself does not have a MCL, but is part of a group of chemicals called trihalomethanes. They are regulated under 40 CFR 141.64.
ARAR = Applicable or Relevant and Appropriate Requirement
MCL = Federal primary Maximum Contaminant Level
µg/L = micrograms of analyte per liter of water
ROD = Record of Decision

TABLE 5-2

Soil Remediation Goals
2012 ROD Amendment (OU 1 - 4)
Cleburn Street Well Site Grand
Island, Hall County, Nebraska

Contaminant of Concern	2012 ROD Risk-Based Soil Cleanup Level (mg/kg) Protective of Groundwater[1]
tetrachloroethene	0.89
trichloroethene	0.053

Notes:

1. OU 1-4 2012 ROD Amendment Table 5 - "The site-specific cleanup goals for subsurface soil were calculated to derive concentrations that would be protective in preventing a continued release of contamination from the soil to the groundwater to facilitate groundwater cleanup. The soil cleanup goals are 0.89 mg/kg for PCE and 0.053 mg/kg for TCE. Currently, there are no established soil cleanup goals for CCl_4 and $CHCl_3$. Soil remediation goals will be established if CCl_4 and $CHCl_3$ are detected in subsurface soils following future sampling events" (USEPA

The RAOs in the ROD amendment state the protection of industrical workers from soil contact. However, it doesn't included specific soil cleanup levels. The protection of groundwater remedication goals are much lower than those of industrial workers.

ND = not detected
NA = not applicable

TABLE 5-3
Changes in Toxicity
Cleburn Street Well Site
Grand Island, Hall County, Nebraska

Inhalation Unit Risk Values (IUR) for Cancer in ($\mu g/m^3$)-1					
Contaminants	Old IUR*	Source	New IUR	Source	Direction of change
benzene	7.8E-06	I	7.8E-06	I	No change
carbon tetrachloride	6.0E-06	I	6.0E-06	I	No change
Chloroform	2.3E-05	I	2.3E-05	I	No change
ethylbenzene	2.5E-06	C	2.5E-06	C	No change
methylene chloride (dichloromethane)	4.7E-07	C	1.0E-08	I	Less carcinogenic
tetrachloroethene	5.9E-06	C	2.6E-07	I	Less carcinogenic
trichloroethylene	2.0E-06	C	4.1E-06	I	More carcinogenic
vinyl chloride	not evaluated		4.4E-06	I	
Inhalation reference concentration (RfC) (mg/m3)					
Contaminants	Old RfC*	Source	New RfC	Source	Direction of Change
1,1-dichloroethene	not evaluated		2.0E-01	I	Now evaluated
1,1,1-trichloroethane	not evaluated		5.0E+00	I	Now evaluated
1,2,4-trimethyl benzene	7.0E-03	P	6.0E-02	I	Less Toxic
1,3,5-trimethylbenzene	NV	NV	6.0E-02	I	More toxic
4-methyl-2-Pentanone	3.0E+00	A	3.0E+00	P	No change
benzene	3.0E-02	I	3.0E-02	I	No change
carbon tetrachloride	1.0E-01	I	1.0E-01	I	No change
Chloroform	9.8E-02	A	9.8E-02	A	No change
ethylbenzene	1.0E+00	I	1.0E+00	I	No change
methylene chloride (dichloromethane)	1.0E+00	A	6.0E-01	I	More toxic
tetrachloroethene	2.7E-01	A	4.0E-02	I	More toxic
toluene	5.0E+00	I	5.0E+00	I	No change
trichloroethylene	1.0E-02	NYSDSH	2.0E-03	I	More toxic
vinyl chloride	not evaluated		1.0E-01	I	Now evaluated
xylene, total	7.0E-01		1.0E-01	I	More toxic

* The old toxicity values were obtained from the 2011 baseline risk assessment for OUs 1-4.

I - EPA's Integrated Risk Information System (IRIS) http://www.epa.gov/IRIS/ Data retrieved 07/30/2018.
P- EPA's Peer Reviewed Provisional Toxicity Values (PPRTVs) http://hhpprtv.ornl.gov/
A- Agency for Toxic Substances and Disease Registry Minimal Risk Levels
C- California Environmental Protection Agency http://www.oehha.ca.gov/tcdb/index.asp
NV- No relevant toxicity value
NYSDH – New York State Department of Health

Tables 2-1 to 2-4 in the text of the FYR Report identify the COCs applicable to each OU.

Notes:
The chemicals of concern , cis-1,2-dichloroethene and trans-1,2-dichloroethene are not included in this table b they do not have inhalation toxicity data.

4-methyl-2-Pentanone1,1-dichloroethene, 1,1,1-trichloroethane, 1,2,4-trimethyl benzene, 1,3,5-trimethylbenzene, toluene, and xylenes, total are not included in the cancer evaluation portion of this table because they do not have cancer inhalation unit risk toxicity valaues.

TABLE 5-4
Summary Of Current Indoor Air Screening / Action Levels (OU2)
Cleburn Street Well Site
Grand Island, Hall County, Nebraska

Analyte	2013 Carcinogenic Residential Investigation Indoor Air Screening Value (1) ($\mu g/m^3$)	2018 Residential Carcinogenic Screening Value (2) 1E-06 (µg/m3)	2018 Residential Carcinogenic Screening Value (2) 1E-05 (µg/m3)	2018 Residential Carcinogenic Screening Value (2) 1E-04 (µg/m3)	2018 Residential Non-cancer Screening Value (2) THI=1 (µg/m3)	2016 Region VII Guidance Action Level (3) Residential Receptors (µg/m3)
Tetrachloro-ethene	9.4 (4)	11	110	1100	42	NA*
Trichloro-ethene	0.43(5)	0.48	4.8	48	2	2
Analyte	2013 Carcinogenic Worker Investigation Indoor Air Screening Value (1) ($\mu g/m^3$)	2018 Worker Carcinogenic Screening Value (6) 1E-06 (µg/m3)	2018 Worker Carcinogenic Screening Value (6) 1E-05 (µg/m3)	2018 Worker Carcinogenic Screening Value (6) 1E-04 (µg/m3)	2018 Worker non-cancer Screening Value (6) THI=1 (µg/m3)	2016 Region VII Guidance Action Level (3) Commercial Receptors (µg/m3)
Tetrachloro-ethene	Not Included*	47	470	4700	1800	NA*
Trichloro-ethene	Not Included*	3	30	300	2	6

1) USEPA Residential Screening Level for Air - Semiannual Performance Report. HGL. January, 2013.
2) USEPA Residential Screening Level for Air - 2018
3) USEPA Region 7 Action Levels for TCE in Air (Nov., 2016). Assumes 8 hour workday.
4) This value is based on 1E-06 Cancer Risk
5) This value is based on a non-cancer Hazard Quotient of 1.
6) USEPA "Composite Worker" Regional Screening Level for Air - 2018. Assumes 8 hour workday.
NA* This Guidance only addresses TCE
Not Included* Commercial screening values were not listed in the 2013 report.

TABLE 5-5
Changes in Groundwater ARARs
Based on RGs OU5 - 2001 ROD
Cleburn Street Well Site Grand Island, Nebraska

CONTAMINANT OF CONCERN	MCL IN ROD	CURRENT MCL	CHANGE?
tetrachloroethene	5 µg/L	5 µg/L	NO
trichloroethene	5 µg/L	5 µg/L	NO
cis-1,2-dichloroethene	70 µg/L	70 µg/L	NO
xylenes	10,000 µg/L	10,000 µg/L	NO
toluene	1,000 µg/L	1,000 µg/L	NO
ethylbenzene	700 µg/L	700 µg/L	NO
benzene	5 µg/L	5 µg/L	NO
LNAPL Hydrocarbon	Sheen – no observable sheen*	Sheen – no observable sheen*	NO

* NO MCL available. The qualitative sheen assessment is in the OU5 ROD.

ARAR = Applicable or Relevant and Appropriate Requirement
MCL = Federal primary Maximum Contaminant Level
µg/L = micrograms of analyte per liter of water
ROD = Record of Decision

RG = Remediation Goal

TABLE 5-6
Soil Cleanup Goals
OU5 2009 ROD Amendment [1]
Cleburn Street Well Site
Grand Island, Hall County, Nebraska

Contaminant of Concern	Risk-Based Soil Cleanup Level (mg/kg) Protective of Groundwater[2]
1,1,1-trichloroethane	28.1
1,1-dichloroethene	0.0006
1,2,4-trimethylbenzene	11.1
1,3,5-trimethylbenzene	6.9
benzene	0.2
cis-1,2-dichloroethene (cis-dce)	3.2
ethylbenzene	43.2
methylene chloride	0.37
tetrachloroethene	0.656
toluene	75.5
trans-1,2-dichloroethene	3.6
trichloroethene	0.17
vinyl chloride	0.12
xylenes	S<

Notes:

1. Source of Table: OU5 ROD Amendment Table 1

2. Calculations for soil cleanup levels protective of leaching to groundwater (MCLs) presented in RD Work Plan (RETEC, 2003)

ND = not detected

NA = not applicable

S< = Soil cleanup level was based on soil/water partitioning and the estimated soil pore water concentrations required to exceed the groundwater MCL as soil pore water leaches to groundwater. However, the calculated soil pore water concentration required to exceed a groundwater MCL was greater than the chemical solubility. Therefore, it is not possible to exceed groundwater MCLs for this chemical by leaching from soil to groundwater based on current assumptions and existing subsurface conditions.

TABLE 5-7
Comparison of Vapor Screening Levels (OU5)
Cleburn Street Well Site
Grand Island, Nebraska

Contaminant	2015 Residential Indoor Air Evaluation Level COC VISL µg/m (a)	Toxicity Basis	Current Residential Indoor Air Evaluation Level COPC VISL (b)	Toxicity Basis	Direction of change
tetrachloroethene	48	NC	42	NC	Slightly lower
trichloroethene	2.0	NC	2.0	NC	No change
vinyl chloride	1.7	C	1.7	CA	No change

Contaminant	2015 Residential Subslab / Soil Vapor Evaluation Level COC VISL µg/m^3 (a)	Toxicity Basis	Current Residential Subslab / Soil Vapor Evaluation Level COPC VISL (b)	Toxicity Basis	Direction of change
Tetrachloroethene	1400	NC	1390	NC	Slightly Lower
Trichloroethene	67	NC	67	NC	No change
vinyl chloride	57	C	57	C	No change

Contaminant	2015 Residential Groundwater Vapor Evaluation Level COC VISL µg/L (a)	Toxicity Basis	Current Residential Groundwater Vapor Evaluation Level COC VISL µg/L (b)	Toxicity Basis	Direction of change
Tetrachloroethene	100	NC	98	NC	Slightly Lower
Trichloroethene	8	NC	8	NC	No change
vinyl chloride	2	C	2	C	No change

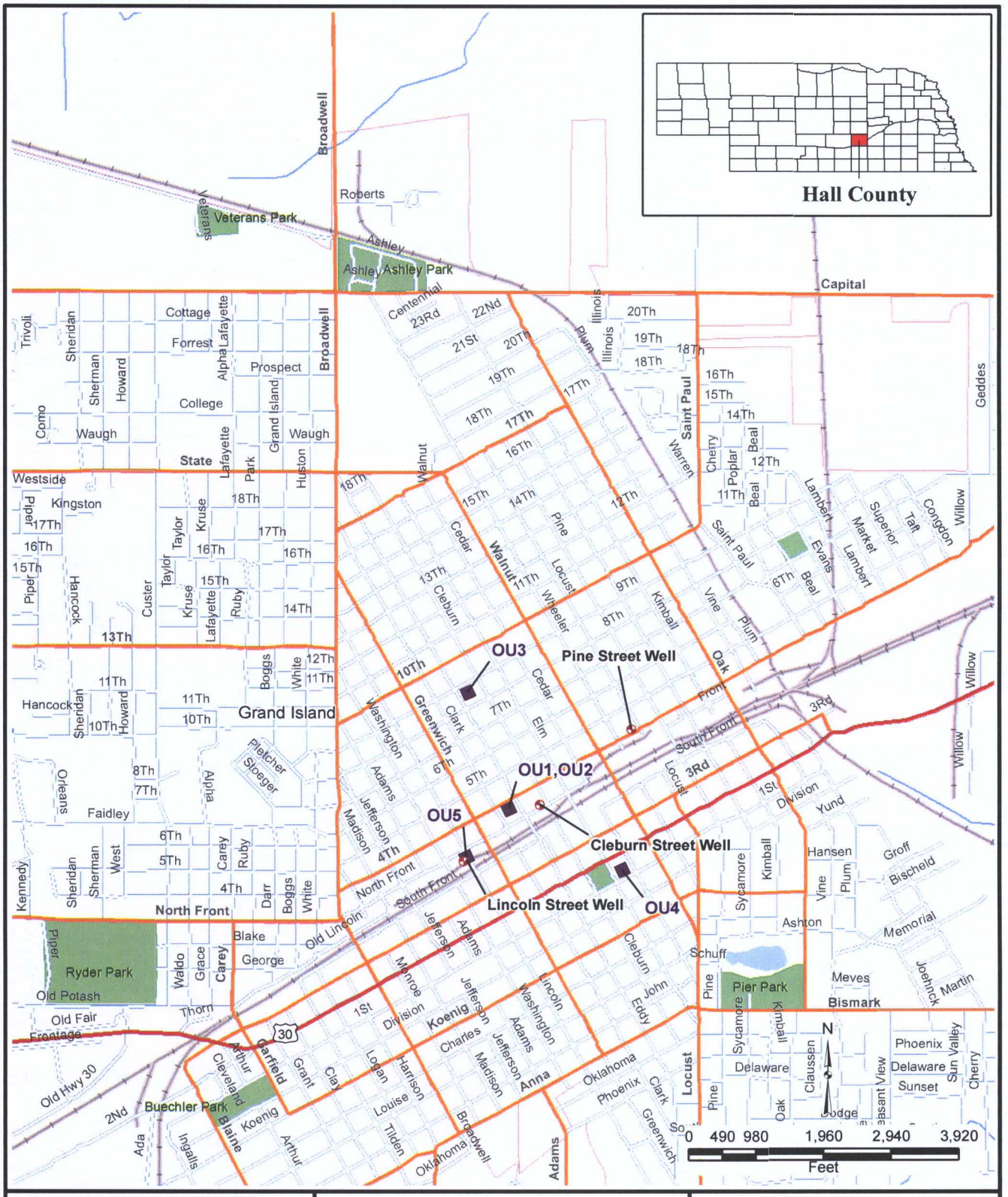
COC OU5 Contaminant of Concern *cis*-1,2-dichloroethylene, is identified as an OU5 COC, butthere is no applicable inhalation toxicity values available.

VISL = Vapor Intrusion Screening Level.
NC= Non-cancer hazard quotient = 1
C = Carcinogenic endpoint Value based on excess risk = 1 x 10-5

(a) Value described in the Shallow impacted soil and residential VI Summary (CH2M HILL, 2015e). EPA, 2015. June 2015 Vapor Intrusion Screening Level Calculator. URL : http://www.epa.gov/oswer/vaporintrusion/guidance.html#Item6 Based on 1 x 10^{-5} and HA=1. Groundwater Temperature based on 16 degrees C from 2014 sampling results.

(b) EPA VISL Calculator retrieved online 04/06/2018 from https://epa-visl.ornl.gov/cgi-bin/visl_search Based on 1 x 10-5 and HA=1. Groundwater Temperature based on 16 degrees C from 2014 sampling results.

Appendix G
Figures



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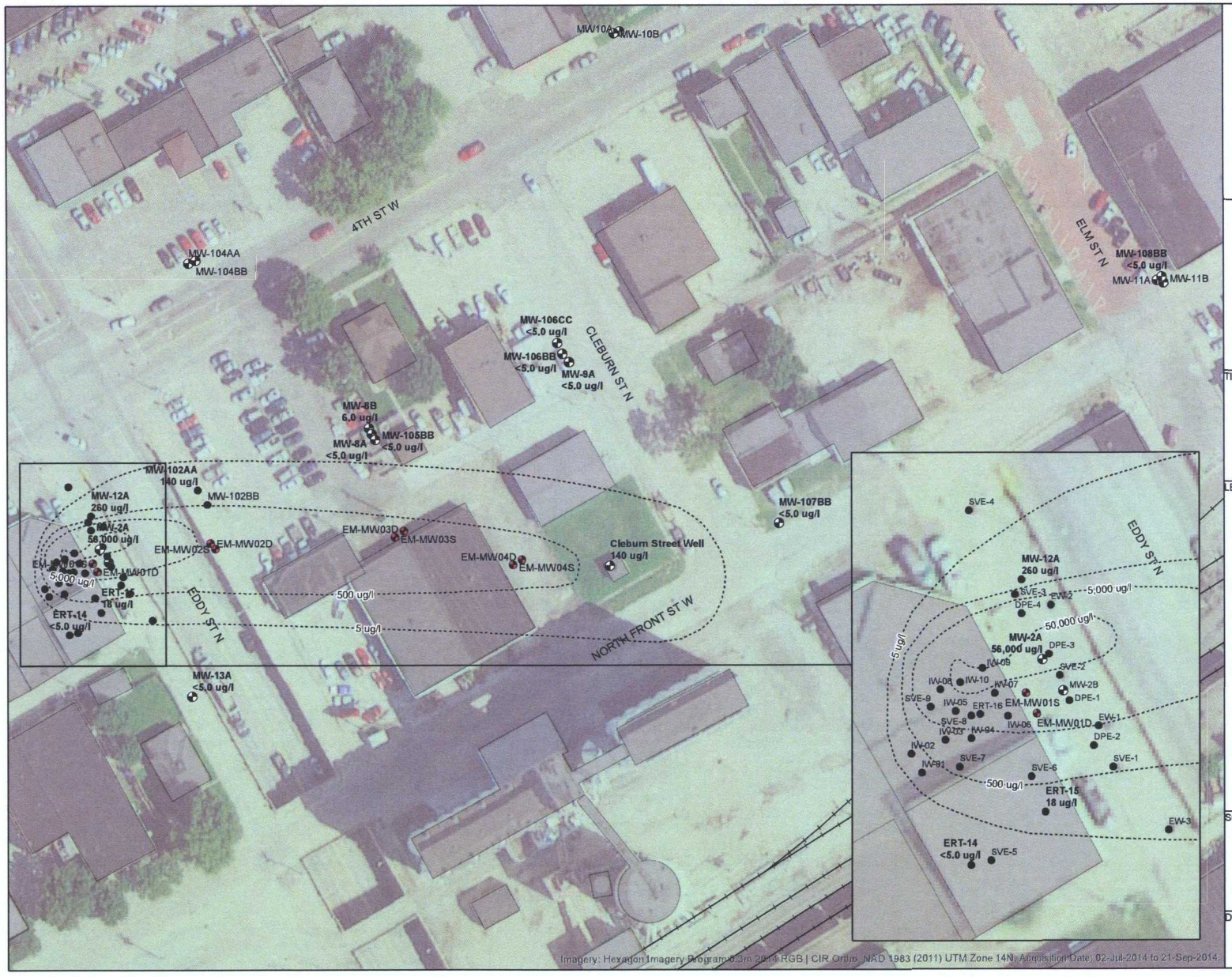
Project: EP9019.11.42.03
Revised: 04/06/11 RL
Source: ESRI StreetMap North America

Legend

- Municipal Well
- Operable Unit

Figure 1-1
Site Location Map
Cleburn Street Well Site

U.S. EPA Region 7



CLEBURN STREET WELL
SUPERFUND SITE
OPERABLE UNIT 2

GRAND ISLAND, NEBRASKA

40.925175°, -98.348697°

MONITORING WELLS
AND
GROUNDWATER PCE
CONTAMINANT PLUME (2015)

TITLE:

LEGEND:

- Existing Well
- Existing Well Scheduled for Abandonment
- Proposed Monitoring Well
- PCE Concentration Isopleth
- Building
- Railroad

SCALE: 1:800

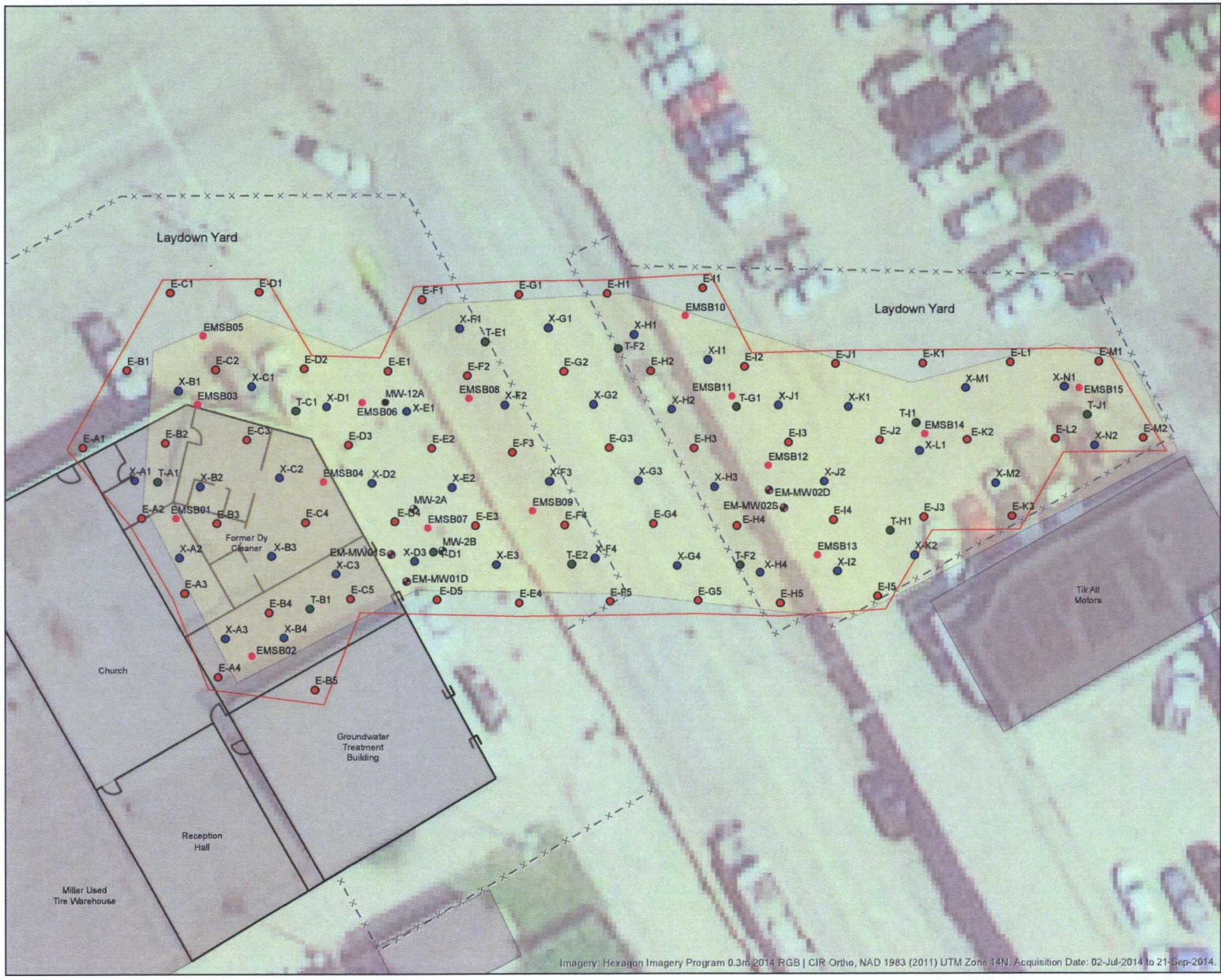
N

0 50 100

Feet

NAD 1983 StatePlane Nebraska FIPS 2600 Feet

DRN/MOD BY:	DATE:	FIGURE:
ADS	2/9/2018	2-1
	REV: N/A	



CLEBURN STREET WELL
SUPERFUND SITE
OPERABLE UNIT 2

GRAND ISLAND, NEBRASKA

40.925175°, -98.348697°

PROPOSED IN-SITU
THERMAL REMEDIATION SYSTEM
WELL FIELD LAYOUT
AND
CONFIRMATION SOIL SAMPLE
BOREHOLES

TITLE:

LEGEND:

- ET-DSP ™ Electrode
- Extraction Well Boring
- Sensor Well
- Proposed Confirmation Soil Sample Borehole
- Proposed Monitoring Well
- Existing Monitoring Well
- Existing Well Scheduled for Abandonment
- Fencing
- Thermal Influence
- Thermal Treatment Zone
- Building
- Building Walls

SCALE: 1:250

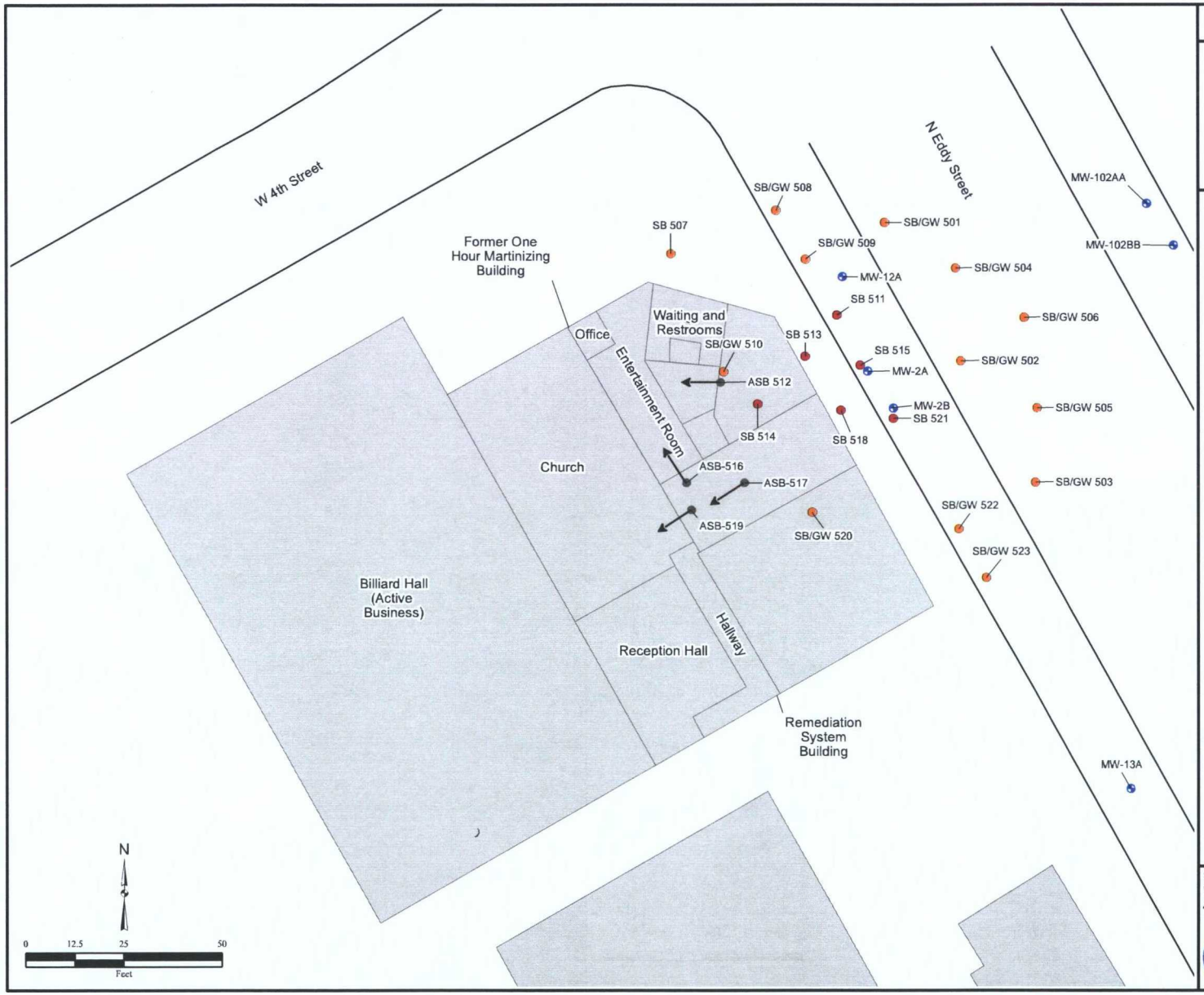
N

0 20 40

Feet

NAD 1983 StatePlane Nebraska FIPS 2600 Feet

DRN/MOD BY:	DATE:	FIGURE:
ADS	2/6/2018	2-2
	REV: N/A	



HGL—Data Summary Report
Cleburn Street Well Site, Grand Island, NE

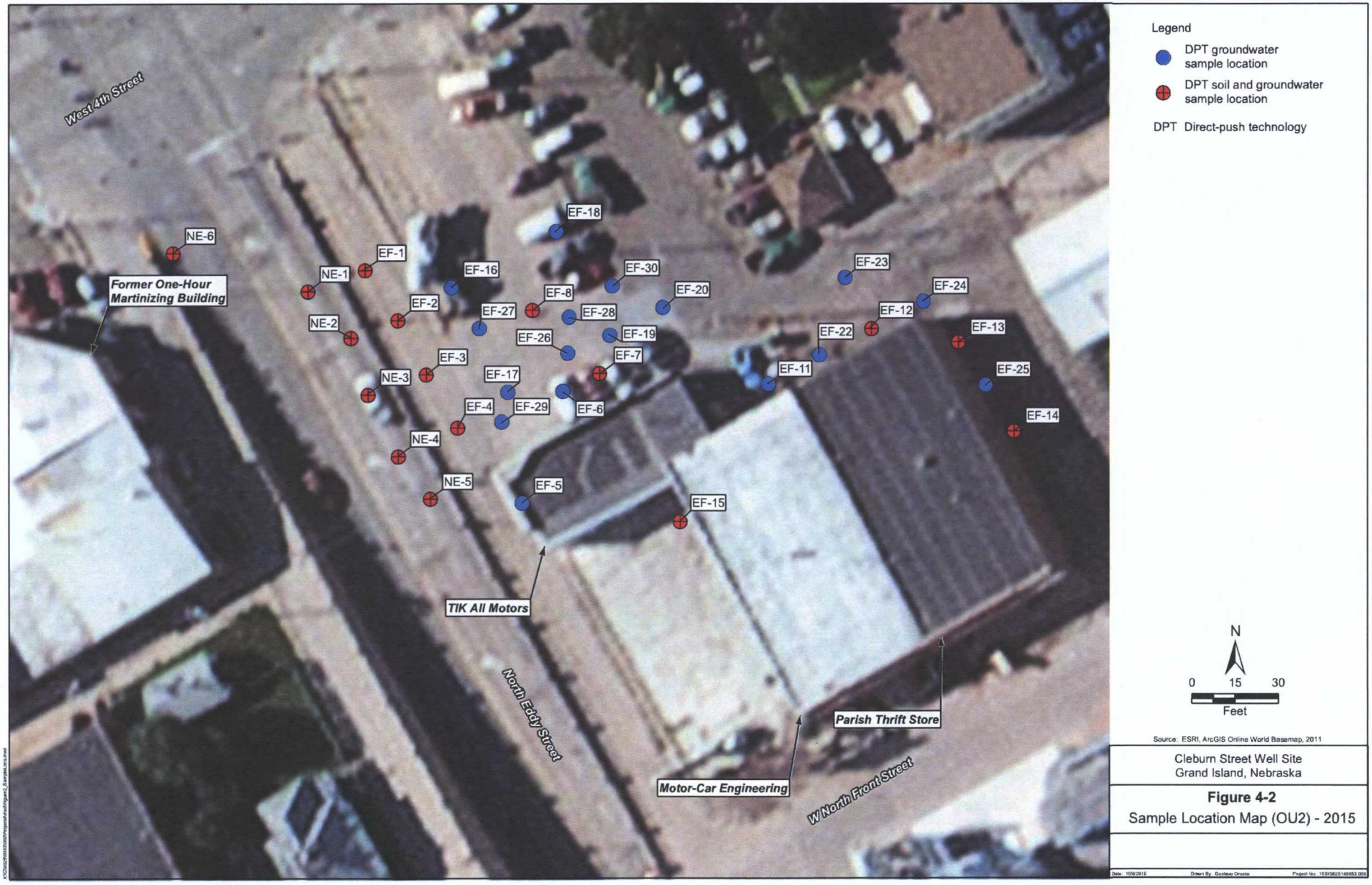
Figure 4-1
Soil and Groundwater Profile Sample Locations (OU1/OU2)
October 2014

Legend

- Angle Boring (Soil/Groundwater Sample)
- Soil /Groundwater Sample Boring
- Soil Boring
- Monitoring Well (Not Sampled)
- Curb Line
- Building/Structure

Note:
Locations in Eddy Street (SB/GW 501-506) and ASB-516, ASB-517, ASB-519, were not surveyed.

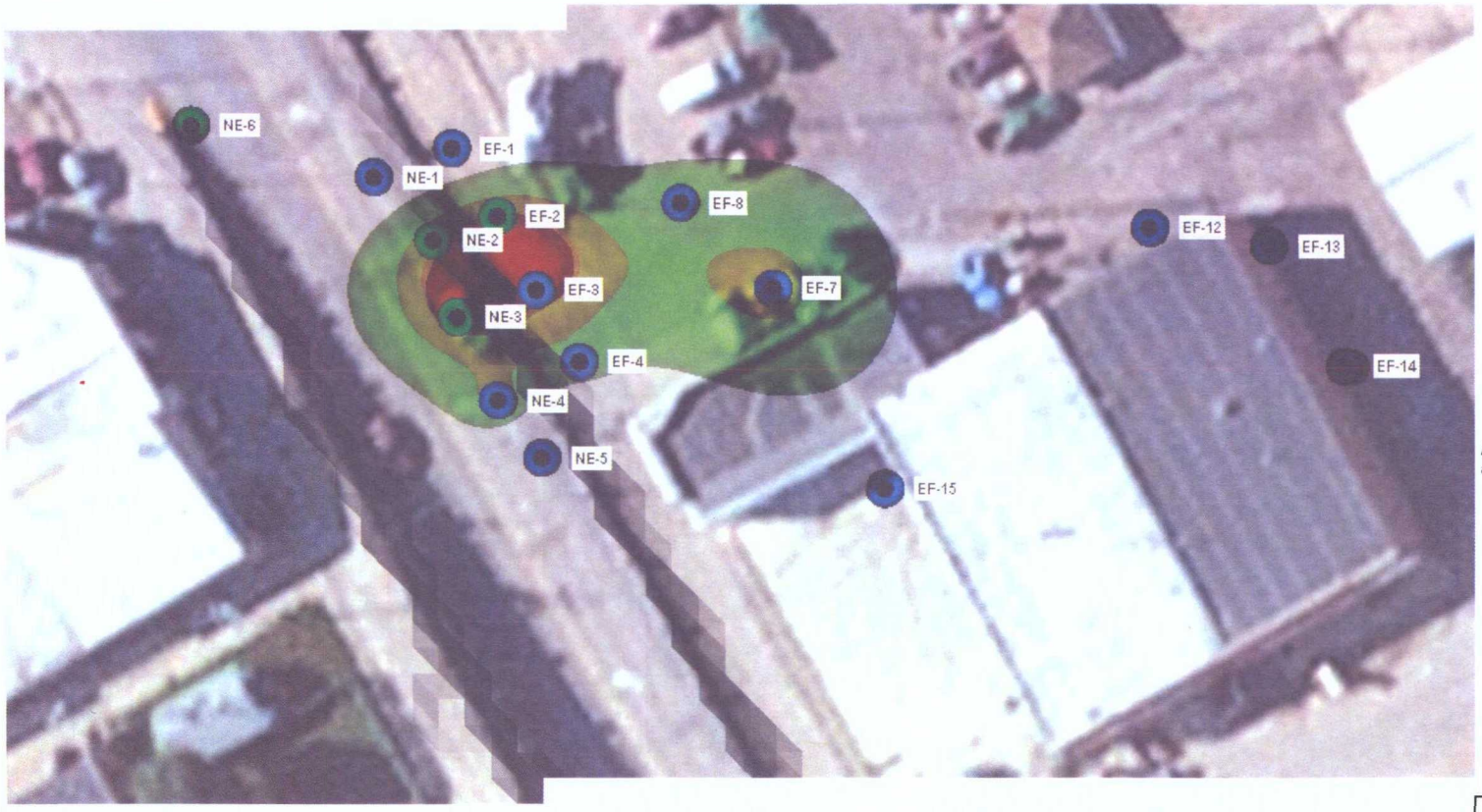
\\Gst-srv-01\HGLGIS\Cleburn_MSIW\Data_Summary_Memo\(2)Soil_GW_Borings.mxd
12/22/2014 JG
Source: HGL, Grand Island Utilities Dept.



Cleburn Street Well Site
Grand Island, Nebraska

Figure 4-2

Sample Location Map (OU2) - 2015



PCE

7200
2000
890
200
50
10
4.5

ft^3 Cubic feet

PCE Tetrachloroethene

ug/kg Micrograms per kilogram

Approximate volume of soil with concentrations above 890 ug/kg equals 11,509 ft^3

N

0 15 30

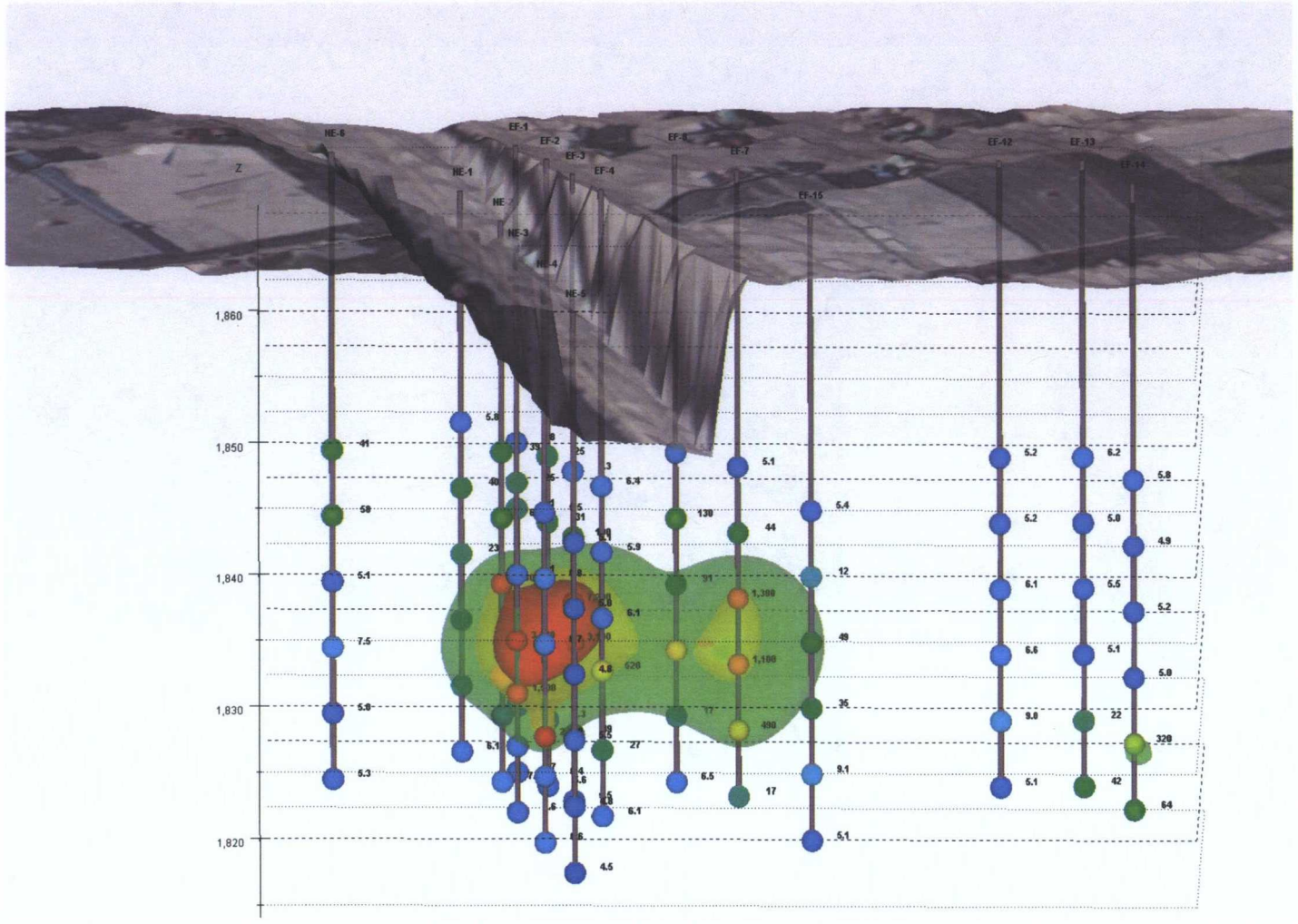
Feet

Source: C Tech Development Corporation, EVS Modeling Software, 2015

Cleburn Street Well Site
Grand Island, Nebraska

Figure 4-3
3D PCE Soil Model (OU2)
Top View

Date: 10/8/2015 Drawn By: Gustavo Orozco Project No: 103X9626140063.000



ft^3 Cubic feet
PCE Tetrachloroethene
ug/kg Micrograms per kilogram
Z Feet Above Mean Sea Level

Approximate volume of soil with concentrations above 890 ug/kg equals 11,509 ft^3

Notes: All PCE values given in ug/kg
Vertical Exaggeration is 5X

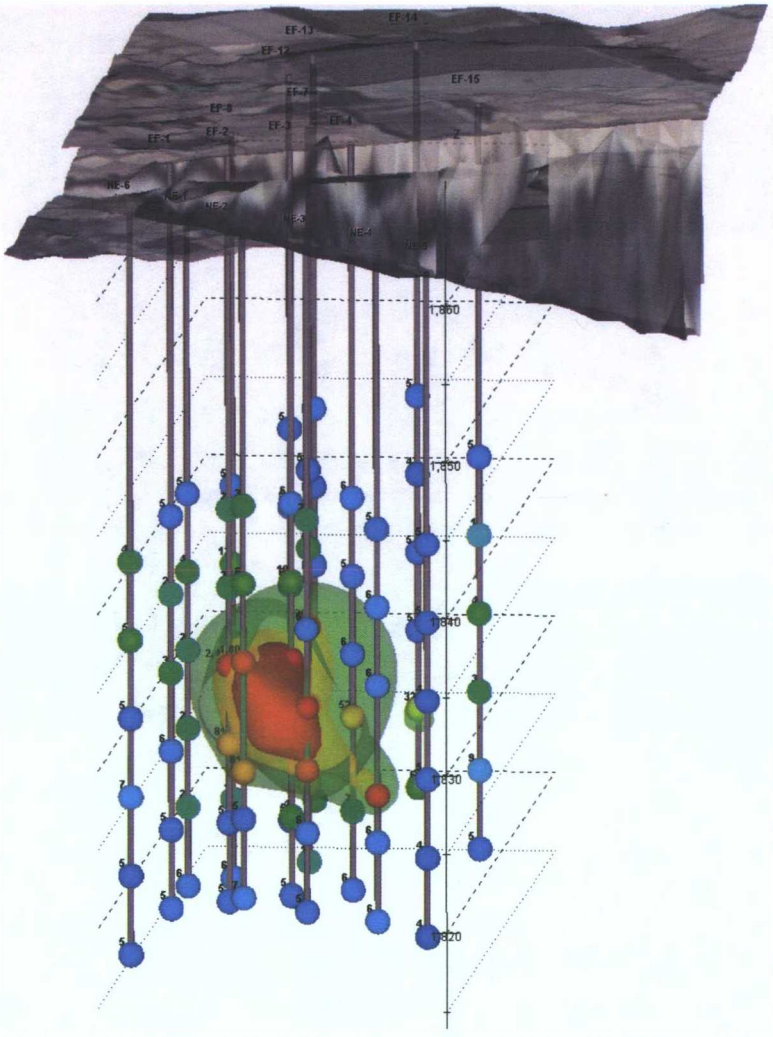
NOT TO SCALE

Source: C Tech Development Corporation, EVS Modeling Software, 2015

Cleburn Street Well Site
Grand Island, Nebraska

Figure 4-4
3D PCE Soil Model (OU2)
South to North View

Date: 10/6/2016 Drawn By: Gustavo Orozco Project No: 163/98251140053.000



PCE
7200
2000
890
200
50
10
4.5

ft^3 Cubic feet
PCE Tetrachloroethene
ug/kg Micrograms per kilogram
Z Feet Above Mean Sea Level

Approximate volume of soil with concentrations above 890 ug/kg equals 11,509 ft^3

Notes: All PCE values given in ug/kg
Vertical Exaggeration is 5X

NOT TO SCALE

Source: C Tech Development Corporation, EVS Modeling Software, 2015

Cleburn Street Well Site
Grand Island, Nebraska

Figure 4-5
3D PCE Soil Model (OU2)
West to East View

Date: 10/9/2015 Drawn By: Gustavo Orozco Project No: 103X3625149953.000

Figure 4-6
OU2 Monitoring Well Locations

Legend

- Existing 2" Monitoring Well
- Shallow 2009 2" Monitoring Well
- Intermediate 2009 2" Monitoring Well
- Deep 2009 2" Monitoring Well
- ERT Groundwater Well
- Municipal Water Well
- MW-2A — Well/Sampling Location Identification
- Curb Line
- Railroad
- Building/Structure

Note:
OU2=Operable Unit 2

:\gis-srv-01\hgl\gis\Cleburn_MSIW\Performance_Quarterly_2012-07\(2)OU2_Location.mxd
9/14/2012 CNL
Source: HGL, Grand Island Utilities Department

Figure 4-7
PCE Isoconcentration (OU2)
July 2015

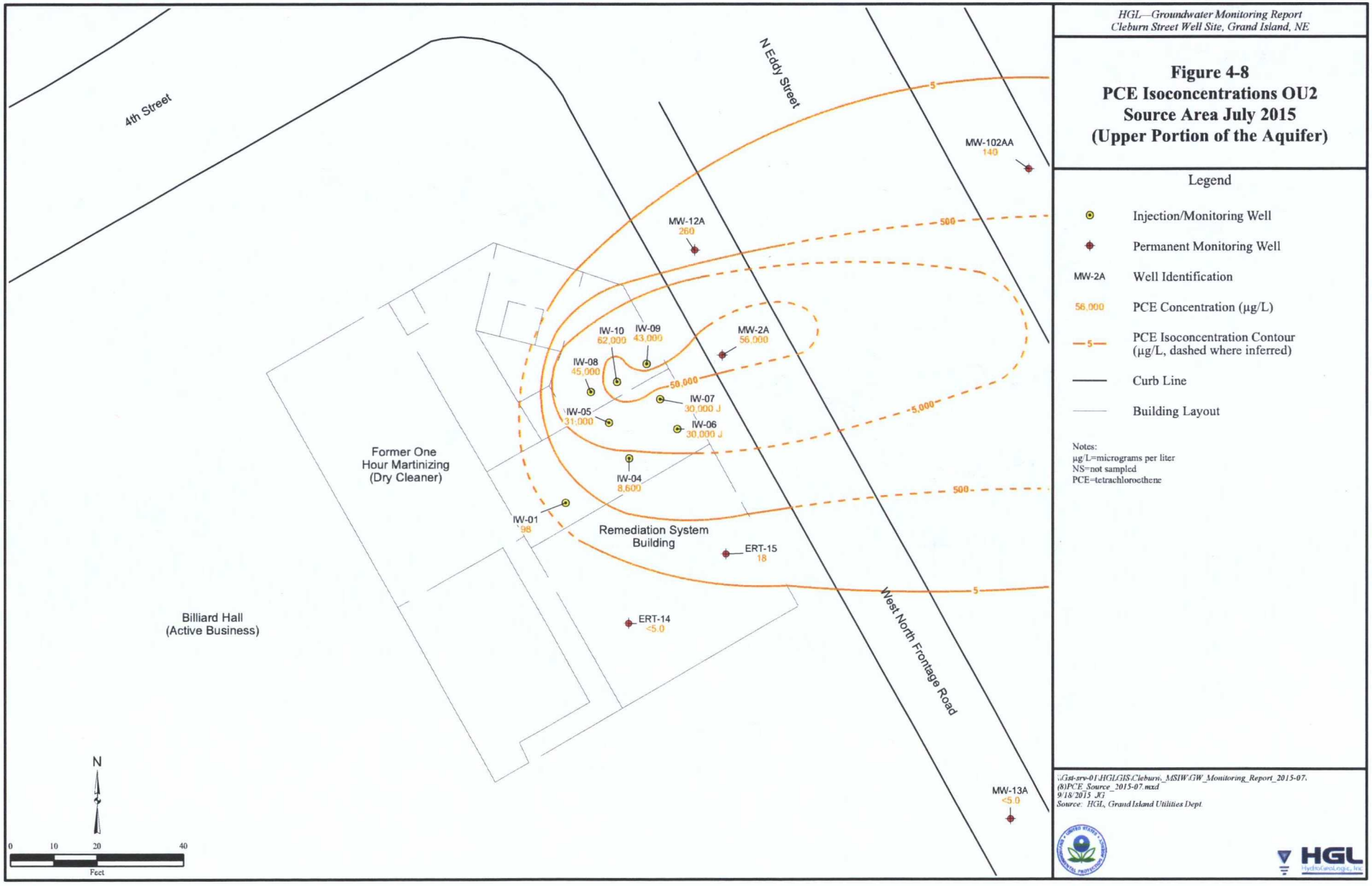
Legend

- Existing 2" Monitoring Well
- Shallow 2009 2" Monitoring Well
- Intermediate 2009 2" Monitoring Well
- Deep 2009 2" Monitoring Well
- ERT Groundwater Well
- Municipal Water Well
- MW-2A — Well Identification
- 56,000 — PCE Concentration (µg/L)
- —5— PCE Isoconcentration Contour (µg/L, dashed where inferred)
- Curb Line
- Railroad
- Building/Structure

Notes:
OU2=Operable Unit 2
PCE=tetrachloroethylene

\\Gis-srv-01\HGLGIS\Cleburn_MSIW\GW_Monitoring_Report_2015-07-(9)\Site_PCE.mxd
9/18/2015 JG
Source: HGL, Grand Island Utilities Department

HGL HydroGeoLogic, Inc



HGL—Groundwater Monitoring Report
Cleburn Street Well Site, Grand Island, NE

Figure 4-8
PCE Isoconcentrations OU2 Source Area July 2015 (Upper Portion of the Aquifer)

Legend

- Injection/Monitoring Well
- Permanent Monitoring Well
- MW-2A — Well Identification
- 56,000 — PCE Concentration (µg/L)
- 5 — PCE Isoconcentration Contour (µg/L, dashed where inferred)
- Curb Line
- Building Layout

Notes:
µg/L=micrograms per liter
NS=not sampled
PCE=tetrachloroethene

:\Gst-srv-01\HGL\GIS\Cleburn_MSIW\GW_Monitoring_Report_2015-07\(8)PCE_Source_2015-07.mxd
9/18/2015 JG
Source: HGL, Grand Island Utilities Dept.

PCE
32,000
10,000
2,000
1,000
100
20
5
0

PCE Tetrachloroethene

N

0 15 30

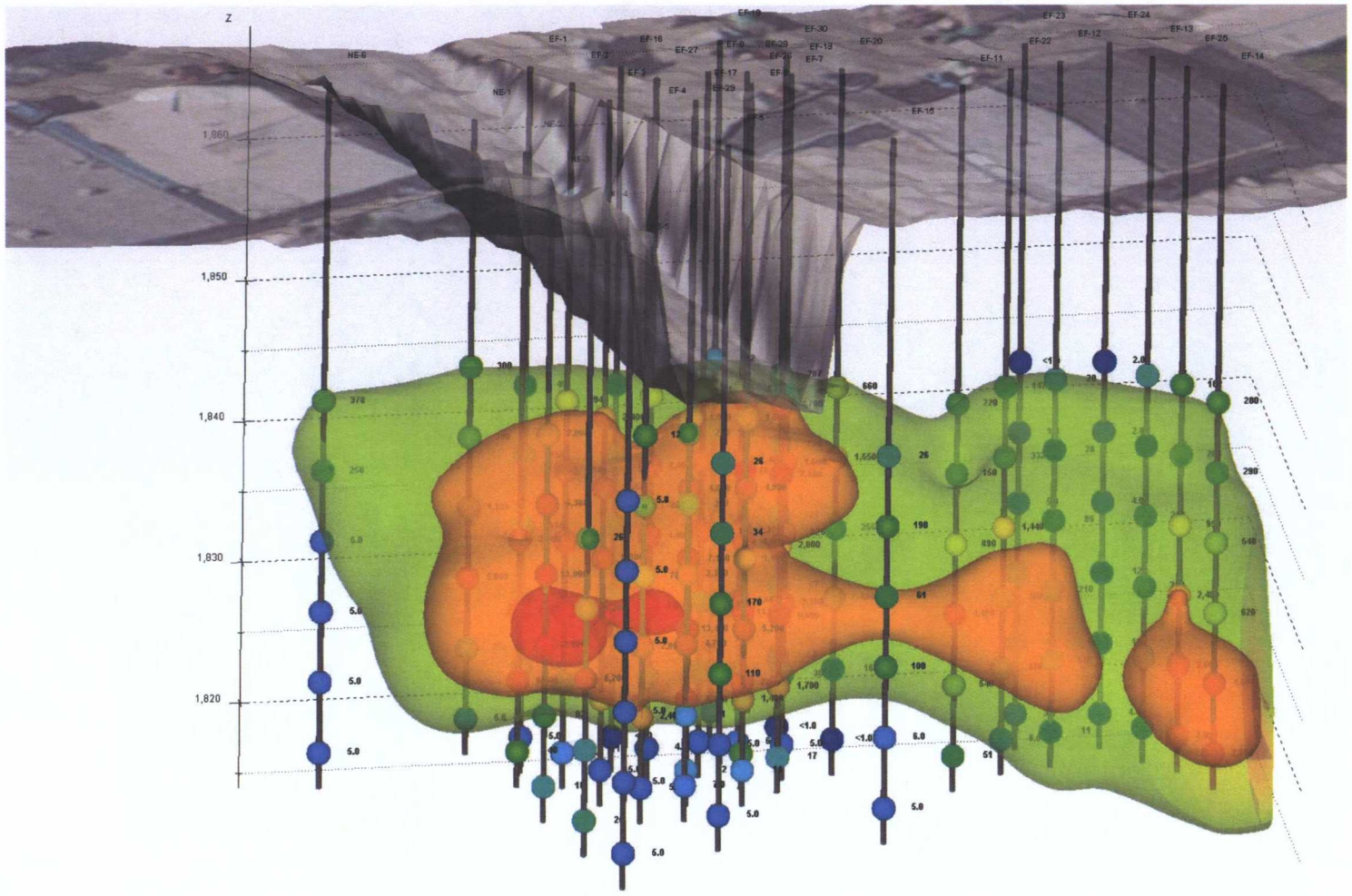
Feet

Source: C Tech Development Corporation, EVS Modeling Software, 2015

Cleburn Street Well Site
Grand Island, Nebraska

Figure 4-9
3D PCE Groundwater Plume Model
(OU2) Top View

Date: 10/8/2015 Drawn By: Gustavo Orozco Project No: 103X3625149053.000



PCE Tetrachloroethene
ug/L Micrograms per Liter
Z Feet Above Mean Sea Level

Notes: All PCE values given in ug/L
Vertical Exaggeration is 5X

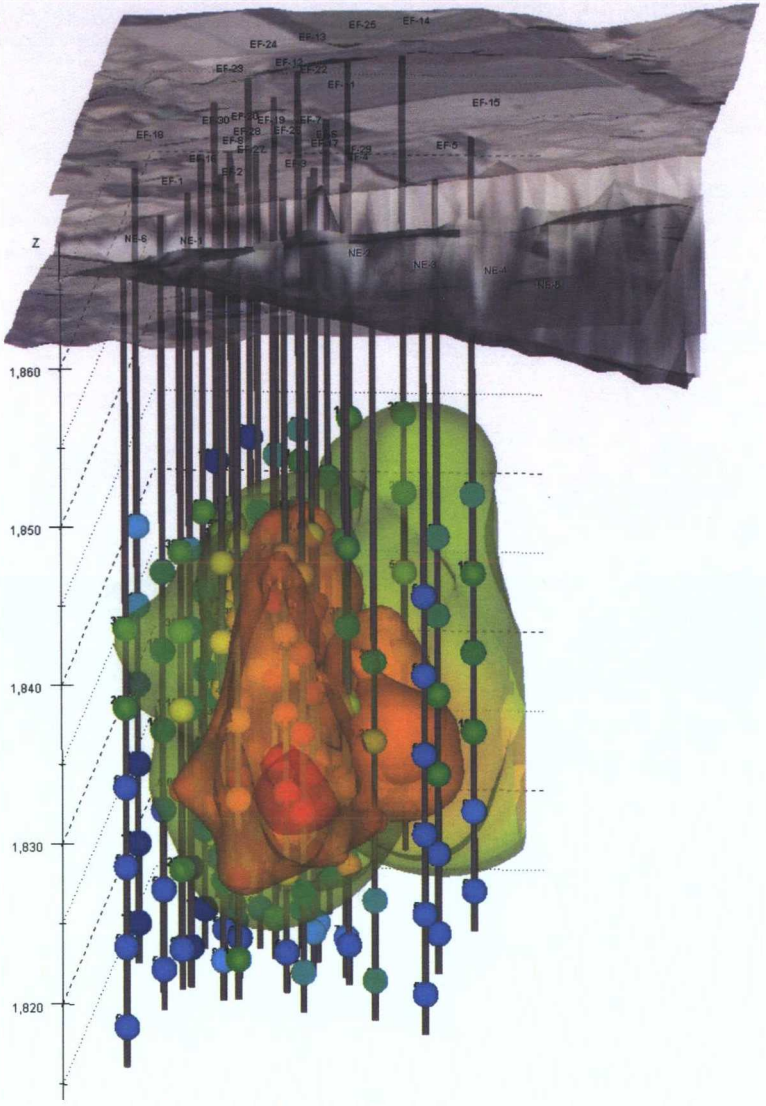
NOT TO SCALE

Source: C Tech Development Corporation, EVS Modeling Software, 2015

Cleburn Street Well Site
Grand Island, Nebraska

Figure 4-10
3D PCE Groundwater Plume Model
(OU2) - South to North View

Date: 10/8/2015 Drawn By: Gustavo Orozco Project No: 103/3625140953.000



PCE
32,000
10,000
2,000
1,000
100
20
5
0

PCE Tetrachloroethene
ug/L Micrograms per Liter
Z Feet Above Mean Sea Level

Notes: All PCE values given in ug/L
Vertical Exaggeration is 5X

NOT TO SCALE

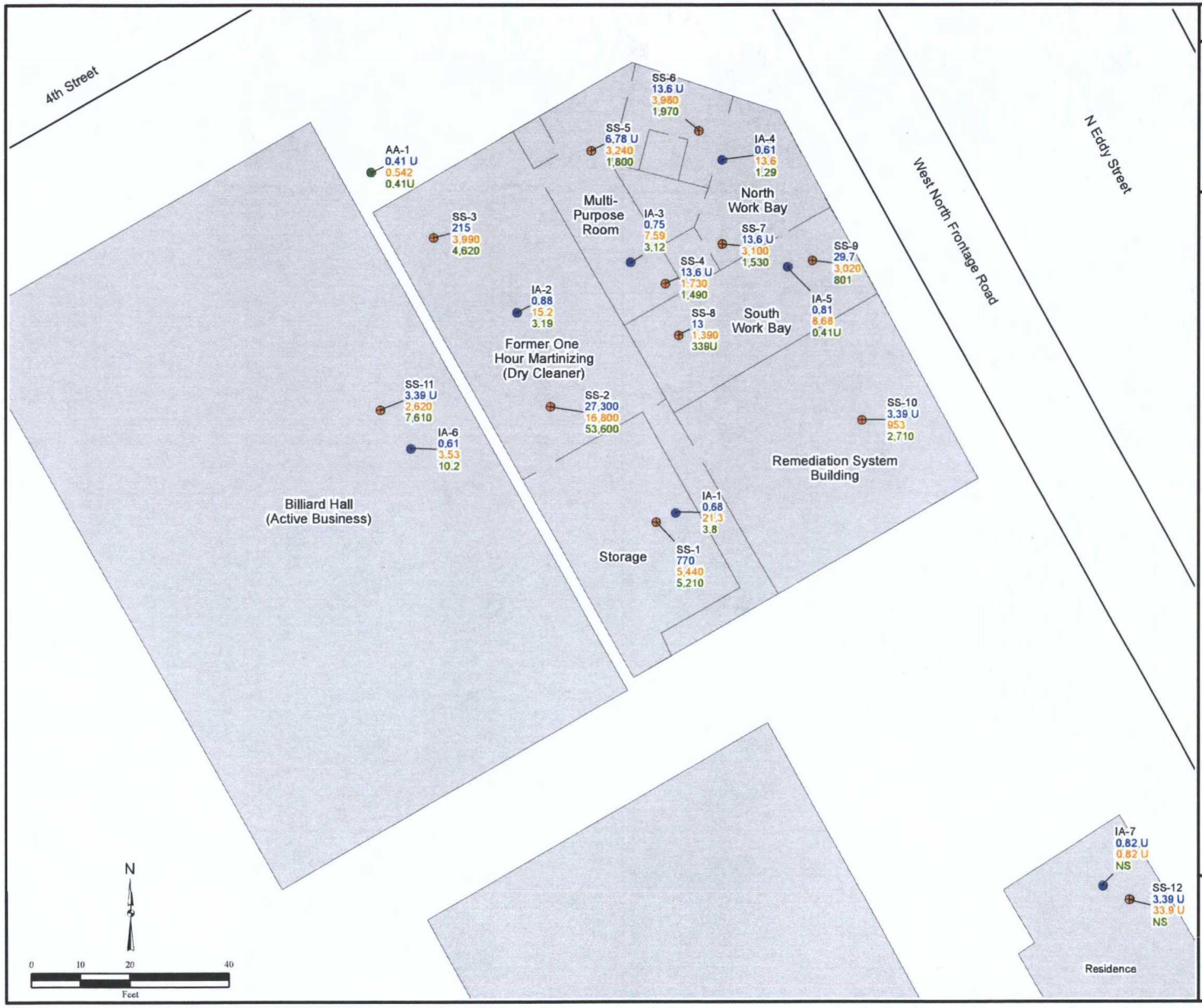
Source: C Tech Development Corporation, EVS Modeling Software, 2015

Cleburn Street Well Site
Grand Island, Nebraska

Figure 4-11
3D PCE Groundwater Plume Model
(OU2) - West to East View

Date: 10/8/2015 Drawn By: Gustavo Orozco Project No: 103X9025140053.000

Figure 4-12
Vapor Intrusion Sampling Locations (OU1/OU2)



Legend

- Ambient Air Sampling Location
- Indoor Air Sampling Location
- Subslab Sampling Location
- AA-1 — Sampling Location Identification

PCE Concentration (µg/m³):

- 0.41 U — February 2012
- 0.542 — July 2012
- 3.12 — January 2013
- Curb Line
- Building Layout
- Building/Structure

Notes:
Sample Locations SS-11 and SS-13 were collected from the same location due to excessive pressure loss of initial sample container.

U=The analyte was not detected; the reported result is the sample quantitation limit or the analyte was detected but determined to be an artifact.

\\gst-srv-01\HGLGIS\Cleburn_MSIW\Performance_Quarterly_2013-04\(1)\1_Location.mxd
4/17/2013 ST
Source: HGL, Grand Island Utilities Dept.

Legend

Monitoring well location

N

0 15 30

Feet

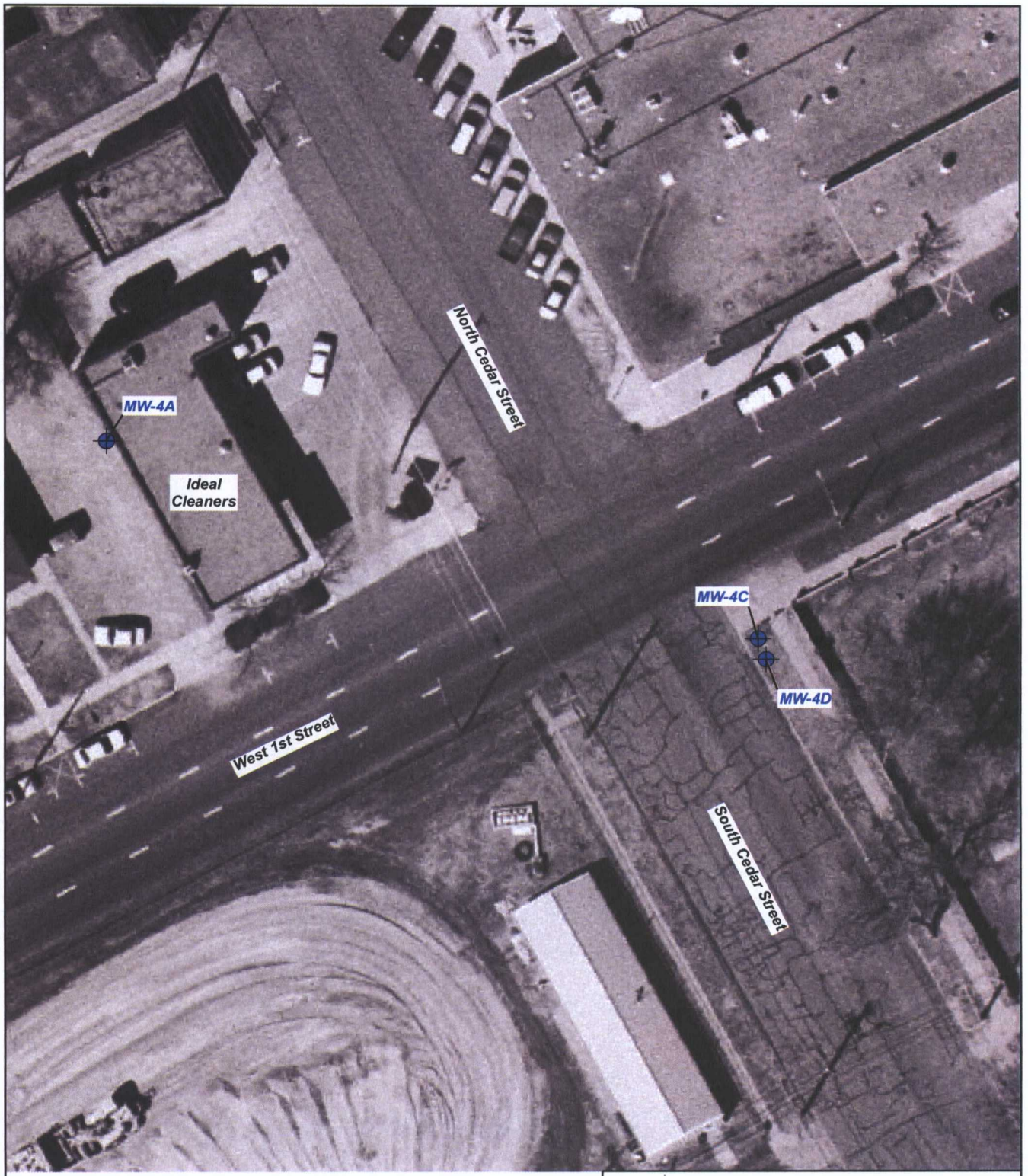
Source: City of Grand Island Aerial Imagery, 2003

Cleburn Street Well Site
Grand Island, Nebraska

Figure 4-13
Groundwater Sample Locations - OU3

Date: 10/8/2012 Drawn By: Bill Spiking Project No: S1968.1223A

X:\S1968.1223A\Project\arcmxd\Figure2.mxd



Legend

Monitoring well location

N

0 20 40

Feet

Source: City of Grand Island Aerial Imagery, 2003

Cleburn Street Well Site
Grand Island, Nebraska

Figure 4-14
Groundwater Sample Locations- OU4

Date: 10/8/2012 Drawn By: Bill Spiking Project No: S1968.1223A

X:\S1968.1223A\Projects\mxd\Figure3.mxd

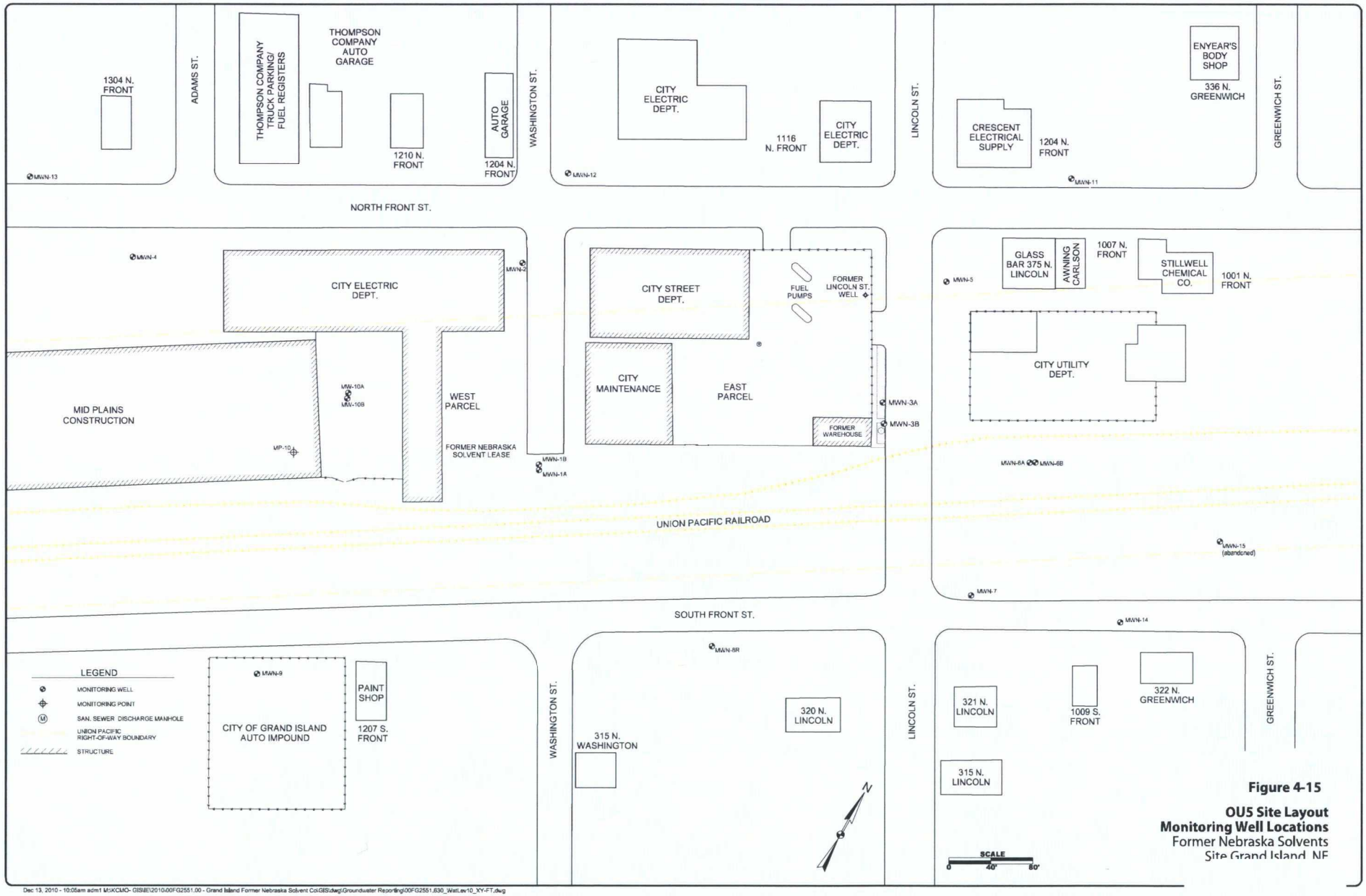


Figure 4-15

OU5 Site Layout
Monitoring Well Locations
Former Nebraska Solvents
Site Grand Island, NE

Dec 13, 2010 - 10:05am adm1 M:\KCMO- GIS\IE\2010\00FG2551.00 - Grand Island Former Nebraska Solvent Co\GIS\dwg\Groundwater Reporting\00FG2551.630_WatLev10_XY-FT.dwg

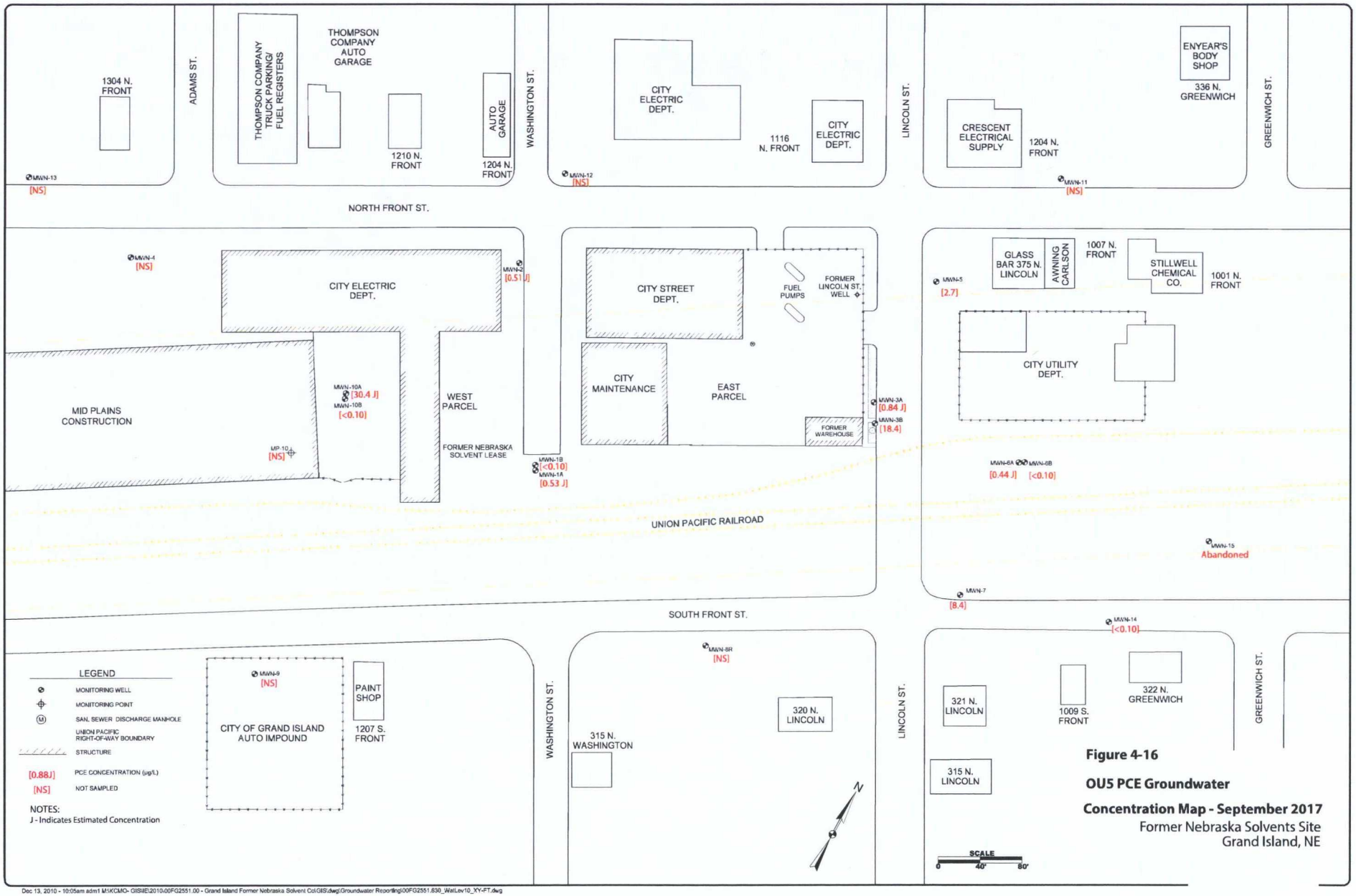


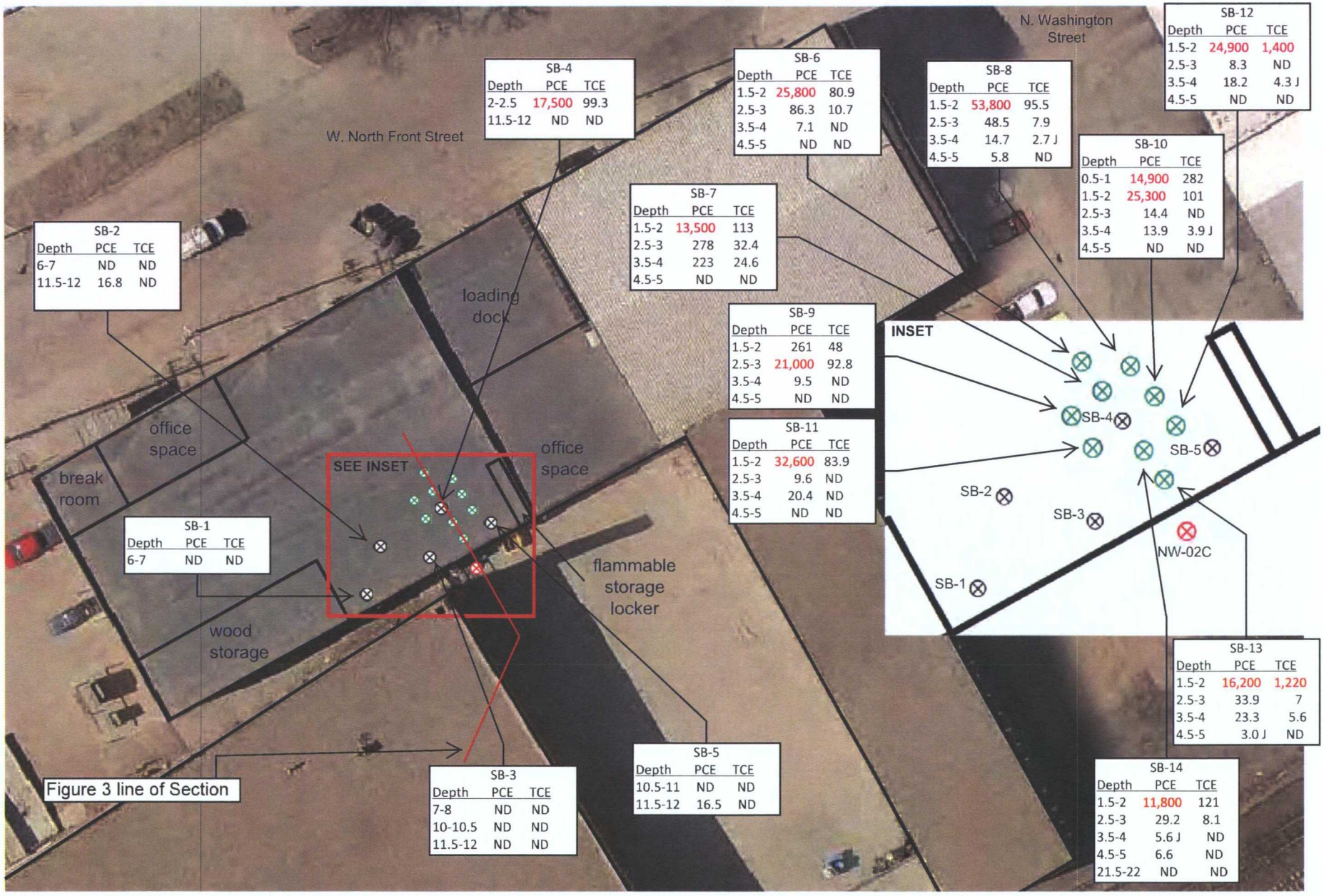
Figure 4-16

OU5 PCE Groundwater

Concentration Map - September 2017

Former Nebraska Solvents Site
Grand Island, NE

Dec 13, 2010 - 10:05am adm1 M:\KCMO- GISNE\2010\00FG2551.00 - Grand Island Former Nebraska Solvent Co\GIS\dwg\Groundwater Reporting\00FG2551.830_WatLev10_XY-FT.dwg



Confirmation Soil Sample Location

Soil Boring Location, Sept 2012

Soil Boring Location, May 2013

PCE: Tetrachloroethene (ug/kg)

TCE: Tetrachloroethene (ug/kg)

J: quatitation is an estimate

ND: not detected above the method detection limit

red & bold font: concentration exceeds the Soil Cleanup Level Protective of Groundwater

40 ft

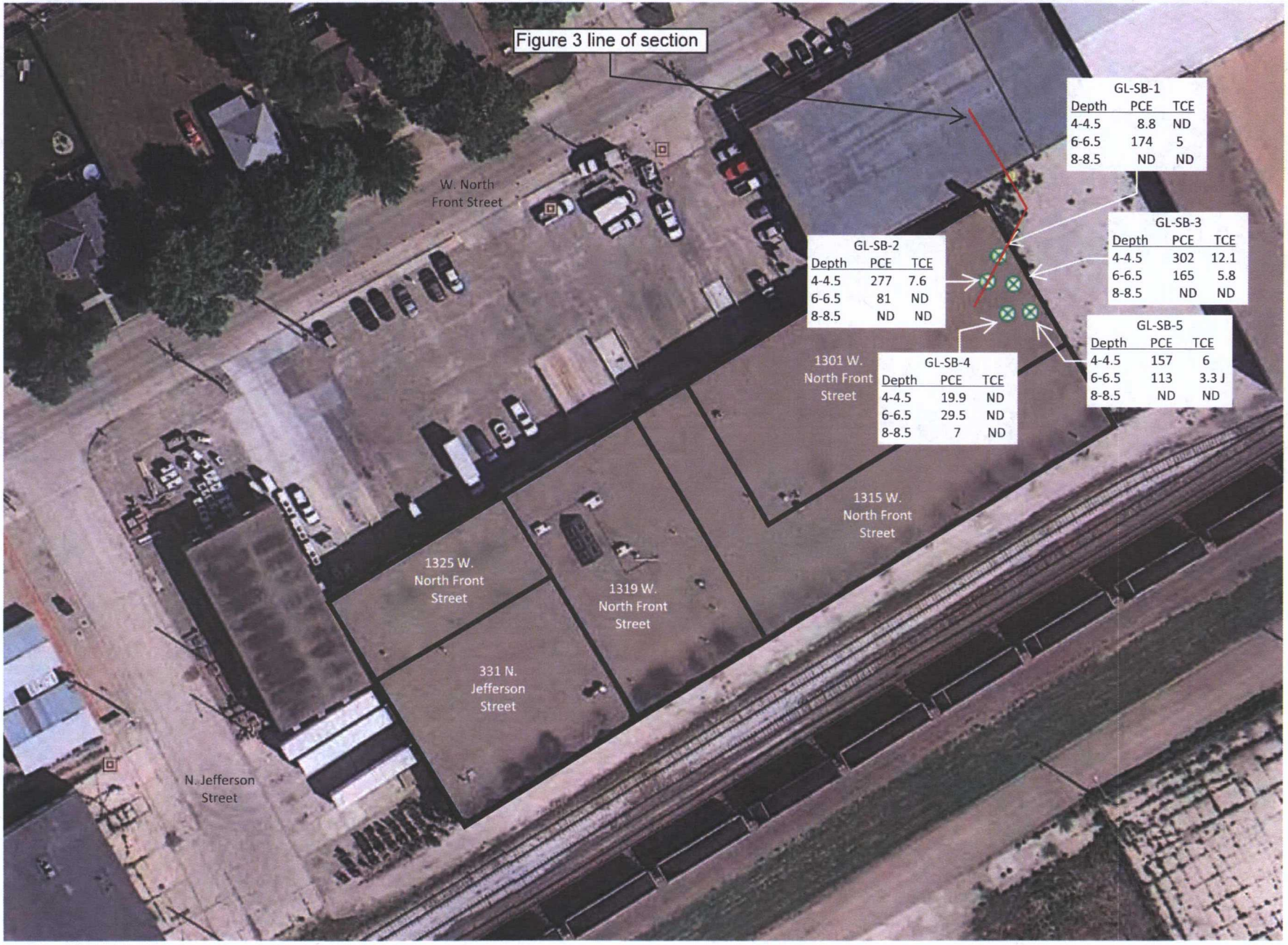
N

FIGURE 4-17

Soil Results - City Electric Building

Cleburn Street Well Superfund Site (OU5)

Grand Island, Nebraska



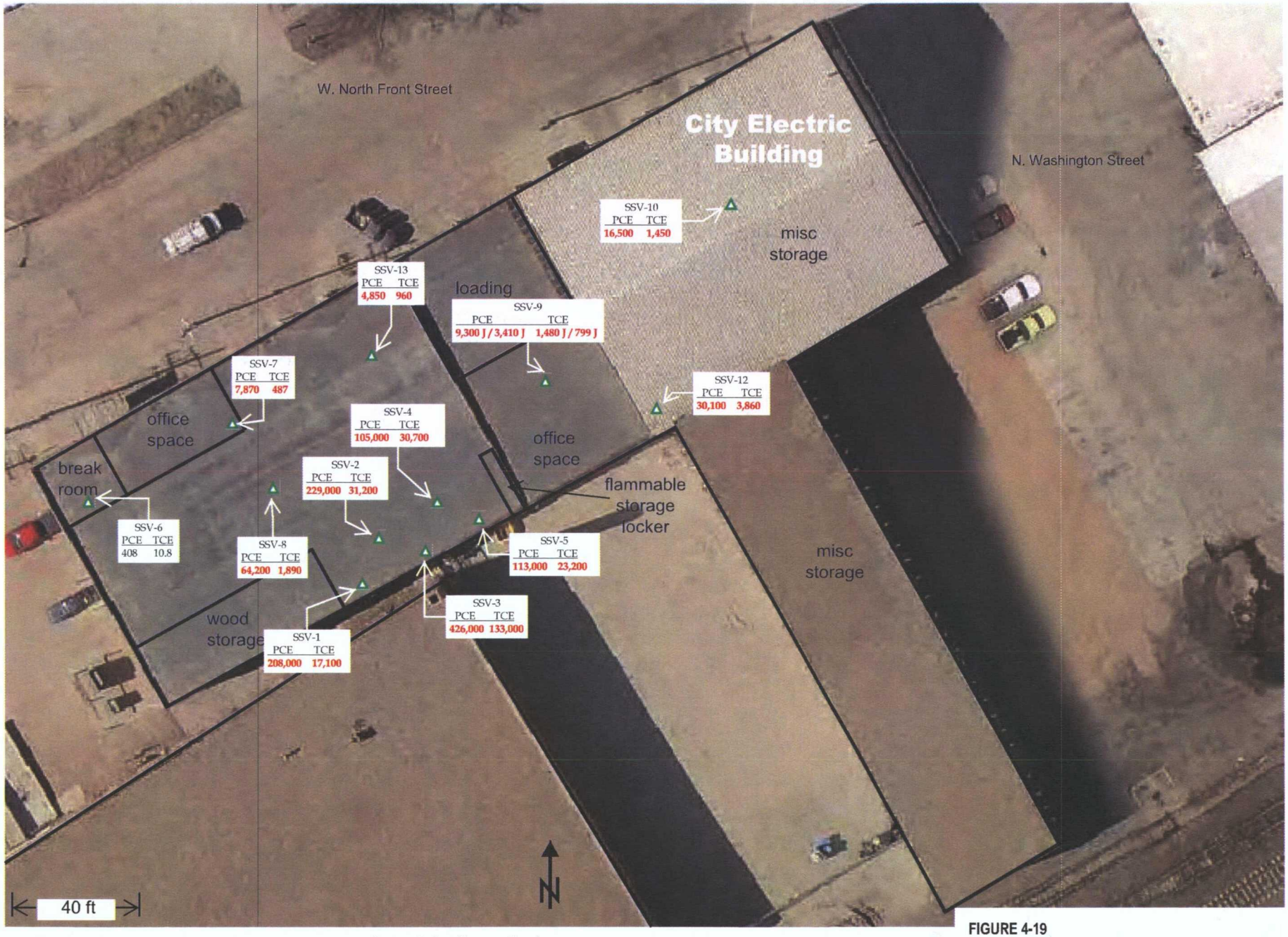
⊗ *Soil Boring Location, May 2013*
PCE: Tetrachloroethene (ug/kg)
TCE: Tetrachloroethene (ug/kg)

J: quantitation is an estimate
ND: not detected above the method detection limit

60 feet

N

FIGURE 4-18
Soil Results - Mid Plains Construction Building
Cleburn Street Well Superfund Site (OU5)
Grand Island, Nebraska

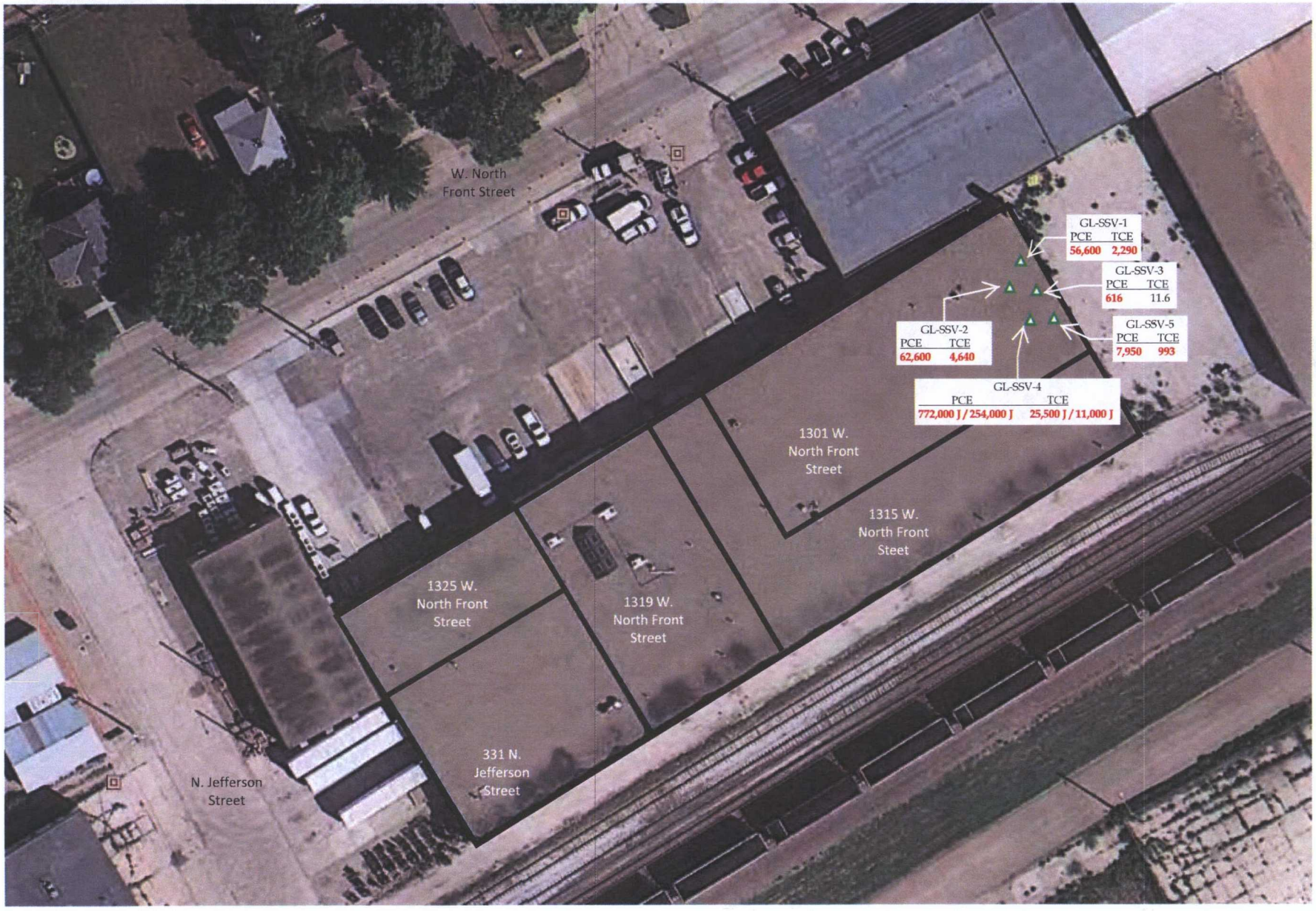


△ *Subslab Vapor Probe Location*

PCE: Tetrachloroethene (ug/m3)
TCE: Tetrachloroethene (ug/m3)

J: quantation is an estimate
/ ##: parent sample result / duplidate sample result
red & bold font: concentration exceeds the Subslab Vapor Screening Level

FIGURE 4-19
Subslab Vapor Results - City Electric Building
Cleburn Street Well Superfund Site (OU5)
Grand Island, Nebraska



△ *Subslab Vapor Sample Location, June 2013*

J: quantitation is an estimate

/ ##: parent sample result / duplicate sample result

red & bold font: concentration exceeds the Subslab Vapor Screening Level

PCE: Tetrachloroethene (ug/m3)
TCE: Tetrachloroethene (ug/m3)

60 Feet

N

FIGURE 4-20
Subslab Vapor Sample Locations - Mid Plains Construction Building
Grand Island, Nebraska

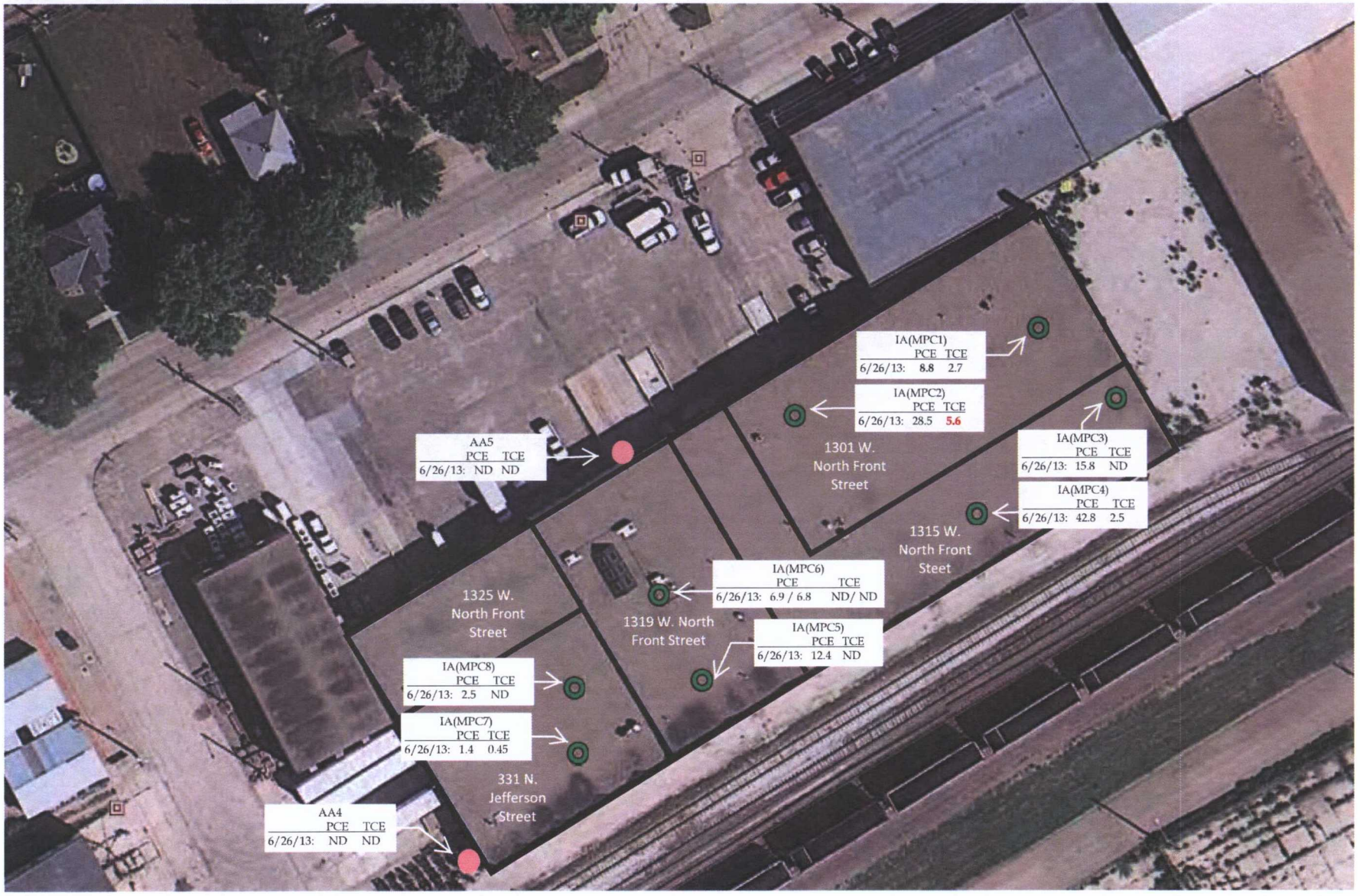
Indoor Air Sample Location
Ambient (outdoor) Air Sample Location
PCE: Tetrachloroethene (ug/m3)
TCE: Tetrachloroethene (ug/m3)

ND: not detected above the method detection limit
/ ##: parent sample result / duplicate sample result
red & bold font: concentration exceeds the Target Indoor Air Concentration
Note: AA-3 was collected approximately 220 feet northeast of the building.

40 ft

N

FIGURE 4-21
Indoor and Ambient Air Results - City Electric Building
Cleburn Street Well Superfund Site (OU5)
Grand Island, Nebraska



Indoor Air Sample Location

Ambient (outdoor) Air Sample Location

PCE: Tetrachloroethene (ug/m3)

TCE: Tetrachloroethene (ug/m3)

/ ##: parent sample result / duplicate sample result

< : analyte not detected above the method detection limit

red & bold font: concentration exceeds the Target Indoor Air Concentration

60 Feet

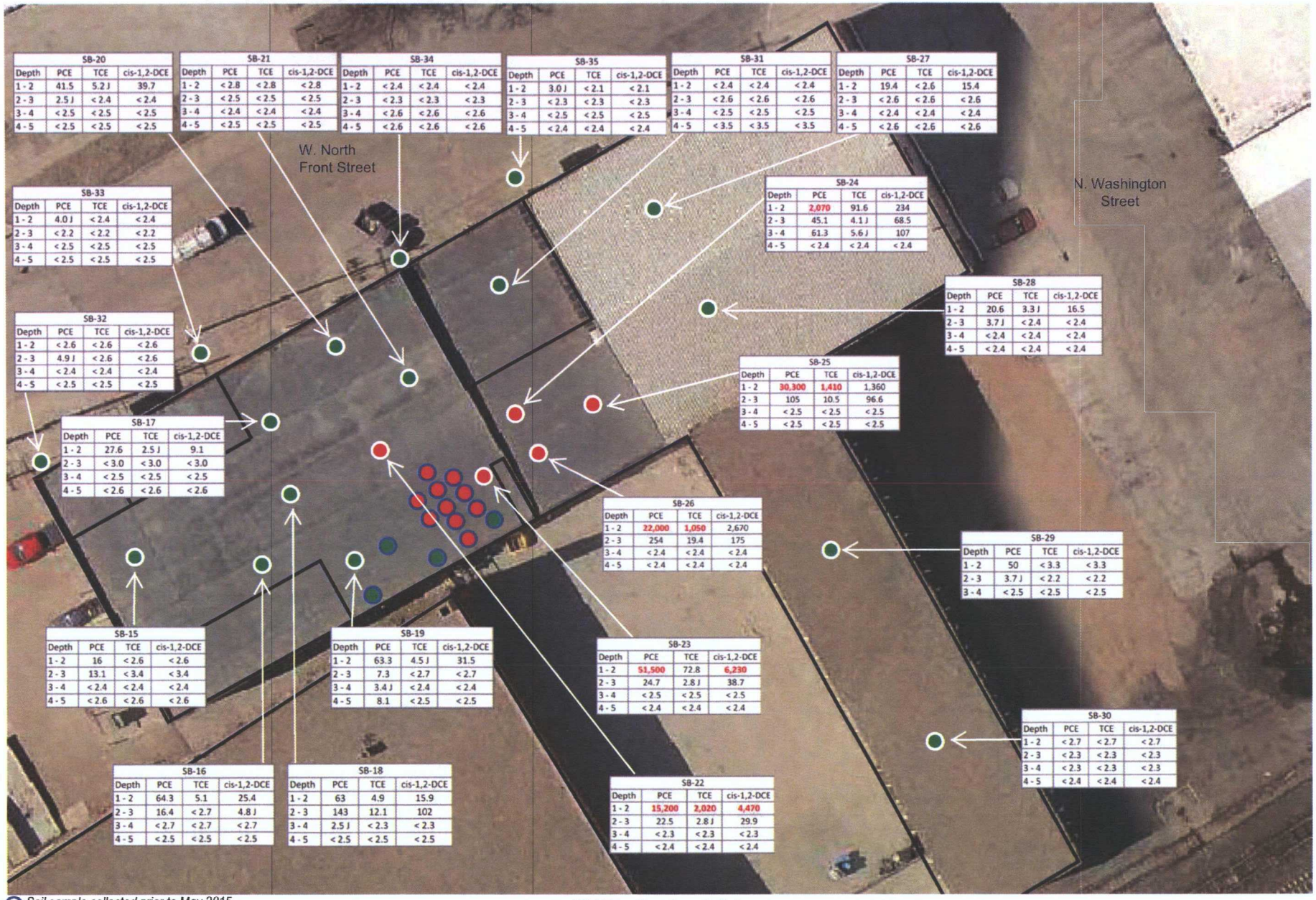
N

FIGURE 4-22

Indoor and Ambient Air Results - Mid Plains Construction Building

Cleburn Street Well Superfund Site (OU5)

Grand Island, Nebraska



Soil sample collected prior to May 2015

Soil sample results below the Soil Cleanup Level Protective of Groundwater

Soil sample results above the Soil Cleanup Level Protective of Groundwater

red & bold font: concentration exceeds the Soil Cleanup Level Protective of Groundwater

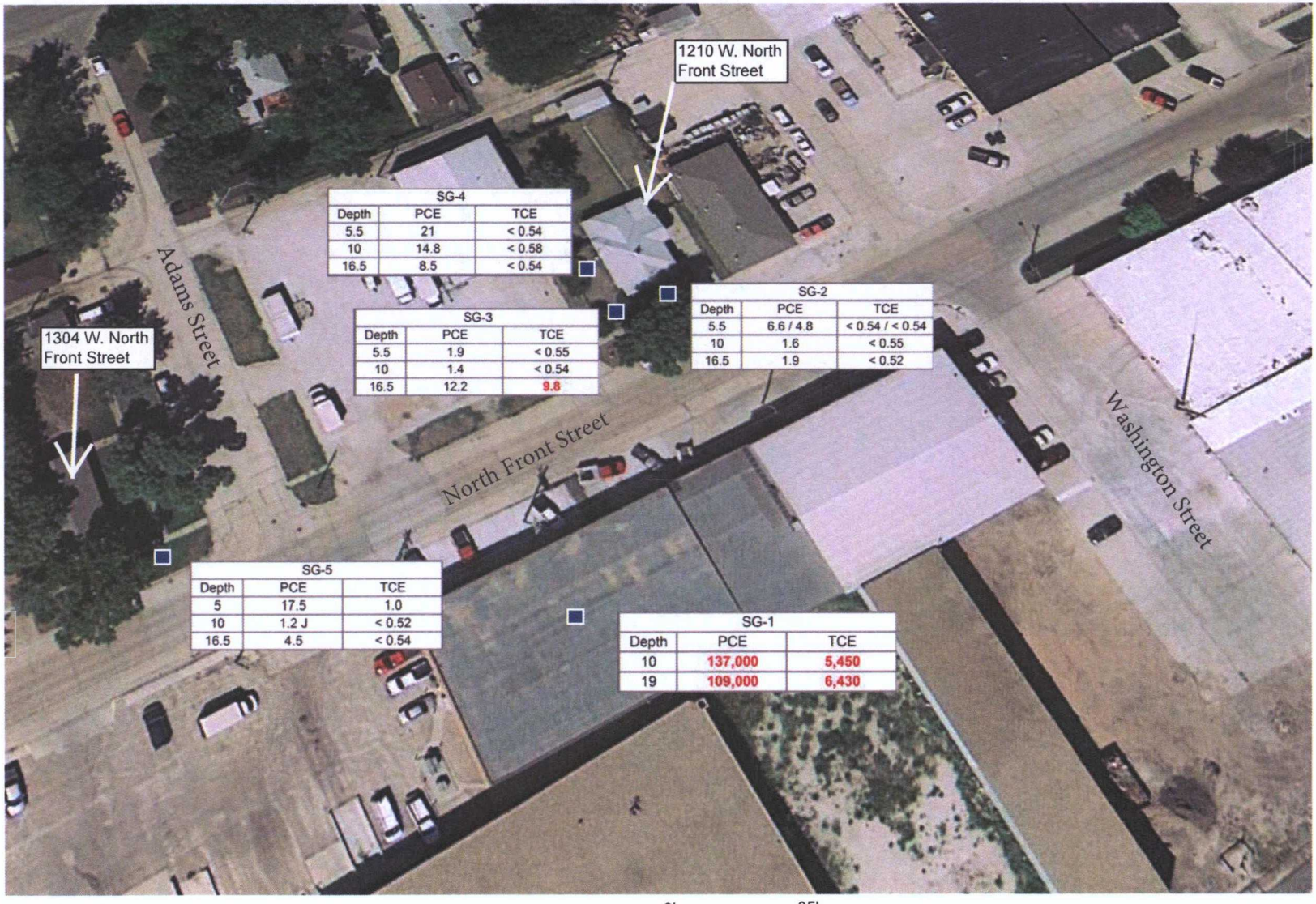
Note: Analytical results are shown for locations advanced in May 2015. All other locations were advanced in 2012 and 2013; results for those locations have been previously provided.

PCE: Tetrachloroethene (ug/kg)
TCE: Tetrachloroethene (ug/kg)
cis-1,2-DCE: cis-1,2-dichloroethylene (ug/kg)
J: quantitation is an estimate
ND: not detected above the method detection limit
Depth: feet below ground/slab surface

40 ft

N

FIGURE 4-23
Soil Results for the City Electric Building, May 2015
Cleburn Street Well Superfund Site (OU5) Grand Island, Nebraska



■ **Soil Gas Sample Location**

red & bold font: concentrations exceeds the Residential Target Exterior Soil Gas COPC Screening VISL
<: analyte was not detected above the reporting limit
ND: not detected above the method detection limit

0' 65'

PCE: Tetrachloroethene (ug/m3)
TCE: Tetrachloroethene (ug/m3)
Depth: feet below ground surface
/ ##: parent sample result / duplicate sample result

FIGURE 4-24
Soil Gas Results, Residential Properties, May 2015
Cleburn Street Well Superfund Site (OU5) Grand Island, Nebraska

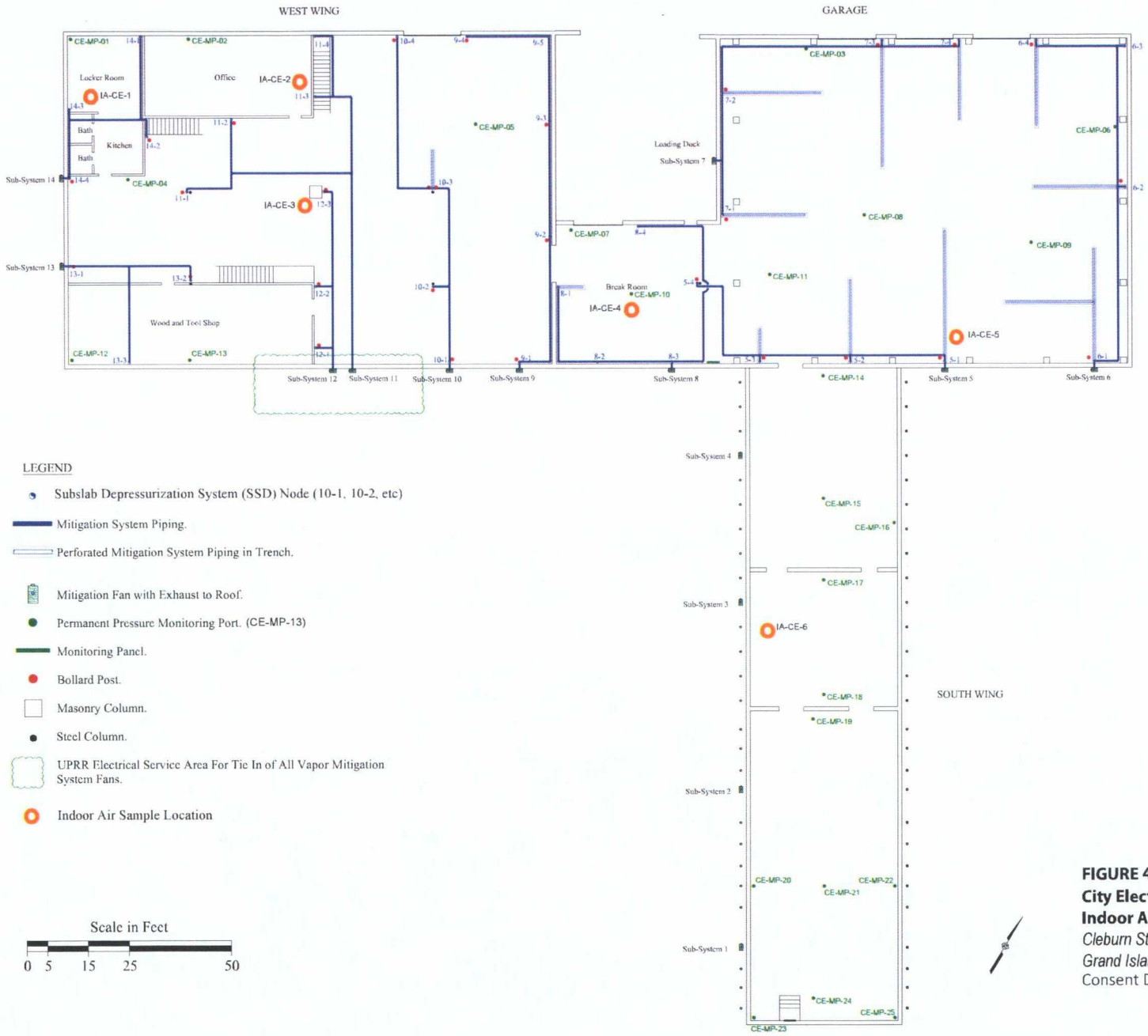


FIGURE 4-25
City Electric Building VIMS Layout and Indoor Air Sampling Locations
Cleburn Street Well Superfund Site (OU5)
Grand Island, Nebraska
Consent Decree Civil Action No. 8:02CV368

LEGEND

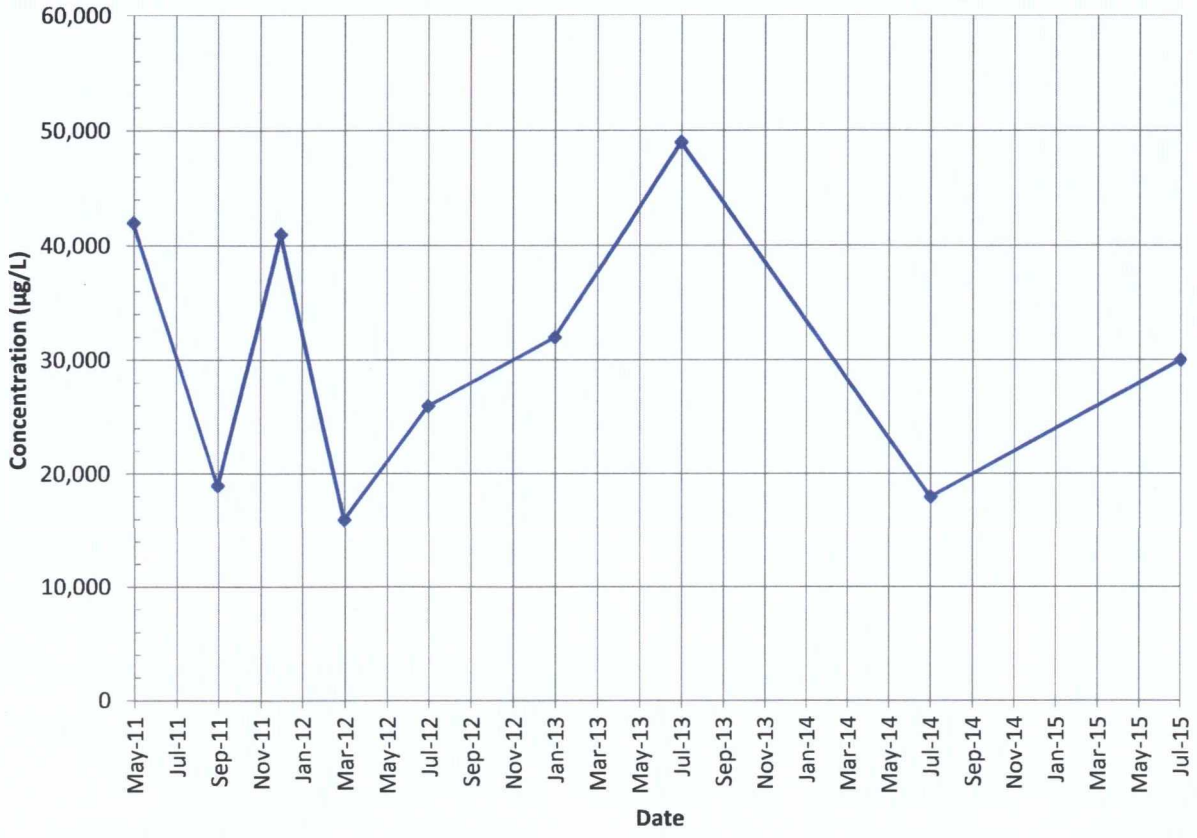
- Subslab Depressurization System (SSD) Node (20-1, 20-2, etc)
- Extraction Point within Enclosure.
- Mitigation System Piping.
- Mitigation Fan with Exhaust to Roof.
- Permanent Pressure Monitoring Port. (MP-MP-22)
- Monitoring Panel.
- Bollard Post.
- Masonry Column.
- UPRR Electrical Service Area for Tie In of All Vapor Mitigation System Fans.
- Indoor Air Sample Location

Scale in Feet

0 5 15 25 50

FIGURE 4-26
Mid Plains Construction Building VIMS Layout and Indoor Air Sampling Locations
Cleburn Street Well Superfund Site (OU5)
Grand Island, Nebraska
Consent Decree Civil Action No. 8:02CV368

Appendix H
Statistical Analysis



Date	PCE (µg/L)
May-11	42000
Sep-11	19000
Dec-11	41000
Mar-12	16,000
Jul-12	26,000
Jan-13	32,000
Jul-13	49,000
Jul-14	18,000
Jul-15	30,000

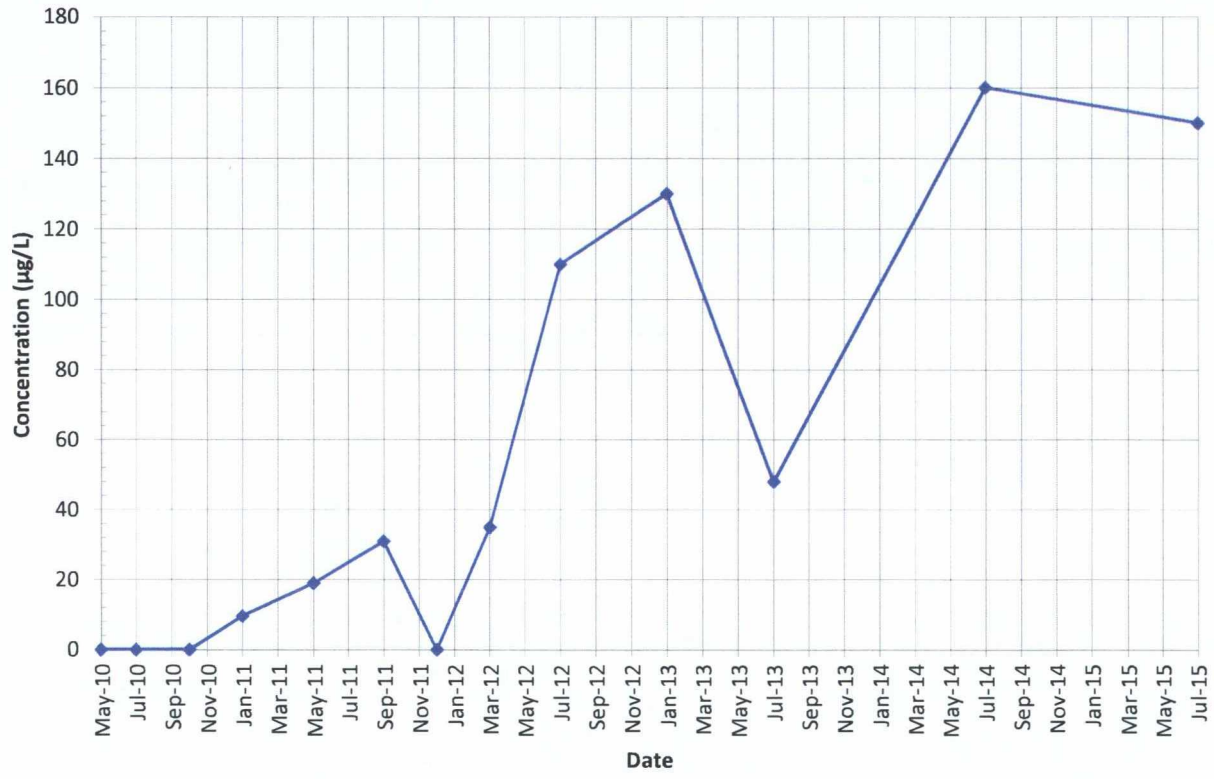
HGL HydroGeoLogic, Inc

Project: EP90054

Legend

PCE concentration in micrograms per liter (µg/L).

Graph 4-1
OU2 IW-6
PCE Results



Date	PCE (µg/L)
May-10	ND
Jul-10	ND
Oct-10	ND
Jan-11	9.6
May-11	19
Sep-11	31
Dec-11	ND
Mar-12	35
Jul-12	110
Jan-13	130
Jul-13	48
Jul-14	160
Jul-15	150

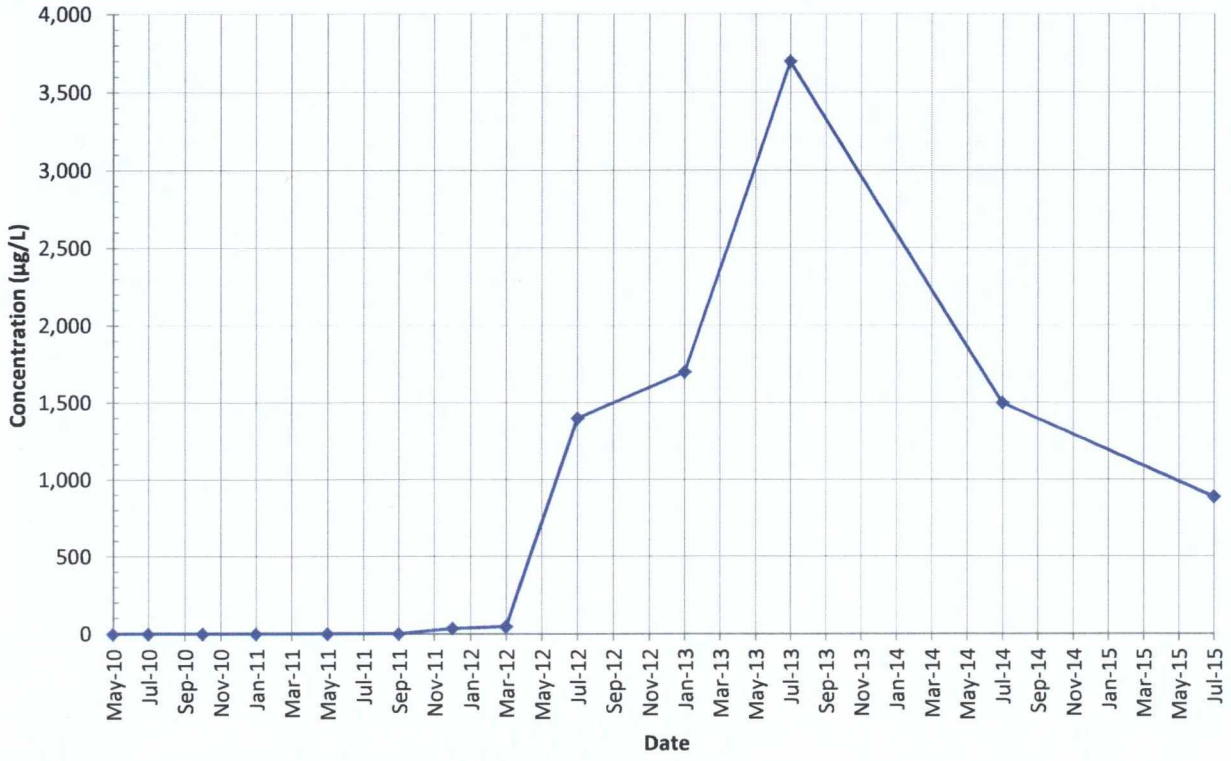
HGL HydroGeoLogic, Inc

Project: EP90054

Legend

PCE concentration in micrograms per liter (µg/L).

Graph 4-2
OU2 MW-102AA
PCE Results



Date	PCE (µg/L)
May-10	ND
Jul-10	ND
Oct-10	ND
Jan-11	ND
May-11	ND
Sep-11	ND
Dec-11	34
Mar-12	47
Jul-12	1,400
Jan-13	1,700
Jul-13	3,700
Jul-14	1,500
Jul-15	890

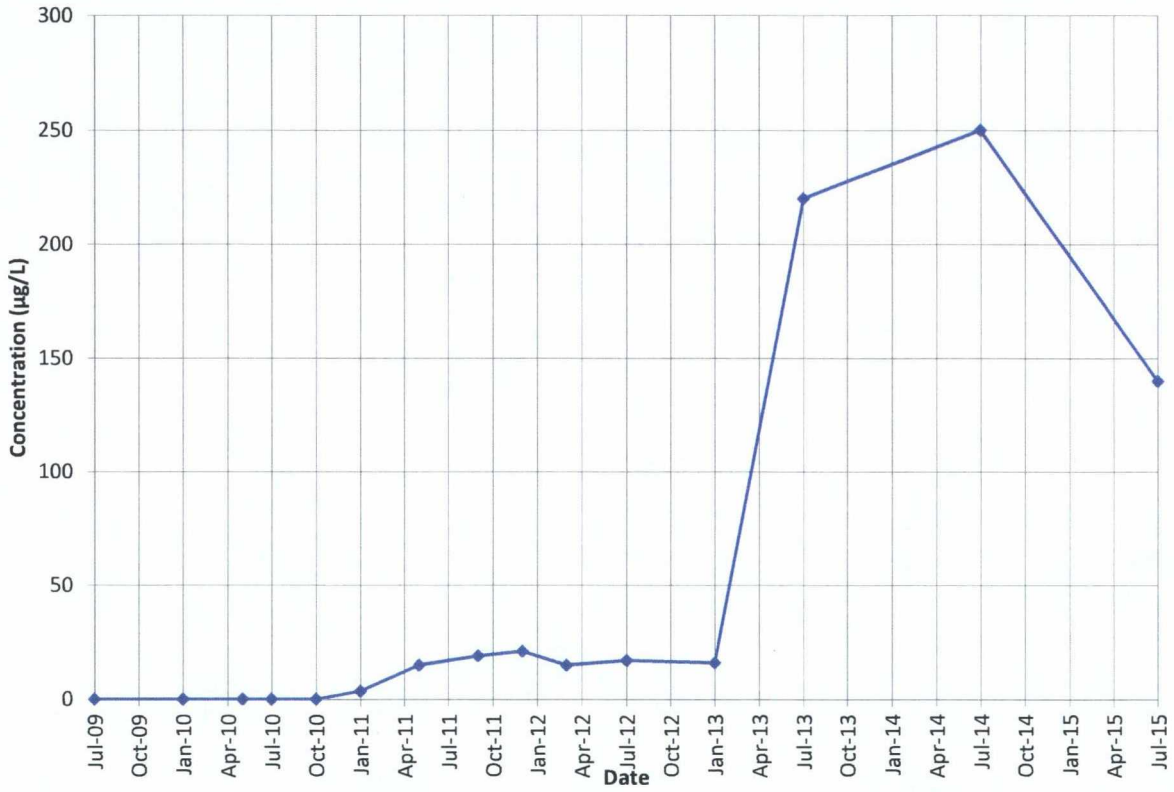
HGL HydroGeoLogic, Inc

Project: EP90054

Legend

PCE concentration in micrograms per liter (µg/L).

Graph 4-3
OU2 MW-2B
PCE Results



Date	PCE (µg/L)
Jul-09	ND
Jan-10	ND
May-10	ND
Jul-10	ND
Oct-10	ND
Jan-11	3.6
May-11	15
Sep-11	19
Dec-11	21
Mar-12	15
Jul-12	17
Jan-13	16
Jul-13	220
Jul-14	250
Jul-15	140

Note: The elevated concentration detected of 19,000 J µg/L in December 2011 is believed to have been caused by well development drawing the plume toward the well.

HGL HydroGeoLogic, Inc

Project: EP90054

Legend

PCE Concentration in micrograms per liter (µg/L).

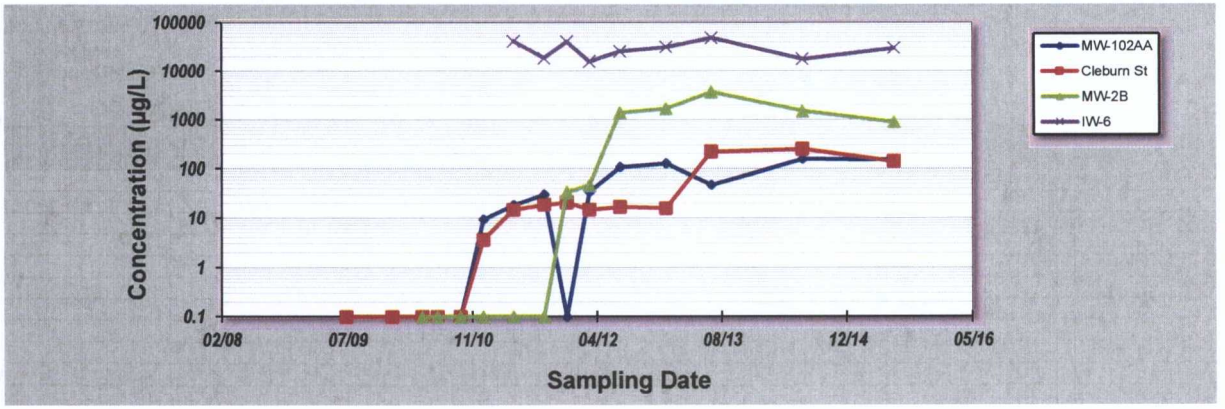
Graph 4-4
OU2 Cleburn Street Well
PCE Results

MANN-KENDALL
PCE Trend Analysis (OU2)

Graph 4-5

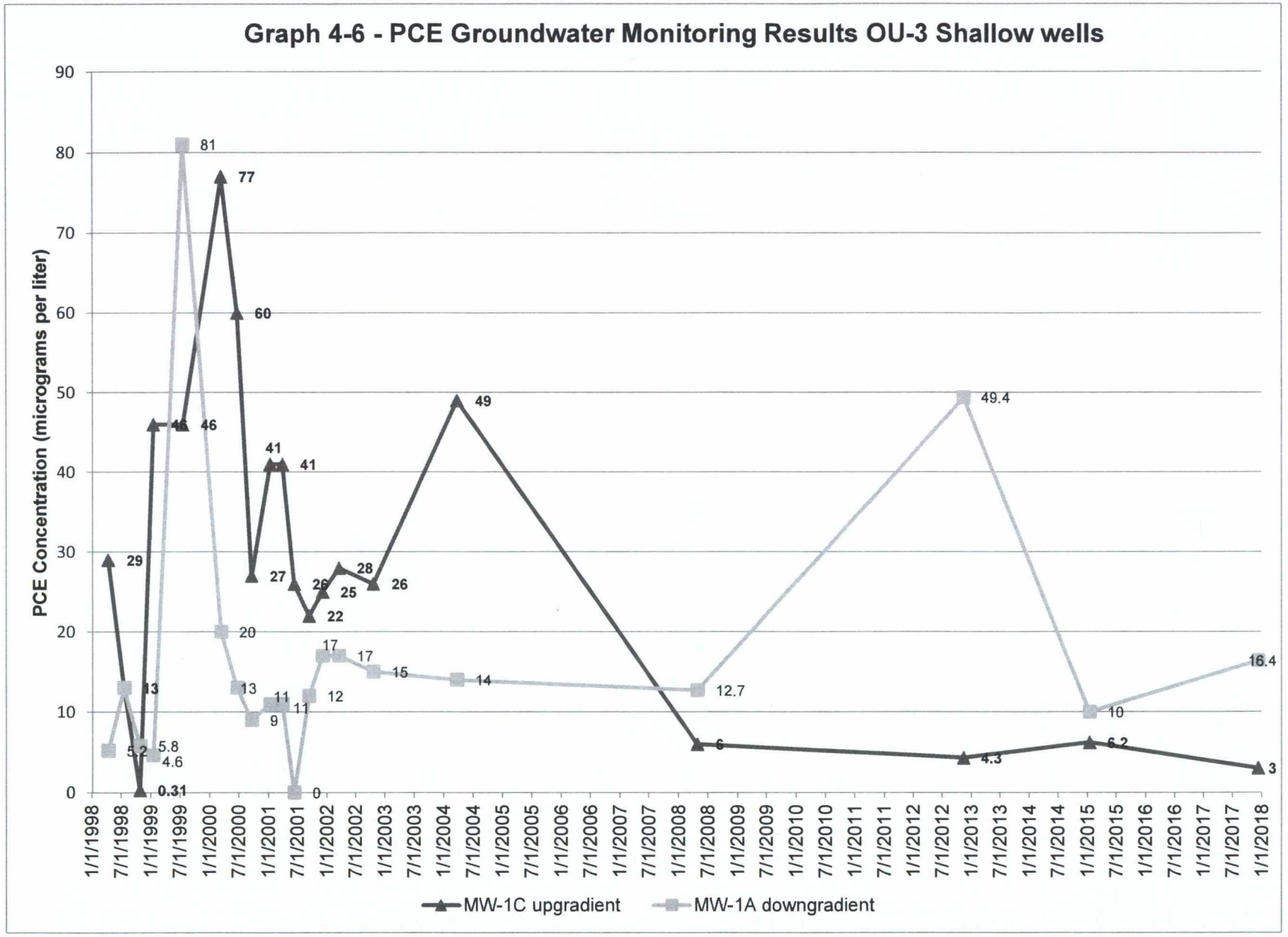
Evaluation Date:	26-Feb-18	Job ID:	NA
Facility Name:	Cleburn Street Well Superfund Site OU-3	Constituent:	Tetrachloroethene
Conducted By:	U.S. Army Corps of Engineers, Kansas City	Concentration Units:	µg/L

Sampling Point ID:	MW-102AA	Cleburn St	MW-2B	IW-6			
Sampling Event	Sampling Date	TETRACHLOROETHENE CONCENTRATION (µg/L)						
1	1-Jul-09		0.1					
2	1-Jan-10		0.1					
3	1-May-10	0.1	0.1	0.1				
4	1-Jul-10	0.1	0.1	0.1				
5	1-Oct-10	0.1	0.1	0.1				
6	1-Jan-11	9.6	3.6	0.1				
7	1-May-11	19	15	0.1	42000			
8	1-Sep-11	31	19	0.1	19000			
9	1-Dec-11	0.1	21	34	41000			
10	1-Mar-12	35	15	47	16000			
11	1-Jul-12	110	17	1400	26000			
12	1-Jan-13	130	16	1700	32000			
13	1-Jul-13	48	220	3700	49000			
14	1-Jul-14	160	250	1500	18000			
15	1-Jul-15	150	140	890	30000			
16								
17								
18								
19								
20								
Coefficient of Variation:		1.15	1.75	1.57	0.39			
Mann-Kendall Statistic (S):		60	76	51	-2			
Confidence Factor:		>99.9%	>99.9%	100.0%	54.0%			
Concentration Trend:		Increasing	Increasing	Increasing	Stable			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

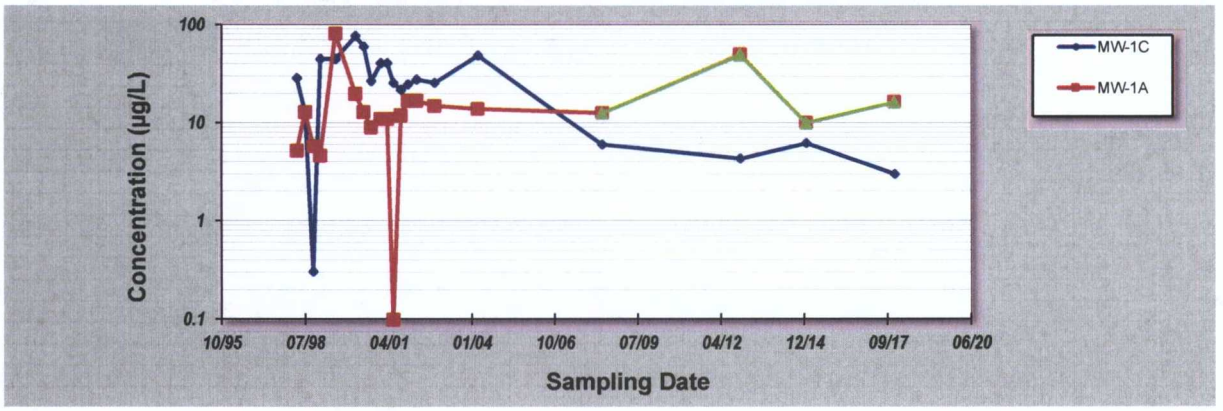

Graph 4-6 - PCE Groundwater Monitoring Results OU-3 Shallow wells
PCE Concentration (micrograms per liter)
90
80
70
60
50
40
30
20
10
0
1/1/1998
7/1/1998
1/1/1999
7/1/1999
1/1/2000
7/1/2000
1/1/2001
7/1/2001
1/1/2002
7/1/2002
1/1/2003
7/1/2003
1/1/2004
7/1/2004
1/1/2005
7/1/2005
1/1/2006
7/1/2006
1/1/2007
7/1/2007
1/1/2008
7/1/2008
1/1/2009
7/1/2009
1/1/2010
7/1/2010
1/1/2011
7/1/2011
1/1/2012
7/1/2012
1/1/2013
7/1/2013
1/1/2014
7/1/2014
1/1/2015
7/1/2015
1/1/2016
7/1/2016
1/1/2017
7/1/2017
1/1/2018
29
0.31
46
77
60
41
41
27
22
25
28
26
49
6
4.3
6.2
3
5.2
5.8
4.6
81
20
13
9
11
0
12
17
17
15
14
12.7
49.4
10
16.4
MW-1C upgradient
MW-1A downgradient

MANN-KENDALL
PCE Trend Analysis (OU3)

Graph 4-7

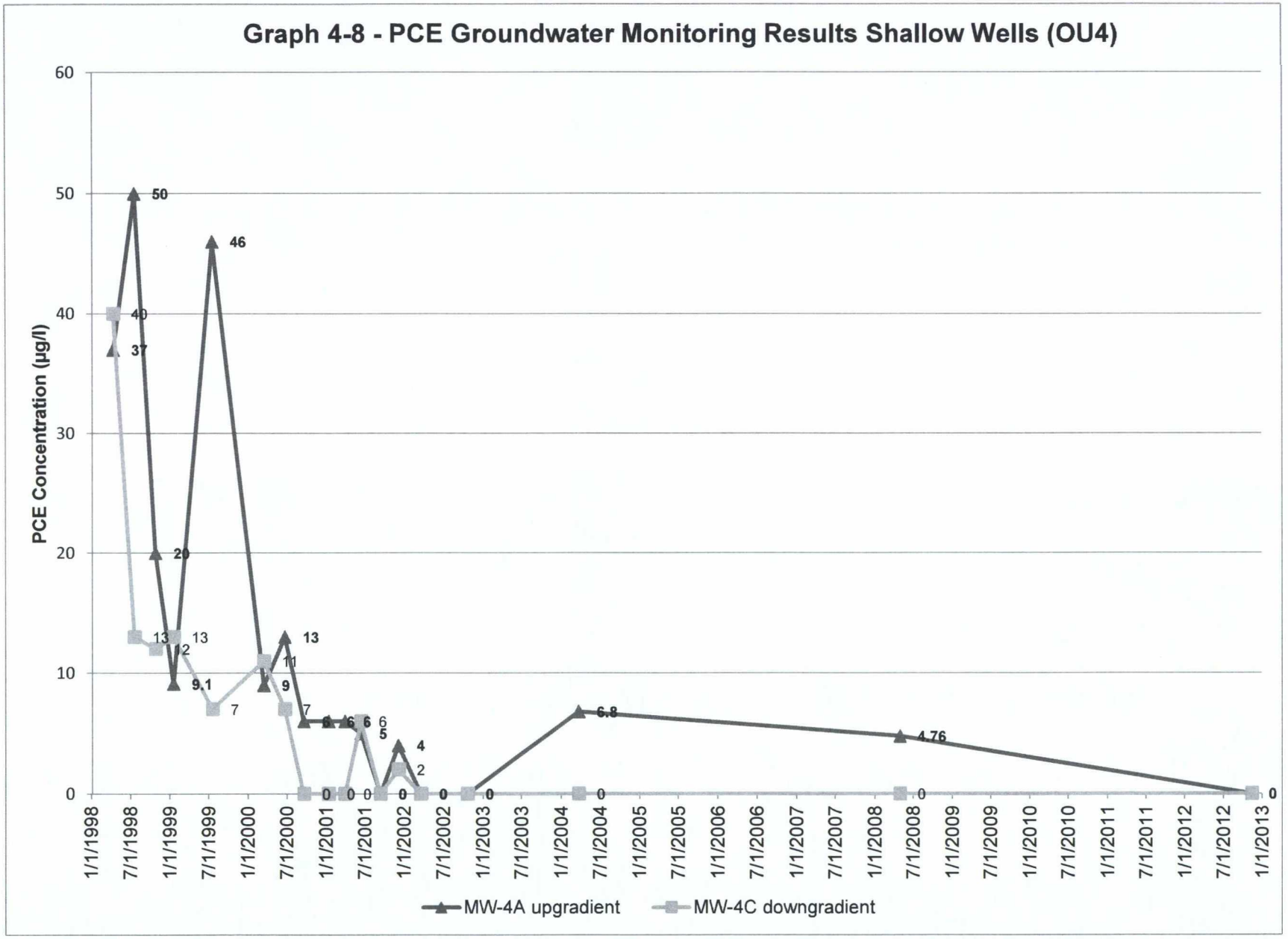
Evaluation Date:	26-Feb-18	**Job ID:**	NA
Facility Name:	Cleburn Street Well Superfund Site OU-3	**Constituent:**	Tetrachloroethene
Conducted By:	U.S. Army Corps of Engineers, Kansas City	**Concentration Units:**	µg/L

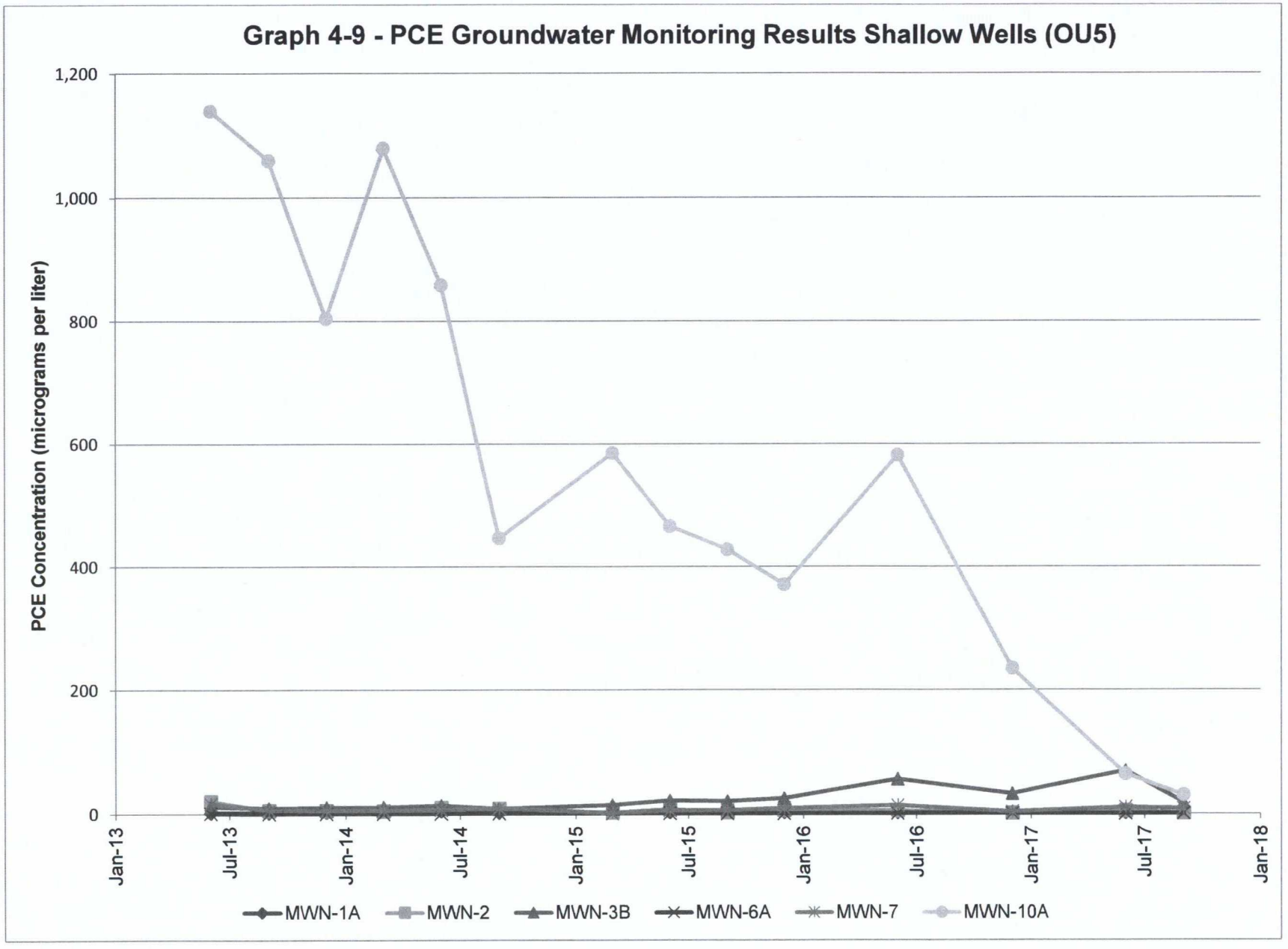
Sampling Point ID:	MW-1C	MW-1A	MW-1A Recent				
Sampling Event	Sampling Date	TETRACHLOROETHENE CONCENTRATION (µg/L)						
1	14-Apr-98	29	5.2					
2	21-Jul-98	13	13					
3	27-Oct-98	0.31	5.8					
4	19-Jan-99	45	4.6					
5	20-Jul-99	45	81					
6	15-Mar-00	77	20					
7	22-Jun-00	60	13					
8	20-Sep-00	27	9					
9	13-Jan-01	41	11					
10	31-Mar-01	41	11					
11	13-Jun-01	26	0.1					
12	13-Sep-01	22	12					
13	6-Dec-01	25	17					
14	20-Mar-02	28	17					
15	22-Oct-02	26	15					
16	24-Mar-04	49	14					
17	29-Apr-08	6	12.7	12.7				
18	14-Nov-12	4.3	49.4	49.4				
19	15-Jan-15	6.2	10	10				
20	12-Dec-17	3	16.4	16.4				
21								
22								
23								
24								
25								
Coefficient of Variation:		0.71	1.07	0.83				
Mann-Kendall Statistic (S):		-63	41	0				
Confidence Factor:		97.9%	90.2%	37.5%				
Concentration Trend:		Decreasing	Prob. Increasing	Stable				

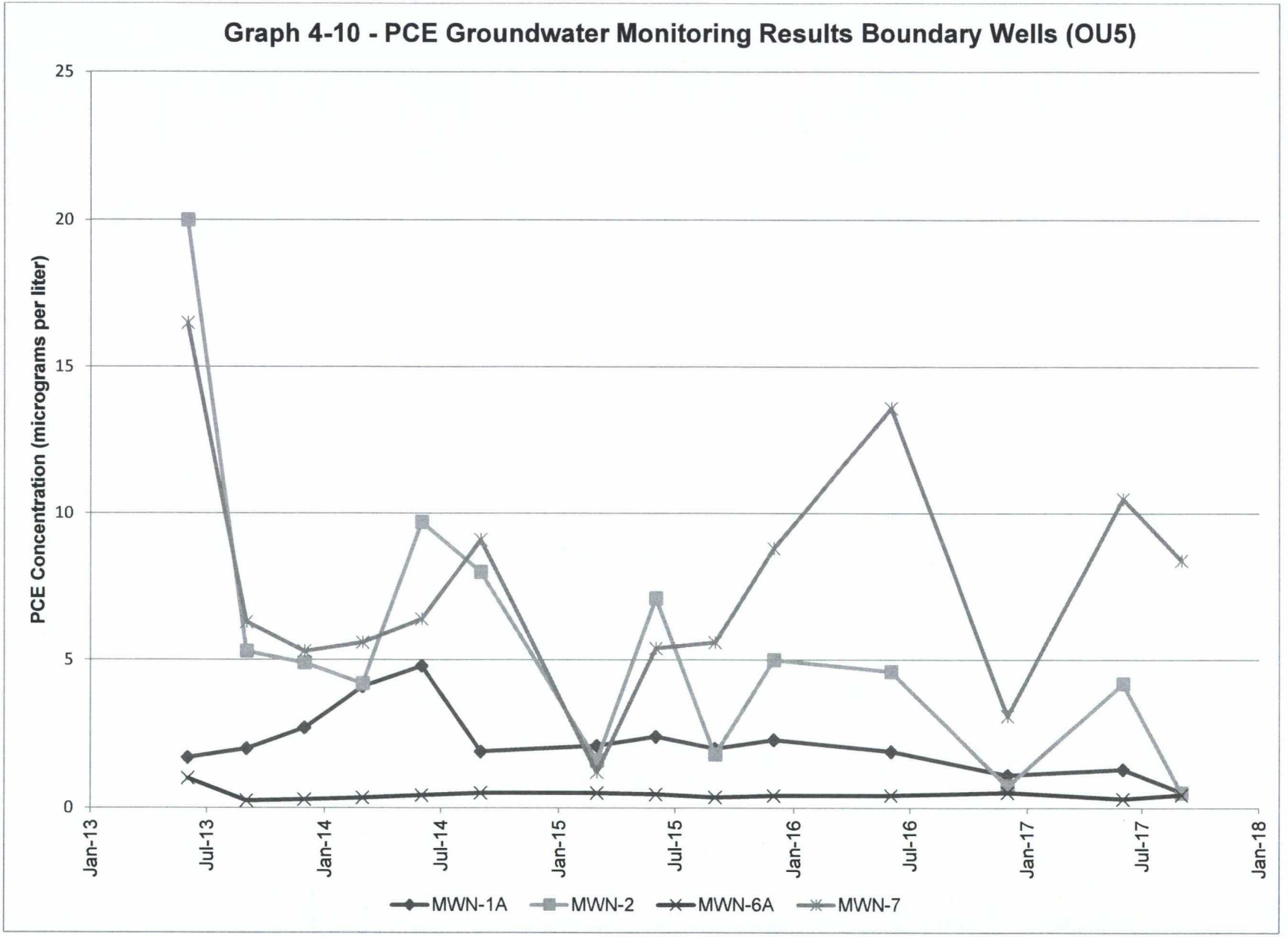


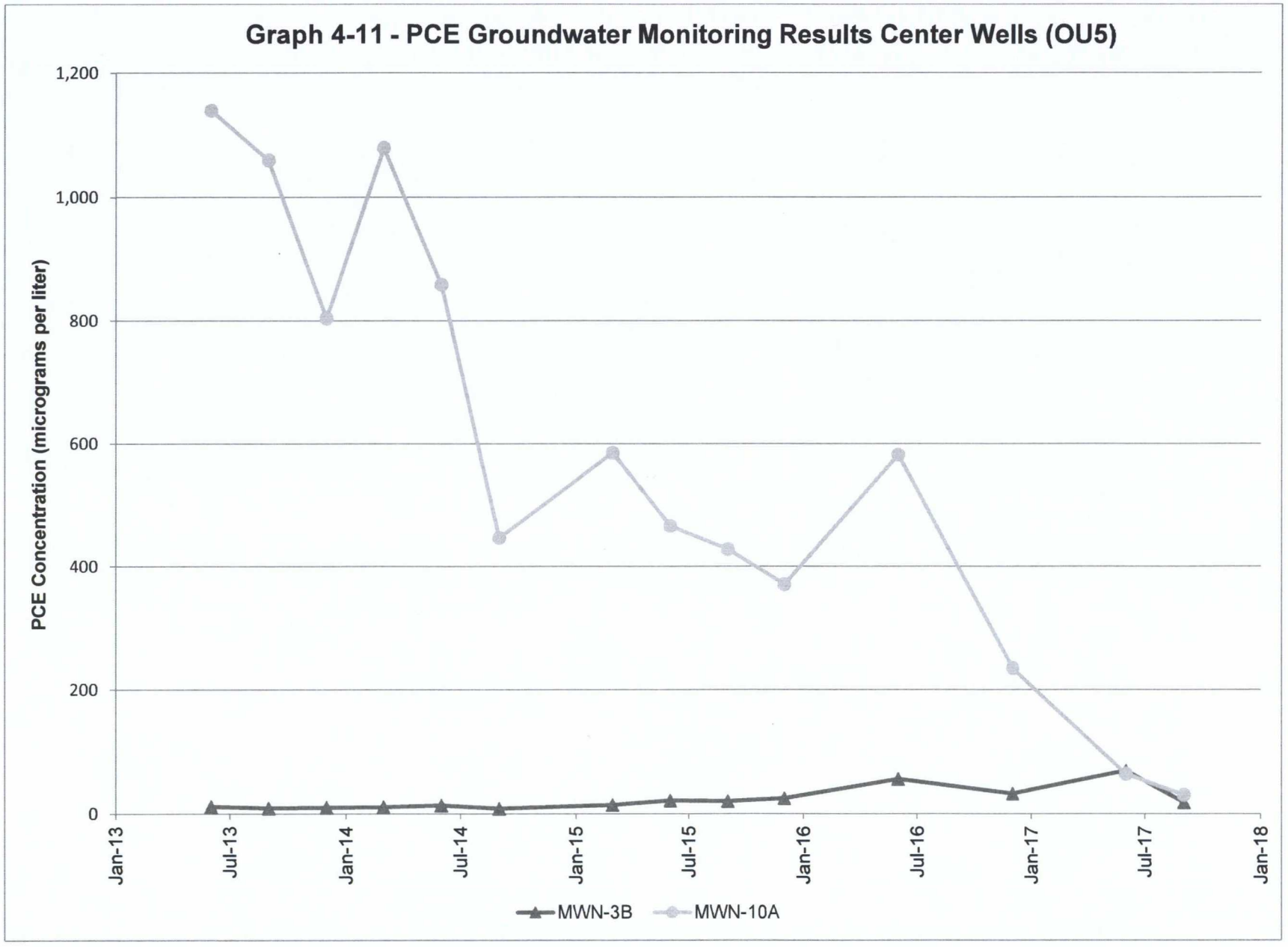
Notes:

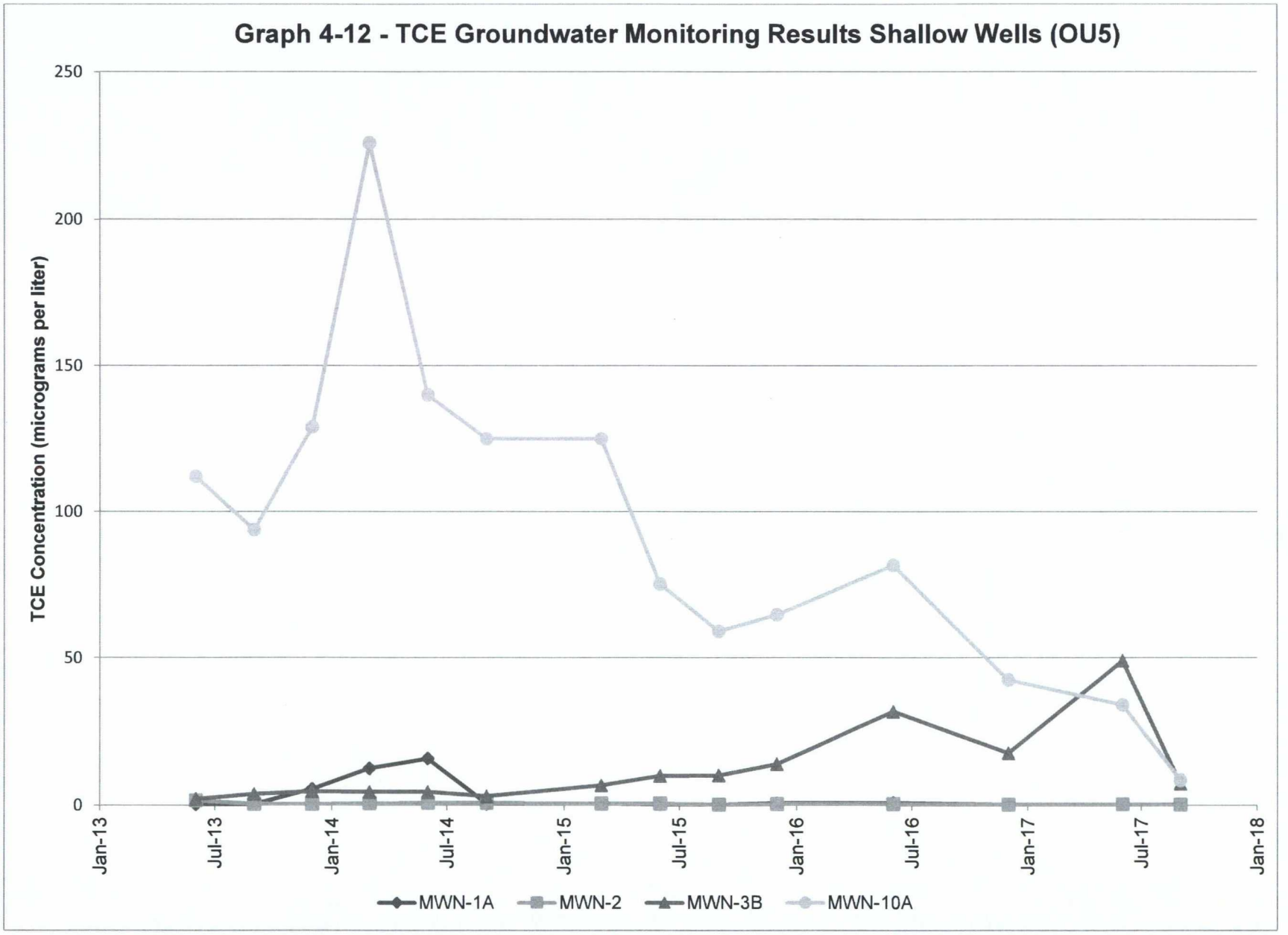
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

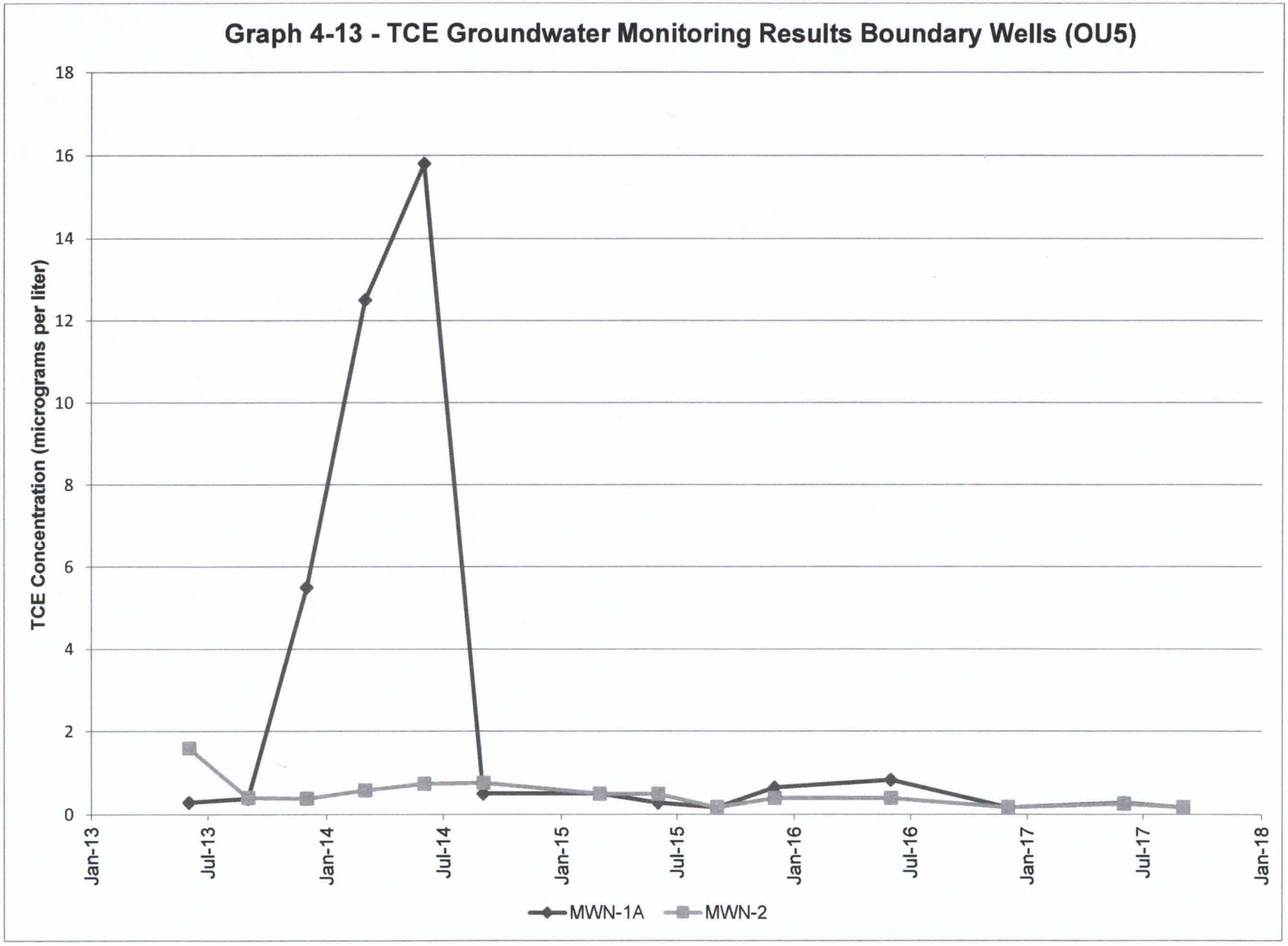

Graph 4-8 - PCE Groundwater Monitoring Results Shallow Wells (OU4)
PCE Concentration (µg/l)
60
50
40
30
20
10
0
1/1/1998
7/1/1998
1/1/1999
7/1/1999
1/1/2000
7/1/2000
1/1/2001
7/1/2001
1/1/2002
7/1/2002
1/1/2003
7/1/2003
1/1/2004
7/1/2004
1/1/2005
7/1/2005
1/1/2006
7/1/2006
1/1/2007
7/1/2007
1/1/2008
7/1/2008
1/1/2009
7/1/2009
1/1/2010
7/1/2010
1/1/2011
7/1/2011
1/1/2012
7/1/2012
1/1/2013
MW-4A upgradient
MW-4C downgradient

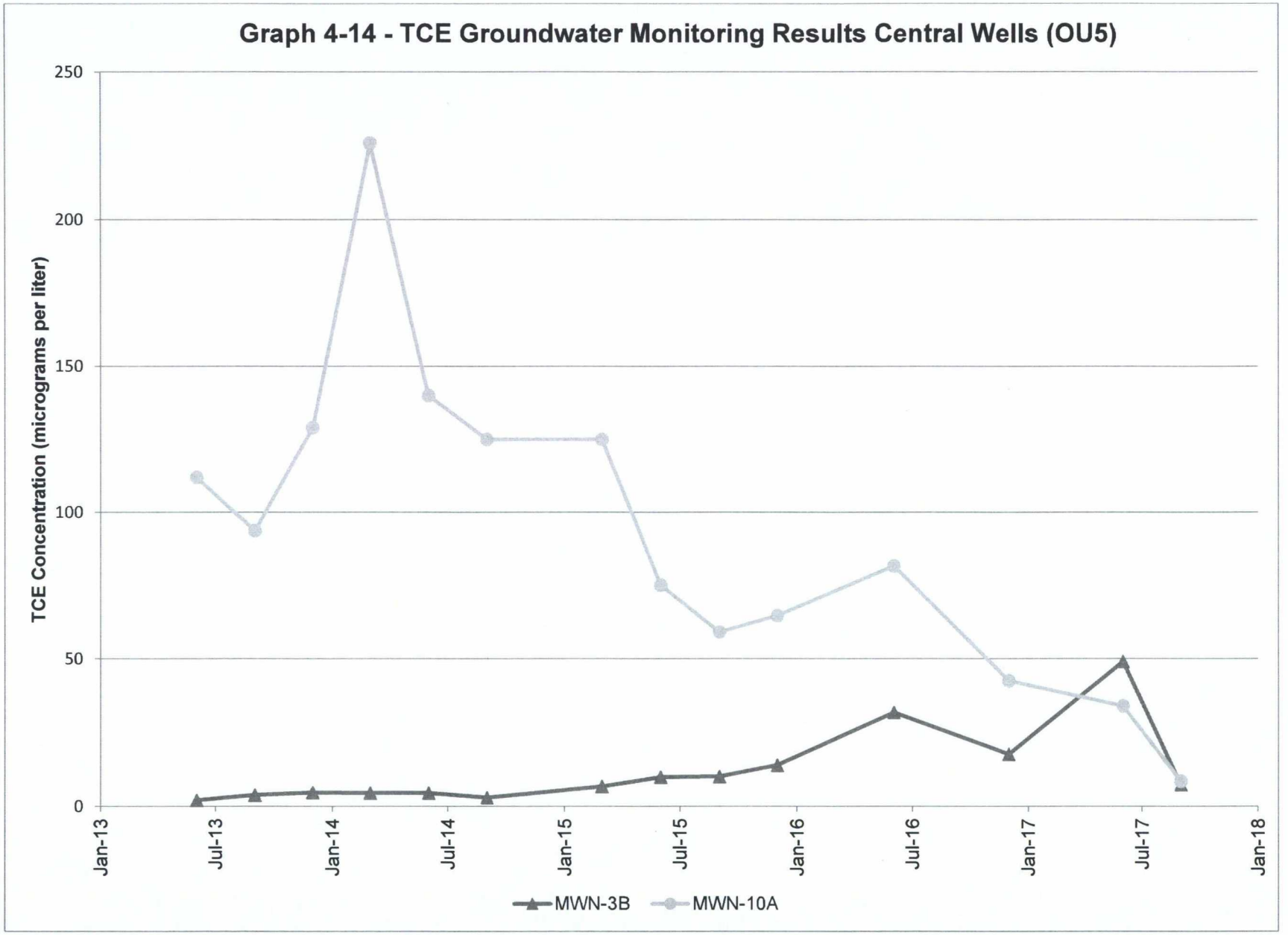

Graph 4-9 - PCE Groundwater Monitoring Results Shallow Wells (OU5)
PCE Concentration (micrograms per liter)
1,200
1,000
800
600
400
200
0
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
MWN-1A
MWN-2
MWN-3B
MWN-6A
MWN-7
MWN-10A

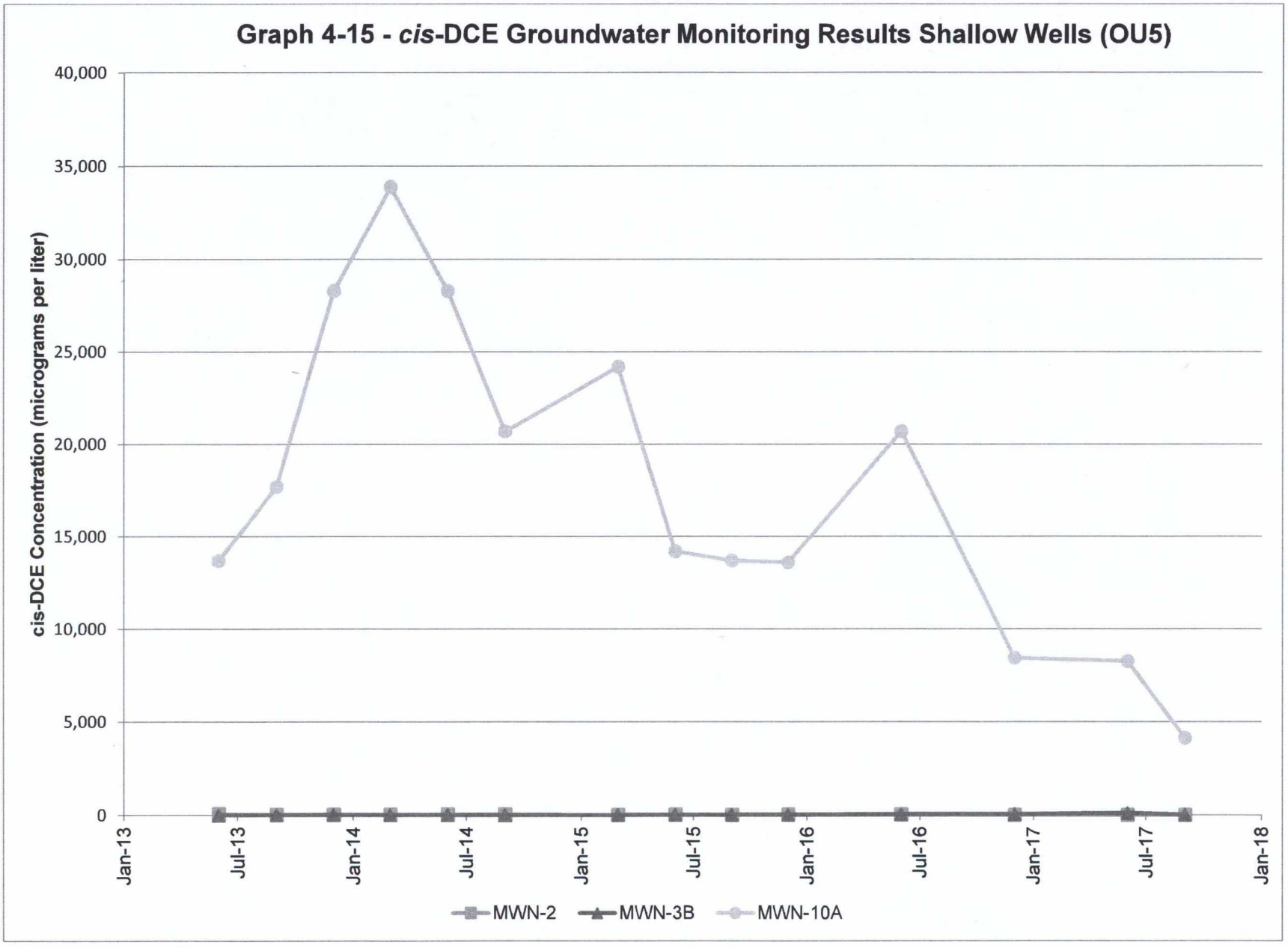

Graph 4-10 - PCE Groundwater Monitoring Results Boundary Wells (OU5)
PCE Concentration (micrograms per liter)
25
20
15
10
5
0
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
MWN-1A
MWN-2
MWN-6A
MWN-7

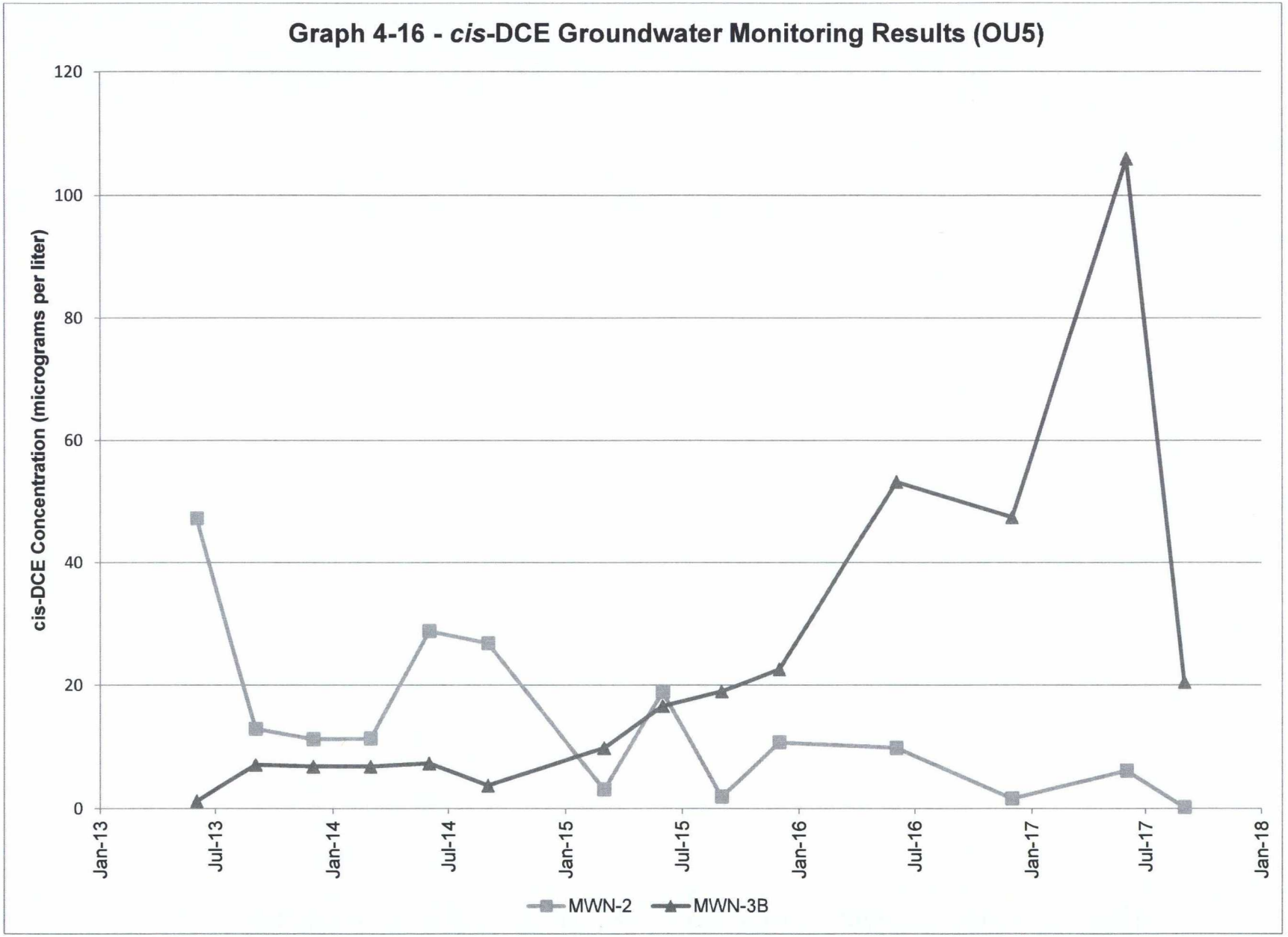

Graph 4-11 - PCE Groundwater Monitoring Results Center Wells (OU5)
PCE Concentration (micrograms per liter)
1,200
1,000
800
600
400
200
0
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
MWN-3B
MWN-10A

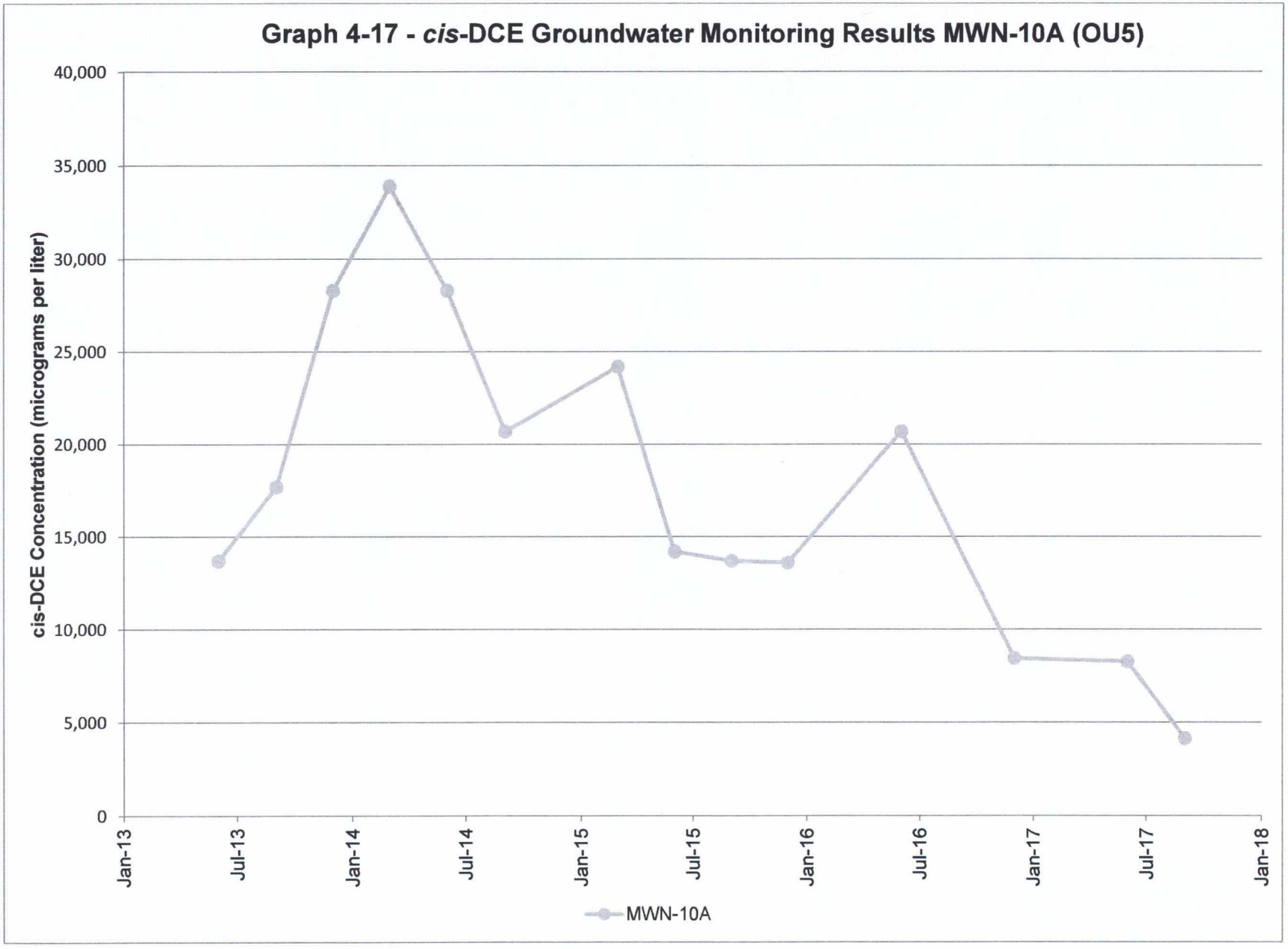

Graph 4-12 - TCE Groundwater Monitoring Results Shallow Wells (OU5)
TCE Concentration (micrograms per liter)
250
200
150
100
50
0
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
MWN-1A
MWN-2
MWN-3B
MWN-10A


Graph 4-13 - TCE Groundwater Monitoring Results Boundary Wells (OU5)
TCE Concentration (micrograms per liter)
18
16
14
12
10
8
6
4
2
0
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
MWN-1A
MWN-2


Graph 4-14 - TCE Groundwater Monitoring Results Central Wells (OU5)
TCE Concentration (micrograms per liter)
250
200
150
100
50
0
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
MWN-3B
MWN-10A


Graph 4-15 - cis-DCE Groundwater Monitoring Results Shallow Wells (OU5)
cis-DCE Concentration (micrograms per liter)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
MWN-2
MWN-3B
MWN-10A


Graph 4-16 - cis-DCE Groundwater Monitoring Results (OU5)
cis-DCE Concentration (micrograms per liter)
120
100
80
60
40
20
0
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
MWN-2
MWN-3B


Graph 4-17 - cis-DCE Groundwater Monitoring Results MWN-10A (OU5)
cis-DCE Concentration (micrograms per liter)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
MWN-10A

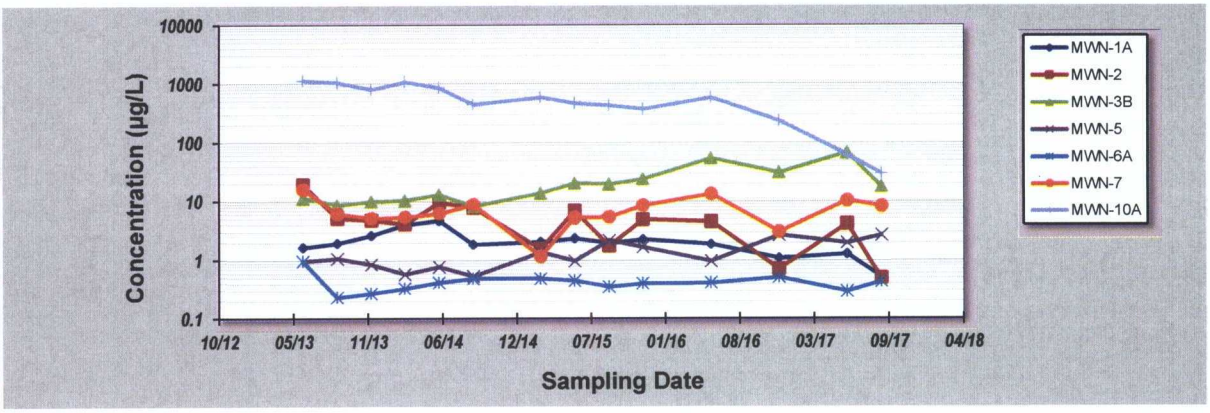
MANN-KENDALL
PCE Trend Analysis (OU5)

Graph 4-18

Evaluation Date: 12-Mar-18
Facility Name: Cleburn Street Well Superfund Site OU-5
Conducted By: U.S. Army Corps of Engineers, Kansas City

Job ID: NA
Constituent: Tetrachloroethene
Concentration Units: µg/L

Sampling Point ID:	MWN-1A	MWN-2	MWN-3B	MWN-5	MWN-6A	MWN-7	MWN-10A
Sampling Event	Sampling Date	TETRACHLOROETHENE CONCENTRATION (µg/L)						
1	Jun-13	1.7	20	11.6	1	1	16.5	1140
2	Sep-13	2	5.3	8.9	1.1	0.24	6.3	1060
3	Dec-13	2.7	4.9	10.3	0.88	0.28	5.3	804
4	Mar-14	4.1	4.2	10.8	0.6	0.34	5.6	1080
5	Jun-14	4.8	9.7	13.4	0.8	0.43	6.4	859
6	Sep-14	1.9	8	8.5	0.55	0.5	9.1	447
7	Mar-15	2.1	1.6	14.3	1.4	0.5	1.2	585
8	Jun-15	2.4	7.1	21.1	1	0.46	5.4	466
9	Sep-15	2	1.8	20.2	2.2	0.36	5.6	428
10	Dec-15	2.3	5	24.8	1.7	0.41	8.8	371
11	Jun-16	1.9	4.6	55.7	0.99	0.42	13.6	582
12	Dec-16	1.1	0.73	32.1	2.7	0.52	3.1	235
13	Jun-17	1.3	4.2	69.2	2	0.3	10.5	63.7
14	Sep-17	0.53	0.51	18.4	2.7	0.44	8.4	30.4
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.50	0.89	0.80	0.53	0.41	0.53	0.62
Mann-Kendall Statistic (S):		-35	-48	59	41	10	6	-73
Confidence Factor:		96.9%	99.6%	100.0%	98.7%	68.6%	60.6%	>99.9%
Concentration Trend:		Decreasing	Decreasing	Increasing	Increasing	No Trend	No Trend	Decreasing



Notes:

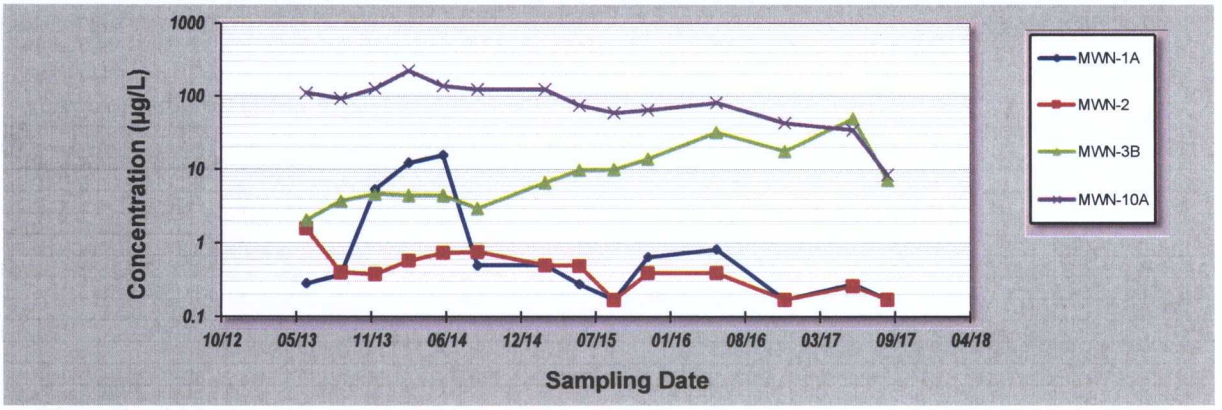
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

MANN-KENDALL
TCE Trend Analysis (OU5)

Graph 4-19

Evaluation Date:	12-Mar-18	**Job ID:**	NA
Facility Name:	Cleburn Street Well Superfund Site OU-5	**Constituent:**	Trichloroethene
Conducted By:	U.S. Army Corps of Engineers, Kansas City	**Concentration Units:**	µg/L

Sampling Point ID:	MWN-1A	MWN-2	MWN-3B	MWN-10A			
Sampling Event	**Sampling Date**	**TRICHLOROETHENE CONCENTRATION (µg/L)**						
1	Jun-13	0.29	1.6	2.1	112			
2	Sep-13	0.38	0.4	3.8	93.8			
3	Dec-13	5.5	0.38	4.7	129			
4	Mar-14	12.5	0.58	4.5	226			
5	Jun-14	15.8	0.74	4.5	140			
6	Sep-14	0.5	0.76	3	125			
7	Mar-15	0.5	0.5	6.7	125			
8	Jun-15	0.28	0.49	9.9	75.2			
9	Sep-15	0.17	0.17	10.1	59.1			
10	Dec-15	0.65	0.39	13.9	64.7			
11	Jun-16	0.83	0.39	31.8	81.7			
12	Dec-16	0.17	0.17	17.6	42.5			
13	Jun-17	0.28	0.26	49.1	34			
14	Sep-17	0.17	0.17	7.3	8.5			
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.87	0.74	1.10	0.58			
Mann-Kendall Statistic (S):		-28	-49	64	-58			
Confidence Factor:		92.9%	99.7%	>99.9%	100.0%			
Concentration Trend:		Prob. Decreasing	Decreasing	Increasing	Decreasing			



Notes:

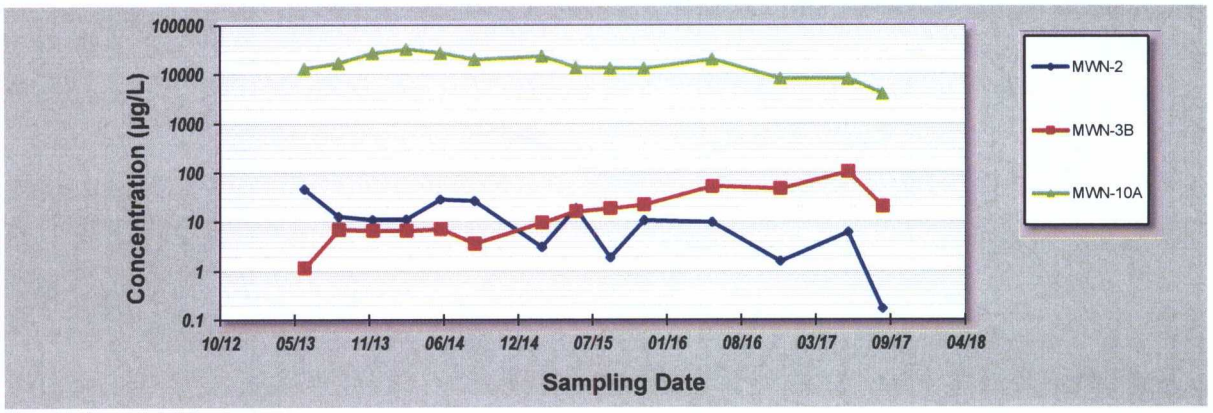
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

MANN-KENDALL
cis-DCE Trend Analysis (OU5)

Graph 4-20

Evaluation Date:	12-Mar-18	**Job ID:**	NA
Facility Name:	Cleburn Street Well Superfund Site OU-5	**Constituent:**	cis-Dichloroethene
Conducted By:	U.S. Army Corps of Engineers, Kansas City	**Concentration Units:**	µg/L

Sampling Point ID:	MWN-2	MWN-3B	MWN-10A				
Sampling Event	**Sampling Date**	**CIS-DICHLOROETHENE CONCENTRATION (µg/L)**						
1	Jun-13	47.2	1.2	13700				
2	Sep-13	12.9	7.1	17700				
3	Dec-13	11.2	6.8	28300				
4	Mar-14	11.3	6.8	33900				
5	Jun-14	28.8	7.3	28300				
6	Sep-14	26.8	3.7	20700				
7	Mar-15	3.1	9.8	24200				
8	Jun-15	18.9	16.6	14200				
9	Sep-15	1.9	19	13700				
10	Dec-15	10.7	22.6	13600				
11	Jun-16	9.8	53.2	20700				
12	Dec-16	1.6	47.4	8430				
13	Jun-17	6.1	106	8260				
14	Sep-17	0.17	20.5	4130				
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.96	1.21	0.48				
Mann-Kendall Statistic (S):		-55	68	-50				
Confidence Factor:		99.9%	>99.9%	99.8%				
Concentration Trend:		Decreasing	Increasing	Decreasing				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Appendix I
Institutional Controls

Chapter 35
Article VI. Groundwater Control Area No. 1

§35-60. Purpose

The United States Environmental Protection Agency issued a Record of Decision (ROD) for the Cleburn Street Well Superfund Site on June 7, 1996, which identified three sources of subsurface soil and groundwater contamination. These sources included the former One Hour Martinizing facility, Liberty Cleaners and Shirt Launderers, and Ideal Cleaners. The former Nebraska Solvent Company was identified as a possible fourth contamination source subject to subsequent evaluation and testing. The ROD described selected remedies for the three source areas, an element of which required the City of Grand Island to enact and enforce institutional control ordinances designating a Groundwater Control Area No. 1 in which groundwater use would be restricted to prevent human exposure and consumption of potentially contaminated groundwater, requiring registration of existing wells and requiring approval and registration of new wells. The institutional control ordinances are to remain in full force and effect until the groundwater contamination identified in the ROD is reduced to a level making the groundwater safe to be used as a source of drinking water pursuant to 42 USC §300g, et seq., the Safe Drinking Water Act, or its successor legislation.

§35-61. Definitions

As used in this Article, the following terms mean:

Groundwater means water pumped from a well located within the Groundwater Control Area No. 1 described in Section 35-62.

Groundwater Contamination means the chemicals of concern (COC) described in the United States Environmental Protection Agency Record of Decision (ROD) for the Cleburn Street Well Superfund Site date June 7, 1996, which was received and accepted by the Mayor and City Council pursuant to Resolution 98-28.

Groundwater Control Area No. 1 means a defined area within the corporate limits of the City of Grand Island subject to the institutional controls provided in this Article which are intended to prohibit human consumption of potentially contaminated groundwater from wells.

Well means a hole or shaft sunk into the earth in order to obtain water from a natural subterranean supply or aquifer.

The definitions found in Neb. Rev. Stat., Chapter 46 - Irrigation and Regulation of Water are adopted by reference, except where such definitions are in conflict with those provided in this section above.

§35-62. Groundwater Control Area Boundaries

The outer boundaries of the Groundwater Control Area No. 1 are described as follows: Commencing at the southeasterly corner of the intersection of 9th Street and Adams Street; thence running northeasterly along the south boundary of 9th Street to the southwesterly corner of the intersection of 9th Street and Sycamore Street; thence running southeasterly along the west boundary of Sycamore Street to the northwesterly corner of the intersection of Sycamore Street and 1st Street; thence running southwesterly along the north boundary of 1st Street to the northwesterly corner of the intersection of 1st Street and Locust Street; thence running southerly along the west boundary of Locust Street

to the intersection of Locust Street and Division Street: thence running southwesterly along the north boundary of Division Street to the northeasterly corner of the intersection of Division Street and Adams Street: thence running northwesterly along the east boundary of Adams Street to the point of beginning.

§35-63. Duration of Institutional Control Ordinance

(A) This Article shall remain in full force and effect for an initial term of twenty-five (25) years from the effective date following approval and adoption by the Mayor and City Council.

(B) The term of this Article may be extended by the Mayor and City Council if at the end of the initial term there remains groundwater contamination identified in the ROD described in Section 35-60 making the groundwater unsafe to be used as a source of drinking water pursuant to the Safe Drinking Water Act or its successor legislation.

(C) In the event the City of Grand Island is notified during the initial term by the Environmental Protection Agency that groundwater contamination within the Groundwater Control Area No. 1 has been reduced to a level making the groundwater safe to be used as a source of drinking water pursuant to the Safe Drinking Water Act or its successor legislation, the Mayor and City Council may proceed to repeal this Article forthwith.

§35-64. Prohibited Groundwater Uses

(A) Groundwater pumped from wells within the Groundwater Control Area No. 1 shall not be used for any human consumption including drinking water, cooking, washing or other household uses. Because groundwater from wells within the groundwater control area may be contaminated and present a hazard to the health, safety and welfare of persons exposed to said water, any known human consumption of groundwater from wells within the Groundwater Control Area No. 1 is a violation of this Article and is declared a public nuisance subject to abatement as provided hereafter.

(B) This Article shall not apply to uses of groundwater pumped from wells within the Groundwater Control Area No. 1 which do not involve human consumption, including, but not limited to, non-contact cooling wate for industrial, commercial or residential uses and watering of vegetation other than gardens, plants and trees producing food for human consumption.

§35-65. Well Registration

(A) All wells for which drilling has commenced or existing within the Groundwater Control Area No. 1 as of the effective date of this Article shall be registered with the Building Department by the person owning the real estate on which the well is located. There shall be no fee for registering an existing well.

(B) No person shall drill or install a well within the Groundwater Control Area No. 1 prior to applying for and obtaining a well permit from the Building Department. There shall be a nonrefundable fee in accordance with the City of Grand Island Fee Schedule paid to the Building Department contemporaneously with making an application for a well permit.

§35-66. Existing Well Registration, Information Required

The following information shall be submitted to the Building Department in connection with registering a wel in existence as of the effective date of this Article:

(A) The name and address of the person owning the real estate on which the well is located.

(B) The address and legal description of the property on which the well is located.

(C) The address of all properties being served by groundwater pumped from the well.

(D) A description of the uses of the water pumped from the well, including specifically whether such groundwater is used for human consumption including, but not limited to drinking, cooking, washing, or othe household uses.

(E) Whether City water is available to the property currently served by the well.

(F) The depth of the well, if known.

(G) A diagram showing the location of the well.

§35-67. New Well Registration, Application for Well Permit

The following information shall be submitted to the Building Department in connection with applying for a well permit for a new well in the Groundwater Control Area No. 1:

(A) The name and address of the person owning the real estate on which the proposed well is to be located.

(B) The address and legal description of the property on which the proposed well is to be located.

(C) The address of all properties to be served by groundwater pumped from the proposed well.

(D) A description of the uses to be made of water pumped from the proposed well, including a certification that said groundwater will not be used for human consumption, including but not limited to drinking, cooking, washing, or other household uses.

(E) Whether City water is available to the property to be served by the proposed well.

(F) The depth of the proposed well.

(G) A diagram showing the location of the proposed well.

§35-68. Violations of Institutional Control Ordinance, Abatement of Public Nuisance

Whenever the Building Department Director, or his/her designee has inspected any well within the Groundwater Control Area No. 1 and determined that groundwater pumped from the well is being used in violation of this Article, he/she shall send a written notice to the owner of record or owner's duly authorized agent, or person in

possession, charge or control, or to the occupant by ordinary first-class mail and by certified mail, return receipt requested, notifying the addressee of the violation. The written notice shall contain the following information:

(A) The street address and a legal description sufficient for identification of the premises on which the well is located.

(B) A brief and concise description of the acts or circumstances constituting a violation of this Article.

(C) A brief and concise description of the corrective action required to be taken to render the well and groundwater uses in compliance with this code.

(D) A brief and concise statement advising the addressee that if the well and groundwater uses are not brought into compliance with this Article within the time specified, that the Building Department Director, or his/her designee may order electrical power to the well disconnected and may request the City Attorney, with the consent of the Mayor, to file an action to abate the public nuisance and charge the costs thereof against the real estate, the owner of record and the addressee.

§35-69. Procedure for Abatement of Public Nuisance

If the addressee of the written notice described in Section 35-68 fails to abate said nuisance within the time specified, the City of Grand Island, at the written request of the Building Department Director, or his/her designee directed to the City Attorney, and with the consent of the Mayor, may proceed to abate said public nuisance pursuant to Section 20-15 of the Grand Island City Code, and charge the costs thereof against the real estate on which the well is located and the addressee of the written notice.

In the event the use of the groundwater in violation of this Article might cause irreparable harm or poses a threat to public health, safety or welfare, or the health, safety or welfare of the persons using the groundwater, the written notice to abate pursuant to Section 20-15 shall not be required as a condition precedent to commencing a legal action to obtain abatement of the nuisance. The City of Grand Island, with the consent of the Mayor, may immediately file an action requesting such temporary and permanent orders as are appropriate to expeditiously and permanently abate said public nuisances and protect the public health, safety or welfare or the health, safety or welfare of persons using the groundwater in violation of this Article.

Appendix J
Public Notice

PUBLIC NOTICE

FOURTH FIVE-YEAR REVIEW START
Cleburn Street Well Site
Grand Island, Hall County, Nebraska
September 2017

EPA Region 7: Iowa, Kansas, Missouri, Nebraska, and Nine Tribal Nations

The U.S. Environmental Protection Agency (EPA) Region 7 has started the Fourth Five-Year Review for the Cleburn Street Well Site. Five-Year Reviews are required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) when hazardous substances remain on-site above levels that permit unrestricted use and unlimited exposure. Five-Year Reviews provide an opportunity to evaluate the site remedy to determine whether it remains protective of human health and the environment. This Five-Year Review should be completed in September 2018.

EPA encourages community members to ask questions and report any concerns about this site.

EPA has assessed the ability of the public to access the Five-Year Review through an internet-based repository, and has determined that the local community has this ability. As a result, the Fourth Five-Year Review for this site will be available through this website once completed:

https://semspub.epa.gov/src/collection/07/SC9463

Questions or requests for site information and/or the Five-Year Review process can be submitted to:

Pamela Houston
U.S. EPA Community Engagement Specialist
Email: houston.pamela@epa.gov

Additional site information is available at the following website:
https://www.epa.gov/superfund/cleburnstreetwell

U.S. Environmental Protection Agency
11201 Renner Boulevard, Lenexa, KS 66219
Phone: 1-800-223-0425

Appendix K
OU3 Vapor Intrusion Screening Level (VISL) Calculations

Site-specific VISL Results
Resident Equation Inputs

*** Inputted values different from Resident defaults are highlighted.**
Output generated 06APR2018:10:05:28

Variable	Resident Air Default Value	Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
ED_{res} (exposure duration) years	26	26
ED_{0-2} (mutagenic exposure duration first phase) years	2	2
ED_{2-6} (mutagenic exposure duration second phase) years	4	4
ED_{6-16} (mutagenic exposure duration third phase) years	10	10
ED_{16-26} (mutagenic exposure duration fourth phase) years	10	10
EF_{res} (exposure frequency) days/year	350	350
EF_{0-2} (mutagenic exposure frequency first phase) days/year	350	350
EF_{2-6} (mutagenic exposure frequency second phase) days/year	350	350
EF_{6-16} (mutagenic exposure frequency third phase) days/year	350	350
EF_{16-26} (mutagenic exposure frequency fourth phase) days/year	350	350
ET_{res} (exposure time) hours/day	24	24
ET_{0-2} (mutagenic exposure time first phase) hours/day	24	24
ET_{2-6} (mutagenic exposure time second phase) hours/day	24	24
ET_{6-16} (mutagenic exposure time third phase) hours/day	24	24
ET_{16-26} (mutagenic exposure time fourth phase) hours/day	24	24
THQ (target hazard quotient) unitless	0.1	1
LT (lifetime) years	70	70
TR (target risk) unitless	1.0E-06	1.0E-05

Resident Vapor Intrusion Screening Levels (VISL)
<a href= \/guide.html#Table1 ⮕ User's Guide Variable References

Output generated 06APR2018:10:05:28

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? ($C_{vp} > C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? ($C_{hc} > C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-05 or THQ=1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis
Tetrachloroethylene	127-18-4	Yes	Yes	Yes	Yes	4.17E+01	NC
Trichloroethylene	79-01-6	Yes	Yes	Yes	Yes	2.09E+00	NC
Vinyl Chloride	75-01-4	Yes	Yes	Yes	Yes	1.68E+00	CA

Chemical	Target Sub-Slab and Exterior Soil Gas Concentration (TCR=1E-05 or THQ=1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-05 or THQ=1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp} (16 ° C) (\µg/m³)	Maximum Groundwater Vapor Concentration C_{hc} (\µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (° C)	Lower Explosive Limit LEL (% by volume)
Tetrachloroethylene	1.39E+03	9.21E+01	No (5)	1.65E+08	9.33E+07	16	
Trichloroethylene	6.95E+01	7.77E+00	No (5)	4.88E+08	3.43E+08	16	8.00
Vinyl Chloride	5.59E+01	1.83E+00	Yes (2)	1.00E+10	8.07E+09	16	3.60

Chemical	LEL Ref	Inhalation Unit Risk (ug/m³)$^{-1}$	IUR Ref	Chronic RfC (mg/m³)	Chronic RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-05 $C_{ia,c}$ (µg/m³)	Noncarcinogenic VISL THQ=1 $C_{ia,nc}$ (µg/m³)
Tetrachloroethylene		2.60E-07	I	4.00E-02	I		1.08E+02	4.17E+01
Trichloroethylene	CRC89	4.10E-06	I	2.00E-03	I	Mut	4.78E+00	2.09E+00
Vinyl Chloride	CRC89	4.40E-06	I	1.00E-01	I	Mut	1.68E+00	1.04E+02

Chemical Properties
Output generated 06APR2018:10:05:28

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW (g/mol)	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	Pure Component Water Solubility S (mg/L)	S Ref
Tetrachloroethylene	127-18-4	Yes	Yes	165.83	PHYSPROP	1.85E+01	PHYSPROP	2.06E+02	PHYSPROP
Trichloroethylene	79-01-6	Yes	Yes	131.39	PHYSPROP	6.90E+01	PHYSPROP	1.28E+03	PHYSPROP
Vinyl Chloride	75-01-4	Yes	Yes	62.50	PHYSPROP	2.98E+03	EPI	8.80E+03	PHYSPROP

Chemical Properties
Output generated 06APR2018:10:05:28

Chemical	MCL (ug/L)	Henry's Law Constant @25° C (atm-m³/mole)	Henry's Law Constant (unitless)	Henry's Law Constant (16 ° C)	Henry's Law Constant Used in Calcs (unitless)	H`& HLC Ref	Enthalpy of vaporization @ groundwater temperature \Δ$H_{v,gw}$ (cal/mol)	Exponent for \Δ$H_{v,gw}$	Vapor Pressure VP (16 ° C) (mm Hg)
Tetrachloroethylene	5	1.77E-02	7.24E-01	4.53E-01	4.53E-01	PHYSPROP	-4777.95	0.35	1.03E+08
Trichloroethylene	5	9.85E-03	4.03E-01	2.68E-01	2.68E-01	PHYSPROP	-4183.08	0.35	3.25E+08
Vinyl Chloride	2	2.78E-02	1.14E+00	9.18E-01	9.18E-01	PHYSPROP	-2342.57	0.34	8.09E+09

Chemical	Air Diffusivity D_{ia} (cm^2/s)	D_{ia} (16 °C) (cm^2/s)	D_{ia} Used in Calcs (cm^2/s)	D_{ia} Ref	Water Diffusivity D_{iw} (cm^2/s)	D_{iw} (16 °C) (cm^2/s)	D_{iw} Used in Calcs (cm^2/s)	D_{iw} Ref	Normal Boiling Point T_{boil} (K)
Tetrachloroethylene	5.05E-02	0.0481962	0.0481962	WATER9 (U.S. EPA, 2001)	9.46E-06	9.1694E-6	9.1694E-6	WATER9 (U.S. EPA, 2001)	394.45
Trichloroethylene	6.87E-02	0.0655731	0.0655731	WATER9 (U.S. EPA, 2001)	1.02E-05	9.9122E-6	9.9122E-6	WATER9 (U.S. EPA, 2001)	360.35
Vinyl Chloride	1.07E-01	0.1023015	0.1023015	WATER9 (U.S. EPA, 2001)	1.20E-05	0.0000116	0.0000116	WATER9 (U.S. EPA, 2001)	259.85

Chemical Properties
Output generated 06APR2018:10:05:28

Chemical	BP Ref	Critical Temperature T_{crit} (K)	T_{crit} Ref	Enthalpy of vaporization at the normal boiling point Δ$H_{v,b}$ (cal/mol)	Δ$H_{v,b}$ Ref	Organic Carbon Partition Coefficient K_{oc} (cm3/g)	K_{oc} Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Tetrachloroethylene	PHYSPROP	6.20E+02	YAWS	8288.00	Weast	94.94	EPI		
Trichloroethylene	PHYSPROP	5.71E+02	YAWS	7505.00	Weast	60.7	EPI	8.00	CRC89
Vinyl Chloride	PHYSPROP	4.25E+02	CRC89	4971.32	CRC89	21.73	EPI	3.60	CRC89

Appendix L
Basis for the Original Soil Remediation Goal Calculations

STATE OF NEBRASKA

Mike Johanns
Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY
Michael J. Linder
Director
Suite 400, The Atrium
1200 'N' Street
P.O. Box 98922
Lincoln, Nebraska 68509-8922
Phone (402) 471-2186
FAX (402) 471-2909

SEP 16 2003

RECEIVED
SEP 18 2003
SUPERFUND DIVISION

Mr. Steven Kinser
Remedial Project Manager
SUPR Division/IANE Branch
901 North 5th Street
Kansas City, Kansas 66101

RE: Cleburn Street Well Superfund Site, Operable Unit 1, IIS 59391

Dear Mr. Kinser,

The Nebraska Department of Environmental Quality (NDEQ) is pleased to submit the following proposed remediation goals (e.g. soil cleanup levels) for Operable Unit 1 (OU1) of the above referenced site. NDEQ requests that the Environmental Protection Agency (EPA) review and provide concurrence on these proposed soil cleanup levels within 30 days of the receipt of this letter.

The June 1996 Record of Decision (ROD) addressed three of the four source areas of the Cleburn Street Well Superfund Site (Site). The three source areas that the 1995 ROD addressed were broken down into four operable units (OUs) and identified as OU1, OU2, OU3, and OU4. The soils at the One-Hour Martinizing facility were assigned as OU1.

The ROD stated that the RAOs for OU1 were the following: 1) protect human health by preventing or minimizing direct contact with soils having a carcinogenic risk greater than 1×10^{-6}, and/or a hazard index for non-carcinogens greater than 1.0; and 2) protect the environment by preventing the migration of contaminants that would result in groundwater contamination in excess of the MCLs. According to the ROD, EPA's soil screening levels were to serve as a guideline in the development of the remediation goals (contaminant concentrations) to achieve the RAOs. The remediation goals were to be developed using 'computer models' during the remedial design. However, neither a remediation goal protective of human health nor a remediation goal protective of the environment has ever been established. The remediation goals were not addressed in any deliverable issued subsequent to the ROD (Remedial Design, Operations and Maintenance Manual, Semi-Annual Performance Monitoring Report). Therefore, the soil vapor extraction (SVE) system constructed to remediate the soils at OU1 has been operating without any clear cleanup objectives.

RD
Site: Cleburn Street Well
ID#: NED981499313
Break: 9.0
Other: OU 2
9-18-03
07ES

Calculation of Risk-Based Soil Cleanup Levels Protective of Leaching to Groundwater

1.0 INTRODUCTION

The remedial action objectives identified in the 1996 Record of Decision for Operable Unit 1 of the Cleburn Street Well Superfund Site were to protect human health and the environment by 1) preventing or minimizing direct contact with soils having a carcinogenic risk greater than 1×10^{-6} and/or a hazard index for non-carcinogens greater than 1; and 2) preventing the migration of contaminants from the vadose zone to the saturated zone at rates that would result in groundwater contamination in excess of the maximum contaminant limits (MCLs). The two principal pathways were direct contact with the soils and consumption of groundwater contaminated by leachate. This report develops risk-based screening levels/action levels (RBSL) for subsurface soil that are protective of exposure to groundwater for each Constituent of Concern (COC). MCLs based on drinking water standards (USEPA, 2002a) were used as acceptable groundwater screening levels for COCs. Soil RBSLs were back calculated from groundwater action levels, accounting for soil leachate partitioning and dilution attenuation of COCs in groundwater directly below the source using the Soil-Screening Guidance: User's Guide (EPA, 1996). Chemical specific and site-specific (when available) input parameters were utilized to determine the soil RBSLs. A brief description of the parameters and the equations utilized in the soil RBSL calculations in presented below.

2.0 INPUT PARAMETERS

The input parameters used for the derivation of the RBSL are based on both chemical-specific and site-specific data. When site-specific information was not available, the literature-based default value or professional judgment was used. A brief description of each type of input parameter follows.

2.1 Chemical-Specific Input Parameters

2.1.1 Derivation of Groundwater Risk-Based Screening Levels

The development of RBSLs for subsurface soil, that are protective of the leaching to groundwater pathway, requires groundwater screening levels for the COCs. The groundwater screenings levels for each chemical were determined based on MCLs.

2.1.2 Chemical-Specific Parameters

Chemical-specific physical properties were used to calculate the soil RBSL for each COC. The properties, associated units, and values are presented in Table 1.

2.2 Site-Specific Parameters

In addition to chemical-specific parameters, several site-specific parameters are necessary to calculate the SSLs. These parameters pertain to groundwater and soil used for the calculation of the soil RBSL. A general description of the parameters, associated units and values is presented in Table 2. As stated earlier, if site-specific information was not available for an input parameter, a literature-based default values was used. In the case where literature-based default values were given as a range, the value representing the midpoint of the range was used. The infiltration rate was assumed to be equivalent to recharge.

3.0 CALCULATING TARGET SOIL RBSL LEVELS

The soil RBSL for the migration to groundwater pathway is derived considering two processes: 1) the partitioning of contaminants to the soil/water leachate as water infiltrates through the contaminated subsurface; and 2) the dilution of the soil/water leachate at the water table by the clean groundwater flowing beneath the contaminated soil. These two processes are termed the soil partition factor (*PF*) and the dilution attenuation factor (*DAF*), respectively. The impact of these processes on the soil RBSL ($RBSL_s$) can be described by the following equation:

$$RBSL_s\left[\frac{mg}{kg-soil}\right] = PF\left[\frac{\frac{mg}{kg-soil}}{\frac{mg}{L-H_2O}}\right] AF\left[\frac{\frac{mg}{L-H_2O}}{\frac{mg}{L-H_2O}}\right] RBSL_{wi}\left[\frac{mg}{L-H_2O}\right]$$

where:

$RBSL_{wi}$ = EPA promulgated Maximum Contaminant Level (MCL) or groundwater risk-based screening level

$RBSL_s$ = soil risk-based screening level (soil concentration protective of groundwater)

The *DAF* and *PF* must first be calculated in order to determine the soil RBSL. These parameters are calculated using equations presented in USEPA's Soil Screening Guidance: User's Guide (USEPA, 1996).

3.1 Calculating the Attenuation Factor (DAF)

The dilution attenuation factor (DAF) is a site-specific parameter that accounts for the dilution of organics as leachate from the overlying contaminated soil zone mixes with the clean groundwater in the underlying aquifer. The DAF is based on site-specific parameters and is not dependent on the particular COC. The DAF is defined as the ratio of soil leachate concentration to receptor point concentration and is estimated using a simple mixing-zone equation derived from a water-balance relationship (Equation 11, USEPA, 1996).

$$AF\left[\frac{\frac{mg}{L-H_2O}}{\frac{mg}{L-H_2O}}\right]=\frac{C_{pw}}{C_{gw}}=\left(1+\frac{U_{gw}\delta_{gw}}{IL}\right)$$

where:

$$\delta_{gw}=\left(0.0112L^2\right)^{0.5}+d_a\{1-\exp[(-LI)/(Kid_a)]\}$$

and

C_{pw} = pore water concentration (mg/L-H_2O)

C_{gw} = groundwater concentration (mg/L-H_2O), refer to USEPA MCLs.

U_{gw} = groundwater flow (m/day) = K x i

δ = mixing zone depth (m)

I = infiltration rate (m/day)

L = source length parallel to groundwater flow (m)

K = aquifer hydraulic conductivity (m/day)

i = hydraulic gradient in the aquifer (m/m)

d_a = aquifer thickness (m)

SSLs are sensitive to the DAF and site-specific parameter values must be used. The DAF is most sensitive to the source length parameter L and this value should be based on sufficient site characterization. There are a few assumption built into the DAF that make the SSLs developed from it more conservative, and thus lower the cleanup standard. These assumptions include the following:

- Deep percolation through affected soil is assumed to reach the water-bearing unit, regardless of soil thickness or permeability.

- There is no biodegredation or other loss of COCs in the groundwater zone.

As the DAF increases, so does the soil RBSL, which is the soil concentration protective of groundwater.

3.2 Calculating the Partitioning Factor (PF)

The soil-leachate partition factor (PF) relates the concentration of an organic constituent in the soil pore water to the source concentration in the affected soil mass. The PF is dependent on site- and chemical-specific values and is used to represent the release of soil constituents to leachate percolating through the affected soil zone. It is calculated using the following equation (Equation 10, USEPA, 1996):

$$PF\left[\frac{\frac{mg}{kg-soil}}{\frac{mg}{L-H_2O}}\right] = \frac{C_s}{C_{pw}} = K_d + \frac{[\theta_{ws} + (\theta_{as} \times H'_{TS})]}{\rho_b}$$

where:

θ_{ws} = soil water-filled porosity (cm^3/cm^3)

K_d = soil-water partition coefficient (cm^3/g or L/kg)

ρ_b = soil dry bulk density (g/cm^3 or kg/L)

H'_{TS} = Henry's law constant at the system (soil) temperature (dimensionless)

θ_{as} = soil air-filled porosity (cm^3/cm^3)

The above equation for the PF is based on the following assumptions:

- COC leachate concentrations reach immediate equilibrium with the affected soil source.
- There is no COC biodegradation (or other loss) occurring in the soil or leachate.
- The mass of COC in the soil stays constant over time.

These assumptions result in conservative estimates of the PF (i.e. will lower the cleanup standard). As with the dilution attenuation factor, as the PF increases, so does the soil RBSL, which is the soil concentration protective of groundwater.

4.0 RESULTS

Soil RBSLs were calculated based on groundwater MCLs (USEPA, 2002a) and are presented in Table 3. The calculated RBSLs protective of leaching to groundwater ranged from 2 to 4 times higher than the generic Region 9 Preliminary Remediation Goals (PRGs) (USEPA, 2002b). Considering the fact that the Region 9 PRGs are conservative estimates, the RBSLs derived for the Cleburn Street OU1 will be protective of human health and the environment.

5.0 REFERENCES

Mays, L.W., 2001, *Stormwater Collection Systems Design Handbook*, McGraw-Hill, New York.

Sverdrup, 1993, Remedial Investigation Report for the Cleburn Street Well Site, Grand Island, Nebraska, Phase III Addendum.

Sverdrup, 1994, Treatability Study Report for the Cleburn Street Well Site, Grand Island, Nebraska.

USEPA, 1996, Soil Screening Guidance: User's Guide, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C., EPA/540/R-96/018.

USEPA, 2002a, National Primary Drinking Water Standards, Office of Water, EPA 816-F-02-013.

USEPA, 2002b, Region 9 Preliminary Remediation Goals, 2002 Table, Region IX, U.S. Environmental Protection Agency.

Table 1
Chemical-Specific Properties
Cleburn Street Site
Grand Island, Nebraska

Constituent of Interest	Henry's Constant H (dimensionless)	Source	Sorption Coefficient $\log(k_{oc})$ (L_{H2O}/kg)	Source	Mole Fraction [1]	Solubility S(l) (mg/L_{H2O})	Source	Eff. Solubility [2] S(l) (mg/L_{H2O})	Partitioning Factor [3] PF [(mg/kg_{soil})/(mg/L_{H2O})]
tetrachloroethylene	7.5E-01	1	2.19	1	1.0	2.00E+02	1	2.0E+02	0.49
trichloroethylene	4.2E-01	1	2.22	1	1.0	1.10E+03	1	1.1E+03	0.48
1,1-dichloroethylene	1.1E+00	1	1.77	1	1.0	2.25E+03	1	2.3E+03	0.35
trans 1,2-dichloroethylene	3.9E-01	1	1.72	1	1.0	6.30E+03	1	6.3E+03	0.27
cis 1,2-dichloroethylene	3.2E-02	1	0.14	1	1.0	800	1	8.0E+02	0.14
vinyl chloride	1.1E+00	1	1.27	1	1.0	2.76E+03	1	2.8E+03	0.29
1,1,1-trichloroethane	7.1E-01	1	2.04	1	1.0	1.33E+03	1	1.3E+03	0.41
1,1,2-trichloroethane	3.7E-02	1	1.70	1	1.0	4.42E+03	1	4.4E+03	0.23

[1] Mole fraction for all compounds assumed to be 1 (I .e., compounds treated as a single component)
[2] Effective solubility assumed to be 100% as a conservative estimate
[3] Calculated value. See Section 3.2

Sources:
1. U.S. EPA, 1996, Table C-1. Soil Screening Guidance: User's Guide EPA/540/R-96/018. Office of Solid W aste and Emergency Response, U.S. Environmental Protection Agency .

Table 2
Site-Specific Properties
Cleburn Street Site
Grand Island, Nebraska

Groundwater Parameters				
Estimate Infiltration Rate			**Input**	**Source**
P	precipitation	(m/day)	1.80E-03	1
f	fraction infiltrated		3.00E-01	2
I	infiltration	(m/day)	5.40E-04	Calculated ($P \times I$)
Estimate Groudwater Darcy Velocity				
K	saturated horizontal hydraulic con	(m/day)	105	3
i	gradient	(m/m)	0.003	4
U	groundwater flow rate	(m/day)	0.315	Calculated (K x i)
Estimate Attenuation Factor				
L	source length parallel to gw flow	(m)	34	5
W	source width	(m)	34	5
d_e	aquifer thickness	(m)	21	4
δ	mixing zone thickness	(m)	3.9	6
AF	attenuation factor	((mg/l)/(mg/l))	6.82E+01	7
Soil Parameters				
ρ_b	soil density	(g/cm^3)	1.62	8
ρ_s	soil particle density	(g/cm^3)	2.65	9
K_s	saturated K of unsaturated zone	(m/day)	0.63	10
1/(2b+3)	exponential term	(dimensionless)	0.08	10
n	porosity	(dimensionless)	0.39	Calculated [$1-(\rho_b/\rho_s)$]
θ_{ws}	soil moisture content	(cm^3_{H2O}/cm^3_{soil})	0.22	11
θ_{as}	soil air content	(cm^3_{H2O}/cm^3_{soil})	0.17	Calculated ($n - \theta_{ws}$)
f_{oc}	fraction organic carbon	(g_{Carbon}/g_{soil})	0.0018	12
T	soil temperature	(Kelvin)	287	4

Sources:

1. Based on normal annual precipitation for Grand Island, Nebraska
   Data from NOAA website - http://www.ncdc.noaa.gov/oa/climate/online/ccd/nrmlprcp.html
2. Based on a minimum runoff coefficient of 0.70 for a downtown business area (Table 4.3, Mays, 2001).
3. Estimated from pumping test (Sverdrup, 1994).
4. Site specific data.
5. Based on site specific data - 100 ug/kg contour of PCE concentrations at the 18 - 20 ft depth interval (Sverdrup, 1993).
6. Calculated according to Equation 12, Soil Screening Guidance: User's Guide EPA/540/R-96/018.
7. Calculated value, see Section 3.1.
8. Based on average soil density for sand-textured soils. VLEACH Model,. 1995. Appendix B. U.S. Environmental Protection Agency.
9. Best professional judgement.
10. Based on estimated saturated hydraulic conductivity for sandy loam from Table A-2, Soil Screening Guidance: User's Guide EPA/540/R-96/018.
11. Calculated $[n(I/K_s)^{1/(2b+3)}]$, Appendix A, Soil Screening Guidance: User's Guide EPA/540/R-96/018.
12. Site specific data not available. Value is average of a range of two estimates. Lower estimate (0.001) is based on professional judgement and higher estimate (0.0025) is based on f_{oc} applied at Cleburn Street OU5.

Table 3
Soil Risk-Based Screening Levels
Cleburn Street Site
Grand Island, Nebraska

COC	$RBSL_{wi}$ Groundwater[1] (µg/L)	RBSL Partitioning Factor	$RBSL_s$ Soil[2] (mg/kg)	Region 9 Soil[3] (mg/kg)
tetrachloroethylene	5	0.49	0.17	0.06
trichloroethylene	5	0.48	0.16	0.06
1,1-dichloroethylene	7	0.35	0.17	0.06
trans 1,2-dichloroethylene	100	0.27	1.85	0.70
cis 1,2-dichloroethylene	70	0.14	0.68	0.40
vinyl chloride	2	0.29	0.04	0.01
1,1,1-trichloroethane	200	0.41	5.56	2.00
1,1,2-trichloroethane	5	0.23	0.08	0.02

[1] EPA promulgated Maximum Contaminant Level (MCL) or groundwater risk-based screening level

[2] Calculated using the site-specific attenuation factor AF=68.2. $RBSL_s = (RBSL_{wi} * \text{Partitioning Factor} * 68.2)/1000$

[3] Region 9 Generic Soil Screening Levels based on a dilution attenuation factor (AF) of 20.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

13 JAN 2004

RECEIVED
JAN 15 2004
DEPARTMENT OF ENVIRONMENTAL QUALITY

Brian Zurbuchen, Ph.D.
Program Specialist, Remediation Section
Nebraska Department of Environmental Quality
Suite 400, The Atrium
1200 'N' Street, Post Office Box 98922
Lincoln, Nebraska 68509-8922

Dear Dr. Zurbuchen:

I am enclosing a copy of the review provided by our regional risk assessors. I rely upon the regional risk assessment staff for their technical expertise in matters such as this. If the state of Nebraska finds the response supplied by them as being acceptable, I see no reason not to use the remediation goals recommended by them. If further discussion is required, please let me know.

I am also enclosing a copy of the October 2003 Quarterly Report which was received in late December.

If you have any questions, do not hesitate to contact me. I may be reached by telephone at (913) 551-7728 or by e-mail at kinser.steven@epa.gov .

Sincerely,

Steven E. Kinser

Steven E. Kinser R.G.
Remedial Project Manager
Missouri/Kansas Remedial Branch
Superfund Division

Enclosures

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

DEC 30 2003

RECEIVED
JAN 15 2004
DEPARTMENT OF
ENVIRONMENTAL QUALITY

MEMORANDUM

SUBJECT: Soil Remediation Levels for the Cleburn Well Site

FROM: Greg McCabe
ENSV/DISO

TO: Steve Kinser
SUPR/MOKS

As requested in your 11/17/03 e-mail, we have completed our review of the documentation (letter and attachment) you provided us regarding proposed soil clean-up levels at the Cleburn Well site. Based on our review of that material, we offer the following comments:

1. After contacting NDEQ directly, it became apparent to us that the materials we received from Superfund contained discrepancies that did not coincide with the most current version prepared by NDEQ. These discrepancies were primarily in format, resulting from software transposition errors between NDEQ and EPA computers; e.g., incorrect section headings, missing equations, etc. Following discussions with NDEQ, we were provided with the appropriate documents in PDF and Excel formats for review. We have attached a copy of those documents for your records.

2. The attachment frequently cites EPA guidance in the development of the proposed soil clean-up levels. However, EPA guidance cited does not contain the equations as they appear in the attachment submitted for our review. Even though it is possible to derive soil clean-up levels using the approach presented in the attachment, such an approach increases the likelihood of error, is confusing to the reader, and does not allow for sufficient transparency for members of the general public or other readers who may have an interest in soil cleanup at the site. In the future, we strongly recommend that EPA guidance be used without modification.

3. It is important to note that the soil screening values developed by NDEQ made extensive use of site-specific properties. The values of these site-specific properties are included in Table 2. Such properties include infiltration rate, hydraulic conductivity, groundwater flow rate, source width and length, mixing zone thickness, soil density and porosity, etc. Validation of such site-specific geological and hydrogeological properties is beyond the scope of a risk assessment review. Rather, our review is based on the assumption that Superfund has validated these

properties as part of the remedial investigation review process, and thus we accepted them as valid for purposes of our review. If in fact any of these site-specific values are incorrect, the resulting risk-based soil screening levels based on these values will also be incorrect.

4. The chemical specific properties of cis 1,2-dichloroethylene (DCE), as presented in Table 1, appear to be in error. For example, the Henry's Constant value presented in Table 1 is 0.0032, while the value contained in EPA guidance is 0.167. Other similar errors are also present for this compound. In our verification of appropriate soil screening levels, we used the correct literature values rather than those presented in Table 1.

5. The derivation of the dilution factor contained a significant error. The correct equations for the derivation of the dilution factor are contained in Equations 11 and 12 of EPA's Soil Screening Guidance. In Equation 12, NDEQ inadvertently used the value for the infiltration rate (I) in place of the hydraulic gradient (i). Because the development of risk-based soil screening levels is dependent on use of the derived dilution factor, all of the screening levels developed by NDEQ were impacted by this error. We contacted NDEQ directly to verify our findings. Our understanding is that NDEQ is in the process of revising the soil screening levels to eliminate this error.

6. Table 2 contains several errors that need correction. Two of these errors appear to be typographical; e.g., Infiltration = P x f, not P x I as presented, and the units for the soil air content are incorrect. Also, because of the error in developing the dilution factor, the values for the mixing zone thickness and the attenuation factor are incorrect as presented.

7. As a result of correcting the dilution factor error, the calculated mixing zone thickness has increased to over 24 meters. Page 30 of EPA's Soil Screening Guidance states that aquifer thickness is to be used in calculating the dilution factor whenever the mixing zone thickness exceeds aquifer thickness. Because aquifer thickness is identified as 21 meters in Table 2, it is this value which should be used in the calculation of the dilution factor.

8. Once the errors relative to cis 1,2-DCE and the dilution factor have been corrected, we anticipate that the soil screening levels will be revised as shown by the table below. Please note that:

a) column 2 contains the Region 9 PRGs for the soil to groundwater migration pathway, assuming a DAF of 20
b) column 3 contains the Region 9 PRGs for the residential soil pathway
c) column 4 contains the NDEQ RBSLs submitted to EPA
d) column 5 contains the RBSLs as revised by EPA

NDEQ proposes in its letter to EPA that for each COC, the minimum of either the Region 9 residential soil value or the site-specific soil to groundwater RBSL be selected as the proposed soil remediation goals. Based on a comparison of those two values in the following table, we

have used boldface type to identify what we anticipate the selected soil remediation goals will be. Again, these values are based on the assumption that the values developed for site-specific geological and hydrogeological properties are valid.

Constituent of Interest	Region 9 soil to ground-water PRG (mg/kg)	Region 9 residential soil PRG (mg/kg)	NDEQ soil to groundwater RBSL, as submitted to EPA (mg/kg)	Revised soil to groundwater RBSL (mg/kg)
tetrachloroethylene	0.06	1.5	0.17	**0.89**
trichloroethylene	0.06	**0.053**	0.16	0.87
1,1-dichloroethylene	0.06	120	0.17	**0.90**
trans 1,2-dichloroethylene	0.70	69	1.85	**9.79**
cis 1,2-dichloroethylene	0.40	43	0.68	**5.51**
vinyl chloride	0.01	**0.079**	0.04	0.21
1,1,1-trichloroethane	2.00	1200	5.56	**29.48**
1,1,2-trichloroethane	0.02	0.73	0.08	**0.42**

If you have any questions regarding our review, please contact me at x7709.

Attachments

Appendix M
2016 EPA Region 7 Memorandum
Action Levels for TCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

NOV 0 2 2016

MEMORANDUM

SUBJECT: EPA Region 7 Action Levels for Trichloroethylene in Air

FROM: Mike Beringer, Chief
Environmental Data & Assessment Branch
Environmental Sciences & Technology Division

TO: Branch Chiefs
Waste Enforcement and Materials Management Branch
and Waste Remediation & Permitting Branch
Air and Waste Management Division

Branch Chiefs
Superfund Division

The purpose of this memorandum is to update the U.S. Environmental Protection Agency Region 7 RCRA and Superfund programs on the recommended action levels for trichloroethylene (TCE) in air, and provide information on characterizing and addressing human health risks from less-than-lifetime exposures. The action level for a residential scenario is 2 $\mu g/m^3$, and the action level for an industrial/commercial scenario with an 8-hr workday is 6 $\mu g/m^3$. Equations to allow derivation of action levels for alternative scenarios, such as a 10-hr workday, are presented. As described in this attachment, it is assumed that an exposure to TCE at any time during an approximate three-week period in early pregnancy could result in one or more types of cardiac malformations. Thus, the critical exposure period of concern used to evaluate the potential for heart defects and derive action levels for TCE is one day. An exceedance of the TCE action level indicates a potential imminent threat to human health. Region 7 should expedite early or interim action(s) to eliminate, reduce, and/or control the hazards posed by the site as quickly as possible. If you or your staff have any questions or need further assistance, please contact Kelly Schumacher (x7963).

EPA Region 7 Action Levels for Trichloroethylene in Air.	
Exposure Scenario	*Action Level*
Residential (24 hours/day)	**2 $\mu g/m^3$**
Industrial/Commercial (8 hours/day)[1]	**6 $\mu g/m^3$**

[1] Site-specific action levels should be derived when the workday differs from 8 hours/day.

Attachment

EPA Region 7 Action Levels for Trichloroethylene in Air

Introduction

In 2011, the latest human health toxicity values for trichloroethylene were published by the United States Environmental Protection Agency's Integrated Risk Information System program (EPA, 2011a). As discussed in this document, these new values are partly based on developmental health effects that result from less-than-lifetime exposures. In contrast, the toxicity values typically used to evaluate potential health risks and derive action levels at Superfund and RCRA sites are based on health effects associated with long-term, or chronic exposures. Further, the equations and exposure parameters used typically reflect all or a significant portion of a person's lifetime. Once the current TCE values were released, the protectiveness of using traditional approaches to assess and address TCE exposures was questioned. The purpose of this memorandum is to update the EPA Region 7 RCRA and Superfund programs on the recommended action levels for TCE in air and provide information on characterizing and addressing human health risks from less-than-lifetime exposures. To support these objectives, the window of susceptibility for the developmental toxicity associated with TCE is examined, the critical exposure period of concern is identified, and the appropriate exposure parameters and equations are elucidated.

Toxicity Assessment

The EPA's final toxicological review by the IRIS program incorporates comments by the U.S. National Academy of Sciences (National Research Council, 2006), two U.S. EPA Science Advisory Boards (EPA, 2002 and 2011b), the Executive Office of the President (Office of Management and Budget, 2009 and 2011), the U.S. Department of Defense (DOD, 2009a, 2009b and 2011), the National Aeronautics and Space Administration (NASA, 2009 and 2011), internal Agency reviewers, and the public, among others. The Halogenated Solvents Industry Alliance, Inc., which represents the interests of TCE manufacturers and producers, submitted a Request for Correction of the TCE IRIS assessment (HSIA, 2013), which was denied by the EPA's Acting Assistant Administrator (EPA, 2015). The HSIA then submitted a Request for Reconsideration (HSIA, 2015), which was also denied by the EPA (EPA, 2016a). The EPA found the Requests "directly contrary to the SAB's conclusions and recommendations, such that to accept HSIA's RFC/RFR would require EPA to reject SAB's advice" (EPA, 2016a).

The EPA's Office of Land and Emergency Management recognizes an IRIS assessment as the official Agency scientific position regarding the toxicity of a chemical based on the data available at the time of the review (EPA, 2003). As such, IRIS is generally the preferred source of human health toxicity values used to evaluate risks at Superfund and RCRA hazardous waste sites. In accordance with Directive 9285.7-53 (EPA, 2003), the 2011 IRIS TCE toxicity values will be used to evaluate risks and derive action levels by the Region 7 RCRA and Superfund programs until the 2011 values are either revised or rescinded.

Non-Carcinogenic Health Effects

In general, the EPA assumes that a dose or exposure level exists below which adverse non-carcinogenic health effects will not occur (EPA, 1989). Below this threshold, it is believed that exposure to a chemical is tolerated without adverse effects. Adverse health effects occur only when physiologic protective mechanisms are overcome by exposure to doses or concentrations above the threshold. For chronic toxicity values, the first adverse effect (or its known precursor) that occurs to the most sensitive species as the dose rate of an agent increases, regardless of the exposure duration, is designated the

critical endpoint. The dose or exposure at which the critical endpoint is observed is the point of departure. Uncertainty factors, ranging from 1 to 3,000, reflecting limitations of the data used are applied to the point of departure to derive the inhalation reference concentration. The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime (EPA, 1989).

The 2011 Scientific Advisory Board panel recommended that, "The two endpoints for immune effects from Keil *et al.* (2009) and the cardiac malformations from Johnson *et al.* (2003) should be considered the principal studies supporting the RfC" (EPA, 2011b). The panel considered the immune effects and cardiac malformations co-critical endpoints (EPA, 2011b). In accordance with the SAB panel recommendations, the IRIS program based the TCE chronic reference concentration of 2 $\mu g/m^3$ on these two co-critical endpoints, each of which can support the RfC independently: autoimmune disease following chronic exposure in adults (0.00033 ppm, or 1.8 $\mu g/m^3$) and heart defects following exposure during early pregnancy (0.00037 ppm, or 2.0 $\mu g/m^3$). The RfC is also supported by nephrotoxicity (kidney effects) following chronic exposure in adults (0.00056 ppm, or 3.0 $\mu g/m^3$). Following publication of these values, the developmental cardiac effects were further addressed by the IRIS program in "TCE Developmental Cardiac Toxicity Assessment Update" (EPA, 2014a) and by scientists in the EPA's Office of Research and Development in the peer-reviewed literature (Makris *et al.*, 2016).

Chronic exposure to TCE poses a potential human health hazard to the central nervous system, kidneys, liver, immune system, and male reproductive system. As mentioned above, immunotoxicity in adults is considered a co-critical endpoint, at a slightly lower concentration than that associated with cardiac defects. Overall, the IRIS program concluded that "the human and animal studies of TCE and immune-related effects provide strong evidence for a role of TCE in autoimmune disease and in a specific type of generalized hypersensitivity syndrome" (EPA, 2011a). Kidney toxicity was considered a supporting endpoint, with high confidence found in multiple lines of evidence in both human and animal studies.

Short-term exposures to TCE during pregnancy are associated with many forms of developmental toxicity, including spontaneous abortions, decreased growth, developmental neurotoxicity, developmental immunotoxicity, and birth defects. However, the critical developmental endpoint is cardiac malformations. The primary types of heart defects observed with TCE exposures include atrial and ventricular septal defects, which are holes in the wall (septa) between the top two chambers (atria) or bottom two chambers (ventricles) of the heart, and pulmonary and aortic valve stenoses, which are thickened or fused heart valves that do not properly open and/or close and may leak blood. The critical window of susceptibility for these types of defects is an approximate three week period (i.e., valvuloseptal morphogenesis, or the period in which major cardiac morphogenic events such as heart valve formation occur) approximately four to seven weeks after conception, early in the first trimester of human pregnancy (Dhanantwari *et al.*, 2009). The type and severity of the resulting cardiac malformation or malformations depends on the timing and level of exposure to TCE within this approximate three week period. Exposures that clear the body before this period do not impact the heart valves and septa, because they have not yet begun to form. In humans, TCE and most of its metabolites are eliminated within a week of exposure (EPA, 2011a).

Carcinogenic Effects

The EPA evaluates carcinogenicity in two parts (EPA, 2005a). First, the Agency evaluates all available scientific information and assigns a weight-of-evidence classification based on a compound's potential to cause cancer in humans. In the absence of sufficient data regarding the mode of action or if the

weight-of-evidence supports a mutagenic mode of action, the EPA generally assumes that any exposure to a chemical will increase an individual's risk of developing cancer. Under this default approach, there is no threshold below which the probability of developing cancer is zero. Second, a toxicity value is derived to define the quantitative relationship between dose or concentration and carcinogenic response. For inhalation exposures using the default approach, this value is known as the inhalation unit risk. The IUR is a generally plausible upper-bound estimate of the increased probability of developing cancer following a lifetime of exposure. This value is used to estimate the increased risk of developing cancer from inhalation of potentially carcinogenic chemicals.

Following the EPA's Guidelines for Carcinogen Risk Assessment (EPA, 2005a), the IRIS program has evaluated the carcinogenic potential of TCE and has classified it as "carcinogenic to humans" by all routes of exposure. This conclusion is based on convincing evidence of a causal association between TCE exposure in humans and kidney cancer, strong evidence of non-Hodgkin's lymphoma, and more limited evidence of liver and biliary tract cancer. The inhalation unit risk for TCE, based on these combined cancer types, is 4.1E-06 $(\mu g/m^3)^{-1}$. Sufficient evidence supports a mutagenic mode of action for TCE-induced kidney tumors in humans, but modes of actions have not been established for the other TCE-induced cancer types. The portion of the TCE IUR specific for kidney tumors is 1.0E-06 $(\mu g/m^3)^{-1}$, while the IUR for non-Hodgkin's lymphoma plus liver and biliary tract cancers is 3.1E-06 $(\mu g/m^3)^{-1}$.

Risk Characterization

The EPA's RCRA and Superfund programs characterize potential human health risks using standardized equations that combine toxicity values with exposure parameters because risk is a function of both hazard and exposure. Typically, the EPA's standard default exposure parameters for chronic scenarios, published in OSWER Directive 9200.1-120 (EPA, 2014b), are used. However, exposure assessments must take into account the time scale related to the specific biological response (NRC, 1991). This means that exposure parameters selected to evaluate risks and/or develop levels of concern for a given chemical and scenario should correspond as closely as possible with the exposure period used to develop the toxicity value. For example, time-weighted average exposures over a lifetime have little relevance for a developmental toxin if the adverse effects could only occur following exposure during a particular stage of development (EPA, 1992).

Non-Cancer Hazard Quotients for Cardiac Defects

The toxicity values considered protective for a lifetime of exposure to TCE are partly based on non-cancer health effects resulting from less-than-lifetime exposures. As previously stated, one of the two co-critical endpoints that serves as the basis for the TCE RfC is cardiac defects. This effect can only occur when the fetus is exposed during the period of heart development. Therefore, the EPA's standard default exposure parameters for chronic exposures are invalid for estimating hazard quotients representing the potential for cardiac defects associated with TCE exposures and for deriving TCE levels of concern that are protective of developmental endpoints. To select appropriate less-than-lifetime exposure parameters that may be used to characterize these hazards and derive levels of concern, the critical exposure period of concern for TCE-related heart malformations must first be identified.

"[F]or developmental toxic effects, a primary assumption is that a single exposure at a critical time in development may produce an adverse developmental effect, i.e., repeated exposure is not a necessary prerequisite for developmental toxicity to be manifested" (EPA, 1991). The EPA's Risk Assessment Guidance for Superfund Part A (EPA, 1989) directs the use of a day or a single exposure incident to assess the potential risks of adverse developmental effects. Following this guidance, it is assumed that a

single exposure to TCE at any time during the approximate three week period of valvuloseptal morphogenesis could result in one or more of the types of heart malformations described previously. Thus, the critical exposure period of concern used to evaluate the potential for cardiac defects is one day. A 24-hour exposure period has been used by the EPA to evaluate acute hazards associated with TCE in the final, peer-reviewed TSCA Work Plan Chemical Risk Assessment (EPA, 2014c).

The EPA's Risk Assessment Guidance for Superfund Part F, Supplemental Guidance for Inhalation Risk Assessment (EPA, 2009) specifies that the exposure concentration (EC) that should be used to evaluate risks and derive levels of concern for acute endpoints is equivalent to the concentration detected in air (CA), as shown in Equation 1.

$$EC\left(\frac{\mu g}{m^3}\right) = CA\left(\frac{\mu g}{m^3}\right) \quad (1)$$

For a residential scenario, in which exposure to TCE inside a home is assumed to occur throughout the entire exposure period of concern, Equation 1 is appropriate. However, for other types of scenarios (e.g., industrial, commercial, recreational), exposures to TCE only occur for a portion of any given 24-hour period. Moreover, exposures to different concentrations of TCE may occur within a single day at some sites. To account for these multiple exposures, Equation 1 can be modified, resulting in a time-weighted average exposure concentration. The 24-hour TWA exposure concentration can be calculated using Equation 2.

$$EC_{24} = \sum_{i=1}^{n}(CA_i \cdot ET_i)/AT_{24} \quad (2)$$

where: EC_{24} ($\mu g/m^3$) = time-weighted average exposure concentration over 24 hours;
CA_i ($\mu g/m^3$) = TCE concentration in air in microenvironment (ME) i;
ET_i (hours) = exposure time spent in ME i;
AT_{24} (hours) = averaging time for the exposure period of concern (24 hours)

In a residential scenario, there is a single microenvironment, the residence, with an exposure time of 24 hours. Thus, the Residential EC_{24} will equal CA_{res}, as shown in Equation 3. To reduce uncertainty in residential scenarios, CA_{res} should be based on air samples collected for an entire 24-hour exposure period. Generally, stationary 24-hour indoor air sample results are used.

$$Residential\ EC_{24} = \frac{(CA_{res} \cdot 24\ hrs)}{24\ hrs} = CA_{res} \quad (3)$$

In a typical industrial or commercial scenario, there are two microenvironments. One is the workplace, and the other is away from the workplace. The Industrial/Commercial EC_{24} can be calculated using Equation 4, below. Although the standard value for ET_{work} is an 8-hour workday, this variable should reflect site-specific conditions. For example, employees at a given site may work longer shifts, such as 10 or 12 hours, and they may or may not take their lunch breaks on site. CA_{work} should be based on air samples collected for the entire exposure time, ET_{work}, during the portion of the day that workers are present. This is to prevent potential underestimates of TCE concentrations if diurnal variations occur at a site, although such variability does not exist at all sites. Generally, stationary 8-hour or 10-hour indoor air samples are appropriate. ET_{away} should equal the remainder of the 24-hour period spent away from the workplace. CA_{away} is generally assumed to equal zero, unless site-specific data suggest otherwise.

$$Industrial/Commercial\ EC_{24} = \frac{(CA_{work} \cdot ET_{work}) + (CA_{away} \cdot ET_{away})}{24\ hrs} \quad (4)$$

If multiple or variable microenvironments are present at a site, it is possible to use Equation 2 to generate a 24-hour TWA exposure concentration. However, consideration should be given to the use of portable sampling equipment to more accurately measure true exposure concentrations to the receptor(s) of concern over the entire exposure time, as opposed to stationary sampling equipment positioned in multiple areas where exposure occurs.

Non-cancer hazard quotients for heart defects can be derived using Equation 5, where HQ_{24} is the developmental hazard quotient; EC_{24} is the 24-hr time-weighted average exposure concentration calculated using Equations 2, 3, or 4; and the RfC is 2 $\mu g/m^3$. As shown in Equation 5, a hazard quotient is the ratio of the exposure to the non-cancer toxicity value. Thus, an HQ greater than 1 means that the exposure is greater than the RfC and exceeds a level of concern for that particular non-cancer health effect.

$$HQ_{24} = \frac{EC_{24}}{RfC} \tag{5}$$

Equation 5 can be combined with Equation 3 or 4 to calculate the developmental hazard quotients (HQ_{24}) for a residential or industrial/commercial receptor, as follows.

$$Residential\ HQ_{24} = \frac{CA_{res}}{2\ \frac{\mu g}{m^3}} \tag{6}$$

$$Industrial/Commercial\ HQ_{24} = \frac{(CA_{work} \cdot ET_{work}) + (CA_{away} \cdot ET_{away})}{24\ hrs \cdot 2\ \frac{\mu g}{m^3}} \tag{7}$$

Non-Cancer Hazard Quotients for Chronic Health Effects

Autoimmune disease, a co-critical endpoint upon which the TCE RfC is based, and kidney toxicity, the supporting endpoint, are both health effects associated with chronic or long-term exposures. Equation 8 is the standardized equation used to evaluate non-cancer hazard quotients for chronic health effects; the exposure parameters are defined in Table 1. If seasonal or temporal fluctuations in TCE concentrations potentially exist, consideration should be given as to whether sufficient data are available to generate an average concentration for use as the CA term. If the dataset is limited, it may be more health-protective to use the highest concentration detected.

$$HQ_{chronic} = \frac{CA\left(\frac{\mu g}{m^3}\right) \cdot ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years)}{AT_{nc,chronic}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)} \tag{8}$$

The above equation can be presented in terms of residential or industrial/commercial exposure scenarios, as shown below. Note that it is only appropriate to calculate non-cancer hazard quotients for chronic health effects for those receptors with long-term exposures.

$$Residential\ HQ_{chronic} = \frac{CA_{res}\left(\frac{\mu g}{m^3}\right) \cdot ET_{res}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{res}\left(\frac{days}{year}\right) \cdot ED_{child}(years)}{AT_{nc,chronic,child}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)} \tag{9}$$

$$Industrial/Commercial\ HQ_{chronic} = \frac{CA_{work}\left(\frac{\mu g}{m^3}\right) \cdot ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years)}{AT_{nc,chronic,work}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)} \tag{10}$$

Cancer Risks

TCE is classified "carcinogenic to humans," based on kidney cancer, non-Hodgkin's lymphoma, and liver and biliary tract cancer. Equation 11 is the standardized equation used to evaluate excess individual lifetime cancer risks; the exposure parameters are defined in Table 1. If temporal fluctuations in TCE concentrations potentially exist, consideration should be given as to whether sufficient data are available to generate an average concentration for use as the CA term. If the dataset is limited, it may be more health-protective to use the highest concentration detected.

$$CR = \frac{CA\left(\frac{\mu g}{m^3}\right) \cdot ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}}{AT_{cancer}(days)} \quad (11)$$

The above equation can be presented in terms of residential or industrial/commercial exposure scenarios, as shown below. Because a mutagenic mode of action has been established for kidney tumors associated with TCE, it is necessary to apply age-dependent adjustment factors when deriving risks for this cancer type in children (EPA, 2005b). ADAFs are not applied when deriving risks for non-Hodgkin's lymphoma or liver and biliary tract cancers associated with TCE exposures because they have not been determined to operate via a mutagenic mode of action. Because only adults are evaluated in an industrial/commercial exposure scenario and no adjustments for mutagenicity are made for adults (i.e., $ADAF_{adult} = 1$), ADAFs are not included in Equation 13.

$$Residential\ CR = \left(\frac{CA_{res}\left(\frac{\mu g}{m^3}\right) \cdot ET_{res}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{res}\left(\frac{days}{year}\right)}{AT_{cancer}(days)}\right) \cdot \left[\left(ED_{0-2}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{0-2}\right) + \left(ED_{2-16}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{2-16}\right) + \left(ED_{16-26}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{adult}\right) + \left(ED_{res}(years) \cdot IUR_{N\&L}\left(\frac{\mu g}{m^3}\right)^{-1}\right)\right] \quad (12)$$

$$Industrial/Commercial\ CR = \frac{CA_{work}\left(\frac{\mu g}{m^3}\right) \cdot ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}}{AT_{cancer}(days)} \quad (13)$$

The definitions, values, and references for the exposure parameters and toxicity values used in this document are provided in Table 1. For the chronic scenarios, the EPA's standard default exposure parameters (EPA, 2014b) are used to best represent reasonable maximum exposure scenarios, which are the highest exposures reasonably expected to occur at a site (EPA, 1989). These values are based on the 2011 Exposure Factors Handbook (EPA, 2011c). Although the default exposure time for an indoor worker is 8 hours/day, it is preferable to identify a site-specific worker exposure time.

Table 1. Exposure Parameters and Toxicity Values.

Parameter	Definition	Units	Value	Reference
$ADAF_{0-2}$	Age-dependent adjustment factor – ages 0 to 2 years	-	10	EPA, 2005b
$ADAF_{2-16}$	Age-dependent adjustment factor – ages 2 to 16 years	-	3	EPA, 2005b
$ADAF_{adult}$	Age-dependent adjustment factor – ages 16 years and older	-	1	EPA, 2005b
AT_{24}	Averaging time – developmental effects	hours	24	-
AT_{cancer}	Averaging time – cancer	days	25,550	EPA, 2014b

Table 1. Exposure Parameters and Toxicity Values.				
Parameter	**Definition**	**Units**	**Value**	**Reference**
$AT_{nc,chronic,\ child}$	Averaging time – chronic non-cancer health effects, resident child	days	2,190	EPA, 2014b
$AT_{nc,chronic,\ work}$	Averaging time – chronic non-cancer health effects, indoor worker	days	9,125	EPA, 2014b
CA	Concentration of TCE in air	$\mu g/m^3$	Measured	-
CA_{res}	Concentration of TCE in air of the residence	$\mu g/m^3$	Measured	-
CA_{work}	Concentration of TCE in air of the workplace	$\mu g/m^3$	Measured	-
ED_{0-2}	Exposure duration – ages 0 to 2 years	years	2	EPA, 2005b
ED_{2-16}	Exposure duration – ages 2 to 16 years	years	14	EPA, 2005b
ED_{16-26}	Exposure duration – ages 16 to 26 years	years	10	EPA, 2005b
ED_{child}	Exposure duration – resident (child, ages 0 to 6 years)	years	6	EPA, 2014b
ED_{res}	Exposure duration – resident (child + adult, ages 0 to 26 years)	years	26	EPA, 2014b
ED_{work}	Exposure duration – indoor worker	years	25	EPA, 2014b
EF_{res}	Exposure frequency – resident	days/yr	350	EPA, 2014b
EF_{work}	Exposure frequency – indoor worker	days/yr	250	EPA, 2014b
ET_{away}	Exposure time – time spent away from work by an indoor worker (24 hrs/day minus ET_{work})	hrs/day	16 or site-specific	-
ET_{res}	Exposure time – time spent at home by a resident	hrs/day	24	EPA, 2014b
ET_{work}	Exposure time – time spent at work by an indoor worker	hrs/day	8 or site-specific	EPA, 2014b or site-specific
IUR	TCE inhalation unit risk - total	$(\mu g/m^3)^{-1}$	4.1E-06	EPA, 2011a
IUR_{kid}	TCE inhalation unit risk – kidney cancer	$(\mu g/m^3)^{-1}$	1.0E-06	EPA, 2011a
$IUR_{N\&L}$	TCE inhalation unit risk – non-Hodgkin's lymphoma and liver and biliary tract cancers	$(\mu g/m^3)^{-1}$	3.1E-06	EPA, 2011a
RfC	TCE reference concentration	$\mu g/m^3$	2	EPA, 2011a
THQ	Target hazard quotient	-	1	-
TR	Target cancer risk	-	1E-04	Upper-end of Target Cancer Risk Range

Action Levels

Level of Concern for Developmental Effects

Equations 2 and 5 can be manipulated to solve for the level of concern for developmental health effects, using a target non-cancer hazard quotient of 1, as follows. Note that the only exposure parameter that can vary in this calculation is the exposure time. The TCE levels of concern for developmental effects based on standard exposure times are provided in Table 2. For a 24-hour residential scenario, the developmental LOC equals 2 $\mu g/m^3$. For a typical 8-hour industrial/commercial scenario, the developmental LOC equals 6 $\mu g/m^3$. Site-specific developmental LOCs may be derived using alternate exposure times; for example, a 10-hour exposure time results in a developmental LOC of 4.8 $\mu g/m^3$.

$$TCE\ LOC_{developmental}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{24}(hrs) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET\left(\frac{hrs}{day}\right)} \quad (14)$$

$$TCE\ Residential\ LOC_{developmental}\left(\frac{\mu g}{m^3}\right) = \frac{1 \cdot 24\ hrs \cdot 2\ \frac{\mu g}{m^3}}{24\ hrs} \quad (15)$$

$$TCE\ Industrial/Commercial\ LOC_{developmental}\left(\frac{\mu g}{m^3}\right) = \frac{1 \cdot 24\ hrs \cdot 2\ \frac{\mu g}{m^3}}{ET_{work}\left(\frac{hrs}{day}\right)} \quad (16)$$

Level of Concern for Chronic Non-Cancer Health Effects

Equation 8 can be manipulated to solve for the level of concern for chronic, non-cancer health effects, using a target non-cancer hazard quotient of 1 and the exposure parameters presented in Table 1, as follows. For a residential scenario, this LOC equals 2.1 µg/m^3, which is the value listed as the non-cancer residential air Regional Screening Level for TCE, based on an HQ of 1 (EPA, 2016b). For an industrial/commercial scenario, the chronic LOC equals 8.8 µg/m^3, which is the value listed as the non-cancer worker air RSL for TCE, based on an HQ of 1. Site-specific chronic LOCs may be derived using alternate exposure times or other parameters.

$$TCE\ LOC_{chronic}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{nc,chronic}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years)} \quad (17)$$

$$TCE\ Residential\ LOC_{chronic}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{nc,chronic,child}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET_{res}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{res}\left(\frac{days}{year}\right) \cdot ED_{child}(years)} \quad (18)$$

$$TCE\ Industrial/Commercial\ LOC_{chronic}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{nc,chronic,work}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years)} \quad (19)$$

Level of Concern for Cancer Risks

Equations 11, 12, and 13 can be manipulated to solve for the level of concern for cancer risks, using a target excess cancer risk (TR) of 1E-04, which is the upper bound of the EPA's target cancer risk range, and the exposure parameters presented in Table 1, as follows. For a residential scenario, this LOC equals 48 µg/m^3, and for an industrial/commercial scenario, the cancer LOC equals 300 µg/m^3.

$$TCE\ LOC_{cancer}\left(\frac{\mu g}{m^3}\right) = \frac{TR \cdot AT_{cancer}(days)}{ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}} \quad (20)$$

$$TCE\ Residential\ LOC_{cancer}\left(\frac{\mu g}{m^3}\right) = \frac{TR \cdot AT_{cancer}(days)}{ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot \left[\begin{array}{c}\left(ED_{0-2}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{0-2}\right) + \left(ED_{2-16}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{2-16}\right) + \\ \left(ED_{16-26}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{16-26}\right) + \left(ED_{res}(years) \cdot IUR_{N\&L}\left(\frac{\mu g}{m^3}\right)^{-1}\right)\end{array}\right]} \quad (21)$$

$$TCE\ Industrial/Comm.\ LOC_{cancer}\left(\frac{\mu g}{m^3}\right) = \frac{TR \cdot AT_{cancer}(days)}{ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}} \quad (22)$$

As shown below in Table 2, the levels of concern for developmental health effects are lower than the LOCs for chronic health effects and cancer, for both residential and occupational scenarios, when based on target hazard quotients of 1 or target cancer risks of 1E-04. These are the levels of risk that, when exceeded, warrant action under the National Contingency Plan. Basing the Region 7 TCE action levels

on the developmental LOCs is protective for all potential forms of adverse health effects associated with TCE. Thus, the action level for a residential scenario is 2 $\mu g/m^3$, and the action level for a typical industrial/commercial scenario with an 8-hr workday is 6 $\mu g/m^3$. As previously mentioned, the developmental LOC, and thus the action level, is highly dependent on the exposure time. Therefore, for non-residential exposure scenarios, careful consideration should be given to the value selected as the exposure time.

Table 2. Levels of Health Concern for Trichloroethylene ($\mu g/m^3$), THQ = 1 and TR = 1E-04.	
Residents (24-hr Exposure Scenario)	
Developmental Non-Cancer LOC:	*2*
Chronic Non-Cancer LOC:	*2.1*
Cancer LOC:	*48*
Region 7 Residential TCE Action Level:	**2**
Industrial/Commercial Workers (8-hr Exposure Scenario)	
Developmental Non-Cancer LOC:	*6*
Chronic Non-Cancer LOC:	*8.8*
Cancer LOC:	*300*
Region 7 Industrial/Commercial TCE Action Level:	**6**

Risk Management Considerations

If the TCE action level is exceeded, this indicates a potential imminent threat to human health, and early or interim action(s) should be taken to eliminate, reduce, and/or control the hazards posed by the site (EPA, 2014d). At Superfund sites, coordination between the remedial and removal programs should immediately commence as early as the receipt of preliminary sampling results indicative of a potential human health concern (EPA, 2016c). Potential receptors should be informed of the results and potential risks to human health. Standard Region 7 practice is to communicate this information via data transmittal letters submitted to property owners and employers, but when TCE action levels are exceeded, tenants, residents, employees and others who may be exposed should also be informed. Although the action levels derived in this document are applicable to women in the first trimester of pregnancy, note that the levels protective of autoimmune disease and kidney toxicity in all individuals are not significantly different, at 2.1 and 8.8 $\mu g/m^3$, for residents and workers, respectively. Depending on the concentrations detected, immediate site actions could include relocation, restricting the time residents or workers remain in areas exceeding action levels, opening basement or lower level windows for ventilation (using a fan), sealing cracks in the slab, sealing sump pits, sealing cinder block or stone walls, and/or using air filtration systems. Vapor mitigation systems or adjustments to HVAC systems may be used to minimize exposures on a more long-term basis. Post-remedy testing and continued operation and maintenance is necessary to ensure protection of human health until the source of TCE in soil and/or groundwater is ultimately addressed.

Other EPA Regions and states have derived tiered action levels prescribing the types and urgency of various responses, as described below.

- Although Region 7 consistently uses a THQ of 1 as the basis for both removal and remedial Superfund actions, other Regions have used a THQ of 3 as a science policy approach to prioritize actions that may warrant the use of removal authority, with ultimate cleanup goals based on a THQ of 1. Since non-cancer toxicity values have historically been based on effects resulting from chronic exposure, this practice assumes that the most highly contaminated sites will be remediated first, but all sites will be remediated before exposures have occurred for a sufficiently long duration (e.g., 25 years as a worker or 26 years as a resident) to pose significant health risks.

This assumption is not protective of the short-term health effects associated with TCE, in which the critical window of susceptibility is an approximate three week period and a single exposure during this critical time may result in cardiac malformations.

- Tiered action levels could also be derived by reducing the uncertainty factor applied to the RfC from 10 to 1. The existing UF of 10 is applied for uncertainty regarding differences in pharmacodynamics between animals and humans and between the general population and sensitive subpopulation. Other than the toxicokinetic variability characterized by the physiologically-based pharmacokinetic model, EPA (2011a) indicates that there are inadequate chemical-specific data to quantify the degree of differential susceptibility due to factors such as genetic polymorphisms, race/ethnicity, preexisting health status, lifestyle factors, and nutritional status. The UF of 10 was included in the extensive peer-review process described in this document, and Region 7 does not have justification to alter this value.
- Similarly, the selection of a 1% excess risk as the benchmark response and a human equivalent concentration for a toxicokinetically sensitive individual at the 99th percentile were both extensively reviewed, and Region 7 does not have justification to alter these criteria.

Although Region 7 has not developed tiered levels because this approach may not be protective of human health, higher concentrations of TCE are associated with greater health risks. Actions should be implemented as quickly as is practicable to minimize risks of developmental toxicity. This document reinforces that Region 7 should expedite actions to protect human health whenever the TCE air concentration exceeds 2 $\mu g/m^3$ in a residential scenario or 6 $\mu g/m^3$ for an 8-hour worker scenario.

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Appendix M
2016 EPA Region 7 Memorandum
Action Levels for TCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

NOV 0 2 2016

MEMORANDUM

SUBJECT: EPA Region 7 Action Levels for Trichloroethylene in Air

FROM: Mike Beringer, Chief
Environmental Data & Assessment Branch
Environmental Sciences & Technology Division

TO: Branch Chiefs
Waste Enforcement and Materials Management Branch
and Waste Remediation & Permitting Branch
Air and Waste Management Division

Branch Chiefs
Superfund Division

The purpose of this memorandum is to update the U.S. Environmental Protection Agency Region 7 RCRA and Superfund programs on the recommended action levels for trichloroethylene (TCE) in air, and provide information on characterizing and addressing human health risks from less-than-lifetime exposures. The action level for a residential scenario is 2 $\mu g/m^3$, and the action level for an industrial/commercial scenario with an 8-hr workday is 6 $\mu g/m^3$. Equations to allow derivation of action levels for alternative scenarios, such as a 10-hr workday, are presented. As described in this attachment, it is assumed that an exposure to TCE at any time during an approximate three-week period in early pregnancy could result in one or more types of cardiac malformations. Thus, the critical exposure period of concern used to evaluate the potential for heart defects and derive action levels for TCE is one day. An exceedance of the TCE action level indicates a potential imminent threat to human health. Region 7 should expedite early or interim action(s) to eliminate, reduce, and/or control the hazards posed by the site as quickly as possible. If you or your staff have any questions or need further assistance, please contact Kelly Schumacher (x7963).

EPA Region 7 Action Levels for Trichloroethylene in Air.	
Exposure Scenario	*Action Level*
Residential (24 hours/day)	**2 $\mu g/m^3$**
Industrial/Commercial (8 hours/day)[1]	**6 $\mu g/m^3$**

[1] Site-specific action levels should be derived when the workday differs from 8 hours/day.

Attachment

EPA Region 7 Action Levels for Trichloroethylene in Air

Introduction

In 2011, the latest human health toxicity values for trichloroethylene were published by the United States Environmental Protection Agency's Integrated Risk Information System program (EPA, 2011a). As discussed in this document, these new values are partly based on developmental health effects that result from less-than-lifetime exposures. In contrast, the toxicity values typically used to evaluate potential health risks and derive action levels at Superfund and RCRA sites are based on health effects associated with long-term, or chronic exposures. Further, the equations and exposure parameters used typically reflect all or a significant portion of a person's lifetime. Once the current TCE values were released, the protectiveness of using traditional approaches to assess and address TCE exposures was questioned. The purpose of this memorandum is to update the EPA Region 7 RCRA and Superfund programs on the recommended action levels for TCE in air and provide information on characterizing and addressing human health risks from less-than-lifetime exposures. To support these objectives, the window of susceptibility for the developmental toxicity associated with TCE is examined, the critical exposure period of concern is identified, and the appropriate exposure parameters and equations are elucidated.

Toxicity Assessment

The EPA's final toxicological review by the IRIS program incorporates comments by the U.S. National Academy of Sciences (National Research Council, 2006), two U.S. EPA Science Advisory Boards (EPA, 2002 and 2011b), the Executive Office of the President (Office of Management and Budget, 2009 and 2011), the U.S. Department of Defense (DOD, 2009a, 2009b and 2011), the National Aeronautics and Space Administration (NASA, 2009 and 2011), internal Agency reviewers, and the public, among others. The Halogenated Solvents Industry Alliance, Inc., which represents the interests of TCE manufacturers and producers, submitted a Request for Correction of the TCE IRIS assessment (HSIA, 2013), which was denied by the EPA's Acting Assistant Administrator (EPA, 2015). The HSIA then submitted a Request for Reconsideration (HSIA, 2015), which was also denied by the EPA (EPA, 2016a). The EPA found the Requests "directly contrary to the SAB's conclusions and recommendations, such that to accept HSIA's RFC/RFR would require EPA to reject SAB's advice" (EPA, 2016a).

The EPA's Office of Land and Emergency Management recognizes an IRIS assessment as the official Agency scientific position regarding the toxicity of a chemical based on the data available at the time of the review (EPA, 2003). As such, IRIS is generally the preferred source of human health toxicity values used to evaluate risks at Superfund and RCRA hazardous waste sites. In accordance with Directive 9285.7-53 (EPA, 2003), the 2011 IRIS TCE toxicity values will be used to evaluate risks and derive action levels by the Region 7 RCRA and Superfund programs until the 2011 values are either revised or rescinded.

Non-Carcinogenic Health Effects

In general, the EPA assumes that a dose or exposure level exists below which adverse non-carcinogenic health effects will not occur (EPA, 1989). Below this threshold, it is believed that exposure to a chemical is tolerated without adverse effects. Adverse health effects occur only when physiologic protective mechanisms are overcome by exposure to doses or concentrations above the threshold. For chronic toxicity values, the first adverse effect (or its known precursor) that occurs to the most sensitive species as the dose rate of an agent increases, regardless of the exposure duration, is designated the

critical endpoint. The dose or exposure at which the critical endpoint is observed is the point of departure. Uncertainty factors, ranging from 1 to 3,000, reflecting limitations of the data used are applied to the point of departure to derive the inhalation reference concentration. The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime (EPA, 1989).

The 2011 Scientific Advisory Board panel recommended that, "The two endpoints for immune effects from Keil *et al.* (2009) and the cardiac malformations from Johnson *et al.* (2003) should be considered the principal studies supporting the RfC" (EPA, 2011b). The panel considered the immune effects and cardiac malformations co-critical endpoints (EPA, 2011b). In accordance with the SAB panel recommendations, the IRIS program based the TCE chronic reference concentration of 2 $\mu g/m^3$ on these two co-critical endpoints, each of which can support the RfC independently: autoimmune disease following chronic exposure in adults (0.00033 ppm, or 1.8 $\mu g/m^3$) and heart defects following exposure during early pregnancy (0.00037 ppm, or 2.0 $\mu g/m^3$). The RfC is also supported by nephrotoxicity (kidney effects) following chronic exposure in adults (0.00056 ppm, or 3.0 $\mu g/m^3$). Following publication of these values, the developmental cardiac effects were further addressed by the IRIS program in "TCE Developmental Cardiac Toxicity Assessment Update" (EPA, 2014a) and by scientists in the EPA's Office of Research and Development in the peer-reviewed literature (Makris *et al.*, 2016).

Chronic exposure to TCE poses a potential human health hazard to the central nervous system, kidneys, liver, immune system, and male reproductive system. As mentioned above, immunotoxicity in adults is considered a co-critical endpoint, at a slightly lower concentration than that associated with cardiac defects. Overall, the IRIS program concluded that "the human and animal studies of TCE and immune-related effects provide strong evidence for a role of TCE in autoimmune disease and in a specific type of generalized hypersensitivity syndrome" (EPA, 2011a). Kidney toxicity was considered a supporting endpoint, with high confidence found in multiple lines of evidence in both human and animal studies.

Short-term exposures to TCE during pregnancy are associated with many forms of developmental toxicity, including spontaneous abortions, decreased growth, developmental neurotoxicity, developmental immunotoxicity, and birth defects. However, the critical developmental endpoint is cardiac malformations. The primary types of heart defects observed with TCE exposures include atrial and ventricular septal defects, which are holes in the wall (septa) between the top two chambers (atria) or bottom two chambers (ventricles) of the heart, and pulmonary and aortic valve stenoses, which are thickened or fused heart valves that do not properly open and/or close and may leak blood. The critical window of susceptibility for these types of defects is an approximate three week period (i.e., valvuloseptal morphogenesis, or the period in which major cardiac morphogenic events such as heart valve formation occur) approximately four to seven weeks after conception, early in the first trimester of human pregnancy (Dhanantwari *et al.*, 2009). The type and severity of the resulting cardiac malformation or malformations depends on the timing and level of exposure to TCE within this approximate three week period. Exposures that clear the body before this period do not impact the heart valves and septa, because they have not yet begun to form. In humans, TCE and most of its metabolites are eliminated within a week of exposure (EPA, 2011a).

Carcinogenic Effects

The EPA evaluates carcinogenicity in two parts (EPA, 2005a). First, the Agency evaluates all available scientific information and assigns a weight-of-evidence classification based on a compound's potential to cause cancer in humans. In the absence of sufficient data regarding the mode of action or if the

weight-of-evidence supports a mutagenic mode of action, the EPA generally assumes that any exposure to a chemical will increase an individual's risk of developing cancer. Under this default approach, there is no threshold below which the probability of developing cancer is zero. Second, a toxicity value is derived to define the quantitative relationship between dose or concentration and carcinogenic response. For inhalation exposures using the default approach, this value is known as the inhalation unit risk. The IUR is a generally plausible upper-bound estimate of the increased probability of developing cancer following a lifetime of exposure. This value is used to estimate the increased risk of developing cancer from inhalation of potentially carcinogenic chemicals.

Following the EPA's Guidelines for Carcinogen Risk Assessment (EPA, 2005a), the IRIS program has evaluated the carcinogenic potential of TCE and has classified it as "carcinogenic to humans" by all routes of exposure. This conclusion is based on convincing evidence of a causal association between TCE exposure in humans and kidney cancer, strong evidence of non-Hodgkin's lymphoma, and more limited evidence of liver and biliary tract cancer. The inhalation unit risk for TCE, based on these combined cancer types, is 4.1E-06 $(\mu g/m^3)^{-1}$. Sufficient evidence supports a mutagenic mode of action for TCE-induced kidney tumors in humans, but modes of actions have not been established for the other TCE-induced cancer types. The portion of the TCE IUR specific for kidney tumors is 1.0E-06 $(\mu g/m^3)^{-1}$, while the IUR for non-Hodgkin's lymphoma plus liver and biliary tract cancers is 3.1E-06 $(\mu g/m^3)^{-1}$.

Risk Characterization

The EPA's RCRA and Superfund programs characterize potential human health risks using standardized equations that combine toxicity values with exposure parameters because risk is a function of both hazard and exposure. Typically, the EPA's standard default exposure parameters for chronic scenarios, published in OSWER Directive 9200.1-120 (EPA, 2014b), are used. However, exposure assessments must take into account the time scale related to the specific biological response (NRC, 1991). This means that exposure parameters selected to evaluate risks and/or develop levels of concern for a given chemical and scenario should correspond as closely as possible with the exposure period used to develop the toxicity value. For example, time-weighted average exposures over a lifetime have little relevance for a developmental toxin if the adverse effects could only occur following exposure during a particular stage of development (EPA, 1992).

Non-Cancer Hazard Quotients for Cardiac Defects

The toxicity values considered protective for a lifetime of exposure to TCE are partly based on non-cancer health effects resulting from less-than-lifetime exposures. As previously stated, one of the two co-critical endpoints that serves as the basis for the TCE RfC is cardiac defects. This effect can only occur when the fetus is exposed during the period of heart development. Therefore, the EPA's standard default exposure parameters for chronic exposures are invalid for estimating hazard quotients representing the potential for cardiac defects associated with TCE exposures and for deriving TCE levels of concern that are protective of developmental endpoints. To select appropriate less-than-lifetime exposure parameters that may be used to characterize these hazards and derive levels of concern, the critical exposure period of concern for TCE-related heart malformations must first be identified.

"[F]or developmental toxic effects, a primary assumption is that a single exposure at a critical time in development may produce an adverse developmental effect, i.e., repeated exposure is not a necessary prerequisite for developmental toxicity to be manifested" (EPA, 1991). The EPA's Risk Assessment Guidance for Superfund Part A (EPA, 1989) directs the use of a day or a single exposure incident to assess the potential risks of adverse developmental effects. Following this guidance, it is assumed that a

single exposure to TCE at any time during the approximate three week period of valvuloseptal morphogenesis could result in one or more of the types of heart malformations described previously. Thus, the critical exposure period of concern used to evaluate the potential for cardiac defects is one day. A 24-hour exposure period has been used by the EPA to evaluate acute hazards associated with TCE in the final, peer-reviewed TSCA Work Plan Chemical Risk Assessment (EPA, 2014c).

The EPA's Risk Assessment Guidance for Superfund Part F, Supplemental Guidance for Inhalation Risk Assessment (EPA, 2009) specifies that the exposure concentration (EC) that should be used to evaluate risks and derive levels of concern for acute endpoints is equivalent to the concentration detected in air (CA), as shown in Equation 1.

$$EC\left(\frac{\mu g}{m^3}\right) = CA\left(\frac{\mu g}{m^3}\right) \quad (1)$$

For a residential scenario, in which exposure to TCE inside a home is assumed to occur throughout the entire exposure period of concern, Equation 1 is appropriate. However, for other types of scenarios (e.g., industrial, commercial, recreational), exposures to TCE only occur for a portion of any given 24-hour period. Moreover, exposures to different concentrations of TCE may occur within a single day at some sites. To account for these multiple exposures, Equation 1 can be modified, resulting in a time-weighted average exposure concentration. The 24-hour TWA exposure concentration can be calculated using Equation 2.

$$EC_{24} = \sum_{i=1}^{n}(CA_i \cdot ET_i)/AT_{24} \quad (2)$$

where: EC_{24} ($\mu g/m^3$) = time-weighted average exposure concentration over 24 hours;
CA_i ($\mu g/m^3$) = TCE concentration in air in microenvironment (ME) i;
ET_i (hours) = exposure time spent in ME i;
AT_{24} (hours) = averaging time for the exposure period of concern (24 hours)

In a residential scenario, there is a single microenvironment, the residence, with an exposure time of 24 hours. Thus, the Residential EC_{24} will equal CA_{res}, as shown in Equation 3. To reduce uncertainty in residential scenarios, CA_{res} should be based on air samples collected for an entire 24-hour exposure period. Generally, stationary 24-hour indoor air sample results are used.

$$Residential\ EC_{24} = \frac{(CA_{res} \cdot 24\ hrs)}{24\ hrs} = CA_{res} \quad (3)$$

In a typical industrial or commercial scenario, there are two microenvironments. One is the workplace, and the other is away from the workplace. The Industrial/Commercial EC_{24} can be calculated using Equation 4, below. Although the standard value for ET_{work} is an 8-hour workday, this variable should reflect site-specific conditions. For example, employees at a given site may work longer shifts, such as 10 or 12 hours, and they may or may not take their lunch breaks on site. CA_{work} should be based on air samples collected for the entire exposure time, ET_{work}, during the portion of the day that workers are present. This is to prevent potential underestimates of TCE concentrations if diurnal variations occur at a site, although such variability does not exist at all sites. Generally, stationary 8-hour or 10-hour indoor air samples are appropriate. ET_{away} should equal the remainder of the 24-hour period spent away from the workplace. CA_{away} is generally assumed to equal zero, unless site-specific data suggest otherwise.

$$Industrial/Commercial\ EC_{24} = \frac{(CA_{work} \cdot ET_{work}) + (CA_{away} \cdot ET_{away})}{24\ hrs} \quad (4)$$

If multiple or variable microenvironments are present at a site, it is possible to use Equation 2 to generate a 24-hour TWA exposure concentration. However, consideration should be given to the use of portable sampling equipment to more accurately measure true exposure concentrations to the receptor(s) of concern over the entire exposure time, as opposed to stationary sampling equipment positioned in multiple areas where exposure occurs.

Non-cancer hazard quotients for heart defects can be derived using Equation 5, where HQ_{24} is the developmental hazard quotient; EC_{24} is the 24-hr time-weighted average exposure concentration calculated using Equations 2, 3, or 4; and the RfC is 2 $\mu g/m^3$. As shown in Equation 5, a hazard quotient is the ratio of the exposure to the non-cancer toxicity value. Thus, an HQ greater than 1 means that the exposure is greater than the RfC and exceeds a level of concern for that particular non-cancer health effect.

$$HQ_{24} = \frac{EC_{24}}{RfC} \tag{5}$$

Equation 5 can be combined with Equation 3 or 4 to calculate the developmental hazard quotients (HQ_{24}) for a residential or industrial/commercial receptor, as follows.

$$Residential\ HQ_{24} = \frac{CA_{res}}{2\frac{\mu g}{m^3}} \tag{6}$$

$$Industrial/Commercial\ HQ_{24} = \frac{(CA_{work} \cdot ET_{work}) + (CA_{away} \cdot ET_{away})}{24\ hrs \cdot 2\frac{\mu g}{m^3}} \tag{7}$$

Non-Cancer Hazard Quotients for Chronic Health Effects

Autoimmune disease, a co-critical endpoint upon which the TCE RfC is based, and kidney toxicity, the supporting endpoint, are both health effects associated with chronic or long-term exposures. Equation 8 is the standardized equation used to evaluate non-cancer hazard quotients for chronic health effects; the exposure parameters are defined in Table 1. If seasonal or temporal fluctuations in TCE concentrations potentially exist, consideration should be given as to whether sufficient data are available to generate an average concentration for use as the CA term. If the dataset is limited, it may be more health-protective to use the highest concentration detected.

$$HQ_{chronic} = \frac{CA\left(\frac{\mu g}{m^3}\right) \cdot ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years)}{AT_{nc,chronic}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)} \tag{8}$$

The above equation can be presented in terms of residential or industrial/commercial exposure scenarios, as shown below. Note that it is only appropriate to calculate non-cancer hazard quotients for chronic health effects for those receptors with long-term exposures.

$$Residential\ HQ_{chronic} = \frac{CA_{res}\left(\frac{\mu g}{m^3}\right) \cdot ET_{res}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{res}\left(\frac{days}{year}\right) \cdot ED_{child}(years)}{AT_{nc,chronic,child}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)} \tag{9}$$

$$Industrial/Commercial\ HQ_{chronic} = \frac{CA_{work}\left(\frac{\mu g}{m^3}\right) \cdot ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years)}{AT_{nc,chronic,work}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)} \tag{10}$$

Cancer Risks

TCE is classified "carcinogenic to humans," based on kidney cancer, non-Hodgkin's lymphoma, and liver and biliary tract cancer. Equation 11 is the standardized equation used to evaluate excess individual lifetime cancer risks; the exposure parameters are defined in Table 1. If temporal fluctuations in TCE concentrations potentially exist, consideration should be given as to whether sufficient data are available to generate an average concentration for use as the CA term. If the dataset is limited, it may be more health-protective to use the highest concentration detected.

$$CR = \frac{CA\left(\frac{\mu g}{m^3}\right) \cdot ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}}{AT_{cancer}(days)} \quad (11)$$

The above equation can be presented in terms of residential or industrial/commercial exposure scenarios, as shown below. Because a mutagenic mode of action has been established for kidney tumors associated with TCE, it is necessary to apply age-dependent adjustment factors when deriving risks for this cancer type in children (EPA, 2005b). ADAFs are not applied when deriving risks for non-Hodgkin's lymphoma or liver and biliary tract cancers associated with TCE exposures because they have not been determined to operate via a mutagenic mode of action. Because only adults are evaluated in an industrial/commercial exposure scenario and no adjustments for mutagenicity are made for adults (i.e., $ADAF_{adult} = 1$), ADAFs are not included in Equation 13.

$$Residential\ CR = \left(\frac{CA_{res}\left(\frac{\mu g}{m^3}\right) \cdot ET_{res}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{res}\left(\frac{days}{year}\right)}{AT_{cancer}(days)}\right) \cdot \left[\left(ED_{0-2}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{0-2}\right) + \left(ED_{2-16}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{2-16}\right) + \left(ED_{16-26}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{adult}\right) + \left(ED_{res}(years) \cdot IUR_{N\&L}\left(\frac{\mu g}{m^3}\right)^{-1}\right)\right] \quad (12)$$

$$Industrial/Commercial\ CR = \frac{CA_{work}\left(\frac{\mu g}{m^3}\right) \cdot ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}}{AT_{cancer}(days)} \quad (13)$$

The definitions, values, and references for the exposure parameters and toxicity values used in this document are provided in Table 1. For the chronic scenarios, the EPA's standard default exposure parameters (EPA, 2014b) are used to best represent reasonable maximum exposure scenarios, which are the highest exposures reasonably expected to occur at a site (EPA, 1989). These values are based on the 2011 Exposure Factors Handbook (EPA, 2011c). Although the default exposure time for an indoor worker is 8 hours/day, it is preferable to identify a site-specific worker exposure time.

Table 1. Exposure Parameters and Toxicity Values.

Parameter	Definition	Units	Value	Reference
$ADAF_{0-2}$	Age-dependent adjustment factor – ages 0 to 2 years	-	10	EPA, 2005b
$ADAF_{2-16}$	Age-dependent adjustment factor – ages 2 to 16 years	-	3	EPA, 2005b
$ADAF_{adult}$	Age-dependent adjustment factor – ages 16 years and older	-	1	EPA, 2005b
AT_{24}	Averaging time – developmental effects	hours	24	-
AT_{cancer}	Averaging time – cancer	days	25,550	EPA, 2014b

Table 1. Exposure Parameters and Toxicity Values.				
Parameter	**Definition**	**Units**	**Value**	**Reference**
$AT_{nc,chronic,\ child}$	Averaging time – chronic non-cancer health effects, resident child	days	2,190	EPA, 2014b
$AT_{nc,chronic,\ work}$	Averaging time – chronic non-cancer health effects, indoor worker	days	9,125	EPA, 2014b
CA	Concentration of TCE in air	$\mu g/m^3$	Measured	-
CA_{res}	Concentration of TCE in air of the residence	$\mu g/m^3$	Measured	-
CA_{work}	Concentration of TCE in air of the workplace	$\mu g/m^3$	Measured	-
$ED_{0\text{-}2}$	Exposure duration – ages 0 to 2 years	years	2	EPA, 2005b
$ED_{2\text{-}16}$	Exposure duration – ages 2 to 16 years	years	14	EPA, 2005b
$ED_{16\text{-}26}$	Exposure duration – ages 16 to 26 years	years	10	EPA, 2005b
ED_{child}	Exposure duration – resident (child, ages 0 to 6 years)	years	6	EPA, 2014b
ED_{res}	Exposure duration – resident (child + adult, ages 0 to 26 years)	years	26	EPA, 2014b
ED_{work}	Exposure duration – indoor worker	years	25	EPA, 2014b
EF_{res}	Exposure frequency – resident	days/yr	350	EPA, 2014b
EF_{work}	Exposure frequency – indoor worker	days/yr	250	EPA, 2014b
ET_{away}	Exposure time – time spent away from work by an indoor worker (24 hrs/day minus ET_{work})	hrs/day	16 or site-specific	-
ET_{res}	Exposure time – time spent at home by a resident	hrs/day	24	EPA, 2014b
ET_{work}	Exposure time – time spent at work by an indoor worker	hrs/day	8 or site-specific	EPA, 2014b or site-specific
IUR	TCE inhalation unit risk - total	$(\mu g/m^3)^{-1}$	4.1E-06	EPA, 2011a
IUR_{kid}	TCE inhalation unit risk – kidney cancer	$(\mu g/m^3)^{-1}$	1.0E-06	EPA, 2011a
$IUR_{N\&L}$	TCE inhalation unit risk – non-Hodgkin's lymphoma and liver and biliary tract cancers	$(\mu g/m^3)^{-1}$	3.1E-06	EPA, 2011a
RfC	TCE reference concentration	$\mu g/m^3$	2	EPA, 2011a
THQ	Target hazard quotient	-	1	-
TR	Target cancer risk	-	1E-04	Upper-end of Target Cancer Risk Range

Action Levels

Level of Concern for Developmental Effects

Equations 2 and 5 can be manipulated to solve for the level of concern for developmental health effects, using a target non-cancer hazard quotient of 1, as follows. Note that the only exposure parameter that can vary in this calculation is the exposure time. The TCE levels of concern for developmental effects based on standard exposure times are provided in Table 2. For a 24-hour residential scenario, the developmental LOC equals 2 $\mu g/m^3$. For a typical 8-hour industrial/commercial scenario, the developmental LOC equals 6 $\mu g/m^3$. Site-specific developmental LOCs may be derived using alternate exposure times; for example, a 10-hour exposure time results in a developmental LOC of 4.8 $\mu g/m^3$.

$$TCE\ LOC_{developmental}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{24}(hrs) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET\left(\frac{hrs}{day}\right)} \quad (14)$$

$$TCE\ Residential\ LOC_{developmental}\left(\frac{\mu g}{m^3}\right) = \frac{1 \cdot 24\ hrs \cdot 2\ \frac{\mu g}{m^3}}{24\ hrs} \quad (15)$$

$$TCE\ Industrial/Commercial\ LOC_{developmental}\left(\frac{\mu g}{m^3}\right) = \frac{1 \cdot 24\ hrs \cdot 2\ \frac{\mu g}{m^3}}{ET_{work}\left(\frac{hrs}{day}\right)} \quad (16)$$

Level of Concern for Chronic Non-Cancer Health Effects

Equation 8 can be manipulated to solve for the level of concern for chronic, non-cancer health effects, using a target non-cancer hazard quotient of 1 and the exposure parameters presented in Table 1, as follows. For a residential scenario, this LOC equals 2.1 µg/m^3, which is the value listed as the non-cancer residential air Regional Screening Level for TCE, based on an HQ of 1 (EPA, 2016b). For an industrial/commercial scenario, the chronic LOC equals 8.8 µg/m^3, which is the value listed as the non-cancer worker air RSL for TCE, based on an HQ of 1. Site-specific chronic LOCs may be derived using alternate exposure times or other parameters.

$$TCE\ LOC_{chronic}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{nc,chronic}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years)} \quad (17)$$

$$TCE\ Residential\ LOC_{chronic}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{nc,chronic,child}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET_{res}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{res}\left(\frac{days}{year}\right) \cdot ED_{child}(years)} \quad (18)$$

$$TCE\ Industrial/Commercial\ LOC_{chronic}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{nc,chronic,work}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years)} \quad (19)$$

Level of Concern for Cancer Risks

Equations 11, 12, and 13 can be manipulated to solve for the level of concern for cancer risks, using a target excess cancer risk (TR) of 1E-04, which is the upper bound of the EPA's target cancer risk range, and the exposure parameters presented in Table 1, as follows. For a residential scenario, this LOC equals 48 µg/m^3, and for an industrial/commercial scenario, the cancer LOC equals 300 µg/m^3.

$$TCE\ LOC_{cancer}\left(\frac{\mu g}{m^3}\right) = \frac{TR \cdot AT_{cancer}(days)}{ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}} \quad (20)$$

$$TCE\ Residential\ LOC_{cancer}\left(\frac{\mu g}{m^3}\right) = \frac{TR \cdot AT_{cancer}(days)}{ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot \left[\begin{array}{c}\left(ED_{0-2}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{0-2}\right) + \left(ED_{2-16}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{2-16}\right) + \\ \left(ED_{16-26}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{16-26}\right) + \left(ED_{res}(years) \cdot IUR_{N\&L}\left(\frac{\mu g}{m^3}\right)^{-1}\right)\end{array}\right]} \quad (21)$$

$$TCE\ Industrial/Comm.\ LOC_{cancer}\left(\frac{\mu g}{m^3}\right) = \frac{TR \cdot AT_{cancer}(days)}{ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}} \quad (22)$$

As shown below in Table 2, the levels of concern for developmental health effects are lower than the LOCs for chronic health effects and cancer, for both residential and occupational scenarios, when based on target hazard quotients of 1 or target cancer risks of 1E-04. These are the levels of risk that, when exceeded, warrant action under the National Contingency Plan. Basing the Region 7 TCE action levels

on the developmental LOCs is protective for all potential forms of adverse health effects associated with TCE. Thus, the action level for a residential scenario is 2 $\mu g/m^3$, and the action level for a typical industrial/commercial scenario with an 8-hr workday is 6 $\mu g/m^3$. As previously mentioned, the developmental LOC, and thus the action level, is highly dependent on the exposure time. Therefore, for non-residential exposure scenarios, careful consideration should be given to the value selected as the exposure time.

Table 2. Levels of Health Concern for Trichloroethylene ($\mu g/m^3$), THQ = 1 and TR = 1E-04.	
Residents (24-hr Exposure Scenario)	
Developmental Non-Cancer LOC:	*2*
Chronic Non-Cancer LOC:	*2.1*
Cancer LOC:	*48*
Region 7 Residential TCE Action Level:	**2**
Industrial/Commercial Workers (8-hr Exposure Scenario)	
Developmental Non-Cancer LOC:	*6*
Chronic Non-Cancer LOC:	*8.8*
Cancer LOC:	*300*
Region 7 Industrial/Commercial TCE Action Level:	**6**

Risk Management Considerations

If the TCE action level is exceeded, this indicates a potential imminent threat to human health, and early or interim action(s) should be taken to eliminate, reduce, and/or control the hazards posed by the site (EPA, 2014d). At Superfund sites, coordination between the remedial and removal programs should immediately commence as early as the receipt of preliminary sampling results indicative of a potential human health concern (EPA, 2016c). Potential receptors should be informed of the results and potential risks to human health. Standard Region 7 practice is to communicate this information via data transmittal letters submitted to property owners and employers, but when TCE action levels are exceeded, tenants, residents, employees and others who may be exposed should also be informed. Although the action levels derived in this document are applicable to women in the first trimester of pregnancy, note that the levels protective of autoimmune disease and kidney toxicity in all individuals are not significantly different, at 2.1 and 8.8 $\mu g/m^3$, for residents and workers, respectively. Depending on the concentrations detected, immediate site actions could include relocation, restricting the time residents or workers remain in areas exceeding action levels, opening basement or lower level windows for ventilation (using a fan), sealing cracks in the slab, sealing sump pits, sealing cinder block or stone walls, and/or using air filtration systems. Vapor mitigation systems or adjustments to HVAC systems may be used to minimize exposures on a more long-term basis. Post-remedy testing and continued operation and maintenance is necessary to ensure protection of human health until the source of TCE in soil and/or groundwater is ultimately addressed.

Other EPA Regions and states have derived tiered action levels prescribing the types and urgency of various responses, as described below.

- Although Region 7 consistently uses a THQ of 1 as the basis for both removal and remedial Superfund actions, other Regions have used a THQ of 3 as a science policy approach to prioritize actions that may warrant the use of removal authority, with ultimate cleanup goals based on a THQ of 1. Since non-cancer toxicity values have historically been based on effects resulting from chronic exposure, this practice assumes that the most highly contaminated sites will be remediated first, but all sites will be remediated before exposures have occurred for a sufficiently long duration (e.g., 25 years as a worker or 26 years as a resident) to pose significant health risks.

This assumption is not protective of the short-term health effects associated with TCE, in which the critical window of susceptibility is an approximate three week period and a single exposure during this critical time may result in cardiac malformations.

- Tiered action levels could also be derived by reducing the uncertainty factor applied to the RfC from 10 to 1. The existing UF of 10 is applied for uncertainty regarding differences in pharmacodynamics between animals and humans and between the general population and sensitive subpopulation. Other than the toxicokinetic variability characterized by the physiologically-based pharmacokinetic model, EPA (2011a) indicates that there are inadequate chemical-specific data to quantify the degree of differential susceptibility due to factors such as genetic polymorphisms, race/ethnicity, preexisting health status, lifestyle factors, and nutritional status. The UF of 10 was included in the extensive peer-review process described in this document, and Region 7 does not have justification to alter this value.
- Similarly, the selection of a 1% excess risk as the benchmark response and a human equivalent concentration for a toxicokinetically sensitive individual at the 99th percentile were both extensively reviewed, and Region 7 does not have justification to alter these criteria.

Although Region 7 has not developed tiered levels because this approach may not be protective of human health, higher concentrations of TCE are associated with greater health risks. Actions should be implemented as quickly as is practicable to minimize risks of developmental toxicity. This document reinforces that Region 7 should expedite actions to protect human health whenever the TCE air concentration exceeds 2 $\mu g/m^3$ in a residential scenario or 6 $\mu g/m^3$ for an 8-hour worker scenario.

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