Health Consultation

GENERAL MILLS/HENKEL CORPORATION SUPERFUND SITE

MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA

EPA FACILITY ID: MND051441731

Prepared by:
Minnesota Department of Health

MARCH 5, 2018

Prepared Under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Foreword

This document summarizes public health concerns related to contamination at a site in Minnesota. It is based on a formal evaluation prepared by the Minnesota Department of Health (MDH). For a formal site evaluation, a number of steps are necessary:

- *Evaluating exposure:*
  MDH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present and how people might be exposed to it. Usually, MDH does not collect its own environmental sampling data. Rather, MDH relies on information provided by the Minnesota Pollution Control Agency (MPCA), the US Environmental Protection Agency (EPA), other government agencies, private businesses, and the general public.

- *Evaluating health effects:*
  If there is evidence that people are being exposed—or could be exposed—to hazardous substances, MDH scientists will take steps to determine whether that exposure could be harmful to human health. MDH's report focuses on public health— that is, the health impact on the community as a whole. The report is based on existing scientific information.

- *Developing recommendations:*
  In the evaluation report, MDH outlines its conclusions regarding any potential health threat posed by a site and offers recommendations for reducing or eliminating human exposure to pollutants. The role of MDH is primarily advisory. For that reason, the evaluation report will typically recommend actions to be taken by other agencies—including EPA and MPCA. If, however, an immediate health threat exists, MDH will issue a public health advisory to warn people of the danger and will work to resolve the problem.

- *Soliciting community input*:
  The evaluation process is interactive. MDH starts by soliciting and evaluating information from various government agencies, the individuals or organizations responsible for the site, and community members living near the site. Any conclusions about the site are shared with the individuals, groups, and organizations that provided the information. Once an evaluation report has been prepared, MDH seeks feedback from the public. If you have questions or comments about this report, we encourage you to contact us.

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List of Acronyms

AF	attenuation factor
ATSDR	Agency for Toxic Substances and Disease Registry
BDIS	Birth Defects Information System
DRO	diesel range organics
EPA	United States Environmental Protection Agency
GMI	General Mills, Incorporated
GWISV	groundwater intrusion screening value
ISV	intrusion screening value
MCSS	Minnesota Cancer Surveillance System
MDH	Minnesota Department of Health
MPCA	Minnesota Pollution Control Agency
PCE	perchloroethylene or tetrachloroethylene
pCi/L	picocuries per liter
RAP	remedial action plan
ROD	record of decision
SLV	soil leaching value
SRV	soil reference value
TCE	trichloroethylene
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
UST	underground storage tank
VOCs	volatile organic compounds

I. Summary

The Minnesota Department of Health's (MDH) mission is to protect, maintain, and improve the health of all Minnesotans. For communities living near state or federal Superfund sites, MDH's goal is to provide information people need to protect their health. MDH also evaluates environmental data, and advises state and federal regulatory agencies and local governments on actions that can be taken to protect public health.

The General Mills/Henkel Corporation Superfund site in Minneapolis is a former solvent disposal area that resulted in a trichloroethylene (TCE) groundwater contamination plume under a residential neighborhood. Solvents were disposed in the ground between 1947 and 1962 and the groundwater plume was reported in the early 1980s. Remedial activities consisted of installation and operation of a groundwater pump-and-treat system that operated from 1985-2010 to contain and reduce the concentrations of TCE. General Mills, Incorporated (GMI) began a vapor intrusion investigation in 2011.

In November 2013, the Minnesota Pollution Control Agency (MPCA) notified neighborhood property owners and residents that a vapor intrusion investigation was needed to evaluate the potential for indoor air contamination. As of June 2015, sub-slab sampling was conducted at 339 properties. Based on the sampling results, 188 properties received vapor mitigation systems to prevent exposure to site contaminants at levels of health concern in indoor air (Barr, 2015g).

The MPCA requested MDH assistance with various activities related to the vapor intrusion investigation and communications to the affected community. Residents of the affected neighborhood expressed frustration with a lack of easily understandable information about the site history and investigation and cleanup activities. They expressed a desire for one document that combines this information with available information about past and present human health and environmental impacts. The possible health effects from breathing TCE depends on the amount of TCE in indoor air and how long people breathe it. While there is little data regarding actual exposures to TCE at this site, health risks associated with TCE include an increase in the risk of heart defects in a developing fetus. Exposure to TCE may also affect the immune system, especially in sensitive individuals, such as pregnant women, young children, the elderly, and those with a compromised immune system. This Health Consultation serves as an independent evaluation of the data collected to date and actions taken to protect public health. MDH reached four main conclusions in this Health Consultation:

Conclusion 1

MDH concludes that contaminants in soil vapor are not currently harming people's health in the majority of properties within the investigation area (see Figure 1).

Basis for Conclusion:

a. The current location of the soil vapor plume has been defined with reasonable certainty. More than 90 percent of all properties within the investigation area received sub-slab soil vapor testing (Barr, 2015h). Mitigation systems were installed as needed (based on a health

protective, sub-slab action level) to prevent exposure to site contaminants at levels of health concern in indoor air. Use of an attenuation factor of 0.1 to make mitigation decisions is protective and often overestimates the potential for vapor intrusion.

b. Mitigation systems prevent entry of much of the contaminated soil vapor into buildings by continuously capturing the vapor and venting it outside. Diagnostic testing completed after each mitigation system was installed confirmed the system was operating as intended. Modifications were made if the diagnostic criteria were not met.

c. Indoor air was tested at several unmitigated properties that had elevated TCE concentrations in the sub-slab. No site-related contaminants were found at levels of health concern.

d. To confirm the effectiveness of the vapor mitigation systems, indoor air was sampled in 20 homes with the highest sub-slab concentrations (approximately 10% of properties mitigated). TCE was detected in 11 out of 20 properties, many likely influenced by consumer products and/or outdoor air. Although three of the residential properties had TCE concentrations greater than the Intrusion Screening Value (2.6, 3, and 5.3 $\mu g/m^3$), none of these concentrations are likely to affect health because they were measured in rarely occupied basements and only slightly exceed a safe screening value. Modifications were subsequently made to two of these properties to improve the performance of the mitigation systems.

Conclusion 2

There are limitations in MDH's ability to evaluate current health risks associated with vapor intrusion at some properties. Contaminants in untested or unmitigated homes may be harming people's health.

Basis for Conclusion:

a. While the sub-slab investigation and mitigation effort has been very successful, there are a number of properties where access to sample or mitigate was denied. Decisions on mitigation or additional actions are pending at other properties because of unique situations.

b. Post-mitigation indoor air sampling was not conducted at the majority of properties. Currently, this sampling is now considered a best management practice to confirm that vapors are not intruding into properties. This can be important to detect overlooked pathways where soil vapor can readily enter into buildings (pipe penetrations, drains, etc.).

Conclusion 3

MDH cannot determine whether past exposures to TCE from soil vapor within the investigation area may have affected people's health.

Basis for Conclusion:

a. Limited indoor air data indicate that past exposure to site-related contaminants due to vapor intrusion may have increased health risks for some people. TCE concentrations in shallow groundwater monitoring wells were higher in the past; this suggests that sub-slab concentrations may also have been higher in the past, with potential for increased indoor air exposures.

b. Historical exposures to site contaminants due to vapor intrusion are impossible to reconstruct. A health investigation would not be able to show a relationship between an estimated exposure to contaminants from the site and health effects in this community.

Conclusion 4

Vapor intrusion is the only exposure pathway of health concern at this site.

Basis for Conclusion:

MDH considered other ways that people could be exposed to contaminants from the site. As described below, no other exposure pathways are complete.

a. Site contaminants have never affected tap water in Minneapolis.
b. Groundwater in the area of the site is not used as a drinking water source (neither for private drinking water wells or city water supplies).
c. Past and current exposure to contaminants in soil is very unlikely (other than workers who contacted soil at the disposal site in the past).
d. Small amounts of TCE found in outdoor air samples in the investigation area appear similar to the amount of TCE present throughout Minneapolis.
e. TCE does not build up in surface soils or plants.
f. Past and current exposure to site-related TCE due to recreational use of, or eating fish from, the Mississippi River is very unlikely.

Recommendations

1) MDH recommends monitoring the edges of the groundwater contaminant plume in the glacial drift aquifer and the soil vapor plume where vapor mitigation actions have already occurred. Additional sampling should include the full list of VOCs for analysis.

2) Additional efforts should be made to sample untested homes within the vapor plume area. Vapor mitigation systems should be installed in any additional properties that are found to be affected (over action levels) by site contamination in the future.

3) A plan should be developed for future sampling or mitigation for properties that had sub-slab sample results above action levels and subsequent indoor air testing, but remain unmitigated.

4) Indoor air testing should be considered for additional buildings that have been mitigated. Indoor air testing is the best way to show TCE is not present at an elevated concentration.

5) Vapor mitigation systems should be operated and maintained. Property owners should periodically check the u-tube manometer to make sure the system pressure is the same as it was when the system was installed. An overall operation and maintenance plan for the mitigation systems should be developed and implemented.

6) If property owners have questions about the integrity of their vapor mitigation system and are concerned about exposures they should contact MPCA to discuss whether follow-up actions are appropriate.

7) Efforts should be undertaken to reduce TCE concentrations in the groundwater below levels of vapor intrusion concern.

8) Some chemicals in indoor air come from products stored or used inside buildings. Occupants can minimize their exposures to chemicals in indoor air by reducing the amount of stored chemicals and increasing fresh air intake.

II. Introduction/Site Identification

The General Mills/Henkel Corporation Superfund site (hereafter referred to as “the site”) is located at 2010 East Hennepin Avenue in Minneapolis, Minnesota (Appendix A, Figure A-1). Residential areas are located within one block to the south, east, and west of the site, and commercial properties are one block north of the site.

Beginning in 1930, GMI used a portion of the ten-acre site property as a food research lab and technical center (USEPA, 2013). In 1947, GMI added chemical research at the facility (USEPA, 2013). To dispose of solvents at the site, GMI stacked three 55-gallon drums with the tops and bottoms removed in the ground, with the bottom of the deepest drum 10-12 feet beneath the surface (Barr, 1983). A two-inch diameter standpipe was attached to the uppermost drum, and laboratory solvents were simply dumped into the standpipe which emptied into the drums and then into the soil (Barr, 1983). It has been estimated that approximately 1,000 gallons of solvents were disposed in that manner each year from 1947 to 1962 (USEPA, 2013); totaling about 16,000 gallons.

Historic aerial photographs and captions provide some information regarding past site activities. A 1953 aerial photograph shows a diked area in the central portion of the site contained twelve above-ground storage tanks. Four small waste ponds were also visible. Two additional storage tanks south of the main buildings had no spill containment dikes. In an aerial photograph from 1969, drums and a drum staging platform were visible on the site. Seven fuel oil underground storage tanks (USTs) were installed at the site between 1930 and 1973; all were removed by 1999. Six of the USTs had a capacity between 1,000-4,000 gallons; one was 25,000 gallons. The description of a July 1984 aerial photograph from MPCA’s files indicates there were an estimated 400 drums on site at that time. At least 60 of these drums were described as rusting, piled haphazardly, and appeared to be leaking. Three storage tanks surrounded by dark liquid spillage within a walled containment area were also shown and additional spillage was noted east of the tanks. Two tanks south of the buildings that were visible in the 1953 photograph were removed by the time of the 1984 photo. No information was found regarding the removal of the drums.

The Henkel Corporation purchased the property from GMI in 1977 (MPCA, 2004). The drums and piping associated with the disposal site are believed to have been excavated in 1981, although there is no record of the excavation. The base of the excavation was reportedly 12 feet deep (MPCA, 2004) and no soil was removed (MPCA, 2009). Although it was documented that the standpipe was visible in 1983 (Barr, 1983), MPCA believes that the drums associated with it were removed earlier and the standpipe was left in place as a marker of the former disposal area for future evaluation (MPCA, 2014b).

GMI notified the MPCA on June 12, 1981, that they filed waste facility notification forms with the U.S. Environmental Protection Agency (EPA) pursuant to the federal Superfund law and initiated an investigation that year. MPCA determined that high levels of volatile organic compounds (VOCs) were present in the soil and groundwater at and near the disposal site. The results of the 1981 investigation and subsequent investigations are described in Section III.B *Site Characterization and Remediation* of this report. The site was listed as a federal Superfund site in September 1984 based on the investigation findings. Although it is a federal Superfund site, an agreement between the EPA and MPCA resulted in naming the MPCA as the primary agency overseeing its cleanup under the state Superfund program.

III. Site History and Background

A. Geology and Hydrogeology

To understand how contaminants have been able to move away from the site and predict where they may go, it helps to know about the unconsolidated materials (soil, sand, gravel, clay, etc.) and bedrock beneath the site and surrounding area, and understand how groundwater moves through them. The geologic units described below are shown, in simplified form, in Appendix A, Figure A-2.

The surface soil at the site consists of fill material over peat and is underlain by 30-40 feet of sand that is most often referred to as "glacial drift," but in some site reports may also be called "alluvial sand," "alluvium," or simply "drift." Beneath the southeast portion of the site, the sand is underlain by a layer of mixed clay, sand, and gravel that is also sometimes called "glacial till" or simply "till." The till acts as a confining layer (Barr, 1983; ATSDR, 1989). Confining layers slow or prevent the downward movement of groundwater and may reduce the concentration of contaminants in the groundwater as it moves downward because some contaminants adsorb to the confining layer materials.

Groundwater is encountered in the glacial drift, at a shallow depth of 10 to 20 feet below the ground surface (Barr, 1983). The surface of the groundwater is referred to as the water table; water bearing units below the water table which can provide enough water to support a well are called aquifers. For this reason, the glacial drift is also referred to as the "water table aquifer" in some site reports.

In most places beneath the site, the first layer of bedrock below the sand or till is the Decorah Shale, which consists of two sub-units or "members," a shale and limestone unit called the "unnamed member" and the underlying limestone Carimona Member (Olsen and Bloomgren, 1989; Barr, 1983; Mossler, 2008). Until 2008, geologists considered the Carimona Member to be part of the Platteville Formation (described below), and that is how it is described in earlier site reports, while later reports place it in the Decorah Shale. (This also led to three monitoring wells [BB, LL, PP] previously thought to be drawing water from the Carimona Member to be reclassified as Magnolia Member wells. Monitoring wells are used to collect water quality samples.)

In the area of the site, the "unnamed member" of the Decorah is thin and was heavily weathered in the past when it was exposed at the surface (before being covered by the glacial till and drift now above it). As a result, it may be present only as isolated patches at some locations (Barr, 1983). Where it is present in sufficient thickness, the "unnamed member" of the Decorah Shale is considered to be a confining unit that separates the water table aquifer above from the Carimona Member below (Barr, 1983). A layer of volcanic clay at the base of the Carimona Member also acts as a confining layer, separating it from the underlying Platteville Formation.

The Platteville Formation beneath the Decorah Shale has four members: Magnolia, Hidden Falls, Mifflin, and Pecatonica. Each of these members are separated by confining layers, although they tend to be rather "leaky" so some groundwater is able to move between the members. Of these members, the Magnolia is the main water-bearing unit.

The Glenwood Formation acts as a confining layer between the Platteville Formation (above) and the regional aquifers (below) which provide the majority of drinking water in the Twin Cities area outside of Minneapolis and St. Paul. Groundwater in these regional aquifers—the St. Peter Sandstone, Prairie du Chien Group, and Jordan Sandstone—generally flows to the south-southwest (Barr, 2005).

The aquifers beneath the site are composed of varying types of rock and are separated from each other by confining layers. As a result, the groundwater in each one may behave differently. Groundwater in the water table (glacial drift) aquifer flows to the southwest, but a ridge of till just southwest of the site may act as a partial physical barrier that slows down and diverts groundwater and contaminant movement (Barr, 1983). In contrast, groundwater flows to the south-southwest in the Carimona Member of the Decorah Shale and northwest in the Magnolia Member of the Platteville Formation (Barr, 1983, 2006). Ultimately, all of the groundwater in these aquifers discharges to the Mississippi River. However, during periods when the glacial draft and Carimona Member aquifers were being pumped at the site (see page 9 and Appendix A, Figure A-5), groundwater near the site flowed toward the pumping well(s).

B. Site Characterization and Remediation

Environmental investigations at the site began in 1981 and a large amount of data has been gathered since then. To provide a comprehensive data set for the site, soil data are presented in Appendix B and groundwater data and well information are presented in Appendix C. Summary data tables are presented within the body of this report.

In 1981, 11 soil borings were drilled. Twenty soil samples were collected at various depths from the borings and tested for 23 VOCs (SEC, 1981; see Appendix B, Table B-1). Only three soil borings (borings 2, 3, and 4) had significant contamination, with the greatest concentrations at depths between approximately 20-26 feet next to the disposal site (boring 2) and to the southeast (boring 3). The locations of most of the borings are shown as blue squares in Appendix A, Figure A-3. Contaminants found at the highest concentrations included: benzene, chloroform, 1,2-dichloroethane, ethyl benzene, nitrobenzene, toluene, TCE, 1,1,2,2-tetrachloroethane, and xylenes.

During the 1981 investigation, a special type of well called a piezometer, used primarily for measuring water levels, was installed southwest of the disposal area and screened across the water table in the uppermost aquifer—the glacial drift. A groundwater sample was collected from piezometer "A" and tested for VOCs. Twelve VOCs were detected; the highest concentrations were: TCE (2400 µg/L; µg/L = micrograms per liter, or parts per billion), benzene (200 µg/L), toluene (180 µg/L), chloroform (70 µg/L), and xylenes (52 µg/L) (SEC, 1981; Barr, 1983; see Appendix C, Table C-1).

From 1981-1983, 21 wells were installed in the glacial drift aquifer and 19 in the bedrock (Carimona member of the Decorah Shale and Magnolia member of the Platteville formations; Barr, 2012c). The well locations are shown in Appendix A, Figure A-4 and construction information is presented in Appendix C, Table C-2. A wide variety of VOCs were detected in both aquifers, with TCE found at the highest concentrations (Barr, 1983). All historic TCE groundwater data MDH was able to locate is presented in Appendix C, Tables C-3, C-4, C-5, and C-6 and all historic VOC groundwater data is presented in Appendix C, Tables C-7, C-8, C-9, and C-10.

The June 1983 Site Characterization Study and Remedial Action Plan recommended that solvents in the soil immediately below the disposal site should be removed or contained because they would likely act as a source for further solvent migration from the site (Barr, 1983). Three additional soil borings were drilled to try to better understand the amount of solvent remaining in the soils (see Appendix A, Table A-3; Appendix B, Table B-2, March table). One of two borings immediately adjacent to the disposal site (#106) contained VOC concentrations similar to the 1981 sample results, while the other (#101) had surprisingly little solvent. The third boring (#102) placed about 40 feet southeast of the disposal site confirmed that the contamination does not extend that far (Barr, 1983). It was estimated that between 300- 400 gallons of solvents remained in the soils below the disposal site, with about 25 to 30 percent still present in the unsaturated soils above the water table (Barr, 1983). It was further estimated that about 85 percent of the solvent was within a relatively small area in soil beneath the former disposal site with a diameter of about 45 feet, and 98 percent of the solvent was within a 70-foot diameter area (Barr, 1983).

A soil leachability study was conducted in the fall of 1983 (O.H. Materials Co., 1984) to determine the feasibility of using water to flush the contaminants out of the soil. Three soil samples (location unknown) were analyzed as part of the study. One sample was free of solvent while the concentrations in the remaining two samples were not as high as previous samples (Appendix B, Table B-2, September table). The study indicated that soil flushing could remove some solvent, but would not do so efficiently.

In a letter to MPCA in April of 1984, GMI concluded that "the concentrations of solvents in the unsaturated soil (above 20' depth) is not sufficient at the disposal site to warrant the removal of the soil or the expense of the water flushing system…as compared to the glacial drift well pumpout system" (GMI, 1984).

The 1983 leachability study soil samples called into question the extent of soil contamination at the site. There was also a concern that an excavation would affect the structural integrity of the Burlington Northern Railroad tracks and Talmage Avenue (MPCA, 2000). In addition, because excavation would *only* remove 25 to 30 percent of the contamination (with only a small percentage of the contamination being TCE) a groundwater pump-out system would still be necessary to capture the bulk of the contamination (Barr, 1991a).

Although there was no known route of exposure from the groundwater, the contamination met the definition of a release and threat of migration of a hazardous substance. Options for addressing the contamination to protect the groundwater as a drinking water resource were summarized in 1983 (Barr, 1991a). Eight alternatives to address the groundwater contamination were identified:

1. No action;
2. Excavation of contaminated soils in the vadose zone (the unsaturated soil above the water table);
3. 45-ft. diameter excavation of contaminated soils to a depth of 30 ft. (vadose and saturated zone);
4. 70-ft. diameter excavation of contaminated soils to a depth of 30 ft. (vadose and saturated zone);
5. Venting of the vadose zone in conjunction with a groundwater pump-out and treatment system;
6. Groundwater pump-out and treatment;
7. Slurry wall and cap; and
8. Soil washing in conjunction with a groundwater pump-out and treatment system.

A groundwater pump-out system was chosen to reduce the contamination in the groundwater and prevent the groundwater plume from expanding. It was believed the other options would not eliminate the need for, nor significantly reduce the operating time of, a groundwater pump-out system, and therefore, were not cost effective (Barr, 1991a).

In October 1984, a Consent Order and a Remedial Action Plan (RAP) were signed between MPCA and GMI (MPCA, 1984). The RAP concluded that there was little contamination in the unsaturated soils at the site and focused on groundwater cleanup and containment in the water table (glacial drift) and Carimona Member aquifers (MPCA, 1984). The Consent Order required the groundwater pump-out system for the glacial drift aquifer to capture all groundwater with TCE concentrations of 270 µg/L or greater (wells 109-113). The Carimona aquifer groundwater pump-out system was required to capture all groundwater with TCE concentrations of 27 µg/L or greater (well #108). The extent of the groundwater contaminant plumes and capture zones in 1984 are shown in Appendix A, Figure A-5. The Consent Order also required an assessment of the Magnolia Member water quality and, if TCE levels in the Magnolia were greater than 27 µg/L, an additional groundwater pump-out system needed to be proposed. The Order also required an investigation of the St. Peter Formation.

No cleanup requirement was set for the St. Peter, although TCE concentrations in that aquifer were above 27 µg/L (USEPA, 1994). Detailed monitoring requirements were also contained in the Consent Order, including annual groundwater sampling for the existing Prairie du Chien well located on site (MPCA, 1984). Concentrations greater than 27 µg/L also were found in the Prairie du Chien aquifer but, due to the depth and the presence of confining layers between the St. Peter Sandstone and Prairie du Chien, the contamination was suspected to be from other sources (USEPA, 1994). See Table 1, below, for the highest concentrations of TCE found in various aquifers in the early 1980s.

Table 1: Highest TCE Concentrations Measured in Various Aquifers During 1981-1985

Aquifer	TCE Concentration (µg/L)	Year
Glacial Drift	7200 (on-site well)	1983
Carimona (Decorah)	2300	1985
Magnolia (Platteville)	200	1982
St. Peter	220	1984
Prairie du Chien/Jordan	71	1985

Barr, 2012c

The 27 µg/L TCE cleanup requirement in the Consent Order was a health-based value calculated to protect public health by limiting the theoretical excess risk of cancer from daily consumption of water to no more than 1 additional case of cancer in 100,000 people exposed; similar to the former MDH Health Risk Limit (drinking water guidance) for TCE of 30 µg/L at that time. The cleanup value was multiplied by 10 to yield 270 µg/L TCE as a cleanup requirement for the overlying glacial drift aquifer (based on a 1 in 10,000 excess cancer risk). The rationale for applying a ten-fold higher cleanup value to the glacial drift aquifer was that it is not used for drinking water production. It was also assumed that TCE concentrations would decrease due to dilution and adsorption to aquifer materials as contaminated groundwater moved into the underlying strata; a factor of 10 was considered to be a reasonable dilution/attenuation factor to account for this expected decrease (USEPA, 1994).

By 1985, a total of six groundwater extraction wells were installed and operating. Two wells are located on the site – one removed groundwater from the glacial drift aquifer (#109) and one removed groundwater from the Carimona Member aquifer (#108). A third (#110) was installed just down-gradient of the site and also removed water from the glacial drift. Water from the three wells was pumped to an air stripper for treatment. An air stripper removes VOCs from water by aerating it, which causes the VOCs to evaporate more quickly. The treated water was discharged to the storm sewer under an MPCA permit (USEPA, 1994). Three glacial drift pump-out wells (#111, 112, and 113) were located down-gradient from the site and, under an MPCA permit, discharged directly to the storm sewer without treatment (USEPA, 1994). All six pump-out wells are shown in Appendix A, Figure A-5.

In 1988, an air impact analysis of the air stripping operation was completed (MPCA, 1988). Air dispersion modeling predicted the maximum outdoor concentrations of VOCs in air outside the property boundaries. This maximum air concentration was predicted to be 3.3 micrograms of TCE per cubic meter of air (μg/m^3). This concentration, along with estimated concentrations of eight other VOCs, was not considered a health risk. While the predicted maximum concentration of TCE from 1988 is slightly greater than the current MDH Health-Based Value of 2 μg/m^3 for inhalation (see section IV. A.) it is likely that actual outdoor air concentrations beyond the property boundaries were lower than the predicted maximum and not of health concern.

In late 1989, TCE was measured in the Magnolia Member above the 27 μg/L action level (MPCA, 1990). Initially, MPCA delayed expansion of the pump-out system because it was thought the contamination in the Magnolia may be coming from another source located some distance from the site (MPCA, 1990). MPCA re-evaluated the feasibility of removing soil, but concluded that the bulk of the contamination had migrated out of the soil and the window of opportunity to remove the soil had passed (MPCA, 1990). MPCA ultimately concluded that expansion of the pump-and-treat system into the Magnolia was reasonable because at least some of the contamination was from the GMI site (MPCA, 1990).

In September 1991, a Record of Decision (ROD) was prepared, but not actually signed. A ROD is a public document that explains which cleanup alternatives will be used at a Superfund site. The ROD was consistent with the selection of the groundwater remedy in the 1984 Consent Order, but also called for an expansion of the existing groundwater pump-out system by adding two additional groundwater extraction wells to capture contaminated groundwater in the Magnolia. The two additional extraction wells (MG1 and MG2) were installed onsite in 1992 (Appendix A, Figure A-4). Subsequently, the Carimona Member well (#108) was shut down because the contaminated groundwater in the Carimona was being captured by the Magnolia extraction wells (USEPA, 1994).

In the 1994 Five Year Review, the EPA raised concerns that the groundwater cleanup goals were not protective enough as they did not meet the federal Maximum Contaminant Level of 5 μg/L, which is an enforceable standard (effective in 1989) for public drinking water supplies (USEPA, 1994). EPA recommended that the Consent Order be amended to establish 5 μg/L as the cleanup standard for TCE in the groundwater (USEPA, 1994). As a point of comparison, ATSDR's vapor intrusion screening level for TCE in groundwater is 0.6 μg/L for cancer effects and 5.0 ug/L for non-cancer effects. However, these values were not considered by EPA at that time. Subsequent discussion identified two options for meeting EPA's recommendation – expansion of the pump-out system and continuing to pump groundwater for a much longer time period or concentrate on further investigation and remediation near the source area (MPCA, 1994). However, MPCA and the EPA decided to defer a determination regarding cleanup levels for TCE and the protectiveness of the remedy until the original cleanup levels in the Consent Order were achieved (USEPA, 1999).

In January 1997, a vapor risk survey was completed at the source area in accordance with MPCA guidance to ensure contaminated vapors were not accumulating at high concentrations or causing explosive conditions at or near the site. Basements in two buildings on site, the tunnel connecting these two buildings, and the sanitary sewer were screened for the presence of vapors that could be detected by a field instrument with a detection limit of 1 part per million, which isn't a low enough detection limit to detect TCE vapors of health concern (Barr, 1997a). No vapors were detected in the sewer. Odor and vapors measured in the buildings were attributed to tenant activities such as painting and printing (Barr, 1997a).

In 2001, nine additional soil borings (shown as orange triangles in Appendix A, Figure A-3) were drilled near the former disposal site and sampled to evaluate the vertical distribution of contaminants (Barr, 2001a). Although low levels of some VOCs were detected in the surface soils (zero to four feet) they did not exceed their respective Soil Reference Values (SRVs) and do not present a risk to anyone at the site (see Appendix B, Table B-3; MPCA, 2004). [SRVs are values used to evaluate whether exposure to contaminated soil may pose a risk to human health under different land use scenarios.] Higher levels of contamination were generally detected at depths greater than four feet below grade and SRVs for some contaminants were exceeded in three of the borings (1, 3, and 6) (see Appendix B , Table B-3). However, people could only be exposed to these deeper soils during major excavation activities, and the soils are managed by institutional controls in the form of a restrictive covenant placed on the property deed (completed in 2004) to restrict digging in this part of the property (MPCA, 2014c). The sample results were also compared to the Soil Leaching Values (SLVs), which are used to evaluate the potential for a contaminant to be flushed from soil and enter groundwater. Some of the contaminants in the deeper soil samples (7 feet below grade and deeper) did exceed their SLVs, but the consultant calculated the mass of solvents in the soil to be approximately 4 gallons and suggested that it is likely that a larger mass of solvents is present below the water table in the vicinity of the former disposal pit. At that time, it was estimated that the pump-out system had removed 480 gallons of solvents. MPCA concluded there was not enough contamination remaining in the soil to require further soil removal (MPCA, 2004).

Groundwater monitoring results through 2010 indicated that TCE concentrations decreased significantly compared to previous years' results as shown in Appendix A, Figures A-6 to A-10 (see also Appendix C, Tables C-3, C-4, C-5, and C-6). Between 1985 and 2010, TCE concentrations dropped 70-80%. Starting around 2000, the TCE concentrations in the pump-out wells were stable, which is typical of pump-out systems as they approach the limits of their ability to remove contaminants (Barr, 2012c). Moreover, the TCE concentrations in the 2010 groundwater samples declined below the cleanup levels established in the 1984 Consent Order (Barr, 2012c); with the exception of two monitoring wells (MW-11 and MW-UU) in the Carimona Member, shown in Table 2 below.

Table 2: Highest TCE Concentrations Measured in Various Aquifers in 2010

Aquifer	**TCE Concentration (µg/L)**	**Consent Order TCE Cleanup Levels (µg/L)**
Glacial Drift (on-site)	120	270
Glacial Drift (down-gradient)	210	270
Carimona (Decorah)	65	27
Magnolia (Platteville)	12	27
St. Peter	21	no requirement
Prairie du Chien/Jordan	5.9	no requirement

Barr, 2012c

In 2010, GMI and MPCA began discussing delisting the site from the state Superfund list and achieving closure (Barr, 2011b) based on the groundwater monitoring results. MPCA suggested shutting down the groundwater pump-out system for approximately one year and evaluating groundwater conditions. The system was shut down in September 2010 and monitoring of the glacial drift aquifer afterward showed all but two wells (#109 and 110) had stable TCE concentrations. TCE concentrations have fluctuated in pump-out well #109 near the disposal area (Barr, 2012c). TCE concentrations in down-gradient pump-out well #110 initially decreased, but then began to increase in 2011. As of March 2015, TCE in well #110 has exceeded the 270 µg/L cleanup requirement set in the Consent Order (Barr, 2015h). The two Magnolia pump-out wells, MG1 and MG2, have continued to stay below the 27 µg/L limit set in the Consent Order as recently as 2012 (Barr, 2012c). TCE concentrations following the shutdown of the pump-out system are summarized in Table 3.

It is estimated that the pump-out system removed approximately 6.6 billion gallons of groundwater and 7,000 pounds (or about 570 gallons) of TCE from the groundwater in 25 years. Barr estimated that an additional 4,500-6,500 pounds of TCE would be removed if the system operated for another 50 years (Barr, 2012c).

Groundwater monitoring continues under MPCA oversight. Without groundwater pumping at the site it is expected that some movement of contaminants away from the source area will occur. VOC concentrations in the groundwater continue to exceed drinking water standards; however, the groundwater in this area is not used for drinking water and it meets surface water quality standards where it discharges to the Mississippi River (USEPA, 2013). Ultimately, because this site is a federal Superfund site, the groundwater will have to meet the federal enforceable standard for public drinking water supplies of 5 µg/L before it can be removed from the federal Superfund list. Additional groundwater data suggest contamination sources may be present upgradient of the site. Further work is being conducted by GMI and the MPCA to evaluate these data.

Table 3: TCE Concentrations (in µg/L) Following Pump-Out System Shut Down

Aquifer	Well	Sep-2010	Dec-2010	Mar-2011	June-2011	Dec-2012	Jan-2013	Dec-2014	Mar-2015
Glacial Drift	S	-	-	-	-	73	-	64	67
Glacial Drift	Q	1.2	-	-	-	<1.0	-	0.8	<4.0
Glacial Drift	T	<1.0	-	-	-	<1.0	-	<0.4	<0.4
Glacial Drift	V	56	55	58	58	31	-	21	29
Glacial Drift	W	3.4	4.2	3.4	5.2	6.8	-	6.7	8.4
Glacial Drift	X	<1.0	<1.0	<1.0	<1.0	<1.0	-	0.61	0.7
Glacial Drift	109	120	110	120	160	160	-	112	145
Glacial Drift	110	100	99	73	110	-	230	214	275
Glacial Drift	111	<1.0	<1.0	<1.0	<1.0	-	-	5.3	4.8
Glacial Drift	112	-	42	29	14	-	5.4	4.0	4.8
Glacial Drift	113	78	12	4.5	4.8	4.5	-	1.0	1.8
Carimona	9	3.3	-	-	-	-	-	-	-

Aquifer	Well	Sep-2010	Dec-2010	Mar-2011	June-2011	Dec-2012	Jan-2013	Dec-2014	Mar-2015
Carimona	10	13	-	-	-	-	-	-	-
Carimona	11	65	-	-	-	-	-	-	-
Carimona	12	<1.0	-	-	-	-	-	-	-
Carimona	SS	<1.0	-	-	-	-	-	-	-
Carimona	UU	47	-	-	-	-	-	-	-
Magnolia	QQ	1.8	-	-	-	2.1	-	-	-
Magnolia	TT	1.4	1.2	<1.0	<1.0	<1.0	-	-	-
Magnolia	14	6	5.3	4.5	5.3	4.2	-	-	-
Magnolia	MG1	6.4	12	11	15	6.5	-	-	-
Magnolia	MG2	10	9.3	8.5	9.2	13	-	-	-
Saint Peter	200	5.3	-	-	-	5.3	-	-	-
Saint Peter	2003	21	-	-	-	19	-	-	-
Prairie du Chien/Jordan	HENKEL	5.9	-	-	-	-	-	-	-

Barr, 2013; Barr, 2015h (-) = not sampled

C. Initial Vapor Intrusion Investigations

In early 2010, MPCA asked GMI whether risk from vapor intrusion had been evaluated at the site. TCE and other VOCs easily evaporate from polluted soil and groundwater creating vapors that rise towards the ground surface. Vapors that encounter buildings as they travel upwards may enter through cracks in the foundation, around pipes, or through a sump or drain system. Through this process—called vapor intrusion—VOCs may contaminate indoor air.

At an April 2011 meeting, MPCA and GMI discussed evaluation of the vapor intrusion pathway as part of the process to delist the site from the state Superfund list. In September of that year, GMI submitted a Vapor Intrusion Work Plan.

The first step in evaluating the vapor intrusion pathway was to compare the shallow groundwater TCE concentrations to MPCA's TCE Groundwater Intrusion Screening Value (GWISV) of 20 µg/L (MPCA, 2008). The GWISV's are in part based on a chemical's ability to evaporate from the groundwater to the overlying soil vapor. Following MPCA guidance, the area of potential vapor intrusion concern was determined to be an area where the TCE concentrations in groundwater were greater than 20 µg/L plus an additional 100 feet surrounding the plume. This resulted in a total area of approximately 78 acres (Barr, 2011a). A list was created of all the potentially affected homes and businesses within this area.

In addition to Phase 1 (which was a desktop evaluation of known site conditions), the Vapor Intrusion Work Plan proposed three phases:

- 2A: evaluate the vertical groundwater quality profile; sample soil vapor using existing monitoring wells with screens that intercept the water table and thereby the lowest part of the unsaturated soil above the water table;

- 2B (if necessary): sample soil vapor on site where the highest concentrations of TCE in groundwater are located; and
- 2C (if necessary): sample soil vapor in city right-of-way (boulevards).

Phase 2A work was done in November 2011. Five existing glacial drift aquifer wells were sampled at different intervals to show the TCE concentrations at different depths within the aquifer (Barr, 2012a). In three wells, TCE concentrations increased with depth, but in two others, concentrations were roughly consistent throughout. Vapor sample results from the five wells were 0.8, 1.5, 110, 810, and 2,600 $\mu g/m^3$ and did not correlate well with the uppermost groundwater concentrations (Barr, 2012a). MPCA and GMI agreed that Phase 2B was necessary.

In February 2012, GMI proposed taking three matched soil vapor and groundwater samples for Phase 2B. MPCA encouraged a larger scale soil vapor investigation and recommended that Phase 2B and 2C be combined. GMI responded by moving forward with the limited investigation and preparing for a larger future investigation.

Phase 2B results were submitted to MPCA on June 12, 2012 (Appendix A, Figure A-11). Two sets (multiple depths) of samples were taken from on the site (DP001 and DP002/Well B), and another was on the boulevard in front of 907 19th Avenue Southeast (DP003). The results showed no detections of TCE vapors in the shallowest samples (depth of four feet), but increasing concentrations with depth. TCE concentrations from the boulevard sample were low (maximum of 14 $\mu g/m^3$ at a depth of 11 feet) (Barr, 2012b). Later, GMI proposed an additional ten soil vapor samples for Phase 2C (Barr, 2012b).

In December 2012, ten soil vapor samples were collected within the plume and one other was collected on site (Barr, 2013a). Temporary wells were installed at all eleven locations in order to get paired groundwater samples. Results from Phase 2C, as well as 2B, are shown in Appendix A, Figure A-11 (Barr, 2013a). The approximate area where soil vapor was present above the residential action level at the time (30 $\mu g/m^3$ TCE) at a depth of eight feet (approximate depth of typical basements) is also shown on Figure A-11.

A preliminary passive soil vapor sampling round (Phase 2D) was conducted in June-July 2013 to identify TCE hot spots and evaluate the use of passive sampling at this site (Barr, 2013b). Active sampling uses a vacuum to collect gas samples at a particular point in time. Passive sampling allows for soil vapors to adsorb onto the sampler over several days. At the end of the preliminary sampling, it was concluded that the passive technology was not an appropriate method, so Phase 2E was proposed (Barr, 2013c).

Phase 2E consisted of soil vapor sampling at eight-foot depths at 26 locations, and groundwater sampling at 10 locations in September 2013 (Barr, 2013d). This approach for further sampling was considered reasonable because GMI decided to evaluate the need for vapor intrusion mitigation by residential blocks, rather than individual homes. Appendix A, Figure A-12 is a map of the soil vapor and groundwater TCE results from Phase 2B, 2C, and 2E (Barr, 2013d). The data in Figure A-12 show two samples with TCE in the groundwater below the screening value of 20 $\mu g/L$ co-located with soil vapor concentrations above residential action levels (sample locations DP-032 and DP-040), which indicates the importance of soil vapor sampling. A Phase 2F work plan for more sampling around the edges of the plume was proposed in October 2013, but later cancelled because of the decision to start residential sampling (see below).

D. Residential Vapor Intrusion Investigation

In October 2013, MPCA notified MDH about the soil vapor plume and requested assistance with evaluating health risks and communicating health risk information to the community. MDH encouraged expediting notification of the public, testing, and mitigation. Therefore, in order to proceed expeditiously, planning and preparing informational materials occurred as information and data became available. The focus was on developing a process to protect public health by identifying locations where exposures may be occurring and stopping exposures to contaminants in soil vapor as quickly as possible.

MPCA typically begins a vapor intrusion investigation by sampling soil vapor near buildings to determine if soil vapors are present and if they exceed screening values. When soil vapors near buildings are elevated above screening values, a sample of soil vapor beneath the building foundation is collected by drilling a small hole through the slab and collecting a sample of the vapor below the slab (referred to as a “sub-slab” sample). Next, if the concentrations in a sub-slab sample are high enough to indicate the potential for a vapor intrusion problem, MPCA recommends installation of a mitigation system to vent the vapors before they can enter the building.

The mitigation systems typically installed to reduce chemical vapors inside homes are the same as those used to reduce radon levels in homes or other buildings. Such a system prevents soil vapors from entering the home by using a fan to create a slight vacuum beneath the slab, relative to the interior air pressure, to draw the vapors from below the building slab. The soil vapors are vented through a pipe to the air above the home.

Estimating TCE in Indoor Air from Sub-Slab Soil Vapor Data

TCE in indoor air resulting from vapor intrusion is often estimated using the concentration of TCE in a sub-slab sample multiplied by an attenuation factor (AF). An AF accounts for the reduction in concentration that occurs when vapors enter a building and mix with indoor air. At the time of the GMI vapor intrusion investigation, MPCA used a very protective AF of 0.1, (or 10% of the soil vapor concentration found in the sub-slab will be in indoor air). This overestimates indoor air concentrations in most homes. EPA recommends a default AF of 0.03 (slightly less protective) for screening sub-slab soil vapor at vapor intrusion sites throughout the U.S. (USEPA, 2015). EPA derived the AF of 0.03 after looking at data from numerous homes across the country. Ninety-five percent of the homes studied had (basement) indoor air concentrations that were less than or equal to 0.03 times the sub-slab concentration, and 50 percent of the homes had (basement) indoor air concentrations less than or equal to 0.003 times their sub-slab concentration. Table 4 gives examples of how these AFs can be used to predict what may be in indoor air. MPCA currently uses the EPA default AF of 0.03.

Table 4: TCE Concentrations and Attenuation Factors: Estimated Basement Air Concentrations Due to Vapor Intrusion

	Estimated TCE Concentration in the Basement of a Property Using:		
Concentration of TCE in sub-slab (µg/m^3)	Previous MPCA screening AF of 0.1	95thpercentile AF of 0.03 (USEPA, 2012)	50th percentile AF of 0.003 (USEPA, 2012)ᵻ
15,000	1,500	450	45
3,000	300	90	9
500	50	15	1.5
20	2	.6	0.06

ᵻ *The 50th percentile AF is similar to site-specific attenuation factors calculated from Table 5 and Table 6 measurements.*

In general, vapor movement into a building can be influenced by many factors, including:

- *Weather (atmospheric pressure changes) and seasons;*
- *Foundation type, sumps and the condition of the foundation (cracks and conduits);*
- *Type/use of heating, ventilation, and air conditioning systems (building depressurization); and*
- *Contaminant characteristics, soil properties, changes in the elevation of the water table.*

Vapor intrusion can be greatest during the winter months when air exchange rates can be low and heated interior air (which tends to rise and draw air up through the home) can cause depressurization in the lower portion of a structure. Such depressurization can pull soil gases into a building. Sub-slab contaminant concentrations may also vary over time; such as during winter when contaminants may build up because frozen ground prevents soil vapor from escaping, or during summer when the water table may be higher.

If vapor intrusion is occurring, contaminant concentrations will usually be greatest in the basement or lowest level. Concentrations typically decrease moving upward, so the first floor contains less than the basement and the second floor contains less than the first floor.

MPCA, GMI, and MDH agreed that mitigation systems would be offered to owners of properties within the approximate limits of the GMI plume if sub-slab TCE concentrations exceeded an action level of 10 times the MPCA Intrusion Screening Value (ISV) for TCE. Because the residential ISV for TCE was 2 µg/m^3 (MPCA, 2013), mitigation was offered if more than 20 µg/m^3 TCE was detected in a residential sub-slab soil vapor sample.

MPCA developed the Intrusion Screening Values for TCE and other volatile chemicals, in consultation with MDH, to evaluate the vapor intrusion pathway. ISVs represent a safe concentration of a chemical in indoor air, and are intended to be used to screen or evaluate site-related data for potential inhalation health risks. The residential ISV for TCE is a safe amount for people to breathe 24 hours a day during any period of life, or over an entire lifetime. The commercial ISV used for this site, which applies to a workplace exposure, is 6 µg/m^3. These ISVs protect people from potential harmful effects to the immune system and increased cancer risk, as well as possible effects to a developing fetus and other effects that may be associated with excessive exposure to TCE (see section IV. A.).

The decision to mitigate buildings based on an exceedance of this sub-slab action level (10 times the ISV) likely resulted in installing mitigation systems in some homes that may not have had indoor air concentrations that exceeded ISVs at the time of the investigation. Nevertheless, installation of a mitigation system is a health-protective benefit because it can improve indoor air quality and decrease exposure to naturally occurring radon gas. (Radon is discussed below in Section IV. D.)

GMI also agreed that mitigation of buildings would include complete installation and diagnostic testing of the system to assure vapor intrusion is controlled and indoor air concentrations for contaminants do not exceed the MPCA ISVs.

In November 2013, property owners/residents within an area that contained the estimated soil vapor plume were notified of the vapor intrusion investigation by letter. The letter (Appendix D) invited people to a public meeting and requested that property owners sign an access agreement to allow sub-slab sampling to measure the concentration of TCE beneath their homes.

As described above, if the TCE in sub-slab vapor exceeded the MPCA residential action level of 20 µg/m^3, a mitigation system was offered and installed with permission of the property owner. If the sub-slab TCE concentration was between 2 and 20 µg/m^3, a second sample was collected (typically, 7-30 days after the first sample). If the second sample was 20 µg/m^3 or greater, a mitigation system was offered. If the TCE concentration in the second sample was less than 20 µg/m^3, no further work was required.

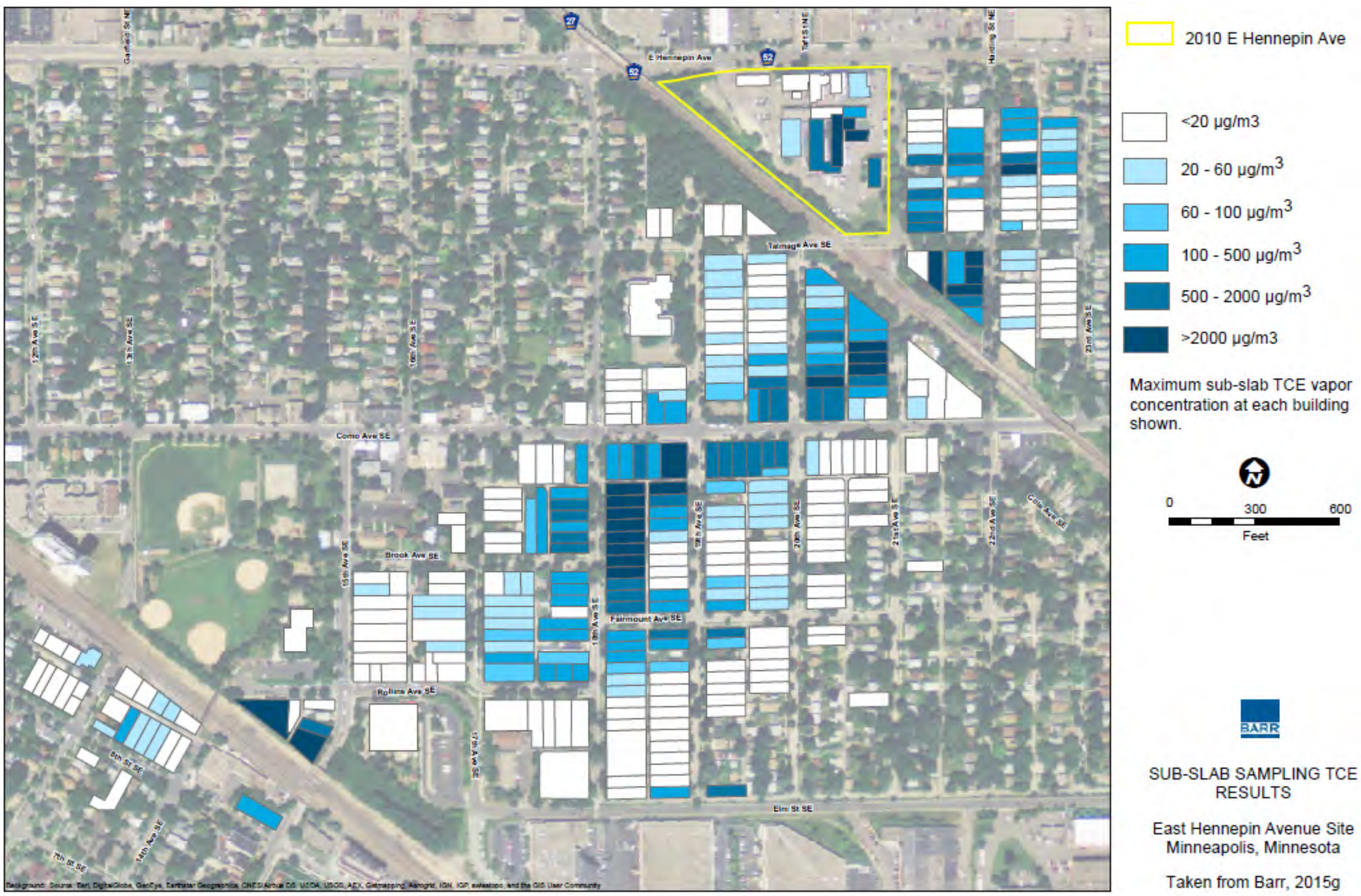
Details regarding the sampling procedure can be found in the Final Sub-Slab Sampling and Building Mitigation Work Plan (Barr, 2014c). As property owners provided access and sub-slab sampling was conducted, MPCA and GMI continued to learn more about the shape of the soil vapor plume. As a result, the boundaries of the plume expanded in some areas and additional property owners were notified that they were within the new plume boundaries. Partly because the plume boundaries changed over time with the addition of new data, collection of sub-slab samples continued throughout 2014.

By April 2015, GMI reported that out of 361 addresses contacted, they obtained sub-slab results from 339 properties (Barr, 2015g). Of those 339 properties, approximately half had TCE concentraions at or above 20 µg/m^3 in the soil vapor. Concentrations of TCE in the sub-slab soil vapor ranged from non-detect to 15,300 µg/m^3. See Figure 1 for TCE sub-slab sample results.

Why Not Measure Indoor Air to Determine if a Mitigation System is Needed?

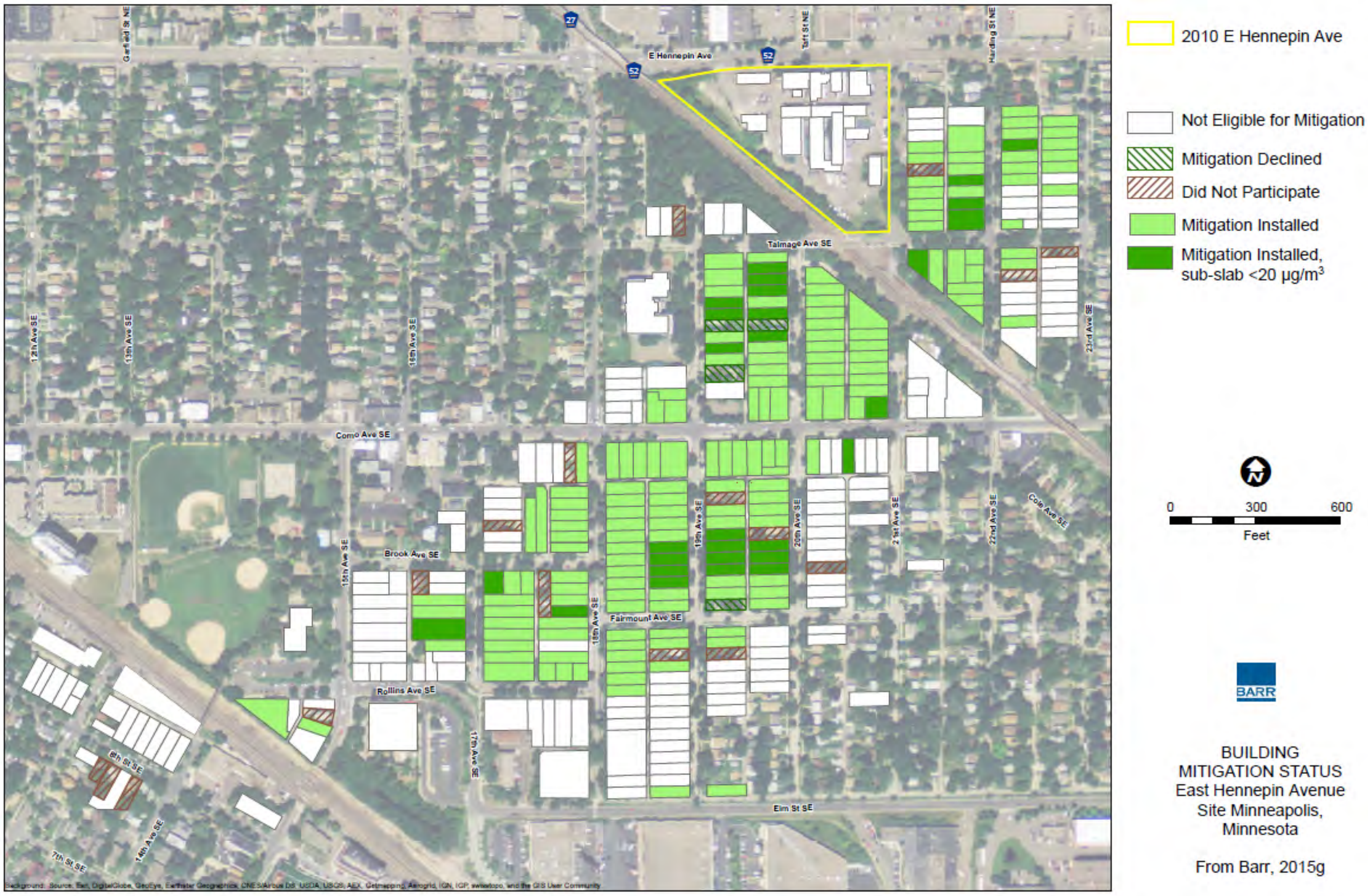
Testing indoor air can show whether contaminants in soil vapors are also present inside a building and if they exceed levels of concern. However, TCE and other chemicals associated with the General Mills plume can be in solvents and other household or consumer products. Therefore, it can be difficult to determine whether the source of indoor air contaminants is the soil vapor (plume), a source inside the building, or even an outdoor source in some cases. Because indoor air test results can be challenging to interpret, it is often considered more expeditious and cost-effective to simply use sub-slab sample results to determine whether mitigation is needed.

Figure 1: Sub-Slab TCE Data (June 2015)



As of June 2015, GMI offered mitigation systems to 192 properties. Of those, 188 properties had mitigation systems installed and tested. See Figure 2 for the June 2015 building mitigation status. Some properties where sub-slab TCE concentrations were below 20 µg/m^3 were also offered mitigation because they were within the boundaries of the soil vapor plume and neighbored other properties that were eligible for mitigation. This prevented islands of unmitigated homes within the plume and will prevent future exposures from occurring if sub-slab TCE concentrations increase in the future.

Figure 2: Mitigation Status (June 2015)



Indoor Air Sampling

Responding to special requests from homeowners to sample indoor air instead of installing mitigation systems, GMI sampled indoor air in 12 properties. Data from these 12 properties are shown in Table 5. These data, and data from property #8193 (Table 6) and 2010 East Hennepin Ave (Appendix E, Table E-2), are the only results available from the investigation area (the area that includes properties sampled, see Figures 1 or 2) that allow a comparison of pre-mitigation sub-slab and indoor air TCE concentrations. The data in Table 5 show a wide range of sub-slab TCE concentrations and two properties with indoor air measurements above the MPCA ISV of 2 µg/m^3 (a concentration was considered above the ISV of 2 if it is 2.5 or greater; in 2016 MPCA revised their TCE ISV to 2.1 µg/m^3). The presence of an indoor source of TCE was confirmed at one of these properties. These data suggest, as anticipated, that indoor air TCE concentrations were below the residential ISV at many properties where sub-slab TCE concentrations exceeded the action level, but they also suggest that indoor air in some homes may have been affected by vapor intrusion. Indoor air sampling was done at these properties to determine if there was a health risk at the time of the investigation. While no levels of health concern were found at that time, the results from indoor air testing in these 12 properties do not rule out the potential for vapor intrusion to increase in the future during worst-case conditions or due to changes in building integrity and operation or increases in TCE soil vapor concentrations.

Table 5: Indoor Air Sampling in Properties Not Mitigated (Barr, 2015g)

Addresses tested (unique IDs)	Sub-Slab TCE (µg/m³)	Indoor Air TCE (µg/m³)	TCE detected in outdoor air?	Sample Date - Both Sub-Slab and Indoor Air or (Indoor Air)
1191*	53.9	<1.1	Yes – 1.5	6/12/14
1420	463; 377	<0.85; 1.4	No	7/9/14; 12/19/2014
2143	24.7; 12.8	<0.89; <0.82	No	8/12/14; 12/30/2014
2857	877	2.1	No	11/21/14
3559	68.9	<0.74	No	11/21/14
5419	9.1; 9.7	<1.6; < 0.79	No	9/30/14; 1/16/2014
5906	44; 29.9	<0.79; 2.3	Yes – 1.7	7/9/14; 12/16/2014
7084**	29.4	**2.9**	No	11/14/14
7187	3	<0.74	No	11/14/14
7358	353; 72.6	0.86; <0.92	No	4/18/14
8222***	58.2, 24.8; 60.9, 30.8	<0.79, **5.2**, <0.82; 0.86, **6.2**, <0.79	No No	4/23/14; 12/23/2014
9895	NA****	0.9; <0.79	Yes – 1.3; 0.86	(8/9/14; 12/23/2014)

* Property owner declined access to sample in winter

** Building sumps and pipe penetrations were inspected and sealed in December 2014 (Barr, 2015a)

*** 5.2 µg/m³ and 6.2 µg/m³ were measured in the maintenance room of the apartment building and an indoor source was identified (Barr, 2015b)

**** Property had an existing passive Sub-Slab Depressurization System for radon mitigation

Extensive Investigation at One Property

The residence at unique ID #8193 had the highest sub-slab TCE concentrations within the GMI plume, with concentrations of 15,300 µg/m³ and 15,200 µg/m³ in two samples taken in November 2013. The presence of VOCs in sub-slab, indoor air, outdoor air, soil vapor adjacent to the building, and groundwater was extensively characterized in February 2014 (Haley & Aldrich, Inc., 2014). TCE data from that effort are summarized in Table 6.

Table 6: TCE Sampling Data at Property #8193 Prior to Mitigation (2/27/2014)

Sample location	**TCE result (µg/m³)**
Sub-slab	22,300; 15,100; 14,500; 8030
Indoor air – basement 1	19.2, 20.8
Indoor air – first floor	9.4
Indoor air – second floor	4.1
Outdoor air	Not detected

Note: Property was mitigated in May 2014 (see Table 7)

Additional sub-slab samples collected in February 2014 confirmed that the concentrations of TCE beneath the slab were approximately 15,000 μg/m^3. TCE concentrations measured in the basement air were approximately 20 μg/m^3, less than expected if estimating using a generic attenuation factor (see pages 15-16). Because this sampling occurred during the heating season, the indoor air concentrations measured should be higher than the annual average concentration.

Results in Table 6 also show indoor air TCE concentrations for the one sampling event decreased from the basement (approximately 20 μg/m^3) to the first floor (9.4 μg/m^3), to the second floor (4.1 μg/m^3) of the house. This decrease in contaminant concentration with increasing movement away from the slab (between the basement and upper floors) is what is expected; however, these specific concentrations are one-time measurements only and additional data collected at different times would likely vary.

TCE concentrations in air in the living areas of this home exceeded the residential ISV during the February 2014 sampling event. It is possible that TCE entered this home from soil vapor for an extended period. However, it is impossible to reconstruct historical infiltration into the home or estimate the duration and magnitude of past exposures. Also, because potential sources of chemical vapors (e.g., products stored in the home) were not removed prior to indoor air sampling, it is possible that an indoor source contributed to the TCE concentrations measured in the indoor air. This home subsequently received a mitigation system (for more information, see "Post-Mitigation Indoor Air Sampling" section below).

Vapor Intrusion Data from 2010 Hennepin Ave

The former solvent disposal area was located at 2010 East Hennepin Avenue, at the southern end of the more than six acre GMI property. The property contains 14 buildings that served as a GMI technical center and research laboratory complex (Appendix A, Figure A-13). The buildings are now used as spaces for artists and small businesses. There is one residence on the third floor of Building 14. Underground tunnels connect all of the buildings.

Sixty-three sub-slab samples were taken beneath 13 of the buildings between December 2013 and June 2014 (Appendix E, Table E-1). Forty-three of those samples were analyzed for a list of 61 VOCs, while 20 were only analyzed for TCE. Building 6 was not sampled; reportedly due to its limited access crawlspace. Fourteen of the sub-slab sample results in five different buildings (numbered 8, 10, 11, 12, and 14) were above the commercial action level of 60 μg/m^3 for TCE; these ranged from 78 to 3,320 μg/m^3. Because these results exceeded the sub-slab action level, an additional 21 indoor air samples were taken in the same five buildings and in the tunnel between Buildings 11 and 14 during two sampling events – one in July 2014 and one in February 2015. The indoor air results ranged from not detected to 2.9 μg/m^3 TCE, with no detections in Building 14. Because none of the indoor air TCE concentrations exceeded the commercial ISV of 6 μg/m^3, mitigation was not conducted (Barr, 2015c). Paired sub-slab and indoor air sample data are in Appendix E, Table E-2. Additional testing of these buildings is needed in the future to ensure occupants are not at risk due to vapor intrusion.

Post-Mitigation Indoor Air Sampling

In order to confirm the effectiveness of the vapor mitigation systems, indoor air was sampled in all 20 homes with sub-slab TCE concentrations greater than 2,000 µg/m^3 (approximately 10% of all homes mitigated). In each case, an interior building survey was done prior to sampling to identify any potential sources of VOCs within the home and select sampling locations. However, because possible sources of indoor VOCs were not removed from the buildings, it was not possible to determine whether contaminants detected were due to vapor intrusion or an indoor source (Haley & Aldrich, Inc., 2014). A 24-hour indoor air sample was taken from the basement or lowest living space of each building. In addition, after each indoor air sample was collected, the performance of the mitigation system was confirmed by a visual inspection of the u-tube manometer to verify that an adequate pressure differential existed (Haley & Aldrich, Inc., 2014). The indoor air samples were analyzed for a full list of VOCs. Because outdoor contaminants can influence indoor air quality, an outdoor air sample was also taken at the same time just outside or near the building. A summary of TCE data from this post-mitigation indoor air sampling is shown in Table 7.

TCE was not detected in indoor air in 9 of the 20 properties where post-mitigation indoor air testing was done. In seven others, TCE indoor air concentrations ranged from 0.75-2.2 µg/m^3; and in five of those, TCE in outdoor air (ranging from 0.83-2.4 µg/m^3) may have influenced the indoor results.

TCE concentrations in three residences exceeded the MPCA residential ISV for TCE (ISV is described on page 16); the results for one home were 5.0 and 5.3 µg/m^3, and 2.6 µg/m^3 for another home. Further sealing was performed at two pipe penetrations in the basement at one residence, and two additional suction points were added to the mitigation system at the other. TCE indoor air results from subsequent retesting were below the level of detection in both of these residences. The most recent sample for the third residence with an ISV exceedance was 3 µg/m^3. Owners of this residence were offered additional follow up investigation.

A commercial property that was tested after a mitigation system was installed had sources of TCE inside the building (Barr, 2015d). TCE levels measured within this property (up to 10.6 µg/m^3 in the basement storage area, see Table 7) exceeded the commercial TCE ISV of 6 µg/m^3. It is unlikely that vapor intrusion, following installation of the mitigation system, contributes significantly to the indoor air level within this property. However, this specific property needs follow-up testing to ensure the indoor air is safe for occupants to breathe.

Table 7: Post-Mitigation Indoor Air Sampling (Barr, 2015g)

Addresses Tested (unique IDs)	Initial Sub-slab Sampling Date	Pre-mitigation Max Sub-slab TCE (μg/m³)	Mitigation System Install Start/ Diagnostics Complete Date	Post-Mitigation Indoor Air Results TCE (μg/m³)	Indoor Air Sampling Date	TCE detected in outdoor air?
8193	11/22/13	15,300	5/20/14	2.0, 2.4 **2.6** **3.0**	6/12/14 2/24/15 1/26/16	No No No
4031	12/19/13	10,700	4/3/14	1 <0.76	5/7/14 2/24/15	No No
3589	4/11/14	8,270	5/13/14	<0.85 <0.79	8/14/14 1/13/15	No No
3182*	1/8/14	6,740	4/11/14	**8.0, 10.6, 5.3** **7.4, 7.3, 4.1**	5/17/14 7/1/14	No No
2470	4/22/14	5,890	7/31/14	<0.82 <0.79	9/18/14 2/26/15	No No
3180	12/5/13	4,550	1/31/14	<0.82 <0.81	5/7/14 1/6/15	No No
9366	1/10/14	4,450	2/25/14	1.1	3/26/14	Yes – 0.83
6699	1/2/14	4,150	3/5/14	<0.85 <1.0	4/19/14 2/3/15	No No
1762	11/29/13	3,500	12/19/13	<.74 1.1	4/15/14 12/10/14	No Yes - 1.2
3963	11/20/13	3,370	4/21/14	<0.79 <0.82	5/8/14 1/6/15	No No
4433	11/25/13	3,360	12/17/13	1.9	3/26/14	Yes – 0.83
4150	1/17/14	3,310	2/12/14	<0.79 <0.81	6/12/14 1/20/15	No No
1065	3/17/14	3,260	4/7/14	0.75 <0.81	5/6/14 1/9/15	No No
8281	11/22/13	2,980	12/13/13	<0.89 <0.73	4/16/14 1/20/15	Yes – 1.3 No
5846	1/9/14	2,750	5/19/14	<0.92 <0.79	6/13/14 12/10/14	No No
2803	11/24/13	2,670	12/10/13 install start diagnostics not passed***	<1.6 2.1	5/22/14 12/19/14	No Yes - 2.4
9316**	12/17/13	2,490	1/29/14 install start diagnostics not passed 8/28/14 pass	1.8, 2.1 **2.6**, <1.7 <0.89 <0.73, <0.73	5/23/14 6/27/14 9/12/14 1/8/15	Yes – 2.0 Yes – 1.8 No Yes – 0.99
4566**	1/6/14	2,340	6/20/14	**5.0, 5.3** <0.82, <0.82 <0.96, <1.0	7/25/14 10/2/14 3/13/15	No No No
3293	11/25/13	2,240	1/13/14 install start diagnostics not passed***	<1.8 <0.81	7/29/14 2/3/15	No No
7232	11/24/13	2,100	12/19/13	<0.85 2.2	4/22/14 12/19/14	No Yes – 2.4

*Commercial property: presence of TCE-containing products noted (Barr, 2015d)

** TCE levels in indoor air decreased below the ISV after additional sealing of pipe penetrations at one property and the installation of two additional suction points for the mitigation system in another property (Barr, 2015e; Barr, 2015f)

***Mitigation system did not meet diagnostic testing criteria. Indoor air sampling was used to show system effectiveness.

Properties with Special Considerations

While the sub-slab investigation and mitigation effort has been very successful, there are additional special considerations at some of the properties where decisions on mitigation or additional actions are pending. These include properties where there was no response to outreach efforts, no access agreement signed, or access denial by the property owner. Also included are properties with elevated TCE in the sub-slab that had indoor air sampling in place of mitigation (see Table 5), as well as other unique situations. The MPCA has stated that they are committed to addressing these special considerations to protect people who may be exposed to vapor intrusion contaminants.

E. Additional Soil, Soil Vapor, and Groundwater Investigations (2014-2015)

On March 11, 2014, the MPCA and GMI signed an agreement that modified the Remedial Action Plan (RAP) of the 1984 Consent Order. The purpose of the modification was to implement response actions as necessary to address VOCs in soil vapor through monitoring and evaluation of remedial options (MPCA, 2014a).

The agreement required a work plan that contained the following points:

- Plans for monitoring and sampling soil vapor and groundwater to define the magnitude and extent of VOC concentrations in the soil vapor and shallow groundwater;
- Plans for drilling and sampling any additional soil borings at the site, including the former disposal area, as may be necessary to delineate the spatial extent of VOCs in soil, soil vapor and groundwater;
- Plans for identifying and evaluating a range of alternatives to reduce VOC concentrations in soil, soil vapor and groundwater due to GMI's operations at the site;
- Plans for performance of treatability studies, if any, needed to evaluate remedial technologies to reduce VOC concentrations in soil, soil vapor, and groundwater. GMI is required to evaluate a minimum of three treatment technologies, with treatability testing performed; and
- Schedules for conducting the tasks set forth in the work plan. The work plan may be implemented in stages to define the scope of the investigation as appropriate to meet the remedial action objectives.

Beginning on March 31, 2014, nine additional soil borings were drilled to collect soil, groundwater, and soil vapor samples as part of Phase 2G (Barr, 2014b). These samples were taken to help determine plume boundaries in three areas (the northeast, south, and southwest edges of the known plume). TCE was found in all of the sample locations, at varying concentrations, in at least one media (soil, groundwater or soil vapor) per location.

During a disposal area investigation in May 2014 (Barr, 2014a), eleven soil samples were taken at different depths from four locations (DP-054-S through DP-057-S, shown on Appendix A, Figure A-3). One boring (DP-054-S) was located as close to the former disposal area as buried utilities at the site would permit, and the others were 30-40 feet west, east, and south of the disposal area (Barr, 2014a;

Figure A-3). The samples were tested for 68 VOCs, of which only 13 were detected (see Appendix B, Table B-4). TCE was only found at trace levels at depths greater than 40 feet. The sample at the disposal site at a depth of 13.5 feet was the only soil sample to have greater than trace levels of contaminants; although petroleum compounds, not TCE, were the contaminants detected (Barr, 2014a).

During the same sampling event, ten groundwater samples were collected from varying depths at the four locations (DP-054-W through DP-057-W on Figure A-3). Results for these samples are in Appendix C, Table C-11. TCE was present in all water samples and increased with depth, with the highest concentration detected in boring DP-056-W, east of the disposal area. Cis-1-2-dichloroethylene, a breakdown product of TCE, was present in all but one sample. Vinyl chloride, also a breakdown product of TCE, was found in four samples. Two samples at the water table had high concentrations of petroleum compounds (benzene, toluene, ethyl benzene, and xylene).

One soil vapor sample collected from the source area (DP-054-SG) was heavily contaminated by petroleum compounds (Appendix E, Table E-3) and as a result, the laboratory reporting limits for TCE and other VOCs were very high. TCE was not detected in this sample (with a reporting limit 4,900 $\mu g/m^3$); however, vinyl chloride was notably high (15,700 $\mu g/m^3$). Vinyl chloride was rarely detected in sub-slab sampling, but TCE breakdown products should continue to analyzed for during future monitoring.

In September 2014, after approval from MPCA, GMI finalized their Vapor Intrusion Pathway Investigation and Feasibility Study Work Plan (Barr, 2014d). In July 2015, GMI submitted a report of the results of this investigation, which included additional soil, soil vapor, and groundwater sampling at the site and in the investigation area, including off-site areas where TCE has been found in the groundwater (Barr, 2015h). A total of 23 soil samples were analyzed from 18 locations in the investigation area, including nine locations on the 2010 East Hennepin Avenue property (See Appendix A, Figure A-14). At 2010 East Hennepin Avenue, petroleum contaminants were found in one sample near the southeast corner of the property. Low levels of TCE were found in another sample location; however, the data overall supports the absence of additional source areas on the property. To evaluate whether soil vapor is moving beyond the boundaries where properties have been mitigated, GMI installed a soil vapor monitoring network of 30 sampling locations. Two quarterly rounds of sampling data were included in the report, which show the soil vapor plume to be stable (See Appendix A, Figure A-15). A total of 38 new groundwater monitoring wells were installed during this investigation. Two quarterly rounds of sampling data from these wells and 13 other previously existing wells are shown in Appendix A, Figure A-16 and summarized in Appendix C, Table C-12 (Barr, 2015h; Barr, 2015i).

General Mills believes that most or all of the contamination present in the groundwater and soil gas in areas southwest, southeast, and northeast of the site are associated with other sources not related to their historical operations. To prevent further delay in assessing properties, MPCA investigated and provided mitigation systems at residential properties in these areas (not shown on Figures 1 and 2) with their own contractors. Additional groundwater testing has found contamination coming from other industrial properties upgradient (northeast) of the GMI plume. This area, designated as the Southeast

Hennepin Superfund site, was added to the State Superfund list in 2016. As part of the ongoing vapor intrusion investigation of this site, MPCA has requested access to more than 24 industrial and commercial properties northeast of the GMI vapor plume.

IV. Chemicals of Interest

A. Trichloroethylene

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a chloroform-like odor. Commercial production of TCE began in the 1920s (USEPA, 2011a). Historically, the most important use of TCE has been for vapor degreasing of metal parts (ATSDR, 2014). In 2004, 73% of TCE use in the U.S. was estimated to be as a feedstock for HRC-134a, a refrigerant that was introduced as a replacement for CFC-12 in the 1990s (ATSDR, 2014). Metal degreasing accounted for approximately 24% of TCE use in 2004 (ATSDR, 2014). TCE is also widely used as a solvent for extraction, waterless drying and finishing, and as a general purpose solvent in adhesives, lubricants, paints, varnishes, paint strippers, pesticides, and cold metal cleaners (ATSDR, 2014).

TCE is a common environmental contaminant, widespread in outdoor air, indoor air, soil, and groundwater (USEPA, 2011a). It is extremely volatile, and most TCE released into the environment will evaporate into the air. TCE released to soil or leaking from underground storage tanks or landfills can also migrate through the soil into groundwater due to its moderate water solubility. Under the right conditions, TCE may break down slowly in soil and groundwater. It can persist in groundwater and is one of the most frequently detected groundwater contaminants.

TCE Toxicity

To determine a safe level of exposure to contaminants, scientists frequently rely largely on studies where animals in a laboratory (often rodents) are exposed to large quantities a chemical of interest. Although it may be unclear how well tests on animals predict how people may respond to the same chemicals and exposures, an attempt is made to translate the effects observed in animal studies to human relevance, while deliberately erring on the side of caution. This precautionary approach includes additional considerations for protecting sensitive populations, such as infants and pregnant women. Based on data that are typically available, toxicologists are confident in their ability to calculate a “safe” level of exposure where health effects are extremely unlikely, but they are much less confident about predicting what level of exposure could be expected to produce observable health effects in a population. Studies of human exposures typically involve workplace exposure among healthy, adult workers and often are not capable of identifying the lowest exposures at which health effects occur.

In 2011, the EPA developed a safe inhalation value of 2 $\mu g/m^3$ for TCE based on a review of many studies of animals and humans that were exposed to TCE. EPA reviewed all the studies available in the published literature and chose two rodent studies as the basis for calculating the inhalation value. These two studies showed health effects at the lowest concentrations that the animals were exposed to in the experiments. One study showed an increased risk of subtle impacts to the immune system; the thymus (a specialized organ of the immune system) weighed less than normal after mice were exposed to TCE in drinking water. The second study showed heart defects in rats whose mothers were exposed to TCE in drinking water during pregnancy.

TCE may also cause kidney cancer in people who are exposed to high concentrations of TCE, or for a long time. There is also evidence of an association between high levels of TCE exposure and non-Hodgkin's lymphoma and liver cancer. Less evidence is found for an association between TCE exposure and other types of cancers (USEPA, 2011a). According to EPA's 2011 assessment described above, breathing TCE at 2 µg/m^3 for a lifetime would result in no more than 1 additional case of cancer in 100,000 exposed people. ATSDR screens by using a Cancer Risk Evaluation Guide of 0.22 µg/m^3 which represents a risk of 1 cancer in 1 million people exposed over a lifetime. This is essentially equivalent to a cancer risk of 1 additional case of cancer in 100,000 people exposed to TCE at a level of 2 µg/m^3 for a lifetime.

MDH considers 2 µg/m^3 a concentration of TCE in air that is safe for people to breathe 24 hours a day during any period of life, or over an entire lifetime. This concentration is considered protective for individuals who may be more sensitive to effects from TCE such as young children, the elderly, pregnant women, and those with a compromised immune system. No public health actions to reduce exposures are necessary or recommended when TCE concentrations in air are at or below 2 µg/m^3.

To further support the protectiveness of the MDH inhalation value, the Agency for Toxic Substances and Disease Registry (ATSDR) recommends a Minimum Risk Level (MRL) for TCE of 2.1 µg/m^3. A MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects.

Occupational Indoor Air Screening Value and Regulatory Standards

The MPCA's commercial ISV for TCE that applies to a workplace setting at this site is 6 µg/m^3 (MPCA updated their commercial ISV in 2016 to 7 µg/m^3). This value is higher than the residential ISV because it accounts for fewer hours of exposure per day. It is used by MPCA and MDH to evaluate TCE concentrations in indoor air from vapor intrusion in non-residential commercial buildings.

Occupational standards for TCE are much higher than the commercial ISV. For example, one occupational standard is 10 parts per million, or 54,000 µg/m^3. One reason for this difference is that occupational standards are not strictly health based. For additional information regarding occupational standards and a comparison to the ISVs, see Appendix F.

Residential Sub-Slab Screening Values

The EPA and ATSDR have recommended similar sub-slab TCE screening values of 4.3 µg/m^3 and 7.3 µg/m^3, respectively (see Appendix G for the specific EPA GMI site recommendation). These values are intended to be used for screening purposes at sites, but not as action levels. The MPCA required using a more protective sub-slab screening value of 2 µg/m^3 at the GMI site; requiring a second sample if the sub-slab results were greater than or equal to 2 µg/m^3. If a sub-slab TCE concentration exceeded the action level of 20 µg/m^3, they required installation of a mitigation system or indoor air testing.

Background TCE in Indoor and Outdoor Air

People can be exposed to low levels of TCE in their homes from both outdoor air and from products within their home. Some businesses are permitted to release TCE into the air. TCE can be present in products such as adhesives, paint removers, cleaners, and varnishes. These sources of contaminants—commonly referred to as "background" contaminants—are distinct from contamination due to contaminated soil and groundwater. Some TCE measured in indoor air during a vapor intrusion investigation may be from background sources.

Background TCE Air Data

To get a sense of the background concentrations of VOCs in indoor air, EPA reviewed studies of indoor air collected from 1990-2005 in residences that were not expected or known to be located over contaminated soil or groundwater or have an effective mitigation system in place (USEPA, 2011b). In 14 studies that measured TCE, 43% of the homes had detectable levels. The 50th percentile values of TCE measurements in homes in the studies ranged from non-detectable (ND) to 1.1 µg/m^3. These data and other summary statistics are shown in Table 8. TCE concentrations in indoor air showed a strong decline over the study period. It is expected that in the future, "background" TCE indoor air levels will decrease as concentrations in consumer products and building materials continue to decline.

Table 8: Summary Statistics for Background Indoor Air Concentrations of TCE Measured in North American Residences between 1990 and 2005

Percentile of TCE Results Reported in Studies	Number of Studies Reporting the Percentile	Range of the Percentile Values Reported (µg/m^3)
50th percentile (median)	14 studies	ND - 1.1
75th percentile	9 studies	ND - 1.2
90th percentile	11 studies	ND - 2.1
95th percentile	5 studies	0.56 - 3.3

USEPA, 2011b
ND= not detected

Another source of data that indicates TCE is commonly present in indoor air is a 1999 study of outdoor, indoor, and personal air samples in three Twin Cities urban neighborhoods (Sexton et al., 2004). Two-day average concentrations of TCE were 0.2 µg/m^3 outdoors (n = 132), 0.5 µg/m^3 indoors (n = 292), and 1.0 µg/m^3 for participants wearing personal sampling devices (n = 288).

The MPCA monitors outdoor (or ambient) air quality throughout Minnesota. Long-term averages for TCE in outdoor air in Minneapolis are on the order of 0.1-0.2 µg/m^3. Appendix A, Figure A-17 shows TCE concentrations for Minneapolis from 2000-2014.

The city of Minneapolis studied outdoor air quality from November 2013 through August 2015 (Minneapolis Health Department, 2016). They largely relied on volunteers to deploy air samplers at locations across the city, up to once every quarter for two years. The samplers collected 72-hour outdoor air samples. Thirteen of the sampling locations were within approximately one half mile of the

GMI site. TCE was detected at five residential sample locations from 0.47—1.2 µg/m^3, at 11.9 µg/m^3 from a sixth residential location, and in several samples collected near a business ranging from 0.28— 9 µg/m^3. See Appendix A, Figure A-18 for a map that includes the sampler locations closest to the GMI site. Appendix H contains the full dataset for the neighborhood. In addition, fifty-two samples from forty-three other locations across Minneapolis had a least one detection of TCE, ranging from 0.45—79.8 µg/m^3, with a median of 1.1 µg/m^3. Although these data are unable to answer the question of whether TCE concentrations are different in the investigation area than in the rest of Minneapolis, it appears that TCE concentrations in outdoor air in the investigation area are generally similar to outdoor TCE measurements throughout Minneapolis.

In addition to the data above, outdoor air samples were collected whenever indoor air samples were collected during the vapor intrusion investigation. These limited TCE outdoor air results range from ND—2.4 µg/m^3 (results shown in Tables 5 and 7).

B. VOCs Detected in Groundwater

Although TCE is the main contaminant of concern, twelve other solvent- and petroleum-related VOCs (listed in Table 9) have been detected in the glacial drift aquifer at some point in time, in at least one boring or well (see Appendix C, Table C-7).

Table 9: Additional VOCs Detected in Groundwater

1,1,1-trichloroethane	benzene
1,1,2,2-tetrachloroethane	ethyl benzene
1,1-dichloroethane	tetrachloroethylene (PCE)
1,2-dichloroethane	toluene
cis-1,2-dichloroethylene (cis-1,2-DCE)	vinyl chloride
trans-1,2-dichloroethylene (trans-1,2-DCE)	xylenes

C. VOCs Detected in Sub-Slab Soil Vapor Samples

Soil vapor investigations in Minnesota often involve analyzing samples for a list of 61 VOCs. While many solvents were disposed on the GMI site, the main contaminant of concern in the groundwater plume is TCE. To expedite interpreting data and mitigating potential health threats within the GMI plume, MPCA and MDH agreed that analyses of sub-slab samples within the GMI plume could be limited to TCE alone, as long as a subset of samples was analyzed for the full list of VOCs.

In 236 sub-slab samples taken from 110 properties during the vapor intrusion investigation, vapor was tested for the full list of 61 VOCs (Barr, 2015g). Most VOCs were detected at least once, primarily at low concentrations that are of no public health significance. PCE is the only additional contaminant in sub-slab soil vapor that appears to be a minor constituent in the groundwater plume, but it was found at much lower concentrations than TCE and has a lower potential health risk. The presence of the additional contaminants in sub-slab vapors is common and expected in urban areas. Such contaminants may come from spillage or improper disposal to the soil, but they can also come from spills or leaks in homes that penetrate basement floors. Some VOCs also have natural sources.

Data from these 236 sub-slab samples demonstrates that TCE was correctly identified as the main contaminant of concern and supports the use of the TCE sub-slab action level alone to make expedient mitigation decisions at this site.

D. Radon

Radon is a colorless, odorless soil vapor that is produced from the natural decay of uranium that is present in nearly all soils. When inhaled, it gives off radioactive particles that can damage the cells of the lung and cause lung cancer. Radon is the leading cause of lung cancer in non-smokers. Over 21,000 lung cancer deaths in the U.S. each year are from radon.

Radon is a common problem in Minnesota where 2 in 5 homes have radon levels that pose a significant health risk. According to an MDH database, 283 radon tests have been reported in zip code 55414; in 63 of these, the results were over the EPA action level for mitigation of 4.0 pCi/L (picocuries of radon per liter of air). The average radon level reported in this zip code is 2.8 pCi/L and the highest value reported is 29 pCi/L (MDH, 2014).

Minnesota state law requires a seller to disclose in writing any knowledge they have of radon concentrations in the home. The Minnesota Department of Health also strongly recommends that all home buyers have an indoor radon test performed prior to purchase or taking occupancy, and recommends having the radon levels mitigated if elevated concentrations are found.

A benefit of having a sub-slab mitigation system installed to prevent soil vapor intrusion is that it will also reduce the level of radon in home and lower occupants' risk of lung cancer. Having such a system in place—which is essentially identical to a radon mitigation system—is a positive attribute when selling a home in Minnesota.

V. Discussion

This section provides summary and descriptive information intended to help people who were affected by the vapor intrusion investigation. It also provides additional information in response to questions from residents of the community.

A. Vapor Intrusion Investigation Summary

Chemicals from the site were disposed into the ground from 1947-1962. It is unknown when vapor intrusion may have first affected the neighborhood and what concentrations of TCE or other VOCs people may have been exposed to in the past.

The current soil vapor plume has been defined with reasonable certainty and the vast majority of properties within the plume were tested and, if needed, mitigated. The action level for requiring mitigation system installation in a home is a TCE measurement of 20 $\mu g/m^3$ in soil vapor beneath the slab. This is protective for three main reasons:

- The ISV of 2 µg/m^3 is protective. It protects for cancer over a lifetime and for other health effects for all individuals, including sensitive individuals. Although lifetime exposures to TCE at concentrations above the ISV could increase cancer risk, we would expect the health risk to be very low. Non-cancer health risks also may increase as exposures increase above the ISV. However, even at indoor air concentrations above 2 µg/m^3, we would expect the health risk to be very low. Health effects are often not evident even for people who are occupationally exposed to TCE on the order of hundreds to tens of thousands times higher than typical environmental exposures.
- The limited amount of data available for comparing simultaneously collected sub-slab and indoor air samples from the investigation area suggests that the screening attenuation factor of 0.1 used for the site is also protective. More often than not, less than one-tenth of the concentration of TCE in the sub-slab vapor was found in the paired indoor air sample. At the home with the highest sub-slab TCE concentration, the foundation appears to be good at preventing vapors from entering indoor air.
- The highest levels of TCE from vapor intrusion in any building are expected to be found in the basement or the lowest floor. Many people spend most of their time at higher levels in buildings where the amounts of any contaminants from soil vapor are expected to be significantly less.

To be sure that chemicals from the site other than TCE do not pose a potential health risk, MDH examined a subset of data for sub-slab samples analyzed for TCE and other VOCs. The results showed that many VOCs are present in sub-slab soils—as would be expected in an area with a long history of urban development. The VOCs found did not appear to be coming from the site and the vast majority were at very low concentrations, which posed no public health concerns. This assessment confirms that the practice of basing mitigation decisions solely on TCE results appears to have been appropriately protective for this site.

Examining the amount of TCE in indoor air after mitigation for 20 properties (those with the highest sub-slab TCE results) was intended to determine whether additional steps were needed to ensure effectiveness of the vapor mitigation systems at other properties. TCE was detected in roughly half of the properties. (Note: Indoor air at these properties could have been influenced by products inside the building or outdoor air.) Three of the residential properties had TCE concentrations (3, 2.6, and 5.3 µg/m^3) in basement indoor air that were greater than the ISV, although the health risks at such levels are very low. In two of these properties, modifications were subsequently made to further reduce the amount of TCE vapor entering the indoor air.

MDH recommends that property owners continue to operate the vapor mitigation systems and periodically check the u-tube manometer to make sure the system pressure is the same as it was when the system was installed. If any property owners are concerned about the integrity of their mitigation system, they should contact MPCA. A forthcoming operation and maintenance plan for the mitigation systems is expected to help ensure the systems continue to operate as intended into the future.

MDH also recommends that the soil vapor plume continue to be monitored to ensure all properties that may be affected by vapor intrusion are offered mitigation systems.

B. Additional Community Concerns Regarding Exposures Related to the Site

Drinking Water

No drinking water wells are affected by the contaminant plume. The most recent well survey in the area of the site was conducted in 2012 and confirmed that the only active wells in the groundwater contamination plume are not connected to potable water supply services and not used for drinking water (Barr, 2013e).

The source of drinking water for Minneapolis has always been the Mississippi River. It is expected that any VOCs in groundwater that may enter the river would be diluted to undetectable levels. In addition, Minneapolis water intakes are located upstream of where the VOC plume discharges to the river and the water from the river is treated using ultrafiltration and tested regularly to ensure Minneapolis tap water is clean and safe.

Mississippi River Water and Fish

Community members have asked about the potential impact of the groundwater contaminant plumes on the Mississippi River and the potential for exposure through its water. Again, VOCs from groundwater that may enter the river would be diluted to undetectable levels. In addition, TCE also easily evaporates from surface water and does not accumulate in fish tissue. For these reasons, it is expected that people have never been exposed to site-related TCE through recreation on the Mississippi River or eating fish from it.

Disposal Site Soil

As discussed previously, very little contamination has been found in the top four feet of soil near the former disposal site and community members cannot directly contact contaminated soils that are well below the surface. In 2004, an institutional control (i.e., an administrative and/or legal control that minimizes the potential for exposure to contamination) was placed on the property. In the form of a restrictive covenant filed with Hennepin County, this institutional control only allows for commercial/industrial uses of the property and prevents disturbing the deep soils. Nevertheless, in the 2014 Five-Year Review, MPCA identified that the restrictive covenant was not adequate (because the soil impact area is not able to be identified from the legal description) and requested that a figure with geographic information system coordinates be developed and available in the event that construction in the affected area is proposed (MPCA, 2014c).

Residential Gardens

Community members have raised concerns about the safety of gardening and potential for exposure to TCE in soil vapor. Because TCE in soil vapor does not build up in surface soils, skin contact or incidental ingestion (swallowing small amounts of dirt and dust) of soil within the investigation area would not result in exposure to TCE. Instead, soil vapors that rise through soil to the surface, will readily enter and mix with the air. This upward migration and dilution of soil vapor constituents can be seen in the off-site soil vapor sampling data (see Appendix A, Figure A-11) which shows less TCE in soil vapor samples closer to the surface. Once TCE is in the outdoor air, it is greatly diluted in the atmosphere and begins to breakdown.

It is possible that TCE in the air can diffuse into the leaves of plants, but the movement of TCE back out of the leaves into the air keeps it from collecting in plants. Because TCE does not attach to or build up in soil or plants, TCE from soil vapor in the investigation area will not affect garden produce. MDH believes gardening is a healthy activity that people should continue to enjoy.

Mitigation Systems and Outdoor Air

The amount of TCE released into the air from vapor mitigation systems in the investigation area is too small to affect the overall quality of outdoor air in the neighborhood. The relatively high TCE concentrations in some sub-slab soil samples are expected to have resulted from slow movement and build-up of TCE vapor beneath buildings over time. The concentrations of TCE continuously exhausted by vapor mitigation systems will be much lower and will quickly be diluted in the atmosphere. Once in outdoor air, TCE is greatly diluted and breaks down through a reaction with sunlight; about seven days are required for half of a quantity of TCE to break down this way (ATSDR, 2014).

C. Community Health Risk and Health Data

Within a population, the health risk due to a particular contaminant release varies greatly. An individual's exposures vary depending on factors such as where one works, where one lives, the amount of time spent in different locations (e.g., indoors or out), etc. The amount of a contaminant a person needs to take into their body to cause an adverse health impact also varies from one individual to another depending on factors such as genetic differences, age, pre-existing health conditions, etc.

There is no medical test to determine whether a person was exposed to TCE in the past. TCE does not accumulate in the body. Following exposures to high concentrations (such as occupational exposures), TCE and its breakdown products can be detected in blood and urine for up to a week (ATSDR, 2003). However, occupational exposures to TCE may be on the order of hundreds to tens of thousands times higher than typical environmental or residential soil vapor exposures. Therefore, medical testing does not help determine exposures from vapor intrusion.

Members of the community expressed interest in a health investigation to determine whether environmental exposures to TCE from the site affected the health of people in the investigation area. Health investigations look for evidence of a shared experience (exposure to a chemical) that is capable of causing a disease of concern. To produce observable effects, exposures would have to have occurred at a level that health effects might be expected to result. However, except in occupational settings where very high exposures can occur, elevated rates of health effects are very hard to identify. There are many challenges to conducting health investigations, such as the following:

- Individual exposures are impossible to know and reconstruct;
- Environmental exposures are often too low to cause any observable health impacts;

- Relationships between contaminants and disease are only weakly understood for high-concentration and long-duration occupational exposures or higher exposures at better-defined contaminated sites;
- Because surveillance data doesn't exist for most chronic diseases, it is difficult to determine the expected rate of health conditions for comparison to determine whether the rate in a particular area is increased;
- Geographic clusters of disease can occur randomly by chance alone;
- Diseases typically have multiple causes and can take a long time to develop;
- Individual exposures to other sources of contaminants throughout life are impossible to know and may be just as likely to cause health impacts;
- Study participation can be low; and exposures can be short-term and intermittent in areas with young, highly transient populations; and
- Any study would require substantial financial support over time.

It appears unlikely that exposures to TCE from the GMI site have occurred at levels sufficient to cause evident health effects in individuals. However, it is possible that past exposures to site-related chemicals may have resulted in some increased health risk for some individuals. MDH staff considered the possibility of a health investigation for the community near the site, but concluded that an informative health investigation is not possible given the challenges listed above.

MDH has surveillance systems which collect information about cancers and birth defects. Data from these systems (described below) were evaluated for any indications of higher rates of health effects diagnosed among residents in the investigation area. There are many limitations to what can be observed from these surveillance data and what conclusions can be made. In general, a lack of evidence for higher rates of health effects such as cancers or birth defects among people living in a small geographic area cannot prove such effects have not occurred. However, using what data were available from these systems, MDH did not find any evidence of increased rates of cancers or birth defects.

Minnesota Birth Defects Information System (BDIS)

The BDIS maintains an information system containing data on the cause, treatment, prevention, and cure of major birth defects. The system includes information for 46 structural birth defects; 15 are congenital heart defects, which are of interest because of limited information that suggests that exposure to TCE may impact heart development. An analysis of BDIS data for 2006-2010 indicates that the rate of occurrence of congenital heart defects in the 55414 zip code was not different from the rate for the surrounding areas.

The BDIS database was started in 2006 with infants born or treated in Hennepin and Ramsey Counties and therefore, birth defects surveillance is in its early stages of development in Minnesota. It takes many years to collect enough data to be able to identify trends in the occurrence of birth defects.

Minnesota Cancer Surveillance System (MCSS)

The MCSS is Minnesota's statewide, population-based cancer registry. The MCSS systematically collects demographic, diagnostic, and treatment information on all Minnesota residents with newly diagnosed cancers. One of the primary objectives of the MCSS is to monitor the occurrence of cancer in Minnesota and describe the risks of developing cancer.

In January 2014, MCSS staff prepared an analysis comparing the observed versus expected rates of cancer occurrence in the site investigation area by calculating cancer rates for residents living in zip code 55414 (see Appendix I for the full report). Staff compared observed and expected rates diagnosed over a 10-year period for all cancers combined, and for specific cancers in males and in females. The number of newly-diagnosed cancer cases in the site investigation area zip code did not differ from the number that would be expected, based on a comparison to cancer rates in the greater Twin Cities metropolitan area.

There are several limitations to the MCSS data and its use to answer questions about cancer and specific environmental causes in general. While the analysis provides reassurance that cancer rates in the community are not unusual, the analysis of cancer rates does not specifically address potential health risks from environmental contaminants such as TCE. For a more complete discussion, see Appendix I.

D. Public Engagement

MDH received phone calls, e-mails, and inquiries from community members affected by the site investigation. The site and activities related to the vapor intrusion investigation also received considerable coverage in local newspapers (print and online) and on television. A community meeting was held in partnership with MPCA and GMI in November 2013, followed by open office hours in community locations during the next several months. Several hundred people attended these events.

Area residents' questions and concerns included the issues below.

- Elevated cancer rates in the area;
- Health risks for people with compromised immune systems;
- Risk to children who might have been exposed to contaminated indoor air (both before and after birth);
- Contaminants in drinking water;
- Effectiveness of indoor air mitigation systems;
- Regulatory criteria for TCE in indoor air; and
- Potential property value decline.

MDH made every effort to address the health issues raised by the community in a timely and effective manner through the activities listed below.

- MDH led the effort by MPCA and GMI to inform the community that individuals who believed that they or someone in their family may be sensitive to exposure to chemicals should identify themselves privately to MDH in order to expedite pre-mitigation testing, and if needed, mitigation.
- MDH participated in regularly scheduled and advertised office hours throughout 2014.

- MDH Site Assessment staff coordinated efforts to provide information from the MDH Birth Defects Surveillance program and MDH Cancer Surveillance program.
- MDH partnered with MPCA to deliver information via MPCA's site specific email list serve.
- MDH developed information that was disseminated through website pages (http://www.health.state.mn.us/divs/eh/hazardous/sites/hennepin/gmivi.html) about site activities and health concerns related to this site.
- Printable information sheets were developed in response to concerns; these included "Trichloroethylene (TCE) and Vapor Intrusion" and "Trichloroethylene (TCE): Screening Values and Measurement," which are in Appendix J.
- MDH also provided updates for property owners/residents in cooperation with MPCA through newsletters mailed to the affected vapor intrusion investigation area.
- MDH participated in frequent stakeholder meetings. Stakeholders included MPCA, MDH, Southeast Como Improvement Association, University of Minnesota, City of Minneapolis, GMI representatives, and Hennepin County.

VI. Conclusions and Recommendations

A. Conclusions

MDH reached four main conclusions (described below with supporting information) regarding health risk in the investigation area.

Conclusion 1

MDH concludes that contaminants in soil vapor are not currently harming people's health in the majority of properties within the investigation area.

a. The current location of the soil vapor plume has been defined with reasonable certainty. More than 90 percent of all properties within the investigation area received sub-slab soil vapor testing (Barr, 2015h). Mitigation systems were installed as needed (based on a health protective, sub-slab action level) to prevent exposure to site contaminants at levels of health concern in indoor air. Use of an attenuation factor of 0.1 is protective and often overestimates the potential for vapor intrusion.
b. Mitigation systems prevent entry of much of the contaminated soil vapor into buildings by continuously capturing the vapor and venting it outside. Diagnostic testing completed after each mitigation system was installed confirmed the system was operating as intended. Modifications were made if the diagnostic criteria were not met.
c. Indoor air was tested at several unmitigated properties that had elevated TCE concentrations in the sub-slab. No site-related contaminants were found at levels of health concern.
d. To confirm the effectiveness of the vapor mitigation systems, indoor air was sampled in 20 homes with the highest sub-slab concentrations (approximately 10% of properties

mitigated). TCE was detected in 11 out of 20 properties, many likely influenced by consumer products and/or outdoor air. Although three of the residential properties had TCE concentrations greater than the ISV (2.6, 3, and 5.3 µg/m^3), none of these concentrations in are likely to affect health because they were measured in rarely occupied basements and only slightly exceed a safe screening value. Modifications were subsequently made to two of these properties to improve the performance of the mitigation systems.

Conclusion 2

There are limitations in MDH's ability to evaluate current health risks associated with vapor intrusion at some properties. Contaminants in untested or unmitigated homes may be harming people's health.

a. While the sub-slab investigation and mitigation effort has been very successful, there are number of properties where access to sample or mitigate was denied. Decisions on mitigation or additional actions are pending at other properties because of unique situations.
b. Post-mitigation indoor air sampling was not conducted at the majority of properties. Currently, this sampling is now considered a best management practice to confirm that vapors are not intruding into properties. This can be important to detect overlooked pathways where soil vapor can readily enter into buildings (pipe penetrations, drains, etc.).

Conclusion 3

MDH cannot determine whether TCE exposures from soil vapor within the investigation area in the past may have affected people's health.

a. Limited indoor air data indicate that past exposure to site-related contaminants due to vapor intrusion may have increased health risks for some people., TCE concentrations in shallow groundwater monitoring wells were higher in the past; this suggests that sub-slab concentrations may also have been higher in the past, with the potential for increased indoor air exposures.
b. Historical exposures to site contaminants due to vapor intrusion are impossible to reconstruct. A health investigation would not be able to show a relationship between an estimated exposure to contaminants from the site and health effects in this community.

Conclusion 4

Vapor intrusion is the only pathway of concern at this site.

a. Site contaminants have never affected tap water in Minneapolis.
b. Groundwater in the area of the site is not used as a drinking water source (neither for private drinking water wells or city water supplies).

c. Past and current exposure to contaminants in soil is very unlikely (other than workers who contacted soil at the disposal site in the past).
d. Small amounts of TCE found in outdoor air samples in the investigation area appear similar to the amount of TCE present throughout Minneapolis.
e. TCE does not build up in surface soils or plants.
f. Past and current exposure to site-related TCE due to recreational use of, or eating fish from, the Mississippi River is very unlikely.

B. Recommendations

1) MDH recommends monitoring the edges of the groundwater contaminant plume in the glacial drift aquifer and the soil vapor plume where vapor mitigation actions have already occurred. Additional sampling should include the full list of VOCs for analysis.

2) Additional efforts should be made to sample untested homes within the vapor plume area. Vapor mitigation systems should be installed in any additional properties that are found to be affected (over action levels) by site contamination in the future.

3) A plan should be developed for future sampling or mitigation for properties that had sub-slab sample results above action levels and subsequent indoor air testing, but remain unmitigated.

4) Indoor air testing should be considered for additional buildings that have been mitigated. Indoor air testing is the best way to show TCE is not present at an elevated concentration.

5) Vapor mitigation systems should be operated and maintained. Property owners should periodically check the u-tube manometer to make sure the system pressure is the same as it was when the system was installed. An overall operation and maintenance plan for the mitigation systems should be developed and implemented.

6) If property owners have questions about the integrity of their vapor mitigation system and are concerned about exposures they should contact MPCA to discuss whether follow-up actions are appropriate.

7) Efforts should be undertaken to reduce TCE concentrations in the groundwater below levels of vapor intrusion concern.

8) Some chemicals in indoor air come from products stored or used inside buildings. Occupants can minimize their exposures to chemicals in indoor air by reducing the amount of stored chemicals and increasing fresh air intake.

VII. Public Health Action Plan

- MDH will be available to discuss health concerns and answer questions from stakeholders and the community.
- MDH will be available to review additional site data as it is available.
- MDH will be available to consult with MPCA regarding resolution of properties with special considerations.
- MDH will work with MPCA to further refine state guidance and policies for investigating and protecting the public's health at vapor intrusion sites.

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Preparers of Report

This Health Consultation for the General Mills/Henkel Corporation Superfund Site was prepared by the Minnesota Department of Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies, procedures existing at the date of publication. Editorial review was completed by the cooperative agreement partner. ATSDR technical project officers who worked with the Minnesota Department of Health during development of this document are listed below.

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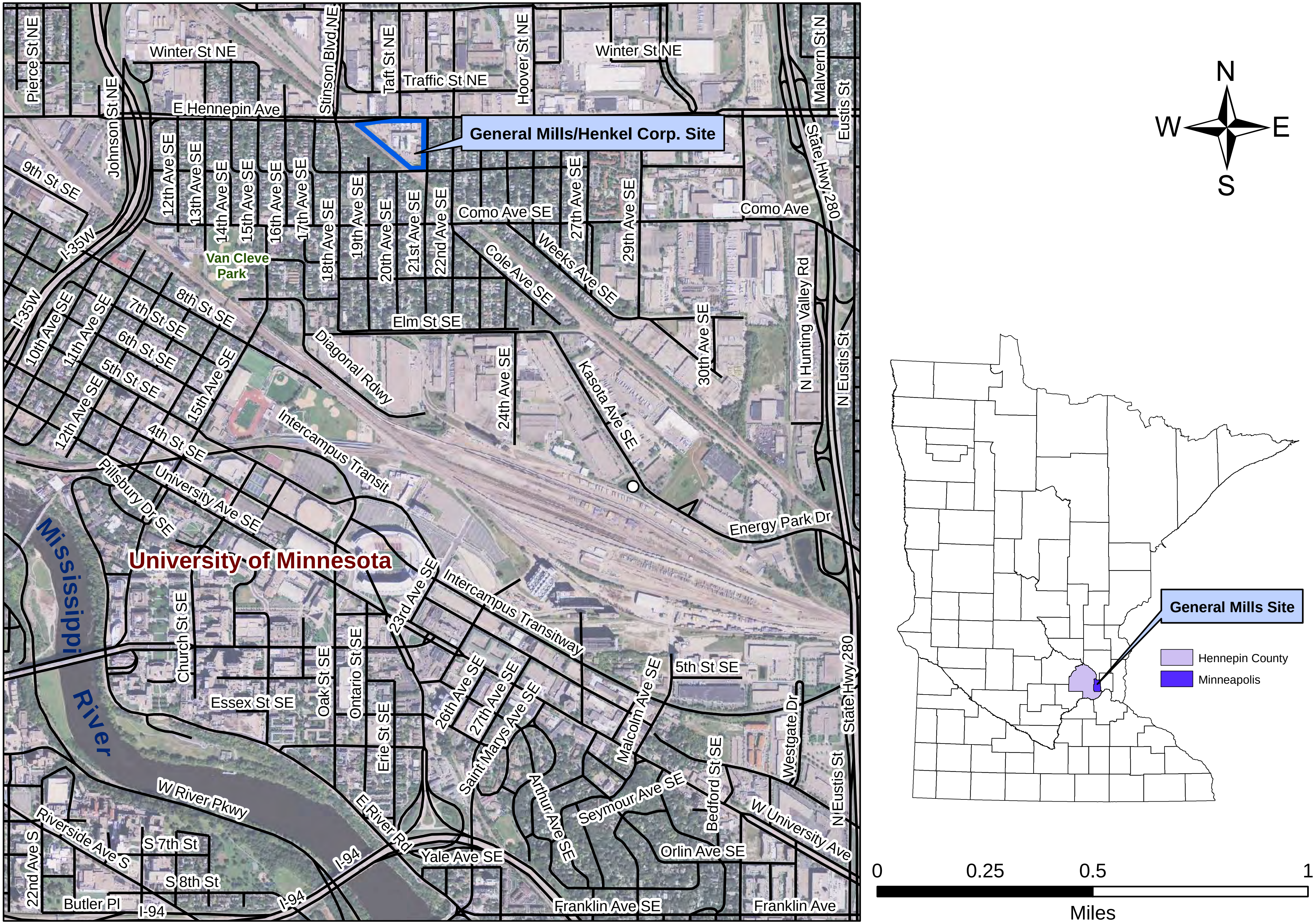


Figure A-1: Location of the General Mills / Henkel Corporation Site, Minneapolis, Minnesota

Figure A-2: Description of Bedrock Units Beneath the General Mills Site

Bedrock Unit	Bedrock Sub-unit	Thickness (ft.)	Description
Quaternary Deposits	Alluvial sands*	30 – 40	Sand, with silt and gravel.
	Glacial till	0 – 10	Clay with sand and gravel
Decorah Shale	Unnamed member	7	Shale with abundant fossil shells; acts as a confining layer
	Carimona member*	3.5 – 4.5	Thin layers of limestone and shale.
Platteville Formation	Magnolia member*	8 - 9	Medium to thick layers of dolomite with fossil shell beds (coquina) up to 1 inch thick.
	Hidden Falls member	5 - 7	Thickly bedded, dense dolomite with shale layers
	Mifflin member	12 - 13	Thin layers of dolomite/limestone and shale
	Pecatonica member	1 – 2	Sandy dolomite
Glenwood Formation		3 - 5	Sandy shale; acts as a confining layer
St. Peter Sandstone*		120 - 160	Fine-grained, poorly cemented, quartz sandstone with shale layers near the base that may act as leaky confining layer in some areas
Prairie du Chien Group*	Shakopee Formation	70 - 100	Thin to medium thick dolomite with sandy dolomite and sandstone layers
	Oneota Dolomite	50	Sandy dolomite with abundant solution cavities (karst) and siltstone layers near the base which may act as a leaky confining layer in some areas
Jordan Sandstone*		85 - 100	Fine to coarse grained sandstone, with shale layers near the base.
St. Lawrence Formation		80 - 120	Thin siltstone, shale, dolomite, and sandstone layers; acts as a regional confining layer

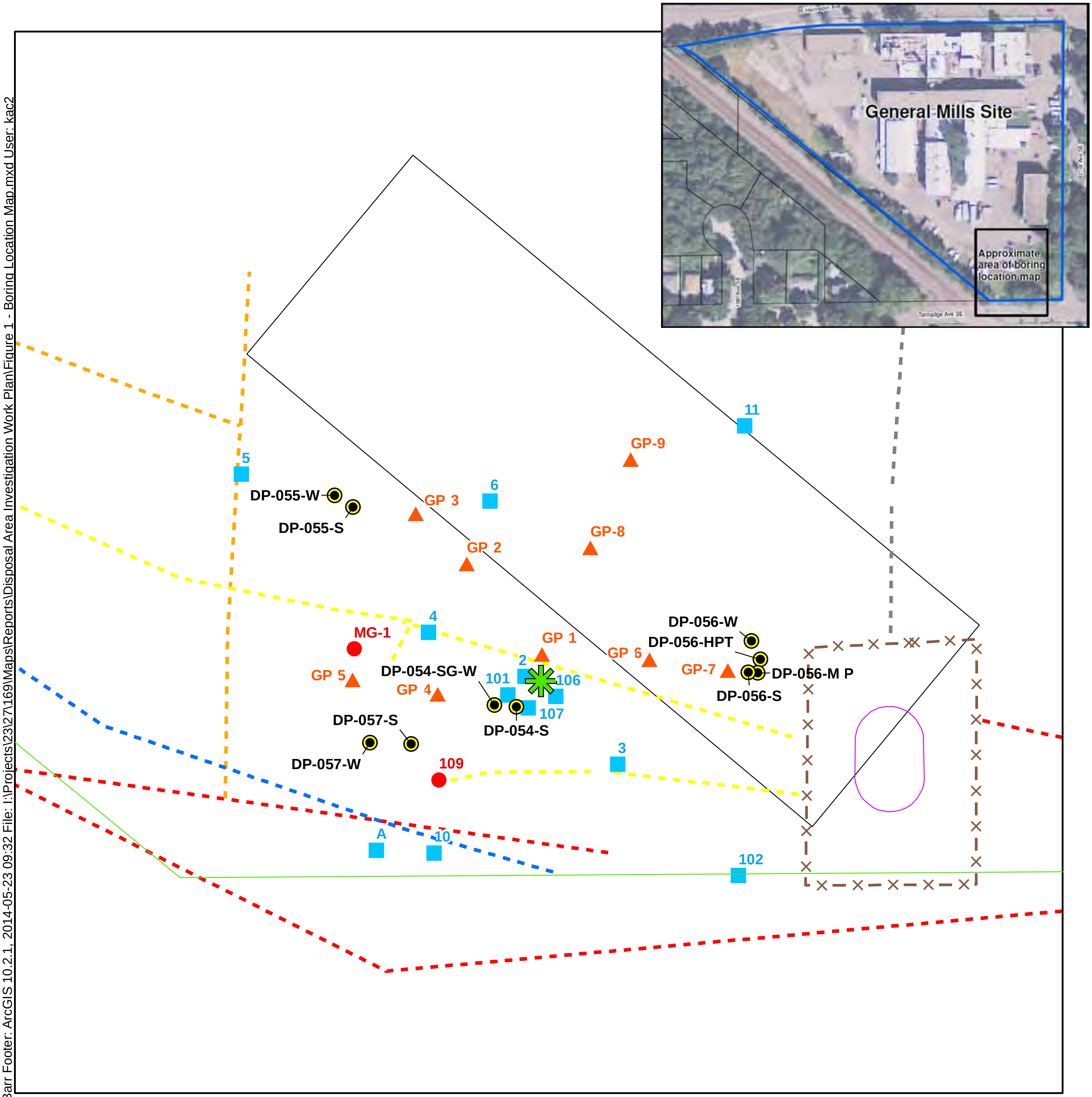
(Based on Mossler, 2008; Barr, 1983 and 2013)

[blue box] Aquifer

[purple box] Aquifer, but shale layers in the unit cause groundwater to mainly flow horizontally and the unit is considered a "leaky" confining layer

[orange box] Confining layer, but may allow some downward movement of groundwater

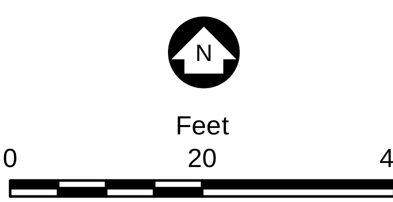
*Site related contaminants have been detected in these aquifers (see Tables C-3 through C-12)



Approximate Disposal Area
Boring Locations
Historic Borings / Wells
Active Wells
2001 Geoprobe Borings
Property Boundary From 2010 Survey
Utility Lines
Fiber Optic
Gas Line
Overhead Electric
Underground Electric
Unknown Utility
Treatment Tower

Treatment Tower Fence
Former Tin Shed

Note:
Boring locations approximate based on historical data



BARR

Figure A-3

BORING LOCATION MAP
East Hennepin Avenue Site
Minneapolis, MN

Modified from Barr, 2014a

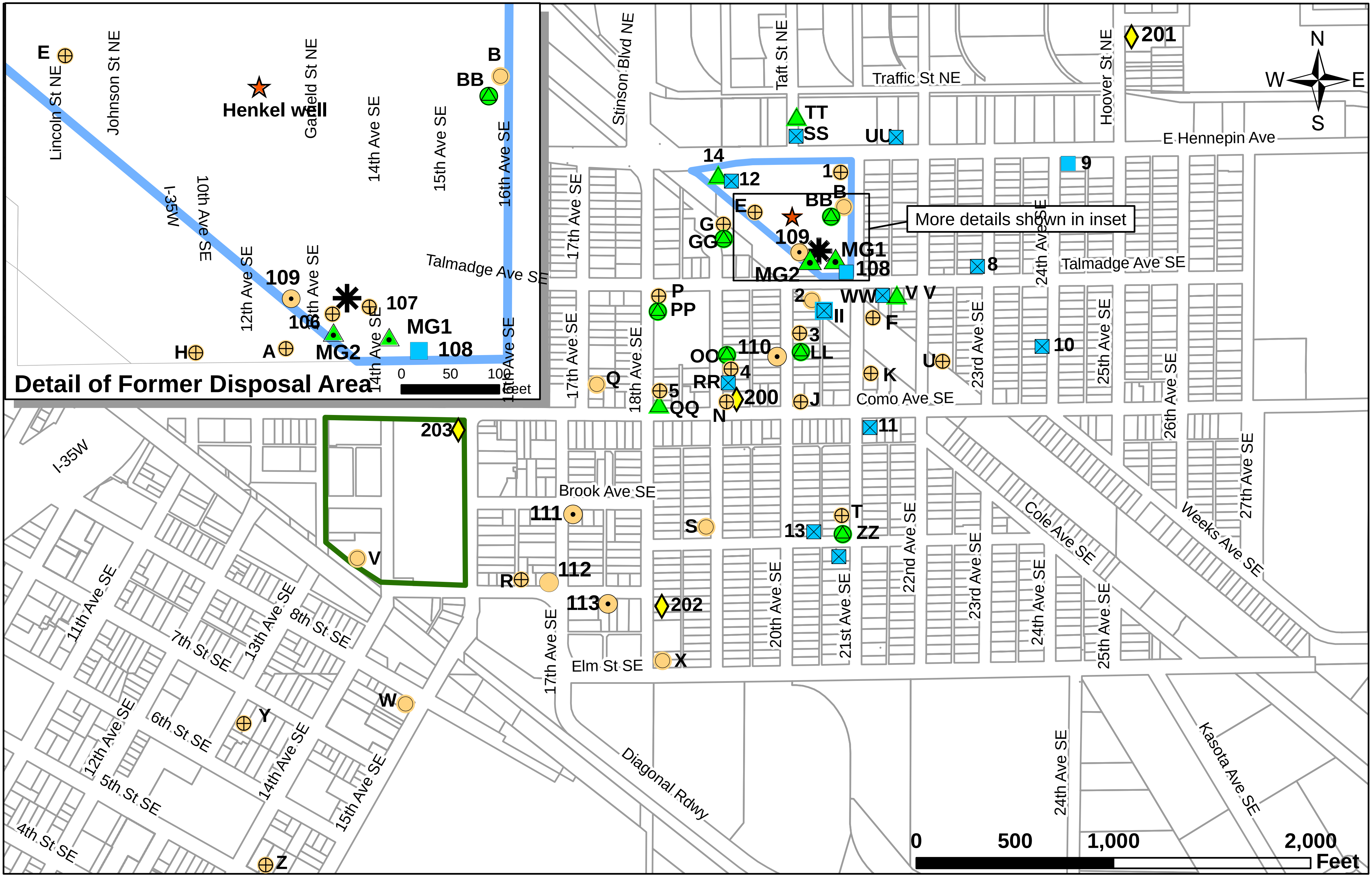


Figure A-4: Groundwater Sample Locations (all locations approximate)

Pump-Out Wells
- Glacial Drift
- Carimona Member
- Magnolia Member

Monitoring Wells or Piezometers
- Glacial Drift
- Carimona Member
- Magnolia Member
- St. Peter Sandstone
- Prairie du Chien/Jordan

Sealed Wells or Piezometers
- Glacial Drift
- Carimona Member
- Magnolia Member

- General Mills Site
- Van Cleve Park
- Former disposal area

MDH, 12/30/2014

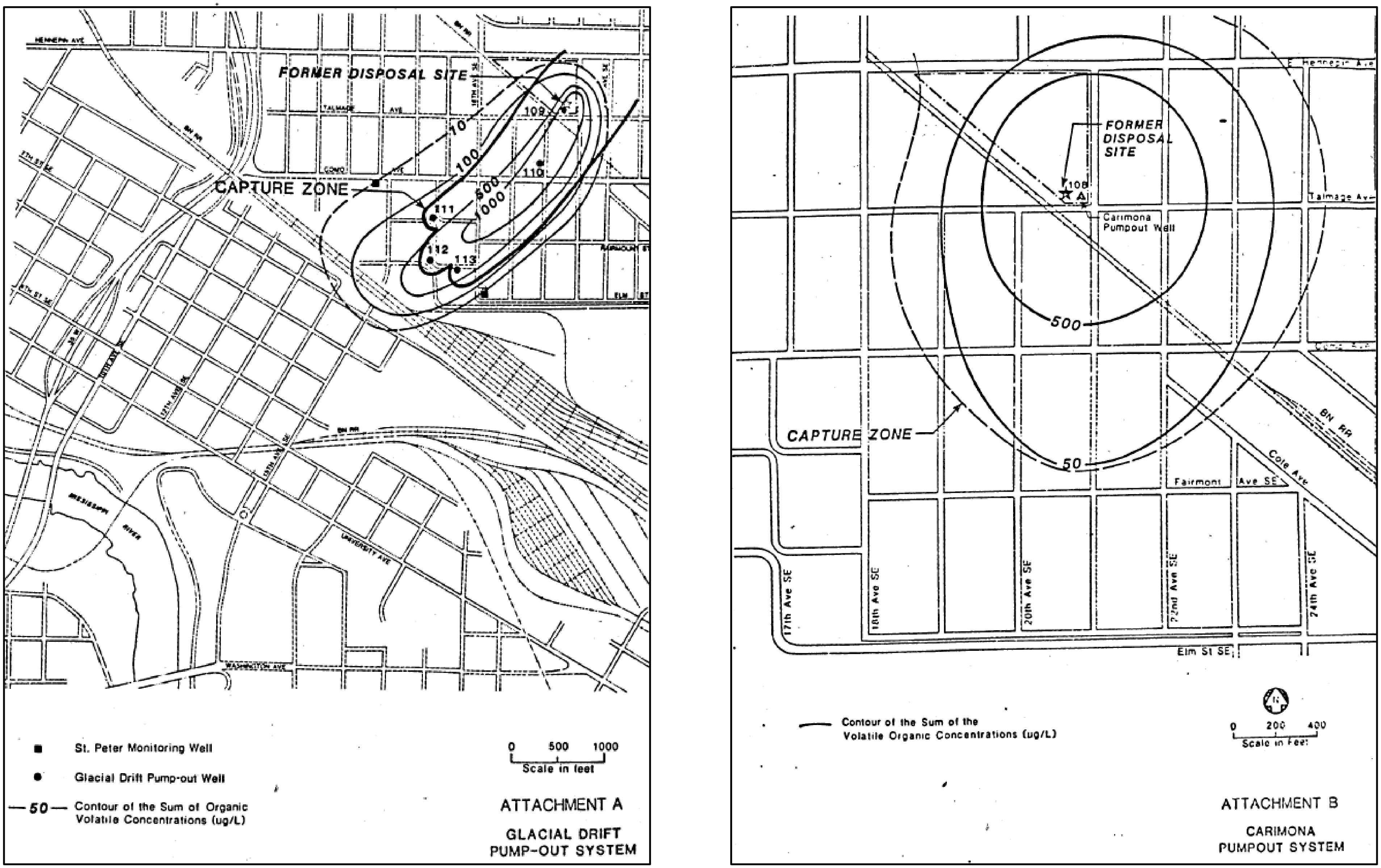
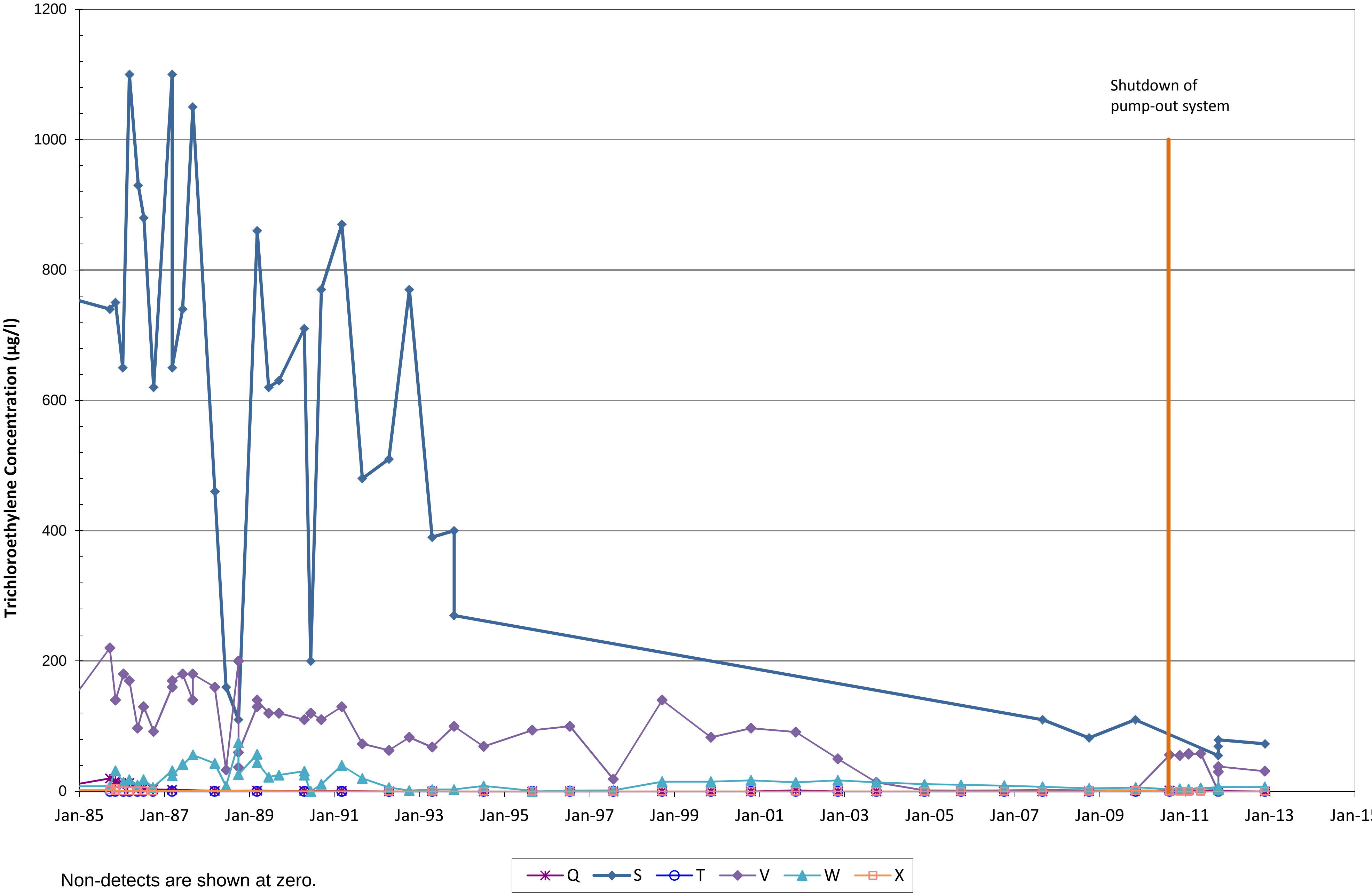


Figure A-5: Capture Zones Established for the Glacial Drift and Carimona Member Pump-out Systems

From: MPCA, 1984

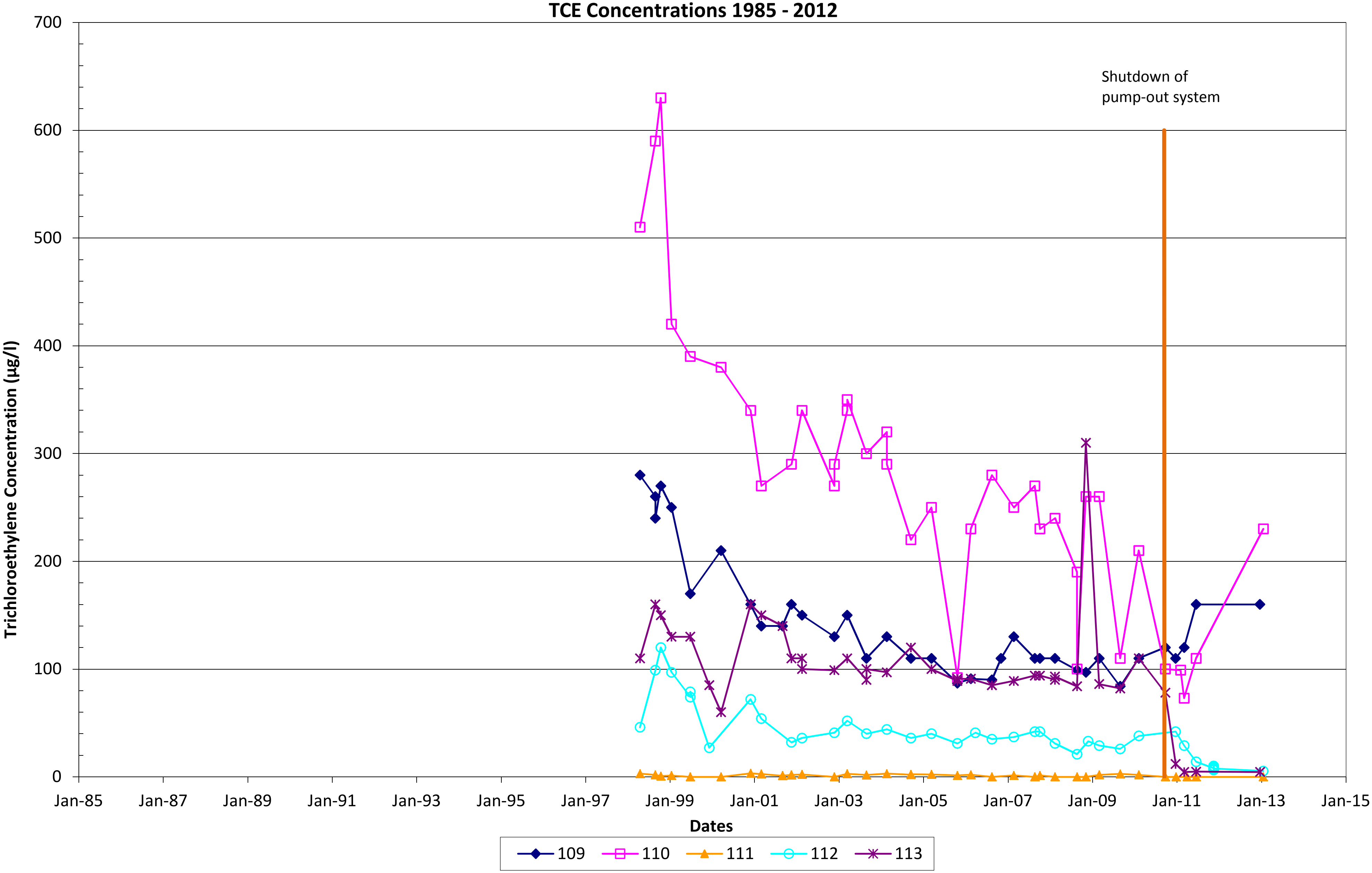
Figure A-6
Glacial Drift Monitoring Wells
TCE Concentrations 1985 - 2012



Non-detects are shown at zero.

From: Barr (2013f), Fig. 13

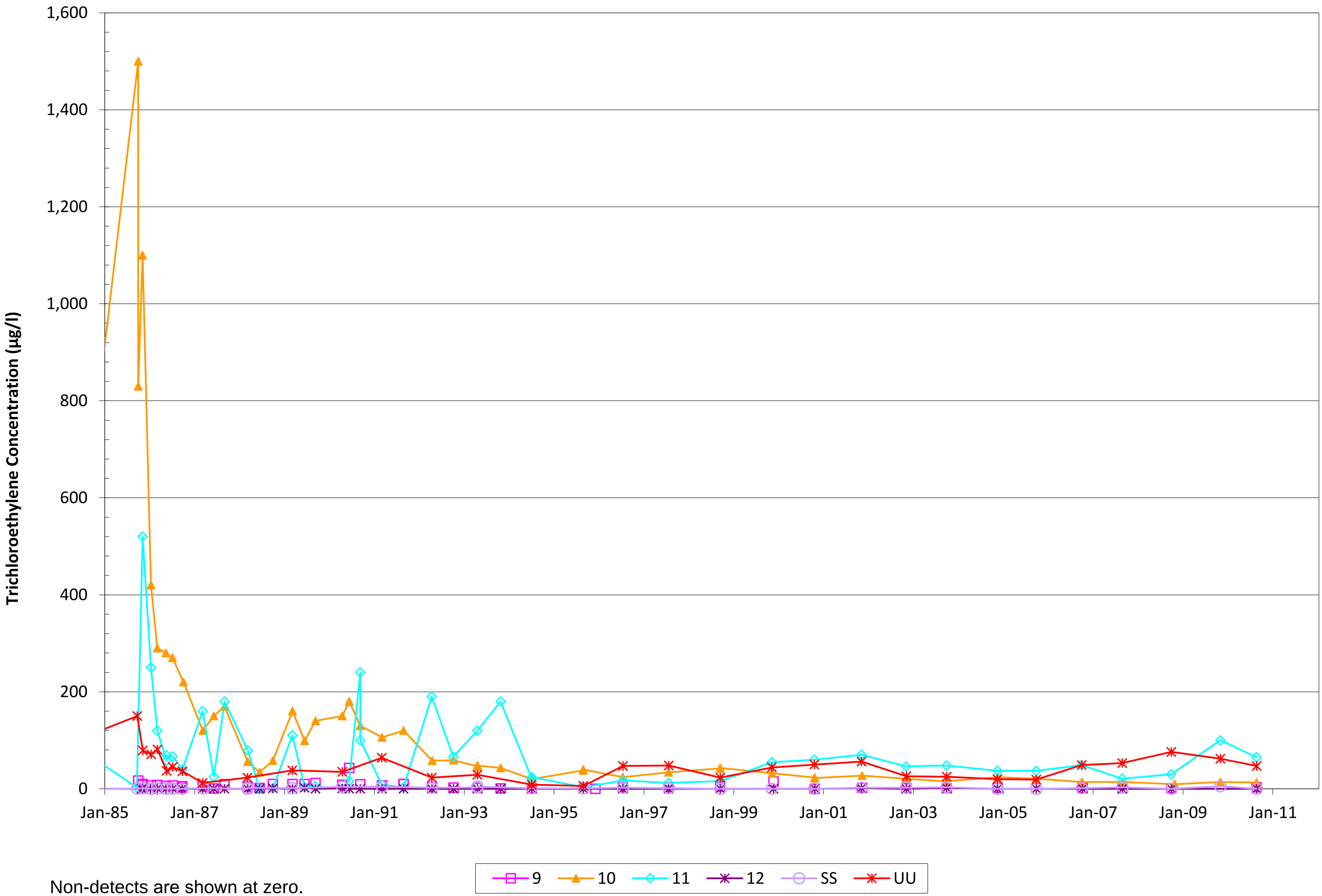
Figure A-7
Glacial Drift Pump Out Wells
TCE Concentrations 1985 - 2012



Non-detects are shown at zero.
Majority of pre-1998 samples were composited by pump-out system and are not shown on this figure.

From: Barr (2013f), Fig. 14

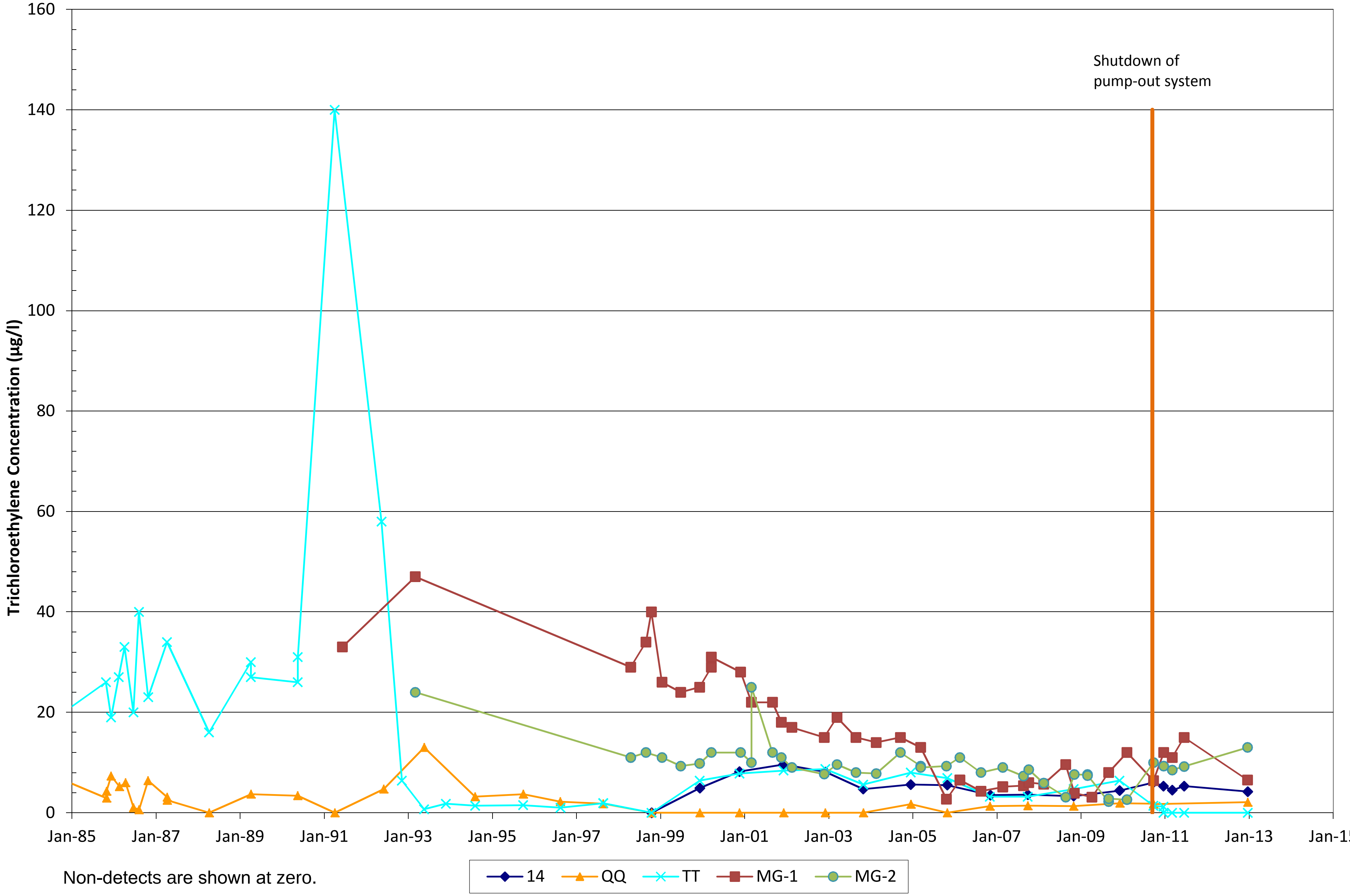
Figure A-8
Carimona Member Monitoring Wells
TCE Concentrations 1985 - 2010



Non-detects are shown at zero.

From: Barr (2012c), Fig. 15

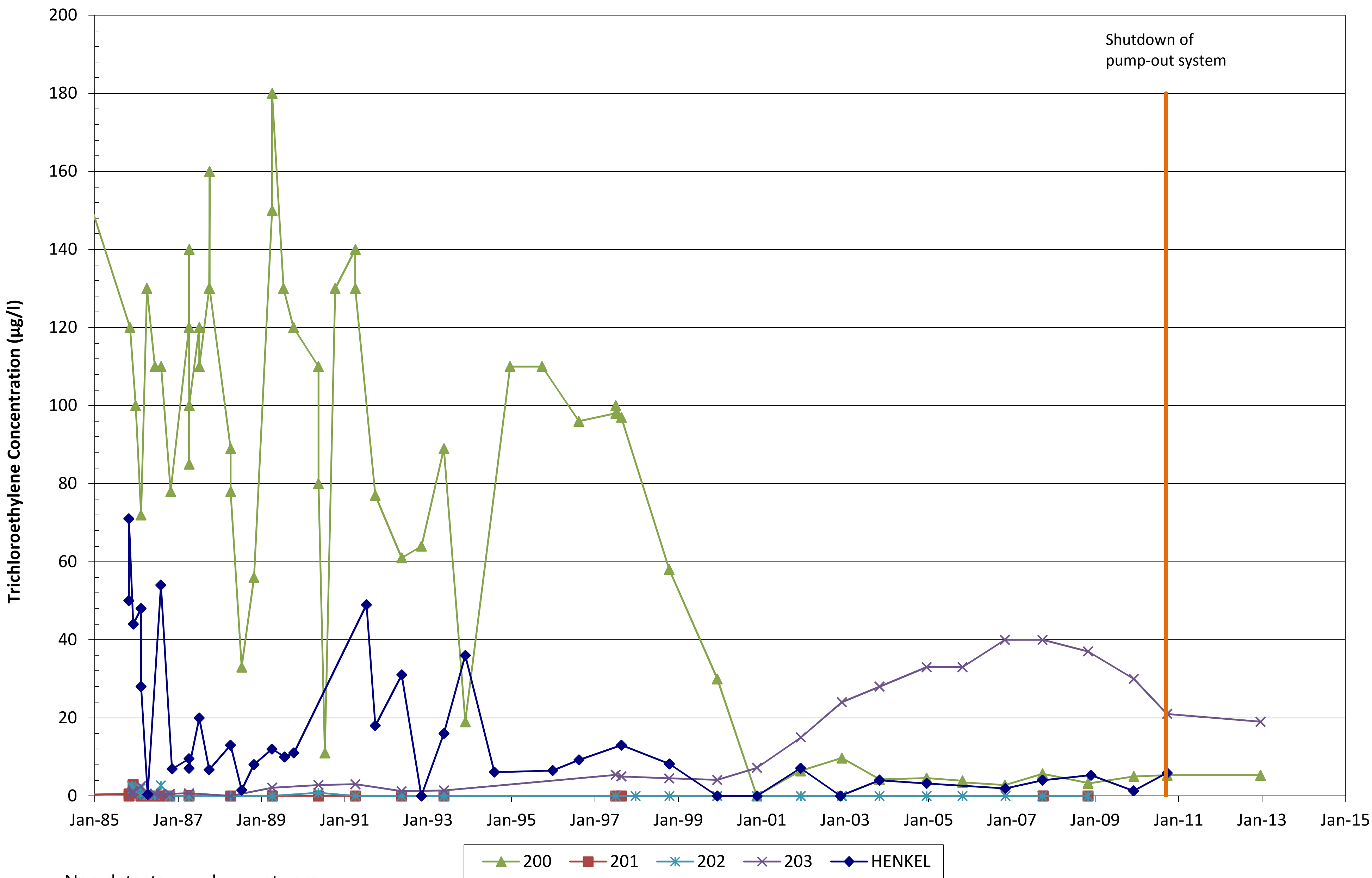
Figure A-9
Magnolia Member Pump Out and Monitoring Wells
TCE Concentrations 1985 - 2012



Non-detects are shown at zero.

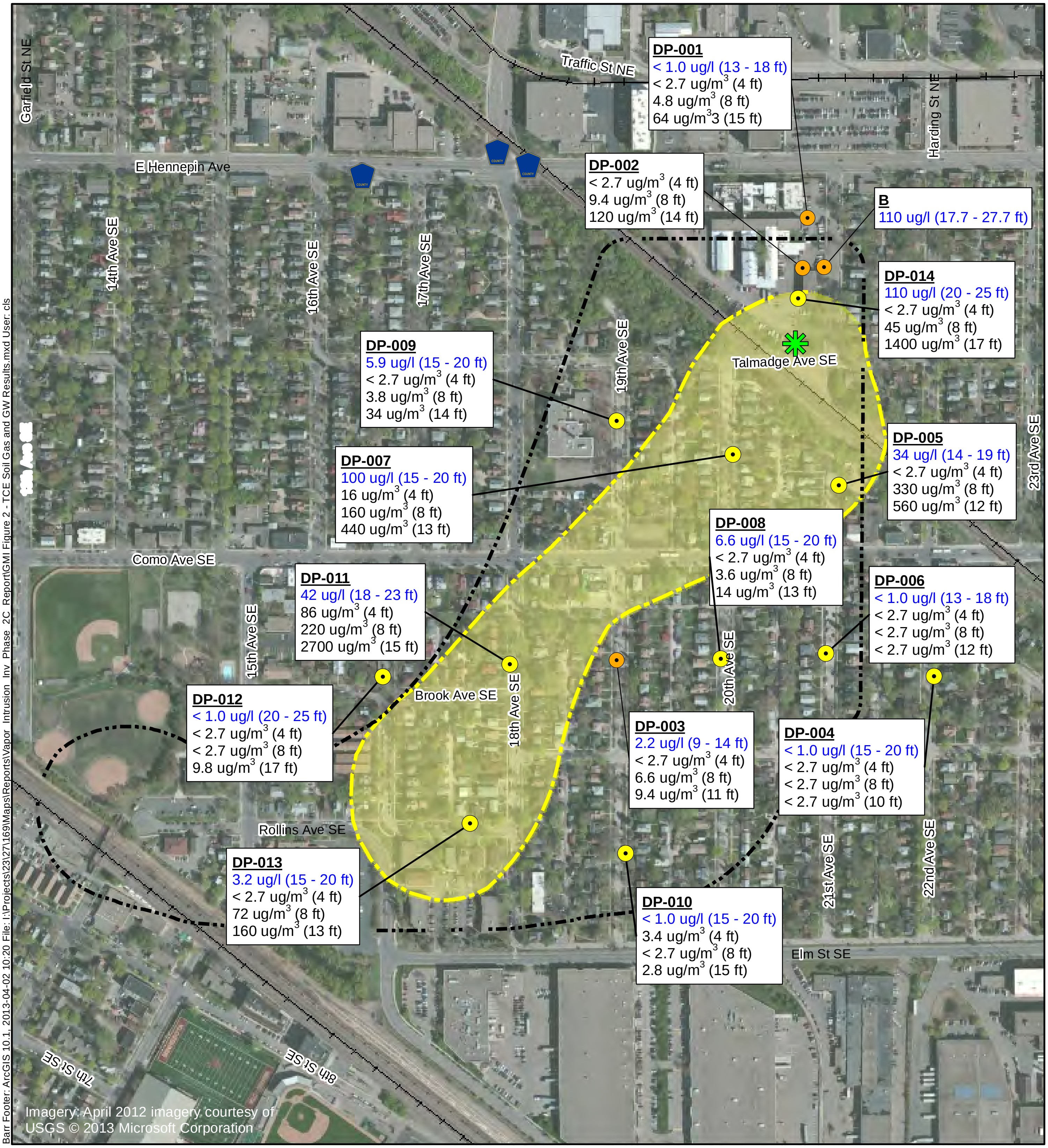
From: Barr (2013f), Fig. 16

Figure A-10
St. Peter Sandstone and Prairie du Chien/Jordan Wells
TCE Concentrations 1985 - 2012



Non-detects are shown at zero.

From: Barr (2013f), Fig. 18



Barr Footer: ArcGIS 10.1, 2013-04-02 10:20 File: I:\Projects\23\27\1169\Maps\Reports\Vapor Intrusion Inv Phase 2C Report\GMI Figure 2 - TCE Soil Gas and GW Results.mxd User: cls

Former Disposal Site

Groundwater and/or Soil Gas Monitoring Point (Phase 2B)

Groundwater and Soil Gas Monitoring Point (Phase 2C)

Soil Gas Concentration > 30.0 ug/m^3 at 8 ft Sample Depth

Potential Receptor Survey Area - 100-foot Setback from TCE Concentrations >20 ug/L (GW ISV) in Glacial Drift

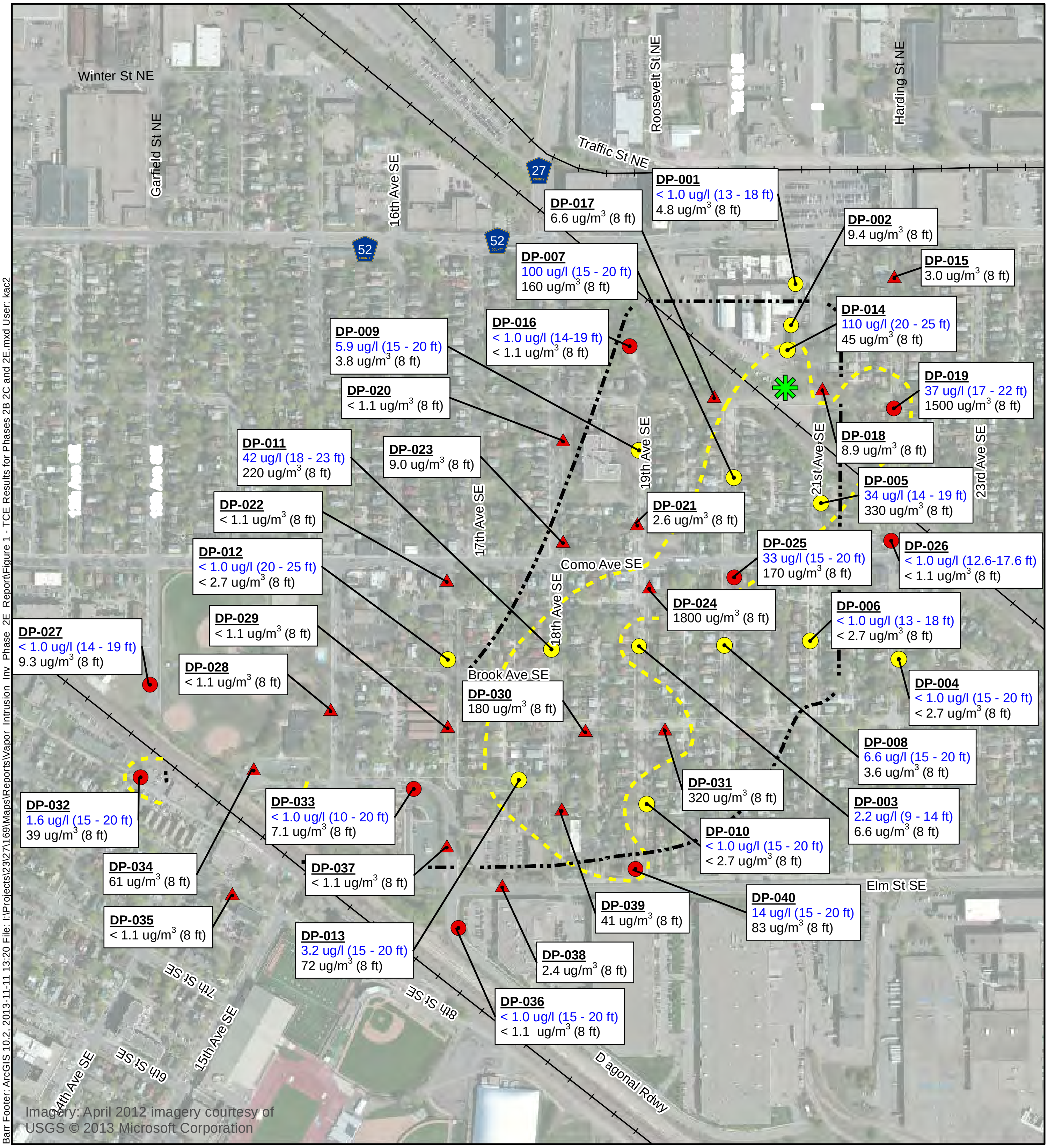
Sample ID
TCE in groundwater (sampling interval)
TCE in soil gas at 4 ft
TCE in soil gas at 8 ft
TCE in soil gas at 3 ft above groundwater

450 0 450
Feet

Figure A-11

TCE CONCENTRATIONS IN GROUNDWATER AND SOIL GAS - PHASES 2B AND 2C (2012)
East Hennepin Avenue Site
Minneapolis, Minnesota

From: Barr (2013a), Fig. 2



Former Disposal Site

Groundwater and Soil Gas Monitoring Point (Phase 2E)

Soil Gas Monitoring Point (Phase 2E)

Groundwater and/or Soil Gas Monitoring Point (Phase 2B and Phase 2C)

Soil Gas Concentration > 20.0 ug/m^3 at 8 ft bgs

Original Study Area - 100-foot Setback from TCE Concentrations >20 ug/L (GW ISV) in Glacial Drift Monitoring Wells (2011)

Sample ID
TCE in groundwater (sampling interval)
TCE in soil gas at 8 ft

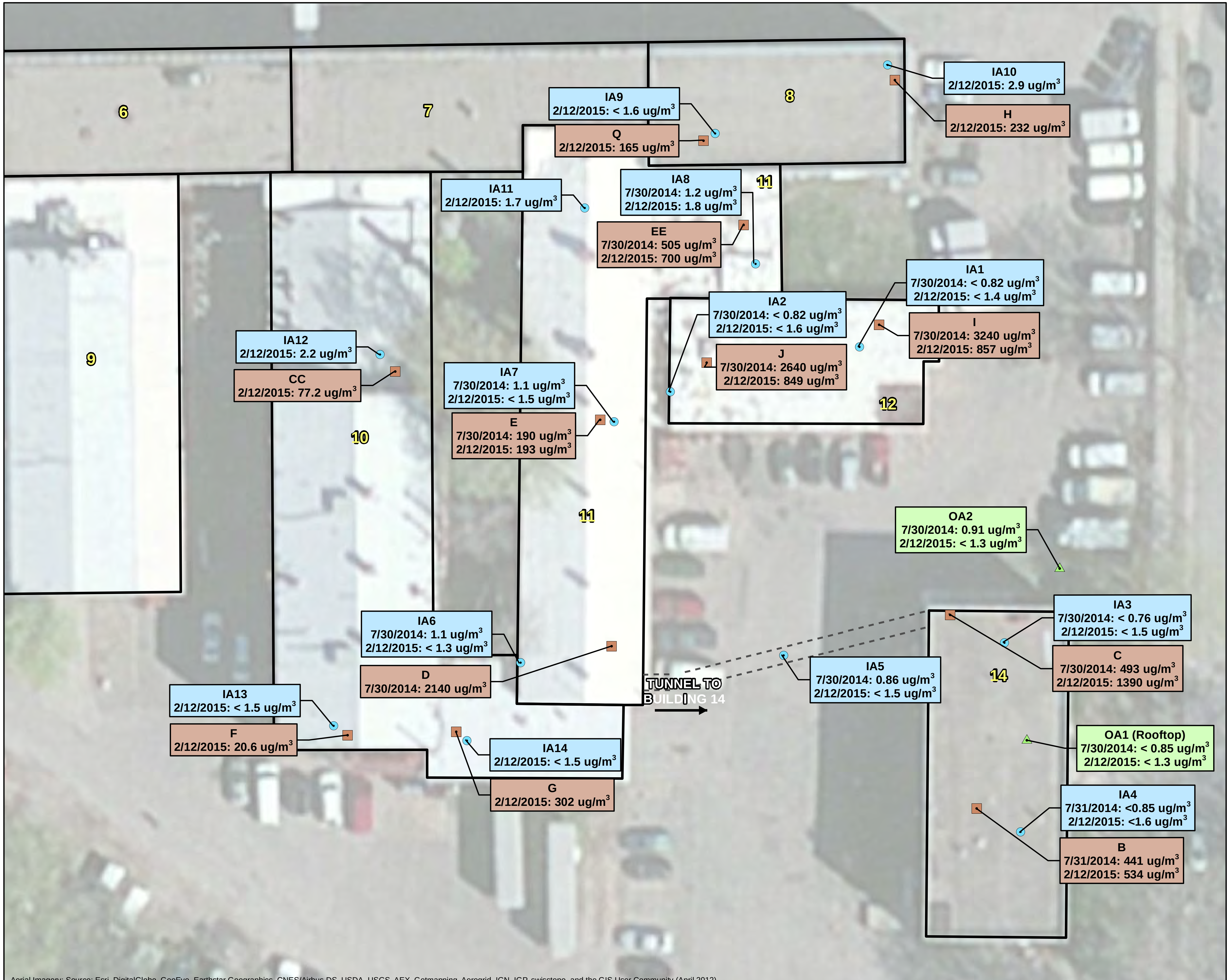
550 0 550
Feet

Figure A-12

SOIL GAS AND GROUNDWATER
TCE RESULTS - PHASES 2B, 2C, AND 2E
2012-2013
Vapor Intrusion Evaluation

East Hennepin Avenue Site
Minneapolis, Minnesota

From: Barr (2013d), Fig. 1



Paired Sub-Slab Vapor Sample Location (Approximate)

Indoor Air Sample Location (Approximate)

Outdoor Air Sample Location (Approximate)

CC Sample ID - Sample IDs Include the Unique ID 3954 Prior to the Sample Location

5 Building Number

Paired Sub-Slab Sample Location

A
12/31/2013: 5.7 ug/m3
1/31/2014: 9.6 ug/m3

Sample Date — TCE Concentration

Indoor Air Sample Location

IA1
7/30/2014: < 0.82 ug/m3
2/12/2015: < 1.4 ug/m3

Sample Date — TCE Concentration

Outdoor Air Sample Location

OA1
7/30/2014: < 0.85 ug/m3
2/12/2015: < 1.3 ug/m3

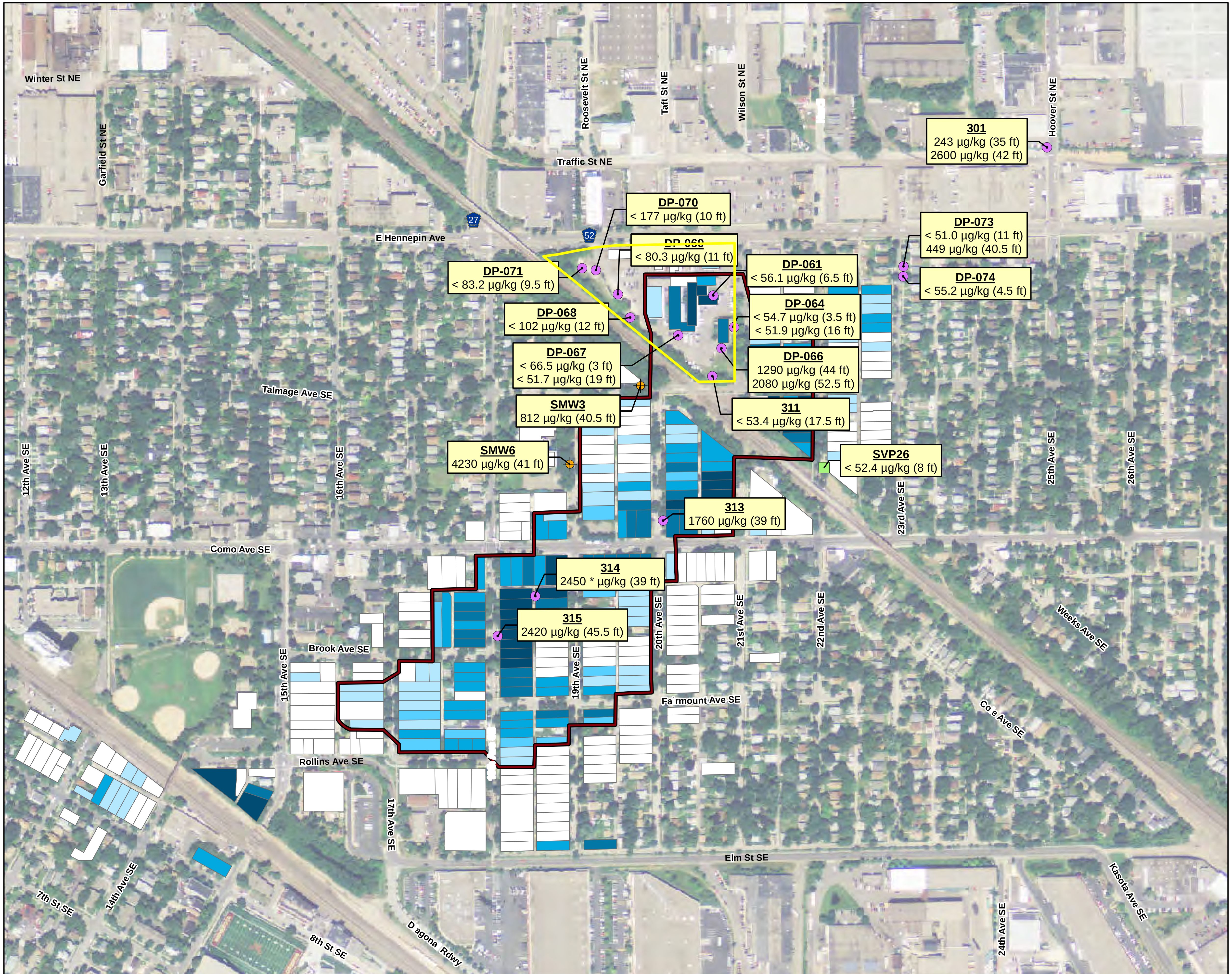
Sample Date — TCE Concentration

30 0 30

Feet

Figure A-13
(Barr, 2015)

INDOOR AIR, OUTDOOR AIR, AND
PAIRED SUB-SLAB SAMPLING
TCE RESULTS
2010 E Hennepin Ave
East Hennepin Avenue Site
Minneapolis, Minnesota



2010 East Hennepin Ave

Soil Gas Monitoring Area

VI Pathway Investigation Locations

- Sentinel Monitoring Well
- Boring
- Sentinel Vapor Monitoring Port

Sub-slab TCE Vapor Concentrations

- < 20 ug/m^3
- 20 - 60 ug/m^3
- 60 - 100 ug/m^3
- 100 - 500 ug/m^3
- 500 - 2000 ug/m^3
- > 2000 ug/m^3

Maximum sub-slab TCE vapor concentration at each building shown.

Sample ID
TCE in Soil (Sample Depth)

Footnotes:
* Estimated value, QA/QC criteria not met.

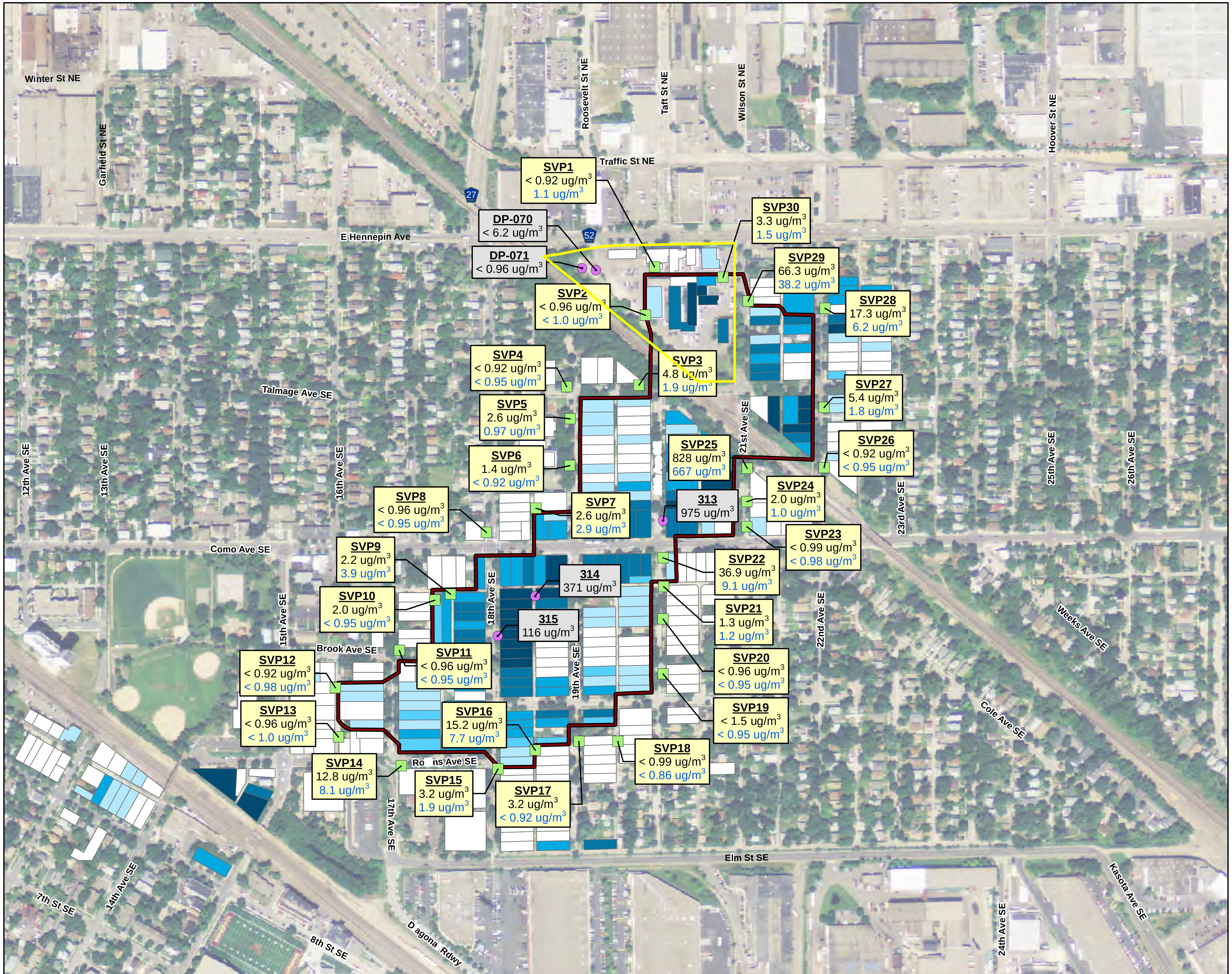
0 400 800
Feet

BARR

Figure A-14

SOIL SAMPLING TCE RESULTS
East Hennepin Avenue Site
Minneapolis, Minnesota

From: Barr (2015h), Fig. 8



2010 East Hennepin Ave

Soil Gas Monitoring Area

VI Pathway Investigation Locations

Boring

Sentinel Vapor Monitoring Port

Sub-slab TCE Vapor Concentrations

< 20 ug/m3

20 - 60 ug/m3

60 - 100 ug/m3

100 - 500 ug/m3

500 - 2000 ug/m3

> 2000 ug/m3

Maximum sub-slab TCE vapor concentration at each building shown.

Permanent Vapor Point

Sample ID
TCE in soil gas, December 2014
TCE in soil gas, March 2015

Temporary Vapor Point

Sample ID
TCE in soil gas

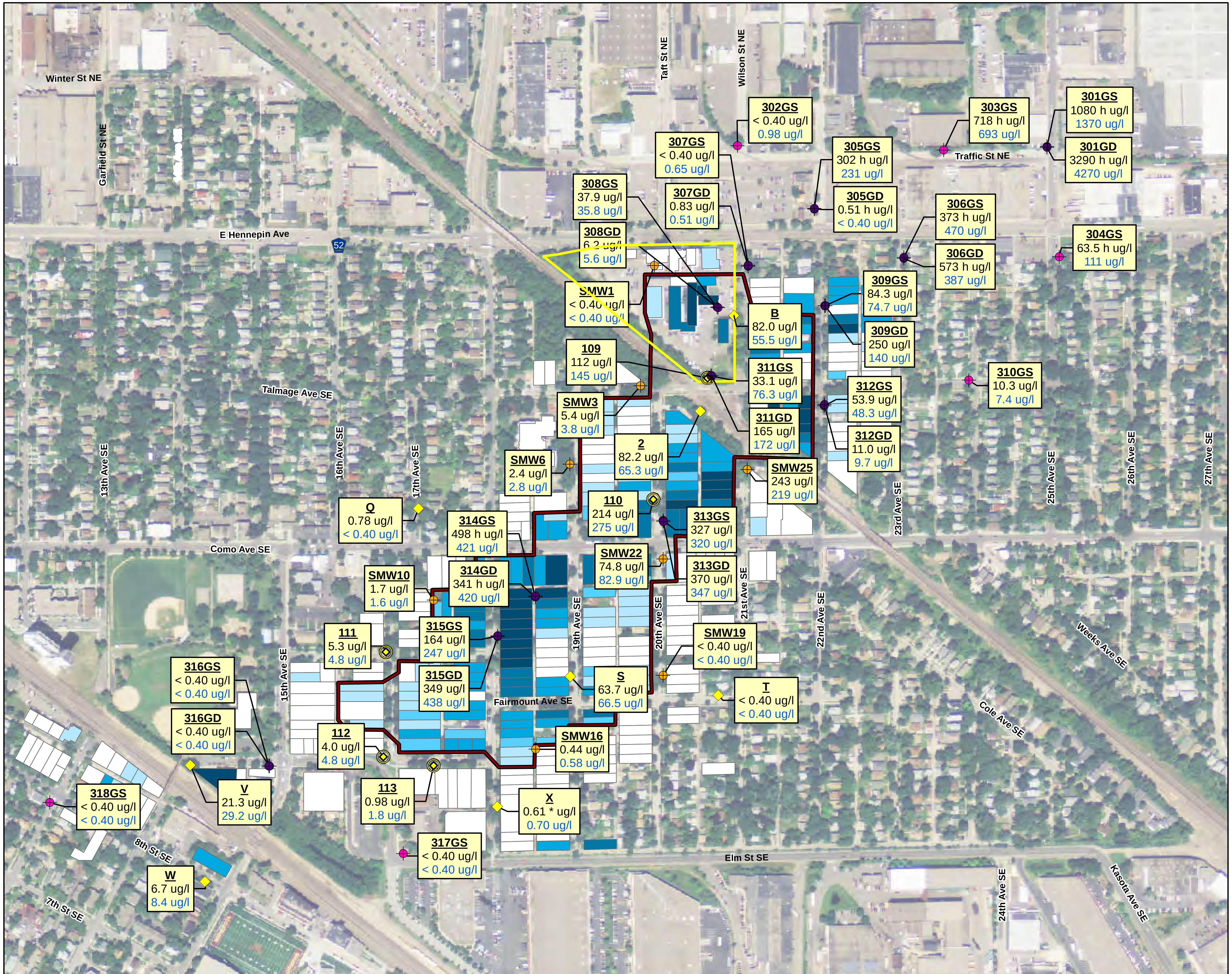
0 400 800
Feet

BARR

Figure A-15

SOIL GAS SAMPLING TCE RESULTS
East Hennepin Avenue Site
Minneapolis, Minnesota

From: Barr (2015h), Fig. 12



2010 East Hennepin Ave

Soil Gas Monitoring Area

VI Pathway Investigation Locations

- Glacial Drift Monitoring Well
- Glacial Drift Nested Monitoring Well
- Sentinel Monitoring Well

Previous Investigation Locations

- Glacial Drift Monitoring Well
- Glacial Drift Pump-Out Well

Sub-slab TCE Vapor Concentrations

- < 20 ug/m³
- 20 - 60 ug/m³
- 60 - 100 ug/m³
- 100 - 500 ug/m³
- 500 - 2000 ug/m³
- > 2000 ug/m³

Maximum sub-slab TCE vapor concentration at each building shown.

Sample ID
TCE in groundwater, December 2014
TCE in groundwater, March 2015

Footnotes:
* Estimated value, QA/QC criteria not met.
h EPA recommended sample preservation, extraction or analysis holding time was exceeded.

N

0 400 800
Feet

BARR

Figure A-16

GROUNDWATER SAMPLING TCE RESULTS - PERMANENT WELLS
East Hennepin Avenue Site
Minneapolis, Minnesota

From: Barr (2015h), Fig. 10

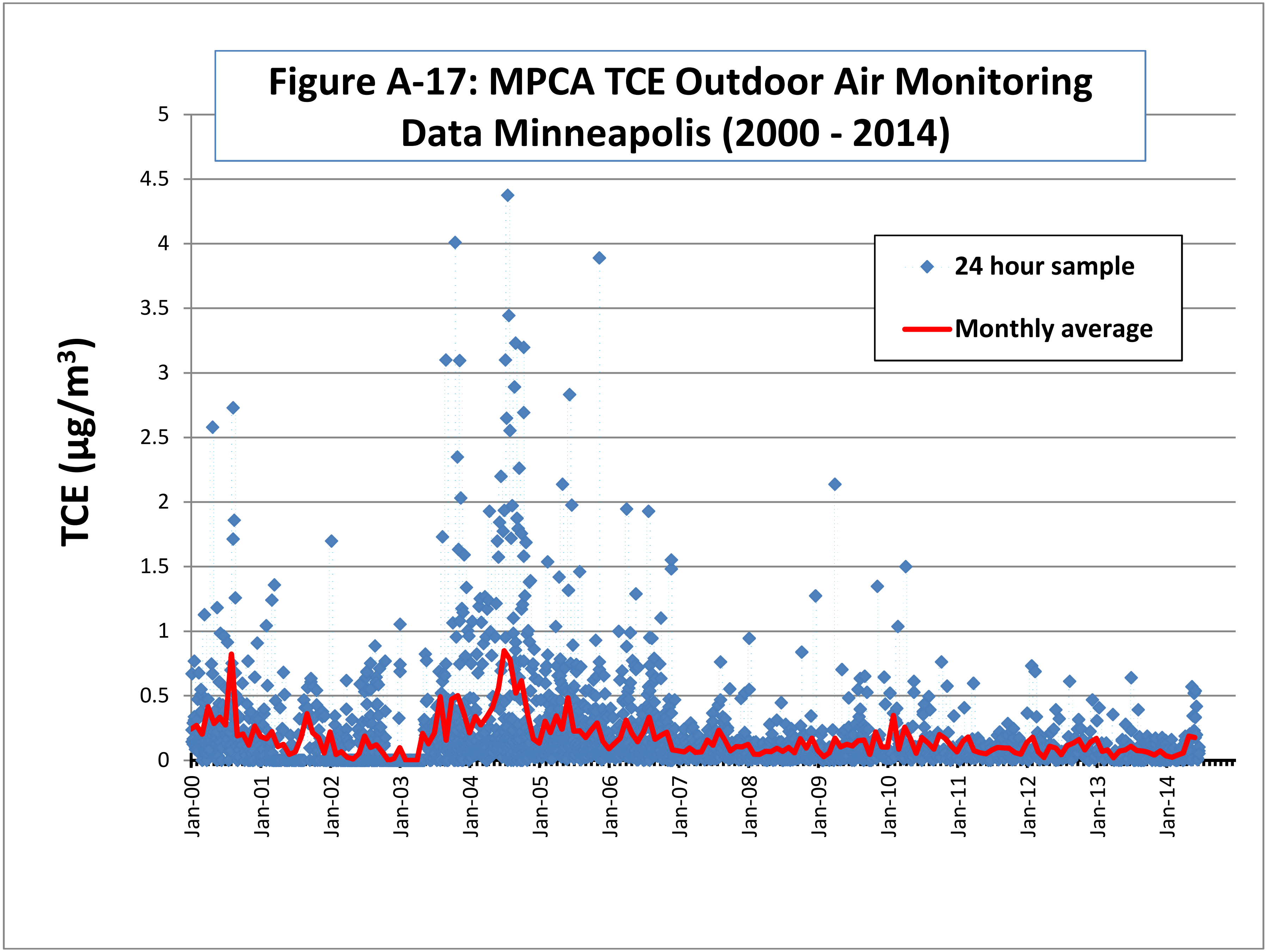


Figure A-17: MPCA TCE Outdoor Air Monitoring Data Minneapolis (2000 - 2014)
24 hour sample
Monthly average
TCE (µg/m3)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14

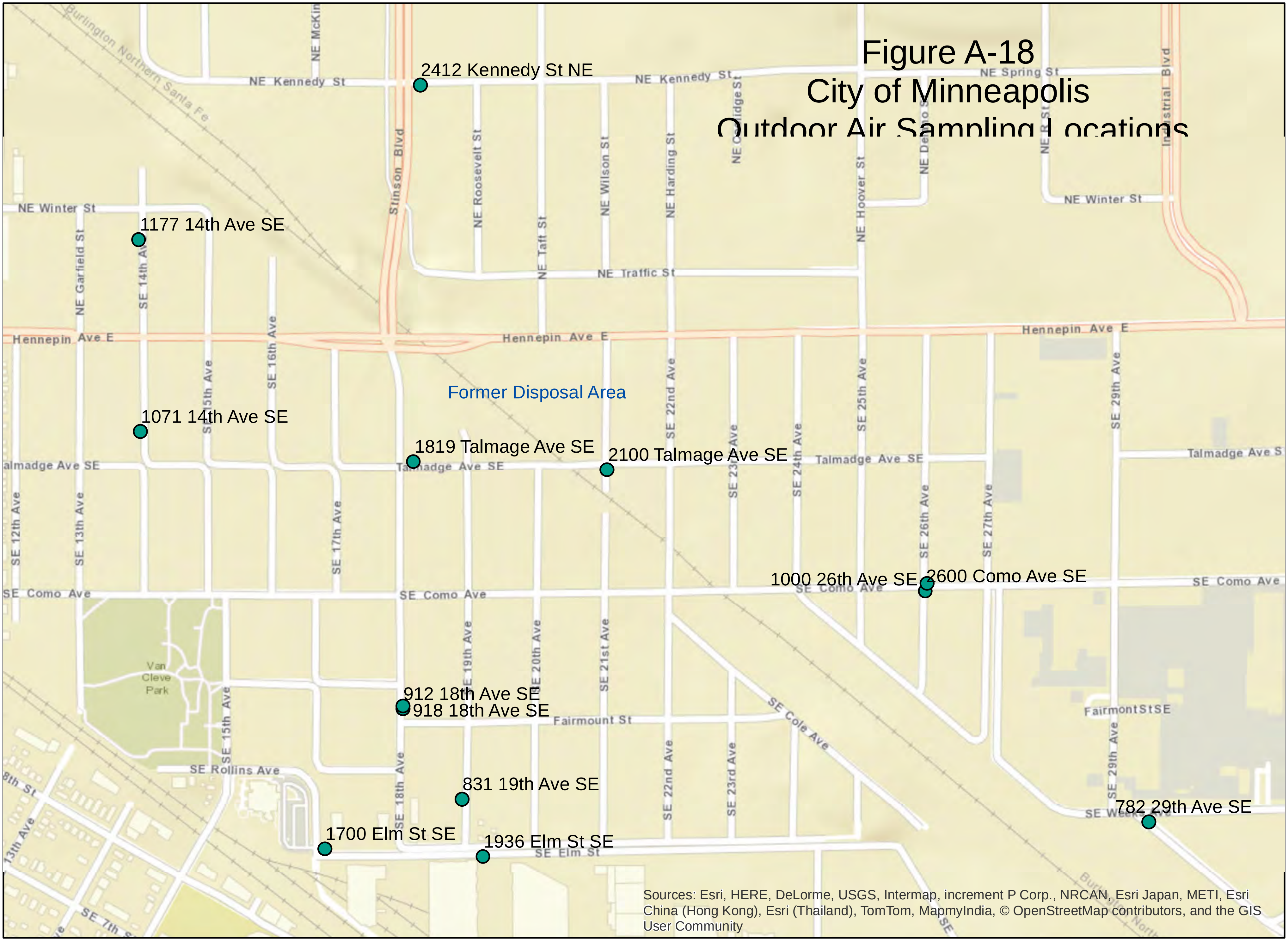


Figure A-18
City of Minneapolis
Outdoor Air Sampling Locations

Appendix B, Table B-1: Disposal Site Soil Data, 1981 (mg/kg)

Soil sample number	1	2						3		4	
Soil sample depth (feet)	14.5-16	0-1.5	4.5-6	9.5-11	14.5-16	19.5-21	24.5-26	14.5-16	19.5-21	14.5-16	19.5-21
1,1 dichloroethane	<	0.006	0.02	0.0089	0.09	0.2	0.2	0.01	0.06	<	<
trichloromethane	<	0.007	0.005	0.01	0.01	0.01	0.01	<	<	<	<
cyclopentane	<	<	<	0.06	2	1	1	<	1	0.1	0.1
chloroform	<	1	6	7	2	275	275	2	215	2	2
1,2 dichloroethane	<	0.003	0.02	0.03	3	25	25	0.6	35	3	5
1,1,1-TCA	<	0.1	0.2	3	1	731	731	0.7	777	1	3
carbon tetrachloride	<	<	<	0.5	6.3	19	19	2.5	21	0.2	0.07
cyclohexane	<	0.003	0.002	2.1	0.2	20	20	0.7	20	0.6	0.01
methylcyclopentane	<	0.004	0.001	0.07	0.001	2.5	2.5	<	3.5	0.003	0.001
TCE	<	0.01	0.07	5.1	2.5	81	82	0.6	111	2.5	4.5
benzene	<	0.02	0.01	26	46	97	97	37	89	9.4	14
hexane	<	<	<	5.3	0.6	13	13	0.3	12	1.9	1.3
1,3 dimethylcyclopentane	<	<	<	4.2	5.7	6.8	6.9	0.2	14	1.7	4.6
1,1,2,2 tetrachloroethane	<	<	0.04	3.1	9.8	76	76	3	62	29	60
toluene	<	0.05	0.01	4.1	87	91	91	79	89	90	17
1,2 dimethylcyclohexane	<	<	<	3.5	4.7	5.7	5.7	0.3	9.6	2.2	1.2
1,1,3 trimethylcyclohexane	<	<	<	64	35	37	37	0.2	29	2.8	8
ethyl benzene	<	<	<	4.9	2.9	33	33	1.2	68	7.7	3.9
chlorobenzene	<	<	<	4.8	2	44	44	0.8	34	1.4	7.2
xylenes	<	<	<	20	35	87	87	18	95	16	58
nitrobenzene	<	<	<	13	17	79	79	7.4	71	19	5
methyl ethyl benzene	<	<	<	1.3	1.5	25	25	0.7	58	17	22
naptha	<	<	<	25	31	51	51	0.5	35	2.5	5.1

Source: Soil Exploration Company (1981) Study of Subsurface Contamination, Henkel Corporation, 2010 East Hennepin Avenue, Minneapolis, Minnesota #120-7478. Samples collected between June 2-19, 1981.

< indicates the compound was not detected

Table B-1 Continued →

Appendix B, Table B-1: Disposal Site Soil Data, 1981 (mg/kg)

Soil sample number	5		6	7	8	9	10		11
Soil sample depth (feet)	14.5-16	19.5-21	14.5-16	14.5-16	14.5-16	14.5-16	14.5-16	19-21	14.5-16
1,1 dichloroethane	<	<	<	<	<	<	<	<	<
trichloromethane	<	<	<	0.09	<	<	<	<	<
cyclopentane	<	<	<	<	<	<	<	0.01	<
chloroform	<	<	<	<	<	<	<	0.1	0.07
1,2 dichloroethane	<	<	<	<	<	<	<	0.01	<
1,1,1-TCA	2	<	<	<	<	<	<	0.08	0.1
carbon tetrachloride	<	<	<	<	<	<	<	0.2	<
cyclohexane	<	<	<	<	<	<	<	0.01	<
methylcyclopentane	<	<	<	<	<	<	<	<	<
TCE	<	<	<	<	<	<	<	0.2	<
benzene	<	<	<	<	<	<	<	0.4	0.2
hexane	<	<	<	<	<	<	<	0.03	<
1,3 dimethylcyclopentane	<	<	<	<	<	<	<	0.07	<
1,1,2,2 tetrachloroethane	<	<	<	<	<	<	<	0.1	<
toluene	<	<	<	<	<	<	<	0.8	0.2
1,2 dimethylcyclohexane	<	<	<	<	<	<	<	0.01	<
1,1,3 trimethylcyclohexane	<	<	<	<	<	<	<	0.01	<
ethyl benzene	<	<	<	<	<	<	<	0.0095	<
chlorobenzene	<	<	<	<	<	<	<	0.01	<
xylenes	<	<	<	<	<	<	<	0.2	0.5
nitrobenzene	<	<	<	<	<	<	<	0.0055	<
methyl ethyl benzene	<	<	<	<	<	<	<	0.0075	<
naptha	<	<	<	<	<	<	<	0.001	<

Source: Soil Exploration Company (1981) Study of Subsurface Contamination, Henkel Corporation 2010 East Hennepin Avenue, Minneapolis, Minnesota #120-7478. Samples collected June 2-5, 1981.

< indicates the compound was not detected

Appendix B, Table B-2: Disposal Site Soil Data, 1983 (mg/kg)

March 1983

Soil sample number/date	101 - 3/25/83						102 - 3/28/83						106 -3/28/83
Soil sample depth (feet)	15-17	20-22	25-27	30-32	35-37	42-44	15-17	20-22	25-27	30-32	35-37	40-42	20-22
benzene	<	<	<	<	<	<	<	<	<	<	<	<	39
chloroform	2	<	<	<	<	<	<	<	<	<	<	<	380
tetrachloroethylene	<	<	<	<	<	<	<	<	<	<	<	<	20
toluene	<	<	<	<	<	<	<	<	<	<	<	<	100
1,1,1-trichloroethane	<	<	<	<	<	<	<	<	<	<	<	<	<
TCE	<	<	<	<	<	<	<	<	<	<	<	<	260
xylenes	4	<	<	1	<	<	<	<	<	<	<	<	39

Source: Barr Engineering Company (1983) Site Characterization Study and Remedial Action Plan, General Mills Solvent Disposal Site, 2010 East Hennepin Avenue, Minneapolis, Minnesota. June 1983.

< indicates the compound was not detected

September 1983

Soil sample number/date	1 - 9/13/83			2 - 9/13/83			3 - 9/13/83		
Soil sample depth (feet)	14-16	20-22	26-28	14-16	20-22	26-28	14-16	20-22	26-28
benzene	2.4	<	<	<	<	<	<	<	<
chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA
tetrachloroethylene	<	<	<	1.4	<	<	<	<	<
toluene	97	<	<	46	94	<	<	<	<
TCE	1.4	<	<	1.5	<	<	<	<	<
xylenes	24	<	<	157	66	<	<	<	<

Source: O.H. Materials Co. (1984) Project 1469 Summary Report of Analytical Services, Soil Leachability Study, General Mills Solvent Site. Memo to Barr Engineering on February 8, 1984.

< indicates the compound was not detected

Appendix B, Table B-3: Disposal Site Soil Data, 2001 (mg/kg)

Shallow soil (0.5-4 feet)

Soil sample number	1		2		3		4		5		6		7		8		9	
Soil sample depth (feet)	0.5-1	3-4	0.5-1	3-4	0.5-1	3-4	0.5-1	3-4	0.5-1	3-4	0.5-1	3-4	0.5-1	3-4	0.5-1	3-4	0.5-1	3-4
acetone	<	<	<	<	NS	1.5	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
benzene	<	<	<	<	NS	<	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
bromomethane	<	<	<	<	NS	<	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
chlorobenzene	<	<	<	<	NS	<	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
chloroform	<	*0.2*	<	0.08	NS	*0.4*	<	<	NS	NS	*0.2*	*0.4*	NS	NS	0.1	<	NS	NS
1,1-dichloroethane	<	<	<	<	NS	<	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
1,2-dichloroethane	<	<	<	<	NS	<	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
cis-1,2-dichloroethylene	<	<	<	<	NS	<	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
1,2-dichloropropane	<	<	<	<	NS	<	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
ethyl benzene	<	<	<	<	NS	0.2	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
methyl isobutyl ketone	<	<	<	<	NS	<	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
1,1,2,2,-tetrachloroethane	<	<	<	<	NS	<	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
PCE	<	*0.1*	<	<	NS	*0.2*	<	<	NS	NS	<	*0.2*	NS	NS	<	<	NS	NS
toluene	<	<	<	<	NS	0.1	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
TCE	<	<	<	*0.3*	NS	*2*	<	<	NS	NS	<	<	NS	NS	<	<	NS	NS
xylenes	<	<	<	<	NS	0.4	<	<	NS	NS	<	0.3	NS	NS	<	<	NS	NS

Table B-3 Continued →

Appendix B, Table B-3: Disposal Site Soil Data, 2001 (mg/kg)

Deep soils (7-12 feet)

Soil sample number	1		2		3		4		5		6		7		8		9			
Soil sample depth (feet)	7-8	11-12	7-8	11-12	7-8	11-12	7-8	11-12	7-8	11-12	7-8	11-12	7-8	11-12	7-8	11-12	7-8	11-12	**SRV**	**SLV**
acetone	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	**1000**	*8.4*
benzene	<	<	*3.3*	*0.1*	***82***	***160***	*0.9*	*1.4*	<	*1.1*	*3.8*	***52***	<	*2.9*	*5.3*	*0.1*	*0.4*	*0.2*	**10**	*0.017*
bromomethane	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	*0.5*	<	**2**	*0.036*
chlorobenzene	<	<	<	<	<	<	<	<	<	<	0.2	<	<	<	<	<	<	<	**32**	*1.2*
chloroform	*0.3*	<	<	<	***110***	***180***	<	<	<	<	<	***6.2***	*0.6*	<	<	<	0.1	<	**4**	*0.11*
1,1-dichloroethane	<	<	<	<	<	<	<	<	<	<	0.1	<	<	<	0.3	<	0.1	<	**55**	*0.41*
1,2-dichloroethane	<	<	<	<	***13***	***40***	<	<	<	<	<	<	<	<	*0.2*	<	*0.1*	<	**6**	*0.0038*
cis-1,2-dichloroethylene	<	<	<	<	*6*	*1.8*	<	<	<	0.1	0.1	*3.4*	<	*0.4*	<	<	<	<	**22**	*0.21*
1,2-dichloropropane	<	<	<	<	<	*1.6*	<	<	<	<	<	<	<	<	<	<	<	<	**6**	*0.024*
ethyl benzene	<	*57*	0.4	0.2	***300***	*160*	<	*3.6*	<	0.4	*2.3*	*17*	<	*2.1*	0.2	0.3	<	0.4	**200**	*1*
methyl isobutyl ketone	<	<	<	<	<	*140*	<	<	<	<	<	<	<	<	<	<	<	<	**9000**	*0.76*
1,1,2,2,-tetrachloroethane	<	<	<	<	***12***	***17***	<	<	<	<	<	<	<	<	<	<	<	<	**6.5**	*0.012*
PCE	*0.09*	*3.1*	<	<	*4.5*	*2.7*	<	<	<	<	*0.3*	<	*0.1*	<	*0.3*	<	<	<	**131**	*0.042*
toluene	<	*15*	0.6	0.2	*200*	*160*	<	3	<	0.3	*3.8*	*280*	<	1.4	0.5	<	0.9	<	**305**	*2.5*
TCE	<	<	<	<	*25*	*17*	<	<	<	<	<	*13*	*3.2*	*0.2*	*0.4*	<	*0.5*	<	**46**	*0.0023*
xylenes	<	***320***	0.6	0.7	***720***	***430***	<	14	<	0.8	*16*	*95*	<	5.4	*6.1*	<	<	0.8	**130**	*5.4*

Source: Barr, 2001

< indicates the compound was not detected

NS indicates the compound was not measured

SRV = MPCA Industrial Soil Reference Value, health-based screening values for direct contact with soil in industrial areas (current as of May 2015)

SLV = MPCA Soil Leaching Value, screening values for evaluating the soil-to-groundwater pathway (current as of May 2015)

bold exceeds SRVs, *italize* exceeds SLVs

Additionals VOCs were analyzed using EPA method 8260B; the 16 listed above were detected

Appendix B, Table B-4: Disposal Site Soil Data, 2014 (mg/kg)

Soil sample number	54			55		56				57	
Soil sample depth (feet)	13.5	41	52	10.5	42	9.5	39	36	52.5	10	41.5
1,2,4-Trimethylbenzene	5*	<	<	0.4	<	<	<	<	<	<	<
1,3,5-Trimethylbenzene	1.4	<	<	0.1	<	<	<	<	<	<	<
benzene	0.2	<	<	0.5	<	<	<	<	<	0.9	<
butyl benzene	1.4*	<	<	0.08	<	<	<	<	<	<	<
butylbenzene, sec	0.6	<	<	<	<	<	<	<	<	<	<
cumene (isopropyl benzene)	0.5	<	<	<	<	<	<	<	<	<	<
cymeme p- (Toluene isopropyl p-)	1.9*	<	<	0.5	<	<	<	<	<	<	<
ethyl benzene	7.1*	<	<	<	<	<	<	<	<	<	<
naphthalene	0.7	<	<	<	<	<	<	<	<	<	<
propylbenzene	0.9	<	<	0.07	<	<	<	<	<	<	<
TCE	<	.06*	<	<	0.06	<	0.1	<	0.8	<	0.07
Xylene m & P	28	<	<	<	<	<	<	<	<	<	<
xylene, total	40	<	<	2.2	<	<	<	<	<	<	<

Source: Barr, 2014a

< indicates the compound was not detected

* estimated value, QA/QC criteria not met

Boring 54 was placed as close as possible to the location of the former disposal area based on the presence of buried utilities. Borings 55, 56, and 57 were then placed 30 to 40 feet west, east, and south of the disposal area, respectively.

68 VOCs were analyzed using EPA method 8260; the 13 listed above were detected

Table C-1: 1981 Glacial Drift Aquifer Groundwater Data, Piezometer A

Contaminant	µg/L
1,1 dichloroethane	0.9
trichloromethane	1.6
cyclopentane	<
chloroform	70
1,2 dichloroethane	8.2
1,1,1-TCA	26
carbon tetrachloride	<
cyclohexane	1.4
methylcyclopentane	<
TCE	2400
benzene	200
hexane	3.9
1,3 dimethylcyclopentane	<
1,1,2,2 tetrachloroethane	36
toluene	180
1,2 dimethylcyclohexane	<
1,1,3 trimethylcyclohexane	<
ethyl benzene	<
chlorobenzene	<
xylenes	52
nitrobenzene	<
methyl ethyl benzene	<
naptha	<

Source: Soil Exploration Company (1981) Study of Subsurface Contamination, Henkel Corporation, 2010 East Hennepin Avenue, Minneapolis, Minnesota #120-7478. Samples collected between June 2-19, 1981.

µg/L = micrograms per liter

< indicates the compound was not detected at or above the lower limit of detection, which is 0.1 µg/L

Sample collected from screened interval, approximately 17 - 27 ft. below grade

Table C-2: List of Wells

Well	Geologic Unit	Well Type	Status	Total Depth Drilled (ft bgs)	Depth: Top of Screen (ft bgs)	Depth: Bottom of Screen (ft bgs)	Unique Well No.	Sealing Record No.	Date Installed
A	Glacial Drift	Piezometer	Abandoned	27	17	27	242970		3/18/1982
B	Glacial Drift	Monitoring Well	**Active**	26.6	16.6	26.6			10/22/1981
C	Glacial Drift	Monitoring Well	Abandoned	26.5	16.5	26.5	242971		10/22/1981
D	Glacial Drift	Monitoring Well	Abandoned	21	11	21			10/21/1981
E	Glacial Drift	Monitoring Well	Abandoned	26.5	16.5	26.5	242972		10/26/1981
F	Glacial Drift	Monitoring Well	Abandoned	33	23	33			10/27/1981
G	Glacial Drift	Monitoring Well	Abandoned (2003)	24	13.5	23.5		217958	10/27/1981
H	Glacial Drift	Monitoring Well	Abandoned	25	15	25			10/27/1981
J	Glacial Drift	Monitoring Well	Abandoned	25.5	22.1	24.1	242973		3/19/1982
K	Glacial Drift	Monitoring Well	Abandoned	23.5	20	22	242974		2/4/1982
L	Glacial Drift	Monitoring Well	Abandoned	24.5	20.2	22.2	242975		2/4/1982
M	Glacial Drift	Monitoring Well	Abandoned	26	22.4	24.4	242976		2/1/1982
N	Glacial Drift	Monitoring Well	Lost	26	22.2	24.2			2/2/1982
P	Glacial Drift	Monitoring Well	Abandoned	25	21.5	23.5	242977		3/8/1982
Q	Glacial Drift	Monitoring Well	**Active**	36.5	13.9	23.9			2/6/1984
R	Glacial Drift	Monitoring Well	Abandoned (2004)	31	10	20		217954	2/9/1984
S	Glacial Drift	Monitoring Well	**Active**	31.2	14.5	24.5			2/8/1984
T	Glacial Drift	Monitoring Well	Abandoned(1984)	30.1	7.2	17.2			2/10/1984
T2	Glacial Drift	Monitoring Well	**Active**	26.6	12	22			2/15/1984
U	Glacial Drift	Monitoring Well	Abandoned (2004)	36	11.5	21.5		217952	2/7/1984
V	Glacial Drift	Monitoring Well	**Active**	35.7	15.6	25.6			3/8/1984
W	Glacial Drift	Monitoring Well	**Active**	20.5	7.1	17.1			3/7/1984
X	Glacial Drift	Monitoring Well	**Active**	27	9	19			3/8/1984
Y	Glacial Drift	Monitoring Well	Abandoned	31.5	12.3	22.3	242978		3/12/1984
Z	Glacial Drift	Monitoring Well	Abandoned	36.5	18.9	28.9	242979		3/9/1984
1	Glacial Drift	Monitoring Well	Abandoned (2003)	28	18	28	196721	217955	12/14/1981
2	Glacial Drift	Monitoring Well	**Active**	27	16	26	196722		12/15/1981
3	Glacial Drift	Monitoring Well	Abandoned (2004)	23.5	13.5	23.5	180917	202998	3/24/1982

Table C-2: List of Wells

Well	Geologic Unit	Well Type	Status	Total Depth Drilled (ft bgs)	Depth: Top of Screen (ft bgs)	Depth: Bottom of Screen (ft bgs)	Unique Well No.	Sealing Record No.	Date Installed
4	Glacial Drift	Monitoring Well	Abandoned (2004)	23	13	23	180916	202999	3/25/1982
5	Glacial Drift	Monitoring Well	Abandoned (2004)	24	14	24	180918	203000	3/26/1982
106	Glacial Drift	Monitoring Well	Abandoned (2003)	26	16	26		217956	4/14/1983
107	Glacial Drift	Monitoring Well	Abandoned (2003)	40	34	39	122237	217957	4/11/1983
109	Glacial Drift	Pump-out well	**Active**	42	18	42	191913		6/8/1984
110	Glacial Drift	Pump-out well	**Active**	37	17	37			
111	Glacial Drift	Pump-out well	**Active**	46	20	40			9/14/1984
112	Glacial Drift	Pump-out well	**Active**	41	16	36			9/13/1984
113	Glacial Drift	Pump-out well	**Active**	46.5	20	40			9/14/1984
108	Carimona	Monitoring Well	Abandoned (2003)	59.5	56.6	59.5	122205	217961	11/3/1983
8	Carimona	Monitoring Well	Abandoned	61.6	58	61.6	122236		3/24/1983
9	Carimona	Monitoring Well	Abandoned	61	57	61	122206		10/17/1983
10	Carimona	Monitoring Well	Abandoned	62	57	62	122202		10/24/1983
11	Carimona	Monitoring Well	Abandoned	52	48.2	52	122203		10/27/1983
12	Carimona	Monitoring Well	Abandoned	60	56.5	59.5	122204		11/11/1983
13	Carimona	Monitoring Well	Abandoned (2004)	50	47	50	191905	217960	3/2/1984
RR	Carimona	Monitoring Well	Abandoned	53	50.4	52.4			3/18/1982
SS	Carimona	Monitoring Well	Abandoned	59.9	57.9	59.9			3/18/1982
UU	Carimona	Monitoring Well	Abandoned	61.8	59.8	61.8			10/28/1982
WW	Carimona	Monitoring Well	Abandoned	59.3	57.3	59.3			11/9/1982
II	Carimona/Magnolia	Monitoring Well	Abandoned	64.2	54.2	64.2	242980		11/21/1981
14	Magnolia	Monitoring Well	**Active**	66	60.5	65.5	616615		5/21/1998
BB	Magnolia	Monitoring Well	Abandoned	69.8	64.8	69.8			10/26/1981
LL	Magnolia	Monitoring Well	Abandoned	56.3	54.3	56.3	242981		2/8/1982
OO	Magnolia	Monitoring Well	Abandoned	60.5	58.5	60.5			3/17/1982

Table C-2: List of Wells

Well	Geologic Unit	Well Type	Status	Total Depth Drilled (ft bgs)	Depth: Top of Screen (ft bgs)	Depth: Bottom of Screen (ft bgs)	Unique Well No.	Sealing Record No.	Date Installed
PP	Magnolia	Monitoring Well	Abandoned	55	53	55	242982		3/10/1982
QQ	Magnolia	Monitoring Well	**Active**	59.3	57.3	59.3			3/12/1982
TT	Magnolia	Monitoring Well	**Active**	68.9	66.9	68.9			10/4/1982
VV	Magnolia	Monitoring Well	**Active**	68.3	66.3	68.3			11/8/1982
ZZ	Magnolia	Monitoring Well	Abandoned (2004)	56.5	52	56	191906	217953	3/22/1984
MG1	Magnolia	Pump-out well	**Active**	72	62	72	463016		5/15/1991
MG2	Magnolia	Pump-out well	**Active**	72	60	72	463017		5/20/1991
GG	Magnolia/Hidden Falls	Monitoring Well	Abandoned (2003)	69	59	69		217959	11/19/1981
200	St. Peter	Monitoring Well	**Active**	200	120	200			4/26/1984
201	St. Peter	Monitoring Well	**Active**	142	116.3	136.3	191920		8/22/1984
202	St. Peter	Monitoring Well	**Active**	114	84	104	191937		2/10/1985
203	St. Peter	Monitoring Well	**Active**	116	96	116	409573		2/6/1985
Henkel	Prairie du Chien/Jordan	Former Industrial Supply	**Active**	404	215	404	200815		4/30/1905

Sources: EPA (2014) Five Year Review and Barr 2013 (2012 annual report)

Table C-3: Historic TCE Groundwater Data - Glacial Drift Wells
(concentrations in ug/L)

Well	1	2	3	4	5	106	107	109	110	111	112	113	A	B	E	F
Well Status	AB	ACT	AB	AB	AB	AB	AB	ACT	ACT	ACT	ACT	ACT	AB	ACT	AB	AB
Sample Date																
6/1981	--	--	--	--	--	--	--	--	--	--	--	--	1500	--	--	--
4/1982	6.0	830	780	4.5	100	--	--	--	--	--	--	--	--	6.0	--	--
12/1982	--	--	--	--	--	--	--	--	--	--	--	--	--	1100	--	--
4/1983	--	--	--	--	--	7200 2400	1300	--	--	--	--	--	1460	--	--	--
12/1983	27	720	800	380	260	560	88	--	--	--	--	--	810	780	290	94
5/1984	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/1984	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/1984	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/1984	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/1984	--	--	--	--	--	--	--	23 1100 1000 960 1000 1100 1000 1000 900 960	--	--	--	--	--	--	--	--
4/1985	--	--	--	--	--	--	--	--	1100	--	--	--	--	--	--	--
5/1985	--	--	--	--	--	--	--	--	1300	--	--	--	--	--	--	--
6/1985	--	--	--	--	--	--	--	--	1500 1400	--	--	--	--	--	--	--
10/1985	1.4 1.5	--	1100	--	--	--	2.1 2.1	--	--	--	--	--	--	1200 740	--	--
11/1985	--	--	--	440	--	--	--	--	--	--	--	--	--	--	--	--
12/1985	1.5	--	770	440	--	--	11	--	--	--	--	--	--	1100	--	--
2/1986	1.4 s	--	760 680	200	--	--	260	--	--	--	--	--	--	1300	--	--
4/1986	3.1	--	1200	210	--	--	580	--	--	--	--	--	--	1000	--	--
6/1986	8.1	--	1300	180	--	--	300	--	--	--	--	--	--	1100	--	--
8/1986	9.3	--	890	280	--	--	770	--	--	--	--	--	--	1000	--	--
10/1986	0.9	--	720	200	--	--	--	--	--	--	--	--	--	--	--	--
11/1986	--	--	--	--	--	--	910	--	--	--	--	--	--	830	--	--
4/1987	2.7	--	740	120	--	--	--	--	--	--	--	--	--	500 800	--	--
7/1987	0.4	--	770	--	--	--	--	--	--	--	--	--	--	--	--	--
10/1987	0.8	--	960	--	--	--	--	--	--	--	--	--	--	--	--	--
4/1988	< 0.5	--	440	55	--	--	--	--	--	--	--	--	--	330	--	--
7/1988	0.5	--	140	--	--	--	--	--	--	--	--	--	--	--	--	--
10/1988	< 0.5	--	98	--	--	--	--	--	--	--	--	--	--	--	--	--
4/1989	0.8	--	320	55	--	--	--	--	--	--	--	--	--	250	--	--
7/1989	0.6 s	--	340	--	--	--	--	--	--	--	--	--	--	--	--	--
10/1989	0.5	--	530	--	--	--	--	--	--	--	--	--	--	--	--	--
5/1990	--	--	520	77	--	--	--	--	--	--	--	--	--	--	--	--
7/1990	0.8	--	770	--	--	--	--	--	--	--	--	--	--	330	--	--
10/1990	< 0.5	--	310	--	--	--	--	--	--	--	--	--	--	--	--	--
4/1991	3.1	--	1500	--	--	--	--	--	--	--	--	--	--	340	--	--
9/1991	1.3	--	300	--	--	--	--	--	--	--	--	--	--	--	--	--
5/1992	2.2	--	400	--	--	--	--	--	--	--	--	--	--	510	--	--
11/1992	0.5	--	170	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-3: Historic TCE Groundwater Data - Glacial Drift Wells

(concentrations in ug/L)

Well	1	2	3	4	5	106	107	109	110	111	112	113	A	B	E	F
Well Status	AB	ACT	AB	AB	AB	AB	AB	ACT	ACT	ACT	ACT	ACT	AB	ACT	AB	AB
Sample Date																
5/1993	< 0.5	--	470	--	--	--	--	--	--	--	--	84	--	580	--	--
11/1993	< 0.5	--	740	--	--	--	--	--	--	--	--	--	--	--	--	--
8/1993	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/1993	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/1996	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/1997	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/1998	--	--	--	--	--	--	--	280	510	3.0	46	110	--	--	--	--
8/1998	--	--	--	--	--	--	--	260	590	1.8	99	160	--	--	--	--
10/1998	--	--	--	--	--	--	--	270	630	0.7	120	150	--	--	--	--
1/1999	--	--	--	--	--	--	--	250	420	1.2	97	130	--	--	--	--
6/1999	--	--	--	--	--	--	--	170	390	< 1.0	74	130	--	--	--	--
12/1999	--	--	--	--	--	--	--	--	--	--	27	85	--	--	--	--
3/2000	--	--	--	--	--	--	--	210	380	< 1.0	--	60	--	--	--	--
11/2000	--	--	--	--	--	--	--	160	340	3.3	72	160	--	--	--	--
2/2001	--	--	--	--	--	--	--	140	270	2.7	54	150	--	--	--	--
8/2001	--	--	--	--	--	--	--	140	--	1.0	--	140	--	--	--	--
11/2001	--	--	--	--	--	--	--	160	290	1.7	32	110	--	--	--	--
12/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/2002	--	--	--	--	--	--	--	150	340	2.2	36	110	--	--	--	--
11/2002	--	--	--	--	--	--	--	130	270	< 1.0	41	99	--	--	--	--
12/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/2003	--	--	--	--	--	--	--	150	340	2.9	52	110	--	--	--	--
8/2003	--	--	--	--	--	--	--	110	300	1.7	40	90	--	--	--	--
10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/2004	--	--	--	--	--	--	--	130	320	3.0	44	97	--	--	--	--
9/2004	--	--	--	--	--	--	--	110	220	2.0	36	120	--	--	--	--
12/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/2005	--	--	--	--	--	--	--	110	250	2.2	40	100	--	--	--	--
10/2005	--	--	--	--	--	--	--	87	92	1.3 b	31	89	--	--	--	--
2/2006	--	--	--	--	--	--	--	91	230	1.9	--	91	--	--	--	--
3/2006	--	--	--	--	--	--	--	--	--	--	41	--	--	--	--	--
8/2006	--	--	--	--	--	--	--	90	280	< 1.0	35	85	--	--	--	--
10/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/2006	--	--	--	--	--	--	--	110	--	--	--	--	--	--	--	--
2/2007	--	--	--	--	--	--	--	130	250	1.3	37	89	--	--	--	--
8/2007	--	--	--	--	--	--	--	110	270	< 1.0	42	94	--	--	--	--
9/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/2007	--	--	--	--	--	--	--	110	230	1.3	42	94	--	--	--	--
2/2008	--	--	--	--	--	--	--	110	240	< 1.0	31	90	--	--	--	--
8/2008	--	--	--	--	--	--	--	99	190 *	< 1.0	21	84	--	--	--	--
10/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/2008	--	--	--	--	--	--	--	97	260	< 1.0	33	310	--	--	--	--
2/2009	--	--	--	--	--	--	--	110	260	1.8	29	86	--	--	--	--
8/2009	--	--	--	--	--	--	--	84	110	2.8	26	82	--	--	--	--
11/2009	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/2009	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/2010	--	--	--	--	--	--	--	110	210	1.8	38	110	--	--	--	--
9/2010	--	--	--	--	--	--	--	120	100	< 1.0	--	78	--	--	--	--
12/2010	--	--	--	--	--	--	--	110	--	< 1.0	42	12	--	--	--	--
1/2011	--	--	--	--	--	--	--	--	99	--	--	--	--	--	--	--
3/2011	--	--	--	--	--	--	--	120	73	< 1.0	29	4.5	--	--	--	--
6/2011	--	--	--	--	--	--	--	160	110	< 1.0	14	4.8	--	--	--	--
1/2012	--	--	--	--	--	--	--	--	--	--	--	--	--	110	--	--
12/2012	--	--	--	--	--	--	--	160	--	--	--	4.5	--	--	--	--
1/2013	--	--	--	--	--	--	--	--	230	< 1.0	5.4	--	--	--	--	--

Table C-3: Historic TCE Groundwater Data - Glacial Drift Wells

(concentrations in ug/L)

Well	H	J	K	N	P	Q	R	S	T	U	V	W	X	Y	Z
Well Status	AB	AB	AB	Lost	AB	ACT	AB	ACT	ACT	AB	ACT	ACT	ACT	AB	AB
Sample Date															
6/1981	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/1982	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/1982	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/1983	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/1983	480	1300	120	1100	0.4	--	--	--	--	--	--	--	--	--	--
5/1984	--	1400	--	1100	--	--	--	--	--	--	--	--	--	--	--
1/1984	--	--	--	1100	--	--	--	--	--	--	--	--	--	--	--
2/1984	--	--	--	--	--	0.8	670	770	0.1	<1.3	--	--	--	--	--
3/1984	--	--	--	--	--	--	--	--	--	--	78	7.5	2.2	< 0.2	< 0.2
6/1984	--	--	--	--	--	--	1100 1100 960 940 980 1000 1000 1100	--	--	--	--	--	--	--	--
4/1985	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/1985	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/1985	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/1985	680	1200	--	--	--	20	1100	740	< 0.3	2.6	220	8.1	2.1	< 0.3	< 0.3
11/1985	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/1985	510	930	--	--	--	14	820	750	< 0.8	3.9	140	32	5.0	< 0.8	< 0.8
2/1986	250 320	370	--	--	--	11	31	650	< 0.5	2.9	180	14	0.66 0.9 s	0.5 s	< 0.5
4/1986	200	220	--	--	--	13	--	1100	< 0.2	3.2	170	18	0.9	< 0.2	< 0.2
6/1986	260	160	--	--	--	4.7	160	930	< 0.2	1.6	97	10	0.9	< 0.2	< 0.2
8/1986	480	100	--	--	--	5.6	--	880	< 0.2	16	130	18	0.7	< 0.2	< 0.2
10/1986	220	--	--	--	--	3.2	--	620	< 0.2	1.4	92	6.2	0.5	< 0.2	< 0.2
11/1986	--	420	--	--	--	--	--	--	--	--	--	--	--	--	--
4/1987	--	--	--	--	--	2.6	--	1100 650	< 0.2	2.7	160	32.0 24	--	--	--
7/1987	--	--	--	--	--	--	--	740	--	--	180	42	--	--	--
10/1987	--	--	--	--	--	--	--	1050	--	--	140	56	--	--	--
4/1988	--	--	--	--	--	0.86	--	460	< 0.5	--	160	43	--	--	--
7/1988	--	--	--	--	--	--	--	160	--	--	33	8.1	--	--	--
10/1988	--	--	--	--	--	--	--	110	--	--	200 37	75 26	--	--	--
4/1989	--	--	--	--	--	1.1	--	860	< 0.5	--	130	57	--	--	--
7/1989	--	--	--	--	--	--	--	620	--	--	120	22	--	--	--
10/1989	--	--	--	--	--	--	--	630	--	--	120	25	--	--	--
5/1990	--	--	--	--	--	0.7	--	710	< 0.5	--	110	31	--	--	--
7/1990	--	--	--	--	--	--	--	200	--	--	120	< 0.5	--	--	--
10/1990	--	--	--	--	--	--	--	770	--	--	110	11	--	--	--
4/1991	--	--	--	--	--	0.7	--	870	< 0.5	2.0	130	40	--	--	--
9/1991	--	--	--	--	--	--	--	480	--	--	73	20	--	--	--
5/1992	--	--	--	--	--	< 1.0	--	510	< 1.0	< 1.0	63	5.9	< 1.0	--	--
11/1992	--	--	--	--	--	--	--	770	--	--	83	1.3	--	--	--

Table C-3: Historic TCE Groundwater Data - Glacial Drift Wells

(concentrations in ug/L)

Well	H	J	K	N	P	Q	R	S	T	U	V	W	X	Y	Z
Well Status	AB	AB	AB	Lost	AB	ACT	AB	ACT	ACT	AB	ACT	ACT	ACT	AB	AB
Sample Date															
5/1993	--	--	--	--	--	< 0.5	--	**390**	< 0.5	0.7	68	2.9	< 0.5	--	--
11/1993	--	--	--	--	--	--	--	**400**	--	--	100	2.9	--	--	--
8/1993	--	--	--	--	--	< 0.5	--	--	< 0.5	--	69	8.4	< 0.5	--	--
9/1993	--	--	--	--	--	< 0.5	--	--	< 0.5	--	94	0.80	< 0.5	--	--
8/1996	--	--	--	--	--	< 0.5	--	--	< 0.5	--	100	1.4	< 0.5	--	--
8/1997	--	--	--	--	--	< 0.5	--	--	< 0.5	--	19	1.5	< 0.5	--	--
4/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/1998	--	--	--	--	--	< 0.5	--	--	< 0.5	--	140	15	< 0.5	--	--
1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/1999	--	--	--	--	--	< 1.0	--	--	< 1.0	--	83	15	< 1.0	--	--
3/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/2000	--	--	--	--	--	< 1.0	--	--	< 1.0	--	97	17	< 1.0	--	--
2/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/2001	--	--	--	--	--	1.6	--	--	< 1.0	--	91	14	< 1.0	--	--
2/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/2002	--	--	--	--	--	< 1.0	--	--	< 1.0	--	50	17	< 1.0	--	--
3/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/2003	--	--	--	--	--	< 1.0	--	--	< 1.0	--	14	14	< 1.0	--	--
2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/2004	--	--	--	--	--	< 1.0	--	--	< 1.0	--	1.5	11	< 1.0	--	--
3/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/2005	--	--	--	--	--	< 1.0	--	--	< 1.0	--	1.2	10	< 1.0	--	--
2/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/2006	--	--	--	--	--	< 1.0	--	--	--	--	1.6	--	--	--	--
11/2006	--	--	--	--	--	--	--	--	< 1.0	--	--	8.8	< 1.0	--	--
2/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/2007	--	--	--	--	--	< 1.0	--	110	< 1.0	--	2.2	7.1	< 1.0	--	--
10/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/2008	--	--	--	--	--	< 1.0	--	82	< 1.0	--	1.5	4.5	< 1.0	--	--
11/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/2009	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/2009	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/2009	--	--	--	--	--	1.1	--	--	--	--	--	--	--	--	--
12/2009	--	--	--	--	--	--	--	110	< 1.0	--	1.5	5.8	1.1	--	--
2/2010	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/2010	--	--	--	--	--	1.2	--	--	< 1.0	--	56	3.4	< 1.0	--	--
12/2010	--	--	--	--	--	--	--	--	--	--	55	4.2	< 1.0	--	--
1/2011	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/2011	--	--	--	--	--	--	--	--	--	--	58	3.4	< 1.0	--	--
6/2011	--	--	--	--	--	--	--	--	--	--	58	5.2	< 1.0	--	--
1/2012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/2012	--	--	--	--	--	< 1.0	--	73	< 1.0	--	31	6.8	< 1.0	--	--
1/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Data sources: see Table C-13

[shaded] Exceeds Consent Order limit of 270 µg/L

Well Status: ACT = active, AB = abandoned

-- compound not analyzed

* Estimated value, QA/QC criteria not met.

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

b - potential false positive based on blank data validation procedures

s - potential false positive value based on statistical analysis of blank sample data

Table C-4: Historic TCE Groundwater Data - Carimona Mbr. Wells (concentrations in ug/L)

Well	8	9	10	11	12	13	108	BB	II	LL	PP	RR	SS	UU	WW
Well Status	ACT	ACT	ACT	ACT	ACT	AB	AB	ACT	AB	AB	ACT	ACT	ACT	ACT	ACT
Sample Date															
5/1982	--	--	--	--	--	--	--	--	--	140	--	46	--	--	--
6/1982	--	--	--	--	--	--	--	1600	910	--	16	--	--	--	--
12/1982	--	--	--	--	--	--	--	1600	880	1000	22	43	< 1.0	78	2100
4/1983	820	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1983	--	--	--	--	--	--	1100	--	--	--	--	--	--	--	--
12/1983	96	< 0.4	2.6	120	0.7	--	--	1400	380	720	--	33	< 0.4	81	1700
1/1984	--	--	--	--	--	--	1000 1100	--	--	--	--	--	--	--	--
3/1984	--	--	--	--	--	25	--	--	--	--	--	--	--	--	--
10/1985	2300	17	1500 830	2.7	--	1.9	--	1900 780	360	730 390	--	110	0.4 s	150	2300
11/1985	--	--	--	--	< 0.2	--	1500	--	--	--	--	--	--	--	--
12/1985	650	10	1100	520	< 0.8	21	820	1100	700	420	--	95	1.2	79	1200
2/1986	240	6.7	420	250	< 0.20 < 0.5	9.7	700	1300	680	730	--	77 88	< 0.5	71	740
4/1986	180	8.0	290	120	0.5	120	750	2200	480	690	--	170	0.4	81	540
6/1986	140	6.1	280	58	< 0.2	130	640	2100	400	490	--	85	0.3	37	290
8/1986	160	6.7	270	67	0.2	14	580	1800	230	430	--	100	0.3	45	220
10/1986	--	5.4	--	40	< 0.2	0.5	540	--	--	--	--	--	< 0.2	36	--
11/1986	110	--	220	--	--	--	--	1300	230	330	--	100	--	--	290
4/1987	86	5.1	120	160	< 0.2	140	300 450	1100	--	--	--	110	1.2	12	290
7/1987	--	0.6	150	25	< 0.2	--	580	--	--	--	--	--	--	--	--
10/1987	--	9.5	170	180	< 0.5	--	560	--	--	--	--	--	--	--	--
4/1988	160	4.5	56	79	< 0.5	< 0.5	200	530	--	--	--	220	< 0.5	23	320
7/1988	--	1.7	34	0.3	< 0.5	--	96	--	--	--	--	--	--	--	--
10/1988	--	10	58	0.8 0.7	1.0 s	--	87	--	--	--	--	--	--	--	--
4/1989	380	9.8	160	110	< 0.5	110	530	340	--	--	--	180	1.3	38	530
7/1989	--	9.9	99	3.6	2.1 s	--	340	--	--	--	--	--	--	--	--
10/1989	--	12	140	5.0	< 0.5	--	--	--	--	--	--	--	--	--	--
12/1989	--	--	--	--	--	--	490	--	--	--	--	--	--	--	--
5/1990	100	8.5	150	< 0.5	0.7	110	570	--	--	--	--	60	4.1	35	450
7/1990	--	43	180	16	< 0.5	--	400	530	--	--	--	--	--	--	--
10/1990	--	9.4	130	240	< 0.5	--	420	--	--	--	--	--	--	--	--
4/1991	80	7.3	106	8.7	< 0.5	< 0.5	710	1100	--	--	--	150	4.5	64	420
9/1991	--	10	120	3.2	< 0.5	--	76	--	--	--	--	--	--	--	--
5/1992	47	3.2	58	190	< 1.0	71	380	870	--	--	--	90	2.2	23	700
11/1992	--	2.4	59	66	< 0.5	--	--	--	--	--	--	--	--	--	--
5/1993	92	1.9	46	120	< 0.5	26	--	940	--	--	--	93	2.5	29	130
6/1993	--	--	--	--	--	--	640	--	--	--	--	--	--	--	--
11/1993	--	0.78	43	180	< 0.5	--	300	--	--	--	--	--	--	--	--
8/1994	38	0.81	20	21	< 0.5	--	--	--	--	--	--	--	1.0	8.6	--
9/1995	40	--	38	3.3	< 0.5	--	--	--	--	--	--	--	0.89	6.0	--
1/1996	--	< 0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
8/1996	35	3.0	24	17	< 0.5	--	--	--	--	--	--	--	2.2	47	--
8/1997	36	3.7	34	12	< 0.5	--	--	--	--	--	--	--	1.4	48	--
10/1998	44	4.8	42	16	< 0.5	--	--	--	--	--	--	--	< 0.5	23	--
12/1999	30	15	32	55	< 1.0	--	--	--	--	--	--	--	< 1.0	44	--
11/2000	53	< 1.0	23	60	< 1.0	--	--	--	--	--	--	--	< 1.0	50	--
12/2001	57	2.2	27	70	1.1	--	--	--	--	--	--	--	2.0	56	--
12/2002	26	1.1	21	46	< 1.0	--	--	--	--	--	--	--	2.0	26	--
10/2003	--	1.1	15	48	1.7	--	--	--	--	--	--	--	2.9	25	--
12/2004	--	2.3	24	37	< 1.0	--	--	--	--	--	--	--	< 1.0	20	--
10/2005	15	--	21	37	< 1.0	--	--	--	--	--	--	--	< 1.0	19	--

Table C-4: Historic TCE Groundwater Data - Carimona Mbr. Wells (concentrations in ug/L)

Well	8	9	10	11	12	13	108	BB	II	LL	PP	RR	SS	UU	WW
Well Status	ACT	ACT	ACT	ACT	ACT	AB	AB	ACT	AB	AB	ACT	ACT	ACT	ACT	ACT
Sample Date															
10/2006	--	--	--	49	--	--	--	--	--	--	--	--	1.3	49	--
11/2006	--	1.6	14	--	< 1.0	--	--	--	--	--	--	--	--	--	--
9/2007	--	1.2	14	21	< 1.0	--	--	--	--	--	--	--	3.0	53	--
10/2008	--	1.1	--	30	< 1.0	--	--	--	--	--	--	--	< 1.0	76	--
11/2008	--	--	9.6	--	--	--	--	--	--	--	--	--	--	--	--
11/2009	--	--	--	100	--	--	--	--	--	--	--	--	5.2	62	--
12/2009	--	--	14	--	--	--	--	--	--	--	--	--	--	--	--
9/2010	--	3.3	13	65	< 1.0	--	--	--	--	--	--	--	< 1.0	47	--

Data sources: see Table C-13

[shaded] Exceeds Consent Order limit of 27 µg/L

Well Status: ACT = active, AB = abandoned

-- compound not analyzed

* Estimated value, QA/QC criteria not met.

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

b - potential false positive based on blank data validation procedures

s - potential false positive value based on statistical analysis of blank sample data

Table C-5: Historic TCE Groundwater Data - Magnolia Mbr. Wells (concentrations in ug/L)

Well	14	GG	MG1	MG2	OO	QQ	TT	VV	ZZ
Well Status	ACT	AB	ACT	ACT	ACT	ACT	ACT	ACT	AB
Sample Date									
5/1982	--	--	--	--	15	--	--	--	--
6/1982	--	< 1.0	--	--	--	13	--	--	--
12/1982	--	< 1.0	--	--	56	13	8.9	200	--
3/1984	--	--	--	--	--	--	--	--	14
10/1985	--	--	--	--	49	2.9 4.3	26	140	85
12/1985	--	--	--	--	31	7.3	19	93	28
2/1986	--	--	--	--	36	5.2	27	92	180 200
4/1986	--	--	--	--	120	6.0	33	280	440
6/1986	--	--	--	--	27	1.0	20	83	91
8/1986	--	--	--	--	19	0.6	40	99	39
10/1986	--	--	--	--	32	6.4	23	77	190
4/1987	--	--	--	--	130	3.1 2.5	34	63	280 230
4/1988	--	--	--	--	160	< 0.50	16	63	130
7/1988	--	--	--	--	20	--	--	9.4	--
10/1988	--	--	--	--	34	--	--	25	83 43
4/1989	--	--	--	--	90	3.7	30	59	180
7/1989	--	--	--	--	70	--	--	87	34
10/1989	--	--	--	--	67	--	--	150	33
5/1990	--	--	--	--	58	3.4	26	33	120
7/1990	--	--	--	--	62	--	--	27	61
10/1990	--	--	--	--	30	--	--	46	36
4/1991	--	--	--	--	5.1	< 0.5	140	75	170
6/1991	--	--	33	--	--	--	--	--	--
9/1991	--	--	--	--	5.0	--	--	48	30
5/1992	--	--	--	--	3.1	--	58	60	88
6/1992	--	--	--	--	--	4.7	--	--	--
11/1992	--	--	--	--	17	--	6.4	29	96
3/1993	--	--	47	24	--	--	--	--	--
5/1993	--	--	--	--	11	13	0.7	190	73
11/1993	--	--	--	--	5.7	--	1.8	150	70
8/1994	--	--	--	--	--	3.2	1.4	--	--
9/1995	--	--	--	--	--	3.7	1.5	--	--
8/1996	--	--	--	--	--	2.2	1.0	--	--
8/1997	--	--	--	--	--	1.8	1.9	--	--
4/1998	--	--	29	11	--	--	--	--	--
8/1998	--	--	34	12	--	--	--	--	--
10/1998	< 0.5	--	40	--	--	< 0.5	< 0.5	--	--
1/1999	--	--	26	11	--	--	--	--	--
6/1999	--	--	24	9.3	--	--	--	--	--
12/1999	4.9	--	25	9.8	--	< 1.0	6.4	--	--
3/2000	--	--	29	12	--	--	--	--	--
11/2000	8.2	--	28	12	--	< 1.0	7.8	--	--
2/2001	--	--	22	10	--	--	--	--	--
8/2001	--	--	22	12	--	--	--	--	--
11/2001	--	--	18	11	--	--	--	--	--
12/2001	9.6	--	--	--	--	< 1.0	8.4	--	--
2/2002	--	--	17	9	--	--	--	--	--
11/2002	--	--	15	7.7	--	--	--	--	--
12/2002	8.1	--	--	--	--	< 1.0	8.7	--	--
3/2003	--	--	19	9.6	--	--	--	--	--
8/2003	--	--	15	8.0	--	--	--	--	--

Table C-5: Historic TCE Groundwater Data - Magnolia Mbr. Wells (concentrations in ug/L)

Well	14	GG	MG1	MG2	OO	QQ	TT	VV	ZZ
Well Status	ACT	AB	ACT	ACT	ACT	ACT	ACT	ACT	AB
Sample Date									
10/2003	4.7	--	--	--	--	< 1.0	5.6	--	--
2/2004	--	--	14	7.8	--	--	--	--	--
9/2004	--	--	15	12	--	--	--	--	--
12/2004	5.6	--	--	--	--	1.7	8.0	--	--
3/2005	--	--	13	9.3	--	--	--	--	--
10/2005	5.5	--	2.7	9.3	--	< 1.0	6.9	--	--
2/2006	--	--	6.5	11	--	--	--	--	--
8/2006	--	--	4.3	8.0	--	--	--	--	--
10/2006	--	--	--	--	--	--	3.2	--	--
11/2006	3.5	--	--	--	--	1.3	--	--	--
2/2007	--	--	5.1	9.0	--	--	--	--	--
8/2007	--	--	5.4	7.3	--	--	--	--	--
9/2007	3.6	--	--	--	--	1.4	3.2	--	--
10/2007	--	--	6.0	8.6	--	--	--	--	--
2/2008	--	--	5.7	5.9	--	--	--	--	--
8/2008	--	--	9.6	3.1	--	--	--	--	--
10/2008	3.3	--	--	--	--	1.3	4.7	--	--
11/2008	--	--	3.9	7.6	--	--	--	--	--
2/2009	--	--	--	7.6	--	--	--	--	--
4/2009	--	--	3.1	--	--	--	--	--	--
8/2009	--	--	8.0	2.2	--	--	--	--	--
11/2009	--	--	--	--	--	--	6.4	--	--
12/2009	4.4	--	--	--	--	1.9	--	--	--
2/2010	--	--	12 *	2.6	--	--	--	--	--
9/2010	6.0	--	6.4	10	--	1.8	1.4	--	--
12/2010	5.3	--	12	9.3	--	--	1.2	--	--
3/2011	4.5	--	11	8.5	--	--	< 1.0	--	--
6/2011	5.3	--	15	9.2	--	--	< 1.0	--	--
12/2012	4.2	--	6.5	13	--	2.1	< 1.0	--	--

Data sources: see Table C-13

Exceeds Consent Order limit of 27 µg/L

Well Status: ACT = active, AB = abandoned

-- compound not analyzed

* Estimated value, QA/QC criteria not met.

< indicates compound not detected at or above the method detection limit (the value shown next to this symbol)

b - potential false positive based on blank data validation procedures

s - potential false positive value based on statistical analysis of blank sample data

Table C-6: Historic TCE Groundwater Data - St. Peter and Prairie du Chien/Jordan Wells (concentrations in ug/L)

Well	200	201	202	203	HENKEL
Well Status	Active	Active	Active	Active	Active
Aquifer	OSTP	OSTP	OSTP	OSTP	OPCJ
Sample Date					
5/1984	340	--	--	--	--
6/1984	190 88 100	--	--	--	--
8/1984	220	0.3	--	--	--
12/1984	150	--	--	--	--
10/1985	--	0.5 s < 0.20	--	--	50 71
11/1985	120	--	2.6	0.5 s	--
12/1985	100	2.9	2.0	1.2	44
2/1986	72	< 0.5	0.35 1.9	2.5	48
4/1986	130	< 0.2	0.2	0.6	0.4
6/1986	110	< 0.2	0.2 s	0.5	--
8/1986	110	< 0.2	2.7	0.5	54
10/1986	78	< 0.2	< 0.2	0.5	--
11/1986	--	--	--	--	6.9
4/1987	120 140 100	< 0.2 0.1	< 0.2	0.7	9.5
7/1987	120				20
10/1987	160	--	--	--	6.7
4/1988	89	< 0.5	< 0.5	< 0.5	13
7/1988	33	--	--	--	1.5
10/1988	56	--	--	--	8.0
4/1989	150	< 0.5	< 0.5	2.1	12
7/1989	130	--	--	--	10
10/1989	120	--	--	--	11
5/1990	110	< 0.5 < 0.5	0.8	2.8	--
7/1990	11 *	--	--	--	--
10/1990	130	--	--	--	--
4/1991	140	< 0.5	< 0.5	3.0	--
7/1991	--	--	--	--	49
9/1991	77	--	--	--	18
5/1992	61	< 1.0	< 1.0	1.2	31
11/1992	64	--	--	--	< 0.5
5/1993	89	< 0.50	< 0.50	1.4	16
11/1993	19	--	--	--	36
8/1994	--	--	--	--	6.1
12/1994	110	--	--	--	--
9/1995	110	--	--	--	--
12/1995	--	--	--	--	6.5
8/1996	96	--	--	--	9.2
7/1997	98	< 0.5	< 0.5	5.4	--
8/1997	97	< 0.5	--	5.0	13
12/1997	--	--	< 0.5	--	--
10/1998	58	--	< 0.5	4.5	8.2
12/1999	30	--	< 1.0	4.1	< 1.0
11/2000	< 1.0	--	< 1.0	7.2	< 1.0

Table C-6: Historic TCE Groundwater Data - St. Peter and Prairie du Chien/Jordan Wells (concentrations in ug/L)

Well	200	201	202	203	HENKEL
Well Status	Active	Active	Active	Active	Active
Aquifer	OSTP	OSTP	OSTP	OSTP	OPCJ
Sample Date					
12/2001	6.4	--	< 1.0	15	7.1
11/2002	--	--	--	--	< 1.0
12/2002	9.7	--	< 1.0	24	--
10/2003	4.2	--	< 1.0	28	4.0
12/2004	4.6	--	< 1.0	33	3.2
10/2005	3.9	--	< 1.0	33	--
11/2006	2.8	--	< 1.0	40	1.9
9/2007	5.7	--	< 1.0	40	4.0
1/2007	--	< 1.0	--	--	--
10/2008	3.3	< 1.0	< 1.0	37	--
11/2008	--	--	--	--	5.3
12/2009	5.0	--	--	30	1.3
9/2010	5.3	--	--	21	5.9

Data sources: see Table C-13
Aquifer: OSTP - St. Peter, OPCJ - Prairie du Chien/Jordan
No limit established for these aquifers under the Consent Order
Well Status: ACT = active, AB = abandoned
-- compound not analyzed
* Estimated value, QA/QC criteria not met.
< indicates compound not detected at or above the method detection limit (the value shown next to this symbol)
b - potential false positive based on blank data validation procedures
s - potential false positive value based on statistical analysis of blank sample data

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

Pump-Out Well #111	11/85	4/98	8/98	10/98	1/99	6/99	3/00	11/00	2/01	8/01	11/01	2/02	11/02	3/03	8/03	2/04	9/04	3/05	10/05	2/06	8/06	2/07	8/07
1,1,1-trichloroethane	**1.3**	**1.7**	**2.4**	**1.1**	**1.3**	<1.0	**3.5**	**3.2**	**2.9**	**1.5**	**4.2**	**1.7**	--	**3.2**	**1.8**	**2.8**	**3.4**	**4.6**	**1.3**	<1.0	**2**	<1.0	<1.0
1,1,2,2-tetrachloroethane	<0.2	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	**0.3**	**1.2**	**1.2**	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	**36**	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, trans	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethyl benzene	--	--	--	--	--	--	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	**0.8**	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	**1.6**	<1.0	<1.0	<1.0	**1.3**	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene	**160**	**3**	**1.8**	**0.7**	**1.2**	<1.0	<1.0	3.3	2.7	1	1.7	2.2	--	**2.9**	**1.7**	**3**	**2**	**2.2**	**1.3b**	**1.9**	<1.0	**1.3**	<1.0
vinyl chloride	--	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	<1.0
xylenes	<1.0	<1.0	<0.5	<1.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Pump-Out Well #111	8/07 - d	10/07	2/08	8/08	11/08	2/09	8/09	2/10	9/10	12/10	3/11	6/11	1/13	12/14
1,1,1-trichloroethane	**1.5**	<1.0	**2.2**	**2.1**	--	<1.0	**2**	**2.5**	**2**	**2.1**	**2.4**	**2.1**	**2.4**	**2.2**
1,1,2,2-tetrachloroethane	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**
1,2-dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethyl benzene	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	<1.0	<1.0	<1.0	**1.1**	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene	<1.0	**1.3**	<1.0	<1.0	<1.0	**1.8**	**2.8**	**1.8**	<1.0	<1.0	<1.0	<1.0	<1.0	**5.3**
vinyl chloride	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
xylenes	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Pump-Out Well #112	4/98	8/98	10/98	1/99	6/99	12/99	11/00	2/01	11/01	2/02	11/02	3/03	8/03	2/04	9/04	3/05	10/05	3/06	8/06	2/07	8/07	10/07	2/08
1,1,1-trichloroethane	**0.9**	<1.0	<1.3	<1.0	<1.0	<1.0	**1.4**	**1.7**	**3.3**	**2.5**	--	**1.7**	<1.0	<5.0	**1.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<0.8	<1.0	<1.3	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	--	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	<0.8	<1.0	<1.3	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	--	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane	<0.8	<1.0	<1.3	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	--	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	**2.7**	**5.3**	**2.4**	**3.2**	**1.7**	<1.0	--	1.2	--	**2.4**	--	**2.8**	**2.7**	<5.0	**1.7**	**1.4**	<1.0	<1.0	**1.3**	**1.1**	**1.5**	**2.2**	**2.3**
1,2-dichloroethylene, trans	<0.8	<1.0	<1.3	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	--	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	<0.8	<1.0	<1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethyl benzene	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	**0.9**	**1.1**	<1.3	**2**	<1.0	<1.0	**3.1**	**1.6**	**1.6**	**1.6**	--	**2.2**	**1.4**	<5.0	**2.2**	<1.0	<1.0	**1.7**	**1.2**	**1.1**	<1.0	<1.0	<1.0
toluene	<0.8	<1.0	<1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene	**46**	**99**	**120**	**97**	**74**	**27**	**72**	**54**	**32**	**36**	--	**52**	**40**	**44**	**36**	**40**	**31**	**41**	**35**	**37**	**42**	**42**	**31**
vinyl chloride	<0.8	--	<1.3	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	--	<1.0	<1.0	<5.0	<1.0	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
xylenes	<1.6	<2.0	<2.8	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<15.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

Pump-Out Well #112	8/08	11/08	2/09	8/09	2/10	12/10	3/11	6/11	1/13	12/14
1,1,1-trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	**1.4**	**1.5**	**1.9**	**2.4**	**1.6**	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	**1.3**	**1.2**	<1.0	**1.9**	**1.2**	**1.3**	<1.0	<1.0	<1.0	<1.0
toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene	**21**	**33**	**29**	**26**	**38**	**42**	**29**	**14**	**5.4**	**4**
vinyl chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
xylenes	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Pump-Out Well #113	4/98	8/98	10/98	1/99	6/99	12/99	3/00	11/00	2/01	8/01	11/01	2/02	11/02	3/03	8/03	2/04	9/04	3/05	10/05	2/06	8/06	2/07	8/07
1,1,1-trichloroethane	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	**2.2**	--	**3**	<2.0	**5**	**2.8**	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0
1,1,2,2-tetrachloroethane	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0
1,1-dichloroethane	<2.0	**2**	<2.0	<2.0	<5.0	<2.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0
1,2-dichloroethane	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0
1,2-dichloroethylene, cis	**14**	**19**	**22**	**19**	**14**	**11**	**8.8**	**32**	**31**	**27**	**20**	**20**	--	**18**	**19**	**16**	**25**	**20**	**17**	**16**	**22**	**23**	**24**
1,2-dichloroethylene, trans	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0
benzene	<2.0	**2**	<2.0	<2.0	<5.0	<2.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0
ethyl benzene	--	--	--	--	--	--	<1.0	<1.0	--	--	<2.0	<2.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0
tetrachloroethylene	**2.0 J**	<2.0	<2.0	**2.4**	<5.0	<2.0	**2**	**5.1**	**3.5**	**3.3**	**3.8**	**4.1**	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	**2.4**	**2.7**	<2.0
toluene	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0
trichloroethylene	**110**	**160**	**150**	**130**	**130**	**85**	**60**	**160**	**150**	**140**	**110**	**110**	--	**110**	**90**	**97**	**120**	**100**	**89**	**91**	**85**	**89**	**94**
vinyl chloride	<2.0	--	<2.0	<2.0	<5.0	<2.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	--	--	<2.0	<2.0	<2.0	<2.0
xylenes	<4.0	<4.0	<6.0	<6.0	<15	<6.0	<3.0	<3.0	<6.0	<6.0	<6.0	<6.0	<15	<15	<15	<15	<15	<15	<15	<6.0	<6.0	<6.0	<6.0

Pump-Out Well #113	10/07	2/08	2/08-d	8/08	11/08	2/09	8/09	2/10	9/10	12/10	3/11	6/11	12/12	12/14
1,1,1-trichloroethane	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	**22**	**23**	**23**	**21**	**97**	**25**	**20**	**20**	**13**	**1.4**	<1.0	**1.9**	**1.3**	<1.0
1,2-dichloroethylene, trans	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	**3.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethyl benzene	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	<2.0	<2.0	<2.0	**3.2**	**9.4**	**2.3**	**4.9**	**2.9**	**2.3**	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene	**94**	**90**	**93**	**84**	**310**	**86**	**82**	**110**	**78**	**12**	**4.5**	**4.8**	**4.5**	**0.98**
vinyl chloride	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
xylenes	<6.0	<6.0	<6.0	<6.0	<15	<6.0	<6.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

Pump-Out Well #109	4/98	8/98	10/98	1/99	6/99	3/00	11/00	2/01	8/01	11/01	2/02	11/02	3/03	8/03	2/04	9/04	3/05	10/05	2/06	8/06	11/06	2/07	8/07
1,1,1-trichloroethane	<3.0	<4.0	<4.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	5.1	2.4	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<5.0	<2.0
1,1,2,2-tetrachloroethane	<3.0	<4.0	<4.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<5.0	<2.0
1,1-dichloroethane	<3.0	<4.0	<4.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<5.0	<2.0
1,2-dichloroethane	<3.0	<4.0	<4.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<5.0	<2.0
1,2-dichloroethylene, cis	8.4	5	<4.0	<5.0	<5.0	<5.0	<2.0	2.4	3.8	10	5.6	--	5	<5.0	<5.0	<5.0	<5.0	<5.0	4.9	2.9	4.7	<5.0	<2.0
1,2-dichloroethylene, trans	<3.0	<4.0	<4.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<5.0	<2.0
benzene	<3.0	<4.0	<4.0	<5.0	<5.0	<5.0	<2.0	<2.0	2.8	<2.0	<2.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<5.0	<2.0
ethyl benzene	--	--	--	--	--	<5.0	<2.0	--	<2.0	<2.0	<2.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<5.0	<2.0
tetrachloroethylene	4.3	<4.0	--	<5.0	<5.0	5.5	7.6	4	<2.0	4.8	4.9	--	<5.0	<5.0	<5.0	7.8	<5.0	<5.0	<2.0	2.9	3.7	<5.0	<2.0
toluene	9.8	21	4.2	<5.0	8	17	<2.0	<2.0	25	2.8	<2.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<5.0	<2.0
trichloroethylene	280	260	270	250	170	210	160	140	140	160	150	--	150	110	130	110	110	87	91	90	110	130	110
vinyl chloride	<3.0	--	<4.0	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<2.0	--	<5.0	<5.0	<5.0	<5.0	--	--	<2.0	<2.0	<2.0	<5.0	<2.0
xylenes	3.9	<4.0	<12	<15	<15	<15	<6.0	<6.0	18	<6.0	<6.0	<15	<15	<15	<15	<15	<15	<15	<6.0	<6.0	<6.0	<15	<6.0

Pump-Out Well #109	10/07	2/08	8/08	11/08	2/09	8/09	2/10	9/10	12/10	3/11	6/11	12/12	12/14
1,1,1-trichloroethane	<2.0	<2.0	<2.0	--	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<2.0	<2.0	<2.0	--	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	<2.0	<2.0	<2.0	--	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	1.1	1.1	1.2
1,2-dichloroethane	<2.0	<2.0	<2.0	--	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	4.3	5	4.2	--	4.8	4	2.7	3.1	3.4	6.5	13	15	25
1,2-dichloroethylene, trans	<2.0	<2.0	<2.0	--	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	<2.0	<2.0	<2.0	--	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	4.4	<1.0	<1.0
ethyl benzene	<2.0	<2.0	<2.0	--	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	13	<1.0	<1.0
tetrachloroethylene	2.6	<2.0	3.7	--	3.2	3.5	2.9	2.7	2.8	3	3.4	3.2	2.6
toluene	<2.0	<2.0	<2.0	--	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	15	<1.0	<1.0
trichloroethylene	110	110	99	97	110	84	110	120	110	120	160	160	112
vinyl chloride	<2.0	<2.0	<2.0	--	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
xylenes	<6.0	<6.0	<6.0	--	<6.0	<6.0	<3.0	<3.0	<3.0	<3.0	48	<3.0	<3.0

Pump-Out Well #110	4/85	4/85	5/85	6/85	4/98	8/98	10/98	1/99	6/99	3/00	11/00	2/01	11/01	2/02	11/02	11/02-d	3/03	8/03	2/04	2/04-d	9/04	3/05	10/05
1,1,1-trichloroethane	13	16	--	--	<6.0	<10	<10	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0	--	--	<10	<10	<10	<10	<10	<10	<5.0
1,1,2,2-tetrachloroethane	<0.1	<0.1	--	--	<6.0	<10	<10	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0	--	--	<10	<10	<10	<10	<10	<10	<5.0
1,1-dichloroethane	3.9	5.9	--	--	<6.0	<10	<10	<5.0	5.4	<10	<5.0	<5.0	<5.0	<5.0	--	--	<10	<10	<10	<10	<10	<10	<5.0
1,2-dichloroethane	<0.1	<0.1	--	--	<6.0	<10	<10	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0	--	--	<10	<10	<10	<10	<10	<10	<5.0
1,2-dichloroethylene, cis	290	280	--	--	87	110	87	75	40	70	51	38	59	75	--	--	73	54	65	60	33	47	12
1,2-dichloroethylene, trans	1.6	1.5	--	--	<6.0	<10	<10	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0	--	--	<10	<10	<10	<10	<10	<10	<5.0
benzene	<1.0	<1.0	--	--	<6.0	<10	<10	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0	<10	<10	<10	<10	<10	<10	<10	<10	<5.0
ethyl benzene	--	--	--	--	--	--	--	--	--	<10	<5.0	--	<5.0	<5.0	<10	<10	<10	<10	<10	<10	<10	<10	<5.0
tetrachloroethylene	20	25	--	--	8.2	<10	<10	<5.0	<5.0	<10	<5.0	6.3	8.4	10	--	--	<10	<10	<10	<10	15	<10	<5.0
toluene	<1.0	<1.0	--	--	<6.0	<10	<10	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0	<10	<10	<10	<10	<10	14	<10	<10	<5.0
trichloroethylene	1100	1100	1300	1400	510	590	630	420	390	380	340	270	290	340	--	--	340	300	320	290	290	250	92
vinyl chloride	--	--	--	--	<6.0	--	<10	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0	--	--	<10	<10	<10	<10	<10	--	--
xylenes	<1.0	<1.0	--	--	<12	<20	<18	<15	<15	<30	<15	<15	<15	<15	<30	<30	<30	<30	<30	<30	<30	<15	<15

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

Pump-Out Well #110	2/06	8/06	2/07	8/07	10/07	2/08	8/08	8/08-d	11/08	2/09	8/09	2/10	9/10	1/11	3/11	6/11	1/13	12/14
1,1,1-trichloroethane	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
1,1,2,2-tetrachloroethane	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
1,1-dichloroethane	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<2.0	1.1
1,2-dichloroethane	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
1,2-dichloroethylene, cis	40	76	81	64	53	54	55 J	4.3 J	--	73	27	32	12	16	12	32	61	55.4
1,2-dichloroethylene, trans	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<2.0	1.4
benzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
ethyl benzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
tetrachloroethylene	<5.0	7.5	6.7	<5.0	<5.0	<5.0	7.6 J	3.7 J	--	6.6	7.5	5	2.8	3	2.3	2.6	7.4	6.9
toluene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
trichloroethylene	230	280	250	270	230	240	190 J	100 J	260	260	110	210	100	99	73	110	230	214
vinyl chloride	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
xylenes	<15	<15	<15	<15	<15	<15	<15	<15	--	<15	<15	<6.0	<3.0	<3.0	<3.0	<3.0	<6.0	<3.0

MW-106	4/83	4/83	12/83
1,1,1-trichloroethane	2800	1400	180
1,1,2,2-tetrachloroethane	--	≤290	ND
1,1-dichloroethane	48	49	8.3
1,2-dichloroethane	ND	1400	18
1,2-dichloroethylene, cis	--	--	24
1,2-dichloroethylene, trans	55	94	ND
benzene	15,000	≤8400	710
ethyl benzene	--	--	--
tetrachloroethylene	2300	≤290	86
toluene	62,000	18,000	3800
trichloroethylene	7200	2400	560
vinyl chloride	--	--	--
xylenes	18,000	4,000	2600

MW-107	4/83	12/83	10/85	12/85	2/86	4/86	6/86	8/86	11/86
1,1,1-trichloroethane	10	1.4	<0.1	--	1.5	--	2.1	--	10
1,1,2,2-tetrachloroethane	≤13	ND	<0.2	--	0.9	--	<0.2	--	2.4
1,1-dichloroethane	5.5	6	1.1	--	3.4	--	4.7	--	13
1,2-dichloroethane	0.2	2.2	0.4	--	0.2	--	1.1	--	15
1,2-dichloroethylene, cis	--	15	9.2	--	16	--	19	--	51
1,2-dichloroethylene, trans	17	ND	<0.1	--	<0.1	--	<0.1	--	0.4
benzene	≤190	7.5	<1.0	--	<1.0	--	2.6	--	64
ethyl benzene	--	--	--	--	--	--	--	--	--
tetrachloroethylene	≤13	3.9	0.4	--	4.3	--	5.8	--	15
toluene	4	12	<1.0	--	7.3	--	3.8	--	120
trichloroethylene	1300	88	2.1	11	260	580	300	770	910
vinyl chloride	--	--	--	--	--	--	--	--	--
xylenes	<0.2	<31	<3.0	--	8.3	--	2.7	--	19

MW-B	12/82	12/83	10/85	12/85	2/86	4/86	6/86	8/86	11/86	4/87	4/87-M	4/88	4/89	7/90	4/91	5/92	5/93
1,1,1-trichloroethane	23	140	13	--	11	--	11	--	6.8	11	9	10	3.3	5.6	4.3	2.5	1.7
1,1,2,2-tetrachloroethane	22	ND	<0.2	--	0.4	--	<0.2	--	<0.2	<0.2	<2.0	<0.2	<2.0	<2.0	<0.5	<0.1	<0.5
1,1-dichloroethane	9.4	7.6	12	--	11	--	13	--	10	9.8	8.6	3.7	8.9	2.5	2.2	2	1.4
1,2-dichloroethane	ND	PP	0.5	--	<1.0	--	0.1	--	<0.1	0.1	0.2	<0.1	<0.4	<0.4	<0.5	<0.1	<0.5
1,2-dichloroethylene, cis	--	43	17	--	18	--	21	--	16	6	5.2	3	1.9	2.3	2.3	7.6	5.1
1,2-dichloroethylene, trans	--	ND	<0.1	--	<1.0	--	0.3	--	<0.1	0.3	0.4	<0.1	<0.6	<0.6	<0.5	<0.1	<0.5
benzene	ND	PP	<1.0	--	<1.0	--	<1.0	--	--	--	--	<0.5	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	18	18	--	17	--	18	--	15	15	12	12	4.9	9.5	6	6	5.2
toluene	ND	PP	<1.0	--	<1.0	--	<1.0	--	--	--	--	<0.5	--	--	--	--	--
trichloroethylene	1100	780	1200	1100	1300	1000	1100	1000	830	800	500	330	250	330	340	530	580
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	ND	<0.2	<3.0	--	<1.0	--	<1.0	--	--	--	--	--	--	--	--	--	--

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

PZ-A	6/81*	4/83	12/83
1,1,1-trichloroethane	26.4	72	19
1,1,2,2-tetrachloroethane	35.7	≤36	ND
1,1-dichloroethane	0.94	13	6.6
1,2-dichloroethane	8.2	40	PP
1,2-dichloroethylene, cis	--	3.4	23
1,2-dichloroethylene, trans	--	43	ND
benzene	200	≤290	<0.2
ethyl benzene	<0.1	--	--
tetrachloroethylene	--	≤36	17
toluene	180	49	<0.2
trichloroethylene	2400	1500	810
vinyl chloride	--	--	--
xylenes	51.9	14	<0.2

MW-E	12/83
1,1,1-trichloroethane	2.3
1,1,2,2-tetrachloroethane	PP
1,1-dichloroethane	1.2
1,2-dichloroethane	PP
1,2-dichloroethylene, cis	1.1
1,2-dichloroethylene, trans	ND
benzene	PP
ethyl benzene	--
tetrachloroethylene	PP
toluene	<4.3
trichloroethylene	290
vinyl chloride	--
xylenes	<0.2

MW-F	12/83
1,1,1-trichloroethane	2.9
1,1,2,2-tetrachloroethane	ND
1,1-dichloroethane	0.5
1,2-dichloroethane	ND
1,2-dichloroethylene, cis	8.5
1,2-dichloroethylene, trans	ND
benzene	PP
ethyl benzene	--
tetrachloroethylene	PP
toluene	<4.3
trichloroethylene	94
vinyl chloride	--
xylenes	<0.2

MW-H	12/83	10/85	12/85	2/86	4/86	6/86	8/86	10/86
1,1,1-trichloroethane	6	6.7	--	4	--	3.4	--	1.9
1,1,2,2-tetrachloroethane	ND	<0.2	--	<0.2	--	<0.2	--	<0.2
1,1-dichloroethane	5.5	7.9	--	4.6	--	3.4	--	2.8
1,2-dichloroethane	0.4	1.5	--	0.2	--	<0.1	--	0.3
1,2-dichloroethylene, cis	9.6	8.9	--	3.9	--	2.6	--	2.6
1,2-dichloroethylene, trans	ND	<0.1	--	<0.1	--	<0.1	--	<0.1
benzene	PP	<0.1	--	<1.0	--	<1.0	--	--
ethyl benzene	--	--	--	--	--	--	--	--
tetrachloroethylene	11	12	--	4.8	--	3.8	--	4.6
toluene	<4.3	<0.1	--	<1.0	--	<1.0	--	--
trichloroethylene	480	680	510	320	200	260	480	220
vinyl chloride	--	--	--	--	--	--	--	--
xylenes	<0.2	3.5 s	--	<1.0	--	<1.0	--	--

MW-J	12/83	1/84	10/85	12/85	2/86	4/86	6/86	8/86	11/86
1,1,1-trichloroethane	6.2	7.7	8.4	--	2.8	--	2.6	--	2.9
1,1,2,2-tetrachloroethane	ND	--	<0.2	--	<0.2	--	<0.2	--	<0.2
1,1-dichloroethane	3.2	0.4	3.9	--	0.9	--	0.6	--	1.3
1,2-dichloroethane	PP	ND	<0.1	--	<0.1	--	<0.1	--	<0.1
1,2-dichloroethylene, cis	260	320	290	--	75	--	34	--	160
1,2-dichloroethylene, trans	2.5	--	2.9	--	0.5	--	0.3	--	1
benzene	<5.3	<5.3	<0.1	--	<1.0	--	<1.0	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--
tetrachloroethylene	36	41	20	--	16	--	5.5	--	7.4
toluene	<4.3	<4.3	<0.1	--	<1.0	--	<1.0	--	--
trichloroethylene	1300	1400	1200	930	370	220	160	100	420
vinyl chloride	--	--	--	--	--	--	--	--	--
xylenes	<0.2	<0.2	<3.0	--	<1.0	--	<1.0	--	--

MW-K	12/83
1,1,1-trichloroethane	1.4
1,1,2,2-tetrachloroethane	ND
1,1-dichloroethane	0.6
1,2-dichloroethane	PP
1,2-dichloroethylene, cis	11
1,2-dichloroethylene, trans	ND
benzene	PP
ethyl benzene	--
tetrachloroethylene	36
toluene	PP
trichloroethylene	120
vinyl chloride	--
xylenes	PP

MW-N	12/83	1/84
1,1,1-trichloroethane	42	62
1,1,2,2-tetrachloroethane	ND	--
1,1-dichloroethane	26	32
1,2-dichloroethane	58	52
1,2-dichloroethylene, cis	35	41
1,2-dichloroethylene, trans	ND	--
benzene	8.3	76
ethyl benzene	--	--
tetrachloroethylene	20	24
toluene	<4.3	<4.3
trichloroethylene	1100	1100
vinyl chloride	--	--
xylenes	<0.2	<0.2

MW-P	12/83
1,1,1-trichloroethane	57
1,1,2,2-tetrachloroethane	PP
1,1-dichloroethane	14
1,2-dichloroethane	3.2
1,2-dichloroethylene, cis	PP
1,2-dichloroethylene, trans	ND
benzene	PP
ethyl benzene	--
tetrachloroethylene	PP
toluene	PP
trichloroethylene	PP
vinyl chloride	--
xylenes	<0.2

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

MW-Q	2/84	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/88	4/89	5/90	4/91	5/92	5/93	9/95	12/99	8/97	10/03	9/04	10/05	10/06	9/07
1,1,1-trichloroethane	**37**	**2.1**	--	**1.4**	--	**1.3**	--	**1.6**	**3.2**	**3.1**	**5.3**	**7.4**	**9.4**	<1.0	**1.1**	**0.72**	<1.0	<0.5	**2.4**	--	--	--	--
1,1,2,2-tetrachloroethane	**PP**	<0.2	--	**0.3**	--	<0.2	--	<0.2	<0.2	**1.6**	<1.0	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	<0.5	<1.0	--	--	--	--
1,1-dichloroethane	**14**	**0.3**	--	**0.1**	--	**0.3**	--	**0.2**	**1.3**	**0.68**	**6.9**	**1.5**	**2.4**	<1.0	<0.5	**0.63**	<1.0	**4**	<1.0	--	--	--	--
1,2-dichloroethane	**2**	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5	<1.0	<0.5	<0.5	<1.0	<0.5	<1.0	--	--	--	--
1,2-dichloroethylene, cis	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	<0.5	<1.0	--	--	--	--
1,2-dichloroethylene, trans	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.3	<0.3	<0.5	<1.0	<0.5	<0.5	<1.0	<0.5	<1.0	--	--	--	--
benzene	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--	--	--	--	--	<0.5	<1.0	<0.5	<1.0	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	<0.5	--	--	--	--	--
tetrachloroethylene	ND	**0.8**	--	**0.5**	--	**0.5**	--	**0.6**	**0.4**	<0.1	<1.0	<1.0	**6**	<1.0	<0.5	<0.5	<1.0	<0.5	<1.0	--	--	--	--
toluene	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--	--	--	--	--	<0.5	<1.0	<0.5	<1.0	--	--	--	--
trichloroethylene	**PP**	**20**	**14**	**11**	**13**	**4.7**	**5.6**	**3.2**	**2.6**	**0.86**	**1.1**	**0.7**	**0.7**	**3.2**	<0.5	<0.5	<1.0	**2**	<1.0	<1.0	<1.0	<1.0	<1.0
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	<0.5	<1.0	--	--	--	--
xylenes	--	<3.0	--	<1.0	--	<1.0	--	--	--	--	--	--	--	--	--	<0.5	<3.0	<0.5	<3.0	--	--	--	--

MW-Q (continued)	10/08	11/09	9/10	12/12	12/14
1,1,1-trichloroethane	--	**1.4**	--	<1.0	**1.8**
1,1,2,2-tetrachloroethane	--	<1.0	--	<1.0	<1.0
1,1-dichloroethane	--	<1.0	--	<1.0	<1.0
1,2-dichloroethane	--	<1.0	--	<1.0	<1.0
1,2-dichloroethylene, cis	--	<1.0	--	<1.0	**1.2**
1,2-dichloroethylene, trans	--	<1.0	--	<1.0	<1.0
benzene	--	<1.0	--	<1.0	<1.0
ethyl benzene	--	<1.0	--	<1.0	<1.0
tetrachloroethylene	--	<1.0	--	<1.0	<1.0
toluene	--	<1.0	--	<1.0	<1.0
trichloroethylene	<1.0	**1.1**	**1.2**	**1.9**	**0.78**
vinyl chloride	--	<1.0	--	<1.0	<1.0
xylenes	--	<3.0	--	<3.0	<3.0

MW-R	2/84	10/85	12/85	2/86	6/86	1987-1990
1,1,1-trichloroethane	**4.4**	**9.2**	--	**5.7**	**2**	well dry
1,1,2,2-tetrachloroethane	**≤5.8**	<0.2	--	<0.2	<0.2	
1,1-dichloroethane	**5.4**	**5.4**	--	**1.3**	**1.5**	
1,2-dichloroethane	ND	<0.1	--	<0.1	<0.1	
1,2-dichloroethylene, cis	**≤47**	**53**	--	**0.7**	**5.8**	
1,2-dichloroethylene, trans	**≤47**	**0.3**	--	<0.1	**0.1**	
benzene	--	<1.0	--	<1.0	<1.0	
ethyl benzene	--	--	--	--	--	
tetrachloroethylene	**≤5.8**	**9.2**	--	**0.5**	**2.7**	
toluene	--	<1.0	--	<1.0	<1.0	
trichloroethylene	**670**	**1100**	**820**	**31**	**160**	
vinyl chloride	--	--	--	--	--	
xylenes	--	<3.0	--	<1.0	<1.0	

MW-S	2/84	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/87-M	7/87	10/87	4/88	7/88	10/88	4/89	7/89	5/90	7/90	10/90	4/91	9/91	5/92
1,1,1-trichloroethane	**1.3**	**1.6**	--	**1.5**	--	**1.5**	--	**1.2**	**1.3**	**1.6**	--	--	**1.5**	--	--	<10	--	**5.7**	--	--	**1.2**	--	<1.0
1,1,2,2-tetrachloroethane	**≤5.4**	<0.2	--	**0.3**	--	<0.2	--	<0.2	<0.2	<2.0	--	--	<0.2	--	--	<20	--	<10	--	--	<0.5	--	<1.0
1,1-dichloroethane	**0.8**	**0.7**	--	**0.7**	--	**0.6**	--	**0.5**	**0.6**	**0.9**	--	--	**0.41**	--	--	<4.0	--	<2.0	--	--	**0.5**	--	<1.0
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	**0.4**	--	--	<0.1	--	--	<4.0	--	<2.0	--	--	<0.5	--	<1.0
1,2-dichloroethylene, cis	**≤70**	**52**	--	**59**	--	**50**	--	**57**	**48**	**54**	--	--	**54**	--	--	**49**	--	**48**	--	--	**27**	--	**16**
1,2-dichloroethylene, trans	**≤70**	**1.5**	--	**1.5**	--	**2.3**	--	**1.4**	**1.4**	<0.2	--	--	<0.1	--	--	<6.0	--	<3.0	--	--	**2.2**	--	<1.0
benzene	--	<1.0	--	<1.0	--	<1.0	--	--	--	<0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	**≤5.4**	**4.8**	--	**5.4**	--	**6.6**	--	**5.7**	**5.3**	**7.9**	--	--	**7.1**	--	--	<20	--	<10	--	--	**5.4**	--	**2.6**
toluene	--	**3**	--	<1.0	--	<1.0	--	--	--	<0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene	**770**	**740**	**750**	**650**	**1100**	**930**	**880**	**620**	**650**	**1100**	**740**	**1000**	**460**	**160**	**110**	**860**	**620**	**710**	**200**	**770**	**870**	**480**	**530**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	**12**	--	<1.0	--	<1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

MW-S continued	**11/92**	**5/93**	**11/93**	**10/08**	**12/09**	**12/12**	**12/14**
1,1,1-trichloroethane	--	<0.5	--	ND	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	--	<0.5	--	ND	<1.0	<1.0	<1.0
1,1-dichloroethane	--	<0.5	--	ND	<1.0	<1.0	<1.0
1,2-dichloroethane	--	<0.5	--	ND	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	--	**11**	--	ND	**1.2**	<1.0	<1.0
1,2-dichloroethylene, trans	--	**0.5**	--	ND	<1.0	<1.0	<1.0
benzene	--	--	--	ND	<1.0	<1.0	<1.0
ethyl benzene	--	--	--	ND	<1.0	<1.0	<1.0
tetrachloroethylene	--	**2.1**	--	ND	**1.6**	**1.2**	**1.6**
toluene	--	--	--	ND	<1.0	<1.0	<1.0
trichloroethylene	**770**	**390**	**400**	**82**	**110**	**73**	**63.7**
vinyl chloride	--	--	--	ND	<1.0	<1.0	<1.0
xylenes	--	--	--	ND	<3.0	<3.0	<3.0

MW-T	**2/84**	**10/85**	**12/85**	**2/86**	**4/86**	**6/86**	**8/86**	**10/86**	**4/87**	**5/88**	**4/89**
1,1,1-trichloroethane	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.5	<0.5
1,1,2,2-tetrachloroethane	**PP**	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<1.0
1,1-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.2
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.2
1,2-dichloroethylene, cis	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.5
1,2-dichloroethylene, trans	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.3
benzene	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	**PP**	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<1.0
toluene	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--
trichloroethylene	**PP**	<0.3	<0.8	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	<3.0	--	<3.0	--	<3.0	--	--	--	--	--

MW-T continued	**5/90**	**4/91**	**5/92**	**5/93**	**9/95**	**8/97**	**12/99**	**10/03**	**9/04**	**10/05**	**11/06**	**9/07**	**10/08**	**12/09**	**9/10**	**12/12**	**12/14**
1,1,1-trichloroethane	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0	<1.0
1,1,2,2-tetrachloroethane	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0	<1.0
1,1-dichloroethane	<0.2	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0	<1.0
1,2-dichloroethane	<0.2	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0	<1.0
1,2-dichloroethylene, cis	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	**1.1**	<1.0
1,2-dichloroethylene, trans	<0.3	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0	<1.0
benzene	--	--	--	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0	<1.0
ethyl benzene	--	--	--	--	--	<0.5	<1.0	--	--	--	--	--	ND	<1.0	--	<1.0	<1.0
tetrachloroethylene	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0	<1.0
toluene	--	--	--	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0	<1.0
trichloroethylene	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.4
vinyl chloride	--	--	--	--	--	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0	<1.0
xylenes	--	--	--	--	<0.5	<0.5	<3.0	<3.0	--	--	--	--	ND	<3.0	--	<3.0	<3.0

MW-U	**2/84**	**10/85**	**12/85**	**2/86**	**4/86**	**6/86**	**8/86**	**10/86**	**4/87**	**4/91**	**5/92**	**5/93**
1,1,1-trichloroethane	ND	**0.2**	--	**0.5**	--	<0.2	--	**0.3 s**	**0.5**	<0.5	<1.0	<0.5
1,1,2,2-tetrachloroethane	ND	<0.2	--	**0.2**	--	<0.2	--	<0.2	<0.2	<0.5	<1.0	<0.5
1,1-dichloroethane	ND	**0.1**	--	**0.2**	--	<0.1	--	**0.1**	<0.1	<0.5	<1.0	<0.5
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.5	<1.0	<0.5
1,2-dichloroethylene, cis	ND	<0.1	--	**0.1**	--	<0.1	--	<0.1	<0.1	<0.5	<1.0	<0.5
1,2-dichloroethylene, trans	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.5	<1.0	<0.5
benzene	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.5	<1.0	<0.5
toluene	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--	--
trichloroethylene	**PP**	**2.6**	**3.9**	**2.9**	**3.2**	**1.6**	**16**	**1.4**	**2.7**	**2**	<1.0	**0.7**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	**5.3**	--	<1.0	--	<1.0	--	--	--	--	--	--

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

MW-V	3/84	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	7/87	10/87	4/88	7/88	10/88	4/89	7/89	5/00	7/90	10/90	4/91	9/91	5/92	11/92
1,1,1-trichloroethane	**12**	**0.4**	--	**0.6**	--	**0.3**	--	**0.5 s**	**0.2**	--	--	**4.6 s**	--	--	<0.5	--	<1.0	--	--	<0.5	--	<1.0	--
1,1,2,2-tetrachloroethane	**PP**	<0.2	--	**0.2**	--	<0.2	--	<0.2	<0.2	--	--	**1.9 s**	--	--	<1.0	--	<2.0	--	--	<0.5	--	<1.0	--
1,1-dichloroethane	ND	**0.3**	--	**0.4**	--	**0.2**	--	<0.1	<0.1	--	--	<0.1	--	--	<0.2	--	<0.4	--	--	<0.5	--	<1.0	--
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	--	--	<0.1	--	--	<0.2	--	<0.4	--	--	<0.5	--	<1.0	--
1,2-dichloroethylene, cis	≤12	**18**	--	**20**	--	**9.2**	--	**10**	**14**	--	--	**10**	--	--	**8.7**	--	**10**	--	--	**8**	--	**2.4**	--
1,2-dichloroethylene, trans	≤12	**0.3**	--	**0.4**	--	**0.3**	--	**0.1**	**0.5**	--	--	<0.1	--	--	**0.4**	--	**0.9**	--	--	**0.7**	--	<1.0	--
benzene	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	**PP**	**0.5**	--	**1**	--	**0.5**	--	**0.3**	**0.8**	--	--	<0.2	--	--	<1.0	--	<2.0	--	--	**5.4**	--	<1.0	--
toluene	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene	**78**	**220**	**140**	**180**	**170**	**97**	**130**	**92**	**160**	**180**	**140**	**160**	**33**	**37**	**130**	**120**	**110**	**120**	**110**	**130**	**73**	**63**	**83**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	<3.0	--	<1.0	--	<1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MW-V continued	5/93	11/93	9/95	8/97	12/99	10/03	9/04	10/05	10/06	9/07	10/08	12/09	9/10	12/10	3/11	6/11	12/12	12/14
1,1,1-trichloroethane	<0.5	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<0.5	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
1,1-dichloroethane	<0.5	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
1,2-dichloroethane	<0.5	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	**4.8**	--	<0.5	**0.8**	**21**	<1.0	--	--	--	--	--	<1.0	--	**6.6**	--	**5.2**	**2.1**	<1.0
1,2-dichloroethylene, trans	<0.5	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
benzene	--	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
ethyl benzene	--	--	--	<0.5	--	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
tetrachloroethylene	<0.5	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
toluene	--	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
trichloroethylene	**68**	**100**	**94**	**19**	**83**	**14**	**2.2**	**1.2**	**1.6**	**2.2**	**1.5**	**1.5**	**56**	**55**	**58**	**58**	**31**	**21.3**
vinyl chloride	--	--	--	<0.5	<1.0	<1.0	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
xylenes	--	--	<0.5	<0.5	<3.0	<3.0	--	--	--	--	--	<3.0	--	<3.0	--	<3.0	<3.0	<3.0

MW-W	3/84	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/87-M	7/87	10/87	4/88	7/88	10/88	4/89	7/89	5/90	7/90	10/90	4/91	9/91	5/92
1,1,1-trichloroethane	ND	**8.1**	--	<0.1	--	<0.1	--	<0.2	<0.2	<0.5	--	--	<0.5	--	--	<2.5	--	<0.5	--	--	<0.5	--	<1.0
1,1,2,2-tetrachloroethane	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<2.0	--	--	**0.2**	--	--	<1.0	--	<1.0	--	--	<0.5	--	<1.0
1,1-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	**0.1**	<0.2	--	--	<0.1	--	--	<0.2	--	<0.2	--	--	<0.5	--	<1.0
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.2	--	--	<0.1	--	--	<0.2	--	<0.2	--	--	<0.5	--	<1.0
1,2-dichloroethylene, cis	**≤3.5**	**4.2**	--	**6.2**	--	**3.9**	--	**3.3**	**9.9**	**9.4**	--	--	**24**	--	--	**28**	--	**19**	--	--	**12**	--	<1.0
1,2-dichloroethylene, trans	**≤3.5**	**0.3**	--	**0.2**	--	**0.1**	--	<0.1	**0.4**	<0.2	--	--	<0.1	--	--	**0.7**	--	**0.9**	--	--	<0.5	--	<1.0
benzene	--	<1.0	--	<1.0	--	<1.0	--	--	--	**2.5**	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	--	--	<0.2	--	--	<1.0	--	<1.0	--	--	**5.4**	--	<1.0
toluene	--	**1.7**	--	<1.0	--	<1.0	--	--	--	<0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene	**7.5**	**8.1**	**32**	**14**	**18**	**10**	**18**	**6.2**	**24**	**32**	**42**	**56**	**43**	**8.1**	**26**	**57**	**22**	**31**	<0.5	**11**	**40**	**20**	**5.9**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	**9.2**	--	<1.0	--	<1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

MW-W (continued)	11/92	5/93	11/93	9/95	8/97	12/99	10/03	9/04	10/05	11/06	9/07	10/08	12/09	12/09	9/10	12/10	3/11	6/11	12/12	12/14
1,1,1-trichloroethane	--	<0.5	--	<0.5	<0.5	<1.0	<2.0	--	--	--	--	ND	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	--	<0.5	--	<0.5	<0.5	<1.0	<2.0	--	--	--	--	ND	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
1,1-dichloroethane	--	<0.5	--	<0.5	<0.5	<1.0	<2.0	--	--	--	--	ND	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
1,2-dichloroethane	--	<0.5	--	<0.5	<0.5	<1.0	<2.0	--	--	--	--	ND	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	--	**0.8**	--	**5.5**	**3.7**	**47**	**52**	--	--	--	--	**20**	**21**	**25**	--	**30**	--	**51**	**54**	**47.7**
1,2-dichloroethylene, trans	--	<0.5	--	<0.5	<0.5	**2.3**	**3.5**	--	--	--	--	ND	**1.2**	**1.3**	--	**2.1**	--	**2.8**	**2.7**	**2.6**
benzene	--	--	--	<0.5	<0.5	<1.0	<2.0	--	--	--	--	ND	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
ethyl benzene	--	--	--	--	<0.5	--	<2.0	--	--	--	--	ND	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
tetrachloroethylene	--	<0.5	--	<0.5	<0.5	<1.0	<2.0	--	--	--	--	ND	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
toluene	--	--	--	<0.5	<0.5	<1.0	<2.0	--	--	--	--	ND	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
trichloroethylene (TCE)	**1.3**	**2.9**	**2.9**	**94**	**1.5**	**15**	**14**	**7.1**	**10**	**8.8**	**7.1**	**4.5**	**5.8**	**6.3**	**3.4**	**4.2**	**3.4**	**5.2**	**6.8**	**6.7**
vinyl chloride	--	--	--	--	<0.5	<1.0	<2.0	--	--	--	--	ND	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0
xylenes	--	--	--	<0.5	<0.5	<3.0	<6.0	--	--	--	--	ND	<3.0	<3.0	--	<3.0	--	<3.0	<3.0	<3.0

MW-X	3/84	10/85	12/85	2/86	4/86	6/86	8/86	10/86	1987-1991	5/92	5/93	9/95	8/97	12/99	10/03	9/04	10/05	11/06	9/07	10/08	12/09	9/10
1,1,1-trichloroethane	**PP**	<0.2	--	<0.1	--	<0.1	--	<0.2	well dry	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
1,1,2,2-tetrachloroethane	**PP**	<0.2	--	<0.2	--	<0.2	--	<0.2		<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
1,1-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1		<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1		<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
1,2-dichloroethylene, cis	ND	<0.1	--	<0.1	--	<0.1	--	<0.1		<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
1,2-dichloroethylene, trans	ND	<0.1	--	<0.1	--	**0.1**	--	<0.1		<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
benzene	--	<1.0	--	<1.0	--	<1.0	--	--		--	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
ethyl benzene	--	--	--	--	--	--	--	--		--	--	--	<0.5	--	<1.0	--	--	--	--	ND	<1.0	--
tetrachloroethylene	**PP**	<0.2	--	<0.2	--	<0.2	--	<0.2		<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
toluene	--	<1.0	--	<1.0	--	<1.0	--	--		--	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
trichloroethylene (TCE)	**2.2**	**2.1**	**5**	**0.9 s**	**0.9**	**0.9**	**0.7**	**0.5**		<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0
vinyl chloride	--	--	--	--	--	--	--	--		--	--	--	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--
xylenes	--	**3.4 s**	--	<1.0	--	**1.1 s**	--	--		--	--	--	<0.5	<3.0	<3.0	--	--	--	--	ND	<3.0	--

MW-X continued	12/10	3/11	6/11	12/12	12/14
1,1,1-trichloroethane	<1.0	--	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<1.0	--	<1.0	<1.0	<1.0
1,1-dichloroethane	<1.0	--	<1.0	<1.0	<1.0
1,2-dichloroethane	<1.0	--	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	<1.0	--	<1.0	<1.0	<1.0
1,2-dichloroethylene, trans	<1.0	--	<1.0	<1.0	<1.0
benzene	<1.0	--	<1.0	<1.0	<1.0
ethyl benzene	<1.0	--	<1.0	<1.0	<1.0
tetrachloroethylene	<1.0	--	<1.0	<1.0	<1.0
toluene	<1.0	--	<1.0	<1.0	<1.0
trichloroethylene (TCE)	<1.0	<1.0	<1.0	<1.0	**0.61**
vinyl chloride	<1.0	--	<1.0	<1.0	<1.0
xylenes	<3.0	--	<3.0	<3.0	<3.0

MW-Y	3/84	10/85	12/85	2/86	4/86	6/86	8/86	10/86
1,1,1-trichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.2
1,1,2,2-tetrachloroethane	ND	<0.2	--	<0.2	--	<0.2	--	<0.2
1,1-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1
1,2-dichloroethylene, cis	ND	<0.1	--	<0.1	--	<0.1	--	<0.1
1,2-dichloroethylene, trans	ND	<0.1	--	<0.1	--	**0.1**	--	<0.1
benzene	--	<1.0	--	<1.0	--	<1.0	--	--
ethyl benzene	--	--	--	--	--	--	--	--
tetrachloroethylene	ND	<0.2	--	<0.2	--	<0.2	--	<0.2
toluene	--	**4**	--	<1.0	--	<1.0	--	--
trichloroethylene (TCE)	**PP**	<0.3	<0.8	**0.5 s**	<0.2	<0.2	<0.2	<0.2
vinyl chloride	--	--	--	--	--	--	--	--
xylenes	--	**19**	--	<1.0	--	**1.1 s**	--	--

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

MW-Z	3/84	10/85	12/85	2/86	4/86	6/86	8/86	10/86
1,1,1-trichloroethane	ND	0.1	--	<0.1	--	<0.1	--	<0.2
1,1,2,2-tetrachloroethane	ND	<0.2	--	<0.2	--	<0.2	--	<0.2
1,1-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1
1,2-dichloroethylene, cis	ND	<0.1	--	<0.1	--	<0.1	--	<0.1
1,2-dichloroethylene, trans	ND	<0.1	--	<0.1	--	<0.1	--	<0.1
benzene	--	<1.0	--	<1.0	--	<1.0	--	--
ethyl benzene	--	--	--	--	--	--	--	--
tetrachloroethylene	ND	<0.2	--	<0.2	--	<0.2	--	<0.2
toluene	--	5	--	<1.0	--	<1.0	--	--
trichloroethylene (TCE)	PP	<0.3	<0.8	<0.5	<0.2	<0.2	<0.2	<0.2
vinyl chloride	--	--	--	--	--	--	--	--
xylenes	--	11	--	1.3 s	--	<0.1	--	--

MW-1	4/82	12/83	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87
1,1,1-trichloroethane	ND	1.6	0.5	--	0.5	--	1.5	--	0.7 s	0.5
1,1,2,2-tetrachloroethane	ND	PP	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2
1,1-dichloroethane	ND	ND	<0.1	--	0.2	--	<0.1	--	<0.1	<0.1
1,2-dichloroethane	ND	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1
1,2-dichloroethylene, cis	--	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1
1,2-dichloroethylene, trans	--	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1
benzene	<0.2	PP	<1.0	--	<1.0	--	<1.0	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	PP	3.3	--	3	--	3	--	3.6	<0.2
toluene	<0.2	<0.2	1.6	--	<1.0	--	<1.0	--	--	--
trichloroethylene (TCE)	6	27	1.4	1.5	1.4 s	3.1	8.1	9.3	0.9	2.7
vinyl chloride	--	--	--	--	--	--	--	--	--	--
xylenes	<0.2	<0.2	7.8	--	1.3 s	--	<0.1	--	--	--

MW-1 (continued)	7/87	10/87	4/88	7/88	10/88	4/89	7/89	7/90	10/90	4/91	9/91	5/92	11/92	5/93	11/93
1,1,1-trichloroethane	--	--	<0.5	--	--	0.8	--	<0.5	--	<0.5	--	<1.0	--	<0.5	--
1,1,2,2-tetrachloroethane	--	--	15 s	--	--	<1.0	--	<1.0	--	<0.5	--	<1.0	--	<0.5	--
1,1-dichloroethane	--	--	<0.1	--	--	<0.2	--	<0.2	--	<0.5	--	<1.0	--	<0.5	--
1,2-dichloroethane	--	--	<0.1	--	--	<0.2	--	<0.2	--	<0.5	--	<1.0	--	<0.5	--
1,2-dichloroethylene, cis	--	--	<0.1	--	--	<0.5	--	<0.5	--	<0.5	--	<1.0	--	<0.5	--
1,2-dichloroethylene, trans	--	--	<0.1	--	--	<0.3	--	<0.3	--	<0.5	--	<1.0	--	<0.5	--
benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	--	<0.1	--	--	7	--	5.4	--	3.4	--	<1.0	--	1	--
toluene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene (TCE)	0.4	0.8	<0.5	0.5	<0.5	0.8	0.6	0.8	<0.5	3.1	1.3	2.2	0.5	<0.5	<0.5
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MW-2	4/82	12/83
1,1,1-trichloroethane	19	180
1,1,2,2-tetrachloroethane	24	ND
1,1-dichloroethane	12	32
1,2-dichloroethane	16	9.8
1,2-dichloroethylene, cis	--	32
1,2-dichloroethylene, trans	17	ND
benzene	54	550
ethyl benzene	--	--
tetrachloroethylene	24	24
toluene	<1	310
trichloroethylene (TCE)	830	720
vinyl chloride	--	--
xylenes	44	480

MW-5	4/82	12/83
1,1,1-trichloroethane	1.3	6
1,1,2,2-tetrachloroethane	ND	ND
1,1-dichloroethane	ND	2.5
1,2-dichloroethane	ND	PP
1,2-dichloroethylene, cis	--	5.4
1,2-dichloroethylene, trans	--	ND
benzene	<0.2	PP
ethyl benzene	--	--
tetrachloroethylene	--	6.7
toluene	<0.2	<0.2
trichloroethylene (TCE)	100	380
vinyl chloride	--	--
xylenes	<0.2	<0.2

MW-3	4/82	4/82	12/83	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	7/87	10/87	4/88	7/88
1,1,1-trichloroethane	43	43	55	33	--	--	--	--	--	13	9.4	--	--	6.6	--
1,1,2,2-tetrachloroethane	19	19	ND	<0.2	--	--	--	--	--	<0.2	<0.2	--	--	<0.2	--
1,1-dichloroethane	14	16	45	14	--	--	--	--	--	11	11	--	--	9.5	--
1,2-dichloroethane	78	78	1.1	<0.1	--	--	--	--	--	1	<0.1	--	--	<0.1	--
1,2-dichloroethylene, cis	--	--	27	110	--	--	--	--	--	59	39	--	--	13	--
1,2-dichloroethylene, trans	--	--	ND	0.4	--	--	--	--	--	0.2	0.2	--	--	<0.1	--
benzene	130	130	35	<1.0	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	--	20	17	--	--	--	--	--	13	11	--	--	11	--
toluene	<0.2	<0.2	6	<1.0	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--
trichloroethylene (TCE)	780	780	800	1100	770	680	1200	1300	890	720	740	770	960	440	140
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	10	13	PP	<3	--	<1.0	--	<1.0	--	<1.0	--	--	--	--	--

Table C-7: Historic Data - VOCs Detected in Glacial Drift Aquifer (in µg/L)

MW-3 continued	10/88	4/6/89	7/89	5/90	7/90	10/90	4/91	9/91	5/92	11/92	5/93	11/93
1,1,1-trichloroethane	--	**3.2**	--	<5.0	--	--	**4.3**	--	**1.4**	--	**1.5**	--
1,1,2,2-tetrachloroethane	--	<5.0	--	<10	--	--	<0.5	--	<1.0	--	<0.5	--
1,1-dichloroethane	--	**11**	--	**8.9**	--	--	**11**	--	**3.8**	--	**3.8**	--
1,2-dichloroethane	--	<1.0	--	<2.0	--	--	<0.5	--	<1.0	--	<0.5	--
1,2-dichloroethylene, cis	--	**13**	--	**11**	--	--	**32**	--	**25**	--	**33**	--
1,2-dichloroethylene, trans	--	<1.5	--	<3.0	--	--	<0.5	--	<1.0	--	<0.5	--
benzene	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	**5.7**	--	<10	--	--	**8.3**	--	**2.8**	--	**3.7**	--
toluene	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene (TCE)	98	**350**	**340**	**520**	**770**	**310**	**1500**	**300**	**400**	**170**	**470**	**740**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	--	--	--	--	--	--	--	--	--	--	--

MW-4	4/82	12/83	11/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/88	5/90
1,1,1-trichloroethane	ND	**6**	**9.1**	--	--	--	--	--	**1.7**	**1.3**	**1.2**	**2.3**
1,1,2,2-tetrachloroethane	ND	ND	<0.2	--	--	--	--	--	<0.2	<0.2	<0.2	<1.0
1,1-dichloroethane	ND	**4.3**	**5.2**	--	--	--	--	--	**2.7**	**1.4**	**0.5**	**0.9**
1,2-dichloroethane	ND	**PP**	<0.1	--	--	--	--	--	**0.4**	<0.1	<0.1	<0.2
1,2-dichloroethylene, cis	--	**5**	**22**	--	--	--	--	--	**3.3**	**1.2**	**1.1**	**2.9**
1,2-dichloroethylene, trans	--	ND	<0.1	--	--	--	--	--	<0.1	<0.1	<0.1	<0.3
benzene	<0.2	**PP**	<1.0	--	<1.0	--	<1.0	--	<1.0	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	**6.7**	**4.8**	--	--	--	--	--	**3.4**	**2.4**	**1.6**	**1.9**
toluene	<0.2	<0.2	<1.0	--	<1.0	--	<1.0	--	<1.0	--	--	--
trichloroethylene (TCE)	**4.5**	**380**	**440**	**440**	**200**	**210**	**180**	**280**	**200**	**120**	**55**	**77**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	<0.2	<0.2	<1.0	--	<1.0	--	<1.0	--	<1.0	--	--	--

Data sources: see Table C-13

exceeds HBV or HRL

TCE exceeds 270 ug/L (Consent Order limit)

-- compound not analyzed

ND - not detected (detection limit not provided in report)

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

≤ indicates compound may be present at concentrations up to the value reported, but interference with another compound makes exact results uncertain

PP - compound detected below the MDL, but concentration and MDL not reported

M - indicates this is a "split" sample that was analyzed by the MDH laboratory

b - potential false positive based on blank data validation procedures

J - Reported value is less than the stated laboratory quantitation limit and is considered an estimated value.

d - duplicate sample

s - potential false positive value based on statistical analysis of blank sample data

Table C-8: Historic Data - VOCs Detected in Carimona Member Aquifer (in µg/L)

MW-II	4/82	6/82	12/82	12/83	10/85	12/85	2/86	4/86	6/86	8/86	11/86
1,1,1-trichloroethane	3.7	3.9	7.1	2.5	2.6	--	7.4	--	3.4	--	2.3
1,1,2,2-tetrachloroethane	5.8	6.1	6.4	--	<0.2	--	<0.2	--	<0.2	--	<0.2
1,1-dichloroethane	6.7	6.4	4.1	3.1	3.3	--	2	--	0.7	--	0.3
1,2-dichloroethane	1.5	2.4	ND	PP	<0.1	--	0.2	--	0.8	--	<0.1
1,2-dichloroethylene, cis	--	--	--	41	36	--	62	--	22	--	14
1,2-dichloroethylene, trans	--	--	--	1.2	1.2	--	2	--	1	--	0.3
benzene	ND	ND	ND	<5.3	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	--	--	PP	2.3	--	3.7	--	2.6	--	1.9
toluene	ND	ND	ND	<4.5	--	--	--	--	--	--	--
trichloroethylene (TCE)	900	910	880	380	360	700	680	480	400	230	230
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--
xylenes	ND	ND	ND	<31	--	--	--	--	--	--	--

MW-RR	4/82	5/82	12/82	12/83	10/85
1,1,1-trichloroethane	ND	ND	ND	PP	1.4
1,1,2,2-tetrachloroethane	ND	ND	ND	ND	<0.2
1,1-dichloroethane	ND	ND	ND	1	2.2
1,2-dichloroethane	ND	ND	ND	PP	0.2
1,2-dichloroethylene, cis	--	--	--	5.6	17
1,2-dichloroethylene, trans	--	--	--	ND	<0.1
benzene	ND	ND	ND	<5.3	--
ethyl benzene	--	--	--	--	--
tetrachloroethylene	--	--	--	PP	0.3
toluene	24	26	ND	<4.5	--
trichloroethylene (TCE)	41	46	43	33	110
vinyl chloride	--	--	--	--	--
xylenes	32	37	ND	<31	--

MW-RR (continued)	12/85	2/86	4/86	6/86	8/86	11/86	4/87	4/88	4/89	5/90	4/91	5/92	5/93
1,1,1-trichloroethane	--	1.2	--	1.2	--	1.1 s	0.9	1.1	1.1	0.5	0.9	<1.0	<0.5
1,1,2,2-tetrachloroethane	--	<0.2	--	<0.2	--	<0.2	<0.2	3.2	--	<1.0	<0.5	<1.0	<0.5
1,1-dichloroethane	--	2.3	--	2.3	--	2.8	<0.1	2.6	9.7	2.3	2.2	<1.0	1.3
1,2-dichloroethane	--	0.2	--	<0.1	--	<0.1	<0.1	<0.1	<0.4	<0.2	<0.5	<1.0	<0.5
1,2-dichloroethylene, cis	--	18	--	15	--	17	12.9	20	26	47	15	16	39
1,2-dichloroethylene, trans	--	0.1	--	0.1	--	<0.1	0.2	<0.1	<0.6	0.5	<0.5	<1.0	<0.5
benzene	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	0.3	--	0.3	--	0.2	<0.2	<0.2	<2.0	<1.0	0.5	9.9	<0.5
toluene	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene (TCE)	95	88	170	85	100	100	110	220	180	60	150	110	93
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	--	--	--	--	--	--	--	--	--	--	--	--

MW-SS	12/82	12/83	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/88	4/89	5/90	4/91	5/92	5/93	9/95	8/97	12/99	10/03	9/04
1,1,1-trichloroethane	ND	ND	<0.1	--	<0.1	--	<0.1	--	1.3	<0.2	<0.5	1.3	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--
1,1,2,2-tetrachloroethane	ND	PP	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<2.0	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--
1,1-dichloroethane	10	16	14	--	13	--	11	--	13	15	<0.1	17	11	9.3	7	3.2	3	3.8	<1.0	3	--
1,2-dichloroethane	ND	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.4	<0.2	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--
1,2-dichloroethylene, cis	--	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	0.5	<0.1	<1.0	2	1.6	<1.0	1.2	<0.5	0.6	<1.0	<1.0	--
1,2-dichloroethylene, trans	--	ND	<0.1	--	0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.6	0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--
benzene	ND	<5.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	--
tetrachloroethylene	--	PP	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	2.8	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--
toluene	ND	<4.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	--
trichloroethylene (TCE)	<0.5	PP	0.4	1.2	<0.5	0.4	0.3	0.3	<0.2	1.2	<0.5	21	4.1	4.5	2.2	2.5	0.89	1.4	<1.0	2.9	3
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	<1.0	--
xylenes	ND	<31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<3.0	<3.0	--

Table C-8: Historic Data - VOCs Detected in Carimona Member Aquifer (in µg/L)

MW-SS (continued)	10/15	10/15	9/07	10/08	11/09	9/10	3/11	6/11
1,1,1-trichloroethane	--	--	--	ND	<1.0	<1.0		
1,1,2,2-tetrachloroethane	--	--	--	ND	<1.0	<1.0		
1,1-dichloroethane	--	--	--	**3**	**3.2**	**3**		
1,2-dichloroethane	--	--	--	ND	<1.0	<1.0		
1,2-dichloroethylene, cis	--	--	--	ND	**1.5**	**2.2**		
1,2-dichloroethylene, trans	--	--	--	ND	<1.0	<1.0		
benzene	--	--	--	ND	<1.0	<1.0		
ethyl benzene	--	--	--	ND	<1.0	<1.0		
tetrachloroethylene	--	--	--	ND	<1.0	<1.0		
toluene	--	--	--	ND	<1.0	<1.0		
trichloroethylene (TCE)	<1.0	**1.3**	**3**	<1.0	**5.2**	<1.0		
vinyl chloride	--	--	--	ND	<1.0	<1.0		
xylenes	--	--	--	ND	<3.0	<3.0		

MW-UU	12/82	12/83	10/85	12/85	2/86	4/86	6/86	8/86
1,1,1-trichloroethane	**2.9**	**2.5**	**3**	--	**2.1**	--	**1.1**	--
1,1,2,2-tetrachloroethane	**1.5**	**PP**	<0.2	--	**0.5**	--	<0.2	--
1,1-dichloroethane	**1.1**	**1.7**	**2.5**	--	**1.2**	--	**0.5**	--
1,2-dichloroethane	ND	**PP**	<0.1	--	<0.1	--	<0.1	--
1,2-dichloroethylene, cis	--	**1**	**1.4**	--	**2.3**	--	**0.4**	--
1,2-dichloroethylene, trans	--	ND	<0.1	--	<0.1	--	<0.1	--
benzene	ND	**PP**	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--
tetrachloroethylene	--	**PP**	**1.6**	--	**0.6**	--	**0.4**	--
toluene	ND	<4.5	--	--	--	--	--	--
trichloroethylene (TCE)	**78**	**81**	**150**	**79**	**71**	**81**	**37**	**45**
vinyl chloride	--	--	--	--	--	--	--	--
xylenes	ND	<31	--	--	--	--	--	--

MW-UU (continued)	10/86	4/87	4/88	4/89	5/90	4/91	5/92	5/93	9/95	8/97	12/99	10/03	9/04	10/05	10/06	9/07	10/08	11/09	9/10
1,1,1-trichloroethane	**0.5 s**	**0.2**	<0.5	**1**	**1.5**	<0.5	<1.0	<0.5	<0.5	**0.9**	<1.0	**1.5**	--	--	--	--	ND	<1.0	**1**
1,1,2,2-tetrachloroethane	<0.2	<0.2	**1.0 s**	<1.0	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
1,1-dichloroethane	**0.4**	<0.1	**0.21**	**1.4**	**0.6**	**0.7**	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
1,2-dichloroethane	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
1,2-dichloroethylene, cis	**0.7**	**0.1**	**2.1**	**11**	**2**	**7.8**	**3.1**	**3.1**	<0.5	**1.1**	<1.0	<1.0	--	--	--	--	**4.7**	**1.9**	<1.0
1,2-dichloroethylene, trans	<0.1	<0.1	<0.1	<0.3	<0.3	**1.8**	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
benzene	--	--	--	--	--	--	--	--	1.3	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	<1.0	--	--	--	--	ND	<1.0	<1.0
tetrachloroethylene	**0.3**	**0.2**	<0.2	<1.0	<1.0	<0.5	<1.0	<0.5	<0.5	**0.6**	<1.0	<1.0	--	--	--	--	ND	**1.4**	**1.5**
toluene	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
trichloroethylene (TCE)	**36**	**12**	**23**	**38**	**39**	**64**	**23**	**29**	**6**	**48**	**44**	**25**	**53**	**19**	**1.3**	**53**	**76**	**62**	**47**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
xylenes	--	--	--	--	--	--	--	--	<0.5	<0.5	<3.0	<3.0	--	--	--	--	ND	<3.0	<3.0

MW-WW	12/82	12/83	10/85	12/85	2/86	4/86	6/86	8/86	11/86	4/87	4/88	4/89	7/89	5/90	4/91	5/92	5/93
1,1,1-trichloroethane	**22**	**22**	**1.9**	--	**11**	--	**3.7**	--	**3.5**	**3.4**	<0.5	<25	--	**<5.0**	**2.9**	**2.4**	<0.5
1,1,2,2-tetrachloroethane	**22**	**PP**	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<50	--	<10	<0.5	<1.0	<0.5
1,1-dichloroethane	**7.7**	**6.2**	**12**	--	**3.1**	--	**0.9**	--	**0.8**	**1.5**	**3**	<10	--	**2.2**	**2.1**	**2.8**	<0.5
1,2-dichloroethane	ND	ND	**0.3**	--	<0.1	--	<0.1	--	<0.1	<0.1	**0.62 s**	<10	--	<2.0	<0.5	<1.0	<0.5
1,2-dichloroethylene, cis	--	**200**	**300**	--	**53**	--	**16**	--	**15**	**10**	**30**	**14**	--	**44**	**23**	**72**	**27**
1,2-dichloroethylene, trans	--	**3.3**	**5.2**	--	**1.1**	--	**0.9**	--	**0.7**	**0.5**	<0.1	**0.5**	--	**3.2**	**2.6**	**2.1**	**1.4**
benzene	ND	<5.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	**20**	**22**	--	**16**	--	**4.7**	--	**7.2**	**5.7**	**7.9**	<50	--	<10	**4**	**5.5**	<0.5
toluene	ND	<4.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene (TCE)	**2100**	**1700**	**2300**	**1200**	**740**	**540**	**290**	**220**	**290**	**290**	**320**	**530**	**87**	**450**	**420**	**700**	**130**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	ND	<31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-8: Historic Data - VOCs Detected in Carimona Member Aquifer (in µg/L)

MW-8	4/83	12/83	10/85	12/85	2/86	4/86	6/86	8/86	11/86	4/87	4/88	4/89	5/90	4/91	5/92	5/93	9/95	8/97	12/99	12/01	12/01d
1,1,1-trichloroethane	**2.8**	**PP**	**32**	--	**2**	--	**1.5**	--	**1.3**	**0.8**	**0.84**	**0.7**	**2.1**	**1**	<1.0	<0.5	<0.5	--	<1.0	--	--
1,1,2,2-tetrachloroethane	ND	--	<0.2	--	**0.3**	--	<0.2	--	<0.2	<0.2	<0.2	<1.0	<2.5	<0.5	<1.0	<0.5	<0.5	--	<1.0	--	--
1,1-dichloroethane	**2.5**	**2.5**	**11**	--	**0.3**	--	**0.2**	--	<0.1	<0.1	**0.22**	**3.1**	<0.5	<0.5	<1.0	**0.6**	<0.5	**0.6**	<1.0	--	--
1,2-dichloroethane	ND	--	**0.1**	--	**2.2**	--	**2.4**	--	**0.7**	**5**	**3.8**	**4.7**	**0.7**	**0.8**	<1.0	**0.8**	<0.5	--	<1.0	--	--
1,2-dichloroethylene, cis	--	**77**	**220**	--	**12**	--	**7.3**	--	**5.1**	**3.3**	**30 s**	**26**	**4.5**	**1.9**	**1.4**	**2.3**	<0.5	**1**	<1.0	--	--
1,2-dichloroethylene, trans	**140**	**3**	**4.2**	--	0.3	--	**0.4**	--	<0.1	<0.1	<0.1	**0.4**	**<0.8**	<0.5	<1.0	<0.5	<0.5	--	<1.0	--	--
benzene	**≤150**	<5.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	**6.5**	**6.7**
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	<1.0
tetrachloroethylene	**5.4**	**PP**	**28**	--	**4.4**	--	**2.7**	--	**2.7**	**1.7**	**2.8**	**3**	<2.5	**1.2**	<1.0	**0.6**	<0.5	**0.7**	<1.0	--	--
toluene	<0.2	<4.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	<1.0
trichloroethylene (TCE)	**820**	**96**	**2300**	**650**	**240**	**180**	**140**	**160**	**110**	**86**	**160**	**380**	**100**	**80**	**47**	**92**	**40**	**36**	**30**	--	--
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	--	--
xylenes	<0.2	<31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	--	<3.0	<3.0	<3.0

MW-8 continued	10/05	12/02
1,1,1-trichloroethane	--	--
1,1,2,2-tetrachloroethane	--	--
1,1-dichloroethane	--	--
1,2-dichloroethane	--	--
1,2-dichloroethylene, cis	--	--
1,2-dichloroethylene, trans	--	--
benzene	**15**	**8.6**
ethyl benzene	<1.0	<1.0
tetrachloroethylene	--	--
toluene	<1.0	<1.0
trichloroethylene (TCE)	--	--
vinyl chloride	--	--
xylenes	<3.0	<3.0

MW-9	12/83	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	7/87	10/87	4/88	7/88	10/88
1,1,1-trichloroethane	ND	**0.3**	--	**1.1**	--	**1.3**	--	**2.7**	**1.4**	--	--	<0.5	--	--
1,1,2,2-tetrachloroethane	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	--	--	<0.2	--	--
1,1-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	**0.1**	<0.1	--	--	**0.12**	--	--
1,2-dichloroethane	ND	**2.8**	--	**0.3**	--	<0.1	--	<0.1	<0.1	--	--	**4.2**	--	--
1,2-dichloroethylene, cis	ND	**0.7**	--	**0.4**	--	**0.2**	--	<0.1	<0.1	--	--	<0.1	--	--
1,2-dichloroethylene, trans	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	--	--	**0.46**	--	--
benzene	<5.3	--	--	--	--	--	--	<1.0	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	ND	**0.4**	--	**0.2**	--	<0.2	--	<0.2	<0.2	--	--	<0.2	--	--
toluene	<4.5	--	--	--	--	--	--	<1.0	--	--	--	--	--	--
trichloroethylene (TCE)	<0.5	**17**	**10**	**6.7**	**8**	**6.1**	**6.7**	**5.4**	**5.1**	**0.6**	**9.5**	**4.5**	**1.7**	**10**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	<31	--	--	--	--	--	--	<1.0	--	--	--	--	--	--

MW-9 continued	4/89	7/89	10/89	5/90	7/90	10/90	4/91	9/91	5/92	11/92	5/93	11/93	1/96	8/97	12/99	12/01	12/02	10/03	9/04	10/05	11/06
1,1,1-trichloroethane	<0.5	--	--	<0.5	--	--	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--
1,1,2,2-tetrachloroethane	<1.0	--	--	<1.0	--	--	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--
1,1-dichloroethane	**0.8**	--	--	**0.8**	--	--	**1.5**	--	<1.0	--	**0.5**	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--
1,2-dichloroethane	**5.4**	--	--	**3.5**	--	--	**3.8**	--	**1.8**	--	**0.6**	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--
1,2-dichloroethylene, cis	**1**	--	--	**0.7**	--	--	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--
1,2-dichloroethylene, trans	<0.3	--	--	<0.3	--	--	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--
benzene	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	**12**	**8.6**	**12**	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0	--	--	--
tetrachloroethylene	<1.0	--	--	<1.0	--	--	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--
toluene	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	--	--	--
trichloroethylene (TCE)	**9.8**	**9.9**	**12**	**8.5**	**43**	**9.4**	**7.3**	**10**	**3.2**	**2.4**	**1.9**	**0.78**	<0.5	**3.7**	**15**	--	--	**1.1**	**1.2**	--	**1.6**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	--	--	<1.0	--	--	--
xylenes	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<3.0	<3.0	<3.0	<3.0	--	--	--

Table C-8: Historic Data - VOCs Detected in Carimona Member Aquifer (in µg/L)

MW-9 continued	11/06d	9/07	10/08	9/10
1,1,1-trichloroethane	--	--	--	<1.0
1,1,2,2-tetrachloroethane	--	--	--	<1.0
1,1-dichloroethane	--	--	--	1.1
1,2-dichloroethane	--	--	--	<1.0
1,2-dichloroethylene, cis	--	--	--	1.6
1,2-dichloroethylene, trans	--	--	--	<1.0
benzene	--	4.7	--	4.8
ethyl benzene	--	<1.0	--	<1.0
tetrachloroethylene	--	--	--	<1.0
toluene	--	<1.0	--	<1.0
trichloroethylene (TCE)	1.7	1.2	1.1	3.3
vinyl chloride	--	--	--	<1.0
xylenes	--	<3.0	--	<3.0

MW-10	12/83	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	7/87	10/87
1,1,1-trichloroethane	ND	18	--	5.4	--	4	--	2.1	1.3	--	--
1,1,2,2-tetrachloroethane	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	--	--
1,1-dichloroethane	ND	8.6	--	0.9	--	0.6	--	0.2	0.2	--	--
1,2-dichloroethane	ND	<0.1	--	0.5	--	2	--	2.9	1.6	--	--
1,2-dichloroethylene, cis	PP	230	--	29	--	14	--	11	4.5	--	--
1,2-dichloroethylene, trans	ND	6.7	--	0.9	--	0.7	--	0.3	0.2	--	--
benzene	<0.2	--	--	--	--	--	--	<1.0	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	ND	5.9	--	2.7	--	2.5	--	2.4	1.5	--	--
toluene	<0.2	--	--	--	--	--	--	<1.0	--	--	--
trichloroethylene (TCE)	2.6	1500	1100	420	290	280	270	220	120	150	170
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--
xylenes	<0.2	--	--	--	--	--	--	<1.0	--	--	--

MW-10 (continued)	4/88	7/88	10/88	4/89	7/89	10/89	5/90	7/90	10/91	4/91	9/91	5/92	11/92	5/93	11/93	9/95	8/97	12/99	12/01	12/02	10/03
1,1,1-trichloroethane	0.9	--	--	2.9	--	--	3	--	--	2.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	1.2
1,1,2,2-tetrachloroethane	<0.2	--	--	<1.0	--	--	<2.5	--	--	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0
1,1-dichloroethane	<0.1	--	--	<0.2	--	--	0.7	--	--	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0
1,2-dichloroethane	0.73	--	--	<0.2	--	--	4	--	--	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0
1,2-dichloroethylene, cis	3.5	--	--	5.5	--	--	17	--	--	1.8	--	1.2	--	<0.5	--	<0.5	0.7	<1.0	--	--	<1.0
1,2-dichloroethylene, trans	<0.1	--	--	<0.3	--	--	0.9	--	--	<0.5	--	<1.0	--	<0.5	--	<0.5	--	<1.0	--	--	<1.0
benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0
tetrachloroethylene	0.8	--	--	1.4	--	--	<2.5	--	--	1	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0
toluene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
trichloroethylene (TCE)	56	34	58	160	99	140	150	180	130	110	120	58	59	46	43	38	34	32	--	--	15
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	--	--	<1.0
xylenes	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<3.0	<3.0	<3.0	<3.0

MW-10 continued	10/03d	9/04	10/05	11/06	9/07	11/08	12/09	9/10
1,1,1-trichloroethane	1.2	--	--	--	--	ND	--	<1.0
1,1,2,2-tetrachloroethane	<1.0	--	--	--	--	ND	--	<1.0
1,1-dichloroethane	<1.0	--	--	--	--	ND	--	<1.0
1,2-dichloroethane	<1.0	--	--	--	--	ND	--	<1.0
1,2-dichloroethylene, cis	<1.0	--	--	--	--	ND	--	<1.0
1,2-dichloroethylene, trans	<1.0	--	--	--	--	ND	--	<1.0
benzene	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethyl benzene	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	<1.0	--	--	--	--	ND	--	<1.0
toluene	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene (TCE)	16	14	21	14	14	9.6	14	13
vinyl chloride	<1.0	--	--	--	--	ND	--	<1.0
xylenes	<3.0	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Table C-8: Historic Data - VOCs Detected in Carimona Member Aquifer (in µg/L)

MW-11	12/83	10/85	12/85	2/86	4/86	6/86	8/86	6/86	10/86	4/87	7/87	10/87	4/88	7/88	10/88	7/89	10/89	5/90	4/89	7/90	10/90
1,1,1-trichloroethane	**PP**	<0.1	--	**1**	--	**1**	--	--	**0.4 s**	**1.8**	--	--	**2.3**	--	--	--	--	<0.5	<2.5	--	--
1,1,2,2-tetrachloroethane	ND	<0.2	--	**0.2**	--	<0.2	--	--	<0.2	<0.2	--	--	<0.2	--	--	--	--	<1.0	<5.0	--	--
1,1-dichloroethane	**1**	**0.4**	--	**3.5**	--	**0.9**	--	--	**0.4**	**0.2**	--	--	**0.14**	--	--	--	--	**0.2**	<1.0	--	--
1,2-dichloroethane	ND	<0.1	--	**0.4**	--	<0.1	--	--	**0.1**	**1.5**	--	--	**0.53**	--	--	--	--	**0.5**	<1.0	--	--
1,2-dichloroethylene, cis	**12**	**2.6**	--	**92**	--	**17**	--	--	**15**	--	--	--	**6**	--	--	--	--	**4.4**	**7.6**	--	--
1,2-dichloroethylene, trans	ND	<0.1	--	**1.6**	--	**0.2**	--	--	**0.2**	--	--	--	<0.1	--	--	--	--	<0.3	<1.5	--	--
benzene	<5.3	--	--	--	--	--	--	<1.0	<1.0	--	--	--	--	--	<0.5	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	--	--	--	--	--	--
tetrachloroethylene	**PP**	<0.2	--	**1.2**	--	**0.8**	--	--	**0.6**	**1.6**	--	--	**1.3**	--	--	--	--	<1.0	<5.0	--	--
toluene	<4.5	--	--	--	--	--	--	<1.0	<1.0	--	--	--	--	--	<0.5	--	--	--	--	--	--
trichloroethylene (TCE)	**120**	**2.7**	**520**	**250**	**120**	**58**	**67**	**58**	**40**	**160**	**25**	**180**	**79**	**0.3**	**0.7**	**3.6**	**5**	<0.5	**110**	**16**	**240**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	<0.2	--	--	--	--	--	--	<1.0	<1.0	--	--	--	--	--	<0.5	--	--	--	--	--	--

MW-11 continued	4/91	9/91	5/92	11/92	5/93	11/93	9/95	8/97	12/99	12/01	12/02	10/03	9/04	10/05	10/06	9/07	10/08	11/09	9/10
1,1,1-trichloroethane	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--	--	--	<1.0	<1.0
1,1,2,2-tetrachloroethane	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--	--	--	<1.0	<1.0
1,1-dichloroethane	**0.7**	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--	--	--	**2.2**	**1.6**
1,2-dichloroethane	**1.6**	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--	--	--	<1.0	<1.0
1,2-dichloroethylene, cis	**12**	--	**6.7**	--	**4.8**	--	**1.2**	**2.4**	<1.0	--	--	**7.5**	--	--	--	--	--	**100**	**130**
1,2-dichloroethylene, trans	<0.5	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--	--	--	**2.6**	**2.6**
benzene	--	--	--	--	--	--	**0.78**	<0.5	<1.0	**3.5**	**2.7**	**6.9**	--	**5.7**	--	**3.8**	--	**2**	**2.2**
ethyl benzene	--	--	--	--	--	--	--	--	--	<1.0	<2.0	<2.0	--	<1.0	--	<1.0	--	<1.0	<1.0
tetrachloroethylene	**0.6**	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	<1.0	--	--	--	--	--	<1.0	<1.0
toluene	--	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	<2.0	<2.0	--	<1.0	--	<1.0	--	<1.0	<1.0
trichloroethylene (TCE)	**8.7**	**3.2**	**190**	**66**	**120**	**180**	**3.3**	**12**	**55**	--	--	**48**	**21**	**37**	**49**	**21**	**30**	**100**	**65**
vinyl chloride	--	--	--	--	--	--	--	--	<1.0	--	--	<1.0	--	--	--	--	--	<1.0	<1.0
xylenes	--	--	--	--	--	--	<0.5	<0.5	<3.0	<3.0	<6.0	<6.0	--	<3.0	--	--	--	<3.0	<3.0

MW-12	12/83	11/85	12/85	2/86	4/86	6/86	8/86	2/86	10/86	4/87	7/87	10/87	4/88	7/88	10/88	7/89	5/90	7/90	4/89	10/90	4/91
1,1,1-trichloroethane	**PP**	<0.1	--	**0.1**	--	<0.2	--	--	<0.2	<0.2	--	--	<0.5	--	--	--	<0.5	--	<0.5	--	<0.5
1,1,2,2-tetrachloroethane	ND	<0.2	--	<0.2	--	<0.2	--	--	<0.2	<0.2	--	--	<0.2	--	--	--	<1.0	--	<1.0	--	<0.5
1,1-dichloroethane	**1**	**0.8**	--	**0.4**	--	**0.2**	--	--	<1.0	<1.0	--	--	<1.0	--	--	--	<0.2	--	<2.0	--	<0.5
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	--	<1.0	<1.0	--	--	<1.0	--	--	--	<0.2	--	<2.0	--	<0.5
1,2-dichloroethylene, cis	ND	<0.1	--	<0.1	--	<0.1	--	--	<1.0	<1.0	--	--	<1.0	--	--	--	<0.5	--	<0.5	--	<0.5
1,2-dichloroethylene, trans	ND	<0.1	--	<0.1	--	<0.1	--	--	<1.0	<1.0	--	--	<1.0	--	--	--	<0.3	--	<0.3	--	<0.5
benzene	<5.3	--	--	--	--	--	--	<0.5	<1.0	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	<0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	ND	<0.2	--	<0.2	--	<0.2	--	--	<0.2	<0.2	--	--	<0.2	--	--	--	<1.0	--	<1.0	--	<0.5
toluene	<4.5	--	--	--	--	--	--	<0.5	<1.0	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene (TCE)	**PP**	<0.2	<0.8	<0.5	**0.5**	<0.2	**0.2**	<0.5	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	**1.0 s**	**2.1**	**0.7**	<0.5	<0.5	<0.5	<0.5
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	<0.2	--	--	--	--	--	--	<0.5	<1.0	--	--	--	--	--	--	--	--	--	--	--	--

Table C-8: Historic Data - VOCs Detected in Carimona Member Aquifer (in µg/L)

MW-12, continued	9/91	5/92	11/92	5/93	11/93	9/95	8/97	12/99	12/01	9/04	10/05	10/06	12/02	10/03	9/07	9/10
1,1,1-trichloroethane	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	--	--	--	<1.0	--	<1.0
1,1,2,2-tetrachloroethane	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	--	--	--	<1.0	--	<1.0
1,1-dichloroethane	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	--	--	--	<1.0	--	<1.0
1,2-dichloroethane	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	--	--	--	<1.0	--	<1.0
1,2-dichloroethylene, cis	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	--	--	--	<1.0	--	<1.0
1,2-dichloroethylene, trans	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	--	--	--	<1.0	--	<1.0
benzene	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0	<1.0
ethyl benzene	--	--	--	--	--	--	--	--	<1.0	--	<1.0	--	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	--	<1.0	--	<0.5	--	<0.5	<0.5	<1.0	--	--	--	--	--	<1.0	--	<1.0
toluene	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	--	--	--	<1.0	<1.0	--	<1.0
trichloroethylene (TCE)	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	--	<1.0	<1.0	<1.0	--	**1.7**	<1.0	<1.0
vinyl chloride	--	--	--	--	--	--	--	<1.0	--	--	--	--	--	<1.0	--	<1.0
xylenes	--	--	--	--	--	<0.5	<0.5	<3.0	<3.0	--	<3.0	--	<3.0	<3.0	<3.0	<3.0

MW-13	3/84	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/88	4/89	5/90	4/91	5/92	5/93
1,1,1-trichloroethane	**0.9**	<0.1	--	<0.1	--	**1.7**	--	<0.2	**1**	<0.5	<2.5	**1.8**	<0.5	<1.0	<0.5
1,1,2,2-tetrachloroethane	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<5.0	<1.0	<0.5	<1.0	<0.5
1,1-dichloroethane	**1.3**	**0.2**	--	**1**	--	**1.4**	--	**0.1**	**0.2**	<1.0	<1.0	**0.6**	<0.5	<1.0	<0.5
1,2-dichloroethane	ND	<0.1	--	<0.1	--	**0.3**	--	<1.0	**0.7**	**0.53**	<1.0	**1.7**	<0.5	<1.0	<0.5
1,2-dichloroethylene, cis	**≤1.5**	**1**	--	**25**	--	**31**	--	**5.4**	**9.1**	**0.7**	**8.1**	**12**	<0.5	**1.3**	**1.1**
1,2-dichloroethylene, trans	**≤1.5**	<0.1	--	**0.3**	--	**1.3**	--	<1.0	**0.4**	<1.0	<1.5	**1.2**	<0.5	<1.0	<0.5
benzene	<0.25	--	--	--	--	--	--	<1.0	--	--	--	<1.0	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	ND	<0.2	--	<0.2	--	**0.3**	--	<0.2	**0.5**	<0.2	<5.0	<1.0	<0.5	<1.0	<0.5
toluene	<0.3	--	--	--	--	--	--	<1.0	--	--	--	<1.0	--	--	--
trichloroethylene (TCE)	**25**	**1.9**	**21**	**9.7**	**120**	**130**	**14**	**0.5**	**140**	<0.5	**110**	**110**	<0.5	**71**	**26**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	<0.3	--	--	--	--	--	--	<1.0	--	--	--	<1.0	--	--	--

MW-108	11/83	1/84	11/85	12/85	2/86	4/86	6/86	8/86	10/86	10/86	4/87	7/87	10/87	4/88	7/88
1,1,1-trichloroethane	**3.6**	**10**	**10**	--	**8**	--	**5.1**	--	<0.2	**6.1**	**4.1**	--	--	**2.4**	--
1,1,2,2-tetrachloroethane	--	**≤7.7**	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	--	--	<0.2	--
1,1-dichloroethane	**4.6**	**7**	**6.8**	--	**4.7**	--	**3.9**	--	**0.1**	**4.1**	**3.5**	--	--	**1.4**	--
1,2-dichloroethane	**0.1**	--	<0.1	--	**0.6**	--	**0.4**	--	<1.0	**1.4**	**0.7**	--	--	**0.21**	--
1,2-dichloroethylene, cis	**150**	**≤200**	**350**	--	**100**	--	**54**	--	**5.4**	**72**	**36**	--	--	**24**	--
1,2-dichloroethylene, trans	--	**≤200**	**3.8**	--	**2.7**	--	**2.3**	--	<1.0	**1.5**	**1.5**	--	--	<1.0	--
benzene	<0.2	**PP**	--	--	--	--	--	--	<1.0	<1.0	<0.5	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	<0.5	--	--	--	--
tetrachloroethylene	**9**	**≤7.7**	**9**	--	**7**	--	**7.4**	--	<0.2	**6.8**	**4.8**	--	--	**3.1**	--
toluene	<0.2	<0.3	--	--	--	--	--	--	<1.0	<1.0	<0.5	--	--	--	--
trichloroethylene (TCE)	**1100**	**1100**	**1500**	**820**	**700**	**750**	**640**	**580**	**0.5**	**540**	**450**	**580**	**560**	**200**	**96**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	<0.2	<0.3	--	--	--	--	--	--	<1.0	<1.0	<0.5	--	--	--	--

Table C-8: Historic Data - VOCs Detected in Carimona Member Aquifer (in µg/L)

MW-108, continued	12/89	4/89	7/89	10/88	12/89	5/90	7/90	10/90	4/91	9/91	5/92	6/93	11/93
1,1,1-trichloroethane	--	<2.5	--	--	**10**	<5.0	--	--	**2.2**	--	**1.7**	**0.87**	--
1,1,2,2-tetrachloroethane	--	<5.0	--	--	<20	<10	--	--	<0.5	--	<1.0	<0.5	--
1,1-dichloroethane	--	<1.0	--	--	<4.0	**3.6**	--	--	**3.1**	--	**3.1**	**3.2**	--
1,2-dichloroethane	--	<1.0	--	--	<4.0	<2.0	--	--	<0.5	--	<1.0	<0.5	--
1,2-dichloroethylene, cis	--	**37**	--	--	**45**	**59**	--	--	**34**	--	**61**	**88**	--
1,2-dichloroethylene, trans	--	<1.5	--	--	<6.0	**4.5**	--	--	**1.9**	--	**2.3**	**2.2**	--
benzene	<20	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	<5.0	--	--	<20	<10	--	--	**3.4**	--	**3.5**	**2.9**	--
toluene	<20	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene (TCE)	**490**	**530**	**340**	**87**	**490**	**570**	**400**	**420**	**710**	**76**	**380**	**640**	**300**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	<20	--	--	--	--	--	--	--	--	--	--	--	--

Data sources: see Table C-13

(light shading) exceeds HBV or HRL

(dark shading) TCE exceeds 27 ug/L (Consent Order limit)

-- compound not analyzed

ND - not detected (detection limit not provided in report)

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

≤ indicates compound may be present at concentrations up to the value reported, but interference with another compound makes exact results uncertain

PP - compound detected below the MDL, but concentration and MDL not reported

M - indicates this is a "split" sample that was analyzed by the MDH laboratory

b - potential false positive based on blank data validation procedures

J - Reported value is less than the stated laboratory quantitation limit and is considered an estimated value.

d - duplicate sample

s - potential false positive value based on statistical analysis of blank sample data

Table C-9: Historic Data - VOCs Detected in Magnolia Member Aquifer (in µg/L)

Magnolia Pump-Out #MG-1	6/91	3/93	1/99	6/99	12/99	3/00	11/00	2/01	8/01	11/01	2/02	3/03	8/03	2/04	9/04	3/05	10/05	2/06	8/06	2/07	2/07d	8/07
1,1,1-trichloroethane	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane	1	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	2.6	1.4	1.8	1.7	<1.0	2.2	2.9	2.1	2.6	2.3	1.8	3.3	2.9	4.1	5.4	5.2	6	4.1	4.9	4.4	4.4	4
1,2-dichloroethylene, trans	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.3	1.7	1.9	2.7	2.6	5.7	2.5	1.7	1.4	1.4	<1.0
ethyl benzene	<1.0	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.7 b	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene	33	47	26	24	25	29	28	22	22	18	17	19	15	14	15	13	2.7	6.5	4.3	5.1	5.2	5.4
vinyl chloride	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	<1.0	<1.0
xylenes	<1.0	--	<1.0	<1.0	<1.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Magnolia Pump-Out #MG-1 (continued)	10/07	2/08	8/08	11/08	4/09	8/09	2/10	9/10	12/10	3/11	6/11	12/12
1,1,1-trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	<1.0	<1.0	<1.0	1	1.3	<1.0	<1.0J	1	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	5	5.2	4.8	4.9	4	3.6	3.7	5.5	5.9	6.1	6.4	11
1,2-dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0J	1.1	<1.0	<1.0	<1.0	<1.0
ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	<1.0	<1.0	<1.0	<1.0	1.5b	<1.0	<1.0J	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene	6	5.7	9.6	3.9	3.1	8	12	6.4	12	11	15	6.5
vinyl chloride	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0J	1.4	<1.0	<1.0	<1.0	1.3
xylenes	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0J	<3.0	<3.0	<3.0	<3.0	<3.0

Magnolia Pump-Out #MG-2	3/93	1/99	6/99	12/99	3/00	11/00	2/01	2/01d	8/01	11/01	2/02	3/03	8/03	2/04	9/04	3/05	3/05d	10/05	2/06	8/06	2/07	8/07
1,1,1-trichloroethane	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	1.1	<1.0	<1.0	<1.0	1.8	<1.0	1.9	4.3	3.2	2.4	1.3	1.6	1.8	1.4	1.5	1.3	1.4	2.9	1.6	1.9	1.6	<1.0
1,2-dichloroethylene, trans	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0
ethyl benzene	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene	24	11	9.3	9.8	12	12	10	25	12	11	9	9.6	8	7.8	12	9.3	9	9.3	11	8	9	7.3
vinyl chloride	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	<1.0	<1.0	<1.0	<1.0
xylenes	--	<1.0	<1.0	<1.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Table C-9: Historic Data - VOCs Detected in Magnolia Member Aquifer (in µg/L)

Magnolia Pump-Out #MG-2 (continued)	10/07	2/08	8/08	11/08	2/09	2/09d	8/09	8/09d	2/10	9/10	12/10	3/11	6/11	12/12
1,1,1-trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**
1,2-dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethylene, cis	**2.1**	**2.5**	**1.3**	**2.8**	**2.7**	**2.6**	**1.3**	**1.4**	<1.0	**3.2**	**2.2**	**2.4**	**2.2**	**7.6**
1,2-dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tetrachloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethylene	**8.6**	**5.9**	**3.1**	**7.6**	**7.6**	**7.4**	**2.2**	**2.8**	**2.6**	**10**	**9.3**	**8.5**	**9.3**	**13**
vinyl chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**
xylenes	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

MW-BB	4/82	6/82	12/82	12/83	10/85	12/85	2/86	4/86	6/86	8/86	11/86	4/87	4/88	4/89	7/90	4/91	5/92	5/93
1,1,1-trichloroethane	**20**	**28**	**42**	**23**	**33**	--	**26**	--	**14**	--	**18**	**13**	**8.7**	**4.2**	**<5.0**	**7.4**	**3.1**	**3.3**
1,1,2,2-tetrachloroethane	**37**	**55**	**29**	ND	<0.2	--	**0.3**	--	<0.2	--	<0.2	<0.2	<0.2	<5.0	<10	<0.5	<1.0	<0.5
1,1-dichloroethane	**13**	**16**	**7.8**	**8.8**	**12**	--	**13**	--	**12**	--	**14**	**11**	**4.3**	**4.9**	**8.2**	**6.6**	**6.9**	**5.4**
1,2-dichloroethane	ND	ND	ND	**0.5**	**0.1**	--	**0.5**	--	**0.3**	--	<0.1	**0.1**	<0.1	<1.0	<2.0	<0.5	<1.0	<0.5
1,2-dichloroethylene, cis	--	--	--	**290**	**180**	--	**220**	--	**160**	--	**220**	**75**	**35**	**31**	**31**	**40**	**98**	**95**
1,2-dichloroethylene, trans	--	--	--	**0.9**	**1.8**	--	**0.6**	--	**1**	--	**0.9**	**0.7**	<0.1	<1.5	<3.0	**1.6**	**1.8**	**1.1**
benzene	ND	ND	ND	<5.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	--	--	**26**	**30**	--	**17**	--	**14**	--	**20**	**14.5**	**1.1**	**6.4**	**11**	**11**	**9.9**	**12**
toluene	ND	ND	ND	<4.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene (TCE)	**1600**	**1600**	**1600**	**1400**	**1900**	**1100**	**1300**	**2200**	**2100**	**1800**	**1300**	**1100**	**530**	**340**	**530**	**1100**	**870**	**940**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	ND	ND	ND	<31	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MW-GG	4/82	6/82	12/82
1,1,1-trichloroethane	ND	ND	ND
1,1,2,2-tetrachloroethane	ND	ND	ND
1,1-dichloroethane	ND	ND	ND
1,2-dichloroethane	ND	ND	ND
1,2-dichloroethylene, cis	--	--	--
1,2-dichloroethylene, trans	--	--	--
benzene	ND	ND	ND
ethyl benzene	--	--	--
tetrachloroethylene	--	--	--
toluene	ND	ND	ND
trichloroethylene (TCE)	**1.9**	ND	ND
vinyl chloride	--	--	--
xylenes	ND	ND	ND

Table C-9: Historic Data - VOCs Detected in Magnolia Member Aquifer (in µg/L)

MW-LL	4/82	5/82	12/82	12/83	10/85	12/85	2/86	4/86	6/86	8/86	11/86
1,1,1-trichloroethane	ND	ND	9.7	13	6.8	--	7.7	--	4.9	--	2.8
1,1,2,2-tetrachloroethane	ND	ND	4	ND	<0.2	--	0.2	--	<0.2	--	<0.2
1,1-dichloroethane	ND	ND	5.7	5.4	7.8	--	2.7	--	1.2	--	0.5
1,2-dichloroethane	ND	ND	ND	1.2	0.5	--	0.2	--	0.5	--	1.4
1,2-dichloroethylene, cis	--	--	--	29	140	--	88	--	32	--	20
1,2-dichloroethylene, trans	--	--	--	ND	3.5	--	2.6	--	1.2	--	0.5
benzene	ND	ND	ND	<5.3	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	--	--	14	3.1	--	4.5	--	3.1	--	2.7
toluene	ND	ND	ND	<4.5	--	--	--	--	--	--	--
trichloroethylene (TCE)	87	140	1000	720	730	420	730	690	490	430	330
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--
xylenes	ND	ND	ND	<31	--	--	--	--	--	--	--

MW-PP	4/82	6/82	12/82
1,1,1-trichloroethane	ND	ND	1.3
1,1,2,2-tetrachloroethane	ND	ND	ND
1,1-dichloroethane	ND	ND	ND
1,2-dichloroethane	ND	ND	ND
1,2-dichloroethylene, cis	--	--	--
1,2-dichloroethylene, trans	--	--	--
benzene	ND	ND	ND
ethyl benzene	--	--	--
tetrachloroethylene	--	--	--
toluene	ND	ND	ND
trichloroethylene (TCE)	11	16	22
vinyl chloride	--	--	--
xylenes	ND	ND	ND

MW-OO	4/82	5/82	12/82	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/88	7/88	10/88	7/89	5/90	7/90	10/90	4/91	9/91	5/92	11/92
1,1,1-trichloroethane	ND	ND	1.3	0.4 s	--	0.5	--	0.3	--	<0.2	1.3	0.7	--	--	--	0.7	--	--	<0.5	--	<1.0	--
1,1,2,2-tetrachloroethane	ND	ND	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	2.3 s	--	--	--	<1.0	--	--	<0.5	--	<1.0	--
1,1-dichloroethane	ND	ND	ND	<0.1	--	0.2	--	<0.1	--	<0.1	0.2	0.11	--	--	--	0.2	--	--	<0.5	--	<1.0	--
1,2-dichloroethane	ND	ND	ND	0.4	--	0.5	--	0.4	--	0.4	0.5	0.4	--	--	--	0.4	--	--	<0.5	--	<1.0	--
1,2-dichloroethylene, cis	--	--	--	2.8	--	3.9	--	1.4	--	3.8	9.2	7.2	--	--	--	7.2	--	--	9.1	--	<1.0	--
1,2-dichloroethylene, trans	--	--	--	0.1	--	0.2	--	0.1	--	<0.1	0.3	<0.1	--	--	--	1.6	--	--	4.4	--	<1.0	--
benzene	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	--	--	0.3	--	<0.2	--	<0.2	--	<0.2	0.4	<0.2	--	--	--	<1.0	--	--	<0.5	--	<1.0	--
toluene	6.5	11	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene (TCE)	12	15	56	49	31	36	120	27	19	32	130	160	20	34	70	58	62	30	5.1	5	3.1	17
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MW-OO (continued)	5/93	11/93
1,1,1-trichloroethane	<0.5	--
1,1,2,2-tetrachloroethane	<0.5	--
1,1-dichloroethane	<0.5	--
1,2-dichloroethane	<0.5	--
1,2-dichloroethylene, cis	<0.5	--
1,2-dichloroethylene, trans	<0.5	--
benzene	--	--
ethyl benzene	--	--
tetrachloroethylene	<0.5	--
toluene	--	--
trichloroethylene (TCE)	11	5.7
vinyl chloride	--	--
xylenes	--	--

Table C-9: Historic Data - VOCs Detected in Magnolia Member Aquifer (in µg/L)

MW-QQ	4/82	6/82	12/82	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/87-M	4/88	4/89	5/90	4/91	6/92	5/93	9/95	8/97	4/98	8/98
1,1,1-trichloroethane	ND	ND	ND	**0.2 s**	--	<0.1	--	<0.2	--	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-tetrachloroethane	ND	ND	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<2.0	<0.2	<1.0	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-dichloroethane	ND	ND	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.2	<0.1	<0.2	<0.2	<0.5	<1.0	<0.5	<0.5	<0.5	**0.6**	<0.5
1,2-dichloroethane	ND	ND	ND	<0.1	--	**0.4**	--	<0.1	--	<0.1	<0.1	**0.2**	<0.1	**0.2**	**0.3**	<0.5	<1.0	<0.5	<0.5	<0.5	**0.5**	<0.5
1,2-dichloroethylene, cis	--	--	--	**0.4**	--	**0.6**	--	**0.4**	--	**0.8**	**1.4**	**2.2**	<0.1	**0.7**	**0.9**	<0.5	<1.0	**3.4**	**1.7**	**3.5**	**2.5**	**2.7**
1,2-dichloroethylene, trans	--	--	--	<0.1	--	<0.1	--	**1.3**	--	**0.5**	**1.1**	**3.7**	<0.1	**0.8**	**1.2**	**0.6**	<1.0	<0.5	<0.5	**0.7**	<0.5	<0.5
benzene	ND	ND	ND	--	--	--	--	--	--	--	--	<0.5	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	--	--	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	**2**	<0.2	<1.0	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
toluene	ND	ND	ND	--	--	--	--	--	--	--	--	<0.5	--	--	--	--	--	--	<0.5	**1**	<0.5	<0.5
trichloroethylene	**12**	**13**	**13**	**2.9**	**7.3**	**5.2**	**6**	**1**	**0.6**	**6.4**	**2.5**	**3.1**	<0.2	**3.7**	**3.4**	<0.5	**4.7**	**13**	**3.7**	**1.8**	**29**	**34**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	--
xylenes	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	**1.5**	<1.0	<1.0

MW-QQ (continued)	10/98	12/99	10/03	9/04	10/05	11/06	9/07	10/08	12/09	9/10	12/12
1,1,1-trichloroethane	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0
1,1,2,2-tetrachloroethane	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0
1,1-dichloroethane	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0
1,2-dichloroethane	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0
1,2-dichloroethylene, cis	**1.8**	<1.0	**1.1**	--	--	--	--	ND	**1.6**	--	**1.7**
1,2-dichloroethylene, trans	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0
benzene	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0
ethyl benzene	--	--	<1.0	--	--	--	--	ND	<1.0	--	<1.0
tetrachloroethylene	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0
toluene	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0
trichloroethylene	**40**	<1.0	<1.0	**1.4**	<1.0	**1.3**	**1.4**	**1.3**	**1.9**	**1.8**	**2.1**
vinyl chloride	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	--	<1.0
xylenes	<1.5	<3.0	<3.0	--	--	--	--	ND	<3.0	--	<3.0

MW-TT	12/82	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/88	4/89	5/90	4/91	5/92	11/92	5/93	11/93	9/95	8/97	4/98	8/98	12/99
1,1,1-trichloroethane	ND	**0.1 s**	--	**0.1**	--	**0.2**	--	**0.2 s**	**0.7**	<0.5	<1.0	<0.5	<0.5	<1.0	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<1.0
1,1,2,2-tetrachloroethane	ND	<0.2	--	**0.2**	--	<0.2	--	<0.2	<0.2	**0.38 s**	<1.0	<1.0	<0.5	<1.0	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<1.0
1,1-dichloroethane	ND	**0.4**	--	**0.6**	--	**0.5**	--	**0.4**	**0.6**	**0.12**	**1.6**	**0.5**	**0.7**	<1.0	--	<0.5	--	<0.5	**0.7**	<0.5	<0.5	<1.0
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.2	**<0.2**	<0.5	<1.0	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<1.0
1,2-dichloroethylene, cis	--	**2.9**	--	**3.7**	--	**3.1**	--	**3.6**	**2.4**	**1.3**	**3.7**	**3.6**	**6.7**	**7.2**	--	**1.2**	--	**2**	**0.8**	**1.7**	**1.7**	<1.0
1,2-dichloroethylene, trans	--	<0.1	--	<0.2	--	<0.1	--	<0.1	<0.1	<0.1	<0.3	<0.3	<0.5	<1.0	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<1.0
benzene	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**3.6**	<0.5	<0.5	<0.5	<1.0
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	<0.2	--	<0.2	--	<0.2	--	<0.2	**0.4**	<0.2	<1.0	<1.0	<0.5	<1.0	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<1.0
toluene	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<1.0
trichloroethylene	**8.9**	**26**	**19**	**27**	**33**	**20**	**40**	**23**	**34**	**16**	**30**	**26**	**140**	**58**	**6.4**	**0.7**	**1.8**	**1.5**	**1.9**	**11**	**12**	**6.4**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.5**	--	<1.0
xylenes	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<1.0	<1.0	<3.0

Table C-9: Historic Data - VOCs Detected in Magnolia Member Aquifer (in µg/L)

MW-TT (continued)	10/03	9/04	10/05	11/06	9/07	10/08	11/09	9/10	12/10	3/11	6/11	12/12
1,1,1-trichloroethane	**2**	--	--	--	--	ND	**1.1**	--	**2.2**	--	<1.0	<1.0
1,1,2,2-tetrachloroethane	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
1,1-dichloroethane	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
1,2-dichloroethane	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
1,2-dichloroethylene, cis	**2.9**	--	--	--	--	**3.4**	**2.5**	--	<1.0	--	<1.0	<1.0
1,2-dichloroethylene, trans	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
benzene	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
ethyl benzene	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
tetrachloroethylene	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
toluene	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
trichloroethylene	**5.6**	**3.2**	**6.9**	**3.2**	**3.2**	**4.7**	**6.4**	**1.4**	**1.2**	<1.0	**1.9**	**1.9**
vinyl chloride	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
xylenes	<3.0	--	--	--	--	ND	<3.0	--	<3.0	--	<3.0	<3.0

MW-VV	12/82	10/85	12/85	2/86
1,1,1-trichloroethane	**2.1**	**1.9**	--	**0.6**
1,1,2,2-tetrachloroethane	**3.2**	<0.2	--	<0.2
1,1-dichloroethane	ND	**1**	--	**0.2**
1,2-dichloroethane	ND	**0.1**	--	**1.8**
1,2-dichloroethylene, cis	--	**8.3**	--	**14**
1,2-dichloroethylene, trans	--	**0.3**	--	**0.4**
benzene	ND	--	--	--
ethyl benzene	--	--	--	--
tetrachloroethylene	--	**1.3**	--	**0.6**
toluene	ND	--	--	--
trichloroethylene	**200**	**140**	**93**	**92**
vinyl chloride	--	--	--	--
xylenes	ND	--	--	--

MW-VV (continued)	4/86	6/86	8/86	10/86	4/87	4/88	7/88	10/88	4/89	7/89	10/89	5/90	7/90	10/90	4/91	9/91	5/92	11/92	5/93	11/93
1,1,1-trichloroethane	--	**0.6**	--	**0.2 s**	**0.6**	<0.5	--	--	**2**	--	--	**1.3**	--	--	**1.3**	--	<1.0	--	<0.5	--
1,1,2,2-tetrachloroethane	--	<0.2	--	<0.2	<0.2	<0.2	--	--	<1.0	--	--	<1.0	--	--	<0.5	--	<1.0	--	<0.5	--
1,1-dichloroethane	--	<0.1	--	<0.1	<0.1	<0.1	--	--	**0.8**	--	--	**0.3**	--	--	<0.5	--	<1.0	--	**1.1**	--
1,2-dichloroethane	--	**2.3**	--	**2.8**	**3.5**	**0.75**	--	--	**0.5**	--	--	**0.3**	--	--	<0.5	--	<1.0	--	<0.5	--
1,2-dichloroethylene, cis	--	**9.5**	--	**13**	**4.9**	**6**	--	--	**8**	--	--	**3**	--	--	**6**	--	**5.8**	--	<0.5	--
1,2-dichloroethylene, trans	--	**0.4**	--	**0.1**	<0.1	<0.1	--	--	<0.3	--	--	<0.3	--	--	<0.5	--	<1.0	--	<0.5	--
benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	--	**0.8**	--	**0.4**	**0.3**	**1.2 s**	--	--	<1.0	--	--	<1.0	--	--	<0.5	--	<1.0	--	**1.4**	--
toluene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene	**280**	**83**	**99**	**34**	**63**	**63**	**9.4**	**25**	**59**	**87**	**150**	**33**	**27**	**46**	**75**	**48**	**60**	**29**	**190**	**150**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MW-ZZ	3/84	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/87-M	4/88	10/88	4/89	7/89	5/90	7/90	10/90	4/91	9/91	5/92	11/92	5/93
1,1,1-trichloroethane	0.9	**1**	--	**2.9**	--	**1.6**	--	**2.1**	**2.1**	**2.1**	**1.7**	--	<2.5	--	**2.4**	--	--	<0.5	--	<1.0	--	<0.5
1,1,2,2-tetrachloroethane	ND	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<2.0	<0.2	--	<5.0	--	<2.5	--	--	<0.5	--	<1.0	--	<0.5
1,1-dichloroethane	0.9	**1.8**	--	**3.2**	--	0.7	--	**1.2**	**0.4**	**0.7**	**0.22**	--	<1.0	--	**0.7**	--	--	**0.6**	--	<1.0	--	**1.7**
1,2-dichloroethane	ND	<0.1	--	<0.1	--	<0.1	--	**1.1**	**1.9**	**2**	**0.9**	--	<1.0	--	**2**	--	--	**0.6**	--	<1.0	--	<0.5
1,2-dichloroethylene, cis	≤1.5	**34**	--	**82**	--	**16**	--	**37**	**13**	**13**	**11**	--	**16**	--	**16**	--	--	**6.4**	--	**3.7**	--	<0.5
1,2-dichloroethylene, trans	≤1.5	**1.7**	--	**3.6**	--	**1**	--	**1.7**	**0.9**	**1.1**	<0.1	--	<1.5	--	**1.6**	--	--	**1**	--	<1.0	--	<0.5
benzene	ND	--	--	--	--	--	--	--	--	<0.5	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	ND	<0.2	--	<0.2	--	<0.2	--	**0.4**	<0.2	<2.0	**0.89**	--	<5.0	--	<2.5	--	--	**0.7**	--	<1.0	--	<0.5
toluene	ND	--	--	--	--	--	--	--	--	<0.5	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene	**25**	**85**	**28**	**200**	**440**	**91**	**39**	**190**	**230**	**280**	**130**	**43**	**180**	**34**	**120**	**61**	**36**	**170**	**30**	**88**	**96**	**73**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-9: Historic Data - VOCs Detected in Magnolia Member Aquifer (in µg/L)

MW-ZZ (continued)	11/93
1,1,1-trichloroethane	--
1,1,2,2-tetrachloroethane	--
1,1-dichloroethane	--
1,2-dichloroethane	--
1,2-dichloroethylene, cis	--
1,2-dichloroethylene, trans	--
benzene	--
ethyl benzene	--
tetrachloroethylene	--
toluene	--
trichloroethylene	**70**
vinyl chloride	--
xylenes	--

MW-14	10/98	10/98d	12/99	12/01	12/02	10/03	9/04	10/05	11/06	9/07	10/08	12/09	9/10	12/10	3/11	6/11	12/12
1,1,1-trichloroethane	--	--	<1.0	--	--	**1.6**	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
1,1,2,2-tetrachloroethane	--	--	<1.0	--	--	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
1,1-dichloroethane	--	--	<1.0	--	--	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
1,2-dichloroethane	--	--	<1.0	--	--	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
1,2-dichloroethylene, cis	--	--	<1.0	--	--	**1.7**	--	--	--	--	ND	<1.0	--	<1.0	--	**1**	**1.5**
1,2-dichloroethylene, trans	--	--	<1.0	--	--	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
benzene	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	<1.0
ethyl benzene	--	--	--	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	<1.0
tetrachloroethylene	--	--	<1.0	--	--	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
toluene	**0.6**	<0.5	<1.0	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	<1.0	<1.0	--	<1.0	--	<1.0	<1.0
trichloroethylene	--	--	**4.9**	--	--	**4.7**	**3.6**	**5.5**	**3.5**	**3.6**	**3.3**	**4.4**	**6**	**5.3**	**4.5**	**5.3**	**4.2**
vinyl chloride	--	--	<1.0	--	--	<1.0	--	--	--	--	ND	<1.0	--	<1.0	--	<1.0	<1.0
xylenes	<1.0	<1.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	--	<3.0	<3.0	<3.0	--	<3.0	--	<3.0	<3.0

Data sources: see Table C-13

(light shading) exceeds HBV or HRL

(dark shading) TCE exceeds 27 ug/L (Consent Order limit)

-- compound not analyzed

ND - not detected (detection limit not provided in report)

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

≤ indicates compound may be present at concentrations up to the value reported, but interference with another compound makes exact results uncertain

PP - compound detected below the MDL, but concentration and MDL not reported

M - indicates this is a "split" sample that was analyzed by the M laboratory

b - potential false positive based on blank data validation procedures

J - Reported value is less than the stated laboratory quantitation limit and is considered an estimated value.

d - duplicate sample

s - potential false positive value based on statistical analysis of blank sample data

Table C-10: Historic Data - VOCs Detected in St. Peter, Prairie du Chien, and Jordan Aquifers (in µg/L)

MW-200 (St. Peter)	11/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/87d	4/87-M	7/87	10/87	10/87d	4/88	7/88	10/88	4/89	7/89	5/90	7/90	10/90
1,1,1-trichloroethane	**0.7**	--	**0.8**	--	**1.2**	--	**0.5 s**	**1**	**1.2**	**0.8**	**0.7**	**0.7**	--	**0.64**	--	--	<2.5	--	**1.3**	--	--
1,1,2,2-tetrachloroethane	<0.2	--	0.3	--	<0.2	--	<0.2	<0.2	<0.2	<2.0	<0.2	<0.2	--	<0.2	--	--	<5.0	--	<1.0	--	--
1,1-dichloroethane	**0.2**	--	**0.5**	--	**0.6**	--	**0.4**	**0.3**	**0.5**	<0.2	0.3	<0.1	--	**0.27**	--	--	<1.0	--	**0.6**	--	--
1,2-dichloroethane	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	0.2	<0.1	**0.1**	--	<0.1	--	--	<1.0	--	<0.2	--	--
1,2-dichloroethylene, cis	**12**	--	**6.4**	--	**7.7**	--	**6.8**	**6.8**	**5.6**	6.4	12	**11.1**	--	**8.5**	--	--	13	--	**10**	--	--
1,2-dichloroethylene, trans	<0.1	--	<0.1	--	**0.1**	--	**0.1**	<0.1	<0.1	<0.2	<0.1	<0.1	--	<0.1	--	--	<1.5	--	<0.3	--	--
benzene	<1.0	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	**1**	--	--	--	--	--	<1.0	--	--
ethyl benzene	--	--	--	--	--	--	<0.5	<0.5	<0.5	--	<1.0	<1.0	<0.5	--	--	--	--	--	--	--	--
tetrachloroethylene	**0.7**	--	**0.2**	--	**0.9**	--	**0.4**	**0.7**	**0.8**	<2.0	**0.5**	**0.6**	--	**0.88**	--	--	<5.0	--	<1.0	--	--
toluene	<1.0	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	--	--	--	--	--	<1.0	--	--
trichloroethylene	**120**	**100**	**72**	**130**	**110**	**110**	**78**	**100**	**85**	**140**	**120**	**160**	--	**89**	**33**	**56**	**150**	**130**	**110**	**11**	**130**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	<1.0	--	--	--	--	--	<0.5	<0.5	<0.5	--	<3.0	<3.0	<0.5	--	--	--	--	--	<1.0	--	--

MW-200 (St. Peter; continued)	4/91	9/91	5/92	11/92	5/93	11/93	12/94	9/95	7/97	8/97	12/99	12/01	12/02	10/03	9/04	10/15	10/05d	11/15	9/07	10/15	10/08d
1,1,1-trichloroethane	<0.5	<0.5	<1.0	--	<0.5	<0.5	--	<1.0	<1.5	<1.5	<1.0	--	--	<1.0	--	--	--	--	--	ND	ND
1,1,2,2-tetrachloroethane	<0.5	<0.5	<1.0	--	<0.5	<0.5	--	<1.0	<1.5	<1.5	<1.0	--	--	<1.0	--	--	--	--	--	ND	ND
1,1-dichloroethane	<0.5	--	<1.0	--	<0.5	--	--	<1.0	<1.5	<1.5	<1.0	--	--	<1.0	--	--	--	--	--	ND	ND
1,2-dichloroethane	<0.5	--	<1.0	--	<0.5	--	--	<1.0	<1.5	<1.5	<1.0	--	--	<1.0	--	--	--	--	--	ND	ND
1,2-dichloroethylene, cis	**6.5**	--	**5.9**	--	**11**	--	--	<1.0	**41**	**21**	**12**	--	--	**1.6**	--	--	--	--	--	ND	ND
1,2-dichloroethylene, trans	<0.5	--	<1.0	--	<0.5	--	--	<1.0	<1.5	<1.5	<1.0	--	--	<1.0	--	--	--	--	--	ND	ND
benzene	--	--	--	--	--	--	<0.5	<1.0	--	<1.5	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	ND	ND
ethyl benzene	--	--	--	--	--	--	<0.5	--	--	--	--	<1.0	<1.0	<1.0	--	--	--	--	--	ND	ND
tetrachloroethylene	**0.7**	--	<1.0	--	<0.5	--	--	<1.0	<1.5	<1.5	<1.0	--	--	<1.0	--	--	--	--	--	ND	ND
toluene	--	--	--	--	--	--	<0.5	<1.0	--	<1.5	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	ND	ND
trichloroethylene	**140**	**77**	**61**	**64**	**89**	**19**	**110**	**110**	**98**	**97**	**30**	--	--	**4.2**	**5.7**	**3.9**	**3.5**	**2.8**	**5.7**	**3.3**	**3.2**
vinyl chloride	--	--	--	--	--	--	--	--	--	<1.5	<1.0	--	--	<1.0	--	--	--	--	--	ND	ND
xylenes	--	--	--	--	--	--	<0.5	<1.0	--	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--	--	ND	ND

MW-200 (St. Peter; continued)	12/09	9/10	12/12
1,1,1-trichloroethane	<1.0	<1.0	--
1,1,2,2-tetrachloroethane	<1.0	<1.0	--
1,1-dichloroethane	<1.0	<1.0	--
1,2-dichloroethane	<1.0	<1.0	--
1,2-dichloroethylene, cis	<1.0	<1.0	--
1,2-dichloroethylene, trans	<1.0	<1.0	--
benzene	<1.0	<1.0	--
ethyl benzene	<1.0	<1.0	--
tetrachloroethylene	<1.0	<1.0	--
toluene	<1.0	<1.0	--
trichloroethylene	**5**	**5.3**	**5.3**
vinyl chloride	<1.0	<1.0	--
xylenes	<3.0	<3.0	--

Table C-10: Historic Data - VOCs Detected in St. Peter, Prairie du Chien, and Jordan Aquifers (in µg/L)

MW-201 (St. Peter)	10/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/87M	8/87	4/88	4/89	5/90	4/91	5/92	5/93	7/97	8/97	10/07	10/08
1,1,1-trichloroethane	<0.1	--	<0.1	--	<0.2	--	**1.3**	<0.2	<0.5	--	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	--	<0.5	--	--
1,1,2,2-tetrachloroethane	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<2.0	--	<0.2	<1.0	<1.0	<0.5	<1.0	<0.5	--	<0.5	--	--
1,1-dichloroethane	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.2	--	<0.1	<0.2	<0.2	<0.5	<1.0	<0.5	--	<0.5	--	--
1,2-dichloroethane	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.2	--	<0.1	<0.2	<0.2	<0.5	<1.0	<0.5	--	<0.5	--	--
1,2-dichloroethylene, cis	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	--	<0.1	<0.5	<0.5	<0.5	<1.0	<0.5	--	<0.5	--	--
1,2-dichloroethylene, trans	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	--	<0.1	<0.3	<0.3	<0.5	<1.0	<0.5	--	<0.5	--	--
benzene	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	<0.5	<1.0	<1.0
ethyl benzene	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	<1.0	<1.0
tetrachloroethylene	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<2.0	--	<0.2	<1.0	<1.0	<0.5	<1.0	<0.5	--	<0.5	--	--
toluene	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	<0.5	<1.0	<1.0
trichloroethylene	**0.5 s**	**2.9**	<0.5	<0.2	<0.2	<0.2	<0.1	**0.1**	<0.2	--	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	--	--
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	--	--
xylenes	--	--	--	--	--	--	<0.5	<0.5	--	<1.0	--	--	--	--	--	--	--	<0.5	<3.0	<3.0

MW-202 (St. Peter)	11/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/88	4/89	5/90	4/91	5/92	5/93	7/97	12/97	12/99	12/01	12/02	10/03	9/04
1,1,1-trichloroethane	<0.1	--	<0.1	--	<0.2	--	**0.2 s**	<0.2	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
1,1,2,2-tetrachloroethane	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<1.0	<1.0	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
1,1-dichloroethane	<0.1	--	**0.2**	--	<0.1	--	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
1,2-dichloroethane	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
1,2-dichloroethylene, cis	**1.1**	--	**0.3**	--	<0.1	--	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
1,2-dichloroethylene, trans	<0.1	--	<0.2	--	<0.1	--	<0.1	<0.1	<0.1	<0.3	<0.3	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
benzene	--	--	<0.5	--	--	--	<0.5	<0.5	--	--	--	--	--	--	--	<0.5	<1.0	<1.0	<1.0	<1.0	--
ethyl benzene	--	--	<0.5	--	--	--	<0.5	<0.5	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0	--
tetrachloroethylene	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<1.0	<1.0	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
toluene	--	--	<0.5	--	--	--	<0.5	<0.5	--	--	--	--	--	--	--	**0.8 b**	<1.0	<1.0	<1.0	<1.0	--
trichloroethylene	**2.6**	**2**	**1.9**	**0.2**	**0.2 s**	**2.7**	<0.2	<0.1	<0.5	<0.5	**0.8**	<0.5	<1.0	<0.5	<0.5	<0.5	<1.0	--	--	<1.0	<1.0
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<1.0	--	--	<1.0	--
xylenes	--	--	<1.0	--	--	--	<0.5	<0.5	--	--	--	--	--	--	--	<1.0	<3.0	<3.0	<3.0	<3.0	--

MW-202 (St. Peter; continued)	10/15	11/15	9/07	10/08
1,1,1-trichloroethane	--	--	--	--
1,1,2,2-tetrachloroethane	--	--	--	--
1,1-dichloroethane	--	--	--	--
1,2-dichloroethane	--	--	--	--
1,2-dichloroethylene, cis	--	--	--	--
1,2-dichloroethylene, trans	--	--	--	--
benzene	--	--	--	--
ethyl benzene	--	--	--	--
tetrachloroethylene	--	--	--	--
toluene	--	--	--	--
trichloroethylene	<1.0	<1.0	<1.0	<1.0
vinyl chloride	--	--	--	--
xylenes	--	--	--	--

Table C-10: Historic Data - VOCs Detected in St. Peter, Prairie du Chien, and Jordan Aquifers (in µg/L)

MW-203 (St. Peter)	11/85	12/85	2/86	4/86	6/86	8/86	10/86	4/87	4/88	4/89	5/90	4/91	5/92	5/93	7/97	8/97	12/99	12/01	12/02	10/03	9/04
1,1,1-trichloroethane	<0.1	--	<0.1	--	<0.2	--	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
1,1,2,2-tetrachloroethane	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<1.0	<1.0	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
1,1-dichloroethane	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
1,2-dichloroethane	<0.1	--	**0.3**	--	<0.1	--	**0.2**	<0.1	<0.1	<0.2	<0.2	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
1,2-dichloroethylene, cis	<0.1	--	**0.1**	--	<0.1	--	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	**3.6**	--
1,2-dichloroethylene, trans	<0.1	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.3	<0.3	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
benzene	--	--	<0.5	--	--	--	<0.5	<0.5	--	--	--	--	--	--	--	<0.5	<1.0	<1.0	<1.0	<1.0	--
ethyl benzene	--	--	<0.5	--	--	--	<0.5	<0.5	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0	--
tetrachloroethylene	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<1.0	<1.0	<0.5	<1.0	<0.5	--	<0.5	<1.0	--	--	<1.0	--
toluene	--	--	<0.5	--	--	--	<0.5	<0.5	--	--	--	--	--	--	--	<0.5	<1.0	<1.0	<1.0	<1.0	--
trichloroethylene	**0.5 s**	**1.2**	**2.5**	**0.6**	**0.5**	**0.5**	**0.5**	**0.7**	<0.5	**2.1**	**2.8**	**3**	**1.2**	**1.4**	**5.4**	**5**	**4.1**	--	--	**28**	**40**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.5	<1.0	--	--	<1.0	--
xylenes	--	--	<1.0	--	--	--	<0.5	<0.5	--	--	--	--	--	--	--	**0.6**	<3.0	<3.0	<3.0	<3.0	--

MW-203 (St. Peter; continued)	10/05	11/06	9/07	10/08	12/09	9/10	12/12
1,1,1-trichloroethane	--	--	--	ND	<1.0	<1.0	--
1,1,2,2-tetrachloroethane	--	--	--	ND	<1.0	<1.0	--
1,1-dichloroethane	--	--	--	ND	<1.0	<1.0	--
1,2-dichloroethane	--	--	--	ND	<1.0	<1.0	--
1,2-dichloroethylene, cis	--	--	--	**3.9**	**2.3**	**1.6**	--
1,2-dichloroethylene, trans	--	--	--	ND	<1.0	<1.0	--
benzene	--	--	--	ND	<1.0	<1.0	--
ethyl benzene	--	--	--	ND	<1.0	<1.0	--
tetrachloroethylene	--	--	--	ND	<1.0	<1.0	--
toluene	--	--	--	ND	<1.0	<1.0	--
trichloroethylene	**33**	**40**	**40**	**37**	**30**	**21**	**19**
vinyl chloride	--	--	--	ND	<1.0	<1.0	--
xylenes	--	--	--	ND	<3.0	<3.0	--

HENKEL (Prairie du Chien-Jordan)	10/85	12/85	2/86	8/86	11/86	4/87	4/87M	7/87	10/87	4/88	7/88	10/88	4/89	7/89	10/89	4/91	9/91	5/92	11/92	5/93
1,1,1-trichloroethane	**4.1**	--	3.5	--	**0.3**	**0.6**	**0.7**	**1.4**	<0.5	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	**0.53**	--	<1.0	**3.4**	<0.5
1,1,2,2-tetrachloroethane	<0.2	--	<0.2	--	<0.2	<0.2	<2.0	<0.2	<0.2	**0.21 s**	<0.2	<0.2	<1.0	<1.0	<1.0	<0.5	--	<1.0	--	<0.5
1,1-dichloroethane	**4.6**	--	3.5	--	**0.8**	**0.5**	**0.8**	**1.2**	**0.4**	**0.72**	<0.1	**0.5**	**1.5**	**1.5**	**1.1**	**2.2**	--	<1.0	--	**0.52**
1,2-dichloroethane	<0.1	--	**0.2**	--	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	--	<1.0	--	<0.5
1,2-dichloroethylene, cis	**0.5**	--	**0.3**	--	<0.1	<0.1	<0.2	<0.1	<0.1	0.16	<0.1	**0.1**	<0.5	<0.5	<0.5	<0.5	--	<1.0	--	<0.5
1,2-dichloroethylene, trans	<0.1	--	<0.1	--	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.3	<0.3	<0.5	--	<1.0	--	<0.5
benzene	--	--	--	--	--	--	<0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
ethyl benzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
tetrachloroethylene	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--	<0.2	<1.0	<1.0	<1.0	<0.5	--	<1.0	--	<0.5
toluene	--	--	--	--	--	--	<0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
trichloroethylene	**71**	**44**	**48**	**54**	**6.9**	**7.1**	**9.5**	**20**	**6.7**	**13**	**1.5**	**8**	**12**	**10**	**11**	**49**	**18**	**31**	<0.5	**16**
vinyl chloride	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-10: Historic Data - VOCs Detected in St. Peter, Prairie du Chien, and Jordan Aquifers (in µg/L)

HENKEL (Prairie du Chien-Jordan; continued)	11/93	12/95	8/97	12/99	10/03	9/04	10/05	11/06	9/07	11/08	12/09	9/10
1,1,1-trichloroethane	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
1,1,2,2-tetrachloroethane	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
1,1-dichloroethane	**1**	<0.5	**1**	<1.0	<1.0	--	--	--	--	ND	<1.0	**1.1**
1,2-dichloroethane	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
1,2-dichloroethylene, cis	<0.5	<0.5	**1.3**	<1.0	**4.2**	--	--	--	--	ND	**3**	**7.8**
1,2-dichloroethylene, trans	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
benzene	--	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
ethyl benzene	--	--	--	--	<1.0	--	--	--	--	ND	<1.0	<1.0
tetrachloroethylene	<0.5	<0.5	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
toluene	--	--	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
trichloroethylene	**36**	**6.5**	**13**	<1.0	**4**	**4**	--	**1.9**	**4**	**5.3**	**1.3**	**5.9**
vinyl chloride	--	--	<0.5	<1.0	<1.0	--	--	--	--	ND	<1.0	<1.0
xylenes	--	<0.5	<0.5	<3.0	<3.0	--	--	--	--	ND	<3.0	<3.0

Data sources: see Table C-13

[shaded] exceeds HBV or HRL

-- compound not analyzed

ND - not detected (detection limit not provided in report)

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

≤ indicates compound may be present at concentrations up to the value reported, but interference with another compound makes exact results uncertain

PP - compound detected below the MDL, but concentration and MDL not reported

M - indicates this is a "split" sample that was analyzed by the M laboratory

b - potential false positive based on blank data validation procedures

J - Reported value is less than the stated laboratory quantitation limit and is considered an estimated value.

d - duplicate sample

s - potential false positive value based on statistical analysis of blank sample data

Table C-11: 2014 Data - VOCs Detected in Temporary Borings (µg/L)

Sample location	DP-054	DP-054	DP-054	DP-055	DP-055	DP-056	DP-056	DP-056	DP-057 (FD)		DP-057	DP-060	DP-060	DP-061
Date	5/7/14	5/9/14	5/9/14	5/8/14	5/9/14	5/6/14	5/8/14	5/8/14	5/7/14	5/7/14	5/9/14	10/14/2014	10/14/2014	10/14/2014
Depth (ft)	19-22	28-30	39-41	19-22	40-42	19-22	37-39	50.5-52.5	19-22	19-22	39.5-41.5	17.5 - 20.5	51.25-53.25	16.4-20.4
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	**1.1**	<1.0	**1.3**	<1.0	**1.9**	<1.0	**3.2**	**1.2**	<1.0	<1.0	**1.4**	<1.0	<1.0	<1.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	**76**	<1.0	<1.0	**1.7**	<1.0	<1.0	<1.0	<1.0	**225***	**105***	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.6	2.6	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	**6.5**	**11.0**	**23.1**	**1.4**	**40.1**	<1.0	**145**	**14.9**	**5.3**	**4.7**	**43.2**	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	<1.0	<1.0	**1.3**	<1.0	**2.1**	<1.0	**2.5**	<1.0	**1.4**	**1.2**	**2.4**	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	**15.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**49.6***	**22.4***	<1.0	<1.0	<1.0	<1.0
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	**73.2**	<1.0	<1.0	**7.2**	<1.0	<1.0	<1.0	<1.0	**249**	**217**	<1.0	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.6**	**3.0**	<1.0	<1.0	<1.0	<1.0
Butyl benzene	**3.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.2**	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, sec	**3.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.9**	**1.7**	<1.0	<1.0	<1.0	<1.0
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	**7.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.5**	**2.4**	<1.0	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cumene (isopropyl benzene)	**7.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**14.4***	**7.0***	<1.0	<1.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	**30.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**60.1***	**22.6***	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	**180**	<1.0	**1.1**	**3.2**	<1.0	**1.3**	<1.0	<1.0	**438**	**463**	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl isobutyl ketone	**5.6**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**32.9**	**39.0**	<5.0	<5.0	<5.0	<5.0
Naphthalene	**17.8**	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	**72.7***	**42.8***	<4.0	<4.0*	<4.0*	<4.0
Propylbenzene	**12.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**18.2***	**7.5***	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	**1.0**	**3.2**	**3.0**	<1.0	**3.9**	<1.0	<1.0	**1.7**	<1.0	<1.0	**3.9**	<1.0	<1.0	<1.0
Toluene	**105**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**83.8**	**63.3**	<1.0	<1.0	<1.0	<1.0
Trichloroethylene (TCE)	**36.5**	**99.5**	**136**	**8.9**	**193**	**4.6**	**425**	**100**	**1.6**	**1.2**	**243**	**9.6**	**5.1**	**16.4**
Vinyl chloride	**7.2**	<0.4	<0.4	**4.7**	<0.4	<0.4	**2.2**	<0.4	**14.3**	**13.3**	<0.4	<0.4	<0.4	<0.4
Xylene, total	**697**	<3.0	<3.0	**5.6**	<3.0	<3.0	<3.0	<3.0	**1510**	**1670**	<3.0	<3.0	<3.0	<3.0

FD = field duplicate

[grey shading] exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-11: 2014 Data - VOCs Detected in Temporary Borings (µg/L)

Sample location	DP-061	DP-062 (FD)		DP-062	DP-063	DP-063	DP-064	DP-064	DP-064	DP-065	DP-065
Date	10/15/2014	10/15/2014	10/15/2014	10/15/2014	10/16/2014	10/16/2014	10/13/2014	10/13/2014	10/13/2014	10/16/2014	10/16/2014
Depth (ft)	52-54	17 - 21	17 - 21	55-57	17 - 21	47-49	19-23	26-28	52.5-54.5	20-24	41-43
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	**1.3**	**1.7**	**3.5**	<1.0	**1.2**
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	**24**	**5.7**	**24.8**	**47.4**	**222**	**6.5**	**20.5**
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	**1.1**	**2.5**	**6**	<1.0	**1.4**
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, sec	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0*	<4.0*	<4.0*	<4.0	<4.0
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	<1.0	<1.0	<1.0	<1.0	**1.9**	**1.5**	**2.5**	**4.6**	**12.1**	<1.0	**2.9**
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene (TCE)	**5.4**	**24.1**	**22.2**	**6.9**	**117**	**58.3**	**149**	**246**	**629**	**48.1**	**191**
Vinyl chloride	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

FD = field duplicate

exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-11: 2014 Data - VOCs Detected in Temporary Borings (µg/L)

Sample location	DP-065	DP-066	DP-066	DP-066 FD	DP-066	DP-067	DP-067	DP-067	DP-068	DP-068	DP-069
Date	10/16/2014	10/17/2014	10/17/2014	10/17/2014	10/17/2014	10/20/2014	10/20/2014	10/20/2014	10/20/2014	10/21/2014	10/21/2014
Depth (ft)	48-50	18-22	36.5-38.5	36.5-38.5	50-52	17.6-21.6	42-44	51.7-53.7	17.6-21.6	36-38	17.3-21.3
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	**1.5**	<1.0	**2.6**
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	**2.3**	<1.0	**1.1**	**1.2**	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	**99.3**	**2.7**	**13.1**	**12.6**	**13.5**	**1.2**	**138**	**155**	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	**2.9**	<1.0	<1.0	**1**	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<100.0	<100.0	<20.0	<20.0	<20.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Butylbenzene, sec	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	**2.2**	<1.0	<1.0
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<25.0	<25.0	<5.0	<5.0	<5.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<25.0	<25.0	<5.0	<5.0	<5.0
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<20.0	<20.0	<4.0	<4.0	<4.0
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Tetrachloroethylene	**4.7**	**1.6**	**2.1**	**2.1**	<1.0	<1.0	**5.3**	**7**	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Trichloroethylene (TCE)	**331**	**52.7**	**139**	**135**	**73.2**	**26.5**	**407**	**509**	**0.42**	**1.6**	<0.40
Vinyl chloride	**0.52**	<0.4	<0.4	<0.4	<0.4	<0.4	<2.0	<2.0	<0.4	<0.4	<0.4
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<15.0	<15.0	<3.0	<3.0	<3.0

FD = field duplicate

(shaded) exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-11: 2014 Data - VOCs Detected in Temporary Borings (µg/L)

Sample location	DP-069	DP-070	DP-070	DP-070	DP-071 (FD)		DP-071	DP-072	DP-072	DP-073	DP-073
Date	10/21/2014	10/21/2014	10/21/2014	10/22/2014	10/22/2014	10/22/2014	10/22/2014	10/24/2014	10/24/2014	10/27/2014	10/28/2014
Depth (ft)	33-35	17-21	29-31	35-37	16.8-20.8	16.8-20.8	33-35	14.3-18.3	36-38	13-17	25-27
1,1,1-Trichloroethane	**4.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
1,1,2-Trichloroethane	<1.0	**6.9**	**1.5**	**2.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	**1.9**	<1.0	<1.0	**4.7**	<1.0	**4**	<1.0	<5.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<1.0	<5.0
1,2,4-Trimethylbenzene	<1.0	**5.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**46.9**	**256**	<1.0	**156**
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	**8.6**	<1.0	<5.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<100.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Butylbenzene, sec	<1.0	**2.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Butylbenzene, tert	<1.0	**3.7**	<1.0	<1.0	**1.2**	**1.2**	<1.0	<1.0	<1.0	<1.0	<5.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Cymene p- (Toluene isopropyl p-)	<1.0	**2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<25.0
Methyl isobutyl ketone	<5.0	**7.5**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<25.0
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<20.0
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Tetrachloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.1**	**10.8**	<1.0	**11.2**
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Trichloroethylene (TCE)	**0.41**	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	**181**	**937**	**4.5**	**559**
Vinyl chloride	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<2.0
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<15.0

FD = field duplicate

[grey shading] exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-11: 2014 Data - VOCs Detected in Temporary Borings (µg/L)

Sample location	DP-073	DP-074	DP-074	DP-075	DP-075	DP-075 (FD)		DP-076	DP-076	DP-077
Date	10/28/2014	10/28/2014	10/28/2014	10/28/2014	10/29/2014	10/29/2014	10/29/2014	10/29/2014	10/29/2014	11/5/2014
Depth (ft)	38.3-40.3	13.5-17.5	44.5-46.5	14-18	35-37	44-46	44-46	13.8-17.8	42-44	13-17
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	**4.1**	<1.0	**2.3**	<1.0	**1.7**	**1.8**	**2**	<1.0	**1.6**	<1.0
1,1-Dichloroethylene	**1.7**	<1.0	**2.4**	<1.0	**1.5**	**2.1**	**2.3**	<1.0	**1.9**	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	**349**	**1.3**	**509**	<1.0	**269**	**401**	**392**	<1.0	**257**	<1.0
1,2-Dichloroethylene, trans	**10.8**	<1.0	**12.7**	<1.0	**8.2**	**11.1**	**11.9**	<1.0	**8.1**	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, sec	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	<1.0	**3.7**	<1.0	**2.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	**25.1**	<1.0	**36.8**	<1.0	**32.9**	**38**	**42**	<1.0	**28.5**	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene (TCE)	**1030**	**6.1**	**1210**	**2.8**	**728**	**945**	**925**	<0.40	**761**	<0.40
Vinyl chloride	**7**	<0.4	**4**	<0.4	**2**	**2.9**	**3.1**	<0.4	**2.5**	<0.4
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

FD = field duplicate

(shaded) exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-11: 2014 Data - VOCs Detected in Temporary Borings (µg/L)

Sample location	DP-077 (FD)		301	301	303	303	304	304	305	305	**HRL/HBV**
Date	11/5/2014	11/5/2014	12/2/2014	12/3/2014	12/4/2014	12/4/2014	12/5/2014	12/8/2014	12/8/2014	12/8/2014	
Depth (ft)	34-36	34-36	17.5-21.5	48-50	15.5-19.5	32-34	13.5-17.5	49-51	15.5-19.5	52-54	
1,1,1-Trichloroethane	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.5**	9000
1,1,2-Trichloroethane	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3
1,1-Dichloroethane	<1.0	<1.0	<10.0	<20.0	**1.2**	**4.9**	<1.0	<1.0	<1.0	<1.0	100
1,1-Dichloroethylene	<1.0	<1.0	<10.0	<20.0	<1.0	**1.5**	<1.0	<1.0	<1.0	<1.0	NE
1,2,4-Trimethylbenzene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100
1,2-Dichlorobenzene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	600
1,2-Dichloroethylene, cis	<1.0	<1.0	**615**	**424**	**106**	**308**	**7**	**1.1**	**10.7**	<1.0	6
1,2-Dichloroethylene, trans	<1.0	<1.0	**12.8**	<20.0	**2.4**	**10.1**	<1.0	<1.0	<1.0	<1.0	40
1,3,5-Trimethylbenzene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100
Acetone	<20.0	<20.0	<200.0	<400.0	<20.0	<20.0	<20.0	**22.5**	<20.0	<20.0	4000
Benzene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2
Bromobenzene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Butyl benzene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Butylbenzene, sec	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Butylbenzene, tert	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Chlorobenzene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100
Chloroform	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	**1.8**	<1.0	<1.0	30
Cumene (isopropyl benzene)	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	300
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Ethyl benzene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	50
Methyl ethyl ketone	<5.0	<5.0	<50.0	<100.0	<5.0	<5.0	<5.0	**6.4**	<5.0	<5.0	4000
Methyl isobutyl ketone	<5.0	<5.0	<50.0	<100.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	300
Naphthalene	<4.0	<4.0	<40.0	<80.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	70
Propylbenzene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Tetrachloroethylene	<1.0	<1.0	**33.5**	<20.0	**4**	**13.3**	**16**	<1.0	<1.0	<1.0	4
Toluene	<1.0	<1.0	<10.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	200
Trichloroethylene (TCE)	<0.40	<0.40	**1040**	**1940**	**255**	**1020**	**51.2**	**1.6**	**73.8**	**0.86**	0.4
Vinyl chloride	<0.4	<0.4	<0.4	<0.4	**2.1**	<0.4	<0.4	<0.4	<0.4	<0.4	0.2
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	300

FD = field duplicate

exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	301GS	301GS	301GD	301GD	302GS	302GS	303GS	303GS	304GS	304GS	305GS
Date	12/18/2014	3/12/2015	12/18/2014	3/12/2015	12/22/2014	3/12/2015	12/19/2014	3/12/2015	12/19/2014	3/12/2015	12/22/2014
1,1,1-Trichloroethane	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	**1.1 h**
1,1,2-Trichloroethane	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	**1.5**	<10.0	**6.7**	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	**3.2**	<10.0	**20.8**	**23.2**	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	**712**	**732**	**639**	**909**	<1.0	<1.0	**339**	**308**	**11.2**	**18.3**	**65.9**
1,2-Dichloroethylene, trans	**17.3**	**20.9**	**9.7**	<20.0	<1.0	<1.0	<10.0	**6.9**	<1.0	<1.0	<4.0
1,3,5-Trimethylbenzene	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Acetone	<20.0	<200.0	<20.0	<400.0	<20.0	<20.0	<200.0	<100.0	<20.0	<20.0	<20.0
Benzene	<1.0	<10.0	**1.6**	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Butyl benzene	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Butylbenzene, sec	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Butylbenzene, tert	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Chloroform	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Cumene (isopropyl benzene)	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Ethyl benzene	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<5.0	<50.0	<5.0	<100.0	<5.0	<5.0	<50.0	<25.0	<5.0	<5.0	<5.0
Methyl isobutyl ketone	<5.0	<50.0	<5.0	<100.0	<5.0	<5.0	<50.0	<25.0	<5.0	<5.0	<5.0
Naphthalene	<4.0	<40.0	<4.0	<80.0	<4.0	<4.0	<40.0	<20.0	<4.0	<4.0	<4.0
Propylbenzene	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Tetrachloroethylene	**48.9**	**52.8**	**1.7**	<20.0	<1.0	<1.0	<10.0	**9.1**	**20.5 h**	**30**	<1.0
Toluene	<1.0	<10.0	<1.0	<20.0	<1.0	<1.0	<10.0	<5.0	<1.0	<1.0	<1.0
Trichloroethylene (TCE)	**1080**	**1370**	**3290**	**4270**	<0.4	**0.98**	**718 h**	**693**	**63.5**	**111**	**302**
Vinyl chloride	**3.3**	<4.0	**12.8**	**8.1**	<0.4	<0.4	<4.0	<2.0	<0.4 h	<0.4	<0.4
Xylene, total	<3.0	<30.0	<3.0	<60.0	<3.0	<3.0	<30.0	<15.0	<3.0 h	<3.0	<3.0

FD = field duplicate

exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	305GS (FD)		305GD	305GD	306GS	306GS	306GD	306GD	307GS	307GS	307GD	307GD
Date	3/12/2015	3/12/2015	12/22/2014	3/12/2015	12/18/2014	3/11/2015	12/18/2014	3/11/2015	12/17/2014	3/11/2015	12/17/2014	3/11/2015
1,1,1-Trichloroethane	<2.0	<2.0	**2.2 h**	**2.2**	<1.0	<5.0	<1.0	<5.0	**1.5**	**2.3**	**1.9**	**2.4**
1,1,2-Trichloroethane	<2.0	<2.0	<5.0 h	<1.0	<5.0	<5.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	<2.0	<2.0	<1.0	<1.0	**2**	<5.0	**3.2**	<5.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	**44.2**	**45.9**	<1.0	<1.0	**166**	**188**	**213**	**149**	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	<2.0	**2.2**	<4.0	<1.0	<4.0	**5.1**	**5.1**	**5.4**	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Acetone	<40.0	<40.0	<20.0	<20.0	<20.0	<100.0	<20.0	<100.0	<20.0	<20.0	<20.0	<20.0
Benzene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Bromobenzene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Butyl benzene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, sec	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, tert	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Chloroform	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Cumene (isopropyl benzene)	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<10.0	<10.0	<5.0	<5.0	<5.0	<25.0	<5.0	<25.0	<5.0	<5.0	<5.0	<5.0
Methyl isobutyl ketone	<10.0	<10.0	<5.0	<5.0	<5.0	<25.0	<5.0	<25.0	<5.0	<5.0	<5.0	<5.0
Naphthalene	<8.0	<8.0	<4.0	<4.0	<4.0	<20.0	<4.0	<20.0	<4.0	<4.0	<4.0	<4.0
Propylbenzene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	<2.0	<2.0	<1.0	<1.0	**7.7**	**8**	**7.5**	<5.0	<1.0	<1.0	<1.0	<1.0
Toluene	<2.0	<2.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene (TCE)	**231**	**247**	<0.4	<0.4	**373**	**470**	**573**	**387**	<0.4	**0.65**	**0.83**	**0.51**
Vinyl chloride	<0.8	<0.8	<0.4	<0.4	**0.97**	<2.0	<0.4	<2.0	<0.4	<0.4	<0.4	<0.4
Xylene, total	<6.0	<6.0	<3.0	<3.0	<3.0	<15.0	<3.0	<15.0	<3.0	<3.0	<3.0	<3.0

FD = field duplicate

exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	308GS	308GS	308GD	308GD	309GS	309GS	309GD	309GD	310GS	310GS	311GS
Date	**12/16/2014**	**3/10/2015**	**12/16/2014**	**3/10/2015**	**12/12/2014**	**3/11/2015**	**12/12/2014**	**3/11/2015**	**12/17/2014**	**3/9/2015**	**12/17/2014**
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	**1.9**	**1.1**	<1.0	<1.0	<5.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**81.8**
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
1,2-Dichloroethylene, cis	**2.4**	**2**	<1.0	<1.0	**9.7**	**7.9**	**81.6**	**25.4**	**4.1**	**2.2**	**5.3**
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**2.3**	**1.7**	<1.0	<1.0	<5.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**21.3**
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<100.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.5**
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Butylbenzene, sec	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**10.8**
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.1**
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**253**
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<25.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<25.0
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	**30.8**
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**10.3**
Tetrachloroethylene	**1.5**	**1.4**	<1.0	<1.0	**2.2**	**2.1**	**4.8**	**3.1**	**9.4**	**8.5**	<5.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Trichloroethylene (TCE)	**37.9**	**35.8**	**6.2**	**5.6**	**84.3**	**74.7**	**250**	**140**	**10.3**	**7.4**	**33.1**
Vinyl chloride	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<2.0
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	**1290**

FD = field duplicate

exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	311GS	311GS	311GD	311GD (FD)		312GS	312GS	312GD	312GD	313GS	313GS	313GD
Date	12/17/2014	3/10/2015	12/17/2014	3/10/2015	3/10/2015	12/10/2014	3/9/2015	12/10/2014	3/9/2015	12/9/2014	3/6/2015	12/9/2014
1,1,1-Trichloroethane	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
1,1,2-Trichloroethane	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
1,1-Dichloroethane	<5.0	<1.0	**1.4**	**1.4**	**1.5**	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
1,1-Dichloroethylene	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
1,2,4-Trimethylbenzene	**79.4**	**50.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
1,2-Dichlorobenzene	<5.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
1,2-Dichloroethylene, cis	**5.1**	**16.3**	**43.7**	**42.6**	**44.5**	**12.3**	**19.4**	**2.1**	**1.9**	**112**	**117**	**128**
1,2-Dichloroethylene, trans	<5.0	<1.0	**1.3**	**1.8**	**2**	<1.0	<1.0	<1.0	<1.0	**2.5**	**3.4**	**3.2**
1,3,5-Trimethylbenzene	**20.5**	**13.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Acetone	<100.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<40.0	<40.0	<40.0
Benzene	**5.3**	**2.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Bromobenzene	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Butyl benzene	<5.0	**3.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Butylbenzene, sec	<5.0	**3.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Butylbenzene, tert	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Chlorobenzene	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Chloroform	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Cumene (isopropyl benzene)	**10.7**	**9.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Cymene p- (Toluene isopropyl p-)	**5.3**	**5.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Ethyl benzene	**257**	**41.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Methyl ethyl ketone	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0
Methyl isobutyl ketone	<25.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0
Naphthalene	**31.6**	**22.6**	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<8.0	<8.0	<8.0
Propylbenzene	**10.1**	**9.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Tetrachloroethylene	<5.0	**1.7**	**2.9**	**3.4**	**3.4**	**1.8**	**1.6**	**1.9**	**1.2**	**9.9**	**10.5**	**10.3**
Toluene	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0
Trichloroethylene (TCE)	**35**	**76.3**	**165**	**172**	**171**	**53.9**	**48.3**	**11**	**9.7**	**327**	**320**	**370**
Vinyl chloride	<2.0	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.8	<0.8	<0.8
Xylene, total	**1270**	**80.1**	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<6.0	<6.0	<6.0

FD = field duplicate

exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	313GD	314GS (FD)		314GS	314GD	314GD	315GS	315GS	315GD	315GD	316GS (FD)	
Date	3/6/2015	12/23/2014	12/23/2014	3/5/2015	12/23/2014	3/5/2015	12/9/2014	3/5/2015	12/9/2014	3/5/2015	12/9/2014	12/9/2014
1,1,1-Trichloroethane	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
1,1,2-Trichloroethane	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
1,1-Dichloroethane	<2.0	**1.7**	**1.6**	<5.0	<1.0	<5.0	<1.0	<1.0	**1.3**	<5.0	<1.0	<1.0
1,1-Dichloroethylene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
1,2-Dichlorobenzene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
1,2-Dichloroethylene, cis	**121**	**160**	**159**	**134**	**108**	**164**	**38.9**	**94.1**	**149**	**159**	<1.0	<1.0
1,2-Dichloroethylene, trans	**3.4**	**4.2**	**4.3**	**5.9**	**2.6**	<5.0	<1.0	**2.5**	**3.5**	**5.8**	<1.0	<1.0
1,3,5-Trimethylbenzene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Acetone	<40.0	<20.0	<20.0	<100.0	<20.0	<100.0	<20.0	<20.0	<20.0	<100.0	<20.0	<20.0
Benzene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Bromobenzene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Butyl benzene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Butylbenzene, sec	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Butylbenzene, tert	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Chlorobenzene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Chloroform	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Cumene (isopropyl benzene)	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Ethyl benzene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Methyl ethyl ketone	<10.0	<5.0	<5.0	<25.0	<5.0	<25.0	<5.0	<5.0	<5.0	<25.0	<5.0	<5.0
Methyl isobutyl ketone	<10.0	<5.0	<5.0	<25.0	<5.0	<25.0	<5.0	<5.0	<5.0	<25.0	<5.0	<5.0
Naphthalene	<8.0	<4.0	<4.0	<20.0	<4.0	<20.0	<4.0	<4.0	<4.0	<20.0	<4.0	<4.0
Propylbenzene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Tetrachloroethylene	**11.1**	**13**	**12.5**	**12**	**10.5**	**11.4**	**6.6**	**7.8**	**10.9**	**10.9**	<1.0	<1.0
Toluene	<2.0	<1.0	<1.0	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0
Trichloroethylene (TCE)	**347**	**498**	**514**	**421**	**341**	**420**	**164**	**247**	**349**	**438**	<0.4	<0.4
Vinyl chloride	<0.8	<0.4	<0.4	<2.0	<0.4	<2.0	<0.4	<0.4	<0.4	<2.0	<0.4	<0.4
Xylene, total	<6.0	<3.0	<3.0	<15.0	<3.0	<15.0	<3.0	<3.0	<3.0	<15.0	<3.0	<3.0

FD = field duplicate

exceeds HBV or HRL

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< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	316GS	316GD	316GD	317GS	317GS	318GS	318GS	SMW1	SMW1	SMW3	SMW3	SMW6
Date	3/4/2015	12/9/2014	3/4/2015	12/8/2014	3/3/2015	12/8/2014	3/3/2015	12/12/2014	3/10/2015	12/12/2014	3/6/2015	12/12/2014
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.1**	**5.3**	**1.6**	**2.2**	**1**
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, sec	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene (TCE)	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	**5.4**	**3.8**	**2.4**
Vinyl chloride	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

FD = field duplicate

exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	SMW6	SMW10 (FD)		SMW10	SMW16	SMW16	SMW19	SMW19 (FD)		SMW22	SMW22
Date	3/6/2015	12/16/2014	12/16/2014	3/4/2015	12/23/2014	3/4/2015	12/8/2014	3/5/2015	3/5/2015	12/22/2014	3/5/2015
1,1,1-Trichloroethane	<1.0	**2**	**2**	**2.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**26.7**	**28.8**
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, sec	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0	<1.0	**13.1**	**9.9**	<1.0	<1.0	<1.0	**5.7**	**8.2**
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.9**	**3.3**
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene (TCE)	**2.8**	**1.7**	**1.5**	**1.6**	**0.44**	**0.58**	<0.4	<0.4	<0.4	**74.8**	**82.9**
Vinyl chloride	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

FD = field duplicate

(shaded) exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	SMW25	SMW25	2	2	109 (FD)		109 (FD)		110	110 (FD)		111
Date	12/12/2014	3/6/2015	12/11/2014	3/9/2015	12/11/2014	12/11/2014	3/6/2015	3/6/2015	12/10/2014	3/5/2015	3/5/2015	12/8/2014
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	**2.2**
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	**1.1**	<1.0	**1.3**	**1.2**	**1.3**	**1.2**	**1.1**	<2.0	<2.0	<1.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
1,2-Dichloroethylene, cis	**78.2**	**61.3**	**15.8**	**12.1**	**24.9**	**25**	**32.3**	**32.1**	**55.4**	**103**	**101**	**1.2**
1,2-Dichloroethylene, trans	**2**	**2**	<1.0	**1**	<1.0	<1.0	**1.3**	**1.7**	**1.4**	**3**	**2.9**	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<40.0	<40.0	<20.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Butylbenzene, sec	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<10.0	<5.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<10.0	<5.0
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<8.0	<8.0	<4.0
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Tetrachloroethylene	**8.3**	**8**	**1.6**	**1.6**	**2.6**	**2.6**	**3.5**	**3.2**	**6.9**	**6.2**	**5.8**	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0
Trichloroethylene (TCE)	**243**	**219**	**82.2**	**65.3**	**112**	**112**	**145**	**145**	**214**	**275**	**272**	**5.3**
Vinyl chloride	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.8	<0.8	<0.4
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<6.0	<6.0	<3.0

FD = field duplicate

[shaded] exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	111	112	112 (FD)		113	113	B	B	Q	Q	S	S
Date	3/3/2015	12/8/2014	3/4/2015	3/4/2015	12/8/2014	3/4/2015	12/11/2014	3/10/2015	12/10/2014	3/3/2015	12/10/2014	3/4/2015
1,1,1-Trichloroethane	**3.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.8**	**1.8**	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1**	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0	**7.7**	**4.7**	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, sec	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.3**	**1.7**	<1.0	<1.0	**1.6**	**1.3**
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene (TCE)	**4.8**	**4**	**4.8**	**4.5**	**0.98**	**1.8**	**82**	**55.5**	**0.78**	<0.4	**63.7**	**66.5**
Vinyl chloride	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

FD = field duplicate

(shaded) exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-12: 2014-2015 Data - VOCs Detected in Monitoring Wells (in ug/L)

Sample location	T	T	V	V	W (FD)		W	X	X	HRL/HBV
Date	12/16/2014	3/5/2015	12/9/2014	3/3/2015	12/9/2014	12/9/2014	3/3/2015	12/9/2014	3/4/2015	
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	9000
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	600
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	**1.9**	**47.1**	**48.3**	**80.4**	<1.0	<1.0	6
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	**2.7**	**2.5**	**3.8**	<1.0	<1.0	40
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	4000
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2
Bromobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Butyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Butylbenzene, sec	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Butylbenzene, tert	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
Cumene (isopropyl benzene)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	300
Cymene p- (Toluene isopropyl p-)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	50
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	4000
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	300
Naphthalene	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	70
Propylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NE
Tetrachloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	200
Trichloroethylene (TCE)	<0.4	<0.4	**21.3**	**29.2**	**6.7**	**6.7**	**8.4**	**0.61***	**0.7**	0.4
Vinyl chloride	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	**0.58**	<0.4	<0.4	0.2
Xylene, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	300

FD = field duplicate

[shaded] exceeds HBV or HRL

* = estimated value, quality assurance/quality control (QA/QC) criteria not met

< indicates compound not detected at or above the method detection limit (MDL; the value shown next to this symbol)

Data source: Barr, 2015h

Table C-13: Sources for Groundwater Data in Tables C-3 to C-10

The following sources were used to construct the historic groundwater data tables; C-3 through C-10:

Barr (1982, 1983, 1984a, 1984b, 1986a, 1986b, 1987a, 1987b, 1989, 1990, 1991a, 1992, 1993, 1994, 1995, 1996, 1997b, 1998, 1999, 2000, 2001b, 2002, 2004, 2005, 2006, 2010, 2011b, 2012c, 2013f, 2014a)

GMI (1988)

MPCA (1992, 2004)

Soil Exploration Company (1981)

Serco (1985)

TriMatrix (2002, 2004)

USEPA (1994, 1999)

Data sources for tables C-1, C-2, C-11, and C-12 are listed at the bottom of those tables.

Minnesota Pollution Control Agency

MINNESOTA MDH DEPARTMENT OF HEALTH

November 6, 2013

Dear Resident/Property Owner:

The Minnesota Pollution Control Agency (MPCA), along with state and local partners, will need your help and cooperation for an environmental investigation in your neighborhood over the next several weeks. MPCA will be overseeing an investigation by General Mills, Inc. (GMI). GMI and its contractors will be looking for underground vapors that may be entering homes and buildings. Some of the groundwater in the area is contaminated and could release vapors that can rise through the soil and seep through basement and foundation cracks into indoor air. This is known as "vapor intrusion." MPCA is requesting that property owners cooperate and allow soil vapor sampling in and around your home or building.

The source of the potential vapor intrusion in the several-block area is related to historic waste disposal activities at 2010 East Hennepin Avenue in Minneapolis, a site owned and operated by GMI from about 1930 until 1977. Beginning in the 1940s, until the early 1960s, solvents were disposed in a soil absorption pit located in the southeast portion of the property. Subsequent discovery of trichloroethylene (TCE), a commonly-used cleaning solvent and degreaser, in the groundwater led to extensive cleanup activities in the area. There is no risk to drinking water supplies.

Representatives from MPCA, Minnesota Department of Health (MDH) and GMI will hold two public meetings this coming Tuesday to update the community on the situation, with additional meetings being planned in the community. At these meetings, property owners and residents will be informed of the testing locations and procedure, as well as the potential health risks of TCE. Testing will be performed using the method approved by the MPCA.

Vapor Study Informational Open House

Tuesday, November 12, 2013 12:30 – 3 p.m.
Tuesday, November 12, 2013 5 – 7:30 p.m.

Van Cleve Recreation Center, 901 15th Avenue SE, Minneapolis

During the first hour there will be an opportunity to talk one-on-one with representatives from the various agencies. A formal presentation, with time for questions and answers will take place at 1:30 and 6 p.m.

GMI has agreed to install sub-surface vapor ventilation systems, which work like radon mitigation systems, in any home found to have TCE above acceptable levels set by the MPCA in soil-gas beneath the home. Such systems are a proven solution to vapor intrusion problems.

Assistance from the public is needed. Residents and property owners that fall within the dotted area on the enclosed map are being asked to sign an access agreement, which allows your home to be sampled. To ensure quick response times, officials with the MPCA and MDH encourage all residents and property owners to cooperate by allowing access. Sampling could begin as early as the week of November 18. The access agreement can be found online at www.pca.state.mn.us/wdwffra and will be available at the open houses to review and sign. There is no cost to residents or property owners for the testing, and vapor intrusion mitigation systems will be offered and installed at no cost in eligible affected buildings.

Below are some commonly asked questions:

Why am I being asked to participate?
Your property is in or near one of two areas that MPCA and MDH have identified as the potential investigation area to test for elevated levels of TCE. Tests also found TCE vapor in public rights of way, south and west of the Hennepin Avenue site.

Why are we concerned about TCE vapors in indoor air?

- MDH staff has reviewed the soil gas data collected at this site and are concerned that vapor intrusion may be occurring. Once inside the building, vapors can be inhaled by residents. If vapor intrusion is occurring, it is likely that vapor levels are higher in basements than on upper floors.
- The groups considered to be more sensitive to potential health effects from breathing in TCE vapor include unborn children, infants and children, and/or people with impaired immune systems. Because of the risk of heart defects occurring in developing fetuses, MDH is concerned about TCE exposures in women who are pregnant or who may become pregnant.

How will the sampling be done?
With the owner's permission, licensed contractors will conduct sub-slab sampling at the target properties to see whether contaminated soil vapors are potentially underneath your home or building. The first step in sampling each residence will be to collect a sub-slab vapor sample. Sub-slab sampling is the name given to the process of collecting a vapor sample from directly underneath the basement floor through a small hole drilled in the floor, which takes about 45 minutes. Sub-slab samples can be more accurate than indoor air samples, which can be cross-contaminated by common household products, such as cleaners and adhesives.

If TCE is detected at my property, how will it be cleaned up?
If the sample results indicate elevated TCE vapor levels above MPCA screening levels, licensed contractors will install a sub-slab ventilation system in the overlying structure. This system is the same as a typical "radon system" commonly installed in homes and buildings in areas where radon is naturally present in the soil. Such systems consist of a hole in the building floor with a sealed pipe that leads to a low-wattage fan in the attic or on the outside of the building. The fan pulls vapors from beneath the floor and discharges them to the atmosphere through a stack on the roof.

Additional information about this project is found at www.pca.state.mn.us/wdwffra. For more information, questions or comments, you can contact these representatives:

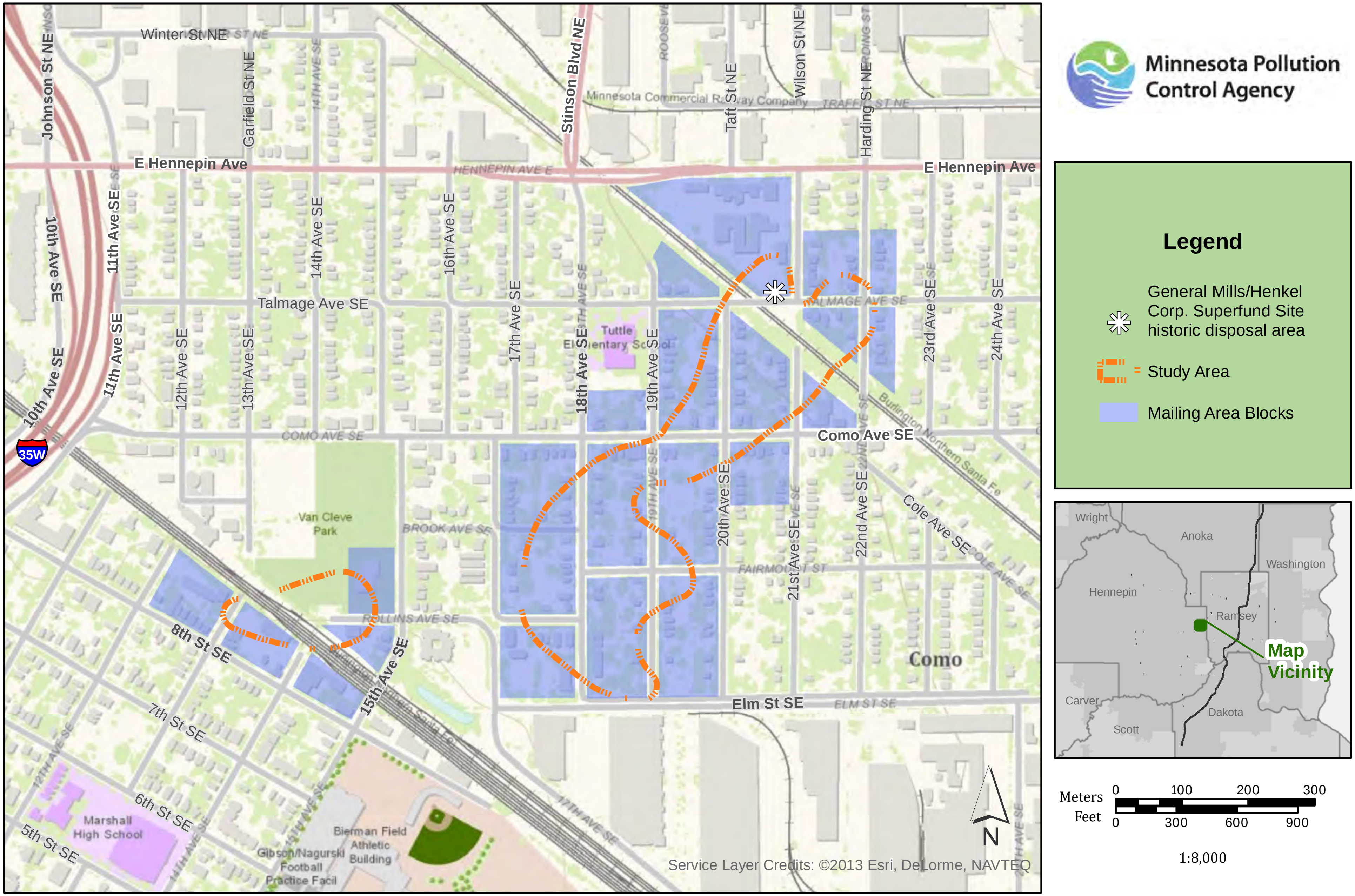
Minnesota Pollution Control Agency (for project or testing questions)
Fred Campbell – Site Remediation, (651) 757-2260, fred.campbell@state.mn.us
Hans Neve– Site Remediation, (651) 757-2608, hans.neve@state.mn.us

Minnesota Department of Health (for health-related questions)
Rita Messing (651) 201-4916 or Emily Hansen (651) 201-4602
Site Assessment and Consultation Unit - (651) 201-4897 or (800) 657-3908
Email health.hazard@state.mn.us or visit us at www.health.state.mn.us/divs/eh/hazardous/topics/tce.html

To schedule sampling, call: Sara Gaffin, Barr Engineering, (952) 832-2935

To contact General Mills, call: (763) 293-1165

General Mills/Henkel Corp. Superfund Site Study Area



Data is organized by ascending building number.

Table E-1
Sub-Slab Sample Analytical Results
2010 East Hennepin Avenue
East Hennepin Avenue Site
Minneapolis, Minnesota

Building Number	Building 1					Building 2					Building 3				Building 4			
Sample Date	3/13/2014		4/03/2014			3/12/2014		4/03/2014			3/12/2014		4/03/2014		3/12/2014		4/03/2014	
Sample ID	3954_II	3954_JJ	3954_KK	3954_LL	3954_WW	3954_U	3954_V	3954_MM	3954_NN	3954_OO	3954_T	3954_Z	3954_PP	3954_QQ	3954_R[1]	3954_S	3954_RR	3954_SS
Parameter																		
Trichloroethylene	< 0.99 ug/m3	< 0.96 ug/m3	< 0.99 ug/m3	< 0.99 ug/m3	< 0.99 ug/m3	1.3 ug/m3	< 0.99 ug/m3	< 1.0 ug/m3	1.4 ug/m3	< 1.7 ug/m3	2.6 ug/m3	< 1.0 ug/m3	< 1.7 ug/m3	1.8 ug/m3	< 0.86 ug/m3	< 0.99 ug/m3	< 0.99 ug/m3	< 0.96 ug/m3
1,1,1-Trichloroethane	--	--	< 2.0 ug/m3	< 2.0 ug/m3	< 2.0 ug/m3	--	--	5.0 ug/m3	17.9 ug/m3	4.9 ug/m3	--	--	43.1 ug/m3	58.0 ug/m3	13.4 ug/m3	--	77.7 ug/m3	54.3 ug/m3
1,1,2,2-Tetrachloroethane	--	--	< 1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	--	< 2.4 ug/m3	< 1.3 ug/m3	< 2.2 ug/m3	--	--	< 2.1 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	--	< 1.3 ug/m3	< 1.2 ug/m3
1,1,2-Trichloroethane	--	--	< 0.99 ug/m3	< 0.99 ug/m3	< 0.99 ug/m3	--	--	< 1.9 ug/m3	< 0.99 ug/m3	< 1.7 ug/m3	--	--	< 1.7 ug/m3	< 0.99 ug/m3	< 0.86 ug/m3	--	< 0.99 ug/m3	< 0.96 ug/m3
1,1-Dichloroethane	--	--	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	--	< 2.8 ug/m3	< 1.5 ug/m3	< 2.6 ug/m3	--	--	< 2.5 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	--	< 1.5 ug/m3	< 1.4 ug/m3
1,1-Dichloroethylene	--	--	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	--	< 2.7 ug/m3	< 1.5 ug/m3	< 2.5 ug/m3	--	--	< 2.4 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	--	< 1.5 ug/m3	< 1.4 ug/m3
1,2,4-Trichlorobenzene	--	--	< 6.8 ug/m3	< 6.8 ug/m3	< 6.8 ug/m3	--	--	< 5.1 ug/m3	< 6.8 ug/m3	< 11.8 ug/m3	--	--	< 11.4 ug/m3	< 6.8 ug/m3	< 2.4 ug/m3	--	< 6.8 ug/m3	< 6.6 ug/m3
1,2,4-Trimethylbenzene	--	--	150 ug/m3	3.9 ug/m3	< 1.8 ug/m3	--	--	< 3.4 ug/m3	4.8 ug/m3	< 3.1 ug/m3	--	--	< 3.0 ug/m3	2.4 ug/m3	2.6 ug/m3	--	4.2 ug/m3	2.9 ug/m3
1,2-Dibromoethane	--	--	< 2.8 ug/m3	< 2.8 ug/m3	< 2.8 ug/m3	--	--	< 5.3 ug/m3	< 2.8 ug/m3	< 4.9 ug/m3	--	--	< 4.7 ug/m3	< 2.8 ug/m3	< 2.4 ug/m3	--	< 2.8 ug/m3	< 2.7 ug/m3
1,2-Dichlorobenzene	--	--	< 2.2 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	--	--	< 4.1 ug/m3	< 2.2 ug/m3	< 3.8 ug/m3	--	--	< 3.7 ug/m3	< 2.2 ug/m3	< 1.9 ug/m3	--	< 2.2 ug/m3	< 2.1 ug/m3
1,2-Dichloroethane	--	--	< 0.74 ug/m3	< 0.74 ug/m3	< 0.74 ug/m3	--	--	< 1.4 ug/m3	< 0.74 ug/m3	< 1.3 ug/m3	--	--	2.7 ug/m3	< 0.74 ug/m3	< 0.64 ug/m3	--	< 0.74 ug/m3	< 0.71 ug/m3
1,2-Dichloroethylene, cis	--	--	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	--	< 2.7 ug/m3	< 1.5 ug/m3	< 2.5 ug/m3	--	--	< 2.4 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	--	< 1.5 ug/m3	< 1.4 ug/m3
1,2-Dichloroethylene, trans	--	--	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	--	< 2.7 ug/m3	< 1.5 ug/m3	< 2.5 ug/m3	--	--	< 2.4 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	--	< 1.5 ug/m3	< 1.4 ug/m3
1,2-Dichloropropane	--	--	< 1.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	--	--	< 3.2 ug/m3	< 1.7 ug/m3	< 2.9 ug/m3	--	--	< 2.8 ug/m3	< 1.7 ug/m3	< 1.5 ug/m3	--	< 1.7 ug/m3	< 1.6 ug/m3
1,2-Dichlorotetrafluoroethane	--	--	< 2.6 ug/m3	< 2.6 ug/m3	< 2.6 ug/m3	--	--	< 4.8 ug/m3	< 2.6 ug/m3	< 4.4 ug/m3	--	--	< 4.3 ug/m3	< 2.6 ug/m3	< 2.2 ug/m3	--	< 2.6 ug/m3	< 2.5 ug/m3
1,3,5-Trimethylbenzene	--	--	35.0 ug/m3	< 4.5 ug/m3	< 4.5 ug/m3	--	--	< 3.4 ug/m3	< 4.5 ug/m3	< 7.8 ug/m3	--	--	< 7.5 ug/m3	< 4.5 ug/m3	< 1.6 ug/m3	--	< 4.5 ug/m3	< 4.3 ug/m3
1,3-Butadiene	--	--	< 0.81 ug/m3	3.2 ug/m3	< 0.81 ug/m3	--	--	< 1.5 ug/m3	< 0.81 ug/m3	< 1.4 ug/m3	--	--	< 1.4 ug/m3	< 0.81 ug/m3	< 0.71 ug/m3	--	< 0.81 ug/m3	< 0.78 ug/m3
1,3-Dichloro-1-propene, cis	--	--	< 1.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	--	--	< 3.1 ug/m3	< 1.7 ug/m3	< 2.9 ug/m3	--	--	< 2.8 ug/m3	< 1.7 ug/m3	< 1.4 ug/m3	--	< 1.7 ug/m3	< 1.6 ug/m3
1,3-Dichloro-1-propene, trans	--	--	< 4.2 ug/m3	< 4.2 ug/m3	< 4.2 ug/m3	--	--	< 3.1 ug/m3	< 4.2 ug/m3	< 7.2 ug/m3	--	--	< 7.0 ug/m3	< 4.2 ug/m3	< 1.4 ug/m3	--	< 4.2 ug/m3	< 4.0 ug/m3
1,3-Dichlorobenzene	--	--	< 5.5 ug/m3	< 5.5 ug/m3	< 5.5 ug/m3	--	--	< 4.1 ug/m3	< 5.5 ug/m3	< 9.6 ug/m3	--	--	< 9.2 ug/m3	< 5.5 ug/m3	< 1.9 ug/m3	--	< 5.5 ug/m3	< 5.3 ug/m3
1,4-Dichlorobenzene	--	--	< 5.5 ug/m3	< 5.5 ug/m3	< 5.5 ug/m3	--	--	< 4.1 ug/m3	< 5.5 ug/m3	< 9.6 ug/m3	--	--	< 9.2 ug/m3	< 5.5 ug/m3	< 1.9 ug/m3	--	< 5.5 ug/m3	< 5.3 ug/m3
2-Hexanone	--	--	< 2.7 ug/m3	< 2.7 ug/m3	< 2.7 ug/m3	--	--	< 2.8 ug/m3	4.9 ug/m3	< 4.7 ug/m3	--	--	< 4.5 ug/m3	3.0 ug/m3	1.5 ug/m3	--	3.5 ug/m3	< 2.6 ug/m3
4-Ethyltoluene	--	--	50.5 ug/m3	< 4.5 ug/m3	< 4.5 ug/m3	--	--	< 3.4 ug/m3	< 4.5 ug/m3	< 7.8 ug/m3	--	--	< 7.5 ug/m3	< 4.5 ug/m3	< 1.6 ug/m3	--	< 4.5 ug/m3	< 4.3 ug/m3
Acetone	--	--	103 ug/m3	68.8 ug/m3	31.4 ug/m3	--	--	929 ug/m3	84.3 ug/m3	21.8 ug/m3	--	--	176 ug/m3	1160 ug/m3	110 ug/m3	--	110 ug/m3	83.5 ug/m3
Benzene	--	--	1.3 ug/m3	9.9 ug/m3	0.95 ug/m3	--	--	6.3 ug/m3	4.9 ug/m3	< 1.0 ug/m3	--	--	< 0.98 ug/m3	2.0 ug/m3	2.1 ug/m3	--	2.5 ug/m3	< 0.57 ug/m3
Benzyl chloride	--	--	< 4.7 ug/m3	< 4.7 ug/m3	< 4.7 ug/m3	--	--	< 8.9 ug/m3	< 4.7 ug/m3	< 8.2 ug/m3	--	--	< 7.9 ug/m3	< 4.7 ug/m3	< 1.6 ug/m3	--	< 4.7 ug/m3	< 4.6 ug/m3
Bromodichloromethane	--	--	< 2.4 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3	--	--	< 4.6 ug/m3	< 2.4 ug/m3	< 4.3 ug/m3	--	--	< 4.1 ug/m3	< 2.4 ug/m3	< 2.1 ug/m3	--	< 2.4 ug/m3	< 2.4 ug/m3
Bromoform	--	--	< 9.5 ug/m3	< 9.5 ug/m3	< 9.5 ug/m3	--	--	< 7.1 ug/m3	< 9.5 ug/m3	< 16.4 ug/m3	--	--	< 15.9 ug/m3	< 9.5 ug/m3	< 3.3 ug/m3	--	< 9.5 ug/m3	< 9.1 ug/m3
Bromomethane	--	--	< 1.4 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3	--	--	< 2.7 ug/m3	< 1.4 ug/m3	< 2.5 ug/m3	--	--	< 2.4 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3	--	< 1.4 ug/m3	< 1.4 ug/m3
Carbon disulfide	--	--	< 1.1 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	--	--	< 2.1 ug/m3	3.8 ug/m3	6.5 ug/m3	--	--	< 1.9 ug/m3	2.6 ug/m3	2.6 ug/m3	--	< 1.1 ug/m3	2.2 ug/m3
Carbon tetrachloride	--	--	< 1.2 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	--	--	< 2.2 ug/m3	3.8 ug/m3	< 2.0 ug/m3	--	--	< 1.9 ug/m3	< 1.2 ug/m3	< 1.0 ug/m3	--	< 1.2 ug/m3	< 1.1 ug/m3
Chlorobenzene	--	--	< 1.7 ug/m3	117 ug/m3	< 1.7 ug/m3	--	--	< 3.2 ug/m3	< 1.7 ug/m3	< 2.9 ug/m3	--	--	< 2.8 ug/m3	< 1.7 ug/m3	< 1.5 ug/m3	--	< 1.7 ug/m3	< 1.6 ug/m3
Chlorodibromomethane	--	--	< 3.1 ug/m3	< 3.1 ug/m3	< 3.1 ug/m3	--	--	< 5.8 ug/m3	< 3.1 ug/m3	< 5.4 ug/m3	--	--	< 5.2 ug/m3	< 3.1 ug/m3	< 2.7 ug/m3	--	< 3.1 ug/m3	< 3.0 ug/m3
Chloroethane	--	--	< 0.97 ug/m3	< 0.97 ug/m3	< 0.97 ug/m3	--	--	< 1.8 ug/m3	< 0.97 ug/m3	< 1.7 ug/m3	--	--	< 1.6 ug/m3	< 0.97 ug/m3	< 0.85 ug/m3	--	< 0.97 ug/m3	< 0.94 ug/m3
Chloroform	--	--	< 1.8 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3	--	--	5.0 ug/m3	20.7 ug/m3	< 3.1 ug/m3	--	--	< 3.0 ug/m3	3.6 ug/m3	< 1.6 ug/m3	--	< 1.8 ug/m3	4.8 ug/m3
Chloromethane	--	--	< 0.76 ug/m3	< 0.76 ug/m3	1.3 ug/m3	--	--	< 1.4 ug/m3	< 0.76 ug/m3	< 1.3 ug/m3	--	--	< 1.3 ug/m3	< 0.76 ug/m3	< 0.66 ug/m3	--	< 0.76 ug/m3	< 0.73 ug/m3
Cyclohexane	--	--	< 1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	--	12.4 ug/m3	17.6 ug/m3	< 2.2 ug/m3	--	--	< 2.1 ug/m3	< 1.3 ug/m3	2.0 ug/m3	--	< 1.3 ug/m3	< 1.2 ug/m3
Dichlorodifluoromethane (CFC-12)	--	--	2.4 ug/m3	2.4 ug/m3	2.2 ug/m3	--	--	< 3.4 ug/m3	2.7 ug/m3	< 3.2 ug/m3	--	--	< 3.1 ug/m3	3.8 ug/m3	10.5 ug/m3	--	4.2 ug/m3	32.0 ug/m3
Ethyl acetate	--	--	< 1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	--	< 2.5 ug/m3	< 1.3 ug/m3	< 2.3 ug/m3	--	--	< 2.2 ug/m3	< 1.3 ug/m3	2.1 ug/m3	--	< 1.3 ug/m3	< 1.3 ug/m3
Ethyl Alcohol	--	--	95.8 ug/m3	47.9 ug/m3	49.5 ug/m3	--	--	4.7 ug/m3	33.6 ug/m3	14.6 ug/m3	--	--	27.2 ug/m3	41.0 ug/m3	37.3 ug/m3	--	45.7 ug/m3	126 ug/m3
Ethyl benzene	--	--	29.7 ug/m3	4.0 ug/m3	6.6 ug/m3	--	--	< 3.0 ug/m3	< 4.0 ug/m3	< 6.9 ug/m3	--	--	< 6.7 ug/m3	< 4.0 ug/m3	3.8 ug/m3	--	< 4.0 ug/m3	< 3.8 ug/m3
Heptane	--	--	2.0 ug/m3	1.7 ug/m3	< 1.5 ug/m3	--	--	< 2.8 ug/m3	< 1.5 ug/m3	< 2.6 ug/m3	--	--	6.9 ug/m3	< 1.5 ug/m3	2.9 ug/m3	--	2.4 ug/m3	< 1.4 ug/m3
Hexachlorobutadiene	--	--	< 4.0 ug/m3	< 4.0 ug/m3	< 4.0 ug/m3	--	--	< 7.4 ug/m3	< 4.0 ug/m3	< 6.9 ug/m3	--	--	< 6.6 ug/m3	< 4.0 ug/m3	< 3.5 ug/m3	--	< 4.0 ug/m3	< 3.8 ug/m3
Hexane (C6)	--	--	4.2 ug/m3	3.3 ug/m3	2.2 ug/m3	--	--	294 ug/m3	6.4 ug/m3	< 2.3 ug/m3	--	--	7.9 ug/m3	2.9 ug/m3	4.7 ug/m3	--	2.2 ug/m3	3.1 ug/m3
Isopropyl alcohol	--	--	52.8 ug/m3	15.5 ug/m3	21.1 ug/m3	--	--	17.4 ug/m3	21.3 ug/m3	4.0 ug/m3	--	--	9.6 ug/m3	5.8 ug/m3	9.8 ug/m3	--	7.1 ug/m3	68.2 ug/m3
Methyl ethyl ketone	--	--	16.9 ug/m3	9.2 ug/m3	5.3 ug/m3	--	--	11000 ug/m3	36.8 ug/m3	12.3 ug/m3	--	--	14.8 ug/m3	36.0 ug/m3	28.6 ug/m3	--	16.3 ug/m3	12.3 ug/m3
Methyl isobutyl ketone	--	--	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	--	4.9 ug/m3	< 1.5 ug/m3	< 2.6 ug/m3	--	--	< 2.5 ug/m3	5.6 ug/m3	1.3 ug/m3	--	1.7 ug/m3	1.9 ug/m3
Methyl tertiary butyl ether (MTBE)	--	--	< 1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	--	< 2.5 ug/m3	< 1.3 ug/m3	< 2.3 ug/m3	--	--	< 2.2 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	--	< 1.3 ug/m3	< 1.3 ug/m3
Methylene chloride	--	--	19.2 ug/m3	25.7 ug/m3	23.9 ug/m3	--	--	25.6 ug/m3	28.7 ug/m3	31.2 ug/m3	--	--	9.2 ug/m3	6.7 ug/m3	4.1 ug/m3	--	8.2 ug/m3	61.2 ug/m3
Naphthalene	--	--	124 ug/m3	28.9 ug/m3	13.3 ug/m3	--	--	21.7 ug/m3	11.9 ug/m3	< 8.3 ug/m3	--	--	8.8 ug/m3	6.7 ug/m3	11.9 ug/m3	--	7.2 ug/m3	8.7 ug/m3
Propylene	--	--	< 0.63 ug/m3	< 0.63 ug/m3	< 0.63 ug/m3	--	--	< 1.2 ug/m3	< 0.63 ug/m3	< 1.1 ug/m3	--	--	< 1.1 ug/m3	< 0.63 ug/m3	7.4 ug/m3	--	6.5 ug/m3	< 0.61 ug/m3
Styrene	--	--	7.1 ug/m3	< 3.9 ug/m3	< 3.9 ug/m3	--	--	< 2.9 ug/m3	< 3.9 ug/m3	< 6.8 ug/m3	--	--	< 6.5 ug/m3	< 3.9 ug/m3	1.4 ug/m3	--	< 3.9 ug/m3	< 3.8 ug/m3
Tetrachloroethylene	--	--	1.7 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	--	--	197 ug/m3	11.1 ug/m3	< 2.2 ug/m3	--	--	4.9 ug/m3	11.1 ug/m3	48.1 ug/m3	--	7.1 ug/m3	26.5 ug/m3
Tetrahydrofuran	--	--	2.7 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	--	--	5190 ug/m3	< 1.1 ug/m3	3.5 ug/m3	--	--	5.2 ug/m3	1.9 ug/m3	< 0.94 ug/m3	--	< 1.1 ug/m3	< 1.0 ug/m3
Toluene	--	--	44.4 ug/m3	9.2 ug/m3	6.0 ug/m3	--	--	3.0 ug/m3	10.5 ug/m3	7.0 ug/m3	--	--	3.0 ug/m3	54.3 ug/m3	139 ug/m3	--	6.2 ug/m3	7.3 ug/m3
Trichlorofluoromethane	--	--	3.4 ug/m3	< 2.1 ug/m3	< 2.1 ug/m3	--	--	< 3.8 ug/m3	< 2.1 ug/m3	< 3.6 ug/m3	--	--	4.6 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3	--	< 2.1 ug/m3	< 2.0 ug/m3
Trichlorotrifluoroethane (Freon 113)	--	--	< 2.9 ug/m3	< 2.9 ug/m3	< 2.9 ug/m3	--	--	< 5.4 ug/m3	< 2.9 ug/m3	< 5.0 ug/m3	--	--	< 4.8 ug/m3	3.5 ug/m3	< 2.5 ug/m3	--	3.8 ug/m3	6.3 ug/m3
Vinyl acetate	--	--	< 1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	--	< 2.4 ug/m3	< 1.3 ug/m3	< 2.2 ug/m3	--	--	< 2.2 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	--	< 1.3 ug/m3	< 1.2 ug/m3
Vinyl chloride	--	--	< 0.47 ug/m3	< 0.47 ug/m3	< 0.47 ug/m3	--	--	1.4 ug/m3	< 0.47 ug/m3	< 0.81 ug/m3	--	--	< 0.79 ug/m3	< 0.47 ug/m3	< 0.41 ug/m3	--	< 0.47 ug/m3	< 0.45 ug/m3
Xylene, m & p	--	--	131 ug/m3	8.0 ug/m3	22.2 ug/m3	--	--	< 5.9 ug/m3	7.9 ug/m3	< 6.9 ug/m3	--	--	< 6.7 ug/m3	11.5 ug/m3	13.1 ug/m3	--	7.1 ug/m3	4.2 ug/m3
Xylene, o	--	--	66.0 ug/m3	2.8 ug/m3	5.0 ug/m3	--	--	< 3.0 ug/m3	3.1 ug/m3	< 2.8 ug/m3	--	--	4.3 ug/m3	4.0 ug/m3	4.0 ug/m3	--	2.9 ug/m3	< 1.5 ug/m3

Data is organized by ascending building number.

Table E-1
Sub-Slab Sample Analytical Results
2010 East Hennepin Avenue
East Hennepin Avenue Site
Minneapolis, Minnesota

Building Number	Building 5										Building 7						Building 8	
Sample Date	3/12/2014	6/10/2014	3/12/2014	6/10/2014	4/03/2014	6/10/2014	4/03/2014	6/10/2014	4/03/2014	6/10/2014	2/14/2014	6/10/2014	2/14/2014	6/10/2014	3/12/2014	6/10/2014	2/14/2014	2/14/2014
Sample ID	3954_W	3954_W	3954_X	3954_X	3954_TT	3954_TT	3954_UU	3954_UU	3954_VV	3954_VV	3954_M	3954_M	3954_N	3954_N	3954_DD	3954_DD	3954_H	3954_Q
Parameter																		
Trichloroethylene	< 0.96 ug/m3	< 1.0 ug/m3	1.0 ug/m3	< 2.0 ug/m3	< 2.0 ug/m3	< 1.9 ug/m3	< 0.99 ug/m3	< 2.0 ug/m3	20.0 ug/m3	< 2.0 ug/m3	< 1.7 ug/m3	3.2 ug/m3	14.2 ug/m3	10.0 ug/m3	3.3 ug/m3	10.4 ug/m3	263 ug/m3	182 ug/m3
1,1,1-Trichloroethane	--	3.1 ug/m3	--	45.3 ug/m3	< 6.8 ug/m3	< 1.9 ug/m3	< 2.0 ug/m3	< 2.0 ug/m3	29.7 ug/m3	< 2.0 ug/m3	34.2 ug/m3	40.9 ug/m3	98.0 ug/m3	11.3 ug/m3	--	74.6 ug/m3	446 ug/m3	551 ug/m3
1,1,2,2-Tetrachloroethane	--	< 2.6 ug/m3	--	< 2.5 ug/m3	< 4.3 ug/m3	< 2.4 ug/m3	< 1.3 ug/m3	< 2.5 ug/m3	< 1.3 ug/m3	< 2.5 ug/m3	< 2.1 ug/m3	< 2.5 ug/m3	< 1.2 ug/m3	< 2.6 ug/m3	--	< 2.5 ug/m3	< 1.2 ug/m3	< 3.5 ug/m3
1,1,2-Trichloroethane	--	< 2.1 ug/m3	--	< 2.0 ug/m3	< 3.4 ug/m3	< 1.9 ug/m3	< 0.99 ug/m3	< 2.0 ug/m3	< 0.99 ug/m3	< 2.0 ug/m3	< 1.7 ug/m3	< 2.0 ug/m3	< 0.96 ug/m3	< 2.1 ug/m3	--	< 2.0 ug/m3	< 0.96 ug/m3	< 2.7 ug/m3
1,1-Dichloroethane	--	< 1.5 ug/m3	--	< 1.5 ug/m3	< 5.0 ug/m3	< 1.4 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 2.5 ug/m3	< 1.5 ug/m3	1.7 ug/m3	< 1.5 ug/m3	--	< 1.5 ug/m3	39.4 ug/m3	9.7 ug/m3
1,1-Dichloroethylene	--	< 1.5 ug/m3	--	< 1.5 ug/m3	< 4.9 ug/m3	< 1.4 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 2.4 ug/m3	< 1.5 ug/m3	< 1.4 ug/m3	< 1.5 ug/m3	--	< 1.5 ug/m3	122 ug/m3	23.4 ug/m3
1,2,4-Trichlorobenzene	--	< 7.1 ug/m3	--	< 6.8 ug/m3	< 9.2 ug/m3	< 6.6 ug/m3	< 6.8 ug/m3	< 6.8 ug/m3	< 6.8 ug/m3	< 6.8 ug/m3	< 4.6 ug/m3	< 6.8 ug/m3	< 2.6 ug/m3	< 7.1 ug/m3	--	< 6.8 ug/m3	< 2.6 ug/m3	< 7.5 ug/m3
1,2,4-Trimethylbenzene	--	2.0 ug/m3	--	6.2 ug/m3	32.9 ug/m3	2.2 ug/m3	116 ug/m3	1.8 ug/m3	55.7 ug/m3	< 1.8 ug/m3	< 3.0 ug/m3	7.4 ug/m3	< 1.7 ug/m3	< 1.9 ug/m3	--	6.4 ug/m3	< 1.7 ug/m3	< 5.0 ug/m3
1,2-Dibromoethane	--	< 7.3 ug/m3	--	< 7.0 ug/m3	< 9.5 ug/m3	< 6.8 ug/m3	< 2.8 ug/m3	< 7.0 ug/m3	< 2.8 ug/m3	< 7.0 ug/m3	< 4.7 ug/m3	< 7.0 ug/m3	< 2.7 ug/m3	< 7.3 ug/m3	--	< 7.0 ug/m3	< 2.7 ug/m3	< 7.8 ug/m3
1,2-Dichlorobenzene	--	< 2.3 ug/m3	--	< 2.2 ug/m3	< 7.5 ug/m3	< 2.1 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	< 3.7 ug/m3	< 2.2 ug/m3	< 2.1 ug/m3	< 2.3 ug/m3	--	< 2.2 ug/m3	< 2.1 ug/m3	< 6.1 ug/m3
1,2-Dichloroethane	--	< 1.5 ug/m3	--	< 1.5 ug/m3	< 2.5 ug/m3	< 1.4 ug/m3	< 0.74 ug/m3	< 1.5 ug/m3	< 0.74 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.5 ug/m3	< 0.71 ug/m3	< 1.5 ug/m3	--	< 1.5 ug/m3	< 0.71 ug/m3	< 2.0 ug/m3
1,2-Dichloroethylene, cis	--	< 1.5 ug/m3	--	< 1.5 ug/m3	< 4.9 ug/m3	< 1.4 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 2.4 ug/m3	< 1.5 ug/m3	< 1.4 ug/m3	< 1.5 ug/m3	--	2.9 ug/m3	4.3 ug/m3	< 4.0 ug/m3
1,2-Dichloroethylene, trans	--	< 1.5 ug/m3	--	< 1.5 ug/m3	< 4.9 ug/m3	< 1.4 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 2.4 ug/m3	< 1.5 ug/m3	< 1.4 ug/m3	< 1.5 ug/m3	--	< 1.5 ug/m3	< 1.4 ug/m3	< 4.0 ug/m3
1,2-Dichloropropane	--	< 1.8 ug/m3	--	< 1.7 ug/m3	< 5.7 ug/m3	< 1.6 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	< 2.8 ug/m3	< 1.7 ug/m3	< 1.6 ug/m3	< 1.8 ug/m3	--	< 1.7 ug/m3	< 1.6 ug/m3	< 4.7 ug/m3
1,2-Dichlorotetrafluoroethane	--	< 2.7 ug/m3	--	< 2.6 ug/m3	< 8.7 ug/m3	< 2.5 ug/m3	< 2.6 ug/m3	< 2.6 ug/m3	< 2.6 ug/m3	< 2.6 ug/m3	< 4.3 ug/m3	< 2.6 ug/m3	< 2.5 ug/m3	< 2.7 ug/m3	--	< 2.6 ug/m3	< 2.5 ug/m3	< 7.1 ug/m3
1,3,5-Trimethylbenzene	--	< 1.9 ug/m3	--	2.7 ug/m3	< 6.1 ug/m3	< 1.7 ug/m3	28.7 ug/m3	< 1.8 ug/m3	21.4 ug/m3	< 1.8 ug/m3	< 3.0 ug/m3	3.2 ug/m3	< 1.7 ug/m3	< 1.9 ug/m3	--	1.9 ug/m3	< 1.7 ug/m3	< 5.0 ug/m3
1,3-Butadiene	--	< 2.1 ug/m3	--	< 2.0 ug/m3	< 2.7 ug/m3	< 2.0 ug/m3	< 0.81 ug/m3	< 2.0 ug/m3	< 0.81 ug/m3	< 2.0 ug/m3	< 1.4 ug/m3	< 2.0 ug/m3	< 0.78 ug/m3	< 2.1 ug/m3	--	< 2.0 ug/m3	< 0.78 ug/m3	< 2.2 ug/m3
1,3-Dichloro-1-propene, cis	--	< 4.3 ug/m3	--	< 4.2 ug/m3	< 5.6 ug/m3	< 4.0 ug/m3	< 1.7 ug/m3	< 4.2 ug/m3	< 1.7 ug/m3	< 4.2 ug/m3	< 2.8 ug/m3	< 4.2 ug/m3	< 1.6 ug/m3	< 4.3 ug/m3	--	< 4.2 ug/m3	< 1.6 ug/m3	< 4.6 ug/m3
1,3-Dichloro-1-propene, trans	--	< 1.7 ug/m3	--	< 1.7 ug/m3	< 5.6 ug/m3	< 1.6 ug/m3	< 4.2 ug/m3	< 1.7 ug/m3	< 4.2 ug/m3	< 1.7 ug/m3	< 2.8 ug/m3	< 1.7 ug/m3	< 1.6 ug/m3	< 1.7 ug/m3	--	< 1.7 ug/m3	< 1.6 ug/m3	< 4.6 ug/m3
1,3-Dichlorobenzene	--	< 2.3 ug/m3	--	< 2.2 ug/m3	< 7.5 ug/m3	< 2.1 ug/m3	< 5.5 ug/m3	< 2.2 ug/m3	< 5.5 ug/m3	< 2.2 ug/m3	< 3.7 ug/m3	< 2.2 ug/m3	< 2.1 ug/m3	< 2.3 ug/m3	--	< 2.2 ug/m3	< 2.1 ug/m3	< 6.1 ug/m3
1,4-Dichlorobenzene	--	< 2.3 ug/m3	--	< 2.2 ug/m3	< 7.5 ug/m3	< 2.1 ug/m3	< 5.5 ug/m3	< 2.2 ug/m3	< 5.5 ug/m3	< 2.2 ug/m3	< 3.7 ug/m3	3.3 ug/m3	< 2.1 ug/m3	< 2.3 ug/m3	--	< 2.2 ug/m3	< 2.1 ug/m3	< 6.1 ug/m3
2-Hexanone	--	2.9 ug/m3	--	2.8 ug/m3	< 5.1 ug/m3	< 2.6 ug/m3	< 2.7 ug/m3	< 2.7 ug/m3	< 2.7 ug/m3	< 2.7 ug/m3	< 2.5 ug/m3	< 2.7 ug/m3	< 1.4 ug/m3	< 2.8 ug/m3	--	< 2.7 ug/m3	< 1.4 ug/m3	< 4.1 ug/m3
4-Ethyltoluene	--	< 1.9 ug/m3	--	2.6 ug/m3	< 6.1 ug/m3	< 1.7 ug/m3	33.3 ug/m3	< 1.8 ug/m3	20.9 ug/m3	< 1.8 ug/m3	< 3.0 ug/m3	2.9 ug/m3	< 1.7 ug/m3	< 1.9 ug/m3	--	2.6 ug/m3	< 1.7 ug/m3	< 5.0 ug/m3
Acetone	--	31.0 ug/m3	--	18.8 ug/m3	143 ug/m3	5.0 ug/m3	94.0 ug/m3	13.6 ug/m3	19.4 ug/m3	5.6 ug/m3	76.9 ug/m3	17.4 ug/m3	43.2 ug/m3	< 4.5 ug/m3	--	10.2 ug/m3	45.1 ug/m3	44.2 ug/m3
Benzene	--	< 3.0 ug/m3	--	< 2.9 ug/m3	7.5 ug/m3	< 2.8 ug/m3	< 0.58 ug/m3	< 2.9 ug/m3	112 ug/m3	< 2.9 ug/m3	2.2 ug/m3	< 2.9 ug/m3	< 0.57 ug/m3	< 3.0 ug/m3	--	< 2.9 ug/m3	< 0.57 ug/m3	< 1.6 ug/m3
Benzyl chloride	--	< 4.9 ug/m3	--	< 4.7 ug/m3	< 16.1 ug/m3	< 4.6 ug/m3	< 4.7 ug/m3	< 4.7 ug/m3	< 4.7 ug/m3	< 4.7 ug/m3	< 3.2 ug/m3	< 4.7 ug/m3	< 1.8 ug/m3	< 4.9 ug/m3	--	< 4.7 ug/m3	< 1.8 ug/m3	< 5.2 ug/m3
Bromodichloromethane	--	< 2.5 ug/m3	--	< 2.4 ug/m3	< 8.3 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3	< 4.1 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3	< 2.5 ug/m3	--	3.8 ug/m3	< 2.4 ug/m3	< 6.8 ug/m3
Bromoform	--	< 3.9 ug/m3	--	< 3.8 ug/m3	< 12.8 ug/m3	< 3.7 ug/m3	< 9.5 ug/m3	< 3.8 ug/m3	< 9.5 ug/m3	< 3.8 ug/m3	< 6.3 ug/m3	< 3.8 ug/m3	< 3.7 ug/m3	< 3.9 ug/m3	--	< 3.8 ug/m3	< 3.7 ug/m3	< 10.4 ug/m3
Bromomethane	--	< 3.7 ug/m3	--	< 3.6 ug/m3	< 4.8 ug/m3	< 3.4 ug/m3	< 1.4 ug/m3	< 3.6 ug/m3	< 1.4 ug/m3	< 3.6 ug/m3	< 2.4 ug/m3	< 3.6 ug/m3	< 1.4 ug/m3	< 3.7 ug/m3	--	< 3.6 ug/m3	< 1.4 ug/m3	< 3.9 ug/m3
Carbon disulfide	--	< 1.2 ug/m3	--	6.1 ug/m3	< 3.8 ug/m3	1.9 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	8.9 ug/m3	< 1.1 ug/m3	8.9 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	< 1.2 ug/m3	--	< 1.1 ug/m3	1.2 ug/m3	< 3.1 ug/m3
Carbon tetrachloride	--	< 6.0 ug/m3	--	< 5.8 ug/m3	< 3.9 ug/m3	< 5.6 ug/m3	< 1.2 ug/m3	< 5.8 ug/m3	< 1.2 ug/m3	< 5.8 ug/m3	36.6 ug/m3	19.0 ug/m3	< 1.1 ug/m3	< 6.0 ug/m3	--	< 5.8 ug/m3	3.8 ug/m3	3.4 ug/m3
Chlorobenzene	--	< 4.4 ug/m3	--	< 4.2 ug/m3	< 5.7 ug/m3	< 4.1 ug/m3	< 1.7 ug/m3	< 4.2 ug/m3	< 1.7 ug/m3	< 4.2 ug/m3	< 2.8 ug/m3	< 4.2 ug/m3	< 1.6 ug/m3	< 4.4 ug/m3	--	< 4.2 ug/m3	< 1.6 ug/m3	< 4.7 ug/m3
Chlorodibromomethane	--	< 3.2 ug/m3	--	< 3.1 ug/m3	< 10.6 ug/m3	< 3.0 ug/m3	< 3.1 ug/m3	< 3.1 ug/m3	< 3.1 ug/m3	< 3.1 ug/m3	< 5.2 ug/m3	< 3.1 ug/m3	< 3.0 ug/m3	< 3.2 ug/m3	--	< 3.1 ug/m3	< 3.0 ug/m3	< 8.6 ug/m3
Chloroethane	--	< 1.0 ug/m3	--	< 0.97 ug/m3	< 3.3 ug/m3	< 0.94 ug/m3	< 0.97 ug/m3	< 0.97 ug/m3	< 0.97 ug/m3	< 0.97 ug/m3	< 1.6 ug/m3	< 0.97 ug/m3	< 0.94 ug/m3	< 1.0 ug/m3	--	< 0.97 ug/m3	< 0.94 ug/m3	< 2.7 ug/m3
Chloroform	--	< 1.9 ug/m3	--	< 1.8 ug/m3	< 6.0 ug/m3	< 1.7 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3	9.1 ug/m3	< 1.8 ug/m3	10.0 ug/m3	17.1 ug/m3	6.9 ug/m3	< 1.9 ug/m3	--	109 ug/m3	6.4 ug/m3	6.5 ug/m3
Chloromethane	--	< 0.79 ug/m3	--	< 0.76 ug/m3	< 2.6 ug/m3	< 0.73 ug/m3	< 0.76 ug/m3	< 0.76 ug/m3	< 0.76 ug/m3	< 0.76 ug/m3	< 1.3 ug/m3	< 0.76 ug/m3	< 0.73 ug/m3	< 0.79 ug/m3	--	< 0.76 ug/m3	< 0.73 ug/m3	< 2.1 ug/m3
Cyclohexane	--	< 3.3 ug/m3	--	< 3.1 ug/m3	5.0 ug/m3	< 3.0 ug/m3	< 1.3 ug/m3	< 3.1 ug/m3	12.5 ug/m3	< 3.1 ug/m3	< 2.1 ug/m3	< 3.1 ug/m3	< 1.2 ug/m3	< 3.3 ug/m3	--	< 3.1 ug/m3	< 1.2 ug/m3	< 3.5 ug/m3
Dichlorodifluoromethane (CFC-12)	--	557 ug/m3	--	8050 ug/m3	829 ug/m3	2620 ug/m3	8450 ug/m3	14300 ug/m3	1260 ug/m3	53.6 ug/m3	4.2 ug/m3	13.7 ug/m3	6.5 ug/m3	6.2 ug/m3	--	9.6 ug/m3	8.0 ug/m3	16.7 ug/m3
Ethyl acetate	--	< 3.4 ug/m3	--	< 3.3 ug/m3	< 4.5 ug/m3	< 3.2 ug/m3	< 1.3 ug/m3	< 3.3 ug/m3	< 1.3 ug/m3	< 3.3 ug/m3	< 2.2 ug/m3	< 3.3 ug/m3	< 1.3 ug/m3	< 3.4 ug/m3	--	< 3.3 ug/m3	< 1.3 ug/m3	< 3.6 ug/m3
Ethyl Alcohol	--	12.2 ug/m3	--	8.4 ug/m3	101 ug/m3	4.0 ug/m3	188 ug/m3	18.0 ug/m3	17.4 ug/m3	9.7 ug/m3	103 ug/m3	7.3 ug/m3	139 ug/m3	< 1.8 ug/m3	--	6.0 ug/m3	83.8 ug/m3	76.5 ug/m3
Ethyl benzene	--	< 4.1 ug/m3	--	7.2 ug/m3	12.1 ug/m3	< 3.8 ug/m3	30.7 ug/m3	< 4.0 ug/m3	56.1 ug/m3	< 4.0 ug/m3	2.7 ug/m3	< 4.0 ug/m3	< 1.5 ug/m3	< 4.1 ug/m3	--	< 4.0 ug/m3	< 1.5 ug/m3	< 4.4 ug/m3
Heptane	--	< 3.9 ug/m3	--	4.0 ug/m3	7.7 ug/m3	< 3.6 ug/m3	< 1.5 ug/m3	< 3.7 ug/m3	29.9 ug/m3	< 3.7 ug/m3	2.9 ug/m3	< 3.7 ug/m3	< 1.4 ug/m3	< 3.9 ug/m3	--	< 3.7 ug/m3	< 1.4 ug/m3	< 4.1 ug/m3
Hexachlorobutadiene	--	< 10.1 ug/m3	--	< 9.8 ug/m3	< 13.4 ug/m3	< 9.4 ug/m3	< 4.0 ug/m3	< 9.8 ug/m3	< 4.0 ug/m3	< 9.8 ug/m3	< 6.6 ug/m3	< 9.8 ug/m3	< 3.8 ug/m3	< 10.1 ug/m3	--	< 9.8 ug/m3	< 3.8 ug/m3	< 10.9 ug/m3
Hexane (C6)	--	< 3.3 ug/m3	--	< 3.2 ug/m3	8.4 ug/m3	< 3.1 ug/m3	< 1.3 ug/m3	< 3.2 ug/m3	26.0 ug/m3	3.5 ug/m3	5.2 ug/m3	< 3.2 ug/m3	< 1.3 ug/m3	< 3.3 ug/m3	--	< 3.2 ug/m3	6.5 ug/m3	4.9 ug/m3
Isopropyl alcohol	--	10.1 ug/m3	--	8.1 ug/m3	144 ug/m3	2.2 ug/m3	41.5 ug/m3	6.4 ug/m3	4.8 ug/m3	< 2.2 ug/m3	< 1.5 ug/m3	3.2 ug/m3	20.9 ug/m3	< 2.3 ug/m3	--	< 2.2 ug/m3	4.8 ug/m3	< 2.5 ug/m3
Methyl ethyl ketone	--	6.1 ug/m3	--	5.3 ug/m3	21.8 ug/m3	< 3.2 ug/m3	10.4 ug/m3	3.8 ug/m3	6.7 ug/m3	< 3.3 ug/m3	12.5 ug/m3	4.7 ug/m3	7.4 ug/m3	< 3.4 ug/m3	--	3.6 ug/m3	7.5 ug/m3	15.5 ug/m3
Methyl isobutyl ketone	--	< 3.9 ug/m3	--	< 3.7 ug/m3	13.8 ug/m3	< 3.6 ug/m3	9.4 ug/m3	< 3.7 ug/m3	< 1.5 ug/m3	< 3.7 ug/m3	< 2.5 ug/m3	< 3.7 ug/m3	< 1.4 ug/m3	< 3.9 ug/m3	--	< 3.7 ug/m3	< 1.4 ug/m3	< 4.1 ug/m3
Methyl tertiary butyl ether (MTBE)	--	< 3.4 ug/m3	--	< 3.3 ug/m3	< 4.5 ug/m3	< 3.2 ug/m3	< 1.3 ug/m3	< 3.3 ug/m3	< 1.3 ug/m3	< 3.3 ug/m3	< 2.2 ug/m3	< 3.3 ug/m3	< 1.3 ug/m3	< 3.4 ug/m3	--	< 3.3 ug/m3	< 1.3 ug/m3	< 3.6 ug/m3
Methylene chloride	--	< 6.6 ug/m3	--	< 6.4 ug/m3	28.4 ug/m3	< 6.1 ug/m3	8.3 ug/m3	< 6.4 ug/m3	49.4 ug/m3	26.1 ug/m3	37.5 ug/m3	< 6.4 ug/m3	3.7 ug/m3	< 6.6 ug/m3	--	< 6.4 ug/m3	29.7 ug/m3	108 ug/m3
Naphthalene	--	14.7 ug/m3	--	14.3 ug/m3	30.1 ug/m3	21.3 ug/m3	163 ug/m3	14.9 ug/m3	23.0 ug/m3	< 4.8 ug/m3	13.7 ug/m3	9.4 ug/m3	23.0 ug/m3	< 5.0 ug/m3	--	20.5 ug/m3	25.3 ug/m3	< 5.3 ug/m3
Propylene	--	< 1.6 ug/m3	--	< 1.6 ug/m3	< 2.1 ug/m3	< 1.5 ug/m3	< 0.63 ug/m3	< 1.6 ug/m3	< 0.63 ug/m3	1.7 ug/m3	9.4 ug/m3	< 1.6 ug/m3	< 0.61 ug/m3	< 1.6 ug/m3	--	< 1.6 ug/m3	< 0.61 ug/m3	4.9 ug/m3
Styrene	--	2.0 ug/m3	--	< 1.6 ug/m3	7.4 ug/m3	< 1.5 ug/m3	10.8 ug/m3	< 1.6 ug/m3	< 3.9 ug/m3	< 1.6 ug/m3	< 2.6 ug/m3	1.8 ug/m3	< 1.5 ug/m3	< 1.6 ug/m3	--	< 1.6 ug/m3	< 1.5 ug/m3	< 4.3 ug/m3
Tetrachloroethylene	--	< 2.6 ug/m3	--	12.3 ug/m3	4.6 ug/m3	2.7 ug/m3	< 1.2 ug/m3	< 2.5 ug/m3	10.6 ug/m3	< 2.5 ug/m3	883 ug/m3	547 ug/m3	68.9 ug/m3	7.1 ug/m3	--	252 ug/m3	50.6 ug/m3	52.6 ug/m3
Tetrahydrofuran	--	< 2.8 ug/m3	--	< 2.7 ug/m3	< 3.7 ug/m3	< 2.6 ug/m3	< 1.1 ug/m3	< 2.7 ug/m3	< 1.1 ug/m3	< 2.7 ug/m3	< 1.8 ug/m3	< 2.7 ug/m3	1.2 ug/m3	< 2.8 ug/m3	--	< 2.7 ug/m3	< 1.0 ug/m3	< 3.0 ug/m3
Toluene	--	1.9 ug/m3	--	2.0 ug/m3	26.9 ug/m3	1.5 ug/m3	46.7 ug/m3	< 1.4 ug/m3	18.9 ug/m3	< 1.4 ug/m3	14.8 ug/m3	5.4 ug/m3	1.8 ug/m3	1.7 ug/m3	--	< 1.4 ug/m3	4.1 ug/m3	14.9 ug/m3
Trichlorofluoromethane	--	< 2.1 ug/m3	--	< 2.1 ug/m3	< 7.0 ug/m3	< 2.0 ug/m3	< 2.1 ug/m3	< 2.1 ug/m3	< 2.1 ug/m3	< 2.1 ug/m3	< 3.4 ug/m3	< 2.1 ug/m3	< 2.0 ug/m3	< 2.1 ug/m3	--	< 2.1 ug/m3	3.2 ug/m3	< 5.7 ug/m3
Trichlorotrifluoroethane (Freon 113)	--	< 3.0 ug/m3	--	< 2.9 ug/m3	< 9.8 ug/m3	< 2.8 ug/m3	< 2.9 ug/m3	< 2.9 ug/m3	5.8 ug/m3	< 2.9 ug/m3	< 4.8 ug/m3	< 2.9 ug/m3	6.3 ug/m3	< 3.0 ug/m3	--	4.1 ug/m3	49.8 ug/m3	69.9 ug/m3
Vinyl acetate	--	4.2 ug/m3	--	4.4 ug/m3	< 4.4 ug/m3	< 3.1 ug/m3	< 1.3 ug/m3	3.5 ug/m3	< 1.3 ug/m3	< 3.2 ug/m3	< 2.2 ug/m3	< 3.2 ug/m3	< 1.2 ug/m3	< 3.3 ug/m3	--	4.6 ug/m3	< 1.2 ug/m3	4.0 ug/m3
Vinyl chloride	--	< 0.97 ug/m3	--	< 0.94 ug/m3	< 1.6 ug/m3	< 0.90 ug/m3	< 0.47 ug/m3	< 0.94 ug/m3	< 0.47 ug/m3	< 0.94 ug/m3	< 0.79 ug/m3	< 0.94 ug/m3	< 0.45 ug/m3	< 0.97 ug/m3	--	< 0.94 ug/m3	< 0.45 ug/m3	< 1.3 ug/m3
Xylene, m & p	--	< 3.3 ug/m3	--	23.6 ug/m3	56.7 ug/m3	3.1 ug/m3	139 ug/m3	< 3.2 ug/m3	363 ug/m3	< 3.2 ug/m3	8.9 ug/m3	9.1 ug/m3	< 3.1 ug/m3	< 3.3 ug/m3	--	< 3.2 ug/m3	3.4 ug/m3	< 8.7 ug/m3
Xylene, o	--	< 1.6 ug/m3	--	9.1 ug/m3	27.6 ug/m3	1.7 ug/m3	85.4 ug/m3	< 1.6 ug/m3	33.8 ug/m3	< 1.6 ug/m3	2.9 ug/m3	3.8 ug/m3	< 1.5 ug/m3	< 1.6 ug/m3	--	< 1.6 ug/m3	< 1.5 ug/m3	< 4.4 ug/m3

Data is organized by ascending building number.

Table E-1
Sub-Slab Sample Analytical Results
2010 East Hennepin Avenue
East Hennepin Avenue Site
Minneapolis, Minnesota

Building Number	Building 9										Building 10						Building 11			Building 12	
Sample Date	2/14/2014	4/11/2014	2/14/2014	4/11/2014	3/13/2014	4/11/2014	3/13/2014	4/11/2014	3/13/2014	4/11/2014	2/13/2014		2/14/2014	3/12/2014			2/03/2014	1/31/2014	3/12/2014	2/14/2014	2/14/2014
Sample ID	3954_K	3954_K	3954_L	3954_L	3954_FF	3954_FF	3954_GG	3954_GG	3954_HH	3954_HH	3954_F	3954_G	3954_O	3954_AA	3954_BB	3954_CC	3954_D	3954_E	3954_EE	3954_I	3954_J
Parameter																					
Trichloroethylene	38.0 ug/m3	32.5 ug/m3	15.4 ug/m3	16.9 ug/m3	2.1 ug/m3	1.7 ug/m3	50.5 ug/m3	48.7 ug/m3	48.3 ug/m3	33.1 ug/m3	57.4 ug/m3	470 ug/m3	25.4 ug/m3	700 ug/m3	1320 ug/m3	78.1 ug/m3	2940 ug/m3	298 ug/m3	1700 ug/m3	3320 ug/m3	2210 ug/m3
1,1,1-Trichloroethane	58.6 ug/m3	51.7 ug/m3	48.2 ug/m3	56.5 ug/m3	--	27.0 ug/m3	--	120 ug/m3	--	41.1 ug/m3	5.6 ug/m3	3.5 ug/m3	11.3 ug/m3	--	--	--	19.4 * ug/m3	9.1 ug/m3	--	24.5 ug/m3	18.0 ug/m3
1,1,2,2-Tetrachloroethane	< 2.0 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	< 1.3 ug/m3	--	< 1.3 ug/m3	--	< 1.3 ug/m3	< 2.1 ug/m3	< 1.3 ug/m3	< 1.4 ug/m3	--	--	--	< 1.9 ug/m3	< 1.3 ug/m3	--	< 1.2 ug/m3	< 1.2 ug/m3
1,1,2-Trichloroethane	< 1.6 ug/m3	< 0.99 ug/m3	< 0.99 ug/m3	< 0.99 ug/m3	--	< 0.99 ug/m3	--	< 0.99 ug/m3	--	< 0.99 ug/m3	< 1.7 ug/m3	< 0.99 ug/m3	< 1.1 ug/m3	--	--	--	< 1.5 ug/m3	< 0.99 ug/m3	--	< 0.92 ug/m3	< 0.96 ug/m3
1,1-Dichloroethane	< 2.3 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	< 1.5 ug/m3	--	3.6 ug/m3	--	< 1.5 ug/m3	< 2.5 ug/m3	< 1.5 ug/m3	< 1.6 ug/m3	--	--	--	5.7 * ug/m3	< 1.5 ug/m3	--	3.1 ug/m3	< 1.4 ug/m3
1,1-Dichloroethylene	< 2.3 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	< 1.5 ug/m3	--	< 1.5 ug/m3	--	< 1.5 ug/m3	< 2.4 ug/m3	< 1.5 ug/m3	< 1.6 ug/m3	--	--	--	< 2.2 ug/m3	< 1.5 ug/m3	--	< 1.4 ug/m3	< 1.4 ug/m3
1,2,4-Trichlorobenzene	< 4.3 ug/m3	< 2.7 ug/m3	< 2.7 ug/m3	< 2.7 ug/m3	--	< 2.7 ug/m3	--	< 2.7 ug/m3	--	< 2.7 ug/m3	< 4.6 ug/m3	< 2.7 ug/m3	< 2.9 ug/m3	--	--	--	< 4.1 ug/m3	< 2.7 ug/m3	--	< 2.5 ug/m3	< 2.6 ug/m3
1,2,4-Trimethylbenzene	10.1 ug/m3	2.6 ug/m3	5.8 ug/m3	< 1.8 ug/m3	--	4.0 ug/m3	--	< 1.8 ug/m3	--	4.3 ug/m3	60.5 ug/m3	< 1.8 ug/m3	6.8 ug/m3	--	--	--	< 2.7 ug/m3	2.0 ug/m3	--	111 ug/m3	481 ug/m3
1,2-Dibromoethane	< 4.4 ug/m3	< 2.8 ug/m3	< 2.8 ug/m3	< 2.8 ug/m3	--	< 2.8 ug/m3	--	< 2.8 ug/m3	--	< 2.8 ug/m3	< 4.7 ug/m3	< 2.8 ug/m3	< 3.0 ug/m3	--	--	--	< 4.3 ug/m3	< 2.8 ug/m3	--	< 2.6 ug/m3	< 2.7 ug/m3
1,2-Dichlorobenzene	< 3.5 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	--	< 2.2 ug/m3	--	< 2.2 ug/m3	--	< 2.2 ug/m3	< 3.7 ug/m3	< 2.2 ug/m3	< 2.4 ug/m3	--	--	--	< 3.3 ug/m3	< 2.2 ug/m3	--	< 2.0 ug/m3	< 2.1 ug/m3
1,2-Dichloroethane	< 1.2 ug/m3	< 0.74 ug/m3	< 0.74 ug/m3	< 0.74 ug/m3	--	< 0.74 ug/m3	--	< 0.74 ug/m3	--	< 0.74 ug/m3	< 1.2 ug/m3	< 0.74 ug/m3	< 0.80 ug/m3	--	--	--	< 1.1 ug/m3	< 0.74 ug/m3	--	2.3 ug/m3	< 0.71 ug/m3
1,2-Dichloroethylene, cis	< 2.3 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	< 1.5 ug/m3	--	< 1.5 ug/m3	--	< 1.5 ug/m3	< 2.4 ug/m3	< 1.5 ug/m3	< 1.6 ug/m3	--	--	--	14.9 * ug/m3	< 1.5 ug/m3	--	4.0 ug/m3	< 1.4 ug/m3
1,2-Dichloroethylene, trans	< 2.3 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	< 1.5 ug/m3	--	< 1.5 ug/m3	--	< 1.5 ug/m3	< 2.4 ug/m3	< 1.5 ug/m3	< 1.6 ug/m3	--	--	--	6.7 * ug/m3	< 1.5 ug/m3	--	3.4 ug/m3	< 1.4 ug/m3
1,2-Dichloropropane	< 2.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	--	< 1.7 ug/m3	--	< 1.7 ug/m3	--	< 1.7 ug/m3	< 2.8 ug/m3	< 1.7 ug/m3	< 1.8 ug/m3	--	--	--	< 2.6 ug/m3	< 1.7 ug/m3	--	< 1.6 ug/m3	< 1.6 ug/m3
1,2-Dichlorotetrafluoroethane	< 4.0 ug/m3	< 2.6 ug/m3	< 2.6 ug/m3	< 2.6 ug/m3	--	< 2.6 ug/m3	--	< 2.6 ug/m3	--	< 2.6 ug/m3	< 4.3 ug/m3	< 2.6 ug/m3	< 2.8 ug/m3	--	--	--	< 3.9 ug/m3	< 2.6 ug/m3	--	< 2.4 ug/m3	< 2.5 ug/m3
1,3,5-Trimethylbenzene	3.2 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3	--	< 1.8 ug/m3	--	< 1.8 ug/m3	--	< 1.8 ug/m3	14.9 ug/m3	< 1.8 ug/m3	< 1.9 ug/m3	--	--	--	< 2.7 ug/m3	< 1.8 ug/m3	--	43.0 ug/m3	107 ug/m3
1,3-Butadiene	< 1.3 ug/m3	< 0.81 ug/m3	< 0.81 ug/m3	< 0.81 ug/m3	--	< 0.81 ug/m3	--	< 0.81 ug/m3	--	< 0.81 ug/m3	< 1.4 ug/m3	< 0.81 ug/m3	< 0.87 ug/m3	--	--	--	< 1.2 ug/m3	< 0.81 ug/m3	--	< 0.76 ug/m3	< 0.78 ug/m3
1,3-Dichloro-1-propene, cis	< 2.6 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	--	< 1.7 ug/m3	--	< 1.7 ug/m3	--	< 1.7 ug/m3	< 2.8 ug/m3	< 1.7 ug/m3	< 1.8 ug/m3	--	--	--	< 2.5 ug/m3	< 1.7 ug/m3	--	< 1.5 ug/m3	< 1.6 ug/m3
1,3-Dichloro-1-propene, trans	< 2.6 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	--	< 1.7 ug/m3	--	< 1.7 ug/m3	--	< 1.7 ug/m3	< 2.8 ug/m3	< 1.7 ug/m3	< 1.8 ug/m3	--	--	--	< 2.5 ug/m3	< 1.7 ug/m3	--	< 1.5 ug/m3	< 1.6 ug/m3
1,3-Dichlorobenzene	< 3.5 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	--	< 2.2 ug/m3	--	< 2.2 ug/m3	--	< 2.2 ug/m3	< 3.7 ug/m3	< 2.2 ug/m3	< 2.4 ug/m3	--	--	--	< 3.3 ug/m3	< 2.2 ug/m3	--	< 2.0 ug/m3	< 2.1 ug/m3
1,4-Dichlorobenzene	< 3.5 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	--	< 2.2 ug/m3	--	< 2.2 ug/m3	--	< 2.2 ug/m3	< 3.7 ug/m3	< 2.2 ug/m3	< 2.4 ug/m3	--	--	--	< 3.3 ug/m3	< 2.2 ug/m3	--	< 2.0 ug/m3	< 2.1 ug/m3
2-Hexanone	< 2.3 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3	--	5.3 ug/m3	--	< 1.5 ug/m3	--	< 1.5 ug/m3	3.6 ug/m3	< 1.5 ug/m3	2.1 ug/m3	--	--	--	< 2.3 ug/m3	< 1.5 ug/m3	--	1.7 ug/m3	1.6 ug/m3
4-Ethyltoluene	5.6 ug/m3	< 1.8 ug/m3	2.6 ug/m3	< 1.8 ug/m3	--	< 1.8 ug/m3	--	< 1.8 ug/m3	--	< 1.8 ug/m3	16.6 ug/m3	< 1.8 ug/m3	2.2 ug/m3	--	--	--	4.8 * ug/m3	< 1.8 ug/m3	--	46.2 ug/m3	205 ug/m3
Acetone	142 ug/m3	31.9 ug/m3	210 ug/m3	4.5 ug/m3	--	104 ug/m3	--	17.7 ug/m3	--	8.2 ug/m3	58.0 ug/m3	71.6 ug/m3	58.9 ug/m3	--	--	--	162 * ug/m3	23.3 ug/m3	--	2220 ug/m3	280 ug/m3
Benzene	10.4 ug/m3	0.84 ug/m3	1.4 ug/m3	< 0.58 ug/m3	--	< 0.58 ug/m3	--	0.67 ug/m3	--	1.0 ug/m3	4.0 ug/m3	1.6 ug/m3	0.98 ug/m3	--	--	--	1.0 * ug/m3	< 0.58 ug/m3	--	6.9 ug/m3	< 0.57 ug/m3
Benzyl chloride	< 3.0 ug/m3	< 1.9 ug/m3	< 1.9 ug/m3	< 1.9 ug/m3	--	< 1.9 ug/m3	--	< 1.9 ug/m3	--	< 1.9 ug/m3	< 3.2 ug/m3	< 1.9 ug/m3	< 2.0 ug/m3	--	--	--	< 2.9 ug/m3	< 1.9 ug/m3	--	< 1.8 ug/m3	< 1.8 ug/m3
Bromodichloromethane	< 3.8 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3	--	< 2.4 ug/m3	--	< 2.4 ug/m3	--	< 2.4 ug/m3	< 4.1 ug/m3	< 2.4 ug/m3	< 2.6 ug/m3	--	--	--	< 3.7 ug/m3	< 2.4 ug/m3	--	< 2.3 ug/m3	< 2.4 ug/m3
Bromoform	< 5.9 ug/m3	< 3.8 ug/m3	< 3.8 ug/m3	< 3.8 ug/m3	--	< 3.8 ug/m3	--	< 3.8 ug/m3	--	< 3.8 ug/m3	< 6.3 ug/m3	< 3.8 ug/m3	< 4.1 ug/m3	--	--	--	< 5.7 ug/m3	< 3.8 ug/m3	--	< 3.5 ug/m3	< 3.7 ug/m3
Bromomethane	< 2.2 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3	--	< 1.4 ug/m3	--	< 1.4 ug/m3	--	< 1.4 ug/m3	< 2.4 ug/m3	< 1.4 ug/m3	< 1.5 ug/m3	--	--	--	< 2.2 ug/m3	< 1.4 ug/m3	--	< 1.3 ug/m3	< 1.4 ug/m3
Carbon disulfide	4.2 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	--	5.4 ug/m3	--	6.7 ug/m3	--	7.2 ug/m3	2.5 ug/m3	< 1.1 ug/m3	< 1.2 ug/m3	--	--	--	5.5 * ug/m3	< 1.1 ug/m3	--	3.1 ug/m3	< 1.1 ug/m3
Carbon tetrachloride	< 1.8 ug/m3	1.4 ug/m3	4.3 ug/m3	4.0 ug/m3	--	< 1.2 ug/m3	--	2.3 ug/m3	--	6.0 ug/m3	< 1.9 ug/m3	< 1.2 ug/m3	3.4 ug/m3	--	--	--	3.9 * ug/m3	1.4 ug/m3	--	< 1.1 ug/m3	< 1.1 ug/m3
Chlorobenzene	< 2.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	--	< 1.7 ug/m3	--	< 1.7 ug/m3	--	< 1.7 ug/m3	< 2.8 ug/m3	< 1.7 ug/m3	< 1.8 ug/m3	--	--	--	< 2.6 ug/m3	< 1.7 ug/m3	--	< 1.6 ug/m3	< 1.6 ug/m3
Chlorodibromomethane	< 4.9 ug/m3	< 3.1 ug/m3	< 3.1 ug/m3	< 3.1 ug/m3	--	< 3.1 ug/m3	--	< 3.1 ug/m3	--	< 3.1 ug/m3	< 5.2 ug/m3	< 3.1 ug/m3	< 3.4 ug/m3	--	--	--	< 4.7 ug/m3	< 3.1 ug/m3	--	< 2.9 ug/m3	< 3.0 ug/m3
Chloroethane	< 1.5 ug/m3	< 0.97 ug/m3	< 0.97 ug/m3	< 0.97 ug/m3	--	< 0.97 ug/m3	--	< 0.97 ug/m3	--	< 0.97 ug/m3	< 1.6 ug/m3	< 0.97 ug/m3	< 1.0 ug/m3	--	--	--	< 1.5 ug/m3	< 0.97 ug/m3	--	< 0.91 ug/m3	< 0.94 ug/m3
Chloroform	157 ug/m3	168 ug/m3	5.2 ug/m3	5.8 ug/m3	--	2.6 ug/m3	--	30.8 ug/m3	--	4.8 ug/m3	12.7 ug/m3	1.8 ug/m3	11.8 ug/m3	--	--	--	4.9 * ug/m3	6.2 ug/m3	--	6.0 ug/m3	9.4 ug/m3
Chloromethane	< 1.2 ug/m3	< 0.76 ug/m3	< 0.76 ug/m3	< 0.76 ug/m3	--	0.93 ug/m3	--	< 0.76 ug/m3	--	< 0.76 ug/m3	< 1.3 ug/m3	< 0.76 ug/m3	< 0.81 ug/m3	--	--	--	< 1.1 ug/m3	< 0.76 ug/m3	--	< 0.71 ug/m3	< 0.73 ug/m3
Cyclohexane	8.0 ug/m3	1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	< 1.3 ug/m3	--	< 1.3 ug/m3	--	< 1.3 ug/m3	2.6 ug/m3	< 1.3 ug/m3	2.8 ug/m3	--	--	--	< 1.9 ug/m3	< 1.3 ug/m3	--	< 1.2 ug/m3	< 1.2 ug/m3
Dichlorodifluoromethane (CFC-12)	3.4 ug/m3	5.0 ug/m3	3.7 ug/m3	< 1.8 ug/m3	--	10.2 ug/m3	--	8.9 ug/m3	--	6.9 ug/m3	11.1 ug/m3	< 1.8 ug/m3	< 2.0 ug/m3	--	--	--	24.8 * ug/m3	9.5 ug/m3	--	2.9 ug/m3	3.7 ug/m3
Ethyl acetate	< 2.1 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	1.7 ug/m3	--	< 1.3 ug/m3	--	< 1.3 ug/m3	< 2.2 ug/m3	< 1.3 ug/m3	< 1.4 ug/m3	--	--	--	< 2.0 ug/m3	< 1.3 ug/m3	--	< 1.2 ug/m3	< 1.3 ug/m3
Ethyl Alcohol	224 ug/m3	14.0 ug/m3	232 ug/m3	20.3 ug/m3	--	12.4 ug/m3	--	13.1 ug/m3	--	10.8 ug/m3	32.3 ug/m3	16.6 ug/m3	52.6 ug/m3	--	--	--	85.4 * ug/m3	53.3 ug/m3	--	33.4 ug/m3	35.7 ug/m3
Ethyl benzene	7.3 ug/m3	< 1.6 ug/m3	2.8 ug/m3	< 1.6 ug/m3	--	< 1.6 ug/m3	--	< 1.6 ug/m3	--	3.4 ug/m3	65.0 ug/m3	< 1.6 ug/m3	< 1.7 ug/m3	--	--	--	< 2.4 ug/m3	< 1.6 ug/m3	--	1110 ug/m3	283 ug/m3
Heptane	10.7 ug/m3	< 1.5 ug/m3	1.7 ug/m3	< 1.5 ug/m3	--	1.6 ug/m3	--	< 1.5 ug/m3	--	< 1.5 ug/m3	4.0 ug/m3	1.8 ug/m3	< 1.6 ug/m3	--	--	--	< 2.3 ug/m3	< 1.5 ug/m3	--	3.6 ug/m3	< 1.4 ug/m3
Hexachlorobutadiene	< 6.2 ug/m3	< 4.0 ug/m3	< 4.0 ug/m3	< 4.0 ug/m3	--	< 4.0 ug/m3	--	< 4.0 ug/m3	--	< 4.0 ug/m3	< 6.6 ug/m3	< 4.0 ug/m3	< 4.3 ug/m3	--	--	--	< 6.0 ug/m3	< 4.0 ug/m3	--	< 3.7 ug/m3	< 3.8 ug/m3
Hexane (C6)	16.9 ug/m3	2.1 ug/m3	6.0 ug/m3	3.2 ug/m3	--	1.4 ug/m3	--	2.7 ug/m3	--	2.6 ug/m3	5.1 ug/m3	< 1.3 ug/m3	2.0 ug/m3	--	--	--	3.6 * ug/m3	< 1.3 ug/m3	--	6.2 ug/m3	4.6 ug/m3
Isopropyl alcohol	< 1.4 ug/m3	< 0.90 ug/m3	38.9 ug/m3	< 0.90 ug/m3	--	3.9 ug/m3	--	1.9 ug/m3	--	< 0.90 ug/m3	40.9 ug/m3	< 0.90 ug/m3	12.5 ug/m3	--	--	--	< 1.4 ug/m3	4.6 ug/m3	--	1770 ug/m3	536 ug/m3
Methyl ethyl ketone	11.6 ug/m3	10.2 ug/m3	15.3 ug/m3	2.5 ug/m3	--	21.2 ug/m3	--	2.2 ug/m3	--	1.4 ug/m3	15.1 ug/m3	994 ug/m3	11.6 ug/m3	--	--	--	8.5 * ug/m3	3.3 ug/m3	--	7.8 ug/m3	7.7 ug/m3
Methyl isobutyl ketone	< 2.3 ug/m3	< 1.5 ug/m3	2.9 ug/m3	< 1.5 ug/m3	--	2.8 ug/m3	--	< 1.5 ug/m3	--	< 1.5 ug/m3	7.4 ug/m3	< 1.5 ug/m3	6.2 ug/m3	--	--	--	< 2.3 ug/m3	< 1.5 ug/m3	--	< 1.4 ug/m3	< 1.4 ug/m3
Methyl tertiary butyl ether (MTBE)	< 2.1 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	< 1.3 ug/m3	--	< 1.3 ug/m3	--	< 1.3 ug/m3	< 2.2 ug/m3	< 1.3 ug/m3	< 1.4 ug/m3	--	--	--	< 2.0 ug/m3	< 1.3 ug/m3	--	< 1.2 ug/m3	< 1.3 ug/m3
Methylene chloride	13.1 ug/m3	14.8 ug/m3	15.3 ug/m3	14.4 ug/m3	--	4.0 ug/m3	--	7.1 ug/m3	--	12.0 ug/m3	114 ug/m3	16.9 ug/m3	2.8 ug/m3	--	--	--	23.4 * ug/m3	7.5 ug/m3	--	8.9 ug/m3	7.6 ug/m3
Naphthalene	18.0 ug/m3	3.3 ug/m3	23.6 ug/m3	11.4 ug/m3	--	8.8 ug/m3	--	5.1 ug/m3	--	10.2 ug/m3	9.7 ug/m3	7.9 ug/m3	21.9 ug/m3	--	--	--	17.0 * ug/m3	6.4 ug/m3	--	6.1 ug/m3	15.9 ug/m3
Propylene	32.0 ug/m3	< 0.63 ug/m3	1.8 ug/m3	< 0.63 ug/m3	--	< 0.63 ug/m3	--	< 0.63 ug/m3	--	< 0.63 ug/m3	< 1.1 ug/m3	< 0.63 ug/m3	2.7 ug/m3	--	--	--	< 0.96 ug/m3	< 0.63 ug/m3	--	6.4 ug/m3	4.5 ug/m3
Styrene	< 2.5 ug/m3	< 1.6 ug/m3	< 1.6 ug/m3	< 1.6 ug/m3	--	< 1.6 ug/m3	--	< 1.6 ug/m3	--	< 1.6 ug/m3	< 2.6 ug/m3	< 1.6 ug/m3	< 1.7 ug/m3	--	--	--	< 2.4 ug/m3	< 1.6 ug/m3	--	< 1.5 ug/m3	< 1.5 ug/m3
Tetrachloroethylene	89.5 ug/m3	57.3 ug/m3	102 ug/m3	88.5 ug/m3	--	35.7 ug/m3	--	80.3 ug/m3	--	90.6 ug/m3	13.6 ug/m3	28.7 ug/m3	211 ug/m3	--	--	--	169 * ug/m3	34.5 ug/m3	--	111 ug/m3	92.4 ug/m3
Tetrahydrofuran	< 1.7 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	--	< 1.1 ug/m3	--	< 1.1 ug/m3	--	< 1.1 ug/m3	< 1.8 ug/m3	11.2 ug/m3	< 1.2 ug/m3	--	--	--	< 1.6 ug/m3	< 1.1 ug/m3	--	< 1.0 ug/m3	< 1.0 ug/m3
Toluene	26.4 ug/m3	4.5 ug/m3	13.2 ug/m3	6.7 ug/m3	--	3.0 ug/m3	--	4.3 ug/m3	--	10 ug/m3	66.7 ug/m3	38.8 ug/m3	6.0 ug/m3	--	--	--	116 * ug/m3	< 1.4 ug/m3	--	40.1 ug/m3	17.9 ug/m3
Trichlorofluoromethane	< 3.2 ug/m3	< 2.1 ug/m3	< 2.1 ug/m3	< 2.1 ug/m3	--	2.5 ug/m3	--	< 2.1 ug/m3	--	< 2.1 ug/m3	< 3.4 ug/m3	< 2.1 ug/m3	< 2.2 ug/m3	--	--	--	< 3.1 ug/m3	< 2.1 ug/m3	--	3.0 ug/m3	< 2.0 ug/m3
Trichlorotrifluoroethane (Freon 113)	6.3 ug/m3	< 7.3 ug/m3	4.9 ug/m3	5.2 ug/m3	--	< 2.9 ug/m3	--	11.2 ug/m3	--	6.0 ug/m3	< 4.8 ug/m3	< 2.9 ug/m3	< 3.1 ug/m3	--	--	--	4.7 * ug/m3	< 2.9 ug/m3	--	3.6 ug/m3	3.0 ug/m3
Vinyl acetate	< 2.0 ug/m3	2.4 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	--	< 1.3 ug/m3	--	2.3 ug/m3	--	1.7 ug/m3	< 2.2 ug/m3	< 1.3 ug/m3	< 1.4 ug/m3	--	--	--	< 2.0 ug/m3	< 1.3 ug/m3	--	< 1.2 ug/m3	< 1.2 ug/m3
Vinyl chloride	< 0.74 ug/m3	< 0.47 ug/m3	< 0.47 ug/m3	< 0.47 ug/m3	--	< 0.47 ug/m3	--	< 0.47 ug/m3	--	< 0.47 ug/m3	< 0.79 ug/m3	< 0.47 ug/m3	< 0.50 ug/m3	--	--	--	< 0.71 ug/m3	< 0.47 ug/m3	--	< 0.44 ug/m3	< 0.45 ug/m3
Xylene, m & p	19.1 ug/m3	4.4 ug/m3	8.4 ug/m3	3.6 ug/m3	--	6.0 ug/m3	--	3.2 ug/m3	--	14.4 ug/m3	255 ug/m3	< 3.2 ug/m3	5.6 ug/m3	--	--	--	< 4.8 ug/m3	< 3.2 ug/m3	--	4360 ug/m3	1590 ug/m3
Xylene, o	6.5 ug/m3	< 1.6 ug/m3	3.0 ug/m3	< 1.6 ug/m3	--	2.3 ug/m3	--	< 1.6 ug/m3	--	5.2 ug/m3	84.3 ug/m3	< 1.6 ug/m3	2.9 ug/m3	--	--	--	< 2.4 ug/m3	< 1.6 ug/m3	--	1350 ug/m3	536 ug/m3

Data is organized by ascending building number.

Table E-1
Sub-Slab Sample Analytical Results
2010 East Hennepin Avenue
East Hennepin Avenue Site
Minneapolis, Minnesota

Building Number	Building 14					Building 15
Sample Date	12/31/2013	1/31/2014	12/31/2013	1/31/2014	1/31/2014	3/12/2014
Sample ID	3954_A	3954_A	3954_B	3954_B	3954_C	3954_Y
Parameter						
Trichloroethylene	5.7 ug/m3	9.6 ug/m3	791 ug/m3	639 ug/m3	1400 ug/m3	2.8 ug/m3
1,1,1-Trichloroethane	--	< 2.0 ug/m3	--	< 2.1 ug/m3	4.8 ug/m3	--
1,1,2,2-Tetrachloroethane	--	< 1.3 ug/m3	--	< 1.3 ug/m3	< 1.2 ug/m3	--
1,1,2-Trichloroethane	--	< 0.99 ug/m3	--	< 1.0 ug/m3	< 0.96 ug/m3	--
1,1-Dichloroethane	--	< 1.5 ug/m3	--	2.7 ug/m3	3.8 ug/m3	--
1,1-Dichloroethylene	--	< 1.5 ug/m3	--	< 1.5 ug/m3	< 1.4 ug/m3	--
1,2,4-Trichlorobenzene	--	< 2.7 ug/m3	--	< 2.8 ug/m3	< 2.6 ug/m3	--
1,2,4-Trimethylbenzene	--	2.2 ug/m3	--	2.5 ug/m3	2.4 ug/m3	--
1,2-Dibromoethane	--	< 2.8 ug/m3	--	< 2.9 ug/m3	< 2.7 ug/m3	--
1,2-Dichlorobenzene	--	< 2.2 ug/m3	--	< 2.3 ug/m3	< 2.1 ug/m3	--
1,2-Dichloroethane	--	< 0.74 ug/m3	--	< 0.77 ug/m3	< 0.71 ug/m3	--
1,2-Dichloroethylene, cis	--	< 1.5 ug/m3	--	9.0 ug/m3	23.3 ug/m3	--
1,2-Dichloroethylene, trans	--	< 1.5 ug/m3	--	2.1 ug/m3	6.3 ug/m3	--
1,2-Dichloropropane	--	< 1.7 ug/m3	--	< 1.8 ug/m3	< 1.6 ug/m3	--
1,2-Dichlorotetrafluoroethane	--	< 2.6 ug/m3	--	< 2.7 ug/m3	< 2.5 ug/m3	--
1,3,5-Trimethylbenzene	--	< 1.8 ug/m3	--	< 1.9 ug/m3	< 1.7 ug/m3	--
1,3-Butadiene	--	< 0.81 ug/m3	--	< 0.84 ug/m3	< 0.78 ug/m3	--
1,3-Dichloro-1-propene, cis	--	< 1.7 ug/m3	--	< 1.7 ug/m3	< 1.6 ug/m3	--
1,3-Dichloro-1-propene, trans	--	< 1.7 ug/m3	--	< 1.7 ug/m3	< 1.6 ug/m3	--
1,3-Dichlorobenzene	--	< 2.2 ug/m3	--	< 2.3 ug/m3	< 2.1 ug/m3	--
1,4-Dichlorobenzene	--	< 2.2 ug/m3	--	< 2.3 ug/m3	< 2.1 ug/m3	--
2-Hexanone	--	< 1.5 ug/m3	--	< 1.6 ug/m3	< 1.4 ug/m3	--
4-Ethyltoluene	--	< 1.8 ug/m3	--	< 1.9 ug/m3	< 1.7 ug/m3	--
Acetone	--	5.8 ug/m3	--	12.4 ug/m3	36.2 ug/m3	--
Benzene	--	< 0.58 ug/m3	--	0.82 ug/m3	< 0.57 ug/m3	--
Benzyl chloride	--	< 1.9 ug/m3	--	< 2.0 ug/m3	< 1.8 ug/m3	--
Bromodichloromethane	--	< 2.4 ug/m3	--	< 2.5 ug/m3	< 2.4 ug/m3	--
Bromoform	--	< 3.8 ug/m3	--	< 3.9 ug/m3	< 3.7 ug/m3	--
Bromomethane	--	< 1.4 ug/m3	--	< 1.5 ug/m3	< 1.4 ug/m3	--
Carbon disulfide	--	< 1.1 ug/m3	--	< 1.2 ug/m3	< 1.1 ug/m3	--
Carbon tetrachloride	--	< 1.2 ug/m3	--	< 1.2 ug/m3	< 1.1 ug/m3	--
Chlorobenzene	--	< 1.7 ug/m3	--	< 1.8 ug/m3	< 1.6 ug/m3	--
Chlorodibromomethane	--	< 3.1 ug/m3	--	< 3.2 ug/m3	< 3.0 ug/m3	--
Chloroethane	--	< 0.97 ug/m3	--	< 1.0 ug/m3	< 0.94 ug/m3	--
Chloroform	--	< 1.8 ug/m3	--	16.1 ug/m3	3.6 ug/m3	--
Chloromethane	--	< 0.76 ug/m3	--	< 0.79 ug/m3	< 0.73 ug/m3	--
Cyclohexane	--	< 1.3 ug/m3	--	< 1.3 ug/m3	< 1.2 ug/m3	--
Dichlorodifluoromethane (CFC-12)	--	36.7 ug/m3	--	30.1 ug/m3	7.0 ug/m3	--
Ethyl acetate	--	< 1.3 ug/m3	--	< 1.4 ug/m3	< 1.3 ug/m3	--
Ethyl Alcohol	--	10.3 ug/m3	--	5.7 ug/m3	28.5 ug/m3	--
Ethyl benzene	--	< 1.6 ug/m3	--	< 1.6 ug/m3	2.0 ug/m3	--
Heptane	--	< 1.5 ug/m3	--	< 1.6 ug/m3	< 1.4 ug/m3	--
Hexachlorobutadiene	--	< 4.0 ug/m3	--	< 4.1 ug/m3	< 3.8 ug/m3	--
Hexane (C6)	--	1.5 ug/m3	--	1.7 ug/m3	1.9 ug/m3	--
Isopropyl alcohol	--	< 0.90 ug/m3	--	< 0.94 ug/m3	< 0.87 ug/m3	--
Methyl ethyl ketone	--	2.2 ug/m3	--	5.3 ug/m3	3.4 ug/m3	--
Methyl isobutyl ketone	--	< 1.5 ug/m3	--	< 1.6 ug/m3	< 1.4 ug/m3	--
Methyl tertiary butyl ether (MTBE)	--	< 1.3 ug/m3	--	< 1.4 ug/m3	< 1.3 ug/m3	--
Methylene chloride	--	13.7 ug/m3	--	9.4 ug/m3	19.9 ug/m3	--
Naphthalene	--	5.5 ug/m3	--	6.0 ug/m3	6.8 ug/m3	--
Propylene	--	< 0.63 ug/m3	--	< 0.65 ug/m3	2.4 ug/m3	--
Styrene	--	< 1.6 ug/m3	--	< 1.6 ug/m3	< 1.5 ug/m3	--
Tetrachloroethylene	--	3.3 ug/m3	--	28.7 ug/m3	67.1 ug/m3	--
Tetrahydrofuran	--	< 1.1 ug/m3	--	< 1.1 ug/m3	< 1.0 ug/m3	--
Toluene	--	< 1.4 ug/m3	--	1.6 ug/m3	2.3 ug/m3	--
Trichlorofluoromethane	--	< 2.1 ug/m3	--	< 2.1 ug/m3	< 2.0 ug/m3	--
Trichlorotrifluoroethane (Freon 113)	--	< 2.9 ug/m3	--	< 3.0 ug/m3	< 2.8 ug/m3	--
Vinyl acetate	--	< 1.3 ug/m3	--	< 1.3 ug/m3	< 1.2 ug/m3	--
Vinyl chloride	--	< 0.47 ug/m3	--	< 0.49 ug/m3	< 0.45 ug/m3	--
Xylene, m & p	--	< 3.2 ug/m3	--	< 3.3 ug/m3	< 3.1 ug/m3	--
Xylene, o	--	< 1.6 ug/m3	--	< 1.6 ug/m3	< 1.5 ug/m3	--

Data is organized by ascending building number.

Table E-2
Paired Sub-Slab, Indoor Air, and Outdoor Air Sample Analytical Results
2010 East Hennepin Avenue
East Hennepin Avenue Site
Minneapolis, Minnesota

Building Number	Building 8				Building 10						Building 11												
Sample Type	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Indoor Air
Sample Date	2/12/2015		2/12/2015		2/12/2015		2/12/2015		2/12/2015		7/30/2014		2/12/2015	7/30/2014		2/12/2015		7/30/2014		2/12/2015		2/12/2015
Sample ID	3954_H	3954-IA10	3954_Q	3954-IA9	3954_F	3954-IA13	3954_G	3954-IA14	3954_CC	3954-IA12	3954_D	3954-IA6	3954-IA6	3954_E	3954-IA7	3954_E	3954-IA7	3954_EE	3954-IA8	3954_EE	3954-IA8	3954-IA11
Parameter																						
Trichloroethylene	232 ug/m3	2.9 ug/m3	165 ug/m3	< 1.6 ug/m3	20.6 ug/m3	< 1.5 ug/m3	302 ug/m3	< 1.5 ug/m3	77.2 ug/m3	2.2 ug/m3	2140 ug/m3	1.1 ug/m3	< 1.3 ug/m3	190 ug/m3	1.1 ug/m3	193 ug/m3	< 1.5 ug/m3	505 ug/m3	1.2 ug/m3	700 ug/m3	1.8 ug/m3	1.7 ug/m3
1,1,1-Trichloroethane	690 ug/m3	< 1.3 ug/m3	480 ug/m3	2.2 ug/m3	2.1 ug/m3	< 0.94 ug/m3	3.8 ug/m3	< 0.97 ug/m3	7.8 ug/m3	< 0.94 ug/m3	18.1 ug/m3	4.6 ug/m3	< 0.82 ug/m3	10.7 ug/m3	3.5 ug/m3	8.5 ug/m3	< 0.94 ug/m3	43.1 ug/m3	11.7 ug/m3	78.0 ug/m3	2.0 ug/m3	< 1.0 ug/m3
1,1,2,2-Tetrachloroethane	< 1.2 ug/m3	< 1.3 ug/m3	< 1.2 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	< 0.94 ug/m3	< 1.2 ug/m3	< 0.97 ug/m3	< 1.2 ug/m3	< 0.94 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 0.82 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.2 ug/m3	< 0.94 ug/m3	< 1.3 ug/m3	< 0.94 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.0 ug/m3
1,1,2-Trichloroethane	< 0.97 ug/m3	< 1.0 ug/m3	< 0.97 ug/m3	< 4.0 ug/m3	< 1.0 ug/m3	< 3.7 ug/m3	< 0.97 ug/m3	< 3.9 ug/m3	< 0.97 ug/m3	< 3.7 ug/m3	< 0.99 ug/m3	< 0.89 ug/m3	< 3.3 ug/m3	< 1.0 ug/m3	< 0.79 ug/m3	< 0.97 ug/m3	< 3.7 ug/m3	< 0.99 ug/m3	< 0.74 ug/m3	< 1.0 ug/m3	< 0.80 ug/m3	< 4.1 ug/m3
1,1-Dichloroethane	56.6 ug/m3	< 1.5 ug/m3	10.6 ug/m3	< 1.2 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	1.5 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	4.2 ug/m3	< 1.3 ug/m3	< 0.97 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	2.2 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3
1,1-Dichloroethylene	162 ug/m3	< 1.5 ug/m3	12.2 ug/m3	< 1.2 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	< 0.96 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3
1,2,4-Trichlorobenzene	< 2.6 ug/m3	< 2.8 ug/m3	< 2.6 ug/m3	< 5.4 ug/m3	< 2.8 ug/m3	< 5.1 ug/m3	< 2.6 ug/m3	< 5.2 ug/m3	< 2.6 ug/m3	< 5.1 ug/m3	< 2.7 ug/m3	< 2.4 ug/m3	< 4.5 ug/m3	< 2.8 ug/m3	< 2.2 ug/m3	< 2.6 ug/m3	< 5.1 ug/m3	< 2.7 ug/m3	< 2.0 ug/m3	< 2.7 ug/m3	< 2.2 ug/m3	< 5.6 ug/m3
1,2,4-Trimethylbenzene	< 1.7 ug/m3	4.4 ug/m3	< 1.7 ug/m3	< 3.6 ug/m3	6.4 ug/m3	< 3.3 ug/m3	4.8 ug/m3	3.5 ug/m3	1.8 ug/m3	< 3.3 ug/m3	< 1.8 ug/m3	< 1.6 ug/m3	< 2.9 ug/m3	< 1.9 ug/m3	1.7 ug/m3	< 1.7 ug/m3	< 3.3 ug/m3	< 1.8 ug/m3	2.0 ug/m3	11.2 ug/m3	2.7 ug/m3	6.1 ug/m3
1,2-Dibromoethane	< 2.7 ug/m3	< 2.9 ug/m3	< 2.7 ug/m3	< 2.2 ug/m3	< 2.9 ug/m3	< 2.1 ug/m3	< 2.7 ug/m3	< 2.2 ug/m3	< 2.7 ug/m3	< 2.1 ug/m3	< 2.8 ug/m3	< 2.5 ug/m3	< 1.8 ug/m3	< 2.9 ug/m3	< 2.2 ug/m3	< 2.7 ug/m3	< 2.1 ug/m3	< 2.8 ug/m3	< 2.1 ug/m3	< 2.8 ug/m3	< 2.2 ug/m3	< 2.3 ug/m3
1,2-Dichlorobenzene	< 2.1 ug/m3	< 2.2 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3	< 2.3 ug/m3	< 1.6 ug/m3	< 2.1 ug/m3	< 1.7 ug/m3	< 2.1 ug/m3	< 1.6 ug/m3	< 2.2 ug/m3	< 2.0 ug/m3	< 1.4 ug/m3	< 2.3 ug/m3	< 1.8 ug/m3	< 2.1 ug/m3	< 1.6 ug/m3	< 2.2 ug/m3	< 1.6 ug/m3	< 2.2 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3
1,2-Dichloroethane	< 0.72 ug/m3	< 0.75 ug/m3	< 0.72 ug/m3	< 0.59 ug/m3	< 0.77 ug/m3	< 0.55 ug/m3	< 0.72 ug/m3	< 0.57 ug/m3	< 0.72 ug/m3	< 0.55 ug/m3	< 0.74 ug/m3	< 0.66 ug/m3	< 0.48 ug/m3	< 0.77 ug/m3	< 0.59 ug/m3	< 0.72 ug/m3	< 0.55 ug/m3	< 0.74 ug/m3	< 0.55 ug/m3	< 0.74 ug/m3	< 0.59 ug/m3	< 0.61 ug/m3
1,2-Dichloroethylene, cis	4.0 ug/m3	< 3.7 ug/m3	< 3.5 ug/m3	< 2.9 ug/m3	< 3.8 ug/m3	< 2.7 ug/m3	< 3.5 ug/m3	< 2.8 ug/m3	< 3.5 ug/m3	< 2.7 ug/m3	10.4 ug/m3	< 1.3 ug/m3	< 2.4 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 3.5 ug/m3	< 2.7 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	< 3.6 ug/m3	< 2.9 ug/m3	< 3.0 ug/m3
1,2-Dichloroethylene, trans	< 1.4 ug/m3	< 1.5 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	4.5 ug/m3	< 1.3 ug/m3	< 0.96 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3
1,2-Dichloropropane	< 1.6 ug/m3	< 1.7 ug/m3	< 1.6 ug/m3	< 1.4 ug/m3	< 1.8 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	< 1.8 ug/m3	< 1.4 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3
1,2-Dichlorotetrafluoroethane	< 2.5 ug/m3	< 2.6 ug/m3	< 2.5 ug/m3	< 2.0 ug/m3	< 2.7 ug/m3	< 1.9 ug/m3	< 2.5 ug/m3	< 2.0 ug/m3	< 2.5 ug/m3	< 1.9 ug/m3	< 2.6 ug/m3	< 2.3 ug/m3	< 1.7 ug/m3	< 2.7 ug/m3	< 2.0 ug/m3	< 2.5 ug/m3	< 1.9 ug/m3	< 2.6 ug/m3	< 1.9 ug/m3	< 2.6 ug/m3	< 2.0 ug/m3	< 2.1 ug/m3
1,3,5-Trimethylbenzene	< 1.7 ug/m3	2.9 ug/m3	< 1.7 ug/m3	< 3.6 ug/m3	2.9 ug/m3	< 3.3 ug/m3	2.0 ug/m3	< 3.5 ug/m3	< 1.7 ug/m3	< 3.3 ug/m3	< 1.8 ug/m3	< 1.6 ug/m3	< 2.9 ug/m3	< 1.9 ug/m3	< 1.4 ug/m3	< 1.7 ug/m3	< 3.3 ug/m3	< 1.8 ug/m3	< 1.3 ug/m3	6.8 ug/m3	< 1.4 ug/m3	4.2 ug/m3
1,3-Butadiene	< 0.78 ug/m3	< 0.82 ug/m3	< 0.78 ug/m3	< 1.6 ug/m3	< 0.84 ug/m3	< 1.5 ug/m3	< 0.78 ug/m3	< 1.6 ug/m3	< 0.78 ug/m3	< 1.5 ug/m3	< 0.81 ug/m3	< 0.72 ug/m3	< 1.3 ug/m3	< 0.84 ug/m3	< 0.65 ug/m3	< 0.78 ug/m3	< 1.5 ug/m3	< 0.81 ug/m3	< 0.60 ug/m3	< 0.81 ug/m3	< 0.65 ug/m3	< 1.7 ug/m3
1,3-Dichloro-1-propene, cis	< 1.6 ug/m3	< 1.7 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.2 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 1.7 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	< 1.7 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 1.7 ug/m3	< 1.2 ug/m3	< 1.7 ug/m3	< 1.3 ug/m3	< 1.4 ug/m3
1,3-Dichloro-1-propene, trans	< 1.6 ug/m3	< 1.7 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.2 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 4.2 ug/m3	< 3.7 ug/m3	< 1.1 ug/m3	< 4.3 ug/m3	< 3.3 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 4.2 ug/m3	< 3.1 ug/m3	< 1.7 ug/m3	< 1.3 ug/m3	< 1.4 ug/m3
1,3-Dichlorobenzene	< 2.1 ug/m3	< 2.2 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3	< 2.3 ug/m3	< 1.6 ug/m3	< 2.1 ug/m3	< 1.7 ug/m3	< 2.1 ug/m3	< 1.6 ug/m3	< 2.2 ug/m3	< 2.0 ug/m3	< 1.4 ug/m3	< 2.3 ug/m3	< 1.8 ug/m3	< 2.1 ug/m3	< 1.6 ug/m3	< 2.2 ug/m3	< 1.6 ug/m3	< 2.2 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3
1,4-Dichlorobenzene	< 2.1 ug/m3	< 2.2 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3	< 2.3 ug/m3	< 1.6 ug/m3	< 2.1 ug/m3	< 1.7 ug/m3	< 2.1 ug/m3	< 1.6 ug/m3	< 2.2 ug/m3	< 2.0 ug/m3	< 1.4 ug/m3	< 2.3 ug/m3	< 1.8 ug/m3	< 2.1 ug/m3	< 1.6 ug/m3	< 2.2 ug/m3	< 1.6 ug/m3	< 2.2 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3
2-Hexanone	2.2 ug/m3	< 1.5 ug/m3	3.0 ug/m3	< 2.2 ug/m3	2.7 ug/m3	< 2.0 ug/m3	2.8 ug/m3	< 2.1 ug/m3	< 1.4 ug/m3	< 2.0 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	< 1.8 ug/m3	2.4 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 2.0 ug/m3	1.9 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 2.2 ug/m3
4-Ethyltoluene	< 1.7 ug/m3	3.3 ug/m3	< 1.7 ug/m3	< 3.6 ug/m3	4.0 ug/m3	< 3.3 ug/m3	2.9 ug/m3	< 3.5 ug/m3	< 1.7 ug/m3	< 3.3 ug/m3	< 1.8 ug/m3	< 1.6 ug/m3	< 2.9 ug/m3	< 1.9 ug/m3	< 1.4 ug/m3	< 1.7 ug/m3	< 3.3 ug/m3	< 1.8 ug/m3	< 1.3 ug/m3	4.0 ug/m3	2.3 ug/m3	4.3 ug/m3
Acetone	31.2 ug/m3	39.8 ug/m3	124 ug/m3	35.8 ug/m3	26.1 ug/m3	120 ug/m3	82.6 ug/m3	62.6 ug/m3	12.4 ug/m3	11.4 ug/m3	18.2 ug/m3	35.9 ug/m3	35.2 ug/m3	22.3 ug/m3	34.1 ug/m3	4.7 ug/m3	62.8 ug/m3	17.6 ug/m3	96.9 ug/m3	< 4.3 ug/m3	39.6 ug/m3	30.1 ug/m3
Benzene	< 1.1 ug/m3	2.2 ug/m3	< 1.1 ug/m3	1.2 ug/m3	24.0 ug/m3	3.0 ug/m3	< 1.1 ug/m3	2.9 ug/m3	< 1.1 ug/m3	1.2 ug/m3	0.74 ug/m3	1.5 ug/m3	0.73 ug/m3	< 0.61 ug/m3	1.3 ug/m3	< 1.1 ug/m3	0.76 ug/m3	< 0.58 ug/m3	1.3 ug/m3	50.8 ug/m3	1.7 ug/m3	1.2 ug/m3
Benzyl chloride	< 1.8 ug/m3	< 1.9 ug/m3	< 1.8 ug/m3	< 3.8 ug/m3	< 2.0 ug/m3	< 3.5 ug/m3	< 1.8 ug/m3	< 3.7 ug/m3	< 1.8 ug/m3	< 3.5 ug/m3	< 1.9 ug/m3	< 1.7 ug/m3	< 3.1 ug/m3	< 2.0 ug/m3	< 1.5 ug/m3	< 1.8 ug/m3	< 3.5 ug/m3	< 1.9 ug/m3	< 1.4 ug/m3	< 1.9 ug/m3	< 1.5 ug/m3	< 3.9 ug/m3
Bromodichloromethane	< 2.4 ug/m3	< 2.5 ug/m3	< 2.4 ug/m3	< 2.0 ug/m3	< 2.5 ug/m3	< 1.8 ug/m3	< 2.4 ug/m3	< 1.9 ug/m3	< 2.4 ug/m3	< 1.8 ug/m3	< 2.4 ug/m3	< 2.2 ug/m3	< 1.6 ug/m3	< 2.5 ug/m3	< 2.0 ug/m3	< 2.4 ug/m3	< 1.8 ug/m3	< 2.4 ug/m3	< 1.8 ug/m3	< 2.4 ug/m3	< 2.0 ug/m3	< 2.0 ug/m3
Bromoform	< 3.7 ug/m3	< 3.8 ug/m3	< 3.7 ug/m3	< 3.0 ug/m3	< 3.9 ug/m3	< 2.8 ug/m3	< 3.7 ug/m3	< 2.9 ug/m3	< 3.7 ug/m3	< 2.8 ug/m3	< 3.8 ug/m3	< 3.4 ug/m3	< 2.5 ug/m3	< 3.9 ug/m3	< 3.0 ug/m3	< 3.7 ug/m3	< 2.8 ug/m3	< 3.8 ug/m3	< 2.8 ug/m3	< 3.8 ug/m3	< 3.0 ug/m3	< 3.1 ug/m3
Bromomethane	< 1.4 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3	< 2.8 ug/m3	< 1.5 ug/m3	< 2.6 ug/m3	< 1.4 ug/m3	< 2.7 ug/m3	< 1.4 ug/m3	< 2.6 ug/m3	< 1.4 ug/m3	< 1.3 ug/m3	< 2.3 ug/m3	1.5 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 2.6 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 2.9 ug/m3
Carbon disulfide	13.5 ug/m3	< 1.2 ug/m3	6.0 ug/m3	< 0.91 ug/m3	< 1.2 ug/m3	< 0.84 ug/m3	2.2 ug/m3	< 0.88 ug/m3	1.6 ug/m3	< 0.84 ug/m3	< 1.1 ug/m3	< 1.0 ug/m3	< 0.74 ug/m3	< 1.2 ug/m3	< 0.91 ug/m3	2.3 ug/m3	< 0.84 ug/m3	< 1.1 ug/m3	< 0.84 ug/m3	1.3 ug/m3	< 0.91 ug/m3	< 0.94 ug/m3
Carbon tetrachloride	5.9 ug/m3	< 5.9 ug/m3	< 5.6 ug/m3	< 0.92 ug/m3	< 6.0 ug/m3	< 0.86 ug/m3	< 5.6 ug/m3	< 0.89 ug/m3	< 5.6 ug/m3	< 0.86 ug/m3	3.4 ug/m3	< 1.0 ug/m3	< 0.75 ug/m3	1.7 ug/m3	< 0.92 ug/m3	< 5.6 ug/m3	< 0.86 ug/m3	1.4 ug/m3	< 0.86 ug/m3	< 5.8 ug/m3	< 4.6 ug/m3	< 0.95 ug/m3
Chlorobenzene	< 1.6 ug/m3	< 1.7 ug/m3	< 1.6 ug/m3	< 3.4 ug/m3	< 1.8 ug/m3	< 3.1 ug/m3	< 1.6 ug/m3	< 3.3 ug/m3	< 1.6 ug/m3	< 3.1 ug/m3	< 1.7 ug/m3	< 1.5 ug/m3	< 2.8 ug/m3	< 1.8 ug/m3	< 1.4 ug/m3	< 1.6 ug/m3	< 3.1 ug/m3	< 1.7 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.4 ug/m3	< 3.5 ug/m3
Chlorodibromomethane	< 3.0 ug/m3	< 3.2 ug/m3	< 3.0 ug/m3	< 2.5 ug/m3	< 3.2 ug/m3	< 2.3 ug/m3	< 3.0 ug/m3	< 2.4 ug/m3	< 3.0 ug/m3	< 2.3 ug/m3	< 3.1 ug/m3	< 2.8 ug/m3	< 2.0 ug/m3	< 3.2 ug/m3	< 2.5 ug/m3	< 3.0 ug/m3	< 2.3 ug/m3	< 3.1 ug/m3	< 2.3 ug/m3	< 3.1 ug/m3	< 2.5 ug/m3	< 2.6 ug/m3
Chloroethane	< 0.94 ug/m3	< 0.99 ug/m3	< 0.94 ug/m3	< 0.78 ug/m3	< 1.0 ug/m3	< 0.72 ug/m3	< 0.94 ug/m3	< 0.75 ug/m3	< 0.94 ug/m3	< 0.72 ug/m3	< 0.97 ug/m3	< 0.87 ug/m3	< 0.64 ug/m3	< 1.0 ug/m3	< 0.78 ug/m3	< 0.94 ug/m3	< 0.72 ug/m3	< 0.97 ug/m3	< 0.72 ug/m3	< 0.97 ug/m3	< 0.78 ug/m3	< 0.80 ug/m3
Chloroform	26.2 ug/m3	6.8 ug/m3	7.6 ug/m3	3.4 ug/m3	40.3 ug/m3	1.0 ug/m3	3.2 ug/m3	< 0.69 ug/m3	12.5 ug/m3	1.1 ug/m3	6.6 ug/m3	3.4 ug/m3	0.92 ug/m3	33.1 ug/m3	7.3 ug/m3	6.0 ug/m3	2.4 ug/m3	49.4 ug/m3	2.0 ug/m3	20.0 ug/m3	4.5 ug/m3	10.5 ug/m3
Chloromethane	< 0.73 ug/m3	1.4 ug/m3	< 0.73 ug/m3	< 0.60 ug/m3	< 0.79 ug/m3	< 0.56 ug/m3	< 0.73 ug/m3	< 0.58 ug/m3	< 0.73 ug/m3	< 0.56 ug/m3	< 0.76 ug/m3	1.4 ug/m3	< 0.50 ug/m3	2.5 ug/m3	1.2 ug/m3	< 0.73 ug/m3	< 0.56 ug/m3	< 0.76 ug/m3	1.3 ug/m3	< 0.76 ug/m3	< 0.60 ug/m3	< 0.63 ug/m3
Cyclohexane	< 1.2 ug/m3	3.8 ug/m3	< 1.2 ug/m3	< 1.0 ug/m3	66.8 ug/m3	< 0.94 ug/m3	< 1.2 ug/m3	< 0.97 ug/m3	< 1.2 ug/m3	< 0.94 ug/m3	< 1.3 ug/m3	1.4 ug/m3	< 0.83 ug/m3	< 1.3 ug/m3	1.3 ug/m3	< 1.2 ug/m3	< 0.94 ug/m3	< 1.3 ug/m3	2.5 ug/m3	82.2 ug/m3	3.1 ug/m3	< 1.0 ug/m3
Dichlorodifluoromethane (CFC-12)	7.5 ug/m3	3.4 ug/m3	14.3 ug/m3	4.8 ug/m3	6.1 ug/m3	2.9 ug/m3	16.5 ug/m3	2.9 ug/m3	2.9 ug/m3	3.0 ug/m3	111 ug/m3	213 ug/m3	29.9 ug/m3	102 ug/m3	145 ug/m3	9.8 ug/m3	29.2 ug/m3	4.9 ug/m3	8.8 ug/m3	4.7 ug/m3	3.1 ug/m3	4.4 ug/m3
Ethyl acetate	2.6 ug/m3	7.2 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 0.98 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	< 0.98 ug/m3	< 1.3 ug/m3	14.0 ug/m3	< 0.86 ug/m3	< 1.4 ug/m3	16.7 ug/m3	< 1.3 ug/m3	< 0.98 ug/m3	< 1.3 ug/m3	8.9 ug/m3	< 1.3 ug/m3	5.7 ug/m3	< 1.1 ug/m3
Ethyl Alcohol	23.1 ug/m3	94.2 ug/m3	4.5 ug/m3	98.5 ug/m3	5.4 ug/m3	69.7 ug/m3	8.6 ug/m3	46.2 ug/m3	21.0 ug/m3	43.9 ug/m3	11.6 ug/m3	2830 ug/m3	1090 ug/m3	13.7 ug/m3	3010 ug/m3	5.2 ug/m3	644 ug/m3	41.3 ug/m3	190 ug/m3	10.9 ug/m3	103 ug/m3	94.1 ug/m3
Ethyl benzene	< 1.5 ug/m3	3.1 ug/m3	< 1.5 ug/m3	2.7 ug/m3	21.3 ug/m3	9.8 ug/m3	3.1 ug/m3	9.5 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.6 ug/m3	< 1.4 ug/m3	< 1.0 ug/m3	< 1.6 ug/m3	1.6 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.6 ug/m3	3.7 ug/m3	2.0 ug/m3	3.2 ug/m3	6.1 ug/m3
Heptane	< 1.4 ug/m3	3.5 ug/m3	< 1.4 ug/m3	1.7 ug/m3	24.8 ug/m3	< 1.1 ug/m3	2.2 ug/m3	1.2 ug/m3	< 1.4 ug/m3	1.2 ug/m3	< 1.5 ug/m3	2.0 ug/m3	1.1 ug/m3	< 1.6 ug/m3	1.7 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	3.6 ug/m3	4.1 ug/m3	2.0 ug/m3	1.7 ug/m3
Hexachlorobutadiene	< 3.8 ug/m3	< 4.0 ug/m3	< 3.8 ug/m3	< 3.2 ug/m3	< 4.1 ug/m3	< 2.9 ug/m3	< 3.8 ug/m3	< 3.1 ug/m3	< 3.8 ug/m3	< 2.9 ug/m3	< 4.0 ug/m3	< 3.5 ug/m3	< 2.6 ug/m3	< 4.1 ug/m3	< 3.2 ug/m3	< 3.8 ug/m3	< 2.9 ug/m3	< 4.0 ug/m3	< 2.9 ug/m3	< 4.0 ug/m3	< 3.2 ug/m3	< 3.3 ug/m3
Hexane (C6)	1.5 ug/m3	7.2 ug/m3	4.7 ug/m3	7.5 ug/m3	23.4 ug/m3	3.2 ug/m3	2.5 ug/m3	1.9 ug/m3	< 1.3 ug/m3	1.9 ug/m3	< 1.3 ug/m3	1.6 ug/m3	< 0.85 ug/m3	< 1.3 ug/m3	2.5 ug/m3	< 1.3 ug/m3	1.6 ug/m3	< 1.3 ug/m3	11.1 ug/m3	26.7 ug/m3	6.3 ug/m3	3.7 ug/m3
Isopropyl alcohol	105 ug/m3	8.4 ug/m3	2.4 ug/m3	< 1.8 ug/m3	< 2.3 ug/m3	< 1.7 ug/m3	< 2.2 ug/m3	< 1.7 ug/m3	35.2 ug/m3	< 1.7 ug/m3	< 2.2 ug/m3	19.2 ug/m3	< 1.5 ug/m3	< 2.3 ug/m3	15.1 ug/m3	< 2.2 ug/m3	< 1.7 ug/m3	< 2.2 ug/m3	18.8 ug/m3	< 2.2 ug/m3	8.1 ug/m3	< 1.9 ug/m3
Methyl ethyl ketone	5.3 ug/m3	10.2 ug/m3	17.9 ug/m3	6.1 ug/m3	4.1 ug/m3	6.2 ug/m3	11.1 ug/m3	< 2.5 ug/m3	< 3.2 ug/m3	< 2.5 ug/m3	6.9 ug/m3	568 ug/m3	65.3 ug/m3	8.9 ug/m3	96.0 ug/m3	< 3.2 ug/m3	27.7 ug/m3	6.5 ug/m3	17.0 ug/m3	17.1 ug/m3	7.1 ug/m3	4.9 ug/m3
Methyl isobutyl ketone	< 3.6 ug/m3	< 3.8 ug/m3	4.4 ug/m3	< 3.0 ug/m3	< 3.9 ug/m3	< 2.8 ug/m3	< 3.6 ug/m3	< 2.9 ug/m3	< 3.6 ug/m3	< 2.8 ug/m3	< 1.5 ug/m3	1.9 ug/m3	< 2.5 ug/m3	2.4 ug/m3	1.7 ug/m3	< 3.6 ug/m3	< 2.8 ug/m3	< 1.5 ug/m3	1.7 ug/m3	< 3.7 ug/m3	< 3.0 ug/m3	< 3.1 ug/m3
Methyl tertiary butyl ether (MTBE)	< 1.3 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 0.98 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	< 0.98 ug/m3	< 1.3 ug/m3	< 1.2 ug/m3	< 0.86 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.3 ug/m3	< 0.98 ug/m3	< 1.3 ug/m3	< 0.98 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3
Methylene chloride	< 6.1 ug/m3	9.3 ug/m3	< 6.1 ug/m3	9.5 ug/m3	< 6.6 ug/m3	7.6 ug/m3	< 6.1 ug/m3	< 4.9 ug/m3	< 6.1 ug/m3	5.1 ug/m3	< 6.4 ug/m3	319 ug/m3	6.6 ug/m3	7.3 ug/m3	< 407 ug/m3	< 6.1 ug/m3	5.0 ug/m3	8.0 ug/m3	102 ug/m3	< 6.4 ug/m3	6.7 ug/m3	7.4 ug/m3
Naphthalene	11.6 ug/m3	< 4.9 ug/m3	8.8 ug/m3	< 3.8 ug/m3	11.2 ug/m3	< 3.6 ug/m3	7.8 ug/m3	< 3.7 ug/m3	8.3 ug/m3	< 3.6 ug/m3	13.9 ug/m3	< 4.3 ug/m3	< 3.1 ug/m3	9.8 ug/m3	< 3.8 ug/m3	6.7 ug/m3	< 3.6 ug/m3	23.4 ug/m3	< 3.6 ug/m3	9.3 ug/m3	< 3.8 ug/m3	5.0 ug/m3
Propylene	2.2 ug/m3	13.4 ug/m3	4.0 ug/m3	< 0.50 ug/m3	1.4 ug/m3	37.3 ug/m3	2.5 ug/m3	28.4 ug/m3	2.2 ug/m3	27.2 ug/m3	< 0.63 ug/m3	< 0.56 ug/m3	< 0.41 ug/m3	< 0.65 ug/m3	< 0.50 ug/m3	0.99 ug/m3	< 0.47 ug/m3	< 0.63 ug/m3	< 0.47 ug/m3	4.3 ug/m3	< 0.50 ug/m3	< 0.52 ug/m3
Styrene	< 1.5 ug/m3	2.1 ug/m3	< 1.5 ug/m3	< 3.1 ug/m3	< 1.6 ug/m3	< 2.9 ug/m3	< 1.5 ug/m3	< 3.0 ug/m3	< 1.5 ug/m3	< 2.9 ug/m3	< 1.6 ug/m3	17.7 ug/m3	< 2.6 ug/m3	< 1.6 ug/m3	12.6 ug/m3	< 1.5 ug/m3	< 2.9 ug/m3	< 1.6 ug/m3	2.6 ug/m3	< 1.6 ug/m3	2.2 ug/m3	< 3.2 ug/m3
Tetrachloroethylene	71.8 ug/m3	3.1 ug/m3	67.4 ug/m3	2.9 ug/m3	19.6 ug/m3	< 1.8 ug/m3	37.2 ug/m3	< 1.9 ug/m3	323 ug/m3	< 1.8 ug/m3	231 ug/m3	< 1.1 ug/m3	< 1.6 ug/m3	65.4 ug/m3	< 0.99 ug/m3	38.0 ug/m3	< 1.8 ug/m3	162 ug/m3	2.6 ug/m3	142 ug/m3	2.4 ug/m3	2.6 ug/m3
Tetrahydrofuran	< 1.0 ug/m3	< 1.1 ug/m3	< 1.0 ug/m3	1.1 ug/m3	< 1.1 ug/m3	1.7 ug/m3	< 1.0 ug/m3	< 0.83 ug/m3	< 1.0 ug/m3	< 0.80 ug/m3	< 1.1 ug/m3	< 0.97 ug/m3	< 0.71 ug/m3	< 1.1 ug/m3	< 0.86 ug/m3	< 1.0 ug/m3	< 0.80 ug/m3	< 1.1 ug/m3	< 0.80 ug/m3	< 1.1 ug/m3	2.0 ug/m3	< 0.89 ug/m3
Toluene	< 1.3 ug/m3	18.4 ug/m3	< 1.3 ug/m3	11.6 ug/m3	28.1 ug/m3	5.0 ug/m3	< 1.3 ug/m3	2.5 ug/m3	< 1.3 ug/m3	4.7 ug/m3	< 1.4 ug/m3	23.0 ug/m3	3.4 ug/m3	76.8 ug/m3	31.4 ug/m3	< 1.3 ug/m3	4.9 ug/m3	< 1.4 ug/m3	33.5 ug/m3	17.1 ug/m3	17.1 ug/m3	24.1 ug/m3
Trichlorofluoromethane	3.8 ug/m3	< 2.1 ug/m3	4.2 ug/m3	< 1.6 ug/m3	< 2.1 ug/m3	< 1.5 ug/m3	< 2.0 ug/m3	< 1.6 ug/m3	< 2.0 ug/m3	< 1.5 ug/m3	3.5 ug/m3	< 1.8 ug/m3	< 1.3 ug/m3	4.9 ug/m3	< 1.6 ug/m3	8.4 ug/m3	< 1.5 ug/m3	64.4 ug/m3	< 1.5 ug/m3	12.5 ug/m3	< 1.6 ug/m3	< 1.7 ug/m3
Trichlorotrifluoroethane (Freon 113)	75.3 ug/m3	< 2.9 ug/m3	85.9 ug/m3	< 2.3 ug/m3	< 3.0 ug/m3	< 2.1 ug/m3	< 2.8 ug/m3	< 2.2 ug/m3	< 2.8 ug/m3	< 2.1 ug/m3	4.6 ug/m3	< 2.6 ug/m3	< 1.9 ug/m3	3.0 ug/m3	< 2.3 ug/m3	2.9 ug/m3	< 2.1 ug/m3	18.7 ug/m3	< 2.1 ug/m3	14.8 ug/m3	< 2.3 ug/m3	< 2.4 ug/m3
Vinyl acetate	16.8 ug/m3	< 1.3 ug/m3	12.6 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	< 0.96 ug/m3	8.5 ug/m3	< 1.0 ug/m3	< 1.2 ug/m3	< 0.96 ug/m3	2.6 ug/m3	7.7 ug/m3	< 0.84 ug/m3	6.6 ug/m3	< 1.0 ug/m3	< 1.2 ug/m3	< 0.96 ug/m3	3.4 ug/m3	< 0.96 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.1 ug/m3
Vinyl chloride	< 0.90 ug/m3	< 0.95 ug/m3	< 0.90 ug/m3	< 0.75 ug/m3	< 0.97 ug/m3	< 0.70 ug/m3	< 0.90 ug/m3	< 0.72 ug/m3	< 0.90 ug/m3	< 0.70 ug/m3	< 0.47 ug/m3	< 0.42 ug/m3	< 0.61 ug/m3	< 0.49 ug/m3	< 0.37 ug/m3	< 0.90 ug/m3	< 0.70 ug/m3	< 0.47 ug/m3	< 0.35 ug/m3	< 0.94 ug/m3	< 0.75 ug/m3	< 0.77 ug/m3
Xylene, m & p	< 3.1 ug/m3	10.8 ug/m3	< 3.1 ug/m3	10.5 ug/m3	63.7 ug/m3	42.4 ug/m3	6.3 ug/m3	42.2 ug/m3	< 3.1 ug/m3	3.5 ug/m3	< 3.2 ug/m3	5.5 ug/m3	2.3 ug/m3	< 3.3 ug/m3	6.3 ug/m3	< 3.1 ug/m3	2.7 ug/m3	< 3.2 ug/m3	13.4 ug/m3	73.0 ug/m3	12.5 ug/m3	29.0 ug/m3
Xylene, o	< 1.5 ug/m3	3.9 ug/m3	< 1.5 ug/m3	3.4 ug/m3	14.6 ug/m3	9.5 ug/m3	< 1.5 ug/m3	9.3 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.6 ug/m3	2.0 ug/m3	< 1.0 ug/m3	< 1.6 ug/m3	2.1 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.6 ug/m3	4.2 ug/m3	2.7 ug/m3	4.3 ug/m3	9.8 ug/m3

Data is organized by ascending building number.

Table E-2
Paired Sub-Slab, Indoor Air, and Outdoor Air Sample Analytical Results
2010 East Hennepin Avenue
East Hennepin Avenue Site
Minneapolis, Minnesota

Building Number	Tunnel between Buildings 11 and 14		Building 12									Building 14							
Sample Type	Indoor Air	Indoor Air	Paired Sub-Slab	Indoor Air	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air	Paired Sub-Slab	Indoor Air
Sample Date	7/30/2014	2/12/2015	7/30/2014			2/12/2015		7/30/2014		2/12/2015		7/30/2014		2/12/2015		7/31/2014		2/12/2015	
Sample ID	3954-IA5	3954-IA5	3954_I	3954-IA1	3954-IA1 Field Dup	3954_I	3954-IA1	3954_J	3954-IA2	3954_J	3954-IA2	3954_C	3954-IA3	3954_C	3954-IA3	3954_B	3954-IA4	3954_B	3954-IA4
Parameter																			
Trichloroethylene	0.86 ug/m3	< 1.5 ug/m3	3240 ug/m3	< 0.82 ug/m3	< 0.82 ug/m3	857 ug/m3	< 1.4 ug/m3	2640 ug/m3	< 0.82 ug/m3	849 ug/m3	< 1.6 ug/m3	493 ug/m3	< 0.76 ug/m3	1390 ug/m3	< 1.5 ug/m3	441 ug/m3	< 0.85 ug/m3	534 ug/m3	< 1.6 ug/m3
1,1,1-Trichloroethane	12.7 ug/m3	< 0.97 ug/m3	62.3 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3	22.7 ug/m3	< 0.88 ug/m3	39.6 ug/m3	< 1.7 ug/m3	20.3 ug/m3	< 1.0 ug/m3	7.1 ug/m3	8.6 ug/m3	4.8 ug/m3	< 0.97 ug/m3	4.8 ug/m3	< 1.7 ug/m3	3.7 ug/m3	< 1.0 ug/m3
1,1,2,2-Tetrachloroethane	< 0.97 ug/m3	< 0.97 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.0 ug/m3	< 1.2 ug/m3	< 0.88 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.2 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	< 0.97 ug/m3	< 1.2 ug/m3	< 0.97 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.2 ug/m3	< 1.0 ug/m3
1,1,2-Trichloroethane	< 0.76 ug/m3	< 3.9 ug/m3	< 1.0 ug/m3	< 0.82 ug/m3	< 0.82 ug/m3	< 0.97 ug/m3	< 3.5 ug/m3	< 0.99 ug/m3	< 0.82 ug/m3	< 0.97 ug/m3	< 4.0 ug/m3	< 0.99 ug/m3	< 0.76 ug/m3	< 0.97 ug/m3	< 3.9 ug/m3	< 0.99 ug/m3	< 0.85 ug/m3	< 0.97 ug/m3	< 4.1 ug/m3
1,1-Dichloroethane	< 1.1 ug/m3	< 1.1 ug/m3	4.2 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	2.8 ug/m3	< 1.0 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3	1.5 ug/m3	< 1.1 ug/m3	6.3 ug/m3	< 1.1 ug/m3	2.5 ug/m3	< 1.3 ug/m3	3.3 ug/m3	< 1.2 ug/m3
1,1-Dichloroethylene	< 1.1 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 1.0 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3
1,2,4-Trichlorobenzene	< 2.1 ug/m3	< 5.2 ug/m3	< 2.8 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3	< 2.6 ug/m3	< 4.8 ug/m3	< 2.7 ug/m3	< 2.2 ug/m3	< 2.6 ug/m3	< 5.4 ug/m3	< 2.7 ug/m3	< 2.1 ug/m3	< 2.6 ug/m3	< 5.2 ug/m3	< 2.7 ug/m3	< 2.3 ug/m3	< 2.6 ug/m3	< 5.6 ug/m3
1,2,4-Trimethylbenzene	< 1.4 ug/m3	< 3.5 ug/m3	< 1.9 ug/m3	5.9 ug/m3	5.6 ug/m3	< 1.7 ug/m3	< 3.1 ug/m3	84.6 ug/m3	5.6 ug/m3	49.9 ug/m3	< 3.6 ug/m3	< 1.8 ug/m3	< 1.4 ug/m3	< 1.7 ug/m3	< 3.5 ug/m3	< 1.8 ug/m3	< 1.5 ug/m3	49.7 ug/m3	< 3.7 ug/m3
1,2-Dibromoethane	< 2.2 ug/m3	< 2.2 ug/m3	< 2.9 ug/m3	< 2.3 ug/m3	< 2.3 ug/m3	< 2.7 ug/m3	< 2.0 ug/m3	< 2.8 ug/m3	< 2.3 ug/m3	< 2.7 ug/m3	< 2.2 ug/m3	< 2.8 ug/m3	< 2.2 ug/m3	< 2.7 ug/m3	< 2.2 ug/m3	< 2.8 ug/m3	< 2.4 ug/m3	< 2.7 ug/m3	< 2.3 ug/m3
1,2-Dichlorobenzene	< 1.7 ug/m3	< 1.7 ug/m3	< 2.3 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3	< 2.1 ug/m3	< 1.5 ug/m3	< 2.2 ug/m3	< 1.8 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3	< 2.2 ug/m3	< 1.7 ug/m3	< 2.1 ug/m3	< 1.7 ug/m3	< 2.2 ug/m3	< 1.9 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3
1,2-Dichloroethane	< 0.57 ug/m3	< 0.57 ug/m3	< 0.77 ug/m3	< 0.61 ug/m3	< 0.61 ug/m3	< 0.72 ug/m3	< 0.52 ug/m3	< 0.74 ug/m3	< 0.61 ug/m3	< 0.72 ug/m3	< 0.59 ug/m3	< 0.74 ug/m3	< 0.57 ug/m3	< 0.72 ug/m3	< 0.57 ug/m3	< 0.74 ug/m3	< 0.64 ug/m3	< 0.72 ug/m3	< 0.61 ug/m3
1,2-Dichloroethylene, cis	< 1.1 ug/m3	< 2.8 ug/m3	6.6 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	< 3.5 ug/m3	< 2.5 ug/m3	1.9 ug/m3	< 1.2 ug/m3	< 3.5 ug/m3	< 2.9 ug/m3	10.3 ug/m3	< 1.1 ug/m3	48.0 ug/m3	< 2.8 ug/m3	10.4 ug/m3	< 1.3 ug/m3	13.9 ug/m3	< 3.0 ug/m3
1,2-Dichloroethylene, trans	< 1.1 ug/m3	< 1.1 ug/m3	5.8 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	2.8 ug/m3	< 1.0 ug/m3	2.6 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3	4.0 ug/m3	< 1.1 ug/m3	10.1 ug/m3	< 1.1 ug/m3	2.6 ug/m3	< 1.3 ug/m3	2.8 ug/m3	< 1.2 ug/m3
1,2-Dichloropropane	< 1.3 ug/m3	< 1.3 ug/m3	< 1.8 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 1.7 ug/m3	< 1.4 ug/m3	< 1.6 ug/m3	< 1.4 ug/m3	< 1.7 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.5 ug/m3	< 1.6 ug/m3	< 1.4 ug/m3
1,2-Dichlorotetrafluoroethane	< 2.0 ug/m3	< 2.0 ug/m3	< 2.7 ug/m3	< 2.1 ug/m3	< 2.1 ug/m3	< 2.5 ug/m3	< 1.8 ug/m3	< 2.6 ug/m3	< 2.1 ug/m3	< 2.5 ug/m3	< 2.0 ug/m3	< 2.6 ug/m3	< 2.0 ug/m3	< 2.5 ug/m3	< 2.0 ug/m3	< 2.6 ug/m3	< 2.2 ug/m3	< 2.5 ug/m3	< 2.1 ug/m3
1,3,5-Trimethylbenzene	< 1.4 ug/m3	< 3.5 ug/m3	3.4 ug/m3	2.3 ug/m3	2.0 ug/m3	< 1.7 ug/m3	< 3.1 ug/m3	21.6 ug/m3	2.1 ug/m3	13.6 ug/m3	< 3.6 ug/m3	< 1.8 ug/m3	< 1.4 ug/m3	< 1.7 ug/m3	< 3.5 ug/m3	< 1.8 ug/m3	< 1.5 ug/m3	14.2 ug/m3	< 3.7 ug/m3
1,3-Butadiene	< 0.63 ug/m3	< 1.6 ug/m3	< 0.84 ug/m3	< 0.67 ug/m3	< 0.67 ug/m3	< 0.78 ug/m3	< 1.4 ug/m3	< 0.81 ug/m3	< 0.67 ug/m3	< 0.78 ug/m3	< 1.6 ug/m3	< 0.81 ug/m3	< 0.63 ug/m3	< 0.78 ug/m3	< 1.6 ug/m3	< 0.81 ug/m3	< 0.70 ug/m3	< 0.78 ug/m3	< 1.7 ug/m3
1,3-Dichloro-1-propene, cis	< 1.3 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 1.7 ug/m3	< 1.4 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 1.7 ug/m3	< 1.4 ug/m3	< 1.6 ug/m3	< 1.4 ug/m3
1,3-Dichloro-1-propene, trans	< 3.2 ug/m3	< 1.3 ug/m3	< 4.3 ug/m3	< 3.4 ug/m3	< 3.4 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 4.2 ug/m3	< 3.4 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 4.2 ug/m3	< 3.2 ug/m3	< 1.6 ug/m3	< 1.3 ug/m3	< 4.2 ug/m3	< 3.6 ug/m3	< 1.6 ug/m3	< 1.4 ug/m3
1,3-Dichlorobenzene	< 1.7 ug/m3	< 1.7 ug/m3	< 2.3 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3	< 2.1 ug/m3	< 1.5 ug/m3	< 2.2 ug/m3	< 1.8 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3	< 2.2 ug/m3	< 1.7 ug/m3	< 2.1 ug/m3	< 1.7 ug/m3	< 2.2 ug/m3	< 1.9 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3
1,4-Dichlorobenzene	< 1.7 ug/m3	< 1.7 ug/m3	< 2.3 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3	< 2.1 ug/m3	< 1.5 ug/m3	< 2.2 ug/m3	< 1.8 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3	< 2.2 ug/m3	< 1.7 ug/m3	< 2.1 ug/m3	< 1.7 ug/m3	< 2.2 ug/m3	< 1.9 ug/m3	< 2.1 ug/m3	< 1.8 ug/m3
2-Hexanone	< 1.2 ug/m3	< 2.1 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 1.9 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	2.1 ug/m3	< 2.2 ug/m3	2.0 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 2.1 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	< 1.4 ug/m3	< 2.2 ug/m3
4-Ethyltoluene	< 1.4 ug/m3	< 3.5 ug/m3	2.9 ug/m3	6.0 ug/m3	5.7 ug/m3	< 1.7 ug/m3	< 3.1 ug/m3	34.9 ug/m3	6.0 ug/m3	20.1 ug/m3	< 3.6 ug/m3	< 1.8 ug/m3	< 1.4 ug/m3	< 1.7 ug/m3	< 3.5 ug/m3	< 1.8 ug/m3	< 1.6 ug/m3	15.4 ug/m3	< 3.7 ug/m3
Acetone	31.4 ug/m3	48.1 ug/m3	14.1 ug/m3	27.5 ug/m3	26.7 ug/m3	12.3 ug/m3	25.6 ug/m3	22.9 ug/m3	27.7 ug/m3	6.5 ug/m3	4.5 ug/m3	23.2 ug/m3	33.3 ug/m3	79.3 ug/m3	78.4 ug/m3	24.7 ug/m3	27.0 ug/m3	4.2 ug/m3	14.9 ug/m3
Benzene	0.69 ug/m3	0.61 ug/m3	1.4 ug/m3	0.81 ug/m3	0.80 ug/m3	< 1.1 ug/m3	1.3 ug/m3	2.9 ug/m3	0.78 ug/m3	2.7 ug/m3	0.74 ug/m3	0.83 ug/m3	0.81 ug/m3	< 1.1 ug/m3	< 0.45 ug/m3	0.64 ug/m3	0.92 ug/m3	1.4 ug/m3	0.67 ug/m3
Benzyl chloride	< 1.5 ug/m3	< 3.7 ug/m3	< 2.0 ug/m3	< 1.6 ug/m3	< 1.6 ug/m3	< 1.8 ug/m3	< 3.3 ug/m3	< 1.9 ug/m3	< 1.6 ug/m3	< 1.8 ug/m3	< 3.8 ug/m3	< 1.9 ug/m3	< 1.5 ug/m3	< 1.8 ug/m3	< 3.7 ug/m3	< 1.9 ug/m3	< 1.6 ug/m3	< 1.8 ug/m3	< 3.9 ug/m3
Bromodichloromethane	< 1.9 ug/m3	< 1.9 ug/m3	< 2.5 ug/m3	< 2.0 ug/m3	< 2.0 ug/m3	< 2.4 ug/m3	< 1.7 ug/m3	< 2.4 ug/m3	< 2.0 ug/m3	< 2.4 ug/m3	< 2.0 ug/m3	< 2.4 ug/m3	< 1.9 ug/m3	< 2.4 ug/m3	< 1.9 ug/m3	< 2.4 ug/m3	< 2.1 ug/m3	< 2.4 ug/m3	< 2.0 ug/m3
Bromoform	< 2.9 ug/m3	< 2.9 ug/m3	< 3.9 ug/m3	< 3.1 ug/m3	< 3.1 ug/m3	< 3.7 ug/m3	< 2.6 ug/m3	< 3.8 ug/m3	< 3.1 ug/m3	< 3.7 ug/m3	< 3.0 ug/m3	< 3.8 ug/m3	< 2.9 ug/m3	< 3.7 ug/m3	< 2.9 ug/m3	< 3.8 ug/m3	< 3.3 ug/m3	< 3.7 ug/m3	< 3.1 ug/m3
Bromomethane	< 1.1 ug/m3	< 2.7 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 2.5 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 2.8 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	< 2.7 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 2.9 ug/m3
Carbon disulfide	< 0.88 ug/m3	< 0.88 ug/m3	< 1.2 ug/m3	< 0.94 ug/m3	< 0.94 ug/m3	< 1.1 ug/m3	10.1 ug/m3	< 1.1 ug/m3	< 0.94 ug/m3	< 1.1 ug/m3	< 0.91 ug/m3	< 1.1 ug/m3	< 0.88 ug/m3	2.7 ug/m3	< 0.88 ug/m3	< 1.1 ug/m3	< 0.98 ug/m3	3.4 ug/m3	< 0.94 ug/m3
Carbon tetrachloride	< 0.89 ug/m3	< 0.89 ug/m3	3.7 ug/m3	< 0.95 ug/m3	< 0.95 ug/m3	< 5.6 ug/m3	< 0.81 ug/m3	3.1 ug/m3	< 0.95 ug/m3	< 5.6 ug/m3	< 0.92 ug/m3	< 1.2 ug/m3	< 0.89 ug/m3	< 5.6 ug/m3	< 0.89 ug/m3	1.3 ug/m3	< 0.99 ug/m3	< 5.6 ug/m3	< 0.95 ug/m3
Chlorobenzene	< 1.3 ug/m3	< 3.3 ug/m3	< 1.8 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3	< 1.6 ug/m3	< 2.9 ug/m3	< 1.7 ug/m3	< 1.4 ug/m3	< 1.6 ug/m3	< 3.4 ug/m3	< 1.7 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	< 3.3 ug/m3	< 1.7 ug/m3	< 1.5 ug/m3	< 1.6 ug/m3	< 3.5 ug/m3
Chlorodibromomethane	< 2.4 ug/m3	< 2.4 ug/m3	< 3.2 ug/m3	< 2.6 ug/m3	< 2.6 ug/m3	< 3.0 ug/m3	< 2.2 ug/m3	< 3.1 ug/m3	< 2.6 ug/m3	< 3.0 ug/m3	< 2.5 ug/m3	< 3.1 ug/m3	< 2.4 ug/m3	< 3.0 ug/m3	< 2.4 ug/m3	< 3.1 ug/m3	< 2.7 ug/m3	< 3.0 ug/m3	< 2.6 ug/m3
Chloroethane	< 0.75 ug/m3	< 0.75 ug/m3	< 1.0 ug/m3	< 0.80 ug/m3	< 0.80 ug/m3	< 0.94 ug/m3	< 0.68 ug/m3	< 0.97 ug/m3	< 0.80 ug/m3	< 0.94 ug/m3	< 0.78 ug/m3	< 0.97 ug/m3	< 0.75 ug/m3	< 0.94 ug/m3	< 0.75 ug/m3	< 0.97 ug/m3	< 0.84 ug/m3	< 0.94 ug/m3	< 0.80 ug/m3
Chloroform	< 0.69 ug/m3	0.93 ug/m3	32.9 ug/m3	< 0.74 ug/m3	< 0.74 ug/m3	10.7 ug/m3	< 0.62 ug/m3	31.2 ug/m3	< 0.74 ug/m3	12.5 ug/m3	< 0.71 ug/m3	1.4 ug/m3	< 0.69 ug/m3	4.3 ug/m3	1.9 ug/m3	26.4 ug/m3	< 0.77 ug/m3	18.6 ug/m3	0.91 ug/m3
Chloromethane	1.1 ug/m3	< 0.58 ug/m3	1.3 ug/m3	< 0.63 ug/m3	0.95 ug/m3	< 0.73 ug/m3	< 0.53 ug/m3	< 0.76 ug/m3	< 0.63 ug/m3	< 0.73 ug/m3	< 0.60 ug/m3	< 0.76 ug/m3	1.1 ug/m3	< 0.73 ug/m3	< 0.58 ug/m3	< 0.76 ug/m3	0.99 ug/m3	< 0.73 ug/m3	< 0.63 ug/m3
Cyclohexane	< 0.97 ug/m3	< 0.97 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.0 ug/m3	< 1.2 ug/m3	< 0.88 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.2 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	1.2 ug/m3	< 1.2 ug/m3	< 0.97 ug/m3	< 1.3 ug/m3	1.6 ug/m3	1.5 ug/m3	< 1.0 ug/m3
Dichlorodifluoromethane (CFC-12)	673 ug/m3	68.2 ug/m3	4.1 ug/m3	7.9 ug/m3	8.1 ug/m3	3.9 ug/m3	3.2 ug/m3	5.0 ug/m3	8.1 ug/m3	3.9 ug/m3	2.8 ug/m3	146 ug/m3	433 ug/m3	10 ug/m3	98.7 ug/m3	246 ug/m3	167 ug/m3	35.1 ug/m3	43.6 ug/m3
Ethyl acetate	6.7 ug/m3	< 1.0 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	< 1.3 ug/m3	< 0.92 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.3 ug/m3	7.1 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	38.9 ug/m3	< 1.3 ug/m3	2.0 ug/m3
Ethyl Alcohol	104 ug/m3	85.1 ug/m3	37.1 ug/m3	109 ug/m3	102 ug/m3	2.4 ug/m3	14.5 ug/m3	48.5 ug/m3	113 ug/m3	4.9 ug/m3	7.5 ug/m3	4.4 ug/m3	193 ug/m3	4.6 ug/m3	20.8 ug/m3	10.5 ug/m3	245 ug/m3	11.1 ug/m3	45.9 ug/m3
Ethyl benzene	1.4 ug/m3	< 1.2 ug/m3	23.0 ug/m3	3.5 ug/m3	3.8 ug/m3	3.1 ug/m3	< 1.1 ug/m3	54.2 ug/m3	3.5 ug/m3	25.2 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.6 ug/m3	< 1.4 ug/m3	7.3 ug/m3	< 1.3 ug/m3
Heptane	1.6 ug/m3	< 1.2 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	1.9 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3	< 1.5 ug/m3	1.6 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	< 1.4 ug/m3	< 1.2 ug/m3
Hexachlorobutadiene	< 3.1 ug/m3	< 3.1 ug/m3	< 4.1 ug/m3	< 3.3 ug/m3	< 3.3 ug/m3	< 3.8 ug/m3	< 2.8 ug/m3	< 4.0 ug/m3	< 3.3 ug/m3	< 3.8 ug/m3	< 3.2 ug/m3	< 4.0 ug/m3	< 3.1 ug/m3	< 3.8 ug/m3	< 3.1 ug/m3	< 4.0 ug/m3	< 3.4 ug/m3	< 3.8 ug/m3	< 3.3 ug/m3
Hexane (C6)	1.1 ug/m3	< 1.0 ug/m3	2.3 ug/m3	1.7 ug/m3	1.3 ug/m3	< 1.3 ug/m3	9.9 ug/m3	2.3 ug/m3	1.3 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	3.4 ug/m3	1.2 ug/m3	2.6 ug/m3	< 1.0 ug/m3	3.3 ug/m3	< 1.1 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3
Isopropyl alcohol	36.8 ug/m3	< 1.7 ug/m3	< 2.3 ug/m3	7.3 ug/m3	6.6 ug/m3	< 2.2 ug/m3	< 1.6 ug/m3	53.5 ug/m3	< 1.9 ug/m3	18.1 ug/m3	< 1.8 ug/m3	< 2.2 ug/m3	28.6 ug/m3	53.3 ug/m3	< 1.7 ug/m3	2.7 ug/m3	12.7 ug/m3	< 2.2 ug/m3	< 1.9 ug/m3
Methyl ethyl ketone	6.8 ug/m3	4.3 ug/m3	2.9 ug/m3	6.6 ug/m3	6.8 ug/m3	< 3.2 ug/m3	< 2.3 ug/m3	4.3 ug/m3	6.2 ug/m3	< 3.2 ug/m3	< 2.6 ug/m3	7.2 ug/m3	3.4 ug/m3	10.8 ug/m3	< 2.5 ug/m3	6.9 ug/m3	6.2 ug/m3	< 3.2 ug/m3	< 2.7 ug/m3
Methyl isobutyl ketone	1.9 ug/m3	< 2.9 ug/m3	< 1.6 ug/m3	< 1.2 ug/m3	< 1.2 ug/m3	< 3.6 ug/m3	< 2.6 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 3.6 ug/m3	< 3.0 ug/m3	< 1.5 ug/m3	1.9 ug/m3	< 3.6 ug/m3	< 2.9 ug/m3	< 1.5 ug/m3	< 1.3 ug/m3	< 3.6 ug/m3	< 3.1 ug/m3
Methyl tertiary butyl ether (MTBE)	< 1.0 ug/m3	< 1.0 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3	< 1.3 ug/m3	< 0.92 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3
Methylene chloride	384 ug/m3	10.0 ug/m3	< 6.6 ug/m3	16.5 ug/m3	25.2 ug/m3	< 6.1 ug/m3	43.2 ug/m3	6.6 ug/m3	15.6 ug/m3	< 6.1 ug/m3	< 5.1 ug/m3	8.6 ug/m3	370 ug/m3	< 6.1 ug/m3	5.0 ug/m3	32.0 ug/m3	69.9 ug/m3	< 6.1 ug/m3	6.0 ug/m3
Naphthalene	< 3.7 ug/m3	< 3.7 ug/m3	15.1 ug/m3	27.5 ug/m3	30.9 ug/m3	11.1 ug/m3	< 3.4 ug/m3	17.9 ug/m3	25.6 ug/m3	14.9 ug/m3	3.9 ug/m3	20.5 ug/m3	< 3.7 ug/m3	6.5 ug/m3	< 3.7 ug/m3	28.3 ug/m3	< 4.1 ug/m3	38.2 ug/m3	< 4.0 ug/m3
Propylene	< 0.49 ug/m3	< 0.49 ug/m3	< 0.65 ug/m3	6.1 ug/m3	< 0.52 ug/m3	1.1 ug/m3	3.3 ug/m3	< 0.63 ug/m3	< 0.52 ug/m3	0.81 ug/m3	< 0.50 ug/m3	< 0.63 ug/m3	< 0.49 ug/m3	2.1 ug/m3	< 0.49 ug/m3	< 0.63 ug/m3	< 0.54 ug/m3	1.4 ug/m3	< 0.52 ug/m3
Styrene	2.3 ug/m3	< 3.0 ug/m3	< 1.6 ug/m3	2.2 ug/m3	2.4 ug/m3	< 1.5 ug/m3	< 2.7 ug/m3	< 1.6 ug/m3	2.3 ug/m3	< 1.5 ug/m3	< 3.1 ug/m3	< 1.6 ug/m3	2.1 ug/m3	< 1.5 ug/m3	< 3.0 ug/m3	< 1.6 ug/m3	1.8 ug/m3	< 1.5 ug/m3	< 3.2 ug/m3
Tetrachloroethylene	< 0.96 ug/m3	< 1.9 ug/m3	404 ug/m3	< 1.0 ug/m3	< 1.0 ug/m3	118 ug/m3	< 1.7 ug/m3	307 ug/m3	< 1.0 ug/m3	111 ug/m3	3.1 ug/m3	60.7 ug/m3	< 0.96 ug/m3	93.2 ug/m3	< 1.9 ug/m3	52.2 ug/m3	< 1.1 ug/m3	39.2 ug/m3	< 2.1 ug/m3
Tetrahydrofuran	< 0.83 ug/m3	< 0.83 ug/m3	< 1.1 ug/m3	< 0.89 ug/m3	< 0.89 ug/m3	< 1.0 ug/m3	< 0.76 ug/m3	< 1.1 ug/m3	< 0.89 ug/m3	< 1.0 ug/m3	< 0.86 ug/m3	< 1.1 ug/m3	< 0.83 ug/m3	3.6 ug/m3	< 0.83 ug/m3	< 1.1 ug/m3	< 0.93 ug/m3	< 1.0 ug/m3	< 0.89 ug/m3
Toluene	5.7 ug/m3	2.5 ug/m3	2.9 ug/m3	158 ug/m3	160 ug/m3	< 1.3 ug/m3	79.4 ug/m3	6.5 ug/m3	160 ug/m3	13.4 ug/m3	13.4 ug/m3	< 1.4 ug/m3	6.2 ug/m3	5.6 ug/m3	< 1.1 ug/m3	< 1.4 ug/m3	8.2 ug/m3	21.9 ug/m3	4.1 ug/m3
Trichlorofluoromethane	1.8 ug/m3	< 1.6 ug/m3	7.4 ug/m3	1.7 ug/m3	1.9 ug/m3	3.8 ug/m3	< 1.4 ug/m3	12.2 ug/m3	1.8 ug/m3	9.4 ug/m3	< 1.6 ug/m3	2.4 ug/m3	1.9 ug/m3	< 2.0 ug/m3	< 1.6 ug/m3	2.2 ug/m3	2.6 ug/m3	< 2.0 ug/m3	< 1.7 ug/m3
Trichlorotrifluoroethane (Freon 113)	< 2.2 ug/m3	< 2.2 ug/m3	10.7 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3	3.7 ug/m3	< 2.0 ug/m3	6.4 ug/m3	< 2.4 ug/m3	3.0 ug/m3	< 2.3 ug/m3	< 2.9 ug/m3	< 2.2 ug/m3	< 2.8 ug/m3	< 2.2 ug/m3	< 2.9 ug/m3	< 2.5 ug/m3	< 2.8 ug/m3	< 2.4 ug/m3
Vinyl acetate	< 1.0 ug/m3	< 1.0 ug/m3	1.9 ug/m3	2.2 ug/m3	1.8 ug/m3	< 1.2 ug/m3	< 0.90 ug/m3	< 1.3 ug/m3	2.1 ug/m3	< 1.2 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	< 1.0 ug/m3	9.6 ug/m3	< 1.0 ug/m3	< 1.3 ug/m3	< 1.1 ug/m3	< 1.2 ug/m3	< 1.1 ug/m3
Vinyl chloride	< 0.36 ug/m3	< 0.72 ug/m3	< 0.49 ug/m3	< 0.39 ug/m3	< 0.39 ug/m3	< 0.90 ug/m3	< 0.66 ug/m3	< 0.47 ug/m3	< 0.39 ug/m3	< 0.90 ug/m3	< 0.75 ug/m3	< 0.47 ug/m3	< 0.36 ug/m3	< 0.90 ug/m3	< 0.72 ug/m3	< 0.47 ug/m3	< 0.40 ug/m3	< 0.90 ug/m3	< 0.77 ug/m3
Xylene, m & p	5.4 ug/m3	< 2.4 ug/m3	10.1 ug/m3	15.7 ug/m3	16.1 ug/m3	< 3.1 ug/m3	4.3 ug/m3	252 ug/m3	15.5 ug/m3	127 ug/m3	< 2.5 ug/m3	< 3.2 ug/m3	4.1 ug/m3	< 3.1 ug/m3	< 2.4 ug/m3	< 3.2 ug/m3	< 2.7 ug/m3	53.7 ug/m3	< 2.6 ug/m3
Xylene, o	2.0 ug/m3	< 1.2 ug/m3	32.0 ug/m3	5.4 ug/m3	5.2 ug/m3	2.7 ug/m3	1.2 ug/m3	107 ug/m3	4.9 ug/m3	49.4 ug/m3	< 1.3 ug/m3	< 1.6 ug/m3	1.6 ug/m3	< 1.5 ug/m3	< 1.2 ug/m3	< 1.6 ug/m3	< 1.4 ug/m3	20.0 ug/m3	< 1.3 ug/m3

Data is organized by ascending building number.

Table E-2
Paired Sub-Slab, Indoor Air, and Outdoor Air Sample Analytical Results
2010 East Hennepin Avenue
East Hennepin Avenue Site
Minneapolis, Minnesota

Building Number	Outdoor Air			
Sample Type	Outdoor Air			
Sample Date	7/30/2014		2/12/2015	
Sample ID	OA1	OA2	OA1	OA2
Parameter				
Trichloroethylene	< 0.85 ug/m3	0.91 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3
1,1,1-Trichloroethane	< 1.7 ug/m3	< 1.7 ug/m3	< 0.82 ug/m3	< 0.82 ug/m3
1,1,2,2-Tetrachloroethane	< 1.1 ug/m3	< 1.1 ug/m3	< 0.82 ug/m3	< 0.82 ug/m3
1,1,2-Trichloroethane	< 0.85 ug/m3	< 0.85 ug/m3	< 3.3 ug/m3	< 3.3 ug/m3
1,1-Dichloroethane	< 1.3 ug/m3	< 1.3 ug/m3	< 0.97 ug/m3	< 0.97 ug/m3
1,1-Dichloroethylene	< 1.3 ug/m3	< 1.3 ug/m3	< 0.96 ug/m3	< 0.96 ug/m3
1,2,4-Trichlorobenzene	< 2.3 ug/m3	< 2.3 ug/m3	< 4.5 ug/m3	< 4.5 ug/m3
1,2,4-Trimethylbenzene	< 1.5 ug/m3	127 ug/m3	< 2.9 ug/m3	< 2.9 ug/m3
1,2-Dibromoethane	< 2.4 ug/m3	< 2.4 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3
1,2-Dichlorobenzene	< 1.9 ug/m3	< 1.9 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3
1,2-Dichloroethane	< 0.64 ug/m3	< 0.64 ug/m3	< 0.48 ug/m3	< 0.48 ug/m3
1,2-Dichloroethylene, cis	< 1.3 ug/m3	< 1.3 ug/m3	< 2.4 ug/m3	< 2.4 ug/m3
1,2-Dichloroethylene, trans	< 1.3 ug/m3	< 1.3 ug/m3	< 0.96 ug/m3	< 0.96 ug/m3
1,2-Dichloropropane	< 1.5 ug/m3	< 1.5 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3
1,2-Dichlorotetrafluoroethane	< 2.2 ug/m3	< 2.2 ug/m3	< 1.7 ug/m3	< 1.7 ug/m3
1,3,5-Trimethylbenzene	< 1.5 ug/m3	37.5 ug/m3	< 2.9 ug/m3	< 2.9 ug/m3
1,3-Butadiene	< 0.70 ug/m3	< 0.70 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3
1,3-Dichloro-1-propene, cis	< 1.4 ug/m3	< 1.4 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3
1,3-Dichloro-1-propene, trans	< 3.6 ug/m3	< 3.6 ug/m3	< 1.1 ug/m3	< 1.1 ug/m3
1,3-Dichlorobenzene	< 1.9 ug/m3	< 1.9 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3
1,4-Dichlorobenzene	< 1.9 ug/m3	< 1.9 ug/m3	< 1.4 ug/m3	< 1.4 ug/m3
2-Hexanone	< 1.3 ug/m3	< 1.3 ug/m3	< 1.8 ug/m3	< 1.8 ug/m3
4-Ethyltoluene	< 1.6 ug/m3	34.8 ug/m3	< 2.9 ug/m3	< 2.9 ug/m3
Acetone	8.1 ug/m3	18.4 ug/m3	< 2.8 ug/m3	6.4 ug/m3
Benzene	0.51 ug/m3	0.88 ug/m3	< 0.38 ug/m3	0.48 ug/m3
Benzyl chloride	< 1.6 ug/m3	< 1.6 ug/m3	< 3.1 ug/m3	< 3.1 ug/m3
Bromodichloromethane	< 2.1 ug/m3	< 2.1 ug/m3	< 1.6 ug/m3	< 1.6 ug/m3
Bromoform	< 3.3 ug/m3	< 3.3 ug/m3	< 2.5 ug/m3	< 2.5 ug/m3
Bromomethane	< 1.2 ug/m3	< 1.2 ug/m3	< 2.3 ug/m3	< 2.3 ug/m3
Carbon disulfide	< 0.98 ug/m3	< 0.98 ug/m3	< 0.74 ug/m3	< 0.74 ug/m3
Carbon tetrachloride	< 0.99 ug/m3	< 0.99 ug/m3	< 0.75 ug/m3	< 0.75 ug/m3
Chlorobenzene	< 1.5 ug/m3	< 1.5 ug/m3	3.6 ug/m3	< 2.8 ug/m3
Chlorodibromomethane	< 2.7 ug/m3	< 2.7 ug/m3	< 2.0 ug/m3	< 2.0 ug/m3
Chloroethane	< 0.84 ug/m3	< 0.84 ug/m3	< 0.64 ug/m3	< 0.64 ug/m3
Chloroform	< 0.77 ug/m3	< 0.77 ug/m3	< 0.59 ug/m3	< 0.59 ug/m3
Chloromethane	0.98 ug/m3	0.82 ug/m3	< 0.50 ug/m3	< 0.50 ug/m3
Cyclohexane	< 1.1 ug/m3	< 1.1 ug/m3	< 0.83 ug/m3	< 0.83 ug/m3
Dichlorodifluoromethane (CFC-12)	1.9 ug/m3	1.8 ug/m3	< 1.2 ug/m3	2.8 ug/m3
Ethyl acetate	< 1.1 ug/m3	< 1.1 ug/m3	< 0.86 ug/m3	< 0.86 ug/m3
Ethyl Alcohol	11.7 ug/m3	17.1 ug/m3	2.8 ug/m3	4.4 ug/m3
Ethyl benzene	< 1.4 ug/m3	14.1 ug/m3	< 1.0 ug/m3	< 1.0 ug/m3
Heptane	< 1.3 ug/m3	2.4 ug/m3	< 0.98 ug/m3	< 0.98 ug/m3
Hexachlorobutadiene	< 3.4 ug/m3	< 3.4 ug/m3	< 2.6 ug/m3	< 2.6 ug/m3
Hexane (C6)	< 1.1 ug/m3	< 1.1 ug/m3	< 0.85 ug/m3	< 0.85 ug/m3
Isopropyl alcohol	< 1.9 ug/m3	53.0 ug/m3	< 1.5 ug/m3	< 1.5 ug/m3
Methyl ethyl ketone	1.2 ug/m3	1.7 ug/m3	< 2.2 ug/m3	< 2.2 ug/m3
Methyl isobutyl ketone	< 1.3 ug/m3	< 1.3 ug/m3	< 2.5 ug/m3	< 2.5 ug/m3
Methyl tertiary butyl ether (MTBE)	< 1.1 ug/m3	< 1.1 ug/m3	< 0.86 ug/m3	< 0.86 ug/m3
Methylene chloride	< 5.5 ug/m3	< 5.5 ug/m3	< 4.2 ug/m3	< 4.2 ug/m3
Naphthalene	< 4.1 ug/m3	156 ug/m3	< 3.1 ug/m3	< 3.1 ug/m3
Propylene	< 0.54 ug/m3	< 0.54 ug/m3	< 0.41 ug/m3	< 0.41 ug/m3
Styrene	1.6 ug/m3	4.7 ug/m3	< 2.6 ug/m3	< 2.6 ug/m3
Tetrachloroethylene	< 1.1 ug/m3	< 1.1 ug/m3	2.4 ug/m3	< 1.6 ug/m3
Tetrahydrofuran	< 0.93 ug/m3	< 0.93 ug/m3	< 0.71 ug/m3	< 0.71 ug/m3
Toluene	2.2 ug/m3	17.3 ug/m3	0.94 ug/m3	< 0.91 ug/m3
Trichlorofluoromethane	< 1.8 ug/m3	< 1.8 ug/m3	< 1.3 ug/m3	< 1.3 ug/m3
Trichlorotrifluoroethane (Freon 113)	< 2.5 ug/m3	< 2.5 ug/m3	< 1.9 ug/m3	< 1.9 ug/m3
Vinyl acetate	< 1.1 ug/m3	< 1.1 ug/m3	< 0.84 ug/m3	< 0.84 ug/m3
Vinyl chloride	< 0.40 ug/m3	< 0.40 ug/m3	< 0.61 ug/m3	< 0.61 ug/m3
Xylene, m & p	< 2.7 ug/m3	83.3 ug/m3	< 2.1 ug/m3	< 2.1 ug/m3
Xylene, o	< 1.4 ug/m3	45.7 ug/m3	< 1.0 ug/m3	< 1.0 ug/m3

Appendix E, Table E-3: 2014 Disposal Site Soil Vapor Data (µg/m^3)

Soil sample number	DP-054
Soil sample depth (feet)	16.4
1,2,4-trimethylbenzene	72,200
1,3,5-trimethylbenzene	25,700
4-ethyltoluene	23,600
benzene	134,000
cyclohexane	79,900
dichlorodifluoromethane (CFC-12)	10,500
ethyl benzene	535,000
heptane	927,000
hexane	26,000
toluene	369,000
vinyl chloride	15,700
xylene, m & p	1,510,000
xylenes, o	429,000

Source: Barr, 2014a

61 VOCs were analyzed, including TCE; the 13 detected are shown above.

Appendix F, Table F-1: TCE Occupational Standards Compared to the Intrusion Screening Values

Source	TCE in µg/m^3	TCE in ppb	TCE in ppm
Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit (PEL) (1967)	540,000	100,000	100
Minnesota OSHA PEL (1989)	270,000	50,000	50
National Institute for Occupational Safety and Health (NIOSH) Recomended Exposure Limit (1994)	135,000	25,000	25
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (2006)	54,000	10,000	10
MPCA Industrial Intrusion Screening Value (ISV) (2013)	6	1.1	0.001
MPCA Residential Intrusion Screening Value (ISV) (2013)	**2**	**0.37**	**0.00037**

µg/m^3 = micrograms per cubic meter

ppb = parts per billion

ppm = parts per million

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
9311 GROH ROAD
GROSSE ILE, MI 48138

MEMORANDUM

SUBJECT: Discussion of Variation of Minnesota Pollution Control Agency and US EPA Vapor Intrusion Screening Levels for the General Mills Site

FROM: Keith Fusinski, PhD Toxicologist US EPA
Superfund Division, Remedial Response Branch #1, Remedial Response Section #1

TO: Leah Evison, Remedial Project Manager, US EPA
Superfund Division, Remedial Response Branch #1, Remedial Response Section #1

DATE: 4/28/2014

STATEMENT OF THE ISSUES

On February 29, 2012, it was recommended that the EPA's screening value of 4.3 μg/m^3 TCE be used for screening soil gas samples at the General Mills site. Currently MPCA is using 20 μg/m^3 in soil gas (sub-slab) as a decision point for installing vapor intrusion mitigation system for homes. RPM Evison requested an explanation of why US EPA and Minnesota Pollution Control Agency (MPCA) use different values and if the MPCA decision point of 20 μg/m^3 is considered protective.

DISCUSSION

The US EPA determines probability of a non-cancer detrimental health effect to occur by calculating a hazard quotient (HQ). The HQ is a ratio of a single substance exposure level over a specified period of time to a reference dose of the same substance derived from a similar exposure period. It is recommended that the HQ of an exposure to a chemical of concern be below or equal to 1 which is the level at which no adverse human health effects are expected to occur. For cancer risk, the US EPA recommends a screening level that would equate to an exposure to a chemical that would increase the excess lifetime cancer risk (ELCR) (or chance of getting cancer over a lifetime) by one in a million ($1x10^{-6}$) or greater. However, rates up to 1 in 10,000 ($1x10^{-4}$) are considered acceptable action levels. It is also important to note, that a screening level is not an action level. Generally, if the concentration of a compound is within or below US EPA's risk range of 10^{-4} to 10^{-6} ELCR, no action would take place. A screening level is just a number which tells the agency that more investigation should be done. The Office of Solid Waste and Emergency Response (OSWER) suggest that a removal action takes place if ELCR exceeds a 1 in 10,000 or the HQ exceeds 3.

Vapor intrusion is the migration of volatile chemicals from the subsurface into overlying buildings. Volatile chemicals in contaminated groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings. The vapor intrusion pathway is considered complete when the vapors move from the source (or groundwater contamination) through the deep soil and subsurface soil gas, and into a structure. Each of these components must exist in order for the pathway to be considered complete.

US EPA determines indoor air screening levels based upon a person being in a home for 24 hours a day, 350 days per year for 30 years. Each step in the vapor intrusion pathway has a different screening level calculated from the indoor air screening level. It has been found that the concentration under a building (subslab) would have to be ten times greater than the indoor screening level to reach that screening level inside the home.

The US EPA screening level for TCE in indoor air is 0.43 $\mu g/m^3$ based upon a 1 in a million ELCR. The acceptable cancer risk range would be 0.43 $\mu g/m^3$ to 43 $\mu g/m^3$ for indoor airThis would equate to a TCE concentration in the subslab soil gas of 4.3 $\mu g/m^3$ to 430 $\mu g/m^3$. It is important to note that an HQ of 1 would be exceeded if indoor air concentrations of TCE exceed 2.1 $\mu g/m^3$ (21 $\mu g/m^3$ in the subslab soil gas).

The MCPA decision point of installing vapor intrusion mitigation systems at subslab soil gas exceedances of 20 $\mu g/m^3$ is consistent with US EPA policy of protecting human health from TCE exposure through vapor intrusion. It is equivalent to an indoor air concentration that is within EPA's acceptable risk range for cancer risk and also meets EPA's recommended cleanup level for non-cancer risk.

Appendix H, Table H-1: City of Minneapolis Outdoor Air TCE Sampling Results - Locations Closest to the Site (See Figure A-18)

Date	Location	TCE Results (µg/m^3)
November 2013	1177 14th Ave SE	ND
November 2013	831 19th Ave SE	ND
November 2013	1700 SE Elm St	0.81
November 2013	2412 Kennedy St NE	0.98
February 2014	1177 14th Ave SE	ND
February 2014	1700 SE Elm St	ND
February 2014	2412 Kennedy St NE	ND
February 2014	1819 Talmage Ave SE	ND
May 2014	1177 14th Ave SE	ND
May 2014	1700 SE Elm St	0.87
May 2014	2412 Kennedy St NE	ND
May 2014	1819 Talmage Ave SE	1.2
August 2014	1071 14th Ave SE	ND
August 2014	1177 14th Ave SE	ND
August 2014	912 18th Ave SE	ND
August 2014	2600 Como Ave SE	ND
August 2014	1700 Elm St SE	ND
August 2014	2412 Kennedy St NE	ND
August 2014	2100 Talmage Ave SE	ND
November 2014	1071 14th Ave SE	11.9
November 2014	912 18th Ave SE	ND
November 2014	2600 Como Ave SE	ND
November 2014	1700 Elm St SE	ND
November 2014	2412 Kennedy St NE	ND
November 2014	2100 Talmage Ave SE	ND
February 2015	1071 14th Ave SE	ND
February 2015	912 18th Ave SE	ND
February 2015	1000 26th Ave SE	ND
February 2015	1700 Elm St SE	ND
February 2015	1936 Elm St. SE	ND
February 2015	2412 Kennedy St NE	ND
February 2015	2100 Talmage Ave SE	ND
May 2015	1700 Elm St SE	ND
May 2015	2412 Kennedy St NE	ND
August 2015	918 18th Ave SE	0.47
August 2015	1000 26th Ave SE	ND
August 2015	1700 Elm St SE	ND
August 2015	2412 Kennedy St NE	1
August 2015	2100 Talmage Ave SE	1.5

ND = not detected

Appendix H, Table H-2: City of Minneapolis Outdoor Air TCE Sampling Results - 782 29th Ave SE (See Figure A-18)

Date	TCE Results ($\mu g/m^3$)
November 2013	1.7
November 2013	9
November 2013	1.6
February 2014	ND
February 2014	ND
February 2014	ND
February 2014	ND
May 2014	ND
May 2014	ND
May 2014	ND
May 2014	0.28
August 2014	ND
August 2014	ND
August 2014	ND
November 2014	1.3
November 2014	ND
November 2014	ND
November 2014	ND
February 2015	ND
February 2015	ND
February 2015	ND
February 2015	ND
May 2015	0.38
May 2015	ND
May 2015	ND
May 2015	ND
August 2015	6.2
August 2015	ND
August 2015	ND
August 2015	ND

ND = not detected

Minnesota Cancer Surveillance System
P.O. Box 64882
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Cancer Occurrence in the Como Neighborhood of Southeast Minneapolis (2001–2010)

Background

In November 2013, Minnesota Department of Health (MDH) Site Assessment and Consultation staff requested that Minnesota Cancer Surveillance System (MCSS) staff calculate cancer rates of residents living in the 55414 ZIP code, using the ZIP code as a representation of the Como neighborhood of southeast Minneapolis. Site Assessment and Consultation staff also requested corresponding cancer rates for a larger population, such as the city of Minneapolis or state of Minnesota, for comparison with cancer rates in the Como neighborhood.

In this report MCSS staff provides these calculations. MCSS staff retrieved information on the number of individuals with newly-diagnosed cancer (defined here as "observed cancer cases") among residents of the 55414 ZIP code geographic area, for the years 2001 through 2010. (For ease of interpretation, this report presents counts rather than rates.)

MCSS staff has also estimated the number of cancers that would be "expected", or projected for the 55414 ZIP code area over the 10-year period, if rates of cancer occurrence were similar to those of broader, seven-county Twin Cities metropolitan area. The expected case counts are statistically-modeled estimates of cancer occurrence that take into account differences in age distribution and population size between the geographic areas. They are intended as benchmarks for comparison with observed cases. Observed and expected cases can be compared to see whether the numbers observed are less than, not different from, or more than the numbers expected.

Cancer occurrence in the Como neighborhood is not unusual

MCSS staff compared observed and expected cases for all cancers combined and for 14 specific cancers in males (Table 1), and for all cancers combined and 16 specific cancers in females (Table 2). The number of newly-diagnosed cancer cases (as "all cancers combined") in the Como neighborhood over the 10-year period did not differ from the number expected, based on comparison of cancer rates in the greater Twin Cities metropolitan area. Among males, 271 new cancers were observed in ZIP code 55414 over the 10-year interval, compared with 293 expected. Among females, 215 new cancers were observed, compared with 245 expected. These estimates fall within the range of the statistical method used to assess them; the observed numbers are not considered to differ from the numbers expected.

In males the observed number of cancer cases did not differ from the expected for any of the 14 specific cancer types. In females, the number of observed cancers was not higher than expected for any of the 16 specific cancer types, and was lower than expected for thyroid cancer and non-Hodgkin lymphoma.

These results should provide some assurance that cancer rates in this community are not unusually high. Based on comparison with cancer rates in the seven-county Metro area, cancer rates in the Como community were not higher than expected.

Table 1. Observed vs. expected cancer occurrence in males; ZIP Code 55414, 2001-2010.

Cancer	Observed Cases [a]	Expected Cases [b]	Observed to Expected Ratio	95% Confidence Interval of Ratio [c]	Observed differs from Expected
All cancers combined	271	292.7	0.93	0.82, 1.04	No
Specific cancer types					
Prostate	74	81.7	0.91	0.71, 1.14	No
Lung	33	29.9	1.10	0.76, 1.55	No
Colorectal	23	24.1	0.96	0.61, 1.43	No
Bladder	16	16.9	0.95	0.54, 1.54	No
Non-Hodgkin Lymphoma	15	15.0	1.00	0.56, 1.65	No
Kidney	13	10.5	1.24	0.66, 2.12	No
Melanoma	11	14.9	0.74	0.37, 1.32	No
Leukemia	9	12.0	0.75	0.34, 1.42	No
Esophagus and stomach	9	7.5	1.20	0.55, 2.27	No
Pancreas	8	5.4	1.50	0.65, 2.94	No
Brain	8	5.9	1.36	0.59, 2.67	No
Oral	5	8.7	0.57	0.19, 1.34	No
Liver	3	3.7	0.81	0.17, 2.35	No
Thyroid	2	4.3	0.47	0.06, 1.69	No

a Number of newly-diagnosed cancer cases among Zip code 55414 residents, recorded in the Minnesota Cancer Surveillance System (MCSS).
b Number of new cancer cases expected, based on age and population of zip code 55414 and Metro area.
c Range of plausible estimates of the observed-to-expected ratio (If this interval includes 1.0 the observed and expected numbers are considered not to differ statistically.)

Guide to interpretation of observed vs. expected cancer occurrence in Tables 1 and 2

As described above, MCSS staff compared the number of observed cancer cases with a statistically modeled estimate of the number of cancer cases that would be expected, if rates were similar as those in the seven-county Metro area (Table 1 and 2). The same results are also presented visually in Appendix Figures 1 and 2.

Epidemiologists make the comparison by calculating the ratio of observed-to-expected cancer cases and a statistical measure called the "95% confidence interval" for that ratio. If the observed-to-expected ratio is sufficiently less than 1.0, the interpretation is that fewer cases were observed than were expected. If the observed-to-expected ratio is sufficiently greater than 1.0, the interpretation is that more cases were observed than were expected. The 95% confidence interval of the ratio is used to determine the statistical significance of the differences. The 95% confidence interval is a range of plausible estimates of the ratio, taking the variability of cancer occurrence into account. If the 95% confidence interval does not include 1.0, the number of observed cases is considered to differ from the expected number; if the 95% confidence interval includes 1.0 the observed cases are not considered to differ.

Table 2. Observed vs. expected cancer occurrence in females; ZIP Code 55414, 2001-2010.

Cancer	Observed Cases [a]	Expected Cases [b]	Observed to Expected Ratio	95% Confidence Interval of Ratio [c]	Observed differs from Expected
All cancers combined	215	244.6	0.88	0.77, 1.00	No
Specific cancer types					
Breast	68	67.2	1.01	0.79, 1.28	No
Colorectal	22	20.1	1.10	0.69, 1.66	No
Lung	21	26.1	0.80	0.50, 1.23	No
Uterus	13	13.9	0.94	0.50, 1.60	No
Melanoma	8	15.8	0.51	0.22, 1.00	No
Ovary	7	7.9	0.88	0.35, 1.82	No
Pancreas	6	4.5	1.34	0.49, 2.91	No
Thyroid	6	13.7	0.44	0.16, 0.95	Yes [d]
Kidney	5	5.1	0.98	0.32, 2.27	No
Bladder	5	5.2	0.97	0.31, 2.26	No
Non-Hodgkin Lymphoma	4	10.7	0.37	0.10, 0.96	Yes [d]
Leukemia	4	7.4	0.54	0.15, 1.39	No
Oral	4	4.5	0.89	0.24, 2.29	No
Brain	3	3.7	0.82	0.17, 2.39	No
Liver	3	1.6	1.91	0.39, 5.57	No
Esophagus and stomach	2	2.9	0.70	0.08, 2.51	No

a Number of newly-diagnosed cancer cases among ZIP code 55414 residents, recorded in the MCSS.
b Number of new cancer cases expected, based on age and population of zip code 55414 and Metro area.
c Range of plausible estimates of the observed-to-expected ratio (If this interval includes 1.0 the observed and expected numbers are considered not to differ statistically.)
d The numbers of observed newly-diagnosed cancer were statistically lower than the expected number of cancers

Strengths

1. The Minnesota Cancer Surveillance System (MCSS) systematically and comprehensively records new cancers occurring within the state of Minnesota. The most recent estimate is that 99.7 percent of all newly-diagnosed cancers in Minnesota residents are ascertained by the MCSS. This high level of completeness provides assurance that the complete picture of cancer occurrence is known and included in this report.

2. Staff has balanced the need to evaluate a relatively small geographic area (the Minneapolis Como neighborhood) with the need to identify enough cancer cases to obtain fairly statistically stable results.

3. MCSS staff applied a standard epidemiologic method to evaluate whether cancer occurrence in a given place and time is less than, not different than, or higher than expected, based on comparison with cancer occurrence in a reference population. The analyses incorporate statistical adjustment to account for differences in age between residents of the 55414 ZIP code area, and that of the greater Twin Cities metro population.

4. These analyses include cancer by specific type (14 cancer types for males and 16 for females) in addition to evaluating all cancers combined.

Limitations

1. Cancer rates in small populations are highly variable over geographic area and time, particularly for individual types of cancer. This limits the conclusions that can be drawn from the results.

2. The population of this community is very young and transient; e.g., census data indicate that a low percent of people lived in the same location five years previously; which further limits the conclusions that can be drawn from the analyses.

3. The estimates of expected cases are based only on the age and gender distribution of the population of interest. The rates do not take into account other risk factors for cancer such as smoking, diet, reproductive history, family history, exposures to occupational or environmental agents, sunlight, etc. More information on established risk factors for specific cancers can be found in Chapter III, *Cancer in Minnesota, 1988 – 2009, Report to the Minnesota Legislature 2013* (www.health.state.mn.us/divs/hpcd/cdee/mcss).

4. While this analysis should provide some reassurance that cancer rates in this community are not unusual, this analysis of cancer rates does not specifically address potential health risks from environmental contaminants.

Appendix: Table results presented in figures

The observed-to-expected ratios and their confidence intervals, from Tables 1 and 2, are presented below, formatted as figures.

Figure 1: Observed vs. expected cancer occurrence in males; ZIP Code 55414, 2001-2010

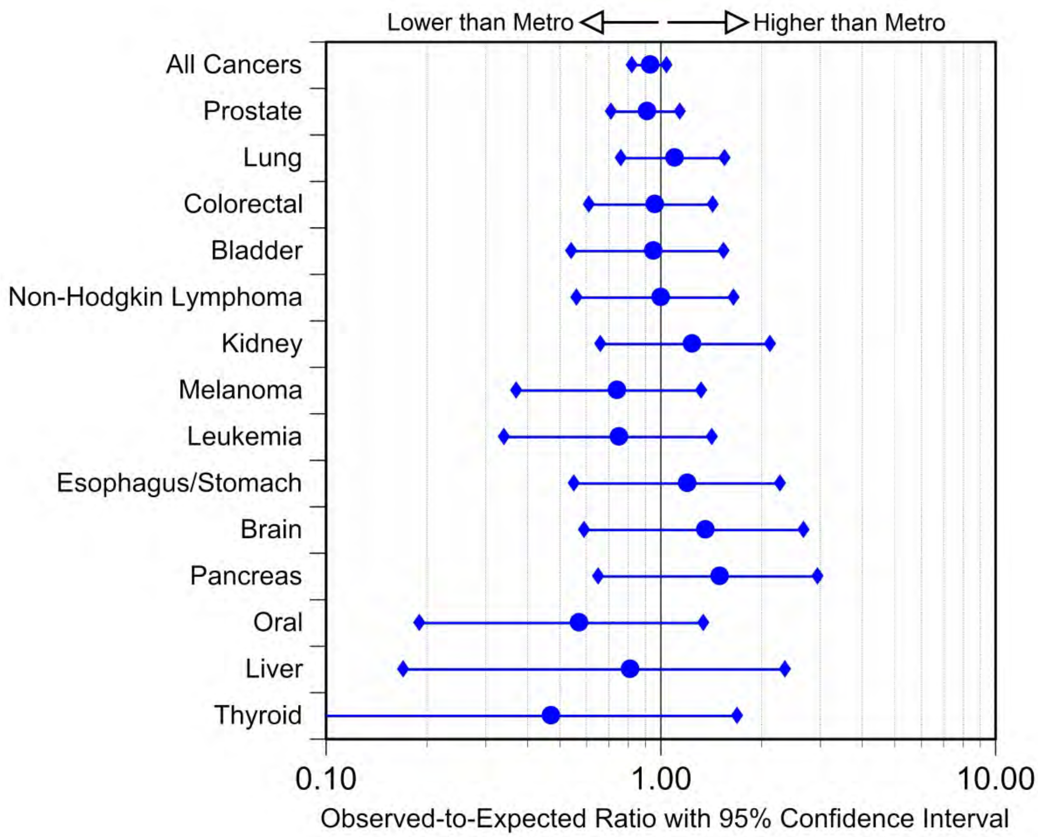
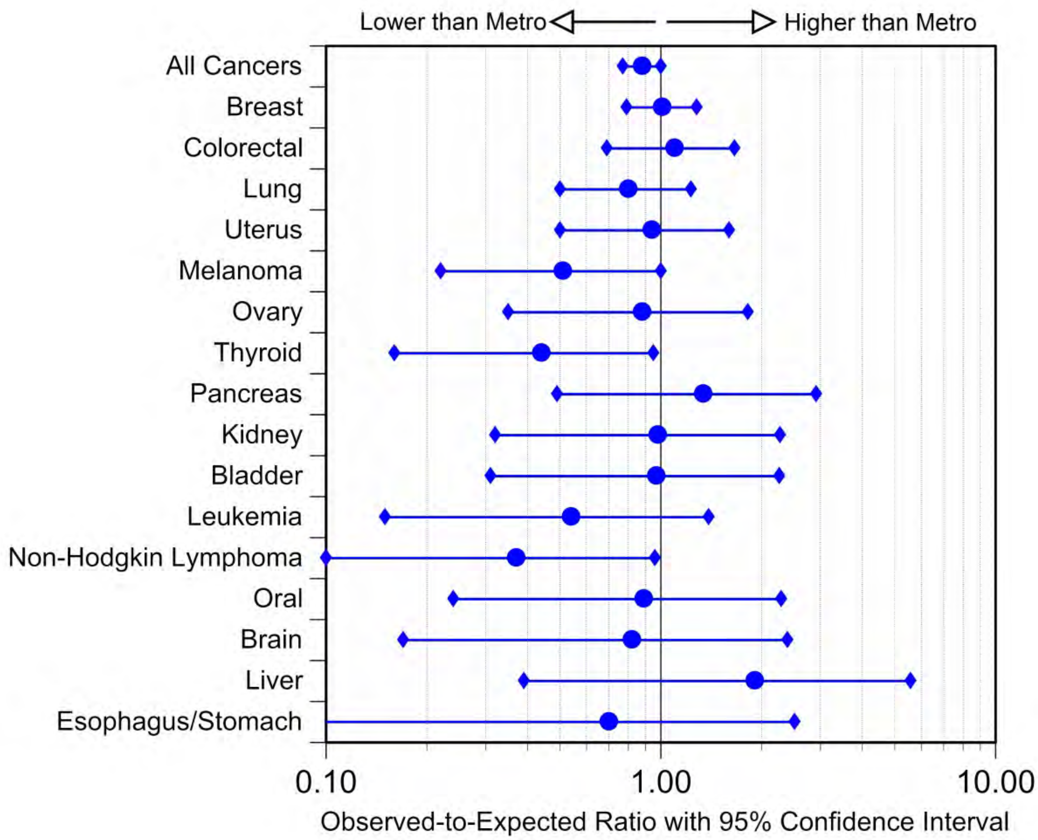


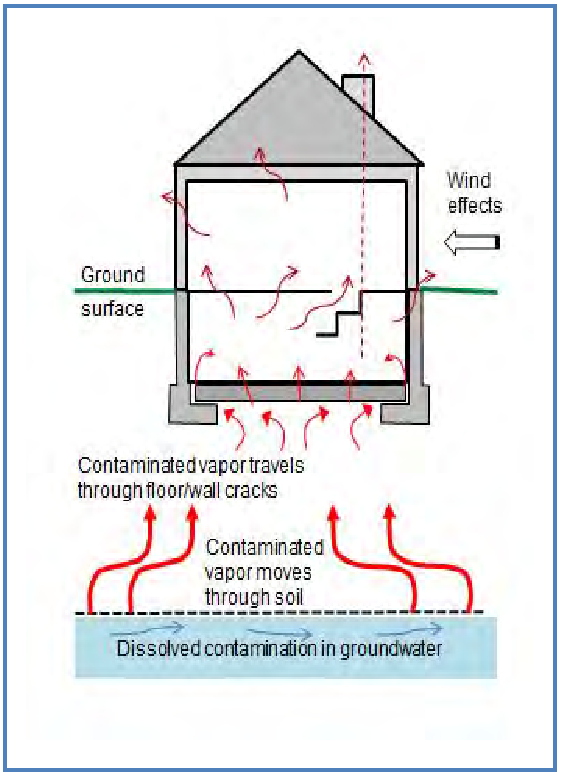
Figure 2: Observed vs. expected cancer occurrence in females; ZIP Code 55414, 2001-2010



Trichloroethylene (TCE) and Vapor Intrusion

TCE is…

- a nonflammable, colorless liquid commonly used in industry to degrease metal parts.
- a chemical that may also be found in household products such as wood finishes, adhesives, paint removers, lubricants, and cleaners.
- a common environmental contaminant that dissolves in water and readily evaporates from soil and water into air.



What are the health concerns with TCE?

- The US Environmental Protection Agency (EPA) recently concluded that TCE poses a potential human health hazard for toxicity to the central nervous system, kidney, liver, immune system, male reproductive system, and developing fetus. The most sensitive health effects are to the immune system and the developing fetus.
- TCE is a carcinogen. Long term exposures to TCE can increase the risk of kidney cancer in humans. There is also evidence that TCE exposure can increase the risk for non-Hodgkin's lymphoma and liver cancer.

What is TCE vapor intrusion?

TCE that has been spilled or dumped on the ground can pollute soil and groundwater. TCE can evaporate from the polluted soil and groundwater and rise toward the ground surface. If these TCE vapors come to a basement as they travel to the surface, they may enter through cracks in the foundation, around pipes, or through a sump or drain system. In this way, the vapors enter buildings and contaminate indoor air. This process, when pollution moves from air spaces in soil to indoor air, is called vapor intrusion.

What happens if vapor intrusion is suspected?

Anytime TCE is in soil or groundwater, there could be vapor intrusion into nearby buildings. Officials begin an investigation by collecting soil, groundwater and soil gas samples to look for the presence and amount of TCE. If TCE is present near buildings, it may be necessary to collect samples of soil gas beneath the slab or in indoor air. Sub-slab samples are collected by drilling a small hole into the building slab in order to collect a sample of the soil gas underneath the home or building. Indoor air samples are typically collected over 24 hours using specialized canisters.

Many factors influence whether vapor intrusion into indoor air will occur: these include weather or season, type of building construction, ventilation and levels of TCE in groundwater and soil gas. If TCE is found in soil gas beneath a building above levels of concern but is not detected in indoor air, it lessens the concern that vapor intrusion is occurring, but does not eliminate it. On the other hand, if TCE is found in indoor air (especially in the basement), of a building situated above where elevated TCE in soil gas or groundwater is located, vapor intrusion may be occurring. However, TCE can come from other sources within the building

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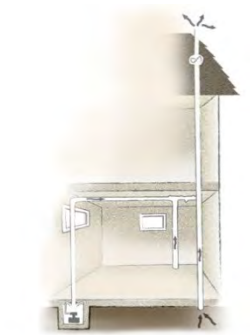
including household products. As a result of multiple factors that can influence the presence of TCE in indoor air, more than one test may be necessary to determine the likelihood of TCE vapor intrusion.

What amount of TCE in the air should I be concerned about?

- Based on a recent US EPA TCE toxicological review, the MPCA has concluded that a concentration of TCE in indoor air of 2 micrograms per cubic meter (µg/m^3) will be protective for immune system effects and for effects to the developing fetus. MDH agrees that this is a protective value and has concluded that this value is also protective of cancer and other health effects. There may be some increased health risk for the most highly exposed and sensitive individuals above 2 µg/m^3.
- At these low levels, there is no odor to warn people that contaminants are in the air.
- The level of concern for TCE in soil vapor below the house is 20 µg/m^3 and higher.
- Sampling for TCE vapors is the best way to know if TCE is present. However, concentrations can change significantly with time so sample results may not be representative of future concentrations.

How can I lower my contact with TCE in indoor air?



Radon Mitigation System

If soil and groundwater contamination is found at a site, some sort of cleanup or remedial action may be required. This could involve digging up and removing contaminated soil, installing a soil vapor extraction (SVE) system, or pumping out and treating the contaminated groundwater. Any of these actions should help reduce vapor intrusion. If chemical vapors are found in indoor air at levels that might affect people's health, it may be necessary to install a system to direct vapors away from indoor air. These systems are the same systems installed to keep radon, a naturally occurring radioactive gas, from entering homes. They direct the vapors that collect underneath the foundation to the outside air. They are relatively inexpensive to operate, simple to design and install, and are a proven solution to radon and vapor intrusion problems. Usually, when the contamination is the result of a spill or leak, the responsible party or a government agency pays for the installation.

Contact with questions or for more information:

For questions about this information sheet, contact the Site Assessment and Consultation Unit at (651) 201-4897 or (800) 657-3908. Send email to health.hazard@state.mn.us or visit the website at http://www.health.state.mn.us/divs/eh/hazardous/index.html

For Indoor Air questions, information about installing a radon mitigation system or testing for radon, contact the Indoor Air Unit at (651) 201-4601 or (800) 798-9050. Visit our website at http://www.health.state.mn.us/

This information sheet was prepared with partial support from the federal Agency for Toxic Substances and Disease Registry (ATSDR). This statement does not imply that ATSDR has endorsed this information sheet.

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Appendix J

Trichloroethylene (TCE): Screening Values & Measurement

TCE Air Screening Values

MDH and MPCA have chosen to use a **residential** Intrusion Screening Value (ISV) of 2 µg/m^3 of TCE in indoor air as a level above which actions should be taken on site to reduce exposure. A concentration of 2 µg/m^3 is considered safe to breathe every day for a lifetime, even for potentially sensitive populations, such as young children or pregnant women.

- This value was developed by the U.S. Environmental Protection Agency in 2011. The number is based on a review of all TCE studies, both animal and human, and choosing studies that show impacts at the lowest doses. Two rodent studies were chosen as the basis for the screening value - one showed an increased risk of subtle immune system impacts (decreased thymus weight) and the other fetal heart malformations when exposed to TCE at certain doses.
- This data is used to develop values (that are much lower than used in the studies) that are not expected to adversely impact people.
- Breathing levels above this level does not mean that health effects will occur.

Applying **occupational** exposure duration to this screening value (less hours per day exposed) results in an MPCA industrial ISV of 6 µg/m^3.

Regarding other occupational standards for TCE in the workplace:

The *Occupational Safety and Health Administration's (OSHA)* Permissible Exposure Limits (PELs) are standards developed to protect workers against the health effects of exposure to hazardous substances. However, they are neither intended nor recommended for protecting the general population. They are calculated to be protective of a healthy working male population that is exposed to chemicals on a five-work day per week basis. Many of the PELs have not been updated at OSHA since the 1970s.

In addition to OSHA levels, the *American Conference of Governmental Industrial Hygienists (ACGIH)* have a Threshold Limit Value, and the *National Institute for Occupational Safety and Health (NIOSH)* have a Recommended Exposure Limit for TCE in the workplace.

MDH does not use these values to describe health risk, because they are too high to be protective of the general population.

Concentrations of air contaminants and TCE values:

Concentrations of air contaminants are often measured in microgram per meter cubed (µg/m^3), in parts per million (ppm) or parts per billion (ppb). One ppb of TCE is equivalent to 5.4 µg/m^3 (1 ppb =5.4 µg/m^3) and one ppm of TCE is equivalent to 1000 ppb (1ppm =1000ppb).

The table below describes values that are used to determine health risk from various sources:

Source	TCE in µg/m³	TCE in ppb	TCE in ppm
Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit (1967)	540,000	100,000	100
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (2006)	54,000	10,000	10
National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (1994)	135,000	25,000	25
MPCA Industrial Intrusion Screening Value (ISV)(2013)	6	1.1	0.001
MPCA Residential Intrusion Screening Value (ISV) (used at the site) (2013)	**2**	**0.37**	**0.00037**

Estimating TCE in Air:

Sub-slab soil gas samples taken as part of the General Mills site investigation provide data on the concentration of TCE in the soil gas below the foundation of the home at the time of the sample. **These concentrations are not what are expected to be in the air in the home.**

Vapor movement into a home can be influenced by a number of factors, including:

- Weather (atmospheric pressure changes)
- Building depressurization due to use of exhaust fans or heating units
- Home foundation type and physical condition of the foundation (cracks and conduits)
- Ventilation
- Soil properties
- Contaminant characteristics

Therefore individual homes can vary significantly in their susceptibility to vapor intrusion. Concentrations in indoor air can also vary over time because of seasonal differences in ventilation, heating and cooling, and differences in the sub-slab soil gas concentrations over time underneath a home.

Dilution also occurs as vapors mix with indoor air. We use an "attenuation factor" to help us predict what the concentration may be in the indoor air. Currently we are using a very protective attenuation factor for site action – that one-tenth of what is in the soil gas below a home will be found in the air inside of the home. It is likely that less than one-tenth will be found in the home. EPA reported much greater attenuation in homes when they looked at data from numerous sites across the country. Instead of an attenuation factor of one-tenth, or 0.1, they found that the median factor for homes was 0.003 and the 95th percentile was 0.03.

An example of the use of these attenuation factors to predict what may be in indoor air is described below:

Potential Basement Air Concentration

Concentration of TCE in sub-slab (µg/m^3)	**Attenuation Factor of 0.1 (used at the site)**	Attenuation Factor of 0.03 (95th percentile, EPA, 2012)*	Attenuation Factor of 0.003 (median, EPA, 2012)*
15,000	**1,500**	450	45
3,000	**300**	90	9
500	**50**	15	1.5
20	**2**	0.6	0.06

*There are limitations to EPA's database, foremost a relatively high percentage of the total data pairings come from a small group of sites which are located primarily in the eastern and western part of the U.S.

When concentrations are found below the sub-slab of a home above 20 µg/m^3, mitigation is recommended, even though resulting concentrations in the home may be much lower than the safe screening value of 2 µg/m^3. This helps to ensure protection over time, by accounting for potential variability in concentrations over time.

Should I get a medical test to determine if I have been exposed to TCE?

MDH does not recommend medical testing for TCE at sites where vapor intrusion may be occurring because occupational medical tests aren't likely to detect TCE or its metabolites. Instead, if environmental sampling indicates vapor intrusion may be occurring, MDH recommends installation of a vapor mitigation system to reduce or eliminate exposure.

Occupational exposures to TCE may be 100 to a few thousand times higher than environmental or residential soil vapor exposures. Medical testing is available to characterize occupational exposures. Exposure to larger amounts is assessed by blood and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene.

It is unlikely that the laboratory will be able to detect TCE or its metabolites in urine or blood at concentrations people may be exposed to from vapor intrusion.