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May 28, 2009

Mr. Todd Richardson (3HS32)
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Subject: Final Trip Report for Jay-Cee Cleaners Site
February 2009 Sampling Event
EPA Contract No. EP-S3-05-02
Technical Direction Document No. E33-020-08-07-024
Document Tracking No. 0711

Dear Mr. Richardson:

Tetra Tech EM Inc. (Tetra Tech) is submitting the final trip report for the Jay-Cee Cleaners site summarizing residential well sampling activities conducted at the site in February 2009. If you have any questions regarding this report, please contact me by phone at (215) 651-4022 or via electronic mail at jordan.vaughn@ttemi.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Vaughn', written in a cursive style.

Jordan Vaughn
Project Manager

Enclosure(s)

cc: TDD File

**FINAL TRIP REPORT
FOR THE
JAY-CEE CLEANERS SITE
FEBRUARY 2009 SAMPLING EVENT
NELSONIA, ACCOMACK COUNTY, VIRGINIA**

Prepared for

U.S. Environmental Protection Agency Region 3
1650 Arch Street
Philadelphia, Pennsylvania 19103

Submitted by

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EPA Contract No. EP-S3-05-02

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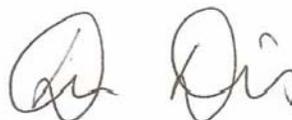
May 28, 2009

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Approved by



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CONTENTS

<u>Section</u>	<u>Page</u>
1.0 INTRODUCTION	1
2.0 BACKGROUND	1
2.1 SITE LOCATION	1
2.2 SITE DESCRIPTION	1
2.3 PREVIOUS SITE INVESTIGATIONS	3
3.0 SITE GEOLOGY AND HYDROGEOLOGY	5
3.1 GEOLOGY	5
3.2 HYDROGEOLOGY	6
4.0 SITE ACTIVITIES	7
4.1 RESIDENTIAL WELL SAMPLING	7
4.2 SAMPLE MANAGEMENT	8
5.0 ANALYTICAL RESULTS	10
6.0 CONCLUSIONS AND RECOMMENDATIONS	10
REFERENCES	11

Appendix

- A. Logbook Notes
- B. February 2009 Residential Well Results

Attachment

Validated Analytical Results

FIGURES

<u>Figure</u>	<u>Page</u>
1 SITE LOCATION MAP	2
2 SITE LAYOUT MAP	4
3 SAMPLING LOCATION MAP	9

TABLES

<u>Table</u>	<u>Page</u>
1 February 2009 Residential Well Sampling Summary	8

1.0 INTRODUCTION

Under Eastern Area Superfund Technical Assessment and Response Team (START) Contract No. EP-S3-05-02, Technical Direction Document (TDD) No. E33-020-08-07-024, U.S. Environmental Protection Agency (EPA) Region 3 tasked Tetra Tech EM Inc. (Tetra Tech) to assist with assessment activities at the Jay-Cee Cleaners site (site) in Nelsonia, Accomack County, Virginia. The purpose of the investigation is to determine whether residential wells near the site have been impacted by hazardous substances released from the site.

This trip report provides site background information in Section 2.0, reviews geology and hydrogeology of the site in Section 3.0, describes site activities in Section 4.0, summarizes analytical results in Section 5.0, and provides conclusions and recommendations in Section 6.0. References are provided after the text.

2.0 BACKGROUND

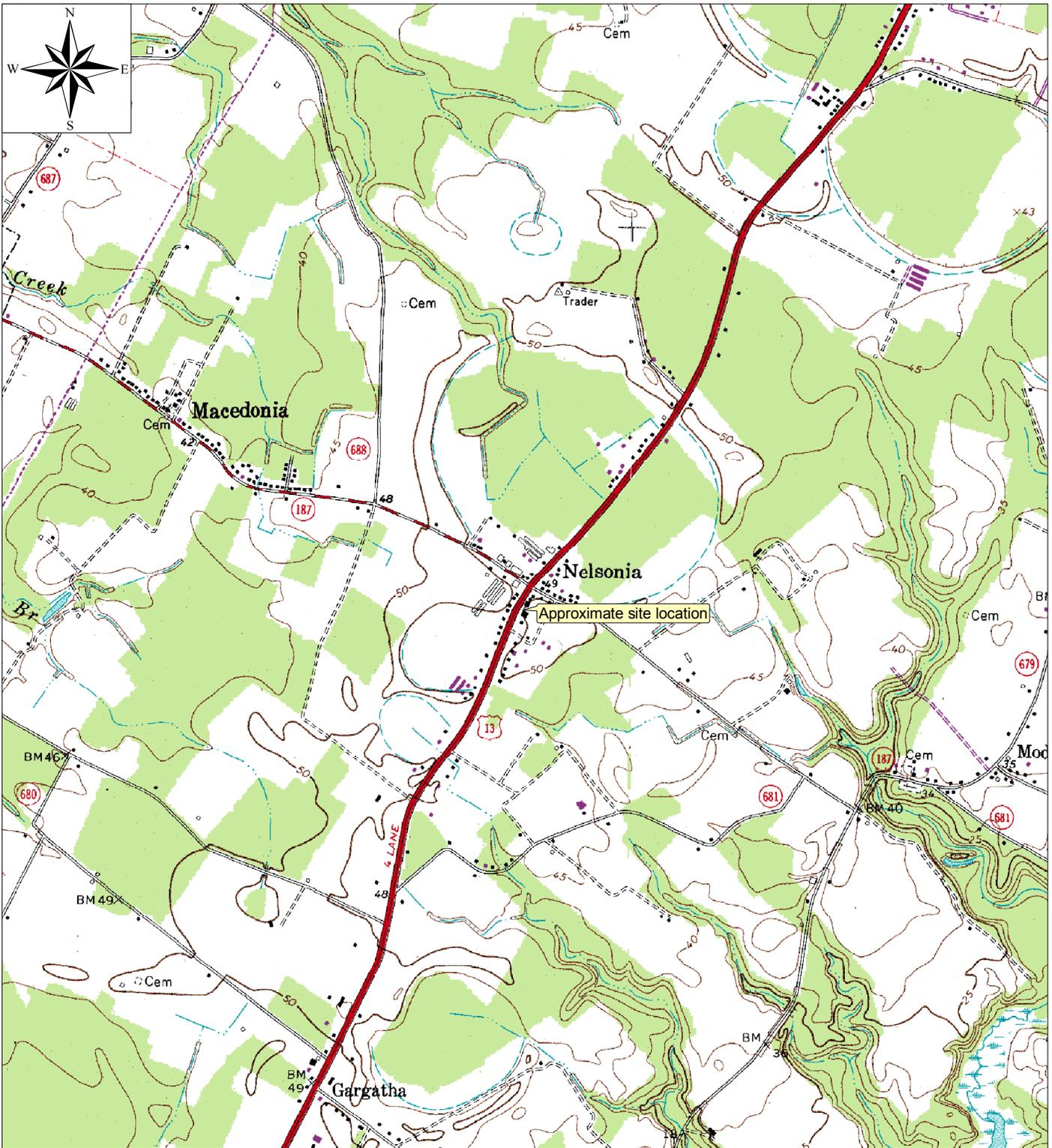
This section provides background information on the site, including its location, description, and history of site activities and investigations.

2.1 SITE LOCATION

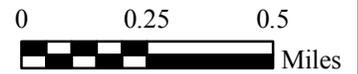
The site is located at 16163 Lankford Highway, approximately 300 feet south of the intersection of Lankford Highway (US Route 13) and Nelsonia Road (State Road 187), in Nelsonia, Accomack County, Virginia, as shown in Figure 1, Site Location Map. The geographic coordinates of the approximate center of the site are 37.8186 north latitude and 75.5883 west longitude (U.S. Geological Survey [USGS] 1965).

2.2 SITE DESCRIPTION

The site covers approximately 1.1 acre of land with an approximately 3,000-square-foot, single-story structure located at the center of the site (ECS Mid-Atlantic, LLC [ECS] 2007). A dry cleaning business operated on the site from approximately 1957 to 2003 (ECS 2007). A retail store operated from the on-site building during 2008. Currently, the single-story structure is



Source: Modified from USGS 7.5-Minute Series Topographic Quadrangle; Bloxom, Virginia



Quadrangle Location = ■



Jay-Cee Cleaners Site
Nelsonia, Accomack County, Virginia

Figure 1
Site Location Map

TDD No. E33-020-08-07-024
EPA Contract No. EP-S3-05-02

Map created on November 19, 2007
by D. Call, Tetra Tech EM Inc.



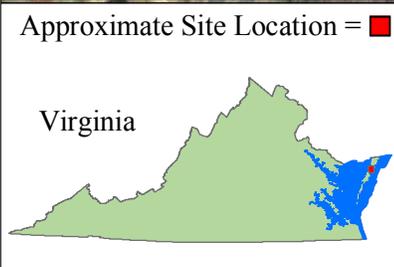
vacant. The site is located approximately 50 feet above mean sea level and slopes gently towards the southwest (USGS 1965).

The site is located in a mixed commercial and residential area. Nearby commercial properties include the Royal Farm convenience store and gas station located immediately northeast of the site, and Complete Auto vehicle maintenance and repair shop located immediately south of the site. Nearby residential properties are located along Lankford Highway (U.S. Route 13), Nelsonia Road (State Route 187), and Leigh Street. The surrounding area includes additional residential and agricultural properties and woodland areas. Figure 2, Site Layout Map, shows the location of Jay-Cee Cleaners, streets and roadways bordering the site, and nearby commercial properties (State of Virginia 2005).

2.3 PREVIOUS SITE INVESTIGATIONS

In April 2007, ECS completed a Phase II environmental site assessment (ESA) for the Jay-Cee Cleaners property. During the ESA, 11 soil borings were completed to maximum depths ranging from 4.0 and 8.0 feet below ground surface (bgs) at various locations of concern throughout the site. Soil samples were collected from three of the borings and analyzed for volatile organic compounds (VOC); groundwater samples were collected from two of the borings and also analyzed for VOCs. No soil or groundwater samples were collected from the remaining borings. Soil sample analytical results showed elevated concentrations of tetrachloroethene (PCE) and several PCE-related compounds, including trichloroethene (TCE) and *cis*-1,2-dichloroethene (*cis*-1,2-DCE). The maximum concentrations of PCE, TCE, and *cis*-1,2-DCE found in the soil samples were 9,200,000 micrograms per kilogram ($\mu\text{g}/\text{kg}$), 100,000 $\mu\text{g}/\text{kg}$, and 36,000 $\mu\text{g}/\text{kg}$, respectively. Groundwater sample results also showed elevated concentrations of PCE, TCE, and *cis*-1,2-DCE. Maximum concentrations of PCE, TCE, and *cis*-1,2-DCE found in groundwater samples were 100,000 micrograms per liter ($\mu\text{g}/\text{L}$), 6,300 $\mu\text{g}/\text{L}$, and 52,000 $\mu\text{g}/\text{L}$, respectively.

Following completion and review of the ESA, the Virginia Department of Environmental Quality (VDEQ) was notified of the elevated VOC concentrations. VDEQ then notified EPA of the elevated concentrations. In September 2007, EPA tasked Tetra Tech with collecting residential



Jay-Cee Cleaners Site
Nelsonia, Accomack County, Virginia

Figure 2
Site Layout Map

TDD No. E33-020-08-07-024
EPA Contract No. EP-S3-05-02

Map created on November 19, 2007
by D. Call, Tetra Tech EM Inc.



well samples from nearby residences for VOC analysis. In October 2007, Tetra Tech collected residential well samples from seven residential properties located near the site. All samples were analyzed for VOCs. Analytical results indicated trace amounts of PCE and/or TCE in two of the residential wells. The maximum concentrations of PCE and TCE detected in the residential wells were 0.6 µg/L and 0.06 µg/L, respectively. In April 2008, Tetra Tech collected a second round of groundwater samples from six of the seven properties sampled in 2007. The samples were analyzed for VOCs. PCE, TCE and *cis*-1,2-DCE were not detected in residential wells during the April 2008 sampling event. Also in April 2008, Tetra Tech collected 11 soil and 11 shallow groundwater samples from the site. The soil and shallow groundwater samples were analyzed for VOCs. Analytical results indicated that soil samples collected from monitoring points at the site contained VOCs, including PCE, TCE, and *cis*-1,2-DCE. The maximum concentrations of PCE, TCE, and *cis*-1,2-DCE detected in soil were 130,000 µg/kg, 50,000 µg/kg, and 5,100 µg/kg, respectively. Analytical results indicated that shallow groundwater samples collected from monitoring points contained VOCs, including PCE, TCE, and *cis*-1,2-DCE. The maximum concentrations of PCE, TCE, and *cis*-1,2-DCE detected in shallow groundwater were 94,000 µg/L, 6,400 µg/L, and 5,000 µg/L, respectively. In July 2008, Tetra Tech conducted a third round of groundwater sampling from all seven properties sampled in 2007. The samples were analyzed for VOCs. PCE was detected at trace amounts (0.30 µg/L) in one of the residential wells.

3.0 SITE GEOLOGY AND HYDROGEOLOGY

This section discusses the local geology and hydrogeology at the site.

3.1 GEOLOGY

The site is located in the Coastal Plain physiographic province of Virginia (Bailey 1999). The Virginia Coastal Plain consists of a wedge of generally unconsolidated Jurassic and younger sediments increasing in thickness from less than 1 foot in the east where the Coastal Plain borders the Piedmont physiographic province to more than 6,000 feet beneath the northeastern part of the Eastern Shore Peninsula (Meng and Harsh 1988). The sediments consist of Jurassic and Cretaceous clay, sand, and gravel overlain by a thin sequence of Tertiary marine sands

overlain by Quaternary sand, mud, and gravel (Bailey 1999). In Virginia, the Coastal Plain is dissected by the Chesapeake Bay, which was created approximately 5,000 to 6,000 years ago when the lower course of the Susquehanna River was flooded by rising sea level (Hobbs 2004).

The site is directly underlain by Quaternary Columbia Group sediments (Cedarstrom 1957). The sediments can generally be characterized as unconsolidated fining-upwards depositional sequences of gravels, sands, and silts and clays (Meng and Harsh 1988). The sediments were deposited in fluvial-deltaic and estuarine settings similar to those that exist in the modern Chesapeake Bay and its tidal tributaries (Meng and Harsh 1988, Bailey 1999).

3.2 HYDROGEOLOGY

Sediments of the Coastal Plain physiographic province are classified into a series of 19 hydrogeologic units designated as aquifers or confining zones (Meng and Harsh 1988, McFarland and Bruce 2006). The uppermost aquifer is the unconfined surficial aquifer (also called the Columbia aquifer), which is composed of unconsolidated interbedded gravels, sands, and silts and clays (Meng and Harsh 1988, McFarland and Bruce 2006). The surficial aquifer is moderately to widely utilized for private domestic wells (McFarland and Bruce 2006). The aquifer is principally recharged by precipitation infiltration. Due to the stratified nature of the sediments, horizontal hydraulic conductivity is generally greater than vertical hydraulic conductivity, and most of the unconfined groundwater flows relatively short distances before discharging to nearby streams and water bodies (McFarland and Bruce 2006). A small amount, however, reaches deeper, confined aquifers. In the area of Jay-Cee Cleaners, the surficial aquifer is underlain by the Yorktown confining zone (Meng and Harsh 1988, McFarland and Bruce 2006). It consists of finer grained sediments and is generally tens of feet thick (McFarland and Bruce 2006). The Yorktown confining zone is underlain by the Yorktown-Eastover aquifer, which is composed of thick to massively bedded shelly sands and lesser clay intervals (Meng and Harsh 1988, McFarland and Bruce 2006). The Yorktown-Eastover aquifer is used for both commercial and private domestic water supply wells.

Commercial well logs recorded in the vicinity of the site and described by Meng and Harsh indicate that the surficial aquifer near the site extends from ground surface to between 64 and 66

feet bgs (Meng and Harsh 1988). The well logs indicate that the Yorktown confining zone is between 60 and 74 feet thick (from between 64 and 66 feet bgs to between 124 and 140 feet bgs). The described wells are completed in the Yorktown-Eastover aquifer and, based on well total depths, indicate that the aquifer extends from the base of the Yorktown confining zone to greater than 340 feet bgs.

A domestic well log completed by Boggs Water & Sewage for a residence located approximately 500 feet from the site indicates that “top soil” and “sand” (likely belonging to the surficial aquifer) extend from ground surface to 60 feet bgs. The well log indicates that “sand clay” and “clay” (likely belonging to the Yorktown confining zone) extend from 60 to 215 feet bgs. The well is completed in “sand gravel shell” (likely the Yorktown-Eastover aquifer), which is described as extending from the base of the confining zone to greater than 235 feet bgs (the total depth of the well) (Boggs Water & Sewer 1999).

Shallow borings completed at the site as part of the April 2008 sampling event encountered surficial groundwater at between 6.40 and 11.13 feet bgs. Depth to water measurements collected from monitoring points during the April 2008 sampling event indicate that surficial groundwater flows to the southeast (Tetra Tech 2008a).

4.0 SITE ACTIVITIES

Tetra Tech conducted residential well sampling activities at the Jay-Cee Cleaners site in February 2009. This section describes residential well sampling activities and sample management procedures conducted as part of the sampling event. Tetra Tech documented site activities in accordance with Tetra Tech Standard Operating Procedure (SOP) No. 024-1, “Recording of Notes in Field Logbook” (Tetra Tech 1999b). Field logbook notes are provided in Appendix A.

4.1 RESIDENTIAL WELL SAMPLING

On February 6, 2009, Tetra Tech and EPA mobilized to the site to sample residential wells located on Lankford Highway, Nelsonia Road, and Lehigh Street near the Jay-Cee Cleaners site. Three of the seven residential wells sampled during the October 2007, April 2008, and July 2008

sampling events were resampled during this February 2009 sampling event. The remaining four properties were either vacant or no one was home at the time of sampling and the outside spigot was turned off, therefore preventing sample collection. Residential well sampling locations are shown in Figure 3, Sampling Location Map.

Tetra Tech collected a total of six samples, including one duplicate sample, one trip blank, and one field blank. All residential well samples were collected from outside sources prior to any treatment systems. All water systems were purged by Tetra Tech for a minimum of 15 minutes prior to sampling. Table 1 summarizes the samples collected during the February 2009 residential well sampling activities, including sample identifiers, laboratory identifiers, matrices, sampling dates and times, analyses, and additional comments.

**TABLE 1
FEBRUARY 2009 RESIDENTIAL WELL SAMPLING SUMMARY**

Sample Identifier	Laboratory Identifier	Sample Matrix	Sample Date	Collection Time	Analysis	Comments
JCC-TB	C0606	Water	2/6/2009	9:19	VOC	Trip blank
JCC-RW-01	C0602	Water	2/6/2009	10:02	VOC	
JCC-RW-02	C0603	Water	2/6/2009	10:12	VOC	MS/MSD
JCC-RW-06	C0604	Water	2/6/2009	10:20	VOC	
JCC-RW-08	C0605	Water	2/6/2009	10:07	VOC	Duplicate of JCC-RW-01
JCC-FB	C0601	Water	2/6/2009	10:25	VOC	Field Blank

Notes:

MS/MSD = Matrix spike/matrix spike duplicate

VOC = Volatile organic compounds

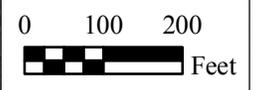
4.2 SAMPLE MANAGEMENT

Samples were handled and packaged in accordance with the Tetra Tech SOP No. 019-6, “Packaging and Shipping Samples” (Tetra Tech 2008c) and with the Tetra Tech “Quality Assurance Project Plan (QAPP) for START” (Tetra Tech 2006). All shipping containers were properly labeled with EPA custody seals and were delivered with signed chain-of-custody forms and appropriate hazard warnings for laboratory personnel. Samples were shipped to Mitkem Corporation (Mitkem) in Warwick, Rhode Island under EPA’s Contract Laboratory Program (CLP) No. 38233 for VOC analysis on February 6, 2009.



Legend

● Sampling location



Approximate Site Location = ■

Virginia

Jay-Cee Cleaners Site
 Nelsonia, Accomack County, Virginia

Figure 3
 Sampling Location Map

TDD No. E33-020-08-07-024
 EPA Contract No. EP-S3-05-02

Map created on November 19, 2007
 by D. Call, Tetra Tech EM Inc.



5.0 ANALYTICAL RESULTS

This section summarizes analytical results for the groundwater samples collected during the Jay-Cee Cleaners site February 2009 sampling event.

All samples were analyzed by Mitkem in Warwick, Rhode Island. Data were qualified as part of laboratory quality control. Tetra Tech compared the residential well analytical data to EPA maximum contaminant levels (MCL) established for public drinking water systems, EPA risk-based screening levels for tap water, and EPA emergency removal guidelines (ERG) for tap water (100 times the risk-based screening level) (EPA 2005, Oak Ridge National Laboratory [ORNL] 2008). No VOC concentrations were reported above laboratory quantitation limits or above EPA MCLs, risk-based screening levels, or ERGs.

A summary of residential well analytical results from the February 2009 sampling event is provided as Appendix B. A copy of the validated laboratory analytical results is provided as an attachment to this report.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Tetra Tech collected residential well water samples from three residential properties located near the Jay-Cee Cleaners site. Samples were analyzed for VOCs. Analytical results indicated that VOC concentrations were below laboratory quantitation limits and below EPA MCLs, risk-based screening levels, and ERGs.

Although no VOCs were detected in residential wells during this sampling event, VOCs were detected in residential wells near the site during two of the previous three sampling events. Based on the historic presence of low concentrations of VOCs in residential well water and the presence of VOCs and in the shallow soil and shallow groundwater at the site, Tetra Tech recommends (1) installing an intermediate monitoring point to determine the vertical extent of soil and groundwater contamination at the site, (2) removing contaminated soil at the site, and (3) collecting air samples from inside of the building at the site to evaluate the possible presence of interior VOC vapors as outlined in the trip report summarizing the April 2008 sampling event at the site (Tetra Tech 2008).

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