

**Pinellas Environmental Restoration Project**

**Building 100  
Off-Site Plume Delineation  
South of Bryan Dairy Road**

**Data Report for  
Rally Stores Property**

**November 2010**



U.S. DEPARTMENT OF  
**ENERGY**

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Management

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## Executive Summary

Plume delineation work was conducted on the property owned by Rally Stores, Inc located at 10980 Belcher Road on August 16–30, 2010. This property is located across Bryan Dairy Road immediately south of the Building 100 Area at the Young - Rainey Science Technology and Research Center. A direct-push drill rig was used to collect groundwater samples from 19 temporary locations near the western and southern property boundaries. At each location, groundwater samples were collected from depth intervals approximately every 4 feet (ft) starting at 8 ft below land surface (bls) and continuing to the bottom of the surficial aquifer at about 32–36 ft bls. A total of 147 groundwater samples were collected.

The results from analysis of the groundwater samples clearly demonstrated that the contaminant plume extends onto the property at 10980 Belcher Road.

- Vinyl chloride exceeded its 1 microgram per liter ( $\mu\text{g/L}$ ) cleanup target level (CTL) at 14 of the 19 locations (maximum concentration of 69  $\mu\text{g/L}$ ),
- *cis*-1,2-dichloroethene exceeded its 70  $\mu\text{g/L}$  CTL at 2 of 19 locations (maximum concentration of 470  $\mu\text{g/L}$ ),
- 1,1-dichloroethene exceeded its 7  $\mu\text{g/L}$  CTL at one location (maximum concentration of 34  $\mu\text{g/L}$ ), and
- Methylene chloride exceeded its 5  $\mu\text{g/L}$  CTL at 2 of 19 locations (maximum concentration of 15  $\mu\text{g/L}$ ).

The contaminant plume enters the 10980 Belcher Road property on the western side and extends southeastward (in the direction of groundwater flow) to the southern property boundary. A small amount of additional delineation should be conducted to determine the northeastward extent of the plume on this property.

Based on the data from this investigation, it appears likely that the contaminant plume extends south onto the property owned by Better Business Forms at 10950 Belcher Road. Therefore, additional plume delineation should be conducted on that property. The additional delineation is described in this document.

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## 1.0 Introduction

This document reports the results of plume delineation work on the property owned by Rally Stores, Inc located at 10980 Belcher Road on August 16–30, 2010 (Figure 1).

The contaminant plume was first discovered beyond the Young - Rainey Science, Technology, and Research Center (STAR Center) property in March 2008 when concentrations exceeding cleanup target levels (CTLs) were measured in monitoring well PIN12-0552 located on the right-of-way for Bryan Dairy Road. Additional plume delineation demonstrated that the plume was located farther south on 8040 Bryan Dairy Road in October 2009. The magnitude of contaminant concentrations, combined with the groundwater flow direction (southeast), suggested that the plume could extend onto 10980 Belcher Road. The *Work Plan for Building 100 Area Off-Site Plume Delineation South of Bryan Dairy Road* (DOE 2010) describes three phases of off-site plume delineation. This data report presents the results of Phase I of the delineation.

## 2.0 Sampling Methodology

The plume delineation work was conducted with a direct-push (Geoprobe) drill rig using a Waterloo Profiler to collect groundwater samples from 19 temporary sampling point locations along the western and southern property boundaries (Figure 2). Sampling points along the western boundary were spaced approximately 20 feet (ft) apart and sampling points along the southern boundary were spaced approximately 30 ft apart.

At each location, groundwater samples were collected approximately every 4 ft depth interval starting at 8 ft below land surface (bls) and continuing to the bottom of the surficial aquifer at about 32–36 ft bls. A total of 147 groundwater samples were collected, including 9 duplicate samples. In addition, 10 equipment blanks and 6 trip blanks were collected.

All groundwater samples were collected using the procedures defined in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. At each sampling interval, groundwater was purged through the Waterloo Profiler with a peristaltic pump. Standard field parameters (such as pH and dissolved oxygen) were measured, and purging continued until the parameters had stabilized. Once stabilization was obtained, a groundwater sample was collected. The process was then repeated at the next sampling interval. All samples were analyzed for volatile organic compounds by TestAmerica-Denver using U.S. Environmental Protection Agency SW-846 Method 8260b.

## 3.0 Results of Plume Delineation Phase I

The results for analytes with concentrations that exceeded their CTLs are listed in Table 1. Several other analytes were detected at concentrations that did not exceed their CTLs; these data are summarized in Table 2. The lab reports are included as Appendix A.

Vinyl chloride (VC) exceeded its 1 microgram per liter ( $\mu\text{g/L}$ ) CTL at 14 of the 19 locations (maximum concentration of 69  $\mu\text{g/L}$ ), *cis*-1,2-dichloroethene (cDCE) exceeded its 70  $\mu\text{g/L}$  CTL

at 2 of 19 locations (maximum concentration of 470 µg/L), and 1,1-dichloroethene exceeded its 7 µg/L CTL at one location (maximum concentration of 34 µg/L) (Table 1).

The VC plume enters the 10980 Belcher Road property on the eastern side and extends southeastward (in the direction of groundwater flow) to the southern property boundary. This plume is continuous with the contaminant plume that extends off the STAR Center property, across Bryan Dairy Road, and onto 8040 Bryan Dairy Road (Figure 2).

Collection of groundwater samples at every 4-ft vertical interval from near the top of the water table to the bottom of the surficial aquifer resulted in very good definition of the vertical extent of the plume. The contaminant plume (as defined by CTL exceedances) is limited to the deep surficial aquifer (below 20 ft bls), although cDCE was detected in the upper surficial aquifer at a few locations at very low concentrations. At almost every location, the highest contaminant concentrations were found at 28 ft bls. When the concentrations at 28 ft bls were relatively high, contaminants generally were detected in the next sample above 28 ft bls and the next sample below 28 ft bls. A cross-section of the VC plume is shown in Figure 3.

In addition to the VC and DCE data discussed above, methylene chloride was detected in excess of its 5 µg/L CTL at RS16 and RS17, locations that are just outside the VC plume (Table 1; Figure 4).

During Phase I sampling, it was observed that a low-permeability layer exists at about 20 ft bls. Water yield from this interval typically was lower than shallower or deeper samples, and at two locations, RS11 and RS17, it was not possible to collect a groundwater sample from the 19–21 ft bls interval. This low-permeability layer most likely divides the shallow surficial aquifer from the deep surficial aquifer. When permanent wells are installed in this general area, the wells should not be screened across this 20 ft bls interval, and instead should be screened above and below this interval (e.g., 10–19 ft bls and 21–30 ft bls).

## **4.0 Plume Delineation Phase II**

This section discusses additional plume delineation that should be conducted at 10980 Belcher Road and 10950 Belcher Road.

### **4.1 Additional Investigation at 10980 Belcher Road**

At 10980 Belcher Road, six additional temporary sampling locations are necessary to confirm the northeastern boundary of the plume. The points are shown on Figure 5. These two lines of three points each will define the plume boundary between the two lines of Phase I sampling points.

At each point, a direct push rig will be used to collect groundwater samples at eight depths in the surficial aquifer. A Waterloo Profiler will be used to collect the samples because all eight samples can be collected during a single push, resulting in a considerable cost savings relative to conventional direct push well-point sampling. The eight samples will be collected at 4 ft intervals, starting at approximately 8 ft bls, near the top of the saturated zone, to approximately 36 ft bls, at the base of the surficial aquifer. This approach is identical to that used in Phase I.

After the results from the Phase II groundwater investigation are reviewed, 3 or 4 permanent continuous multichannel tubing (CMT) monitoring wells will be installed at locations that will define the plume on this property. Each CMT well will have three channels that are screened at approximately 10–19, 21–30, and 32–41 ft bls intervals in the surficial aquifer.

## **4.2 Investigation at 10950 Belcher Road**

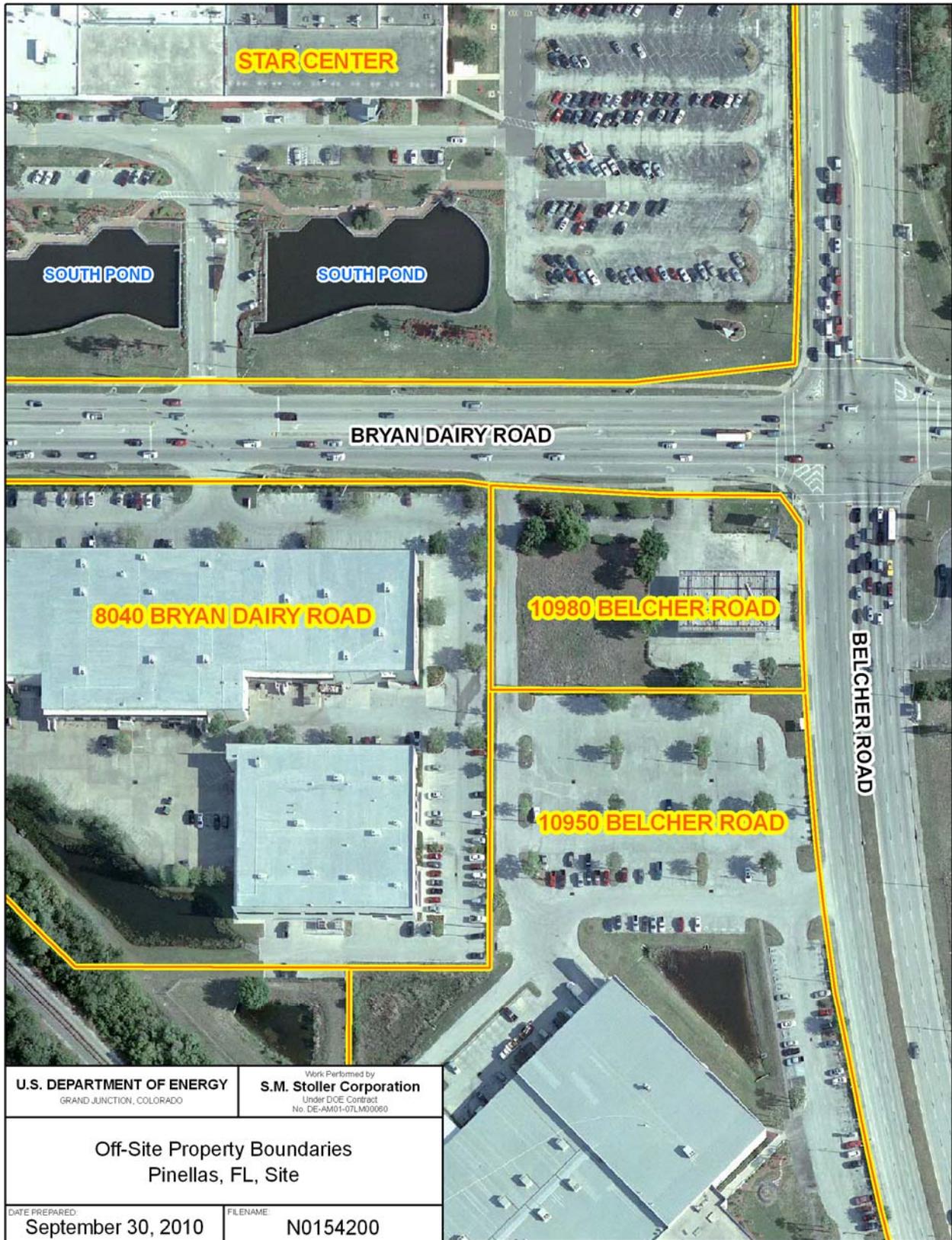
The results of the Phase I plume delineation imply that VC could exceed its CTL on the northern section of the adjacent property at 10950 Belcher Road.

CMT wells 12-0564 and -0656 (Figure 5) have been sampled four times since they were installed in May 2009. Very low concentrations of contaminants, well below CTLs, have been detected occasionally in these wells. Given the distribution of contaminants observed in the temporary sampling points at 10980 Belcher Road, it would appear that these two CMT wells bound the potential plume to the west and east but not the leading edge of the plume on 10950 Belcher Road.

A total of 19 sampling locations arranged in a modified grid configuration will be used to define the plume on this property (Figure 5). A total of 30 temporary points is allowed under the current access agreement, so 11 points will be held in reserve.

Based on the Phase I results along the southern boundary of 10980 Belcher Road, the vertical extent of the plume is limited to the deep surficial aquifer (below 20 ft bls), so samples at 10950 Belcher Road will only be collected at 20 ft bls and below. At each point, a direct push rig will advance the Waterloo sampling tool to collect groundwater samples at five depths in the surficial aquifer. The five samples will be collected at 4 ft intervals, starting at approximately 20 ft bls, near the top of the saturated zone, to approximately 36 ft bls, at the base of the surficial aquifer.

As identified on Figure 5, the plume delineation at 10950 Belcher Road will be optimized by prioritizing temporary sampling point installation and using a quick turnaround time on the analytical data for the first eight sampling points. The southern three prioritized points will be installed first, then the next three points to the north, and then the two points just south of the property line. Then the six sampling points at 10980 Belcher Road will be installed. By the time these points are installed, the data for the first set of points should be available. Then the remaining sampling points will be installed if necessary, as indicated by the results from the first eight prioritized points.



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Figure 1. Property Location Map



Figure 2. Vinyl Chloride Plume

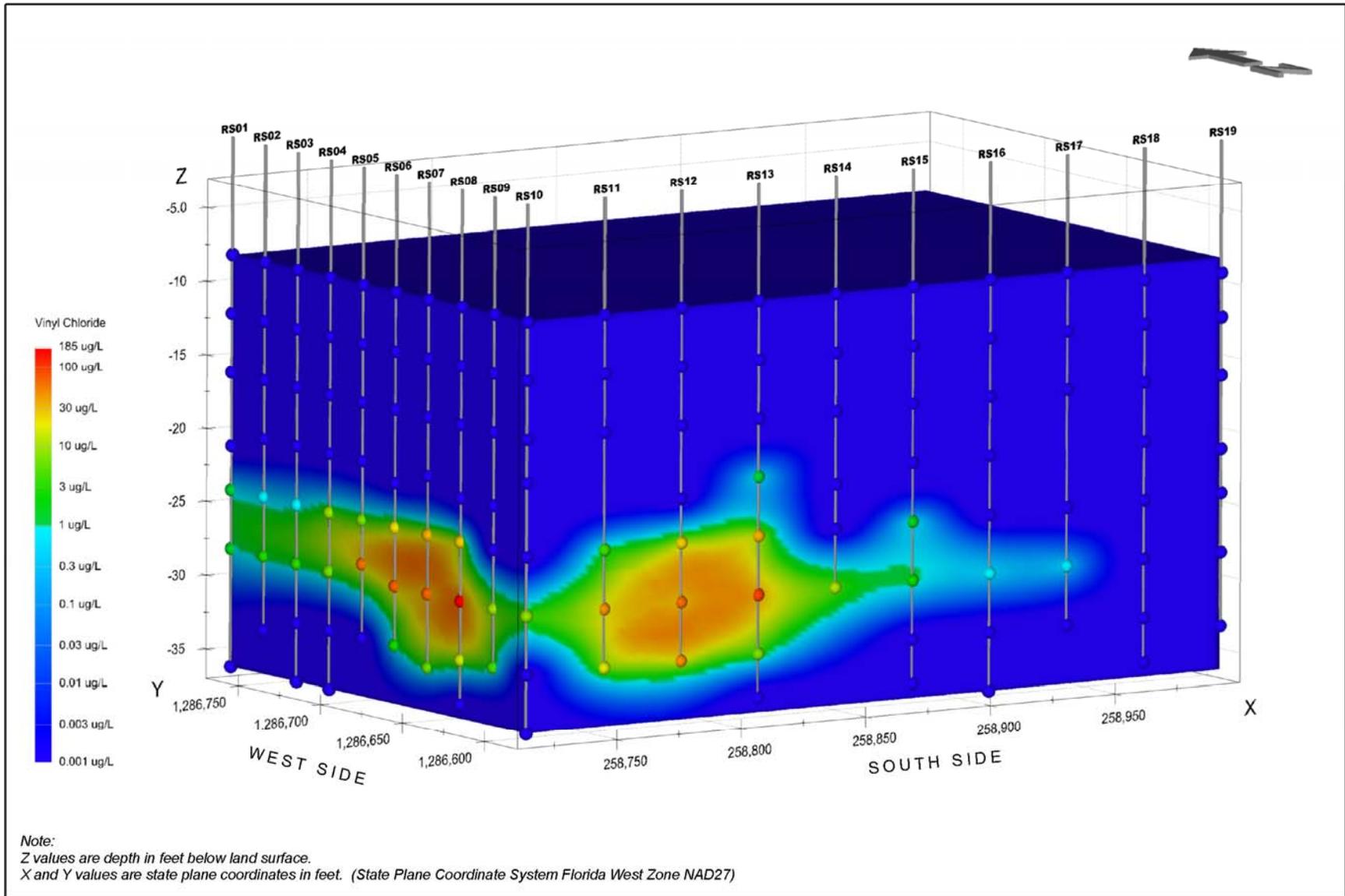


Figure 3. Vinyl Chloride Plume Cross Section

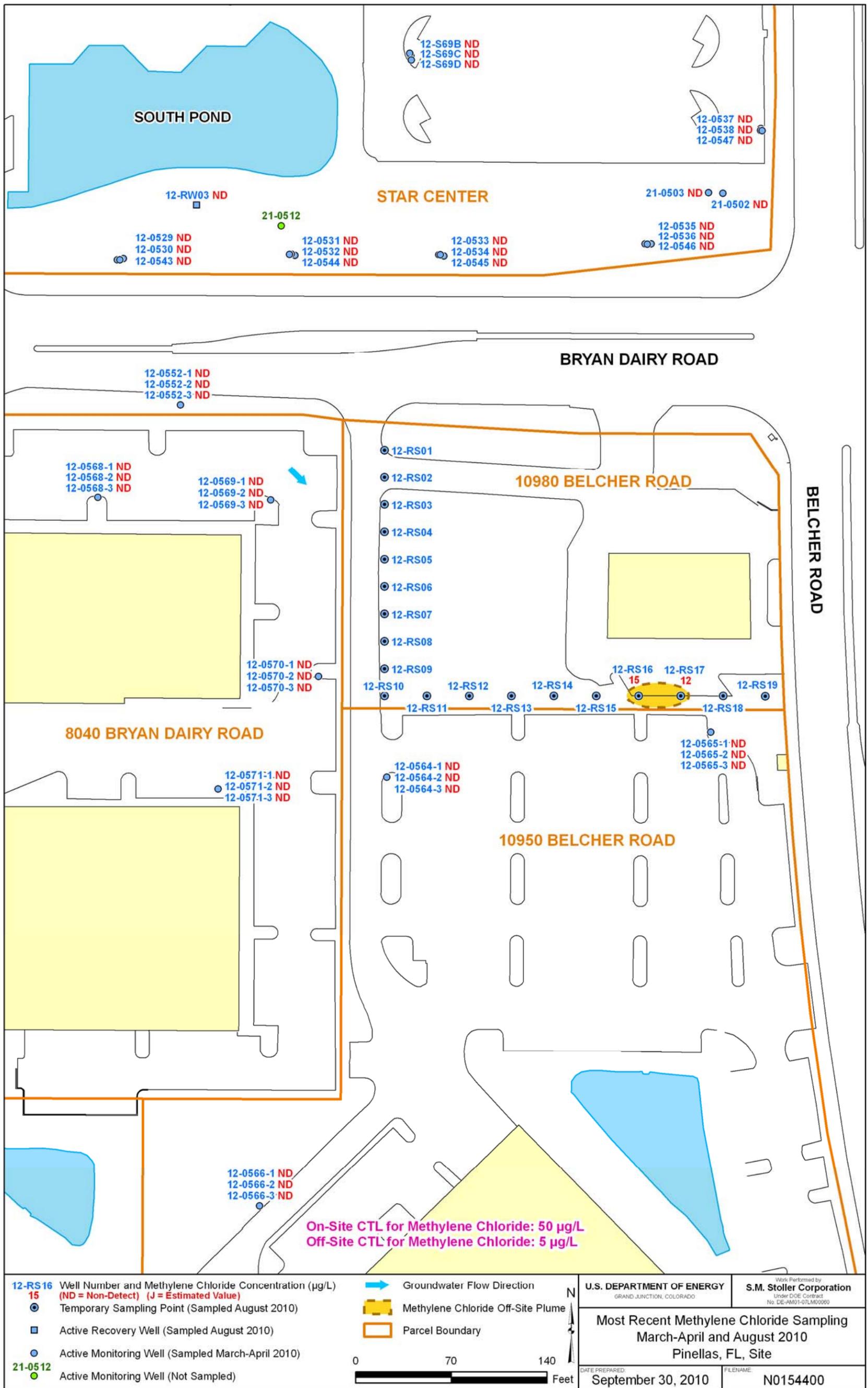


Figure 4. Methylene Chloride Plume

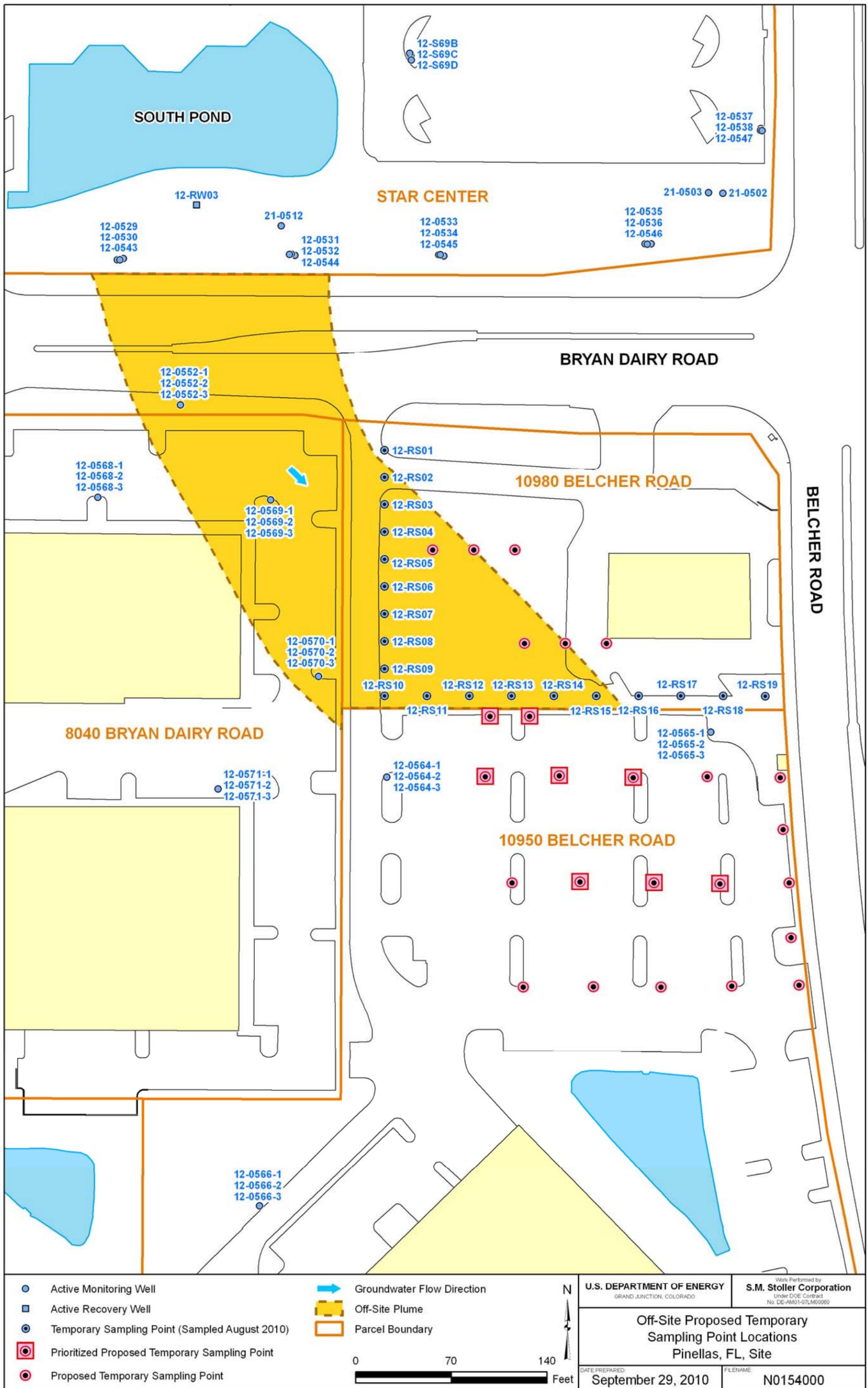


Figure 5. Proposed Temporary Sampling Points at 10980 and 10950 Belcher Road

Table 1. Results for Analytes that Exceeded CTLs  
 Concentrations in µg/L. CTL exceedances are highlighted in yellow.

Location	Depth (ft bls)	Vinyl chloride	cis-1,2- Dichloroethene	1,1-Dichloroethene	Methylene chloride
	Off-site CTL:	1	70	7	5
RS01	8	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	0.34J	<0.23	<0.32
	21	<0.4	0.41J	<0.23	<0.36J
	24	0.67J	0.57J	<0.23	<0.37J
	28	0.82J	0.71J	<0.23	<0.37J
	28 DUP	0.71J	0.66J	<0.23	<0.32
	36	<0.4	<0.15	<0.23	<0.35J
RS02	8	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	<0.15	<0.23	<0.32
	20	<0.4	0.41J	<0.23	<0.5J
	24	0.48J	0.38J	<0.23	<0.46J
	28	1.6	0.67J	<0.23	<0.42J
	28 DUP	1.3	0.62J	<0.23	<0.32
RS03	8	<0.4	<0.15	<0.23	<0.4J
	12	<0.4	0.16J	<0.23	<0.39J
	16	<0.4	<0.15	<0.23	<0.38J
	20	<0.4	0.24J	<0.23	<0.4J
	24	0.55J	0.48J	<0.23	<0.37J
	28	1.7	0.61J	<0.23	<0.45J
	32	<0.4	<0.15	<0.23	<0.32
	36	<0.4	<0.15	<0.23	<0.32
RS04	8	<0.4	<0.15	<0.23	<0.55J
	12	<0.4	0.16J	<0.23	<0.42J
	16	<0.4	<0.15	<0.23	<0.35J
	20	<0.4	0.24J	<0.23	<0.34J
	24	4.4	2.5	<0.23	<0.32
	24 DUP	3.2	2.6	<0.23	<0.32
	28	3.4	1.6	<0.23	<0.32
	32	<0.4	0.25J	<0.23	<0.34J
	36	<0.4	<0.15	<0.23	<0.34J
RS05	8	<0.4	<0.15	<0.23	<0.33J
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	<0.15	<0.23	<0.32
	20	<0.4	<0.15	<0.23	<0.32
	24	3.4	1.7	<0.23	<0.32
	27	27	21	<0.23	<0.32
	32	<0.4	0.62J	<0.23	<0.32

Table 1 (continued). Results for Analytes that Exceeded CTLs.  
Concentrations in µg/L. CTL exceedances are highlighted in yellow.

Location	Depth (ft bls)	Vinyl chloride	<i>cis</i> -1,2- Dichloroethene	1,1-Dichloroethene	Methylene chloride
	Off-site CTL:	1	70	7	5
RS06	8	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	<0.15	<0.23	<0.32
	21	<0.4	0.37J	<0.23	<0.33J
	24	9.8	6.2	<0.23	<0.32
	28	30	18	<0.23	<0.32
	28 DUP	<0.4	<0.15	<0.23	<0.32
	32	1.4	1	<0.23	<0.32
RS07	8	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.71J
	16	<0.4	<0.15	<0.23	<0.32
	20	<0.4	<0.15	<0.23	<0.32
	24	15	9.5	<0.23	<0.32
	28	29	79	3.7	<0.37J
	33	2.8	4.3	<0.23	<0.32
RS08	8	<0.4	<0.15	<0.23	<0.4J
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	<0.15	<0.23	<0.34J
	21	<0.4	1.1	<0.23	<0.41J
	24	12	21	0.8J	<0.32
	28	69	470	34	<0.32
	28 DUP	66	480	31	<0.32
	32	6.7	9	1.5	<0.32
	35	<0.4	5.4	0.88J	<0.54J
RS09	8	<0.4	<0.15	<0.23	<0.34J
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	0.15J	<0.23	<0.32
	21	<0.4	<0.15	<0.23	<0.32
	24	<0.4	1.3	<0.23	<0.46J
	28	4.9	2.7	<0.23	<0.32
	32	2.1	<0.15	<0.23	<0.32
RS10	8	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	0.23J	<0.23	<0.32
	19	<0.4	<0.15	<0.23	<0.32
	24	<0.4	0.2J	<0.23	<0.35J
	28	4.1	0.29J	<0.23	<0.41J
	28 DUP	4.8	0.28J	<0.23	<0.32
	32	<0.4	<0.15	<0.23	<0.52J
	36	<0.4	<0.15	<0.23	<0.51J

Table 1 (continued). Results for Analytes that Exceeded CTLs.  
Concentrations in µg/L. CTL exceedances are highlighted in yellow.

Location	Depth (ft bls)	Vinyl chloride	<i>cis</i> -1,2- Dichloroethene	1,1-Dichloroethene	Methylene chloride
	Off-site CTL:	1	70	7	5
RS11	8	<0.4	<0.15	<0.23	<0.58J
	12	<0.4	<0.15	<0.23	<0.41J
	16	<0.4	<0.15	<0.23	<0.39J
	24	2	0.67J	<0.23	<0.4J
	28	20	35	1.7	<0.32
	32	7.8	1.5	<0.23	<0.36J
RS12	8	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	<0.15	<0.23	<0.32
	21	<1.6	0.94J	<0.92	<1.3
	24	12	7.2	<0.23	<0.32
	28	27	18	<0.46	<0.64
	28 DUP	32	20	<0.23	<0.32
	32	20	7.3	<0.92	<1.3
RS13	8	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	<0.15	<0.23	<0.32
	20	0.62J	0.42J	<0.23	<0.32
	24	15	12	<0.23	<0.32
	28	38	29	<0.23	<0.32
	32	3.5	0.87J	<0.23	<0.32
	35	<0.4	<0.15	<0.23	<0.32
RS14	8	<0.4	<0.15	<0.23	<0.32
	12	<1.6	<0.6	<0.92	<1.3
	16	<0.4	<0.15	<0.23	<0.32
	21	<1.6	<0.6	<0.92	<1.3
	24	<1.6	<0.6	<0.92	<1.3
	28	5.1	2.6J	<0.92	<1.3
	28 DUP	5.3	2.4J	<0.92	<1.3
RS15	8	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	<0.15	<0.23	<0.32
	20	<0.4	<0.15	<0.23	<0.32
	24	0.79J	0.57J	<0.23	<0.32
	28	1.3	0.95J	<0.23	<0.32
	32	<0.4	0.63J	<0.23	<0.32
	35	<0.4	<0.15	<0.23	<0.32

Table 1 (continued). Results for Analytes that Exceeded CTLs.  
Concentrations in µg/L. CTL exceedances are highlighted in yellow.

Location	Depth (ft bls)	Vinyl chloride	<i>cis</i> -1,2- Dichloroethene	1,1-Dichloroethene	Methylene chloride
	Off-site CTL:	1	70	7	5
RS16	8	<0.4	<0.15	<0.23	<0.76J
	12	<0.4	<0.15	<0.23	<0.79J
	16	<0.4	<0.15	<0.23	<0.77J
	20	<1.6	<0.6	<0.92	15
	24	<1.6	<0.6	<0.92	12
	28	<1.6	<0.6	<0.92	12
	28 DUP	0.52J	0.75J	<0.23	<0.32
	32	<1.6	<0.6	<0.92	8.2
	36	<1.6	<0.6	<0.92	5.3
RS17	8	<0.4	<0.15	<0.23	<0.72J
	12	<0.4	<0.15	<0.23	<0.82J
	16	<1.6	<0.6	<0.92	12
	24	<1.6	<0.6	<0.92	8.3
	28	0.45J	0.93J	<0.23	<0.51J
	32	<0.4	0.41J	<0.23	<0.32
RS18	9	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	<0.15	<0.23	<0.32
	20	<0.4	<0.15	<0.23	<0.32
	24	<0.4	0.48J	<0.23	<0.32
	28	<0.4	0.75J	<0.23	<0.32
	28 DUP	<0.4	<0.15	<0.23	<0.32
	32	<0.4	<0.15	<0.23	<0.32
	35	<0.4	<0.15	<0.23	<0.32
RS19	9	<0.4	<0.15	<0.23	<0.32
	12	<0.4	<0.15	<0.23	<0.32
	16	<0.4	<0.15	<0.23	<0.32
	21	<0.4	<0.15	<0.23	<0.32
	24	<0.4	<0.15	<0.23	<0.32
	28	<0.4	<0.15	<0.23	<0.32
	33	<0.4	<0.15	<0.23	<0.32

"<" values are detection limits

J = Estimated value

DUP = duplicate sample

ft bls = feet below land surface

Table 2. Summary of Data for Other Detected Analytes

Detected Analyte	Maximum Detected Concentration (µg/L)	Cleanup Target Level (µg/L)
1,1-Dichloroethane	0.88	70
1,2,4-Trimethylbenzene	0.63	10
1,3-Dichlorobenzene	0.65	210
2-Butanone	2.1	4,200
Acetone	17	6,300
Chloroform	0.19	70
Chloromethane	0.67	2.7
Ethylbenzene	0.44	700
Toluene	0.94	1,000
Total Xylenes	1.4	10,000
<i>trans</i> -1,2-Dichloroethene	6.3	100
Trichloroethene	0.17	3

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