

Pinellas Environmental Restoration Project

Site Rehabilitation Completion Report with No Further Action Proposal for the 4.5 Acre Site

June 2019



U.S. DEPARTMENT OF
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Abbreviations

bls	below land surface
cDCE	<i>cis</i> -1,2-dichloroethene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	contaminant of potential concern
CTL	cleanup target level
DOE	U.S. Department of Energy
EVO	emulsified vegetable oil
FAC	<i>Florida Administrative Code</i>
FDEP	Florida Department of Environmental Protection
ft	feet
IWNF	Industrial Waste Neutralization Facility
LDA	large-diameter auger
LTS&M Plan	<i>Long-Term Surveillance and Maintenance Plan for the Pinellas Site</i>
µg/L	micrograms per liter
NFA	No Further Action without Controls
RBCA	risk-based corrective action
RCRA	Resource Conservation and Recovery Act
RMO	Risk Management Option
SRCR	site rehabilitation completion report
STAR Center	Young - Rainey Science, Technology, and Research Center
TCE	trichloroethene
TCOPC	total COPCs
tDCE	<i>trans</i> -1,2-dichloroethene
USGS	U.S. Geological Survey
VC	vinyl chloride
VOC	volatile organic compound

1.0 Introduction

1.1 Purpose

The purpose of this Site Rehabilitation Completion Report (SRCR) is to demonstrate that site cleanup objectives are achieved at the 4.5 Acre Site and to propose that the site meets the requirements of the Florida Department of Environmental Protection (FDEP) Risk Based Corrective Action (RBCA) regulation for the Risk Management Option (RMO) I, No Further Action without Controls (NFA) status. This report includes a summary of the site description and background, hydrogeology, remediation history, post active remediation monitoring results, sampling procedure, and the RMO I requirements, and a report summary. This report was prepared in accordance with Chapter 62-780, *Florida Administrative Code*, Section 62-780.680(1) for RMO I. The proposal for NFA is based on a demonstration that the requirements of FAC 62-780.680(1) are met as follows: (a) free product is not present, (b) contaminated soil is not present in the unsaturated zone, (c) contaminated groundwater is not present, (d) contaminated surface water is not present, and (e) contaminated sediment is not present. This document includes information required by FAC 62-780.750(4)(d) and 62-780.750(6).

1.2 Site Location and Description

The Young - Rainey Science, Technology, and Research (STAR) Center is a former U.S. Department of Energy (DOE) facility constructed in the mid-1950s. The 99-acre STAR Center is located in Largo, Florida (Figure 1). The 4.5 Acre Site is located adjacent to the northwest property boundary of the STAR Center (Figure 2).

1.3 Site Background

The 4.5 Acre Site was a part of the former DOE Pinellas Plant and is located to the west of the current STAR Center property (Figure 2). The 4.5 Acre parcel was owned by DOE from 1957 to 1972, when it was sold to a private landowner. It was then sold to a new private landowner in 2018. During the period of DOE ownership, the property was used for disposal of drums of waste resins and solvents. This practice contaminated the shallow surficial aquifer at the site. DOE subsequently remediated the 4.5 Acre Site voluntarily under a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) agreement, consistent with RBCA regulations, between DOE and FDEP. This agreement was signed in 2001 and allowed DOE to arrange access to the property until cleanup of contaminated groundwater in the surficial aquifer was complete. A detailed summary of the remediation actions at the site is provided in Section 3.0.

There are currently 17 monitoring wells at the site, 11 onsite and 6 offsite, along the CSX railroad tracks immediately west of the site. Construction details for the wells are provided in Table 1.

1.4 4.5 Acre Site Contaminants of Potential Concern

The contaminants of potential concern (COPCs) for the 4.5 Acre Site were determined in the *Historical Review and Evaluation of Contaminants of Potential Concern* (DOE 2003). The COPCs for the 4.5 Acre Site are trichloroethene (TCE), *cis*-1,2-dichloroethene (cDCE), *trans*-1,2-dichloroethene (tDCE), vinyl chloride (VC), and benzene.

2.0 Hydrogeology

The uppermost deposits at the 4.5 Acre Site are known as the surficial sediments and consist of silty-to-shelly sands that are about 28 feet (ft) thick. Depth to groundwater ranges from about 1 to 4 ft below land surface (bls), depending on the season. No municipal water supplies are obtained from the surficial aquifer due to the poor yield and poor quality of the groundwater. Underlying the surficial sediments is the Hawthorn Group. The Hawthorn Group is a clay aquitard, about 70 ft thick, that separates the surficial aquifer from the underlying upper Floridan aquifer.

The surficial aquifer at the STAR Center, including the 4.5 Acre Site, acts as a two-layer hydraulic system due mainly to horizontal-to-vertical anisotropy. Groundwater flow at the 4.5 Acre Site is generally to the northwest, west, and southwest for the shallow and deep portions of the surficial aquifer. In the southeast portion of the 4.5 Acre Site, there is a component of flow toward the southeast. Figures 3 and 4 are groundwater flow maps for the 4.5 Acre Site deep portion of the surficial aquifer during the dry season (March 2019) and the wet season (September 2018), respectively. Groundwater flow velocity in the surficial aquifer has historically been estimated at about 2 to 5 ft per year.

3.0 4.5 Acre Site Remediation History

During a 1984 investigation of past waste disposal practices at the Pinellas Plant, DOE determined that drummed waste had been buried at the 4.5 Acre Site in about 1962 (DOE 1987). In 1985, the U.S. Geological Survey (USGS) conducted an electromagnetic survey to assess whether drums were present in the subsurface at the 4.5 Acre Site, and this survey identified two areas that could contain buried metallic objects. A more detailed survey conducted in 1985 by HAZTECH using a proton magnetometer confirmed the results of the USGS study and also identified a few other small areas of potential buried metallic objects (HAZTECH 1985). A subsequent excavation by HAZTECH in June 1985 removed 83 drums from the subsurface; 34 drums were partially or completely full when removed, 16 drums were completely empty, and the remaining 33 drums were found crushed and empty (HAZTECH 1985).

Following drum removal, the first remedial action implemented at the 4.5 Acre Site was groundwater pumping, with extracted groundwater discharged directly to the STAR Center's Industrial Waste Neutralization Facility (IWNF). This system used seven recovery wells (R001 through R007) that were screened in the lower half of the surficial aquifer, starting at 15–18 ft bls and extending to near the bottom of the surficial aquifer at 25–28 ft bls. This system began operation in December 1988 but was shut down temporarily in January 1989 because contaminant concentrations in the discharged water exceeded permit limits. An air stripper was

added to the system to treat the water prior to discharge, and this system operated from May 1990 to July 1997.

This groundwater recovery system effectively decreased the extent of the contaminant plume and significantly reduced contaminant concentrations in groundwater, by orders of magnitude at many locations. The air stripper treated approximately 11,125 pounds of volatile organic compounds (VOCs) during its operation, but this amount includes an unknown but likely significant amount of VOCs in groundwater recovered from another part of the Pinellas Plant (now the STAR Center), the Northeast Site. Operation of this system was discontinued because the rate of contaminant mass recovery had decreased, and it was believed that a more aggressive remediation system was necessary to remove the remaining contaminant mass.

The second remedial action, dual-phase extraction, operated from August 1997 to August 1999. This system consisted of 22 wells that extracted groundwater and vapor from the subsurface. These wells were screened over the entire saturated thickness of the surficial aquifer, starting at approximately 5 ft bls. Each well had a vacuum extraction tube installed to approximately 22 ft bls. The system removed approximately 185 pounds of VOCs from the subsurface during the two years of operation. Operation of this system was discontinued because contaminant removal rates were lower than expected.

The third remedial action, biosparging, operated from September 1999 to May 2003. The purpose of this action was to inject air into the subsurface to convert aquifer conditions from reducing and anaerobic to oxidizing and aerobic to facilitate contaminant biodegradation. The biosparge system consisted of three horizontal wells at 24 ft bls, one through the southwestern contaminated area and two through the eastern contaminated area, connected to blowers at the surface. Biosparge performance evaluations conducted in 2002 and 2003 indicated that the system had not been effective at reducing contaminant concentrations for two primary reasons: (1) the small particle size of the aquifer matrix resulted in air channeling through preferential pathways, limiting air contact with most of the matrix, and (2) high oxygen demand in the subsurface prevented attainment of aerobic conditions within a realistic time frame. Biosparge operations were discontinued in May 2003. The three horizontal wells were abandoned in August 2005 and the entire length of each well was grouted.

The fourth remedial action was a pump-and-treat system, started in April 2004, to control the contaminant plume located near the western site boundary until a final site remedy could be determined. The system consisted of three recovery wells, each with a 20 ft screened interval, located along the western side of the site. Recovered groundwater was sent to an onsite, shallow-tray air stripper for treatment. In December 2005, FDEP approved the cessation of this action and the initiation of a 2-year monitoring period to evaluate the potential for closing the site under the State of Florida risk-based corrective action (RBCA) regulations.

Upon treatment system shutdown in December 2005, DOE began a 2-year closure monitoring program as required by FDEP to confirm the stability of the groundwater contaminant plume, in accordance with RBCA rules. Groundwater concentrations for the previous few years had shown a stable or declining trend at most monitoring locations. However, during the first year of closure monitoring, an increasing trend in levels of TCE, dichloroethene, and VC concentrations was observed in several wells and, in particular, in two wells located approximately 60 ft from the southwest property boundary.

On the basis of these results, DOE decided to conduct a detailed characterization of soil in the area of high groundwater contaminant concentrations to determine whether a contaminant source remained in the subsurface. During the summer of 2007, 1172 soil samples were collected from 138 soil borings in the areas of increasing and higher groundwater concentrations. Results from the analysis of the soil samples indicated that a source of contamination likely remained in two areas of the site.

In April 2008, DOE completed a feasibility study that evaluated the available contaminant source removal technologies. The preferred option for source removal at the 4.5 Acre Site was determined to be soil excavation using a large-diameter auger (LDA) and offsite disposal of soil (DOE 2008). In a letter dated May 17, 2008, FDEP stated “the report is acceptable for its intended purpose” and “the preferred option for source removal of soil excavation using [LDA] and offsite disposal is acceptable to the Department.” According to consultation with FDEP, the main regulatory program applicable to this remedial action (source removal) is Global RBCA as promulgated under FAC 62-780. DOE prepared an interim remedial action plan for the soil excavation in accordance with the RBCA regulations and submitted the document to FDEP in July 2008. This plan was approved on August 19, 2008. The objective of the interim remedial action was to remove the source of contamination at the site.

LDA operations commenced at the 4.5 Acre Site on March 31, 2009 and were completed on May 27, 2009. There were 221 large-diameter and 325 small-diameter borings completed. Approximately 7035 cubic yards of soil were excavated; of this total, 4464 cubic yards were removed as clean overburden and 2571 cubic yards of contaminated soil were removed, characterized for waste disposal, and disposed of as nonhazardous waste at a Resource Conservation and Recovery Act (RCRA) Subtitle D landfill. Additional information regarding the 4.5 Acre Site LDA work can be found in the *Data Report for Overburden Soil at the Northeast Site and the 4.5 Acre Site* (DOE 2009b) and the *Interim Remedial Action for Source Removal at the 4.5 Acre Site Final Report* (DOE 2009c).

As a follow-up to the LDA work, to treat the remaining dissolved-phase groundwater contamination at the site, a bioinjection was performed. For this work, emulsified vegetable (soybean) oil (EVO) and the microorganism *Dehalococcoides mccartyi* were injected into the subsurface at 95 locations in February 2010. The *Injection of Emulsified Soybean Oil at the Northeast Site and 4.5 Acre Site* (DOE 2010) describes the work performed. This project resulted in a significant decrease in contaminant mass and concentrations within and around the former contaminant source areas and downgradient from those areas.

In July 2013, DOE conducted an additional interim remedial action at the site, the second bioinjection event, to enhance biodegradation of contaminants along the southwest property boundary. The details of this bioinjection are described in the *Interim Remedial Action Plan for Emulsified Edible Oil Injection at the 4.5 Acre Site* (DOE 2013). Approximately 2300 gallons of EVO and microbes were injected at 46 locations.

A third bioinjection event was conducted at the 4.5 Acre Site in October through December 2016 in an effort to remediate the final dissolved-phase groundwater contaminant concentrations to below cleanup target levels (CTLs). The details of this bioinjection are described in the *Addendum to the Interim Corrective Measure Work Plan for Source and Plume Treatment at the Building 100 Area* (DOE 2016).

A total of approximately 37,500 gallons of injectant fluid (EVO and microbes) were injected at 125 locations. The results of post active remediation monitoring are described in Section 4.0.

4.0 Post Active Remediation Monitoring Results

The *Closure Monitoring Plan for the Northeast Site and 4.5 Acre Site* (DOE 2009a) describes the approach for post-active remediation monitoring. Additional discussion concerning the 4.5 Acre Site occurred between DOE and FDEP as the monitoring progressed.

The 4.5 Acre Site post active remediation monitoring began in August 2009 and was completed in March 2019. Five new monitoring wells (M065 through M069) were installed the week of October 23, 2009, and monitored in addition to existing wells M0502, M0503, M001, M003, M005, M015, M035, and M38D. These 13 wells were chosen for post active remediation monitoring in the *Closure Monitoring Plan for the Northeast Site and 4.5 Acre Site* (DOE 2009a).

Monitoring at the site in March 2009 identified the presence of VC offsite in monitoring well PIN20-M035. DOE reported this discovery to FDEP and to the property owner in accordance with FDEP notification requirements. The last three times this well was sampled (September 2013, March 2014, and September 2016), the VC concentration was below the CTL of 1.0 µg/L.

In September 2010, 6 additional wells along the western property boundary (M053, M056, M057, M058, M059, and M18D) were sampled in addition to the original 13 closure wells. These 19 wells were sampled semiannually through March 2013. In August 2014, DOE met with FDEP and determined that the list of closure monitoring wells should be revised to exclude the wells in the interior of the site and add wells along the southwest property boundary beginning with the September 2014 sampling. Eight wells were sampled during that event (M18D, M053, M056, M057, M058, M059, M068, and M069). For the March 2015 sampling event, DOE decided to also sample three interior wells (M001, M015, M067). These 11 onsite wells were sampled during the semiannual sampling events until the September 2016 sampling event when the 6 offsite wells (M38D, M40D, M40S, M41D, M035, and M036) to the west were also sampled.

During the March 2017 sampling event, six of the routine wells were sampled. Five wells (M001, M053, M056, M057, and M059) appeared to be impacted by the emulsified vegetable oil injected October through December 2016 and were not sampled.

In September 2017, 6 wells that no longer contained VOC detections were abandoned (M0502, M0503, M003, M005, M065, M066) and 10 of the remaining 11 onsite wells were sampled. Monitoring well M057 was not sampled because it was impacted by the bioinjection activities. In March 2018, the 11 onsite routine monitoring wells were sampled and only 1 of the wells (M069) contained VC (11 micrograms per liter [µg/L]) above the regular CTL of 1 µg/L. The six wells along the west fence line contained no VC.

With concurrence from FDEP, the monitoring sampling frequency at the 4.5 Acre Site was increased to quarterly beginning in May 2018. All onsite monitoring wells were sampled during

the quarterly sampling events; M069 was the only well to exceed a CTL (for VC). The results for the June 2018 and September 2018 sampling events for VC in M069 were 3.7 µg/L and 2.5 µg/L, respectively.

On November 8, 2018, the FDEP agreed to increase the sampling from quarterly to monthly. All onsite monitoring wells were sampled during the monthly sampling events, with the exception of wells M015, M058, and M067 in December 2018 because the concrete pads were underwater due to a heavy rain event. Monitoring well M069 was the only well to exceed a CTL. The results for the November 2018 and December 2018 sampling events for VC in M069 were 6.78 µg/L and 8 µg/L, respectively.

It was agreed with FDEP that only well M069 would be sampled in future monthly sampling events. The results for the January through March 2019 sampling events for VC in M069 were 1.9 µg/L, 1.8 µg/L, and 1.2 µg/L, respectively.

As of the March 2019 sampling event, the concentrations of all COPCs (TCE, cDCE, tDCE, VC, and benzene) had decreased to levels below the regular groundwater CTLs in all post active remediation monitoring wells. The March 2019 VC concentration at monitoring well M069 was 1.2 µg/L; that is considered below the CTL due to FDEP's rounding rule. Post active remediation monitoring results for the last five sampling events for active monitoring wells are listed in Table 2. The final total COPCs (TCOPC) and VC concentrations at each active well are shown on Figures 5 and 6, respectively. The most recent post active remediation monitoring laboratory reports which have not previously been provided to FDEP, which include January, February, and March 2019, are included as Appendix A.

Analytical results from the laboratories for COPCs and field measurements of pH, dissolved oxygen, specific conductivity, temperature, and oxidation reduction potential for all sampled wells have been reported in semiannual, quarterly, and monthly groundwater monitoring progress reports previously submitted to FDEP.

5.0 Sampling Procedure

All post active remediation monitoring samples were collected in accordance with the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351), using FDEP standard operating procedures. All monitoring wells were micropurged using a dedicated bladder pump or a peristaltic pump. Sampling was performed when the field measurements stabilized. Wells heavily impacted with EVO did not allow for the collection of a full set of field parameters. In these cases, samples were collected when turbidity, water level, and purge volume criteria were met.

6.0 Risk Management Option Level I Requirements

As stated in Section 1.0, DOE requests that the 4.5 Acre Site be approved for No Further Action without Controls (NFA) as a RMO I closure. This SRCR demonstrates that site cleanup objectives have been achieved at the site. Introduction of an NFA recommendation is based on a demonstration by the site that the requirements of FAC 62-780.680(1) are met as follows:

- (a) free product is not present, (b) contaminated soil is not present in the unsaturated zone, (c) contaminated groundwater is not present, (d) contaminated surface water is not present, and (e) contaminated sediment is not present.
- (a) Free product is not present at this site. The source of contamination was removed through excavation as discussed in Section 3.0.
- (b) Contaminated soil is not present in the unsaturated zone as all contaminated soil was removed through excavation as discussed in Section 3.0 and the following two reports: *Data Report for Overburden Soil at the Northeast Site and the 4.5 Acre Site* (DOE 2009b) and the *Interim Remedial Action for Source Removal at the 4.5 Acre Site Final Report* (DOE 2009c).
- (c) Contaminated groundwater is not present as demonstrated by the analyses of groundwater samples collected from representative sampling locations that show that groundwater contaminant concentrations do not exceed groundwater CTLs. This is detailed in Section 4.0, Table 2, and Figures 5 and 6.
- (d) Contaminated surface water is not present at the 4.5 Acre Site.
- (e) Contaminated sediment is not present at the 4.5 Acre Site.

7.0 Summary

This SRCR summarizes the 4.5 Acre Site remediation history and documents the closure groundwater monitoring conducted from August 2009 through March 2019. Reductions in COPC concentrations to below the standard CTLs in groundwater at the 4.5 Acre Site have been achieved through source removal and active groundwater remediation. The 4.5 Acre Site meets the criteria for an RMO I closure. At this time, DOE requests that a Site Rehabilitation Completion Order (SRCO) be issued for the 4.5 Acre Site granting a No Further Action without Controls closure and permission to suspend all groundwater monitoring at the site. It is also requested that *the Remediation Agreement for the Four and One-Half Acre Site in Largo, Pinellas County Florida*, be officially terminated upon abandonment of the remaining onsite monitoring wells.

8.0 References

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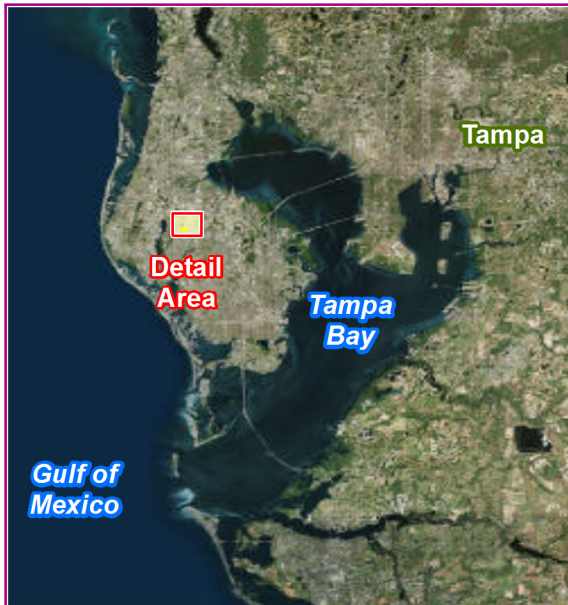
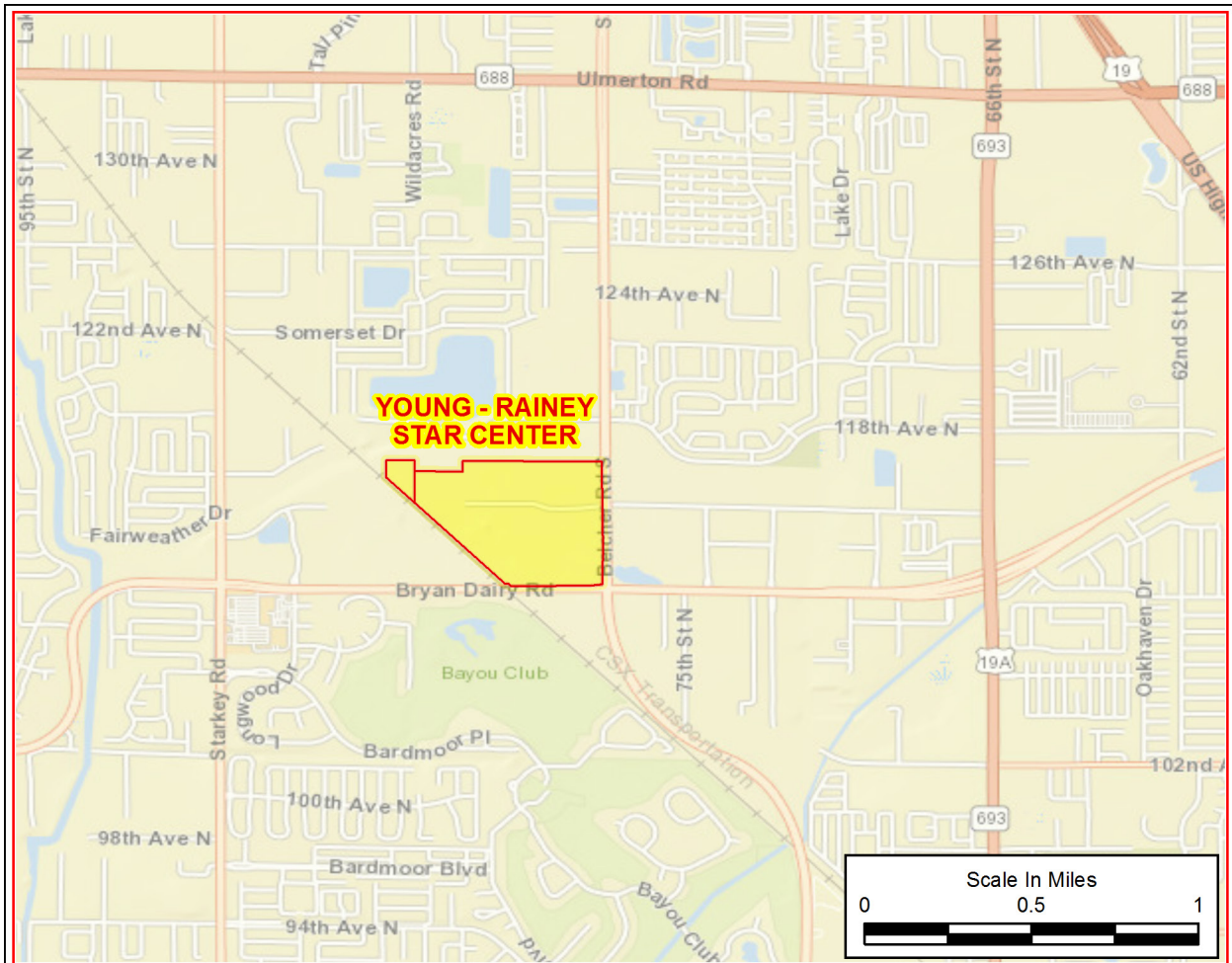
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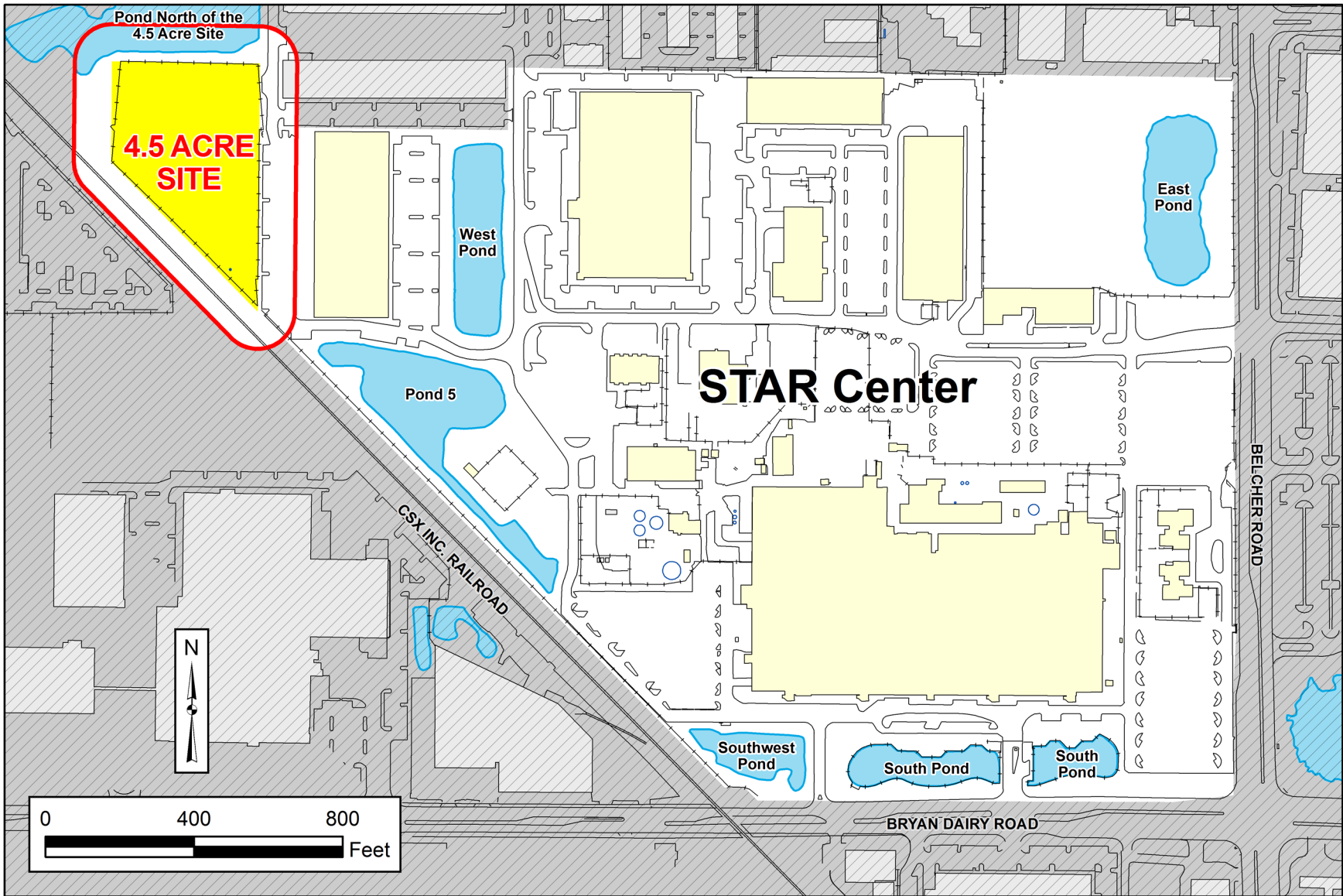
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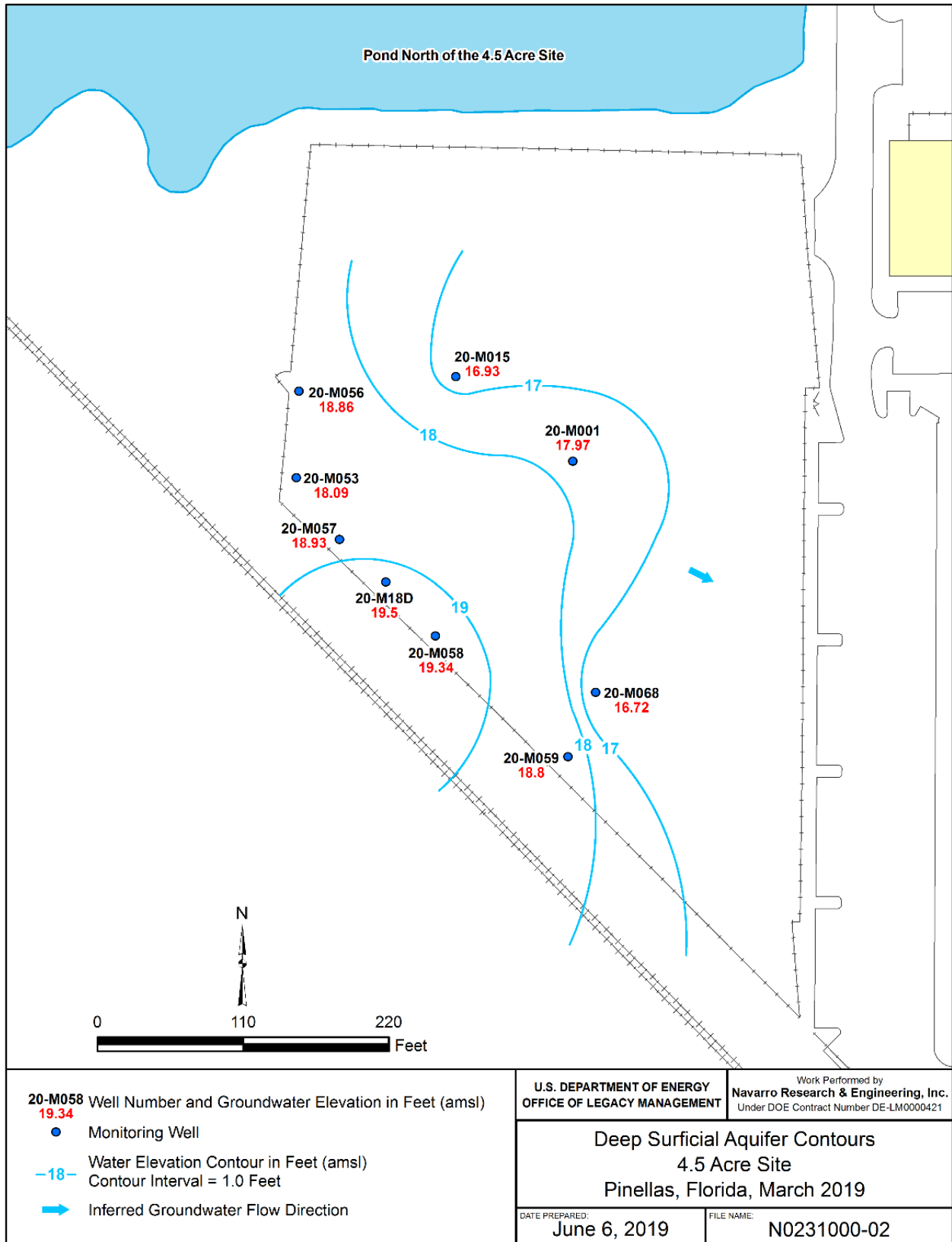
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Figure 1. Young - Rainey STAR Center Location



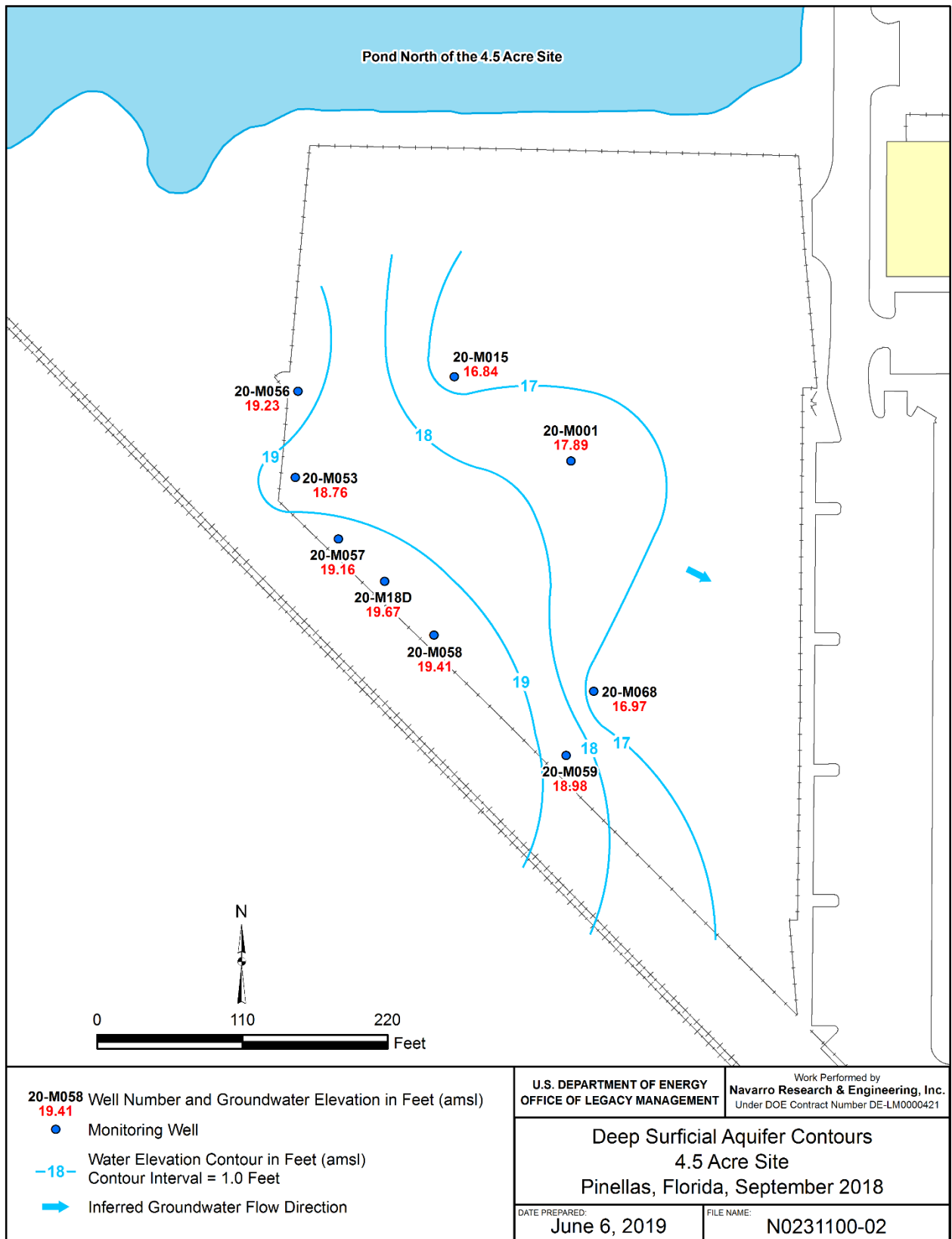
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Figure 2. Location of the 4.5 Acre Site on the STAR Center



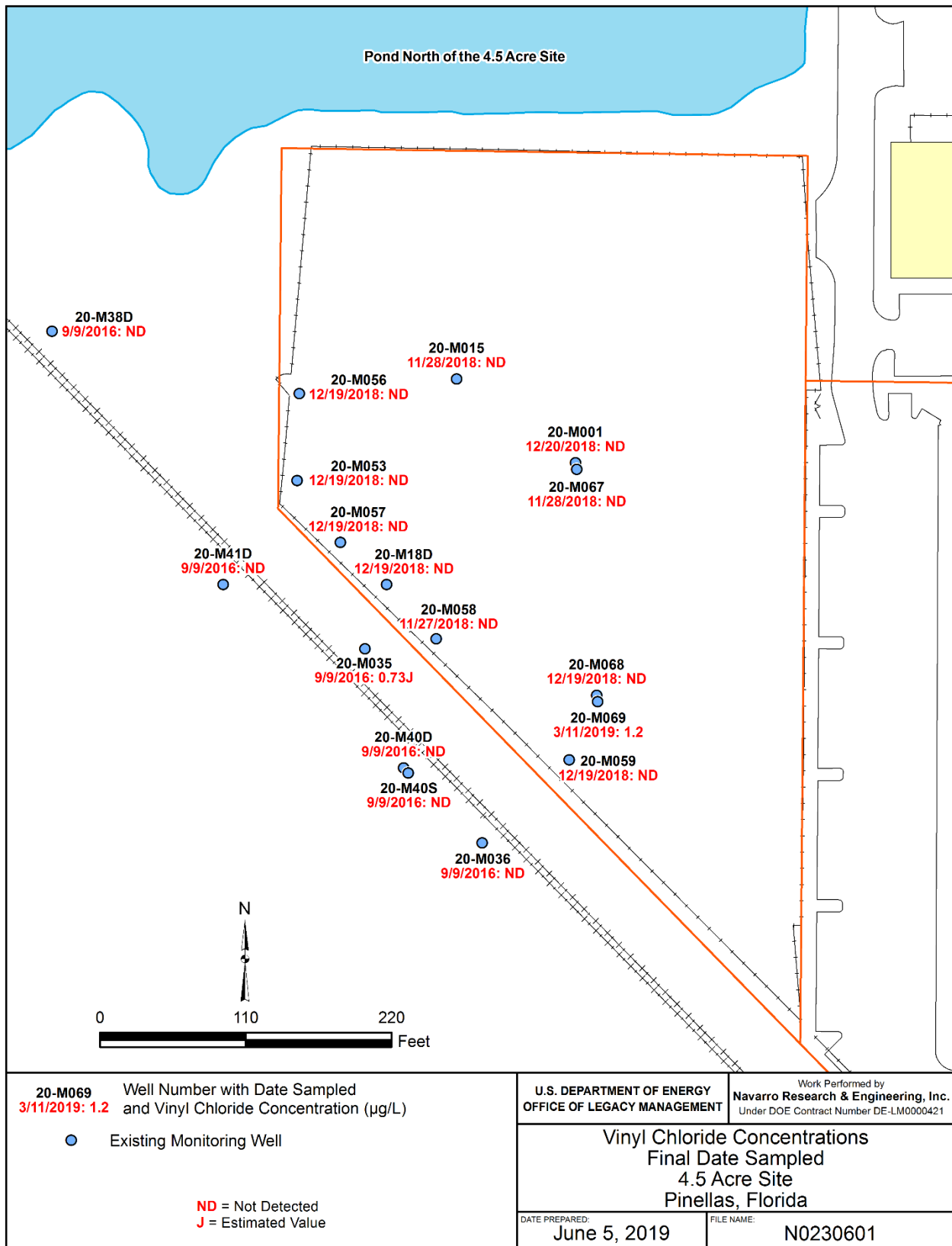
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Figure 3. Deep Surficial Aquifer Contours, March 2019



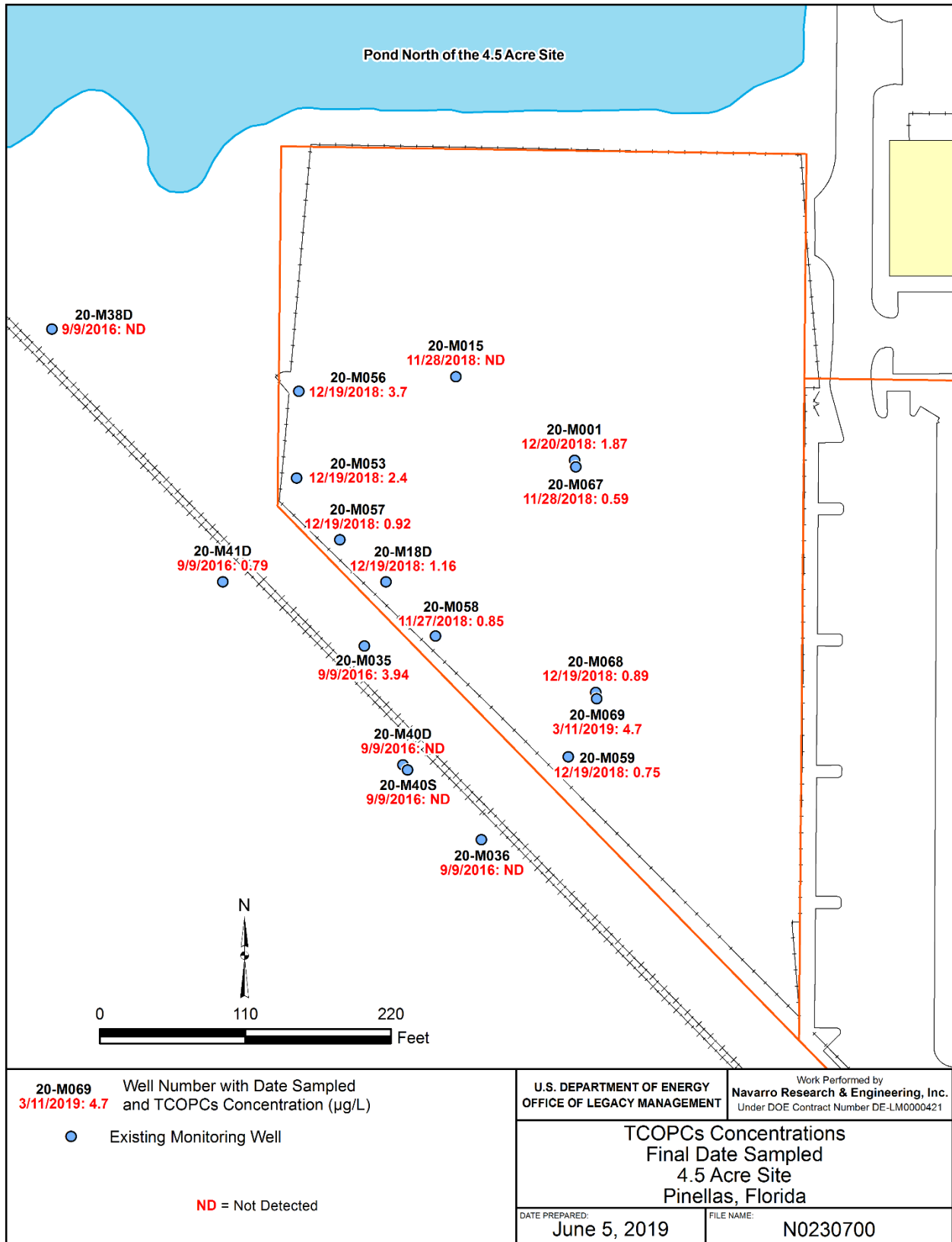
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Figure 4. Deep Surficial Aquifer Contours, September 2018



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Figure 5. Vinyl Chloride Concentrations



<p>20-M069 Well Number with Date Sampled and TCOPCs Concentration (µg/L)</p> <p>● Existing Monitoring Well</p> <p>ND = Not Detected</p>	<p>U.S. DEPARTMENT OF ENERGY OFFICE OF LEGACY MANAGEMENT</p>	<p>Work Performed by Navarro Research & Engineering, Inc. Under DOE Contract Number DE-LM0000421</p>
	<p>TCOPCs Concentrations Final Date Sampled 4.5 Acre Site Pinellas, Florida</p>	
DATE PREPARED:	June 5, 2019	FILE NAME: N0230700

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Figure 6. TCOPCs Concentrations

Table 1. Construction Details 4.5 Acre Site Monitoring Wells

Well	Total Depth (ft bls)	Screened Interval (ft bls)	Date of Installation
PIN20-M001	25	20-25	5/17/1985
PIN20-M015	25.8	20.8-25.8	8/20/1985
PIN20-M035	14	9-14	2/17/1986
PIN20-M036	30	25-30	2/18/1986
PIN20-M38D	30	20-30	7/19/1989
PIN20-M40D	28	18-28	7/20/1989
PIN20-M40S	14	4-14	7/20/1989
PIN20-M41D	26	16-26	1/15/1993
PIN20-M18D	30	20-30	6/25/1999
PIN20-M053	30	20-30	6/22/2001
PIN20-M059	29	19-29	1/22/2004
PIN20-M056	29	19-29	1/23/2004
PIN20-M057	30	20-30	1/23/2004
PIN20-M058	28	18-28	1/23/2004
PIN20-M067	20	10-20	10/21/2009
PIN20-M068	30	20-30	10/21/2009
PIN20-M069	20	10-20	10/21/2009

Table 2. COPC Concentrations at the 4.5 Acre Site (µg/L)

Location	Screen Depth (ft)	Date Sampled	TCE	cDCE	tDCE	VC	Benzene	TCOPCs
Cleanup Target Level			3	70	100	1	1	
M001	20–25	9/12/2016	<0.16	1.4	1.8	19	0.81J	23.01
		6/27/2018	<0.16J	0.40J	1.0 J	0.60J	0.94J	2.94
		9/6/2018	<0.16	0.25J	0.91J	0.83J	0.80J	2.79
		11/28/2018	<0.333	<0.333	0.800J	<0.333	0.700J	1.5
		12/20/2018	<0.16	0.23J	0.89J	<0.10	0.75J	1.87
M015	20.8–25.8	9/9/2017	<0.16	1.6	<0.15	<0.10	<0.16	1.6
		3/1/2018	<0.16	0.72J	<0.15	<0.10	<0.16	0.72
		6/27/2018	<0.16	0.45J	<0.15	1.2 J	<0.16	1.65
		9/6/2018	<0.16	0.28J	<0.15	0.89J	<0.16	1.17
		11/28/2018	<0.333	<0.333	<0.333	<0.333	<0.333	ND
M035	9–14	9/13/2012	0.24J	3.9	0.45J	2.6	<.16	7.19
		3/7/2013	0.21J	3.7	0.34J	1.3	<.16	5.55
		9/19/2013	<0.16	3.1	0.46J	<0.16	0.79J	4.35
		3/7/2014	<0.16	4.1	0.39J	<0.16	0.71J	5.2
		9/9/2016	<0.16	2.7	0.51J	0.73J	<0.16	3.94
M036	25–30	2/28/2008	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		9/15/2008	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		3/19/2009	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		8/28/2009	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		9/9/2016	<0.16	<0.15	<0.15	<0.10	<0.16	ND
M053	20–30	3/1/2018	<0.16	2.0	<0.15	<0.10	<0.16	2
		6/26/2018	<0.16	2.1	<0.15	1.2	<0.16	3.3
		9/7/2018	<0.16	2.5	<0.15	<0.10	<0.16	2.5
		11/27/2018	<0.333	1.65	<0.333	<0.333	<0.333	1.65
		12/19/2018	<0.16	2.4	<0.15	<0.10	<0.16	2.4
M056	19–29	3/1/2018	<0.16	2.7	<0.15	<0.10	<0.16	2.7
		6/27/2018	<0.16	3.0	<0.15	<0.10	<0.16	3
		9/7/2018	<0.16	2.8	<0.15	<0.10	<0.16	2.8
		11/28/2018	<0.333	3.09	<0.333	<0.333	<0.333	3.09
		12/19/2018	<0.16	3.7	<0.15	<0.10	<0.16	3.7
M057	20–30	3/1/2018	<0.16	5.5	0.42J	<0.10	<0.16	5.92
		6/27/2018	<0.16	5.9	0.39J	<0.10	<0.16	6.29
		9/7/2018	<0.16	3.0	0.25J	<0.10	<0.16	3.25
		11/27/2018	<0.333	1.15	<0.333	<0.333	<0.333	1.15
		12/19/2018	<0.16	0.92J	<0.15	<0.10	<0.16	0.92
M058	18–28	9/9/2017	<0.16	2.4	0.30J	<0.10	<0.16	2.7
		3/1/2018	<0.16	1.4	0.18J	<0.10	<0.16	1.58
		6/27/2018	<0.16	1.2	<0.15	0.39J	<0.16	1.59
		9/6/2018	<0.16	1.4	<0.15	<0.10	<0.16	1.4
		11/27/2018	<0.333	0.850J	<0.333	<0.333	<0.333	0.85

Table 2. COPC Concentrations at the 4.5 Acre Site (µg/L) (continued)

Location	Screen Depth (ft)	Date Sampled	TCE	cDCE	tDCE	VC	Benzene	TCOPCs
Cleanup Target Level			3	70	100	1	1	
M059	19–29	3/1/2018	<0.16	0.39J	0.20J	<0.10	0.51J	1.1
		6/27/2018	<0.16J	0.27J	<0.15J	<0.10J	0.48J	0.75
		9/6/2018	<0.16	0.22J	<0.15	<0.10	0.46J	0.68
		11/27/2018	<0.333	<0.333	<0.333	<0.333	0.450J	0.45
		12/19/2018	<0.16	0.24J	<0.15	<0.10	0.51J	0.75
M067	10–20	9/8/2017	<0.16	0.96J	0.24J	1.8	<0.16	3
		3/1/2018	<0.16	0.61J	0.20J	0.55J	<0.16	1.36
		6/27/2018	<0.16	0.44J	<0.15	0.29J	<0.16	0.73
		9/6/2018	<0.16	0.53J	0.23J	0.75J	<0.16	1.51
		11/28/2018	<0.333	0.590J	<0.333	<0.333	<0.333	0.59
M068	20–30	3/1/2018	<0.16	<0.15	0.42J	0.77J	0.42J	1.61
		6/26/2018	<0.16	<0.15	0.64J	0.45J	0.39J	1.48
		9/6/2018	<0.16	<0.15	0.49J	<0.10	0.39J	0.88
		11/27/2018	<0.333	<0.333	<0.333	<0.333	<0.333	ND
		12/19/2018	<0.16	<0.15	0.49J	<0.10	0.40J	0.89
M069	10–20	11/27/2018	<0.333	4.41	2.08	6.78	<0.333	13.27
		12/19/2018	<0.16	6.1	2.3	8.0	<0.16	16.4
		1/31/2019	<0.16	3.9	1.6	1.9	<0.16	7.4
		2/21/2019	<0.16	2.7	1.3	1.8	<0.16	5.8
		3/11/2019	<0.16	2.4	1.1	1.2	<0.16	4.7
M18D	20–30	3/1/2018	<0.16	0.70J	<0.15	<0.10	<0.16	0.7
		6/26/2018	<0.16	0.95J	0.16J	0.93J	<0.16	2.04
		9/7/2018	<0.16	0.81J	<0.15	<0.10	<0.16	0.81
		11/27/2018	<0.333	0.800J	<0.333	<0.333	<0.333	0.8
		12/19/2018	<0.16	1.0	0.16J	<0.10	<0.16	1.16
M38D	20–30	9/13/2012	<0.16	<0.15	<0.15	<0.16	<0.10	ND
		3/7/2013	<0.16	<0.15	<0.15	<0.16	<0.10	ND
		9/19/2013	<0.16	<0.15	<0.15	<0.16	<0.10	ND
		3/7/2014	<0.16	<0.15	<0.15	<0.16	<0.10	ND
		9/9/2016	<0.16	<0.15	<0.15	<0.10	<0.16	ND
M40D	18–28	2/28/2008	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		9/15/2008	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		3/19/2009	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		8/28/2009	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		9/9/2016	<0.16	<0.15	<0.15	<0.10	<0.16	ND
M40S	4–14	2/28/2008	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		9/15/2008	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		3/19/2009	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		8/28/2009	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		9/9/2016	<0.16	<0.15	<0.15	<0.10	<0.16	ND

Table 2. COPC Concentrations at the 4.5 Acre Site (µg/L) (continued)

Location	Screen Depth (ft)	Date Sampled	TCE	cDCE	tDCE	VC	Benzene	TCOPCs
Cleanup Target Level			3	70	100	1	1	
M41D	16–26	2/28/2008	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		9/15/2008	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		3/19/2009	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		8/27/2009	<0.50	<0.65	<0.44	<0.50	<0.50	ND
		9/9/2016	<0.16	0.79J	<0.15	<0.10	<0.16	0.79

Abbreviations:

J = Estimated

ND = Non-Detect

Appendix A

Laboratory Reports January, February, and March 2019

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The laboratory reports in this appendix include data from the 4.5 Acre Site post active remediation monitoring and also data from monitoring at other areas of the STAR Center and adjacent Northeast Site. The IDs for all 4.5 Acre Site wells begin with the “PIN20” prefix.

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ANALYTICAL REPORT

Job Number: 280-119803-1

SDG Number: PIN20-01.1901007

Job Description: PINELLAS 4.5 ACRE SITE

For:

Navarro Research and Engineering, Inc
2597 Legacy Way
Grand Junction, CO 81503
Attention: Mr. Steve Donovan



Approved for release.
DiLea R Bindel
Project Manager I
3/21/2019 5:14 PM

DiLea R Bindel, Project Manager I
4955 Yarrow Street, Arvada, CO, 80002
(303)736-0173
dilea.bindel@testamericainc.com
03/21/2019
Revision: 1

The test results in this report relate only to the samples in this report and meet all requirements of NELAC, with any exceptions noted. Pursuant to NELAP, this report shall not be reproduced except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Denver Project Manager.

The Lab Certification ID# is 4025.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

TestAmerica Laboratories, Inc.

TestAmerica Denver 4955 Yarrow Street, Arvada, CO 80002
Tel (303) 736-0100 Fax (303) 431-7171 www.testamericainc.com

CASE NARRATIVE

Client: Navarro Research and Engineering, Inc.

Project: PINELLAS 4.5 ACRE SITE - PIN20-01.1901007

Report Number: 280-119803-1

With exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. All laboratory quality control samples analyzed in conjunction with the samples in this project were within established control limits, with any exceptions noted. Calculations are performed before rounding to avoid round-off errors in calculated results.

This report includes reporting limits (RLs) less than TestAmerica Denver's practical quantitation limits. These reporting limits are being used specifically at the client's request to meet the needs of this project. Please note that data are not normally reported to these levels without qualification, since they are inherently less reliable and potentially less defensible than required by the current NELAC standards.

Results between the method detection limit (MDL) and reporting limit (RL) are flagged with a "J" qualifier to indicate an estimated value. These results are statistically less reliable than results greater than or equal to the RL and should be considered a qualitative value.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

REVISION - 3/21/2019

The original report did not include the 8260B parent_sample_code for LCSD 280-447186/9.

RECEIPT

The samples were received on 2/2/2019 8:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.6° C.

GC/MS VOLATILES - SW846 8260B

4-Bromofluorobenzene (Surr) failed the MS/MSD surrogate recovery criteria low for sample PIN20-01.1901007-009 (M069). Associated target compounds are qualified with a "S" flag.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

DATA REPORTING QUALIFIERS

Client: Navarro Research and Engineering, Inc

Job Number: 280-119803-1
Sdg Number: PIN20-01.1901007

Lab Section	Qualifier	Description
GC/MS VOA	N	MS, MSD: Spike recovery is outside acceptance limits.
	*	MS/MSD RPD exceeded the control limit
	S	Surrogate is outside control limits
	U	Undetected at the Limit of Detection.

SAMPLE SUMMARY

Client: Navarro Research and Engineering, Inc

Job Number: 280-119803-1
Sdg Number: PIN20-01.1901007

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
280-119803-1	PIN20-01.1901007-009	Water	01/31/2019 1355	02/02/2019 0830
280-119803-1MS	PIN20-01.1901007-009	Water	01/31/2019 1355	02/02/2019 0830
280-119803-1MSD	PIN20-01.1901007-009	Water	01/31/2019 1355	02/02/2019 0830
280-119803-2	PIN20-01.1901007-014	Water	01/31/2019 0900	02/02/2019 0830

EXECUTIVE SUMMARY - Detections

Client: Navarro Research and Engineering, Inc

Job Number: 280-119803-1
Sdg Number: PIN20-01.1901007

Lab Sample ID	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
280-119803-1	PIN20-01.1901007-009					
cis-1,2-Dichloroethene		3.9		1.0	ug/L	8260B
trans-1,2-Dichloroethene		1.6		1.0	ug/L	8260B
Vinyl chloride		1.9		1.0	ug/L	8260B

METHOD SUMMARY

Client: Navarro Research and Engineering, Inc

Job Number: 280-119803-1
Sdg Number: PIN20-01.1901007

Description	Lab Location	Method	Preparation Method
Matrix: Water			
Volatile Organic Compounds (GC/MS)	TAL DEN	SW846 8260B	
Purge and Trap	TAL DEN		SW846 5030B

Lab References:

TAL DEN = TestAmerica Denver

Method References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Analytical Data

Client: Navarro Research and Engineering, Inc

Job Number: 280-119803-1
Sdg Number: PIN20-01.1901007

Client Sample ID: PIN20-01.1901007-009

Lab Sample ID: 280-119803-1
Client Matrix: Water

Date Sampled: 01/31/2019 1355
Date Received: 02/02/2019 0830

8260B Volatile Organic Compounds (GC/MS)

Analysis Method: 8260B Analysis Batch: 280-447186 Instrument ID: VMS_G
Prep Method: 5030B Prep Batch: N/A Lab File ID: G5167.D
Dilution: 1.0 Initial Weight/Volume: 20 mL
Analysis Date: 02/11/2019 1206 Final Weight/Volume: 20 mL
Prep Date: 02/11/2019 1206

Analyte	Result (ug/L)	Qualifier	DL	LOQ
Acetone	1.9	U	1.9	10
Benzene	0.16	U	0.16	1.0
Bromobenzene	0.17	U	0.17	1.0
Bromochloromethane	0.10	U	0.10	1.0
Bromodichloromethane	0.17	U	0.17	1.0
Bromoform	0.19	U	0.19	1.0
Bromomethane	0.21	U	0.21	1.0
2-Butanone (MEK)	2.0	U	2.0	5.0
n-Butylbenzene	0.32	U	0.32	1.0
sec-Butylbenzene	0.17	U	0.17	1.0
tert-Butylbenzene	0.16	U	0.16	1.0
Carbon disulfide	0.45	U	0.45	1.0
Carbon tetrachloride	0.19	U	0.19	1.0
Chlorobenzene	0.17	U	0.17	1.0
Dibromochloromethane	0.17	U	0.17	1.0
Chloroethane	0.41	U	0.41	1.0
Chloroform	0.16	U	0.16	1.0
Chloromethane	0.30	U	0.30	1.0
2-Chlorotoluene	0.17	U	0.17	1.0
4-Chlorotoluene	0.21	U	0.21	1.0
1,2-Dibromo-3-Chloropropane	0.47	U	0.47	1.0
Dibromomethane	0.17	U	0.17	1.0
1,2-Dichlorobenzene	0.15	U	0.15	1.0
1,3-Dichlorobenzene	0.13	U	0.13	1.0
1,4-Dichlorobenzene	0.16	U	0.16	1.0
Dichlorodifluoromethane	0.31	U	0.31	1.0
1,1-Dichloroethane	0.22	U	0.22	1.0
1,2-Dichloroethane	0.13	U	0.13	1.0
cis-1,2-Dichloroethene	3.9		0.15	1.0
trans-1,2-Dichloroethene	1.6		0.15	1.0
1,1-Dichloroethene	0.23	U	0.23	1.0
1,2-Dichloropropane	0.18	U	0.18	1.0
1,3-Dichloropropane	0.22	U	0.22	1.0
2,2-Dichloropropane	0.18	U	0.18	1.0
cis-1,3-Dichloropropene	0.16	U	0.16	1.0
trans-1,3-Dichloropropene	0.19	U	0.19	1.0
1,1-Dichloropropene	0.19	U	0.19	1.0
Ethylbenzene	0.16	U	0.16	1.0
Hexachlorobutadiene	0.36	U	0.36	1.0
2-Hexanone	1.7	U	1.7	5.0
Isopropylbenzene	0.19	U	0.19	1.0
4-Isopropyltoluene	0.20	U	0.20	1.0
Methylene Chloride	0.32	U	0.32	1.0
4-Methyl-2-pentanone	0.98	U	0.98	5.0
Naphthalene	0.22	U	0.22	1.0
n-Propylbenzene	0.16	U	0.16	1.0

Analytical Data

Client: Navarro Research and Engineering, Inc

Job Number: 280-119803-1
Sdg Number: PIN20-01.1901007

Client Sample ID: PIN20-01.1901007-009

Lab Sample ID: 280-119803-1
Client Matrix: Water

Date Sampled: 01/31/2019 1355
Date Received: 02/02/2019 0830

8260B Volatile Organic Compounds (GC/MS)

Analysis Method: 8260B	Analysis Batch: 280-447186	Instrument ID: VMS_G
Prep Method: 5030B	Prep Batch: N/A	Lab File ID: G5167.D
Dilution: 1.0		Initial Weight/Volume: 20 mL
Analysis Date: 02/11/2019 1206		Final Weight/Volume: 20 mL
Prep Date: 02/11/2019 1206		

Analyte	Result (ug/L)	Qualifier	DL	LOQ
Styrene	0.17	U	0.17	1.0
1,1,1,2-Tetrachloroethane	0.21	U	0.21	1.0
1,1,2,2-Tetrachloroethane	0.21	U	0.21	1.0
Tetrachloroethene	0.20	U	0.20	1.0
Toluene	0.17	U	0.17	1.0
1,2,3-Trichlorobenzene	0.21	U	0.21	1.0
1,2,4-Trichlorobenzene	0.21	U	0.21	1.0
1,1,1-Trichloroethane	0.16	U	0.16	1.0
1,1,2-Trichloroethane	0.27	U	0.27	1.0
Trichloroethene	0.16	U	0.16	1.0
Trichlorofluoromethane	0.29	U	0.29	1.0
1,2,3-Trichloropropane	0.33	U	0.33	1.0
1,2,4-Trimethylbenzene	0.15	U	0.15	1.0
1,3,5-Trimethylbenzene	0.16	U	0.16	1.0
Vinyl chloride	1.9		0.10	1.0
Xylenes, Total	0.19	U	0.19	1.0
1,2-Dibromoethane	0.18	U	0.18	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	126		70 - 127
Toluene-d8 (Surr)	113		80 - 125
4-Bromofluorobenzene (Surr)	93		78 - 120
Dibromofluoromethane (Surr)	114		77 - 120

Analytical Data

Client: Navarro Research and Engineering, Inc

Job Number: 280-119803-1
Sdg Number: PIN20-01.1901007

Client Sample ID: PIN20-01.1901007-014

Lab Sample ID: 280-119803-2
Client Matrix: Water

Date Sampled: 01/31/2019 0900
Date Received: 02/02/2019 0830

8260B Volatile Organic Compounds (GC/MS)

Analysis Method: 8260B Analysis Batch: 280-447186 Instrument ID: VMS_G
Prep Method: 5030B Prep Batch: N/A Lab File ID: G5170.D
Dilution: 1.0 Initial Weight/Volume: 20 mL
Analysis Date: 02/11/2019 1313 Final Weight/Volume: 20 mL
Prep Date: 02/11/2019 1313

Analyte	Result (ug/L)	Qualifier	DL	LOQ
Acetone	1.9	U	1.9	10
Benzene	0.16	U	0.16	1.0
Bromobenzene	0.17	U	0.17	1.0
Bromochloromethane	0.10	U	0.10	1.0
Bromodichloromethane	0.17	U	0.17	1.0
Bromoform	0.19	U	0.19	1.0
Bromomethane	0.21	U	0.21	1.0
2-Butanone (MEK)	2.0	U	2.0	5.0
n-Butylbenzene	0.32	U	0.32	1.0
sec-Butylbenzene	0.17	U	0.17	1.0
tert-Butylbenzene	0.16	U	0.16	1.0
Carbon disulfide	0.45	U	0.45	1.0
Carbon tetrachloride	0.19	U	0.19	1.0
Chlorobenzene	0.17	U	0.17	1.0
Dibromochloromethane	0.17	U	0.17	1.0
Chloroethane	0.41	U	0.41	1.0
Chloroform	0.16	U	0.16	1.0
Chloromethane	0.30	U	0.30	1.0
2-Chlorotoluene	0.17	U	0.17	1.0
4-Chlorotoluene	0.21	U	0.21	1.0
1,2-Dibromo-3-Chloropropane	0.47	U	0.47	1.0
Dibromomethane	0.17	U	0.17	1.0
1,2-Dichlorobenzene	0.15	U	0.15	1.0
1,3-Dichlorobenzene	0.13	U	0.13	1.0
1,4-Dichlorobenzene	0.16	U	0.16	1.0
Dichlorodifluoromethane	0.31	U	0.31	1.0
1,1-Dichloroethane	0.22	U	0.22	1.0
1,2-Dichloroethane	0.13	U	0.13	1.0
cis-1,2-Dichloroethene	0.15	U	0.15	1.0
trans-1,2-Dichloroethene	0.15	U	0.15	1.0
1,1-Dichloroethene	0.23	U	0.23	1.0
1,2-Dichloropropane	0.18	U	0.18	1.0
1,3-Dichloropropane	0.22	U	0.22	1.0
2,2-Dichloropropane	0.18	U	0.18	1.0
cis-1,3-Dichloropropene	0.16	U	0.16	1.0
trans-1,3-Dichloropropene	0.19	U	0.19	1.0
1,1-Dichloropropene	0.19	U	0.19	1.0
Ethylbenzene	0.16	U	0.16	1.0
Hexachlorobutadiene	0.36	U	0.36	1.0
2-Hexanone	1.7	U	1.7	5.0
Isopropylbenzene	0.19	U	0.19	1.0
4-Isopropyltoluene	0.20	U	0.20	1.0
Methylene Chloride	0.32	U	0.32	1.0
4-Methyl-2-pentanone	0.98	U	0.98	5.0
Naphthalene	0.22	U	0.22	1.0
n-Propylbenzene	0.16	U	0.16	1.0

Analytical Data

Client: Navarro Research and Engineering, Inc

Job Number: 280-119803-1
Sdg Number: PIN20-01.1901007

Client Sample ID: PIN20-01.1901007-014

Lab Sample ID: 280-119803-2
Client Matrix: Water

Date Sampled: 01/31/2019 0900
Date Received: 02/02/2019 0830

8260B Volatile Organic Compounds (GC/MS)

Analysis Method: 8260B	Analysis Batch: 280-447186	Instrument ID: VMS_G
Prep Method: 5030B	Prep Batch: N/A	Lab File ID: G5170.D
Dilution: 1.0		Initial Weight/Volume: 20 mL
Analysis Date: 02/11/2019 1313		Final Weight/Volume: 20 mL
Prep Date: 02/11/2019 1313		

Analyte	Result (ug/L)	Qualifier	DL	LOQ
Styrene	0.17	U	0.17	1.0
1,1,1,2-Tetrachloroethane	0.21	U	0.21	1.0
1,1,2,2-Tetrachloroethane	0.21	U	0.21	1.0
Tetrachloroethene	0.20	U	0.20	1.0
Toluene	0.17	U	0.17	1.0
1,2,3-Trichlorobenzene	0.21	U	0.21	1.0
1,2,4-Trichlorobenzene	0.21	U	0.21	1.0
1,1,1-Trichloroethane	0.16	U	0.16	1.0
1,1,2-Trichloroethane	0.27	U	0.27	1.0
Trichloroethene	0.16	U	0.16	1.0
Trichlorofluoromethane	0.29	U	0.29	1.0
1,2,3-Trichloropropane	0.33	U	0.33	1.0
1,2,4-Trimethylbenzene	0.15	U	0.15	1.0
1,3,5-Trimethylbenzene	0.16	U	0.16	1.0
Vinyl chloride	0.10	U	0.10	1.0
Xylenes, Total	0.19	U	0.19	1.0
1,2-Dibromoethane	0.18	U	0.18	1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	91		70 - 127
Toluene-d8 (Surr)	92		80 - 125
4-Bromofluorobenzene (Surr)	101		78 - 120
Dibromofluoromethane (Surr)	88		77 - 120

Shipping and Receiving Documents

Login Sample Receipt Checklist

Client: Navarro Research and Engineering, Inc

Job Number: 280-119803-1
SDG Number: PIN20-01.1901007

Login Number: 119803
List Number: 1
Creator: Paul, Amanda E

List Source: TestAmerica Denver

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

Job Number: 280-120531-1

SDG Number: PIN20-01.1902008

Job Description: PINELLAS 4.5 ACRE SITE

For:

Navarro Research and Engineering, Inc

2597 Legacy Way

Grand Junction, CO 81503

Attention: Mr. Steve Donovan



Approved for release.
DiLea R Bindel
Project Manager I
3/5/2019 10:29 AM

DiLea R Bindel, Project Manager I
4955 Yarrow Street, Arvada, CO, 80002
(303)736-0173
dilea.bindel@testamericainc.com
03/05/2019

The test results in this report relate only to the samples in this report and meet all requirements of NELAC, with any exceptions noted. Pursuant to NELAP, this report shall not be reproduced except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Denver Project Manager.

The Lab Certification ID# is 4025.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

TestAmerica Laboratories, Inc.

TestAmerica Denver 4955 Yarrow Street, Arvada, CO 80002

Tel (303) 736-0100 Fax (303) 431-7171 www.testamericainc.com

Definitions/Glossary

Client: Navarro Research and Engineering, Inc
Project/Site: PINELLAS 4.5 ACRE SITE

TestAmerica Job ID: 280-120531-1
SDG: PIN20-01.1902008

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
J	Estimated: The analyte was positively identified; the quantitation is an estimation

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

CASE NARRATIVE

Client: Navarro Research and Engineering, Inc.

Project: PINELLAS 4.5 ACRE SITE - PIN20-01.1902008

Report Number: 280-120531-1

With exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. All laboratory quality control samples analyzed in conjunction with the samples in this project were within established control limits, with any exceptions noted. Calculations are performed before rounding to avoid round-off errors in calculated results.

This report includes reporting limits (RLs) less than TestAmerica Denver's practical quantitation limits. These reporting limits are being used specifically at the client's request to meet the needs of this project. Please note that data are not normally reported to these levels without qualification, since they are inherently less reliable and potentially less defensible than required by the current NELAC standards.

Results between the method detection limit (MDL) and reporting limit (RL) are flagged with a "J" qualifier to indicate an estimated value. These results are statistically less reliable than results greater than or equal to the RL and should be considered a qualitative value.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

The samples were received on 2/23/2019 9:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.0° C.

One of three hydrochloric preserved VOA vials for sample PIN20-01.1902008-015 (2863) contained a bubble greater than 6 mm. Sufficient volume without headspace is available for the analysis.

GC/MS VOLATILES - SW846 8260B

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Navarro Research and Engineering, Inc
Project/Site: PINELLAS 4.5 ACRE SITE

TestAmerica Job ID: 280-120531-1
SDG: PIN20-01.1902008

Client Sample ID: PIN20-01.1902008-009

Lab Sample ID: 280-120531-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Acetone	4.7	J	10	1.9	ug/L	1		8260B	Total/NA
cis-1,2-Dichloroethene	2.7		1.0	0.15	ug/L	1		8260B	Total/NA
trans-1,2-Dichloroethene	1.3		1.0	0.15	ug/L	1		8260B	Total/NA
1,2,3-Trichlorobenzene	0.25	J	1.0	0.21	ug/L	1		8260B	Total/NA
1,2,4-Trichlorobenzene	0.24	J	1.0	0.21	ug/L	1		8260B	Total/NA
Vinyl chloride	1.8		1.0	0.10	ug/L	1		8260B	Total/NA

Client Sample ID: PIN20-01.1902008-015

Lab Sample ID: 280-120531-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
trans-1,2-Dichloroethene	0.17	J	1.0	0.15	ug/L	1		8260B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Denver

Client Sample Results

Client: Navarro Research and Engineering, Inc
 Project/Site: PINELLAS 4.5 ACRE SITE

TestAmerica Job ID: 280-120531-1
 SDG: PIN20-01.1902008

Client Sample ID: PIN20-01.1902008-009

Lab Sample ID: 280-120531-1

Date Collected: 02/21/19 12:25

Matrix: Water

Date Received: 02/23/19 09:45

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	4.7	J	10	1.9	ug/L			03/01/19 13:13	1
Benzene	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
Bromobenzene	0.17	U	1.0	0.17	ug/L			03/01/19 13:13	1
Bromochloromethane	0.10	U	1.0	0.10	ug/L			03/01/19 13:13	1
Bromodichloromethane	0.17	U	1.0	0.17	ug/L			03/01/19 13:13	1
Bromoform	0.46	U	1.0	0.46	ug/L			03/01/19 13:13	1
Bromomethane	0.21	U	1.0	0.21	ug/L			03/01/19 13:13	1
2-Butanone (MEK)	2.0	U	5.0	2.0	ug/L			03/01/19 13:13	1
n-Butylbenzene	0.14	U	1.0	0.14	ug/L			03/01/19 13:13	1
sec-Butylbenzene	0.17	U	1.0	0.17	ug/L			03/01/19 13:13	1
tert-Butylbenzene	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
Carbon disulfide	0.17	U	1.0	0.17	ug/L			03/01/19 13:13	1
Carbon tetrachloride	0.19	U	1.0	0.19	ug/L			03/01/19 13:13	1
Chlorobenzene	0.17	U	1.0	0.17	ug/L			03/01/19 13:13	1
Dibromochloromethane	0.17	U	1.0	0.17	ug/L			03/01/19 13:13	1
Chloroethane	0.41	U	1.0	0.41	ug/L			03/01/19 13:13	1
Chloroform	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
Chloromethane	0.30	U	1.0	0.30	ug/L			03/01/19 13:13	1
2-Chlorotoluene	0.17	U	1.0	0.17	ug/L			03/01/19 13:13	1
4-Chlorotoluene	0.21	U	1.0	0.21	ug/L			03/01/19 13:13	1
1,2-Dibromo-3-Chloropropane	0.47	U	1.0	0.47	ug/L			03/01/19 13:13	1
Dibromomethane	0.17	U	1.0	0.17	ug/L			03/01/19 13:13	1
1,2-Dichlorobenzene	0.15	U	1.0	0.15	ug/L			03/01/19 13:13	1
1,3-Dichlorobenzene	0.13	U	1.0	0.13	ug/L			03/01/19 13:13	1
1,4-Dichlorobenzene	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
Dichlorodifluoromethane	0.31	U	1.0	0.31	ug/L			03/01/19 13:13	1
1,1-Dichloroethane	0.22	U	1.0	0.22	ug/L			03/01/19 13:13	1
1,2-Dichloroethane	0.13	U	1.0	0.13	ug/L			03/01/19 13:13	1
cis-1,2-Dichloroethene	2.7		1.0	0.15	ug/L			03/01/19 13:13	1
trans-1,2-Dichloroethene	1.3		1.0	0.15	ug/L			03/01/19 13:13	1
1,1-Dichloroethene	0.23	U	1.0	0.23	ug/L			03/01/19 13:13	1
1,2-Dichloropropane	0.18	U	1.0	0.18	ug/L			03/01/19 13:13	1
1,3-Dichloropropane	0.090	U	1.0	0.090	ug/L			03/01/19 13:13	1
2,2-Dichloropropane	0.38	U	1.0	0.38	ug/L			03/01/19 13:13	1
cis-1,3-Dichloropropene	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
trans-1,3-Dichloropropene	0.19	U	1.0	0.19	ug/L			03/01/19 13:13	1
1,1-Dichloropropene	0.19	U	1.0	0.19	ug/L			03/01/19 13:13	1
Ethylbenzene	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
Hexachlorobutadiene	0.36	U	1.0	0.36	ug/L			03/01/19 13:13	1
2-Hexanone	1.7	U	5.0	1.7	ug/L			03/01/19 13:13	1
Isopropylbenzene	0.19	U	1.0	0.19	ug/L			03/01/19 13:13	1
4-Isopropyltoluene	0.20	U	1.0	0.20	ug/L			03/01/19 13:13	1
Methylene Chloride	0.94	U	1.0	0.94	ug/L			03/01/19 13:13	1
4-Methyl-2-pentanone	0.98	U	5.0	0.98	ug/L			03/01/19 13:13	1
Naphthalene	0.22	U	1.0	0.22	ug/L			03/01/19 13:13	1
n-Propylbenzene	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
Styrene	0.36	U	1.0	0.36	ug/L			03/01/19 13:13	1
1,1,1,2-Tetrachloroethane	0.21	U	1.0	0.21	ug/L			03/01/19 13:13	1
1,1,2,2-Tetrachloroethane	0.21	U	1.0	0.21	ug/L			03/01/19 13:13	1

Client Sample Results

Client: Navarro Research and Engineering, Inc
Project/Site: PINELLAS 4.5 ACRE SITE

TestAmerica Job ID: 280-120531-1
SDG: PIN20-01.1902008

Client Sample ID: PIN20-01.1902008-009

Lab Sample ID: 280-120531-1

Date Collected: 02/21/19 12:25

Matrix: Water

Date Received: 02/23/19 09:45

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.20	U	1.0	0.20	ug/L			03/01/19 13:13	1
Toluene	0.17	U	1.0	0.17	ug/L			03/01/19 13:13	1
1,2,3-Trichlorobenzene	0.25	J	1.0	0.21	ug/L			03/01/19 13:13	1
1,2,4-Trichlorobenzene	0.24	J	1.0	0.21	ug/L			03/01/19 13:13	1
1,1,1-Trichloroethane	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
1,1,2-Trichloroethane	0.27	U	1.0	0.27	ug/L			03/01/19 13:13	1
Trichloroethene	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
Trichlorofluoromethane	0.29	U	1.0	0.29	ug/L			03/01/19 13:13	1
1,2,3-Trichloropropane	0.33	U	1.0	0.33	ug/L			03/01/19 13:13	1
1,2,4-Trimethylbenzene	0.15	U	1.0	0.15	ug/L			03/01/19 13:13	1
1,3,5-Trimethylbenzene	0.16	U	1.0	0.16	ug/L			03/01/19 13:13	1
Vinyl chloride	1.8		1.0	0.10	ug/L			03/01/19 13:13	1
Xylenes, Total	0.19	U	1.0	0.19	ug/L			03/01/19 13:13	1
1,2-Dibromoethane	0.18	U	1.0	0.18	ug/L			03/01/19 13:13	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
<i>1,2-Dichloroethane-d4 (Surr)</i>	93		70 - 127		03/01/19 13:13	1
<i>Toluene-d8 (Surr)</i>	91		80 - 125		03/01/19 13:13	1
<i>4-Bromofluorobenzene (Surr)</i>	95		78 - 120		03/01/19 13:13	1
<i>Dibromofluoromethane (Surr)</i>	88		77 - 120		03/01/19 13:13	1

Client Sample ID: PIN20-01.1902008-015

Lab Sample ID: 280-120531-2

Date Collected: 02/21/19 09:00

Matrix: Water

Date Received: 02/23/19 09:45

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1.9	U	10	1.9	ug/L			03/01/19 12:12	1
Benzene	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
Bromobenzene	0.17	U	1.0	0.17	ug/L			03/01/19 12:12	1
Bromochloromethane	0.10	U	1.0	0.10	ug/L			03/01/19 12:12	1
Bromodichloromethane	0.17	U	1.0	0.17	ug/L			03/01/19 12:12	1
Bromoform	0.46	U	1.0	0.46	ug/L			03/01/19 12:12	1
Bromomethane	0.21	U	1.0	0.21	ug/L			03/01/19 12:12	1
2-Butanone (MEK)	2.0	U	5.0	2.0	ug/L			03/01/19 12:12	1
n-Butylbenzene	0.14	U	1.0	0.14	ug/L			03/01/19 12:12	1
sec-Butylbenzene	0.17	U	1.0	0.17	ug/L			03/01/19 12:12	1
tert-Butylbenzene	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
Carbon disulfide	0.17	U	1.0	0.17	ug/L			03/01/19 12:12	1
Carbon tetrachloride	0.19	U	1.0	0.19	ug/L			03/01/19 12:12	1
Chlorobenzene	0.17	U	1.0	0.17	ug/L			03/01/19 12:12	1
Dibromochloromethane	0.17	U	1.0	0.17	ug/L			03/01/19 12:12	1
Chloroethane	0.41	U	1.0	0.41	ug/L			03/01/19 12:12	1
Chloroform	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
Chloromethane	0.30	U	1.0	0.30	ug/L			03/01/19 12:12	1
2-Chlorotoluene	0.17	U	1.0	0.17	ug/L			03/01/19 12:12	1
4-Chlorotoluene	0.21	U	1.0	0.21	ug/L			03/01/19 12:12	1
1,2-Dibromo-3-Chloropropane	0.47	U	1.0	0.47	ug/L			03/01/19 12:12	1
Dibromomethane	0.17	U	1.0	0.17	ug/L			03/01/19 12:12	1
1,2-Dichlorobenzene	0.15	U	1.0	0.15	ug/L			03/01/19 12:12	1

TestAmerica Denver

Client Sample Results

Client: Navarro Research and Engineering, Inc
 Project/Site: PINELLAS 4.5 ACRE SITE

TestAmerica Job ID: 280-120531-1
 SDG: PIN20-01.1902008

Client Sample ID: PIN20-01.1902008-015

Lab Sample ID: 280-120531-2

Date Collected: 02/21/19 09:00

Matrix: Water

Date Received: 02/23/19 09:45

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
1,3-Dichlorobenzene	0.13	U	1.0	0.13	ug/L			03/01/19 12:12	1
1,4-Dichlorobenzene	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
Dichlorodifluoromethane	0.31	U	1.0	0.31	ug/L			03/01/19 12:12	1
1,1-Dichloroethane	0.22	U	1.0	0.22	ug/L			03/01/19 12:12	1
1,2-Dichloroethane	0.13	U	1.0	0.13	ug/L			03/01/19 12:12	1
cis-1,2-Dichloroethene	0.15	U	1.0	0.15	ug/L			03/01/19 12:12	1
trans-1,2-Dichloroethene	0.17	J	1.0	0.15	ug/L			03/01/19 12:12	1
1,1-Dichloroethene	0.23	U	1.0	0.23	ug/L			03/01/19 12:12	1
1,2-Dichloropropane	0.18	U	1.0	0.18	ug/L			03/01/19 12:12	1
1,3-Dichloropropane	0.090	U	1.0	0.090	ug/L			03/01/19 12:12	1
2,2-Dichloropropane	0.38	U	1.0	0.38	ug/L			03/01/19 12:12	1
cis-1,3-Dichloropropene	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
trans-1,3-Dichloropropene	0.19	U	1.0	0.19	ug/L			03/01/19 12:12	1
1,1-Dichloropropene	0.19	U	1.0	0.19	ug/L			03/01/19 12:12	1
Ethylbenzene	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
Hexachlorobutadiene	0.36	U	1.0	0.36	ug/L			03/01/19 12:12	1
2-Hexanone	1.7	U	5.0	1.7	ug/L			03/01/19 12:12	1
Isopropylbenzene	0.19	U	1.0	0.19	ug/L			03/01/19 12:12	1
4-Isopropyltoluene	0.20	U	1.0	0.20	ug/L			03/01/19 12:12	1
Methylene Chloride	0.94	U	1.0	0.94	ug/L			03/01/19 12:12	1
4-Methyl-2-pentanone	0.98	U	5.0	0.98	ug/L			03/01/19 12:12	1
Naphthalene	0.22	U	1.0	0.22	ug/L			03/01/19 12:12	1
n-Propylbenzene	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
Styrene	0.36	U	1.0	0.36	ug/L			03/01/19 12:12	1
1,1,1,2-Tetrachloroethane	0.21	U	1.0	0.21	ug/L			03/01/19 12:12	1
1,1,2,2-Tetrachloroethane	0.21	U	1.0	0.21	ug/L			03/01/19 12:12	1
Tetrachloroethene	0.20	U	1.0	0.20	ug/L			03/01/19 12:12	1
Toluene	0.17	U	1.0	0.17	ug/L			03/01/19 12:12	1
1,2,3-Trichlorobenzene	0.21	U	1.0	0.21	ug/L			03/01/19 12:12	1
1,2,4-Trichlorobenzene	0.21	U	1.0	0.21	ug/L			03/01/19 12:12	1
1,1,1-Trichloroethane	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
1,1,2-Trichloroethane	0.27	U	1.0	0.27	ug/L			03/01/19 12:12	1
Trichloroethene	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
Trichlorofluoromethane	0.29	U	1.0	0.29	ug/L			03/01/19 12:12	1
1,2,3-Trichloropropane	0.33	U	1.0	0.33	ug/L			03/01/19 12:12	1
1,2,4-Trimethylbenzene	0.15	U	1.0	0.15	ug/L			03/01/19 12:12	1
1,3,5-Trimethylbenzene	0.16	U	1.0	0.16	ug/L			03/01/19 12:12	1
Vinyl chloride	0.10	U	1.0	0.10	ug/L			03/01/19 12:12	1
Xylenes, Total	0.19	U	1.0	0.19	ug/L			03/01/19 12:12	1
1,2-Dibromoethane	0.18	U	1.0	0.18	ug/L			03/01/19 12:12	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	92		70 - 127		03/01/19 12:12	1
Toluene-d8 (Surr)	89		80 - 125		03/01/19 12:12	1
4-Bromofluorobenzene (Surr)	87		78 - 120		03/01/19 12:12	1
Dibromofluoromethane (Surr)	89		77 - 120		03/01/19 12:12	1

Method Summary

Client: Navarro Research and Engineering, Inc
Project/Site: PINELLAS 4.5 ACRE SITE

TestAmerica Job ID: 280-120531-1
SDG: PIN20-01.1902008

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL DEN
5030B	Purge and Trap	SW846	TAL DEN

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

Client: Navarro Research and Engineering, Inc
Project/Site: PINELLAS 4.5 ACRE SITE

TestAmerica Job ID: 280-120531-1
SDG: PIN20-01.1902008

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
280-120531-1	PIN20-01.1902008-009	Water	02/21/19 12:25	02/23/19 09:45
280-120531-2	PIN20-01.1902008-015	Water	02/21/19 09:00	02/23/19 09:45

Shipping and Receiving Documents

Chain of Custody / Sample Submittal Form

Task Code: PIN20-01.1902008

COC ID: PIN20-01.1902008-COC.1

TURNAROUND TIME: 28

PROJECT INFORMATION

LABORATORY

SAMPLING / SHIPPING

Facility Name: Pinellas 4.5 Acre Site
 Project Number: 1.101.1.06.509.2.01
 Project Name: Pinellas 4.5 Acre Site

Lab Name: TestAmerica Denver
 Address: 4955 Yarrow Street
 City: Arvada State: CO
 Postal Code: 80002
 Phone Number: 303-736-0100
 PO Number:

Shipping Company:
 Tracking Number:
 Cooler Count: 1
 Date Shipped: 02-22-19
 Sampled by: Julian Caballero
 Sampler 2:

SAMPLE DETAILS

ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID	Location	Matrix	Date	Time (24hr)	G=Grab C=Comp	QC	# of Cont	VOAS	Container	Filtered	Preserv.	ANALYSIS REQUESTED										
									GLASS 40 ML	N	4 C, HCl											
20-01.1902008-009	M069	GW	02-21-19	1225	G		3	3 N														
20-01.1902008-015	2863	WATER	02-21-19	0900	G		3	3 N														
X = shared container																						



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ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

RELINQUISHED BY

DATE/TIME

ACCEPTED BY

DATE/TIME

AMP
St. Kelly

02-22-19 0800
2-22-19 01700

St. Kelly
Celyssa Gomez

2-22-19 0800
2-23-19 0945

0.3, 1.0, 10.5, IR5, Xfered by Alla 2.23.19

Login Sample Receipt Checklist

Client: Navarro Research and Engineering, Inc

Job Number: 280-120531-1
SDG Number: PIN20-01.1902008

Login Number: 120531
List Number: 1
Creator: Gomez, Alyssa I

List Source: TestAmerica Denver

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	60
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	False	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ANALYTICAL REPORT

Job Number: 280-121143-2

SDG Number: PIN20-01.1903009

Job Description: Pinellas Bldg 100 Monitoring

For:

Navarro Research and Engineering, Inc
2597 Legacy Way
Grand Junction, CO 81503
Attention: Mr. Steve Donovan



Approved for release.
DiLea R Bindel
Project Manager I
4/1/2019 12:18 PM

DiLea R Bindel, Project Manager I
4955 Yarrow Street, Arvada, CO, 80002
(303)736-0173
dilea.bindel@testamericainc.com
04/01/2019

The test results in this report relate only to the samples in this report and meet all requirements of NELAC, with any exceptions noted. Pursuant to NELAP, this report shall not be reproduced except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Denver Project Manager.

The Lab Certification ID# is 4025.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

TestAmerica Laboratories, Inc.

TestAmerica Denver 4955 Yarrow Street, Arvada, CO 80002
Tel (303) 736-0100 Fax (303) 431-7171 www.testamericainc.com

Definitions/Glossary

Client: Navarro Research and Engineering, Inc
Project/Site: Pinellas Bldg 100 Monitoring

TestAmerica Job ID: 280-121143-2
SDG: PIN20-01.1903009

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
J	Estimated: The analyte was positively identified; the quantitation is an estimation

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

CASE NARRATIVE

Client: Navarro Research and Engineering, Inc.

Project: Pinellas Bldg 100 Monitoring - PIN20-01.1903009

Report Number: 280-121143-2

With exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. All laboratory quality control samples analyzed in conjunction with the samples in this project were within established control limits, with any exceptions noted. Calculations are performed before rounding to avoid round-off errors in calculated results.

This report includes reporting limits (RLs) less than TestAmerica Denver's practical quantitation limits. These reporting limits are being used specifically at the client's request to meet the needs of this project. Please note that data are not normally reported to these levels without qualification, since they are inherently less reliable and potentially less defensible than required by the current NELAC standards.

Results between the method detection limit (MDL) and reporting limit (RL) are flagged with a "J" qualifier to indicate an estimated value. These results are statistically less reliable than results greater than or equal to the RL and should be considered a qualitative value.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

The samples were received on 3/13/2019 9:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.2° C and 3.4° C.

GC/MS VOLATILES - SW846 8260B

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Navarro Research and Engineering, Inc
Project/Site: Pinellas Bldg 100 Monitoring

TestAmerica Job ID: 280-121143-2
SDG: PIN20-01.1903009

Client Sample ID: PIN20-01.1903009-009

Lab Sample ID: 280-121143-43

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Acetone	4.6	J	10	1.9	ug/L	1		8260B	Total/NA
cis-1,2-Dichloroethene	2.4		1.0	0.15	ug/L	1		8260B	Total/NA
trans-1,2-Dichloroethene	1.1		1.0	0.15	ug/L	1		8260B	Total/NA
Vinyl chloride	1.2		1.0	0.10	ug/L	1		8260B	Total/NA

Client Sample ID: PIN20-01.1903009-014

Lab Sample ID: 280-121143-44

No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica Denver

Client Sample Results

Client: Navarro Research and Engineering, Inc
 Project/Site: Pinellas Bldg 100 Monitoring

TestAmerica Job ID: 280-121143-2
 SDG: PIN20-01.1903009

Client Sample ID: PIN20-01.1903009-009

Lab Sample ID: 280-121143-43

Date Collected: 03/11/19 14:55

Matrix: Water

Date Received: 03/13/19 09:05

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	4.6	J	10	1.9	ug/L			03/21/19 12:08	1
Benzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
Bromobenzene	0.17	U	1.0	0.17	ug/L			03/21/19 12:08	1
Bromochloromethane	0.10	U	1.0	0.10	ug/L			03/21/19 12:08	1
Bromodichloromethane	0.17	U	1.0	0.17	ug/L			03/21/19 12:08	1
Bromoform	0.46	U	1.0	0.46	ug/L			03/21/19 12:08	1
Bromomethane	0.21	U	1.0	0.21	ug/L			03/21/19 12:08	1
2-Butanone (MEK)	2.0	U	5.0	2.0	ug/L			03/21/19 12:08	1
n-Butylbenzene	0.14	U	1.0	0.14	ug/L			03/21/19 12:08	1
sec-Butylbenzene	0.17	U	1.0	0.17	ug/L			03/21/19 12:08	1
tert-Butylbenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
Carbon disulfide	0.17	U	1.0	0.17	ug/L			03/21/19 12:08	1
Carbon tetrachloride	0.19	U	1.0	0.19	ug/L			03/21/19 12:08	1
Chlorobenzene	0.17	U	1.0	0.17	ug/L			03/21/19 12:08	1
Dibromochloromethane	0.17	U	1.0	0.17	ug/L			03/21/19 12:08	1
Chloroethane	0.41	U	1.0	0.41	ug/L			03/21/19 12:08	1
Chloroform	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
Chloromethane	0.30	U	1.0	0.30	ug/L			03/21/19 12:08	1
2-Chlorotoluene	0.17	U	1.0	0.17	ug/L			03/21/19 12:08	1
4-Chlorotoluene	0.21	U	1.0	0.21	ug/L			03/21/19 12:08	1
1,2-Dibromo-3-Chloropropane	0.47	U	1.0	0.47	ug/L			03/21/19 12:08	1
Dibromomethane	0.17	U	1.0	0.17	ug/L			03/21/19 12:08	1
1,2-Dichlorobenzene	0.15	U	1.0	0.15	ug/L			03/21/19 12:08	1
1,3-Dichlorobenzene	0.13	U	1.0	0.13	ug/L			03/21/19 12:08	1
1,4-Dichlorobenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
Dichlorodifluoromethane	0.31	U	1.0	0.31	ug/L			03/21/19 12:08	1
1,1-Dichloroethane	0.22	U	1.0	0.22	ug/L			03/21/19 12:08	1
1,2-Dichloroethane	0.13	U	1.0	0.13	ug/L			03/21/19 12:08	1
cis-1,2-Dichloroethene	2.4		1.0	0.15	ug/L			03/21/19 12:08	1
trans-1,2-Dichloroethene	1.1		1.0	0.15	ug/L			03/21/19 12:08	1
1,1-Dichloroethene	0.23	U	1.0	0.23	ug/L			03/21/19 12:08	1
1,2-Dichloropropane	0.18	U	1.0	0.18	ug/L			03/21/19 12:08	1
1,3-Dichloropropane	0.090	U	1.0	0.090	ug/L			03/21/19 12:08	1
2,2-Dichloropropane	0.38	U	1.0	0.38	ug/L			03/21/19 12:08	1
cis-1,3-Dichloropropene	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
trans-1,3-Dichloropropene	0.19	U	1.0	0.19	ug/L			03/21/19 12:08	1
1,1-Dichloropropene	0.19	U	1.0	0.19	ug/L			03/21/19 12:08	1
Ethylbenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
Hexachlorobutadiene	0.36	U	1.0	0.36	ug/L			03/21/19 12:08	1
2-Hexanone	1.7	U	5.0	1.7	ug/L			03/21/19 12:08	1
Isopropylbenzene	0.19	U	1.0	0.19	ug/L			03/21/19 12:08	1
4-Isopropyltoluene	0.20	U	1.0	0.20	ug/L			03/21/19 12:08	1
Methylene Chloride	0.94	U	1.0	0.94	ug/L			03/21/19 12:08	1
4-Methyl-2-pentanone	0.98	U	5.0	0.98	ug/L			03/21/19 12:08	1
Naphthalene	0.22	U	1.0	0.22	ug/L			03/21/19 12:08	1
n-Propylbenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
Styrene	0.36	U	1.0	0.36	ug/L			03/21/19 12:08	1
1,1,1,2-Tetrachloroethane	0.21	U	1.0	0.21	ug/L			03/21/19 12:08	1
1,1,2,2-Tetrachloroethane	0.21	U	1.0	0.21	ug/L			03/21/19 12:08	1

Client Sample Results

Client: Navarro Research and Engineering, Inc
 Project/Site: Pinellas Bldg 100 Monitoring

TestAmerica Job ID: 280-121143-2
 SDG: PIN20-01.1903009

Client Sample ID: PIN20-01.1903009-009

Lab Sample ID: 280-121143-43

Date Collected: 03/11/19 14:55

Matrix: Water

Date Received: 03/13/19 09:05

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.20	U	1.0	0.20	ug/L			03/21/19 12:08	1
Toluene	0.17	U	1.0	0.17	ug/L			03/21/19 12:08	1
1,2,3-Trichlorobenzene	0.21	U	1.0	0.21	ug/L			03/21/19 12:08	1
1,2,4-Trichlorobenzene	0.21	U	1.0	0.21	ug/L			03/21/19 12:08	1
1,1,1-Trichloroethane	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
1,1,2-Trichloroethane	0.27	U	1.0	0.27	ug/L			03/21/19 12:08	1
Trichloroethene	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
Trichlorofluoromethane	0.29	U	1.0	0.29	ug/L			03/21/19 12:08	1
1,2,3-Trichloropropane	0.33	U	1.0	0.33	ug/L			03/21/19 12:08	1
1,2,4-Trimethylbenzene	0.15	U	1.0	0.15	ug/L			03/21/19 12:08	1
1,3,5-Trimethylbenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:08	1
Vinyl chloride	1.2		1.0	0.10	ug/L			03/21/19 12:08	1
Xylenes, Total	0.19	U	1.0	0.19	ug/L			03/21/19 12:08	1
1,2-Dibromoethane	0.18	U	1.0	0.18	ug/L			03/21/19 12:08	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	90		70 - 127		03/21/19 12:08	1
Toluene-d8 (Surr)	96		80 - 125		03/21/19 12:08	1
4-Bromofluorobenzene (Surr)	98		78 - 120		03/21/19 12:08	1
Dibromofluoromethane (Surr)	91		77 - 120		03/21/19 12:08	1

Client Sample ID: PIN20-01.1903009-014

Lab Sample ID: 280-121143-44

Date Collected: 03/11/19 12:00

Matrix: Water

Date Received: 03/13/19 09:05

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1.9	U	10	1.9	ug/L			03/21/19 12:28	1
Benzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
Bromobenzene	0.17	U	1.0	0.17	ug/L			03/21/19 12:28	1
Bromochloromethane	0.10	U	1.0	0.10	ug/L			03/21/19 12:28	1
Bromodichloromethane	0.17	U	1.0	0.17	ug/L			03/21/19 12:28	1
Bromoform	0.46	U	1.0	0.46	ug/L			03/21/19 12:28	1
Bromomethane	0.21	U	1.0	0.21	ug/L			03/21/19 12:28	1
2-Butanone (MEK)	2.0	U	5.0	2.0	ug/L			03/21/19 12:28	1
n-Butylbenzene	0.14	U	1.0	0.14	ug/L			03/21/19 12:28	1
sec-Butylbenzene	0.17	U	1.0	0.17	ug/L			03/21/19 12:28	1
tert-Butylbenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
Carbon disulfide	0.17	U	1.0	0.17	ug/L			03/21/19 12:28	1
Carbon tetrachloride	0.19	U	1.0	0.19	ug/L			03/21/19 12:28	1
Chlorobenzene	0.17	U	1.0	0.17	ug/L			03/21/19 12:28	1
Dibromochloromethane	0.17	U	1.0	0.17	ug/L			03/21/19 12:28	1
Chloroethane	0.41	U	1.0	0.41	ug/L			03/21/19 12:28	1
Chloroform	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
Chloromethane	0.30	U	1.0	0.30	ug/L			03/21/19 12:28	1
2-Chlorotoluene	0.17	U	1.0	0.17	ug/L			03/21/19 12:28	1
4-Chlorotoluene	0.21	U	1.0	0.21	ug/L			03/21/19 12:28	1
1,2-Dibromo-3-Chloropropane	0.47	U	1.0	0.47	ug/L			03/21/19 12:28	1
Dibromomethane	0.17	U	1.0	0.17	ug/L			03/21/19 12:28	1
1,2-Dichlorobenzene	0.15	U	1.0	0.15	ug/L			03/21/19 12:28	1

TestAmerica Denver

Client Sample Results

Client: Navarro Research and Engineering, Inc
 Project/Site: Pinellas Bldg 100 Monitoring

TestAmerica Job ID: 280-121143-2
 SDG: PIN20-01.1903009

Client Sample ID: PIN20-01.1903009-014

Lab Sample ID: 280-121143-44

Date Collected: 03/11/19 12:00

Matrix: Water

Date Received: 03/13/19 09:05

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
1,3-Dichlorobenzene	0.13	U	1.0	0.13	ug/L			03/21/19 12:28	1
1,4-Dichlorobenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
Dichlorodifluoromethane	0.31	U	1.0	0.31	ug/L			03/21/19 12:28	1
1,1-Dichloroethane	0.22	U	1.0	0.22	ug/L			03/21/19 12:28	1
1,2-Dichloroethane	0.13	U	1.0	0.13	ug/L			03/21/19 12:28	1
cis-1,2-Dichloroethene	0.15	U	1.0	0.15	ug/L			03/21/19 12:28	1
trans-1,2-Dichloroethene	0.15	U	1.0	0.15	ug/L			03/21/19 12:28	1
1,1-Dichloroethene	0.23	U	1.0	0.23	ug/L			03/21/19 12:28	1
1,2-Dichloropropane	0.18	U	1.0	0.18	ug/L			03/21/19 12:28	1
1,3-Dichloropropane	0.090	U	1.0	0.090	ug/L			03/21/19 12:28	1
2,2-Dichloropropane	0.38	U	1.0	0.38	ug/L			03/21/19 12:28	1
cis-1,3-Dichloropropene	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
trans-1,3-Dichloropropene	0.19	U	1.0	0.19	ug/L			03/21/19 12:28	1
1,1-Dichloropropene	0.19	U	1.0	0.19	ug/L			03/21/19 12:28	1
Ethylbenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
Hexachlorobutadiene	0.36	U	1.0	0.36	ug/L			03/21/19 12:28	1
2-Hexanone	1.7	U	5.0	1.7	ug/L			03/21/19 12:28	1
Isopropylbenzene	0.19	U	1.0	0.19	ug/L			03/21/19 12:28	1
4-Isopropyltoluene	0.20	U	1.0	0.20	ug/L			03/21/19 12:28	1
Methylene Chloride	0.94	U	1.0	0.94	ug/L			03/21/19 12:28	1
4-Methyl-2-pentanone	0.98	U	5.0	0.98	ug/L			03/21/19 12:28	1
Naphthalene	0.22	U	1.0	0.22	ug/L			03/21/19 12:28	1
n-Propylbenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
Styrene	0.36	U	1.0	0.36	ug/L			03/21/19 12:28	1
1,1,1,2-Tetrachloroethane	0.21	U	1.0	0.21	ug/L			03/21/19 12:28	1
1,1,2,2-Tetrachloroethane	0.21	U	1.0	0.21	ug/L			03/21/19 12:28	1
Tetrachloroethene	0.20	U	1.0	0.20	ug/L			03/21/19 12:28	1
Toluene	0.17	U	1.0	0.17	ug/L			03/21/19 12:28	1
1,2,3-Trichlorobenzene	0.21	U	1.0	0.21	ug/L			03/21/19 12:28	1
1,2,4-Trichlorobenzene	0.21	U	1.0	0.21	ug/L			03/21/19 12:28	1
1,1,1-Trichloroethane	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
1,1,2-Trichloroethane	0.27	U	1.0	0.27	ug/L			03/21/19 12:28	1
Trichloroethene	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
Trichlorofluoromethane	0.29	U	1.0	0.29	ug/L			03/21/19 12:28	1
1,2,3-Trichloropropane	0.33	U	1.0	0.33	ug/L			03/21/19 12:28	1
1,2,4-Trimethylbenzene	0.15	U	1.0	0.15	ug/L			03/21/19 12:28	1
1,3,5-Trimethylbenzene	0.16	U	1.0	0.16	ug/L			03/21/19 12:28	1
Vinyl chloride	0.10	U	1.0	0.10	ug/L			03/21/19 12:28	1
Xylenes, Total	0.19	U	1.0	0.19	ug/L			03/21/19 12:28	1
1,2-Dibromoethane	0.18	U	1.0	0.18	ug/L			03/21/19 12:28	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	92		70 - 127		03/21/19 12:28	1
Toluene-d8 (Surr)	92		80 - 125		03/21/19 12:28	1
4-Bromofluorobenzene (Surr)	100		78 - 120		03/21/19 12:28	1
Dibromofluoromethane (Surr)	95		77 - 120		03/21/19 12:28	1

Method Summary

Client: Navarro Research and Engineering, Inc
Project/Site: Pinellas Bldg 100 Monitoring

TestAmerica Job ID: 280-121143-2
SDG: PIN20-01.1903009

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL DEN
5030B	Purge and Trap	SW846	TAL DEN

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

Client: Navarro Research and Engineering, Inc
Project/Site: Pinellas Bldg 100 Monitoring

TestAmerica Job ID: 280-121143-2
SDG: PIN20-01.1903009

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
280-121143-43	PIN20-01.1903009-009	Water	03/11/19 14:55	03/13/19 09:05
280-121143-44	PIN20-01.1903009-014	Water	03/11/19 12:00	03/13/19 09:05

Shipping and Receiving Documents

Login Sample Receipt Checklist

Client: Navarro Research and Engineering, Inc

Job Number: 280-121143-2
SDG Number: PIN20-01.1903009

Login Number: 121143
List Number: 1
Creator: Gomez, Alyssa I

List Source: TestAmerica Denver

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	False	Refer to Job Narrative for details.
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	