



October 24, 2019

Ms. Renee Romero
New Mexico Environment Department
Petroleum Storage Tank Bureau
1914 West Second Street
Roswell, New Mexico 88201-1712

Re: Aquifer Test Report
Former Y Station, 721 Commerce Way, Clovis, New Mexico
Facility #53742, Release ID #4746, WPID #4022

Dear Ms. Romero:

Daniel B. Stephens & Associates, Inc. (DBS&A) is pleased to submit the enclosed report summarizing aquifer testing activities conducted at the above-referenced site on July 9 through 20, 2019. All activities were completed in accordance with the approved work plan and DBS&A standard operating procedures.

This report constitutes the deliverable for Deliverable ID #4022-2. DBS&A plans to invoice the full amount budgeted for this task.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Thomas Golden, P.E.
Project Engineer

Jason J. Raucci, P.G.
Project Manager

TG/rpf
Enclosure

Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 505-822-9400

Albuquerque, NM 87109 FAX 505-822-8877

Aquifer Test Report

Former Y Station State Lead Site

721 Commerce Way, Clovis, New Mexico

Facility ID #53742, Release ID #4746, WPID #4022

Prepared for

**New Mexico Environment Department
Petroleum Storage Tank Bureau**

October 24, 2019



Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109



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1. Introduction

Daniel B. Stephens & Associates, Inc. (DBS&A) has prepared this aquifer test report for the Former Y Station State Lead site in Clovis, New Mexico (the site). The report documents the work performed from July 9 through 20, 2019 in accordance with the work plan dated September 17, 2018 (DBS&A, 2018), which was amended and approved by the New Mexico Environment Department (NMED) Petroleum Storage Tank Bureau (PSTB) on February 21, 2019 (NMED, 2019). Due to the presence of light nonaqueous-phase liquid (LNAPL) in BW-5, DBS&A recommended a change in the approved scope of work to conduct the aquifer testing activities at newly installed downgradient well MW-11. The change request was submitted to the PSTB on April 26, 2019 and approved on May 8, 2019. All work was completed in accordance with the requirements of Part 119 of the New Mexico Petroleum Storage Tank Regulations (PSTR) and DBS&A standard operating procedures.

1.1 Site History

The Former Y site is located at 721 Commerce Way in Clovis, New Mexico (Figure 1). Initial site investigation activities completed by the previous consultant in 2011 were driven by the discovery of a release during a tank pull at the Allsup's No. 320 (Allsup's) site, located at the corner of Prince and 21st Streets. Subsequent investigations from 2012 to 2016 revealed a large dissolved-phase hydrocarbon plume south of the Allsup's site, centered near the intersection of Prince Street and Commerce Way. Interviews with local residents and inspection of public records by the previous consultant revealed that a Shamrock fueling station was formerly present on the southwest corner of this intersection, locally referred to as "the Y." The former Shamrock was reportedly active from the late 1950s through approximately 1981. The site is currently used an optical retail center and is surrounded by a variety of other commercial land uses, such as big box retail stores, fast food restaurants, and existing gasoline service stations. Residential neighborhoods are adjacent to the commercial corridor to the west and east.

The previous consultant oversaw installation of 10 groundwater monitor wells (BW-1 through BW-10) in the vicinity of the Former Y station, including 3 wells on the Allsup's property



(Figure 2). As of July 2016, the extent of groundwater contamination remained undefined to the south and east. Benzene was the constituent found at the highest concentrations and across the greatest areal extent. Concentrations of other contaminants of concern above applicable regulatory standards were typically localized near the center of the benzene plume.

DBS&A responded to the request for proposals (RFP) for state-lead remediation services for the site with a proposal submitted to the PSTB on October 24, 2017. DBS&A was deemed to be the most responsive bidder and entered into a contract with NMED executed on May 15, 2018. No corrective action has been implemented at the site, pending completion of site characterization.

The aquifer test described herein is one component of the site investigation program conducted by DBS&A under WPID #4022 to address significant data gaps that must be addressed before the proposed remedial action can proceed. This program will help to better define the current extent of groundwater contamination under the site, and will serve to better delineate the extent of hydrocarbon impacts in the vadose zone near the presumed point of release at the Former Y station. Site investigation activities were conducted from May through October 2019. As part of the ongoing site investigation, DBS&A installed new monitor well MW-11, which was used as the pumping well in the aquifer testing program. Installation of MW-11 was completed on June 8, 2019. Well development was completed on July 15, 2019 and aquifer testing commenced on July 17, 2019.

1.2 Site Hydrogeology

The site is located in the Llano Estacado section of the Great Plains physiographic province, at an elevation of approximately 4,280 feet above mean sea level (feet msl). Surface drainage in the area around the site is generally to the south. The City of Clovis (the City) is located within the Curry County underground water basin (UWB), as defined by the New Mexico Office of the State Engineer (NMOSE).

The geology underlying the City consists of layered sedimentary formations dipping gently to the southeast—principally the Ogallala Formation and underlying Triassic-age sedimentary rocks.



The Ogallala Formation (Pliocene) consists of fine- to coarse-grained sand, silt, and clay; ledges of weathering-resistant, calcium carbonate-cemented caprock are present near the top of the formation (Galloway, 1972). The caprock unit of the Ogallala Formation is up to 60 feet thick, variably cemented by caliche, and has been observed in boreholes completed at the site. The caprock is underlain by a thick sequence of fine-grained, loosely consolidated sands and silty sands. A slight increase in cementation is noted below about 250 to 300 feet below ground surface (bgs) in boring logs from the site. Sonic cores retrieved during drilling of new wells installed in 2019 indicated the widespread presence of a poorly sorted, clay- and gravel-rich interval below about 350 feet bgs, consistent with the basal beds described by Galloway (1972).

Based on data from the U.S. Geological Survey (USGS), the Ogallala Formation likely extends to a depth of approximately 380 feet bgs in the site vicinity (Hart and McAda, 1985). The Ogallala Formation is underlain by fine-grained sedimentary rocks of the Triassic-age Dockum Group. Rocks of the Dockum Group are considered hydrologic bedrock, and constitute the lower bound of the Ogallala Aquifer (Hart and McAda, 1985; Galloway, 1972).

At the site, groundwater is present within the Ogallala aquifer under unconfined conditions, and is encountered at depths of approximately 325 to 330 feet bgs. The current saturated thickness of the Ogallala aquifer in the site vicinity is therefore estimated to be approximately 50 to 55 feet. The City currently relies entirely on groundwater from the Ogallala aquifer for its municipal water supply. Significant and ongoing water level declines in the Ogallala aquifer are well documented in the Clovis area. Water levels have decreased in the Clovis vicinity by over 50 feet since 1950, and recent estimates indicate that water levels have been decreasing at locally variable rates up to 1 foot per year. Modeling of the Curry County UWB by the NMOSE estimated that the hydraulic conductivity of the Ogallala aquifer in the vicinity of Clovis is approximately 70 feet per day (ft/d), with a specific yield of approximately 23 percent (NMISC, 2016).



2. Scope of Work

As discussed in the proposal for state-lead remediation services, step-drawdown and constant-rate pumping tests are needed to evaluate parameters for design of the groundwater extraction component of the proposed remedy. In the response to the RFP, DBS&A proposed using BW-7 for these pumping tests, but it was subsequently discovered that BW-7 is damaged and no longer has a sufficient saturated interval to accommodate aquifer testing. DBS&A therefore proposed in the approved work plan to use existing well BW-5. However, during a well check on March 6, 2019, LNAPL was present in well BW-5 at a thickness of 1.92 feet. LNAPL was not reported during previous monitoring events. Pumping tests are typically not conducted in wells containing LNAPL due to the potential for smearing fuel product below the water table and the difficulty of treating LNAPL-containing fluids for discharge. With wells BW-5 and BW-7 both unsuitable for aquifer testing, DBS&A proposed to conduct the tests at newly installed downgradient well MW-11. Pumping tests were scheduled to be conducted following completion of well development at the newly installed well.

Planned aquifer testing at MW-11 consisted of a 12-hour step-drawdown test, followed by a 72-hour constant-rate test. The step-drawdown test was planned to consist of a series of four 3-hour steps, with discharge rates increasing at each step—from 5 gallons per minute (gpm) during the first step to 35 gpm on the last step. These proposed pumping rates were based on calculations from published aquifer parameters. However, observations recorded during well development suggested that the production capacity of on-site wells was less than expected, and would likely be limited to less than 10 gpm for the purposes of aquifer testing. The stepped discharge rates and testing procedure used are described in detail in the following sections.

The results of the step-drawdown test (Section 3.1) were used to select an optimal pumping rate for the proposed 72-hour constant-rate test. DBS&A assessed aquifer parameters using AQTESOLV software and analytical methods appropriate to determine well efficiency, aquifer hydraulic properties, and the theoretical capture zone of the pumped well.



3. Aquifer Testing

Yellow Jacket Drilling, Inc. of Phoenix, Arizona provided the electronic submersible pump (Grundfos model 35S75-22) and controller, including all downhole apparatus, and a generator to operate the pump. EnviroWorks, LLC of Edgewood, New Mexico provided surface conveyance plumbing, flow meters, temporary storage tanks, and treatment equipment, including a second generator, for treatment of discharged groundwater during the aquifer pumping tests. The treatment and disposal process for groundwater discharged during the aquifer tests is described in Section 3.3.

Nearby existing wells BW-10 and BW-7 were used as observation wells for the step-drawdown test and constant-rate test conducted at well MW-11. Wells BW-10 and BW-7 are approximately 350 and 450 feet from the pumping well, respectively. Manual water level measurements were collected from the pumping and observations wells during the step-drawdown test and the constant-rate test. On July 9, 2019, prior to the step-drawdown test, transducers were deployed in pumping well MW-11 and observation well BW-10 to establish baseline conditions and verify transducer function. On July 17, 2019, DBS&A began performing the aquifer tests at well MW-11. Field notes documenting activities conducted and data collected during the aquifer tests are provided in Appendix A. Photographs taken during the aquifer tests are provided in Appendix B.

3.1 Step-Drawdown Test

Based on observations during well development, DBS&A attempted to execute the step-drawdown test at MW-11 with pumping steps of 6, 9, 12, and 15 gpm. These rates are lower than those initially proposed, and the pumping equipment installed at the well was oversized for the selected discharge rates; flow was controlled at the surface using a valve at the discharge point.

Following a period of adjusting the flow controls to maintain a steady rate of 6 gpm, the initial step was conducted for the planned duration of 3 hours, with approximately 15 feet of drawdown observed in the well. Totalizer counts indicated a time-averaged discharge rate of 6.4 gpm during this period. Increasing the flow to 9 gpm resulted in rapid drawdown of the water level to



below the transducer setting, near the pump inlet. Two attempts were made to conduct the second step at the proposed 9 gpm rate, with the same result. The pumping rate was temporarily decreased back to 6 gpm. During the remainder of the test period, two steps of 2 hours duration each were conducted at pumping rates of 2.5 gpm and 4.1 gpm, resulting in drawdown of 4.6 feet and 10.8 feet, respectively. Based on the observed drawdown at the end of the final step, a pumping rate of approximately 4 gpm was selected for the constant-rate test.

3.2 Constant-Rate Pumping Test

Following verification that the water level in the well had recovered at least 95 percent of the drawdown incurred during the step-drawdown test, DBS&A began a constant-rate test at 8:00 a.m. on July 18, 2019. Based on observations from the step-drawdown test, the constant-rate test was conducted at a discharge rate of approximately 4 gpm. As with the step-drawdown test, instantaneous flow rates interpreted from totalizer measurements varied considerably during the first hour of the test. During the bulk of the remainder of the test, time-averaged discharge rates based on totalizer readings were generally within 10 percent of the target rate of 4 gpm. The discharge rate dropped to under 2 gpm between hours 4 and 5 of the test, but was corrected after that time and remained relatively constant for the remainder of the test, with the exceptions noted in Section 4.1.3.

The constant-rate pumping test was terminated after 60 hours, at 10:00 p.m. on July 20, 2019, in order to accommodate the property owner's request that the parking lot area be made accessible for business activities. DBS&A determined that sufficient data for interpretation of aquifer parameters had been gathered by this time. DBS&A monitored recovery from the constant-rate test for approximately 10 hours after cessation of pumping.

3.3 Discharged Groundwater Storage and Disposal

Groundwater discharged during the pumping tests was stored in a 1,500-gallon temporary holding tank located near the pumping well. Groundwater discharge samples were collected once per day during the step-drawdown and constant-rate tests, and were submitted to Hall Environmental Analysis Laboratory of Albuquerque, New Mexico (HEAL) for analysis of volatile



organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) method 8260B and analysis of 1,2-dibromoethane (EDB) using EPA method 504.1.

Water was pumped from the primary holding tank through a Geotech LO-PRO portable air stripper unit into an 1,100-gallon secondary holding tank. The trailer-mounted air stripper was placed on stacked railroad ties so that water could gravity drain through the stripper directly into the secondary tank. Prior to discharge to the City sanitary sewer, water samples collected from the secondary holding tank were field-screened using a Defiant Technologies, Inc. FROG 4000 portable chromatograph. Treated effluent was discharged to the City sanitary sewer pending screening verification that benzene concentrations were reduced to approximately 5 micrograms per liter ($\mu\text{g/L}$), the New Mexico Water Quality Control Commission (NMWQCC) standard. If the water in the secondary holding tank did not meet the screening criteria for release, it was recirculated through the air stripper unit until the discharge criteria were met. Approximately 17,000 gallons of groundwater was extracted, treated, and discharged during the step-drawdown and constant-rate tests. No fluids were discharged to the ground during the step-drawdown and constant-rate tests.

In accordance with industrial discharge requirements for the City, a treated effluent discharge sample was collected during the constant-rate test and analyzed by HEAL for dissolved lead using EPA method 6010/200.7.



4. Results and Analysis

DBS&A analyzed data from the aquifer tests using AQTESOLV for Windows (Version 4.50 Professional). AQTESOLV is distributed by HydroSOLVE, Inc. and contains a comprehensive suite of standard and published analytical solutions for determining aquifer properties from pumping and slug tests. Data collection and analytical results are discussed in the following subsections.

4.1 Field Data

4.1.1 Baseline Data

Transducers were installed in wells MW-11 and BW-10 on July 9, 2019. The transducer cable at MW-11 was cut and stolen on the night of July 14, 2019, although the transducer itself and the background data recorded up to that point were recovered prior to the pumping tests. DBS&A also recorded surface barometric pressure at the site using a BaroTroll datalogging barometer.

Minimal pressure changes were observed in the wells during the baseline monitoring period, although a slight diurnal cycle was noted with a typical magnitude of 2 to 3 inches of water. The transducer cables are vented at the surface, and therefore compensate for changes in surface air pressure. DBS&A believes that the diurnal pressure changes recorded by the transducers represent daily changes in the subsurface pressure differential with respect to surface conditions. Small-magnitude subsurface differential pressure cycles are common in settings where there is a thick vadose zone, and previous site investigators have noted that site wells periodically exhibited positive or negative pressure at depth relative to surface conditions. The observed variances are not sufficient to significantly impact the performance or results of the aquifer testing.

Water level and barometric pressure plots derived from data collected during the baseline monitoring period are provided in Appendix C.



4.1.2 Step-Drawdown Test

The primary purpose of the step-drawdown test was to determine an appropriate and sustainable pumping rate for the constant-rate test. Step-drawdown test data can also be used to estimate the specific capacity of a well at various pumping rates, as well as the well efficiency. Due to the lower-than-expected capacity of the pumping well and multiple attempts to determine a sustainable pumping rate, the step-drawdown test was not conducted using sequentially increasing pumping rates. Because the data used in the step-drawdown test analysis are non-standard, analytical results should be considered provisional and approximate (Appendix D).

4.1.3 Constant-Rate Test

4.1.3.1 Pumping Well

The step-drawdown test data indicated that monitor well MW-11 would be capable of sustaining a pumping rate of 4 gpm. This rate was selected for the constant-rate test. Due to sharp pumping rate fluctuations during the early-time portion of the test, the dataset does not conform to strict criteria for a standard constant-rate test. Due to the great depth to the water table, initially filling the column pipe withdraws a proportionally large amount of water before the discharge rate can be measured and adjusted at the surface, resulting in variable and anomalous pumping rates during the initial minutes of the test. Although the AQTESOLV software can accommodate and interpret variable-rate pumping tests, adjustments to the discharge rate during the test often occurred incrementally during the early part of the test, rendering interpretation problematic. Early-time data from this test are therefore not considered for assessment of aquifer properties.

Time-averaged pumping rates during the bulk of the test were typically within 10 percent of the target discharge rate of 4 gpm. However, due to the limited well capacity and low pumping rates used in the test, small changes in the discharge rate can have a significant effect on drawdown trends. For example, the drawdown observations suggest a slight increase in the overall pumping rate at approximately 33 hours, which is reflected in the pumping rate input for AQTESOLV analysis (Appendix E). A sharp drop in the pumping rate around 5 to 6 hours is



noted in the field documentation, with a corresponding decrease in drawdown observed in the pumping well; this drop is reflected in the model solution. Discharge rates were generally steadier after this adjustment, and these later-time data are used as the basis for interpretation of aquifer parameters (Section 4.2.2).

Drawdown continued to increase slowly during the constant-rate test. During the last 6 hours of pumping, the water level continued to decrease by 0.02 foot per minute. Steady-state conditions therefore did not develop through the duration of the test. The final drawdown in the well after 60 hours of pumping was approximately 15.4 feet. Nearly complete water level recovery occurred within several minutes of the termination of pumping, suggesting that the check valve on the column pipe was not functioning properly. Therefore, recovery observations could not be analyzed to derive aquifer parameters.

4.1.3.2 Observation Wells

Wells BW-10 and BW-7 are approximately 390 and 420 feet from the pumping well, respectively. New wells MW-12 and MW-13 are closer to MW-11, but were not installed at the time of the constant-rate test (Figure 2). Transducer data from BW-10 and manual water level measurements taken at BW-10 and BW-7 indicated minimal changes in observation well water levels during the constant-rate pumping test. Field observations did not indicate an interpretable departure from background conditions during the 60 hours of test pumping.

4.2 Analysis

4.2.1 Step-Drawdown Test

The specific capacity of the pumping well appears to be on the order of 0.4 to 0.5 gpm per foot (gpm/ft) at a pumping rate of less than 4 gpm. Well efficiency was calculated using the methods of Driscoll (1986). Based on the available data, the pumping well appears reasonably efficient, with a calculated efficiency on the order of 75 percent at a flow rate of 4 gpm. As noted above, the step test field procedure was non-standard, and analytical results should be considered provisional and approximate. Calculations are provided in Appendix D.



4.2.2 Constant-Rate Test

DBS&A analyzed data from well MW-11 using the AQTESOLV software application and the solution of Tartakovsky and Neuman (2007) for unconfined aquifers with partially penetrating wells under unsteady flow conditions. The simulation derives aquifer hydraulic properties by matching solution type curves with time-drawdown plots derived from field observations for the given pumping rates. Model inputs included pumping rate information derived from field totalizer records and drawdown data collected from the downhole pressure transducer at 1-minute intervals. Additional inputs include the following:

- The diameter of the 5-inch polyvinyl chloride (PVC) well casing and 9-inch borehole.
- The thickness of the Ogallala aquifer is approximated at 50 feet, and is assumed to be underlain by comparatively impermeable bedrock materials. Approximately 30 feet of well screen is below the water table under current static water level conditions.
- The hydraulic conductivity anisotropy ratio (K_z/K_r) is set to 0.1, consistent with the aquifer lithology of layered silty sand and weakly cemented fine-grained sandstone.
- Storativity and specific yield were assumed to be on the order of 0.2, consistent with unconfined aquifer conditions and sandy, fine-grained aquifer materials (e.g., Freeze and Cherry, 1979) and previous reporting by NMISC (2016).

Drawdown data from manual water level measurements conducted periodically during the test were also analyzed using the same methods and input parameters. Based on the AQTESOLV solutions for input pumping rates, drawdown data were consistent with an aquifer transmissivity of approximately 58 square feet per day (ft^2/d) and a specific yield of 0.20. The transmissivity estimate is equivalent to a hydraulic conductivity of 1.16 ft/d for an aquifer of 50-foot thickness. Drawdown plots with matched type curve solutions are provided in Appendix E.



4.2.3 Water Quality Analysis

A preliminary water quality sample was obtained from well MW-11 immediately following well installation but prior to well development to assess the suitability of the well for aquifer testing. The preliminary sample results indicated a benzene concentration of 64 µg/L and 1,2-dichloroethane (EDC) concentration of 5.2 µg/L, both of which exceed the NMWQCC standards. Concentrations of other VOCs were either below laboratory detection limits or below the applicable groundwater quality standards. These results were deemed suitable for groundwater extraction, treatment, and discharge operations.

Significantly higher concentrations of dissolved-phase VOCs were detected in the daily groundwater discharge samples than were suggested by the preliminary sample analysis. DBS&A believes that the preliminary sample was diluted by water added to the borehole during well drilling and construction. A total of four samples were collected during aquifer testing, and results showed increasing concentrations of VOCs during the testing period. For example, the benzene concentration increased from 1,200 µg/L in the initial sample during aquifer testing to 2,000 µg/L in the final sample prior to cessation of pumping. Concentrations of other VOCs increased correspondingly. Results of the final groundwater discharge sampling on July 20, 2019 indicate that concentrations of benzene (2,000 µg/L), EDB (3.2 µg/L), EDC (91 µg/L), and total xylenes (770 µg/L) exceed NMWQCC standards. Analytical results are summarized in Table 1. Complete analytical laboratory reports are provided in Appendix F.

The dissolved lead concentration of 0.0052 milligrams per liter (mg/L) in the treated effluent sample meets City industrial discharge standards (Appendix F).



5. Conclusions

The results of aquifer testing conducted at Former Y Station monitor well MW-11 indicate aquifer parameters that are consistent with literature ranges for fine-grained silty sand aquifers under unconfined conditions (e.g., Freeze and Cherry, 1979). Although consistent with the site geology, the results of the aquifer test indicate an aquifer that is more than an order of magnitude less transmissive than regional literature estimates for the Ogallala aquifer, which suggested hydraulic conductivities of approximately 70 ft/d.

DBS&A also conducted physical properties analyses of remolded aquifer materials from selected sonic drill cores collected below the water table during borehole installation for wells BW-7R and MW-11 through MW-13. The complete soil laboratory report is provided in Appendix G; additional discussion of soil physical properties analysis will be provided under separate cover in DBS&A's well installation report. Laboratory estimates of hydraulic conductivity from remolded sonic core materials range from 1.59 to 11.3 ft/d; the aquifer test results are therefore close to the low end of laboratory estimates. The sample collected from the borehole for pumping well MW-11 yielded a result of 4.54 ft/d, but did not incorporate the clayey sand and gravel interval at the base of the aquifer. DBS&A believes the physical properties analysis and the aquifer testing results to be broadly consistent, as (1) well losses under pumping drawdown conditions may result in a slight underestimate of hydraulic conductivity based on aquifer testing and (2) target remold parameters for the laboratory sample may result in a slight overestimate of hydraulic conductivity from physical properties analysis.

Pumping test observations and aquifer parameters indicate that a pumping rate on the order of approximately 4 gpm may be sustainable for long-term groundwater extraction operations from well MW-11, assuming that steady-state conditions develop. Water level data from observation wells did not demonstrate an interpretable effect from pumping during the 60-hour constant-rate test. However, a simple approximation based on the Theis (1935) equation, using aquifer parameters consistent with those described in Section 4.2.2, indicates that at a distance of 400 feet from the pumping well, measureable drawdown effects would not have occurred within 60 hours. The results indicate that under idealized conditions, drawdown at distal wells should become measureable within 60 days of the start of extraction at the target rate of 4 gpm from



well MW-11. Tables 2a and 2b summarize hypothetical drawdown over time at a distance of 400 feet from the extraction well.

The aquifer testing results demonstrate that groundwater extraction will be a viable remediation strategy at the site. Additional rigorous groundwater modeling should be conducted using the aquifer test results and other data to establish the basis for remediation system design. This analysis, which would be performed during development of a final remediation plan (FRP), would evaluate both regional drawdown and particle capture from multi-well pumping scenarios. Recommendations for implementation of groundwater treatment at the site would also be discussed in the upcoming FRP for the site.



References

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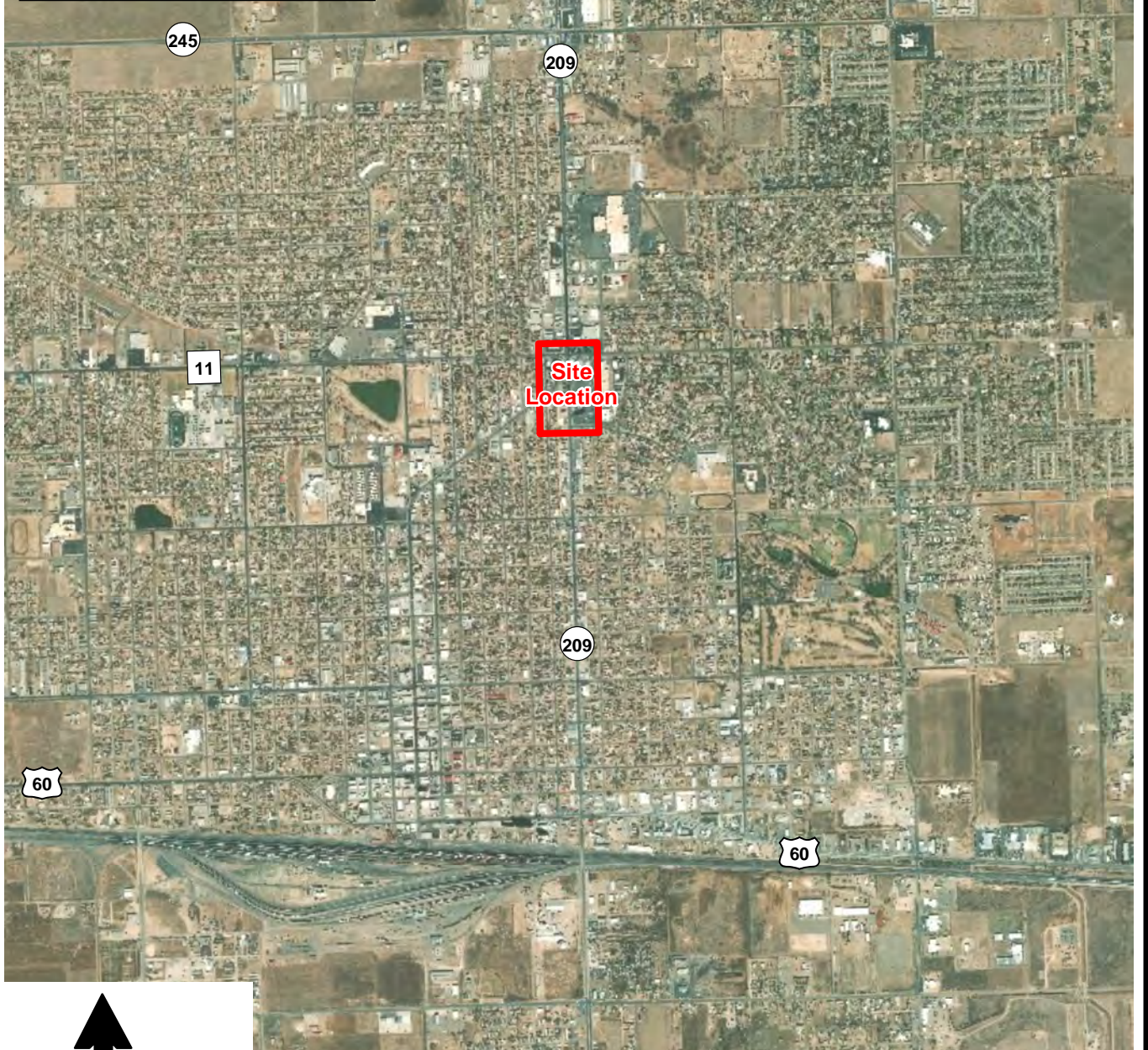
Daniel B. Stephens & Associates, Inc.

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Figures



New Mexico Location Map



0 0.25 0.5
Mile

FORMER Y STATION STATE LEAD SITE
CLOVIS, NEW MEXICO
Area Map

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Daniel B. Stephens & Associates, Inc.
6/3/2019 JN DB18.1157.00

Figure 1



FORMER Y STATION STATE LEAD SITE
CLOVIS, NEW MEXICO
Site Map

Figure 2



Tables



Daniel B. Stephens & Associates, Inc.

**Table 1. Groundwater Analytical Organic Chemistry Data, MW-11
Former Y State Lead Site, Clovis, New Mexico**

Sampling Period	Sample Date	Concentration ^a (µg/L)								
		Benzene	Toluene	Ethylbenzene	Total Xylenes	BTEX	MTBE	EDB ^b	EDC	Total Naphthalenes
<i>NMWQCC Standard</i>		5	1,000	700	620	None	100	0.05	5	30
Preliminary	6/07/2019	64	<1.0	4.3	16	84.3	<1.0	0.014	5.2	<10
Step-drawdown test	7/17/2019	1,200	42	120	460	1,822	<1.0	2.7	71	21.4
<i>Constant-Rate Test</i>										
Day 1	7/18/2019	1,200	18	120	450	1,788	<1.0	2.3	67	23.2
Day 2	7/19/2019	2,000	9.2	190	760	2,959	<1.0	3.1	97	41.2
Day 3	7/20/2019	2,000	<10	190	770	2,960	<10	3.2	91	<100

Bold indicates that value exceeds New Mexico Water Quality Control Commission (NMWQCC) groundwater standard.

^a Samples analyzed in accordance with U.S. Environmental Protection Agency (EPA) method 8260B, unless otherwise noted.

^b Analyzed using EPA method 504.1.

µg/L = Micrograms per liter

BTEX = Benzene, toluene, ethylbenzene, and total xylenes

MTBE = Methyl tertiary-butyl ether

EDB = 1,2-Dibromoethane

EDC = 1,2-Dichloroethane



Table 2a. Observation Well BW-10 Parameters

Parameter	Value ^a
Pumping rate (Q)	4 gpm
Hydraulic conductivity (K)	1.16 ft/d
Storage coefficient (S) ^b	0.2
Distance from pumping well (r)	400 feet
Aquifer thickness (b)	50 feet

^a Aquifer parameters are derived from the constant-rate pumping test conducted in July 2019.

^b Storativity, equivalent to specific yield (S_y) in an unconfined aquifer.

Table 2b. Simplified Theis Calculation of Theoretical Drawdown at Observation Well

Time (days)	Drawdown (feet)
1	<0.01
30	0.002
60	0.04
365	0.78

Note: Pumping well is MW-11; observation well is BW-10.

- Assumptions:
1. Aquifer is infinite, homogeneous, and of uniform thickness.
 2. Water is released instantaneously from storage with decline of hydraulic head.
 3. Well bore storage can be ignored.

Calculations:

$$s = \frac{Q}{4\pi T} w(u)$$

$$w(u) = \int_u^\infty \frac{e^{-y}}{y} dy = -\gamma - \log_e u + u - \frac{u^2}{2 \cdot 2!} + \frac{u^3}{3 \cdot 3!} - \dots + (-1)^{n+1} \frac{u^n}{n \cdot n!}$$

$$u = \frac{r^2 S}{4Tt}$$

- where
- s = drawdown
 - Q = pumping rate (Table 2a)
 - T = transmissivity
 - w(u) = Theis well function
 - y = a variable of integration
 - r = radial distance from pumping well to observation well (Table 2a)
 - S = storativity (Table 2a)
 - t = time elapsed since start of pumping

Appendix A

Field Notes

7/14/19

J. FISHER

0745 ONSITE FOR WELL DEVELOPMENT.
WEATHER IS SUNNY, ~71°F, BREEZY.
YELLOWJACKET CREW IS ONSITE
PREPARING TO MOB EQUIPMENT
TO RW-2.

CALIBRATE VSI, 556MPS

pH: ~~4.00~~ 4.00/4.00 @ 23.52°C

7.00/7.00 @ 24.92°C

10.12/10.14 @ 25.30°C

SC: 1413/1413 @ 25.19°C

DO: 654 mmHg @ 22.99°C

COND. SATN = 86.4% @ 23.00°C

[DI] = 4.14 mg/L @ 23.25°C

ORP: 223/223.0 @ 23.67°C

1005 RW-2 DTW = 328,93' bsc

TD = 365,80' bsc

ICV = 2116[±] GAL

NEW TALENTO SAFETY MEETING.

SEE RANN FOR DETAILS.

1035 1ST BILVER

1045 AFTER 2 BILVER (NS/M) SWITCH
TO SURGE BLOCK,

1110 SWITCH TO BILVER

1200 PREPARE TO INSTALL PUMP.

1540 PUMP IS IN TO ~352.5' (INTAKE)

②
 7/14/19 RW-2 Well Development J
 TIME Vol (GAL) pH T(°C) SC (mg/L) DO (mg/L) ORP (mV) COMMENTS

TIME	Vol (GAL)	pH	T(°C)	SC (mg/L)	DO (mg/L)	ORP (mV)	COMMENTS
1035	INITIAL	7.28	19.90	551	0.87	-56.24	5.11E020 TURBID
1110	7.5	7.63	19.96	539	0.69	-82.8	SL. HC 0002 " "
1155	21	7.77	20.02	534	0.38	-149.1	" "

7/14/19

③

J

1540	DTW = 329.62
1600	PUMP ON. THE WELL DROGG OUT BEFORE WATER MADE IT TO SURFACE.
1655	WE WILL NEED A CHECK VALVE TO PUMP. TRIP OUT THE PUMP.
1800	PUMP IS OUT. OFFSITE.

[Handwritten signature]

7/14/19

④

7/15/19 J. FISHER

0730 ON SITE @ MW-11 FOR WELL DEVELOPMENT.

HOW TO GET TO STREET MEETING. SEE FORM FOR DETAILS. WEATHER IS MILD, ~72°F. P. CLOUDY, B. CALM.

0749 DTW = 325.86

CALIBRATE YSI 556 MP, SN: 13K00928

DO: 6.58, 3 mmHg @ 22.91°C

COND % SAT'N READING = 86.0% @ 22.91°C

[DT] = 4.19 mg/L @ 23.26°C

pH: 4.00/4.00 @ 24.93°C

7.00/7.00 @ 26.44°C

9.98/10.03 @ 26.84°C

SC: 1413/1413 $\frac{mg}{cm}$ @ 26.54°C

ORP: 220/220.0 @ 25.14°C

0805 1ST BAILEY

0845 DTW = 328.51 AFTER BAILEY ~20 GALLONS. SWITCH TO SURGE BLOCK / SWAB.

0855 PULLED UP THE TRANSDUCER. APPARENTLY THEY DID NOT STEAL IT. JUST CUT THE CABLE & TOOK SPOOL.

0925 RESUME BAILEY.

1010 DTW = 326.34 AFTER BAILEY ~50 GAL. PUMP DOWN INTO IMPLIMENT TANK.

⑤

7/15/19 MW-11 Well Development J

Time	Vol (Gal)	pH	T (°C)	SC ($\frac{mg}{cm}$)	DO ($\frac{mg}{L}$)	ORP (mV)	Comment
0805	INITIAL	7.93	20.35	956	0.11	-28.5	V. TURBID SAND, NO O2 OR
0825	10	7.81	19.29	983	0.49	-38.6	" "
1220	58	7.58	26.58	840	0.39	-36.8	TURBID, BROWN NO O2 OR
1300	92	7.46	21.18	763	1.13	-48.1	SLT TURBID, NO O2 OR
1310	150	7.35	20.80	767	1.65	-48.5	" "
1322	250	7.37	20.31	753	1.59	-51.5	CLEAR, NO O2 OR
1340	400	7.42	21.10	756			
1348							
1350	465	7.51	21.16	736	2.15	-29.5	CLEAR, NO O2 OR
1401	530	7.42	23.13	767	1.90	-11.4	" "
1424	650	7.53	21.35	775	1.94	-4.5	" "
1442	742	7.47	22.12	791	1.81	-6.3	" "

7/15/19

8

1070 cont Prepare to install pump.
 1030 Check valve installed 1-20' stick
 (~21') ABOVE PUMP.
 1220 Pump is in to ~358'
 Tag line stick up = 23 1/2"
 1250 DTW = 327.50' bmp. Start Pumping
 1253 Water @ Strapper
 1300 8.5 GPM DTW = 344' bmp
~~1320~~ 1327 Decrease flow 8.5 → 5.5
 1327 1348 5.5 GPM DTW = 343.5
~~1320~~ 1426 Decrease flow 5.5 → 1.4
~~1340~~ 1430 DTW = 332
 1435 Open Flow Control Valve 1.4 GPM - 10.9 GPM
 1508 DTW = 351.9 10.5 GPM 1040 Gaus
 1514 Porta Potty contractor onsite to
 Clean Porta-Potty.
 1821 DTW = 353.6. Totalizer on Strapper
 = 26,488.
 1532 DTW = 353.10
 1551 Pump Off. 1,490.53 Gaus Pumped
 1670 AS TOT = 26860
 1730 Strapper Off. AS TOT = 27184.
 Prepare FROG.
 Run SE-1 Log # 390.
 [Benzene] = 13.27. Wm Recire Through
 Strapper.

7/16/19

7

S. FISHER

0740 onsite. Weather is Mild, Partly
 to Mostly Cloudy. 75°F.
 Calibrate YSI. 556 MPS
 SN: 13K100.928
 DO: 653.5 mmHg
 Cond % SW Reading = 86.0% @ 25.99°C
 [DI] = 3.49 mg/L @ 25.87°C
 pH: 4.00/4.00 @ 26.95°C
 7.00/7.00 @ 28.16°C
~~10~~ 9.96/10.00 @ 28.61°C
 SC: 1413/1413 ^{µS}/_{cm} @ 27.42°C
 ORP: 220/220.0 mV @ 26.60°C
 0815 Traffic Control Set up.
 Prepare to Rail RW-1.
 0845 Rig & Trailer Arrive / in Place.
 0850 DTW = 328.78' btop.
 TD = 360' btop
 0906 Begin Bailing RW-1.
 0945 Off to install Decors Switch to SWAB.
 0957 Start New Test @ MW-10
 RL = 325.30' btop
 1025 Start New Test @ MW-11
 RL = 325.70' btop
 1032 Bailed 30 Gaus. Will install
 A Pump for Further Development

(8)

RW-1 Well Development

TIME	Vol (GAL)	pH	T(°C)	SC (µS/cm)	DO (mg/L)	ORP (mV)		
0917	INITIAL						Too MURDY	V. TURBID, SL. HCO ₃ CO ₂
0940	152	7.83	20.01	561	0.49	-222.6	"	"
1032	130	7.49	19.88	701	2.80	-123.2	TURBID, SL. HCO ₃ CO ₂	
1427	197	7.05	22.69	1008	1.50	108.8	SL. TURBID, IT.	
1440	210	7.06	23.19	1001	2.05	112.6	"	"
1506	216.7	7.10	23.67	1012	1.80	129.8	"	"
1520	235.5	7.16	24.27	996	1.71	129.3	SL. TURBID TO CLEAR	"
1527	245.5	7.13	24.83	1002	1.73	191.6	CLEAR,	"
1541	264.5	7.12	25.30	1015	1.32	104.6	"	"
1604	298.2	7.12	25.45	1006	1.77	103.2	"	"

PUMP OFF, 17378 GALLONS PUMPED.

(9)

7/16/19

J. F. H. 22

1103	PUMP IS READY. BEGIN INSTALLING PUMP & DRAIN PIPE.
	THAT ARE USING A SURFACE PUMP.
1106	INSTALL CHECK VALVE (~20' ABOVE PUMP).
1110	THE CHECK VALVE DOES NOT FIT DOWN THE WELL W/ THE GAUGE LINE. WILL HAVE TO DO THIS WORK W/OUT A GAUGE LINE.
1157	PUMP IS IN TO 356.5'. INSTALL DISCHARGE LINE W/ SAMPLE PORT & FLOW METER.
1206	START PUMP FLOW METER = 124.4 GPM
1211	PUMP OFF. ALLOW TO REVERSE
1232	WATER @ SURFACE CANNOT GET INTERFERENCE PROB TO GO PAST COUPLER IN THE DISCHARGE PIPE.
1255	PUMP ON. FLOW ≈ 2.6 GPM THE DISCHARGE LINE IS LEAKING BEFORE THE FLOW METER. HELPERS OF TO GET A BRACKET.
1310	PUMP OFF AGAIN FLOW = 164 GALLONS
1330	PUMP ON

(10)

7/14/19

J. FISHER

1350 PUMP OFF. TOTALIZER 180 GAL.

1444 RESTART PUMP.

1442 PUMP OFF. PUMP PROBABLY RAN DRY.

TOTALIZER ~~211.7~~

1502 RESTART PUMP

1500-1520 PUMPING RATE \approx 1.4 GPM1604 PUMP OFF. DEVELOPMENT CORRECTS.
173.8 GALLONS PUMPED.1633 START STRIPPER & TREAT
REMAINING WATER IN INFLUENT
TANK (\approx 575 GALLONS)

STRIPPER TOTALIZER = 28218

1740 STOP TEST ON MW-11 DUCK
PULL DUCK.1826 RUN BLANK ON FROG.
LOG # 394.1815 RUN STRIPPER EFFLUENT
SAMPLE & SE-3 LOG # 395.
THERE IS \sim 600 GALLONS IN
SE TANK.1827 BENZENE [I] = 4.16
RELEASE SE TANK WATER.

1832 RUN BLANK LOG # 396.

1840 PACK UP. 1855 SE TANK EMPTY.

1901 STOPPED & PULSED DUCK IN
MW-10 1910 OCCURRED.

(11)

07/17/19

J. FISHER

0740 ON SITE. WEATHER IS MILD (\approx 75°F)
P. CLOONEY, B. ROBERT.MATT & TRISIAN STILL TRAPPING IN
PUMP. THEY HAD SOME ISSUES
WINNING THE PUMP.0830 PREPARE TO INSTALL DUCK
IN MW-10

DTW = 325.34' bop

0900 START NEW TEST

MW-10 STOP TEST 07/17/2019.

0910 PUMP IS IN w/ INFLUENT MW-11
@ 355.5'. TRANSDUCER IS
SET @ 351'.

DTW = 326.61' bop

MP HAS 10 3/8" STICKUP.

0923 START NEW TEST @ MW-11

MW-11 STOP TEST 07/17/2019.

RL = 326.61' bop

0945 PUMP IS ~~+~~ DRILLER'S PICK ON SITE
w/ GENERATOR FOR THE PUMP.

CALIBRATE YSI. 556 MP5

SN: 130100928

DO: 753.7 mm Hg

CRIP & SATN = 86.0% @ 26.67%

[DI] = 3.77 mg/L @ 27.85°C

7/17/19 cont

J

YSI CALIBRATION CONT.

pH: 4.00/4.00 @ 28.16°C

7.00/7.00 @ 29.12°C

9.97/10.01 @ 29.20°C

SC: 1413/1413 @ 28.78°C

ORP: 220/220 @ 28.98°C

PUMP 3557522 GALLONS

7.5 HP MOTOR

1050 FLOW MOTOR = 298.9 GALLONS

DTW = 326.61' bmp STRIPPER 28,820

1100 START PUMP

TRIPPED BREAKER

1102 TRY AGAIN

TRIPPED

1110 TRY AGAIN

TRIPPED,

1115 TRY AGAIN

1117 WATER @ SURFACE.

Flow Motor = 339.1

1119 PUMP DROGO OUT.

1123 RESTART - 1140 START STRIPPER

#56 21.84 7.38 7.79 2.74 58.1

1202 FLOW MOTOR = 573

1222 STRIPPER OFF, ~400 GALLONS

STRIPPER TOTALIZER 28,880

13

7/17/19

J

STEP TIMES: 1423 → 9 GPM

1723 → 12 GPM

2023 → 15 GPM

1248 850 GALLONS on TOTALIZER
6 GPM

1314 RUN BLANK in Flow Log # 397

1329 RUN 2nd BLANK LOG # 398

AS TOTAL = 28980

INLET TANK = ~550 GAL

1332 STRIPPER ON

1355 STRIPPER EFFLUENT SAMPLE COLLECTOR
RUN SE-4 LOG # 399

1359 STRIPPER PUMP OFF. 29362 GAL
SE TANK @ 800 GALLONS.

1405 BENZENE = 10103. RELEASE
SE TANK INTO SEWER.

1411 RUN BLANK LOG # 400

1423 INCREASE FLOW TO 9 GPM.

1436 ~~PUMP~~ WATER LEVEL IS BELOW
TRANS DUCT. - LOWER RATE, BACK TO 6 GPM
WILL ALLOW WELL TO RECOVER
BACK TO ~342' & TRY AGAIN.

1455 INCREASE FLOW.

1500 DROGO OUT PUMP AGAIN.
Reduce To 6 GPM

JF/TG

1506 Lower Flow Rate to ~~36 PM~~ 76 PM

1515 COLLECT INFLUENT SAMPLE & STRIPPER EFFLUENT SAMPLE
RUN INFLUENT SAMPLE LOG #401

BENZENE = OVERRANGE

RUN BLANK LOG #402

RUN 2ND BLANK. LOG #403

1552 STRIPPER TOTALIZER = 30028

2ND BLANK WAS CLEAN.

RUN SE-5 LOG #404

1607 BENZENE @ 15.18, W/L

RECIRCULATE THROUGH STRIPPER (~13.3 GPM)

1617 RUN BLANK LOG #405

1637 COLLECT STRIPPER EFF. SAMPLE

RUN SE-6 LOG #406

1645 T. Golden talked w/ Bill @ Albertsons, Josh @ Dominis and Ray @ Optical Source

1647 PUMP OFF ON RECI. STOT = 30565 GALLONS

BENZENE = 9.53

RELEASE 800 GALLONS

1645 (cont.) Bill says chile roasting in Albertsons parking lot on July 27, 28 so vacating on July 22 is perfect timing.

JF/TG

1645 (cont.) through his store. Told Josh that schedule delayed until around August 4. He says no problem Ray says no problem finishing well development on July 21 (Sunday). Also discussed possible locations for buried pipe through his parking lot. Ray was very happy with our crews and said everyone was extremely friendly.

1655 RUN BLANK LOG #407

1706 INCREASE FLOW TO 46 PM

1712 FLOW @ 46 PM

RESUME STRIPPING FROM 30565

1744 PUMP OFF TO STRIPPER. 30974

1757 RECIRCULATE STRIPPER

1849 COLLECT STRIPPER EFFLUENT SAMPLE SE-7.

RUN SE-7 LOG #408

BENZENE = 4.66

RELEASE ~500 GALLONS

1903 STRIPPER TOTALIZER = 31796 GALLONS

PUMP OFF.

1906 INCREASE FLOW TO 8 GPM.

1915 W/L DOWN TO DOWN

7/17/19

5

Reduce Flow

1918 PUMP OFF

Flow Meter = ~~52~~ 2528.0 Gallons

A13 Turn on Strapper ~480

Gallons in the Influent

Tank. ~~AS~~ Total @ 31796

1948 Run Blank Log #409

2015 OFFSITE

Handwritten signature
7/17/19

7/18/19

17

J. Fisher

0700 ONSITE - Weather is Mild (~75°F)

P. Cloudy, Breeze Instill

Duck in MW-10.

DTW = 325.27' beoc.

Test is still running from yesterday.

0715 Duck Deployed in MW-10

Program for Pumping MW-11

0743 MW-11 DTW = 326.56

0800 Pump on. ~~AS~~ 46 PM.

AS Total = 32,166 Gallons

0828 AS on.

0915 AS Total = 32559.

AS Pump OFF.

1000 Collect 1st Lab Sample

of CRT

1000 Calibrate YSI

pH 4 4.00 @ 26.15°C

7 7.00 @ 26.82°C

10 10.03 @ 27.07°C

SPC 1413 μ /cm 145 @ 26.89°C

ORP 220 mV 220.0 @ 26.31°C

1009 AS Total = 32559

Start Strapper

1024 AS Pump OFF AS Tot = 32759

7/12/19 RUN BLANK LOG # 410 J
 1024 EFFLUENT TANK ~ 700 GALS.
 COLLECT SAMPLE.
 1029 RUN SE-8 LOG # 411
 RECIRCULATE EFFLUENT
 TANK THROUGH STRIPPER
 1035 START AS PUMP.
 1042 RUN BLANK LOG # 412.
 1056 RUN 2ND BLANK LOG # 413
 1110 RUN SE SAMPLE SE-9
 LOG # 414
 BENZENE = 6.6 ppb.
 STOP AS PUMP ~~33407~~ 33413
 RELEASE SE TANK ~ 700 GALS
 1127 RUN BLANK LOG # 415
 1138 AS PUMP ON (AS TOT. 33413)
 1316 AS PUMP OFF AS TOT. 34012
 1320 RECYCLE SE TANK AS TOT
 1440 AS PUMP OFF 35130
 RUN SE 10 LOG # 416
 BENZENE = 2.41 ppb
 RELEASE SE TANK ~ 750 GALLONS
 1448 RUN BLANK LOG # 417
 1 AS PUMP ON (INFLUENT TANK)
 SE TANK VALVE CLOSED
 1530 AS PUMP OFF AS TOT = 35658

7/18/19 J (19)
 1540 COLLECT INFLUENT SAMPLE @ Wellhead.
 RUN INFLUENT SAMPLE.
 IN-2 LOG # 418
 1552 AS PUMP ON.
 SE TANK HAS ~ 600 GALLONS.
 1555 BENZENE OVER RANGE ON IN-2.
 1559 RUN BLANK LOG # 419
 1602 AS PUMP OFF AS TOT = 35767
 Prepare to Recirculate.
 1604 AS PUMP ON (SE TANK Recirc)
~~1604~~ 1614 RUN 2ND BLANK LOG # 420
 1627 RUN SE-11 LOG # 421
 BENZENE = 9.66 ppb.
 RELEASE SE TANK ~ 750 GALLONS
 AS PUMP OFF AS TOT = 36257
 1642 RUN BLANK LOG # 422.
 COLLECT INFLUENT SAMPLE.
 DILUTE 1 PART INFLUENT; 3 PARTS DI.
 RUN IN-3 LOG # 423
 AS PUMP ON (INFLUENT).
 INFLUENT SAMPLE OVER RANGE BENZENE
 P/M = 35.81, EB 11.22, T = 4.63
 1716 RUN BLANK LOG # 424
 1728 RUN 2ND BLANK LOG # 425
 1730 AS PUMP OFF AS TOT = 36658

7/18/19

S

1839 RUN 3RD BLANK. LOG # 426

1750 COLLECT INF SAMPLE.

PREPARE 9:1 DILUTION

RUN IV-4. LOG # 427

BENZENE = 85.07 ppb

UNDILUTED = 850.07 ppb

1817 RUN BLANK LOG # 428

1828 RUN 2ND BLANK LOG # 429

1921 DL TRANSDUCER MTR.

1905 AS PUMP OFF 36986

1910 BEGIN RECIRC IN SE TANK
AS ON

2000 COLLECT SE SAMPLE SE 12

2005 RUN SE-12 LOG # 430

2016 BENZENE = 5.71 ppb.

RELEASE SE TANK ~ 750 Grams

AS TOT = 37842

2028 RUN BLANK LOG # 431

2100 GAUGE MW-10 & BE-7

2140 OFFSITE

[Signature]
7/18/19

7/19/19

(21)

J. R. HICK

0700 ONSITE. WEATHER IS MILD (~75°F),
MOSTLY CLEAR, SE. WINDY TO BREEZY.
STILL MAINTAINING PUMPING RATE
OF 4 GPM.

PANCH & TRISTAN ARE OFF.

REPAIRS BY MIKE WEBB &
MATT OVERTON.SE TANK IS FILLING FROM
INFLUENT TANK.

0840 RUN BLANK LOG # 432

0845 RECIRCULATE SE TANK
THROUGH STRIPPER.

AS TOT = 44602

AS PUMP ON.

0940 COLLECT SE SAMPLE.

0945 RUN SE-13 LOG # 433

CALIBRATE VSI MMS 556

SN: 13K100928

0957 [BENZENE] = 7.60 ppb.

RELEASE SE TANK ~ 750 Grams

AS PUMP OFF AS TOT = 45638

1006 RUN BLANK LOG # 434

1012 AS PUMP ON (INF TANK).

1115 AS PUMP OFF - 46258

AS PUMP ON (SE RECIRC.)

7/19/19

J

1204 RUN SE-14 Log # 435

1213 [BENZENE] = 9.84 ppb.

RELEASE SE TANK. ~700 GALLONS

1218 RUN BLANK Log # 436.

AS PUMP OFF, AS TOT = 47050

1232 SE TANK EMPTY. CLOSE VALVES
AS PUMP ON (INT. TANK)

1259 AS PUMP OFF. AS TOT = 47417

1330 OFFSITE.

1630 BACK ON SITE. IT RAINED
A LITTLE IN THE LAST HALF
HOUR.

1710 Flow Has Consistently Been
3.90 GPM in Tray to VESSEL
IT UP. FOR APPROX 10
HOURS

1750 LIGHTNING.

1835 AS PUMP HAS BEEN RECIRCULATING
FOR ALMOST 2 HOURS.

RELEASE SE TANK (750)
AS TOT = 50682 2000 Collect GW
SAMPLE

~~1838~~ 2018 RUN BLANK Log # 437

SE TANK HAS BEEN RECIRCULATING;
FOR 45 MINUTES

2032 RUN SE-15 Log # 438
[BENZENE] = 13.13 ppb

23

7/19/19

J

CONTINUE TO RECIRCULATE THROUGH
STRIPPER.

2044 RUN BLANK Log # 439

2100 DL MW-11 TRANSDUCER
DATA.

2150 COLLECT SE SAMPLE.

2154 RUN SE-16 Log # 440.

2202 BENZENE @ 3.13

RELEASE SE TANK ~750 GALLONS
AS TOT = 53277

2208 RUN BLANK Log # 441.

2230 DL ~~AW~~ BW 10 TRANSDUCER

2235 OFFSITE

[Signature]
7/19/19

(24)

7/20/19

S. FISHER

0830 ONSITE. WEATHER IS WARM (~75°F)
CLEAR, BREEZY.

0915 DL MW-11 TRANSDUCER DATA.

LINEARITY VS 556 MPa.

SN: 13K100928

DO: $P_B = 651.1 \text{ mmHg}$

CRD % SAT'N REMAINING = 85.7% @ 29.2°C

[DI] = 3.55 mg/L @ 27.92°C

pH: 4.00/4.00 @ 27.46°C

7.06/7.06 @ 27.84°C

9.97/10.01 @ 28.50°C

SC: 1413/1413 @ 28.90°C

ORP: 220/220.0 mV @ 29.00°C

1010 START RECIRCULATING SE
THROUGH STRIPPER.

1057 RUN BLANK LOG # 442

1110 COLLECT SE TANK SAMPLE
RUN SE-17 LOG # 443

1125 [BENZENE] = 14.40 ppb WILL
CONTINUE RECIRCULATING THROUGH
TAG STRIPPER

1133 RUN BLANK LOG # 444

1150 COLLECT SE TANK SAMPLE

1152 RUN SE-18 LOG # 445

1202 [BENZENE] = 81.27 ppb.

(25)

F

7/20/19

1204 RELEASE SE TANK (~750 GALLONS)
AS PUMP OFF AS TOT = 63313.5
RUN BLANK LOG # 446.

1655 AS PUMP OFF. AS TOT = 66879.0
MOVE PUMP TO SE TANK
TO BEGIN RECIRCULATION.

1657 AS PUMP ON. RECIRC.

1757 COLLECT SE TANK SAMPLE.

1800 RUN SE-19 LOG # 447

1805 COLLECT 3RD LAB SAMPLE
MW-11 CRT.

1809 SE-19 [BENZENE] = 13.33 ppb
WILL CONTINUE TO RECIRC. FOR
ANOTHER 1/2 HOUR.

1816 RUN BLANK LOG # 448

1827 COLLECT SE TANK SAMPLE

1833 RUN SE-20 LOG # 448

1842 [BENZENE] = 9.92 ppb. AS PUMP OFF.
RELEASE SE TANK (~750 GALLONS)
MOVE AS PUMP TO INFLUENT TANK
AS TOT = 68378.2

1848 RUN BLANK LOG # 450.

2000 PUMP OFF.

MONITOR RECOVERY.

26) 7/20/19

2100 GAUGE OTHER WOODS (BW-7, BW-10)
2150 DL TRANSDUCER DATA.
FROM MW-11 DUCER
& BROMOMETRIC.

95% RECOVERY ACHIEVED IN
1ST 30 MINUTES.

2135 COLLECT SE TANK SAMPLE

2140 RUN SE-21. LOG# 451

2150 [CHLORINE] = 7.54 ppb.

RELEASE SE TANK (~750 GALLONS)

AS PUMP OFF

AS TOT = 707/5.9

TOTAL IS ~375 GALLONS

REMAINING IN INFLUENT TANK.

PANCHO WILL START RUN

IT THROUGH THE AS & THEN

RECIRC. FOR ~90 MINUTES

& THEN RELEASE

2205 RUN BLANK. LOG# 452.

2210 DL BW-10 TRANSDUCER.

2215 OFFSITE

J. Fisher

7/20/19

27)

7/21/19

J. Fisher

0700 ONSITE. WEATHER IS WARM (~77°F),
CLEAN, BREEZY. HOLD TALKING SMOKEY
MEETING, SEE FORM FOR DETAILS.
PREPARE TO PULL PUMP.

0750 DL MW-11 TRANSDUCER DATA.

0805 BEGIN PULLING PUMP

0910 PUMP IS OUT OF THE HOLE,

PREPARE TO MOVE TO RW-2,

0950 PUMP RIG SET UP ON RW-2.

1007 ~~DW-DW~~ MW

RW-2 DTW = 328.94

1017 BEGIN INSTALLING PUMP,

CHECK VALVE IS ~1' ABOVE PUMP.

INTAKE WILL BE ~359 1/2' HOC.

CALIBRATE YSI 556 MPS.

SN: 13K100928

DO: P₃ = 652.6 mmHg @ 28.18°C

CH'D 9. SAT'N READING = 85.9% @ 28.20°C

[DI] = 3.50 mg/L @ 28.50°C

pH: 4.00/4.00 @ 25.85°C

7.00/7.00 @ 25.5°C

1000 7.16/7.16 @ 25.46°C

SC: 1413/1413 mg/m @ 26.35°C

ORP: 220/2200 mV @ 27.09°C

1105 PUMP IS IN TO 359.5'

7/24/19

I

1105 Ready to start pumping.
CANNOT GET WL MOTOR
Pressure 150'

1107 PUMP ON. FLOW MOTOR:
16688.8,

1112 Water @ SURFACE

1116 ~5.7 GPM

1125 ~5.7 GPM

1130 OPEN VALVE IN THE WAY.

1138 ~5.6 GPM

1200 5.0 GPM

1211 No longer TURBID.

1242 5.0 GPM

Water is SL. EFFLUORESCENT.

1255 PUMP OFF

MOTOR: 17204.4 GALLONS

1313 AS TOT = 72722.7 GALLONS

1315 AS PUMP ON. AS ON.

1325 ~700 GALLONS TRANSFERRED FROM
PONTIAC TANK TO IMPROVE
TANK

1354 AS PUMP OFF. AS TOT = 73275.1
MOVE PUMP INTO SE TANK

1355 AS PUMP ON. REVERSE TANK.

1426 RUN BLANK LOG # 453

RW-2 Well Development

Time	VOL	Flow Motor	pH	T(°C)	SC (µS/cm)	DO (mg/L)	ORP (mV)
1112	16688.8	16713.0	7.42	20.97	642	0.31	-127.0
1126	54.78	16767.0	7.64	21.91	583	2.44	-83.3
1136	133.7	16822.5	7.61	21.27	610	5.21	2.0
1148	196.2	16885.0	7.64	21.08	573	4.41	17.5
1200	-	-	7.61	21.74	621	4.67	31.2
1202	263.7	16952.5		5.27 GPM	166		
1211	309.2	16998.0	7.54	21.14	619	4.93	40.8
1219	346.2	17035.0		SL EFFLUORESCENCE			
1230	400.2	17086.0	7.65	22.09	630	5.03	41.3
1244	467.5	17156.3	7.61	21.33	622	5.19	48.6
1255	515.6	17204.4		PUMP OFF			

Well Development Complete

1445 COLLECT SE TANK SAMPLE

1447 RUN SE-22 LOG # 454

1456 [BENZENE] = 1.51 ppb.

RELEASE SE TANK. (~700 GALLONS)

AS TOT = 74227.1 GALLONS

1501 RUN BLANK. LOG # 455.

1520 STOP TEST & DL TRANSDUCER
DOWN ON BW-10.

1545 OPERATE

Jay Fisher

7/24/19

Pumping Test Field Sheet

STEP TEST

Project Name: FORMERLY			Project No.: DB18,1157			Measured By:					
Well ID: MW-11			Pumping Well <input checked="" type="checkbox"/> Observation Well <input type="checkbox"/>			Measuring Point (height): 10 3/8"					
Casing Diameter: 5"			Distance from Pumping Well:			Planned Duration of Test: 12 hrs					
Initial Totalizer Reading: 298.9			Pump On: Date/Time			Pump Off: Date/Time					
Screened Interval: 205.5-355.5		Static Water Level: 356.2 326.61		SWL Date/Time: 1052 7/13/19		Water Column (ft.):					
Transducer Installed (Y/N):		Make and model: Aqua-level 700		Serial No.:		Install Depth (ft. btoc): 351'					
Pump Make and Model:			Serial No.:			Pump Inlet Setting (ft. btoc):					
Initial water column over transducer (ft.): 24.39				Intake 351.0		Initial water column over pump inlet (ft.): 28.89				Intake 355.5	
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
1100				339.1		7.74	32.86	833	121.9	4.55	drawdown belowducer
1128	13	337.7	11.09	372.9	6 gpm	7.95	23.64	762	103.4	5.57	
1132	18	339.50		397.9	6 gpm						
1137		340.17		430.1	6.	7.56	26.02	799	56.4	1.90	
1207		340.94		622.8	6	7.26	22.64	770	72.2	2.85	
1237		341.22		786.5	6	7.55	23.51	772	63.2	2.43	
1253				885	6	7.57	22.71	768	52.6	2.82	
1309		341.50		978		7.51	23.18	768			switch to 2 gpm 1506
1408		341.95		1335.6	6	7.62	26.14	777	53.1	2.94	
1552		331.16		1821.7	2	7.62	26.48	788	270.717	2.00	
1607		331.16		1850.5	1.92						
1634		331.17		1898.2	2.						
1639		331.17		1943.7	2						
1744		336.89		2113.4	4						switch to 4 gpm 1706
1800		337.00		2188.3	4.						
1827		337.01		2286.7	4	7.49	23.88	786	83.8	3.31	
1450		337.41		2384.0	4						switch to 8 gpm 1906

Turnoff dry ←

Time	SE Tank	IFL Tank
11:40		334130 > Start from IFL to SE Tank
1:10		340127 > Stop from IFL to SE Tank
1:20	340127	3698.6 > Start SE Tank Recycle
7:05		3698.6 > Stop from IFL to SE Tank
7:10		3698.6 > Start SE Tank Recycle
8:15		3784.2 > Stop SE Tank Recycle
8:18		Released 750g1 > Flush SE Tank
8:38		3784.2 > Start from IFL to SIF Tank
9:27		38514 > Stop from IFL to STE Tank
9:30		38514 > Start STE tank recycle
10:32		39394 > Stop STE tank recycle
10:35		Released 800g1 > Flush STE tank recycle
10:58		39394 > Start from IFL to SIF tank
12:18		40080 > Stop from IFL to STE tank
12:21		40050 > Start STE tank recycle
1:22		40922 > Stop STE tank recycle
1:24		Released 720g1 > Flush STE tank
1:45		40922 > Start from IFL to STE tank
3:03		41575 > Stop from IFL to STE tank
3:06		41575 > Start STE tank recycle
4:07		42441 > Stop STE tank recycle
4:11		Released 750g1 > Flush STE tank
4:29		42441 > Start from IFL to STE tank
5:45		43083 > Stop from IFL to STE tank
5:48		43083 > Start STE tank recycle
6:50		43962 > Stop STE Tank recycle
52		Released 750g1 > Flush STE tank

July 18th

	Gallons	INFL to SE tank	SE tank Recycle
10:12 AM		45638 - start	
	620 Gal	46258 - stop	
11:15 AM			46258 - start
12:15 PM			47050 - stop
12:15 PM	200 Gal		Descharge
12:35 PM		47050 start	
14:10		47723 stop	
14:10			47723 start
			48594 stop
15:10	675		Descharge
15:25		48594 start	
16:51		49217.3 stop	
16:51			49217.3 start
18:35			50682.1 stop
18:35	750		Descharge
18:48		50682.1 start	



Time	
7:34	51314 > Stop IFL to STE tank
7:36 7:36	51314 > Start STE tank recycle
10:02	532777 Stop STE tank recycle
10:03	750gl released > STE tank flush
10:23	53277 > Start IFL to STE tank
11:11	53911 > stop IFL to STE tank
11:14	53911 > Start STE tank recycle
12:44	55201 > Stop STE tank
12:45	750gl released > Flush STE tank
1:01	552017 > Start IFL to STE tank
1:51	55855 > Stop IFL to STE tank
1:54	55855 > Start STE tank recycle
3:24	57142 > Stop STE tank recycle
3:25	750gl released > Flush STE tank
3:42	57142 > Start IFL to STE tank
4:36	57783 > Stop IFL to STE tank
4:38	57783 > Start STE tank recycle
6:09	59071 > Stop STE tank
6:09	750gl released > Flush STE tank
6:26	59071 > Start IFL to STE tank
7:20	59792 > Stop IFL to STE tank
7:25	59792 > Start STE tank Recycle
9:00	60976 > Stop STE tank Recycle
9:00	750 Release > Flush STE tank
9:15	60976 > Start IFL to STE Tank
10:10	61676 > Stop IFL to STE tank
10:10	61676 > Start STE Recycle



Time

~~STE Tank Recycle~~

12:04 63313 STOP STE Tank Recycle → Flush 750 Gal's STE Tank

12:24 63313 START IFL to STE Tank

13:16 64015 STOP IFL to STE tank

13:20 64015 START STE Recycle

15:45 66195 STOP STE Recycle

15:45 ~~66195~~ FLUSH STE Tank 750 Gal's

16:02 66195 START IFL to STE Tank

16:50 66879 STOP IFL to STE Tank

~~STE Tank Recycle~~

16:50 66879 START STE Tank Recycle

18:40 68378 STOP STE Tank Recycle

70: 750 Gal. Flush STE tank

7:01 68378 7 Start IFL to STE tank

7:4 69040 7 Stop IFL to STE tank

7:52 69090 7 Start STE tank recycle

9:50 70716 7 Stop STE tank recycle

9:51 750g released 7 Flush STE tank recycle

10:09 70716 7 start IFL to STE tanks

10:35 71042 7 Stop IFL to STE tanks

10:37 71042 7 Start STE tank recycle

12:40 7272 7 Stop STE tank recycle

12:42 600g released 7 Flush STE tank recycle

Pumping Test Field Sheet

Project Name: <u>FORMON 4</u>			Project No.: <u>DB18,1157</u>			Measured By:					
Well ID: <u>MW-11</u>			Pumping Well <input checked="" type="checkbox"/> Observation Well <input type="checkbox"/>			Measuring Point (height): <u>10³/₈"</u>					
Casing Diameter: <u>5"</u>			Distance from Pumping Well: <u>-</u>			Planned Duration of Test: <u>72 hrs</u>					
Initial Totalizer Reading: <u>2528.01</u>			Pump On: Date/Time <u>8:00 7-18-19</u>			Pump Off: Date/Time					
Screened Interval:			Static Water Level: <u>326.56</u>			SWL Date/Time: <u>0750 7-18-19</u>			Water Column (ft.):		
Transducer Installed <input checked="" type="checkbox"/> (Y/N):			Make and model: <u>Aqua Coll</u>			Serial No.:			Install Depth (ft. btoc):		
Pump Make and Model:			Serial No.:			Pump Inlet Setting (ft. btoc):					
Initial water column over transducer (ft.):						Initial water column over pump inlet (ft.):					
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
<u>0801</u>	<u>1</u>										
<u>0802</u>	<u>2</u>	<u>334.40</u>		<u>2549.4</u>							
<u>0803</u>	<u>3</u>										
<u>0804</u>	<u>4</u>										
<u>0805</u>	<u>5</u>	<u>335.32</u>		<u>2553.7</u>	<u>1.4</u>						
<u>0806</u>	<u>6</u>	<u>335.80</u>		<u>2558.0</u>	<u>4.3</u>						
<u>0807</u>	<u>7</u>	<u>336.34</u>		<u>2562.8</u>	<u>4.8</u>						
<u>0808</u>	<u>8</u>	<u>336.55</u>		<u>2564.3</u>	<u>1.5</u>						
<u>0809</u>	<u>9</u>	<u>336.82</u>		<u>2566.9</u>	6.92.6						
<u>0810</u>	<u>10</u>	<u>336.95</u>		<u>2573.8</u>	6.96.9						
<u>0811</u>	<u>11</u>	<u>337.08</u>		<u>2579.8</u>	6.95.4						
<u>0812</u>	<u>12</u>	<u>337.14</u>		<u>2583.8</u>	<u>4.6</u>						
<u>0813</u>	<u>13</u>	<u>337.20</u>		<u>2588.0</u>	<u>4.2</u>						
<u>0814</u>	<u>14</u>	<u>337.00</u>		<u>2595.8</u>	<u>7.8</u>						
<u>0815</u>	<u>15</u>	<u>-</u>		<u>-</u>							
<u>0816</u>	<u>16</u>	<u>336.99</u>		<u>2599.2</u>	<u>1.7</u>						
<u>0817</u>	<u>17</u>	<u>338.77</u>		<u>2603.5</u>	<u>4.3</u>						
<u>0818</u>	<u>18</u>	<u>338.70</u>		<u>2608.3</u>	<u>4.8</u>						
<u>0819</u>	<u>19</u>	<u>336.65</u>		<u>2612.5</u>	<u>4.2</u>						

Pumping Test Field Sheet

Project Name:			Well ID: <u>MW-11</u>			Measured By:					
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
0820	20	336.63		2616.7	4.2						
0821	21	336.63		2620.8	4.1						
0822	22	336.64		2625.2	4.4						
0823	23	336.50		2629.1	3.9						
0824	24	336.48		2632.0	2.9						
0825	25	336.43		2636.8	4.8						
0826	26	336.40		2641.3	4.5						
0827	27	336.40		2644.5	3.2						
0828	28	336.40		2648.9	4.4						
0829	29	336.41		2651.8	2.9						
0830	30	336.43		2655.9	4.1						
0831	31	336.45		2660.2	4.3						
0832	32	336.44		2664.5	4.3						
0833	33	336.46		2668.5	3.8						
0834	34	336.46		2672.5	4						
0835	35	336.47		2675.9	3.4						
0845	45	336.56		2714.5	3.7						
0900	60	336.66		2777.1	4.2						
0930	90	336.74		2896.5	43.99						
1000	120	336.96		3022.1	4.2	7.33	23.06	788	183.3	2.69	
1034	154	337.04		3156.0	3.9	7.50	23.89	783	158.3	2.81	
1100	180	337.12		3259.4	3.97	7.61	23.81	779	79.0	3.63	
1130	210	337.20		3381.8	4.1	7.59	23.62	781	67.5	2.86	
1200	240	337.27		3500.1	3.98	7.59	24.45	783	64.1	2.81	
1230	270	331.80		3572.2	2.73	7.59	25.11	761	64.3	2.88	

Pumping Test Field Sheet

Project Name:				Project No.:				Measured By:			
Well ID: <u>MW-11</u>				Pumping Well <input checked="" type="checkbox"/> Observation Well <input type="checkbox"/>				Measuring Point (height):			
Casing Diameter:				Distance from Pumping Well:				Planned Duration of Test: <u>72 Hrs</u>			
Initial Totalizer Reading:				Pump On: Date/Time <u>8:00 7-18-19</u>				Pump Off: Date/Time			
Screened Interval:			Static Water Level: <u>326.56</u>			SWL Date/Time:			Water Column (ft.):		
Transducer Installed (Y/N):		Make and model: <u>Aqua Tool</u>			Serial No.:			Install Depth (ft. btoc):			
Pump Make and Model:				Serial No.:				Pump Inlet Setting (ft. btoc):			
Initial water column over transducer (ft.):						Initial water column over pump inlet (ft.):					
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
<u>1300</u>		<u>336.65</u>		<u>3637.4</u>	<u>2.2</u>						
<u>1334</u>		<u>337.20</u>		<u>3778.8</u>	<u>4.2</u>	<u>7.57</u>	<u>25.80</u>	<u>781</u>	<u>64.0</u>	<u>3.23</u>	
<u>1400</u>		<u>337.26</u>		<u>3890.1</u>		<u>7.54</u>	<u>25.48</u>	<u>784</u>	<u>56.1</u>	<u>2.82</u>	
<u>1430</u>		<u>337.29</u>		<u>3995.1</u>		<u>7.56</u>	<u>24.09</u>	<u>783</u>	<u>54.3</u>	<u>3.26</u>	
<u>1500</u>		<u>337.36</u>		<u>4116.4</u>		<u>7.55</u>	<u>25.31</u>	<u>786</u>	<u>54.3</u>	<u>2.95</u>	
<u>1530</u>		<u>337.49</u>		<u>4233.5</u>	<u>3.9</u>	<u>7.48</u>	<u>23.97</u>	<u>784</u>	<u>57.6</u>	<u>2.50</u>	
<u>1606</u>		<u>337.48</u>		<u>4377.0</u>	<u>4.0</u>	<u>7.39</u>	<u>25.19</u>	<u>794</u>	<u>52.8</u>	<u>2.37</u>	
<u>1658</u>		<u>337.54</u>		<u>4582.0</u>	<u>3.94</u>	<u>7.51</u>	<u>23.86</u>	<u>777</u>	<u>48.9</u>	<u>2.96</u>	
<u>1742</u>		<u>337.68</u>		<u>4756.0</u>	<u>4</u>						
<u>1810</u>		<u>337.74</u>		<u>4868.5</u>	<u>4.01</u>						
<u>1844</u>		<u>337.81</u>		<u>5002.0</u>							
<u>1904</u>		<u>337.83</u>		<u>5081.0</u>	<u>3.95</u>						
<u>1930</u>		<u>338.9</u>		<u>5190</u>							
<u>2000</u>		<u>338.1</u>		<u>5300</u>	<u>4.00</u>						
<u>2033</u>		<u>338</u>		<u>5430</u>		<u>7.32</u>	<u>22.59</u>	<u>772</u>	<u>62.2</u>	<u>6.80</u>	
<u>2102</u>		<u>338.08</u>		<u>5550.0</u>							
<u>2131</u>		<u>338.02</u>		<u>5660.0</u>							
<u>2200</u>		<u>338.03</u>		<u>5770.0</u>	<u>4.09</u>						
<u>2230</u>		<u>338.02</u>		<u>5870.6</u>							

Pumping Test Field Sheet

Project Name:			Well ID: <u>MW-11</u>				Measured By:				
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
<u>2700</u>		<u>338.03</u>		<u>6010.1</u>	<u>3.33</u>						
<u>2330</u>		<u>338.04</u>		<u>6110.2</u>	<u>4.0</u>						
<u>7/19 0000</u> <u>0030</u>	2400	<u>338.24</u>		<u>6230.4</u>	<u>4.1</u>						
	2430	<u>338.25</u>		<u>6250.7</u>	<u>4.01</u>						
<u>0100</u>		<u>338.05</u>		<u>6450.6</u>	<u>3.3</u>						
<u>0130</u>		<u>338.45</u>		<u>6580.5</u>	<u>4.3</u>						
<u>0200</u>		<u>338.6</u>		<u>6690.3</u>	<u>3.7</u>						
<u>0230</u>		<u>338.57</u>		<u>6840.1</u>	<u>6.6</u>						
<u>0300</u>		<u>338.57</u>		<u>6970.3</u>	<u>2.67</u>						
<u>0330</u>		<u>338.57</u>		<u>7050.4</u>	<u>2.67</u>						
<u>0400</u>		<u>338.8</u>		<u>7170.2</u>	<u>3.99</u>						
<u>0430</u>		<u>338.68</u>		<u>7250</u>	<u>1.99</u>						
<u>0500</u>		<u>338.08</u>		<u>740.1</u>	<u>4.2</u>						
<u>0530</u>		<u>338.9</u>		<u>758.9</u>	<u>2.5</u>						
<u>0600</u>		<u>339.0</u>		<u>766.5</u>	<u>3.4</u>						
<u>0630</u>		<u>339.1</u>		<u>776.7</u>	<u>4.6</u>						
<u>0702</u>		<u>339.02</u>		<u>7905.1</u>	<u>4.3</u>						
<u>0730</u>		<u>339.04</u>		<u>8017.5</u>	<u>4.01</u>						
<u>0801</u>		<u>339.09</u>		<u>8138</u>	<u>4.15</u>						
<u>0831</u>		<u>339.17</u>		<u>8256</u>	<u>3.93</u>						
<u>0900</u>		<u>339.23</u>		<u>8369</u>	<u>3.9</u>						
<u>0930</u>		<u>339.23</u>		<u>8486.6</u>	<u>3.92</u>						
<u>1000</u>		<u>339.27</u>		<u>8605</u>							
<u>1031</u>		<u>339.32</u>		<u>8725.5</u>							
<u>1100</u>		<u>339.36</u>		<u>8839.6</u>							

Pumping Test Field Sheet

Project Name:			Project No.:			Measured By:					
Well ID: <u>MW-11</u>			Pumping Well <input checked="" type="checkbox"/> Observation Well <input type="checkbox"/>			Measuring Point (height):					
Casing Diameter:			Distance from Pumping Well:			Planned Duration of Test: <u>72</u>					
Initial Totalizer Reading:			Pump On: Date/Time			Pump Off: Date/Time					
Screened Interval:		Static Water Level:		SWL Date/Time:		Water Column (ft.):					
Transducer Installed (Y/N):		Make and model:		Serial No.:		Install Depth (ft. btoc):					
Pump Make and Model:				Serial No.:		Pump Inlet Setting (ft. btoc):					
Initial water column over transducer (ft.):						Initial water column over pump inlet (ft.):					
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
<u>1130</u>		<u>339.4</u>		<u>8961</u>	<u>3.91</u>						
<u>1200</u>		<u>339.4</u>		<u>9076</u>	<u>3.97</u>						
<u>1230</u>		<u>339.48</u>		<u>9193</u>	<u>4.03</u>						
<u>1300</u>		<u>339.51</u>		<u>9309.3</u>	<u>3.88</u>						
<u>1330</u>		<u>339.55</u>		<u>9426.9</u>	<u>3.92</u>						
<u>1400</u>		<u>339.45</u>		<u>9543.5</u>	<u>3.89</u>						
<u>1432</u>		<u>339.47</u>		<u>9667.6</u>	<u>3.88</u>						
<u>1500</u>		<u>339.51</u>		<u>9776.4</u>	<u>3.89</u>						
<u>1530</u>		<u>339.54</u>		<u>9893.1</u>	<u>3.89</u>						
<u>1601</u>		<u>339.57</u>		<u>10013.3</u>	<u>3.89</u>						
<u>1630</u>		<u>339.62</u>		<u>10125.8</u>	<u>3.88</u>						
<u>1700</u>		<u>339.66</u>		<u>10242.5</u>	<u>3.89</u>						
<u>1730</u>		<u>339.71</u>		<u>10359.2</u>	<u>3.89</u>						
<u>1800</u>		<u>339.77</u>		<u>10475.5</u>	<u>3.54</u>						
<u>1830</u>		<u>340.61</u>		<u>10594.8</u>	<u>4.31</u>						
<u>1911</u>		<u>340.37</u>		<u>10758.8</u>	<u>4</u>						
<u>1932</u>		<u>340.32</u>		<u>1084.9</u>	<u>4.30</u>						
<u>2002</u>		<u>340.43</u>		<u>1096.0</u>	<u>3.70</u>						
<u>2015</u>				<u>10995.5</u>	<u>4.44</u>						

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4,007

Pumping Test Field Sheet

Project Name:			Well ID: <u>MW-11</u>				Measured By:				
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
<u>2030</u>		<u>340.73</u>		<u>1107.6</u>	<u>4.00</u>						
<u>2100</u>		<u>340.69</u>		<u>1119.3</u>	<u>3.90</u>						
<u>2130</u>		<u>340.85</u>		<u>1131.1</u>	<u>3.93</u>						
<u>2200</u>		<u>340.25</u>		<u>1143.8</u>	<u>4.23</u>						
<u>2230</u>		<u>340.6</u>		<u>1155.6</u>	<u>3.93</u>						
<u>2300</u>		<u>340.76</u>		<u>1166.5</u>	<u>3.63</u>						
<u>2330</u>		<u>340.7</u>		<u>1179.8</u>	<u>4.43</u>						
<u>0000</u>		<u>340.17</u>		<u>1190.5</u>	<u>3.67</u>						
<u>0030</u>		<u>340.67</u>		<u>1205.1</u>	<u>4.87</u>						
<u>0100</u>		<u>340.8</u>		<u>1215.7</u>	<u>3.53</u>						
<u>0130</u>		<u>340.68</u>		<u>1227.8</u>	<u>4.03</u>						
<u>0500</u>		<u>341.2</u>		<u>1315.1</u>	<u>2.47</u>						
<u>0530</u>		<u>341.12</u>		<u>1322.5</u>	<u>2.47</u>						
<u>0600</u>		<u>341.3</u>		<u>1332.8</u>	<u>4.97</u>						
<u>0630</u>		<u>341.43</u>		<u>1342.7</u>	<u>3.65</u>						
<u>0700</u>		<u>341.37</u>		<u>13586.5</u>	<u>3.96</u>						
<u>0730</u>		<u>341.41</u>		<u>13705.4</u>	<u>4.01</u>						
<u>0759</u>		<u>341.44</u>		<u>13821.6</u>	<u>3.99</u>						
<u>0829</u>		<u>341.47</u>		<u>13941.2</u>	<u>3.85</u>						
<u>0900</u>		<u>341.49</u>		<u>14064.7</u>	<u>3.98</u>						
<u>0930</u>		<u>341.53</u>		<u>14184.5</u>	<u>3.99</u>						
<u>1000</u>		<u>341.57</u>		<u>14304.3</u>	<u>3.99</u>						
<u>1030</u>		<u>341.56</u>		<u>14423.9</u>	<u>3.99</u>						
<u>1100</u>		<u>341.59</u>		<u>14543.3</u>	<u>3.98</u>	<u>7.43</u>	<u>22.43</u>	<u>786</u>	<u>131.3</u>		
<u>1130</u>		<u>341.62</u>		<u>14663.1</u>	<u>3.99</u>						

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Pumping Test Field Sheet

Project Name: <u>Former Y</u>			Project No.: <u>D618,1157</u>			Measured By:					
Well ID: <u>MW-11</u>			Pumping Well <input checked="" type="checkbox"/> Observation Well <input type="checkbox"/>			Measuring Point (height): <u>10 3/8"</u>					
Casing Diameter: <u>5"</u>			Distance from Pumping Well: <u>—</u>			Planned Duration of Test: <u>7 1/2 Hours</u>					
Initial Totalizer Reading: <u>2528.01</u>			Pump On: Date/Time <u>0800 7/18/19</u>			Pump Off: Date/Time					
Screened Interval:		Static Water Level:		SWL Date/Time:		Water Column (ft.):					
Transducer Installed (Y/N):		Make and model:		Serial No.		Install Depth (ft. btoc):					
Pump Make and Model:			Serial No:			Pump Inlet Setting (ft. btoc):					
Initial water column over transducer (ft.):						Initial water column over pump inlet (ft.):					
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
<u>1210</u>		<u>341.63</u>		<u>14823.5</u>	<u>4.01</u>						
<u>1230</u>		<u>341.65</u>		<u>14900.0</u>	<u>3.93</u>						
<u>1300</u>		<u>341.67</u>		<u>15021.3</u>	<u>3.98</u>						
<u>1330</u>		<u>341.72</u>		<u>15146.8</u>	<u>3.98</u>						
<u>1400</u>		<u>341.73</u>		<u>15260.3</u>	<u>3.98</u>						
<u>1430</u>		<u>341.76</u>		<u>15379.4</u>	<u>3.97</u>						
<u>1500</u>		<u>341.78</u>		<u>15498.8</u>	<u>3.98</u>						
<u>1529</u>		<u>341.81</u>		<u>15614.1</u>	<u>3.96</u>						
<u>1600</u>		<u>341.83</u>		<u>15737.4</u>	<u>4.11 3.98</u>						
<u>1630</u>		<u>341.83</u>		<u>15856.6</u>	<u>3.97</u>						
<u>1700</u>		<u>341.82</u>		<u>15976.6</u>	<u>4.00</u>						
<u>1730</u>		<u>341.83</u>		<u>16094.4</u>	<u>3.93</u>	<u>7.26</u>	<u>22.09</u>	<u>784</u>	<u>63.0</u>		
<u>1800</u>		<u>341.9</u>		<u>16213.3</u>							
<u>1830</u>		<u>341.92</u>		<u>16332.2</u>							
<u>1900</u>		<u>341.94</u>		<u>16451.2</u>							
<u>1930</u>		<u>341.96</u>		<u>16569.8</u>							
<u>2000</u>		<u>341.98</u>		<u>16688.4</u>							

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Pumping Test Field Sheet

7/20

Project Name:				Well ID:				Measured By:			
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
2001		339.42									
2002		335.81									
2003		333.86									
2004		332.31									
2005		331.10									
2006		330.16									
2007		329.41									
2008		328.87									
2009		328.43									
2010		328.10									
2011		327.82									
2012		327.61									
2013		327.45									
2014		327.31									
2015		327.18									
2016		327.11									
2017		327.03									
2018		326.98									
2019		—									
2020		326.89									
2021		326.87									
2022		326.85									
2023		326.83									
2024		326.82									
2025		326.80									

Pumping Test Field Sheet

CRF

Project Name: <i>Formerly</i>			Project No.: <i>DB18,1157</i>			Measured By:					
Well ID: <i>BW-7</i>			Pumping Well <input type="checkbox"/> Observation Well <input checked="" type="checkbox"/>			Measuring Point (height):					
Casing Diameter:			Distance from Pumping Well:			Planned Duration of Test:					
Initial Totalizer Reading:			Pump On: Date/Time <i>0800 7/18/19</i>			Pump Off: Date/Time					
Screened Interval:		Static Water Level: <i>327.31</i>		SWL Date/Time:			Water Column (ft.):				
Transducer Installed (Y/N):		Make and model:		Serial No.:			Install Depth (ft. btoc):				
Pump Make and Model:				Serial No.:		Pump Inlet Setting (ft. btoc):					
Initial water column over transducer (ft.):						Initial water column over pump inlet (ft.):					
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments
<i>0909</i>		<i>327.31</i>									
<i>1020</i>		<i>327.31</i>									
<i>1108</i>		<i>327.30</i>									
<i>1211</i>		<i>327.30</i>									
<i>1321</i>		<i>327.30</i>									
<i>1851</i>		<i>327.25</i>									
<i>2108</i>		<i>327.29</i>									
<i>7/19 0908</i>		<i>327.34</i>									
<i>0910</i>		<i>327.34</i>									
<i>912</i>		<i>327.32</i>									
<i>1307</i>		<i>327.31</i>									
<i>1938</i>		<i>327.31</i>									
<i>7/20 12:17 217</i>		<i>327.32</i>									
<i>1311</i>		<i>327.31</i>									
<i>0940</i>		<i>327.34</i>									
<i>1235</i>		<i>327.31</i>									
<i>1705</i>		<i>327.26</i>									
<i>1907</i>		<i>327.24</i>									
<i>2107</i>		<i>327.30</i>									

Pumping Test Field Sheet

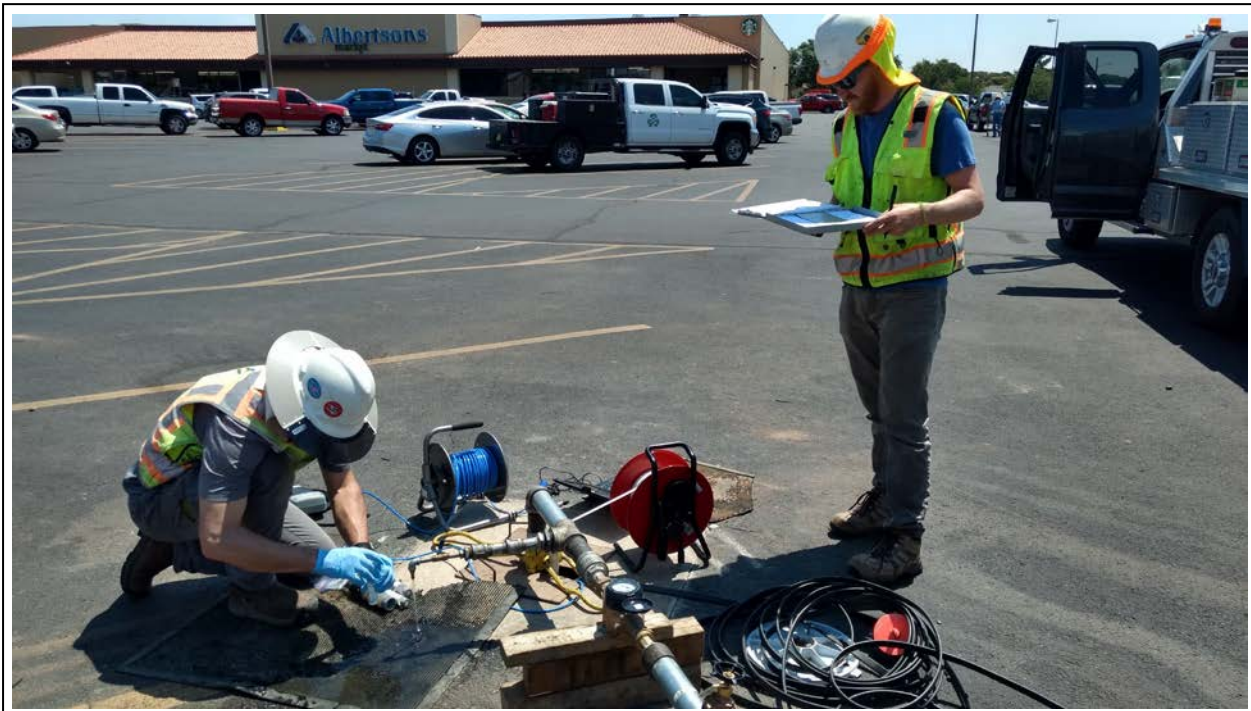
CRT

Project Name: <i>Former Y</i>			Project No.: <i>D1318.1157</i>			Measured By:						
Well ID: <i>BW-10</i>			Pumping Well <input type="checkbox"/> Observation Well <input checked="" type="checkbox"/>			Measuring Point (height):						
Casing Diameter:			Distance from Pumping Well:			Planned Duration of Test:						
Initial Totalizer Reading:			Pump On: Date/Time			Pump Off: Date/Time						
Screened Interval:		Static Water Level: <i>325.27</i>		SWL Date/Time:			Water Column (ft.):					
Transducer Installed (Y/N):		Make and model:			Serial No.:			Install Depth (ft. btoc):				
Pump Make and Model:				Serial No.:			Pump Inlet Setting (ft. btoc):					
Initial water column over transducer (ft.):						Initial water column over pump inlet (ft.):						
Time	Time Since Start (minutes)	Depth to Water (feet)	Drawdown (feet)	Totalizer (gallons)	Pumping Rate (gpm)	pH	Temp. (°C)	Sp. Cond. (µS/cm)	ORP (mv)	D.O. (mg/L)	Comments	
<i>0918</i>		<i>325.25</i>										
<i>1026</i>		<i>325.25</i>										
<i>1115</i>		<i>325.25</i>										
<i>1217</i>		<i>325.23</i>										
<i>1328</i>		<i>325.23</i>										
<i>1857</i>		<i>325.14</i>										
<i>2117</i>		<i>325.20</i>										
<i>0813</i>		<i>325.29</i>										
<i>0917</i>		<i>325.28</i>										
<i>1121</i>		<i>325.27</i>										
<i>1312</i>		<i>325.25</i>										
<i>1943</i>		<i>325.25</i>										
<i>7:20 12:25</i>	<i>24:25</i>	<i>325.25</i>										
<i>3:02</i>		<i>325.25</i>										
<i>0949</i>		<i>325.28</i>										
<i>1242</i>		<i>325.24</i>										
<i>1710</i>		<i>325.17</i>										
<i>1913</i>		<i>325.18</i>										
<i>2112</i>		<i>325.23</i>										

Appendix B
Photographs



1. Site setup: primary and secondary discharge holding tanks in the foreground adjacent to air stripper tower, with pumping well behind (view to the northeast)



2. Pumping well plumbing, with monitoring and discharge sampling equipment

FORMER Y STATION STATE LEAD SITE
CLOVIS, NEW MEXICO
Photographs



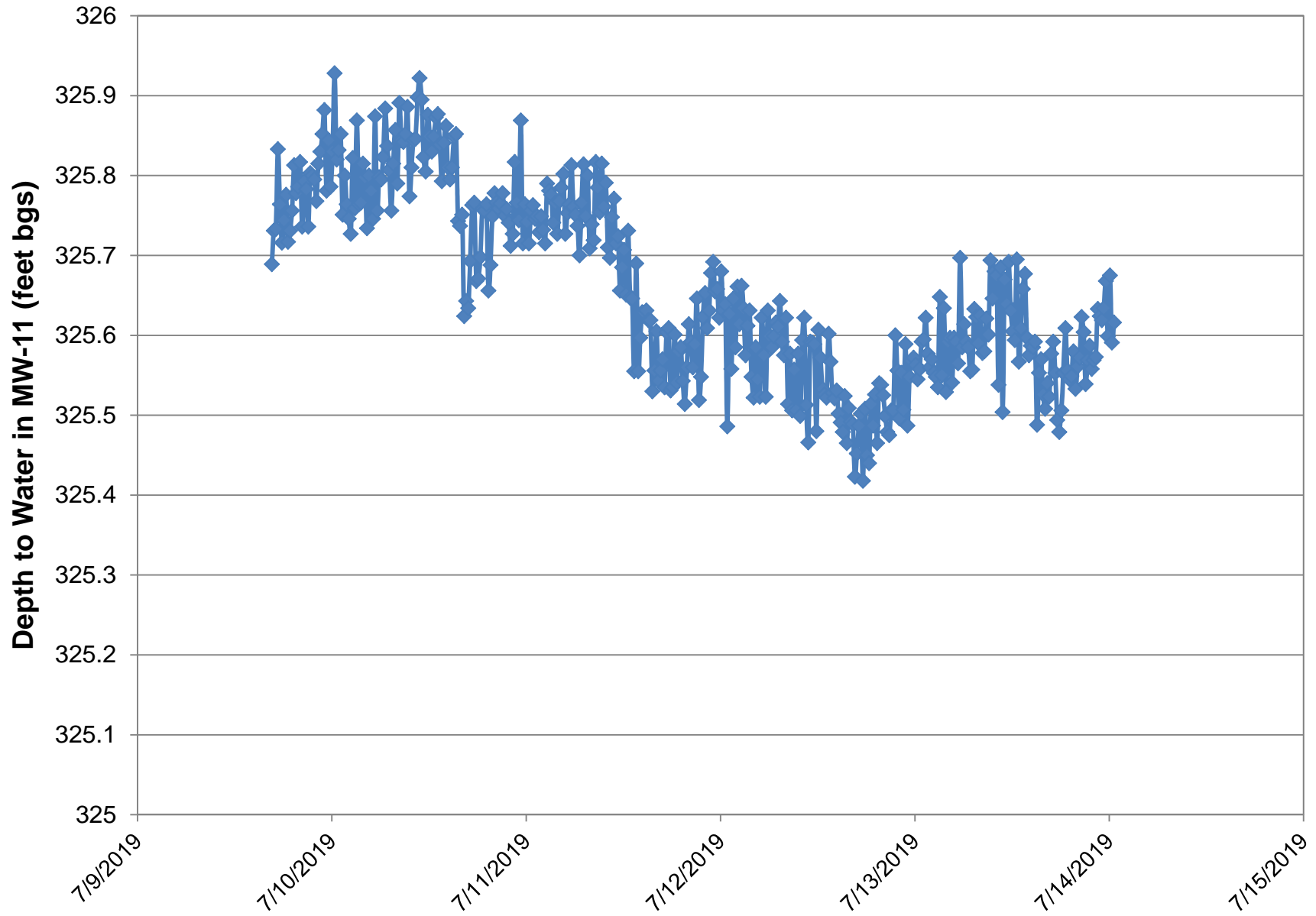


3. Treated effluent discharge to city sewer

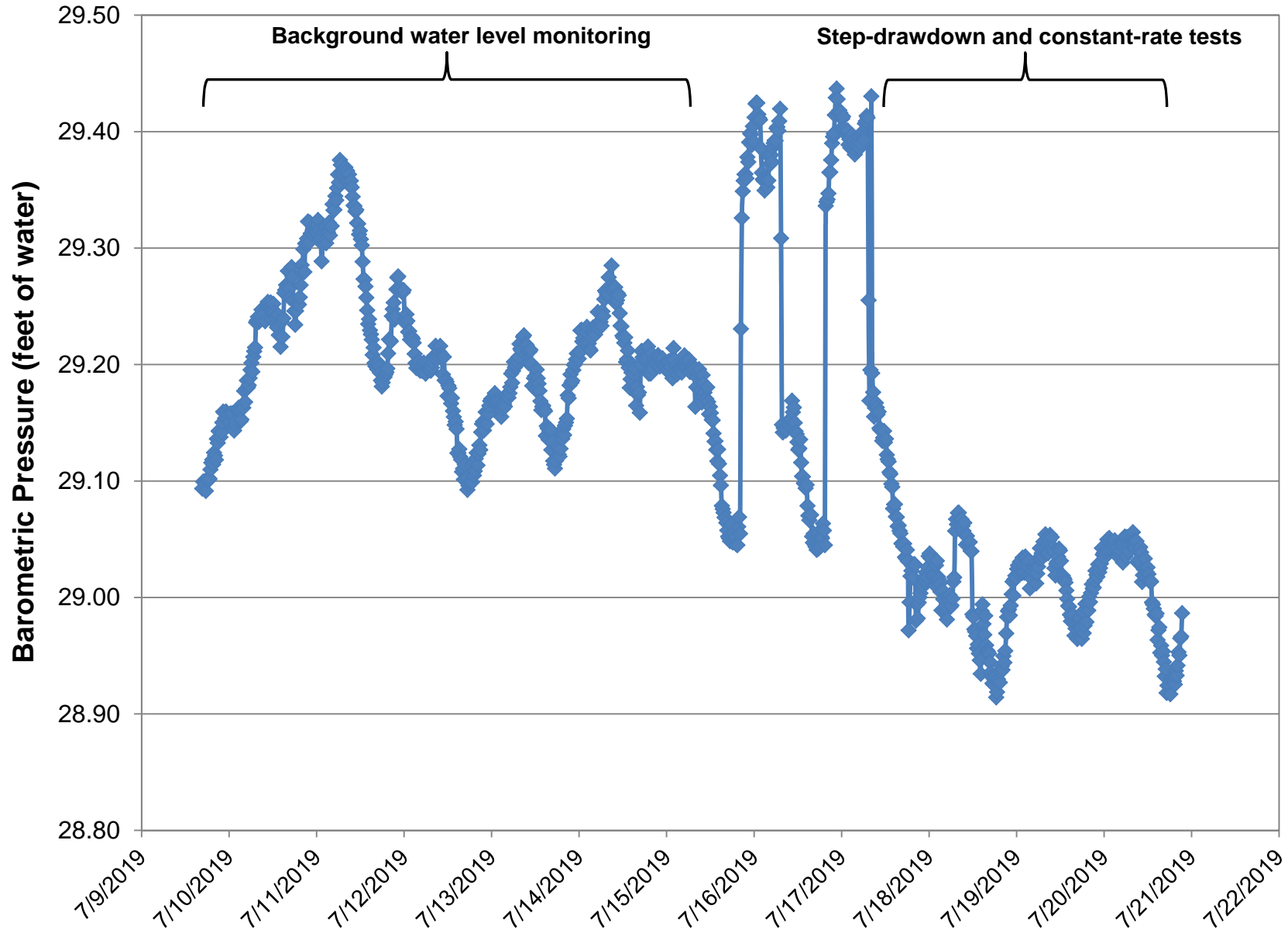


Appendix C
Baseline Plots

Background Depth to Water in MW-11



Barometric Pressure



Appendix D

Step-Drawdown Test Analysis

MW-11 Step Drawdown Test Data Analysis

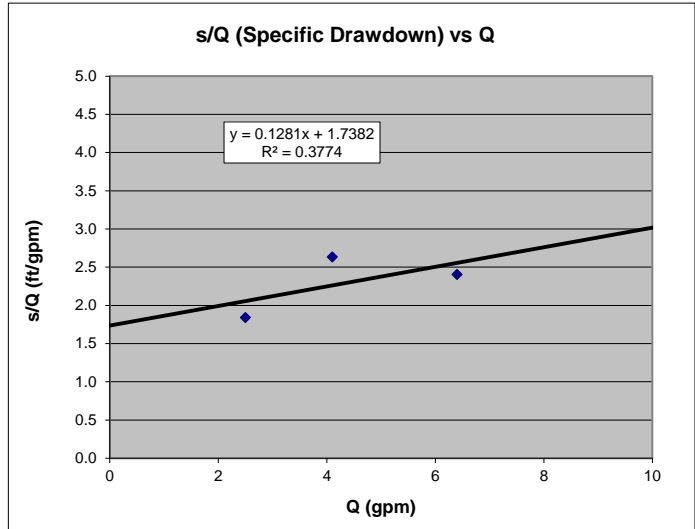
step	Duration (mins.)	Q (gpm)*	s (ft)	s/Q	Q/s
1	120	2.5	4.60	1.840	0.54
2	120	4.1	10.80	2.634	0.38
3	120	6.4	15.40	2.406	0.42

* Based on manual flow meter readings

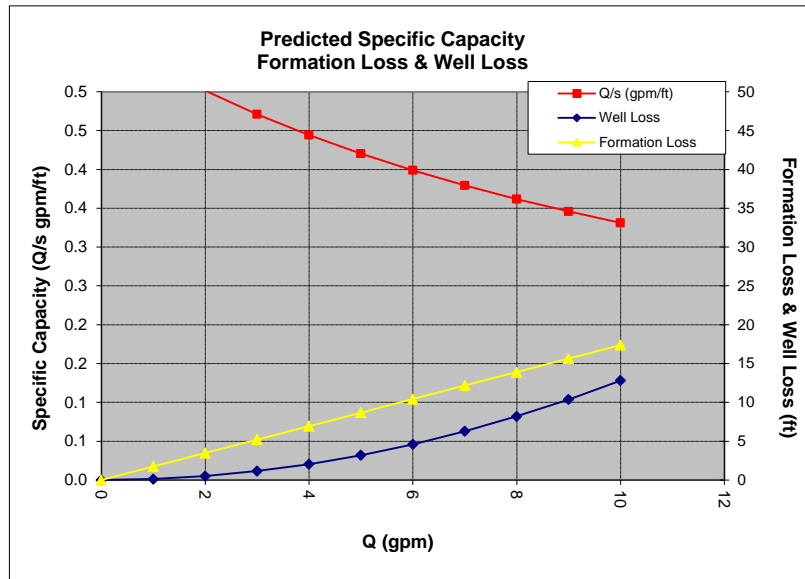
$$s/Q = CQ + B \text{ (Driscoll, eq. 16.9, p. 557)}$$

slope (C) = 0.1281374 Well loss coefficient
intercept (B) = 1.7382035 Formation loss coefficient

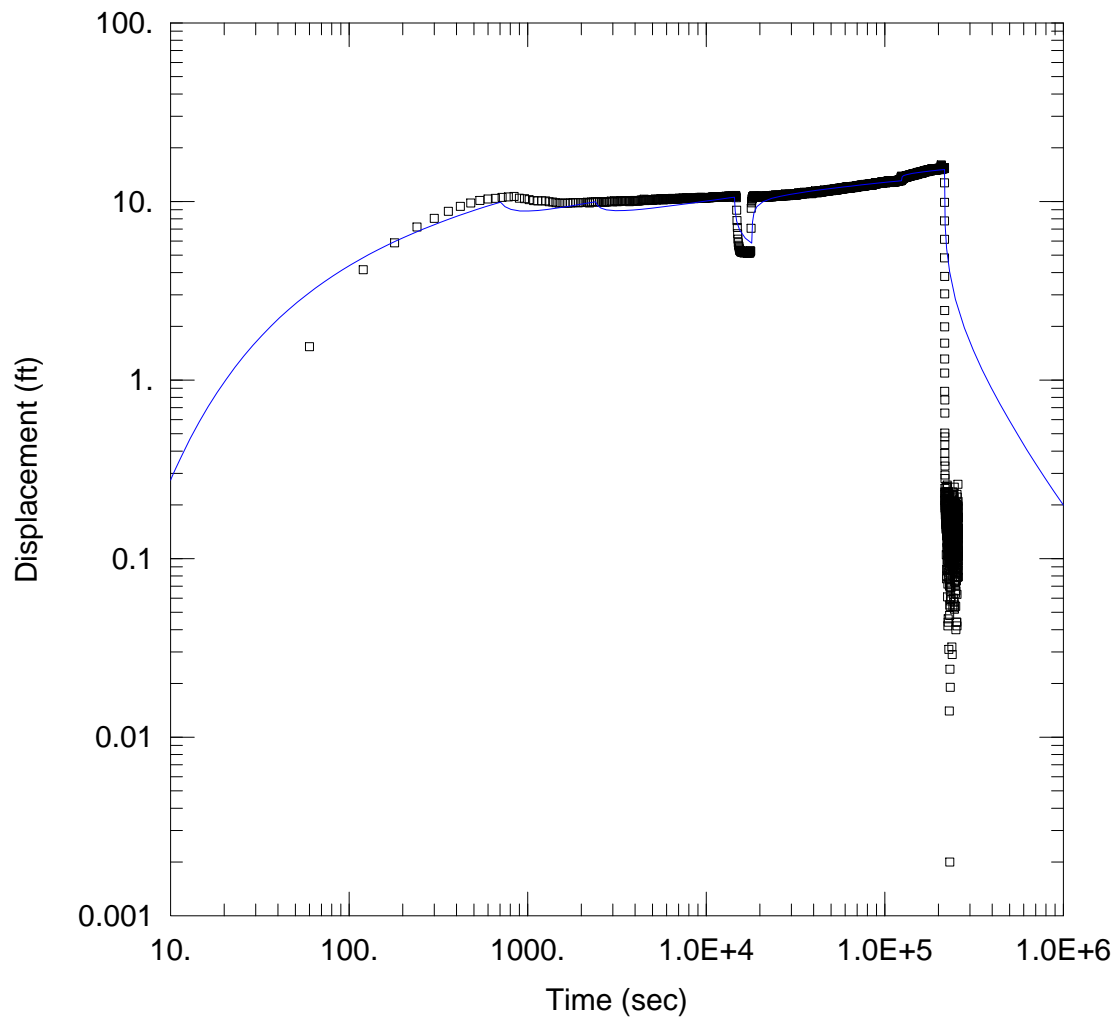
Drawdown & Specific Capacity predictions:
 $SC = Q/s = 1/[CQ + B]$ (Driscoll, eq. 16.10, p. 557)
 equivalent expression: $s = BQ + CQ^2$ (Roscoe Moss p. 303)
 BQ = formation loss
 CQ^2 = well loss



Q (gpm)	Theoretical Drawdown s (ft)	Specific Capacity Q/s (gpm/ft)	Formation Loss BQ	Well Loss CQ^2
0	0.0	0.6	0	0
1	1.9	0.5	1.74	0.13
2	4.0	0.5	3.48	0.51
3	6.4	0.5	5.21	1.15
4	9.0	0.4	6.95	2.05
5	11.9	0.4	8.69	3.20
6	15.0	0.4	10.43	4.61
7	18.4	0.4	12.17	6.28
8	22.1	0.4	13.91	8.20
9	26.0	0.3	15.64	10.38
10	30.2	0.3	17.38	12.81



Appendix E
Constant-Rate Test
Analysis



FORMER Y CRT

Data Set: S:\...\FormerY_MW-11_CRT_Transducer_recovery_Tartakovsky.aqt
 Date: 10/11/19 Time: 15:10:44

PROJECT INFORMATION

Company: DBSA
 Client: NMED-PSTB
 Project: DB18.1157
 Location: Former Y
 Test Well: MW-11
 Test Date: 7/18/19

AQUIFER DATA

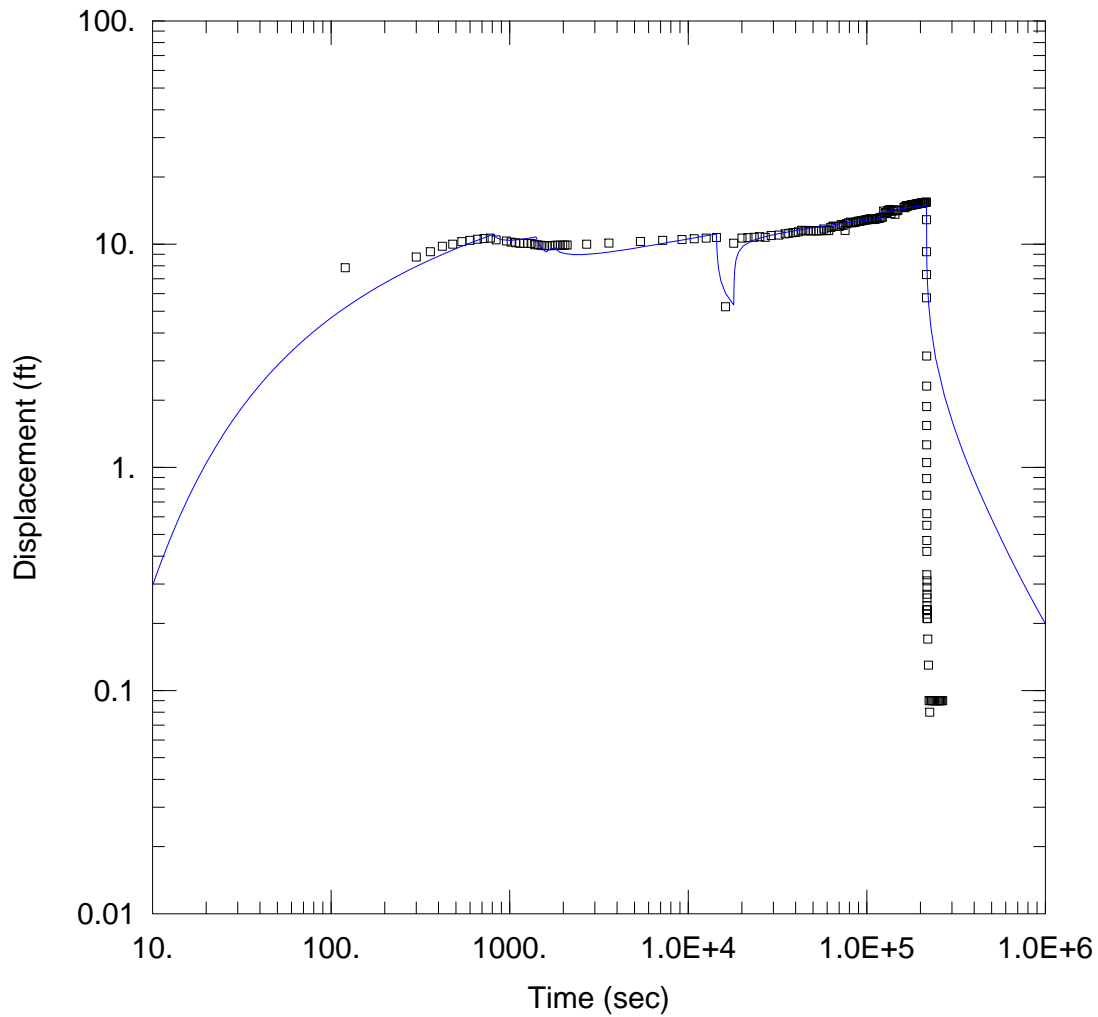
Saturated Thickness: 50. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-11	0	0	□ MW-11	0	0

SOLUTION

Aquifer Model: Unconfined Solution Method: Tartakovsky-Neuman
 T = 58. ft²/day S = 0.2
 Sy = 0.2 Kz/Kr = 0.1
 kD = 1.



FORMER Y CRT

Data Set: S:\...\FormerY_MW-11_CRT_Manual_recovery_Tartakovsky.aqt
 Date: 10/11/19 Time: 15:09:26

PROJECT INFORMATION

Company: DBSA
 Client: NMED-PSTB
 Project: DB18.1157
 Location: Former Y
 Test Well: MW-11
 Test Date: 7/18/19

AQUIFER DATA

Saturated Thickness: 50. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-11	0	0	□ MW-11	0	0

SOLUTION

Aquifer Model: Unconfined Solution Method: Tartakovsky-Neuman
 T = 58. ft²/day S = 0.2
 Sy = 0.2 Kz/Kr = 0.1
 kD = 1.

Appendix F
Analytical Laboratory
Reports



Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

June 14, 2019

Tom Golden

Daniel B. Stephens & Assoc.
6020 Academy NE Suite 100
Albuquerque, NM 87109
TEL: (505) 822-9400
FAX (505) 822-8877

RE: Former Y Station

OrderNo.: 1906493

Dear Tom Golden:

Hall Environmental Analysis Laboratory received 2 sample(s) on 6/10/2019 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a light blue horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1906493

Date Reported: 6/14/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11

Project: Former Y Station

Collection Date: 6/7/2019 4:55:00 PM

Lab ID: 1906493-001

Matrix: AQUEOUS

Received Date: 6/10/2019 12:05:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015D: GASOLINE RANGE							Analyst: RAA
Gasoline Range Organics (GRO)	0.13	0.10		mg/L	2	6/11/2019 9:31:33 PM	G60568
Surr: BFB	103	70-130		%Rec	2	6/11/2019 9:31:33 PM	G60568
EPA METHOD 8011/504.1: EDB							Analyst: CLP
1,2-Dibromoethane	0.014	0.0094		µg/L	1	6/11/2019 9:16:19 PM	45489
EPA METHOD 8015M/D: DIESEL RANGE							Analyst: TOM
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	6/12/2019 8:56:41 AM	45521
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	6/12/2019 8:56:41 AM	45521
Surr: DNOP	107	70-130		%Rec	1	6/12/2019 8:56:41 AM	45521
EPA METHOD 8260B: VOLATILES							Analyst: DJF
Benzene	64	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Toluene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Ethylbenzene	4.3	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,2,4-Trimethylbenzene	2.0	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,2-Dichloroethane (EDC)	5.2	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Naphthalene	ND	2.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1-Methylnaphthalene	ND	4.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
2-Methylnaphthalene	ND	4.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Acetone	14	10		µg/L	1	6/11/2019 12:06:31 PM	W60553
Bromobenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Bromodichloromethane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Bromoform	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Bromomethane	ND	3.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
2-Butanone	ND	10		µg/L	1	6/11/2019 12:06:31 PM	W60553
Carbon disulfide	ND	10		µg/L	1	6/11/2019 12:06:31 PM	W60553
Carbon Tetrachloride	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Chlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Chloroethane	ND	2.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Chloroform	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Chloromethane	ND	3.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
2-Chlorotoluene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
4-Chlorotoluene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
cis-1,2-DCE	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Dibromochloromethane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1906493

Date Reported: 6/14/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11

Project: Former Y Station

Collection Date: 6/7/2019 4:55:00 PM

Lab ID: 1906493-001

Matrix: AQUEOUS

Received Date: 6/10/2019 12:05:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: DJF
Dibromomethane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,2-Dichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,3-Dichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,4-Dichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Dichlorodifluoromethane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,1-Dichloroethane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,1-Dichloroethene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,2-Dichloropropane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,3-Dichloropropane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
2,2-Dichloropropane	ND	2.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,1-Dichloropropene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Hexachlorobutadiene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
2-Hexanone	ND	10		µg/L	1	6/11/2019 12:06:31 PM	W60553
Isopropylbenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
4-Isopropyltoluene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
4-Methyl-2-pentanone	ND	10		µg/L	1	6/11/2019 12:06:31 PM	W60553
Methylene Chloride	ND	3.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
n-Butylbenzene	ND	3.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
n-Propylbenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
sec-Butylbenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Styrene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
tert-Butylbenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
trans-1,2-DCE	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,1,1-Trichloroethane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,1,2-Trichloroethane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Trichloroethene (TCE)	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Trichlorofluoromethane	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
1,2,3-Trichloropropane	ND	2.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Vinyl chloride	ND	1.0		µg/L	1	6/11/2019 12:06:31 PM	W60553
Xylenes, Total	16	1.5		µg/L	1	6/11/2019 12:06:31 PM	W60553
Surr: 1,2-Dichloroethane-d4	95.2	70-130		%Rec	1	6/11/2019 12:06:31 PM	W60553
Surr: 4-Bromofluorobenzene	104	70-130		%Rec	1	6/11/2019 12:06:31 PM	W60553
Surr: Dibromofluoromethane	82.0	70-130		%Rec	1	6/11/2019 12:06:31 PM	W60553

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1906493

Date Reported: 6/14/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11

Project: Former Y Station

Collection Date: 6/7/2019 4:55:00 PM

Lab ID: 1906493-001

Matrix: AQUEOUS

Received Date: 6/10/2019 12:05:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: DJF
Surr: Toluene-d8	94.6	70-130	%Rec	1	6/11/2019 12:06:31 PM	W60553	

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1906493

Date Reported: 6/14/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: Trip Blank

Project: Former Y Station

Collection Date:

Lab ID: 1906493-002

Matrix: TRIP BLANK

Received Date: 6/10/2019 12:05:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8011/504.1: EDB							Analyst: CLP
1,2-Dibromoethane	ND	0.0095		µg/L	1	6/11/2019 9:31:42 PM	45489
EPA METHOD 8260B: VOLATILES							Analyst: DJF
Benzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Toluene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Ethylbenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Naphthalene	ND	2.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1-Methylnaphthalene	ND	4.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
2-Methylnaphthalene	ND	4.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Acetone	ND	10		µg/L	1	6/11/2019 12:35:53 PM	W60553
Bromobenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Bromodichloromethane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Bromoform	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Bromomethane	ND	3.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
2-Butanone	ND	10		µg/L	1	6/11/2019 12:35:53 PM	W60553
Carbon disulfide	ND	10		µg/L	1	6/11/2019 12:35:53 PM	W60553
Carbon Tetrachloride	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Chlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Chloroethane	ND	2.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Chloroform	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Chloromethane	ND	3.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
2-Chlorotoluene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
4-Chlorotoluene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
cis-1,2-DCE	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Dibromochloromethane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Dibromomethane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,2-Dichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,3-Dichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,4-Dichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Dichlorodifluoromethane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,1-Dichloroethane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,1-Dichloroethene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,2-Dichloropropane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1906493

Date Reported: 6/14/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: Trip Blank

Project: Former Y Station

Collection Date:

Lab ID: 1906493-002

Matrix: TRIP BLANK

Received Date: 6/10/2019 12:05:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: DJF
1,3-Dichloropropane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
2,2-Dichloropropane	ND	2.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,1-Dichloropropene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Hexachlorobutadiene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
2-Hexanone	ND	10		µg/L	1	6/11/2019 12:35:53 PM	W60553
Isopropylbenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
4-Isopropyltoluene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
4-Methyl-2-pentanone	ND	10		µg/L	1	6/11/2019 12:35:53 PM	W60553
Methylene Chloride	ND	3.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
n-Butylbenzene	ND	3.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
n-Propylbenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
sec-Butylbenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Styrene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
tert-Butylbenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
trans-1,2-DCE	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,1,1-Trichloroethane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,1,2-Trichloroethane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Trichloroethene (TCE)	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Trichlorofluoromethane	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
1,2,3-Trichloropropane	ND	2.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Vinyl chloride	ND	1.0		µg/L	1	6/11/2019 12:35:53 PM	W60553
Xylenes, Total	ND	1.5		µg/L	1	6/11/2019 12:35:53 PM	W60553
Surr: 1,2-Dichloroethane-d4	91.3	70-130		%Rec	1	6/11/2019 12:35:53 PM	W60553
Surr: 4-Bromofluorobenzene	96.9	70-130		%Rec	1	6/11/2019 12:35:53 PM	W60553
Surr: Dibromofluoromethane	78.5	70-130		%Rec	1	6/11/2019 12:35:53 PM	W60553
Surr: Toluene-d8	97.1	70-130		%Rec	1	6/11/2019 12:35:53 PM	W60553

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1906493

14-Jun-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Sample ID: LCS-45489	SampType: LCS	TestCode: EPA Method 8011/504.1: EDB								
Client ID: LCSW	Batch ID: 45489	RunNo: 60565								
Prep Date: 6/11/2019	Analysis Date: 6/11/2019	SeqNo: 2049186	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	0.088	0.010	0.1000	0	87.7	70	130			

Sample ID: MB-45489	SampType: MBLK	TestCode: EPA Method 8011/504.1: EDB								
Client ID: PBW	Batch ID: 45489	RunNo: 60565								
Prep Date: 6/11/2019	Analysis Date: 6/11/2019	SeqNo: 2049187	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	ND	0.010								

Qualifiers:

- | | |
|---|---|
| * Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank |
| D Sample Diluted Due to Matrix | E Value above quantitation range |
| H Holding times for preparation or analysis exceeded | J Analyte detected below quantitation limits |
| ND Not Detected at the Reporting Limit | P Sample pH Not In Range |
| PQL Practical Quantitative Limit | RL Reporting Limit |
| S % Recovery outside of range due to dilution or matrix | |

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1906493

14-Jun-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Sample ID: LCS-45521	SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range							
Client ID: LCSW	Batch ID: 45521		RunNo: 60571							
Prep Date: 6/12/2019	Analysis Date: 6/12/2019		SeqNo: 2049342	Units: mg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.3	1.0	5.000	0	106	71.8	135			
Surr: DNOP	0.40		0.5000		80.5	70	130			

Sample ID: MB-45521	SampType: MBLK		TestCode: EPA Method 8015M/D: Diesel Range							
Client ID: PBW	Batch ID: 45521		RunNo: 60571							
Prep Date: 6/12/2019	Analysis Date: 6/12/2019		SeqNo: 2049343	Units: mg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	1.0								
Motor Oil Range Organics (MRO)	ND	5.0								
Surr: DNOP	0.88		1.000		87.6	70	130			

Qualifiers:

- | | |
|---|---|
| * Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank |
| D Sample Diluted Due to Matrix | E Value above quantitation range |
| H Holding times for preparation or analysis exceeded | J Analyte detected below quantitation limits |
| ND Not Detected at the Reporting Limit | P Sample pH Not In Range |
| PQL Practical Quantitative Limit | RL Reporting Limit |
| S % Recovery outside of range due to dilution or matrix | |

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1906493

14-Jun-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Sample ID: 100ng lcs	SampType: LCS	TestCode: EPA Method 8260B: VOLATILES								
Client ID: LCSW	Batch ID: R60568	RunNo: 60568								
Prep Date:	Analysis Date: 6/11/2019	SeqNo: 2049227	Units: %Rec							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 1,2-Dichloroethane-d4	8.0		10.00		79.7	70	130			
Surr: 4-Bromofluorobenzene	8.8		10.00		87.9	70	130			
Surr: Dibromofluoromethane	9.4		10.00		94.1	70	130			
Surr: Toluene-d8	8.1		10.00		80.5	70	130			

Sample ID: rb	SampType: MBLK	TestCode: EPA Method 8260B: VOLATILES								
Client ID: PBW	Batch ID: R60568	RunNo: 60568								
Prep Date:	Analysis Date: 6/11/2019	SeqNo: 2049236	Units: %Rec							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 1,2-Dichloroethane-d4	8.2		10.00		82.0	70	130			
Surr: 4-Bromofluorobenzene	8.6		10.00		86.1	70	130			
Surr: Dibromofluoromethane	10		10.00		101	70	130			
Surr: Toluene-d8	8.2		10.00		81.7	70	130			

Sample ID: rb	SampType: MBLK	TestCode: EPA Method 8260B: VOLATILES								
Client ID: PBW	Batch ID: W60553	RunNo: 60553								
Prep Date:	Analysis Date: 6/11/2019	SeqNo: 2049289	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								

Qualifiers:

- | | |
|---|---|
| * Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank |
| D Sample Diluted Due to Matrix | E Value above quantitation range |
| H Holding times for preparation or analysis exceeded | J Analyte detected below quantitation limits |
| ND Not Detected at the Reporting Limit | P Sample pH Not In Range |
| PQL Practical Quantitative Limit | RL Reporting Limit |
| S % Recovery outside of range due to dilution or matrix | |

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1906493

14-Jun-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Sample ID: rb	SampType: MBLK	TestCode: EPA Method 8260B: VOLATILES								
Client ID: PBW	Batch ID: W60553	RunNo: 60553								
Prep Date:	Analysis Date: 6/11/2019	SeqNo: 2049289	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1906493

14-Jun-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sample ID: rb	SampType: MBLK		TestCode: EPA Method 8260B: VOLATILES							
Client ID: PBW	Batch ID: W60553		RunNo: 60553							
Prep Date:	Analysis Date: 6/11/2019		SeqNo: 2049289		Units: µg/L					
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	8.9		10.00		89.3	70	130			
Surr: 4-Bromofluorobenzene	9.8		10.00		97.6	70	130			
Surr: Dibromofluoromethane	7.8		10.00		78.1	70	130			
Surr: Toluene-d8	9.8		10.00		97.5	70	130			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sample ID: 100ng lcs	SampType: LCS		TestCode: EPA Method 8260B: VOLATILES							
Client ID: LCSW	Batch ID: W60553		RunNo: 60553							
Prep Date:	Analysis Date: 6/11/2019		SeqNo: 2049290		Units: µg/L					
Benzene	18	1.0	20.00	0	91.6	70	130			
Toluene	18	1.0	20.00	0	88.4	70	130			
Chlorobenzene	18	1.0	20.00	0	89.4	70	130			
1,1-Dichloroethene	17	1.0	20.00	0	84.7	70	130			
Trichloroethene (TCE)	16	1.0	20.00	0	80.5	70	130			
Surr: 1,2-Dichloroethane-d4	8.5		10.00		84.7	70	130			
Surr: 4-Bromofluorobenzene	9.8		10.00		97.9	70	130			
Surr: Dibromofluoromethane	8.2		10.00		81.8	70	130			
Surr: Toluene-d8	9.9		10.00		99.1	70	130			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quantitative Limit
- S % Recovery outside of range due to dilution or matrix
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1906493

14-Jun-19

Client: Daniel B. Stephens & Assoc.
Project: Former Y Station

Sample ID: 1906493-001A MS	SampType: MS	TestCode: EPA Method 8015D: Gasoline Range								
Client ID: MW-11	Batch ID: G60568	RunNo: 60568								
Prep Date:	Analysis Date: 6/11/2019	SeqNo: 2049255			Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	1.1	0.10	1.000	0.1328	92.2	70	130			
Surr: BFB	20		20.00		100	70	130			

Sample ID: 1906493-001A MSD	SampType: MSD	TestCode: EPA Method 8015D: Gasoline Range								
Client ID: MW-11	Batch ID: G60568	RunNo: 60568								
Prep Date:	Analysis Date: 6/11/2019	SeqNo: 2049256			Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.98	0.10	1.000	0.1328	85.0	70	130	7.07	20	
Surr: BFB	20		20.00		101	70	130	0	0	

Sample ID: 2.5ug gro lcs	SampType: LCS	TestCode: EPA Method 8015D: Gasoline Range								
Client ID: LCSW	Batch ID: G60568	RunNo: 60568								
Prep Date:	Analysis Date: 6/11/2019	SeqNo: 2049258			Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.43	0.050	0.5000	0	85.6	70	130			
Surr: BFB	9.8		10.00		98.1	70	130			

Sample ID: rb	SampType: MBLK	TestCode: EPA Method 8015D: Gasoline Range								
Client ID: PBW	Batch ID: G60568	RunNo: 60568								
Prep Date:	Analysis Date: 6/11/2019	SeqNo: 2049259			Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	0.050								
Surr: BFB	9.9		10.00		99.3	70	130			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quantitative Limit
- S % Recovery outside of range due to dilution or matrix
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

Sample Log-In Check List

Client Name: DBS

Work Order Number: 1906493

RcptNo: 1

Received By: Erin Melendrez

6/10/2019 12:05:00 PM

EM

Completed By: Erin Melendrez

6/10/2019 12:27:57 PM

EM

Reviewed By: *EM*

6/10/19

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? Client

Log In

3. Was an attempt made to cool the samples? Yes No NA
4. Were all samples received at a temperature of >0° C to 6.0°C Yes No NA
5. Sample(s) in proper container(s)? Yes No
6. Sufficient sample volume for indicated test(s)? Yes No
7. Are samples (except VOA and ONG) properly preserved? Yes No
8. Was preservative added to bottles? Yes No NA
9. VOA vials have zero headspace? Yes No No VOA Vials
10. Were any sample containers received broken? Yes No
11. Does paperwork match bottle labels? Yes No
 (Note discrepancies on chain of custody)
12. Are matrices correctly identified on Chain of Custody? Yes No
13. Is it clear what analyses were requested? Yes No
14. Were all holding times able to be met? Yes No
 (If no, notify customer for authorization.)

of preserved bottles checked for pH: _____
 (<2 or >12 unless noted) *6-10-19*
 Adjusted? _____
 Checked by: _____

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes No NA

Person Notified: _____ Date: _____
 By Whom: _____ Via: eMail Phone Fax In Person
 Regarding: _____
 Client Instructions: _____

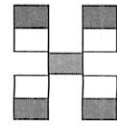
16. Additional remarks:

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.1	Good	Not Present			

Chain-of-Custody Record

Turn-Around Time:
 Standard Rush 48 HOURS
 Project Name: FORMER Y STATION



HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Client: DBSA

Mailing Address: 1020 ACADEMY NE SUITE 100 ALBUQUERQUE, NM 87109

Phone #: 505-822-9400

email or Fax#: tgolden@dbssgeo-logic.com

QA/QC Package:
 Standard Level 4 (Full Validation)

Accreditation: Az Compliance NELAC Other _____

EDD (Type) _____

Project #: DB18.1157.00.00MWD19.01

Project Manager: TOM GOLDEN

Sampler: J. FISHER

On Ice: Yes No

of Coolers: 1 (CF=-0.4)

Cooler Temp (including CF): 1.5 - 0.4 = 1.1°C

Analysis Request

BTEX / MTBE / TMB's (8021)	TPH:80151(GRO/DRO/MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO ₃ , NO ₂ , PO ₄ , SO ₄	8260 (VOA) Full List	8270 (Semi-VOA)	Total Coliform (Present/Absent)										
	X		X				X												
			X																

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No.
6/7/19	1655	GW	MW-11 TRIP BANK	8-VOA	6-MsCl ₂ 2-3574	1906493 -001 -002
<i>[Large Signature]</i>						

Date: 6/9/19 Time: 1540 Relinquished by: [Signature]
 Date: 6/10/19 Time: 12:05 Relinquished by: [Signature]
 Received by: [Signature] Via: CDU Date: 6/10/19 Time: 8:30
 Received by: [Signature] Via: CDU Date: 6/10/19 Time: 1205

Remarks:



Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

August 01, 2019

Tom Golden

Daniel B. Stephens & Assoc.
6020 Academy NE Suite 100
Albuquerque, NM 87109
TEL: (505) 822-9400
FAX: (505) 822-8877

RE: Former Y Station

OrderNo.: 1907B54

Dear Tom Golden:

Hall Environmental Analysis Laboratory received 6 sample(s) on 7/22/2019 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a white background.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11 Step Test

Project: Former Y Station

Collection Date: 7/17/2019 11:33:00 AM

Lab ID: 1907B54-001

Matrix: AQUEOUS

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8011/504.1: EDB							Analyst: CLP
1,2-Dibromoethane	2.7	0.47		µg/L	50	7/30/2019 9:01:18 AM	46435
EPA METHOD 8260B: VOLATILES							Analyst: CCM
Benzene	1200	20		µg/L	20	7/26/2019 2:55:00 AM	R61645
Toluene	42	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Ethylbenzene	120	20		µg/L	20	7/26/2019 2:55:00 AM	R61645
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,2,4-Trimethylbenzene	74	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,3,5-Trimethylbenzene	20	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,2-Dichloroethane (EDC)	71	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,2-Dibromoethane (EDB)	3.6	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Naphthalene	16	2.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1-Methylnaphthalene	ND	4.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
2-Methylnaphthalene	5.4	4.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Acetone	ND	10		µg/L	1	7/25/2019 2:25:00 PM	R61645
Bromobenzene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Bromodichloromethane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Bromoform	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Bromomethane	ND	3.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
2-Butanone	ND	10		µg/L	1	7/25/2019 2:25:00 PM	R61645
Carbon disulfide	ND	10		µg/L	1	7/25/2019 2:25:00 PM	R61645
Carbon Tetrachloride	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Chlorobenzene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Chloroethane	ND	2.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Chloroform	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Chloromethane	ND	3.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
2-Chlorotoluene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
4-Chlorotoluene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
cis-1,2-DCE	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Dibromochloromethane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Dibromomethane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,1-Dichloroethane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,1-Dichloroethene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,2-Dichloropropane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11 Step Test

Project: Former Y Station

Collection Date: 7/17/2019 11:33:00 AM

Lab ID: 1907B54-001

Matrix: AQUEOUS

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: CCM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
2,2-Dichloropropane	ND	2.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,1-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Hexachlorobutadiene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
2-Hexanone	ND	10		µg/L	1	7/25/2019 2:25:00 PM	R61645
Isopropylbenzene	4.6	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
4-Isopropyltoluene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
4-Methyl-2-pentanone	ND	10		µg/L	1	7/25/2019 2:25:00 PM	R61645
Methylene Chloride	ND	3.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
n-Butylbenzene	ND	3.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
n-Propylbenzene	11	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
sec-Butylbenzene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Styrene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
tert-Butylbenzene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
trans-1,2-DCE	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Trichlorofluoromethane	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Vinyl chloride	ND	1.0		µg/L	1	7/25/2019 2:25:00 PM	R61645
Xylenes, Total	460	30		µg/L	20	7/26/2019 2:55:00 AM	R61645
Surr: 1,2-Dichloroethane-d4	97.8	70-130		%Rec	1	7/25/2019 2:25:00 PM	R61645
Surr: 4-Bromofluorobenzene	98.5	70-130		%Rec	1	7/25/2019 2:25:00 PM	R61645
Surr: Dibromofluoromethane	92.9	70-130		%Rec	1	7/25/2019 2:25:00 PM	R61645
Surr: Toluene-d8	96.7	70-130		%Rec	1	7/25/2019 2:25:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11 CRT

Project: Former Y Station

Collection Date: 7/18/2019 10:00:00 AM

Lab ID: 1907B54-002

Matrix: AQUEOUS

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8011/504.1: EDB							Analyst: CLP
1,2-Dibromoethane	2.3	0.47		µg/L	50	7/30/2019 9:16:39 AM	46435
EPA METHOD 8260B: VOLATILES							Analyst: CCM
Benzene	1200	20		µg/L	20	7/26/2019 3:19:00 AM	R61645
Toluene	18	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Ethylbenzene	120	20		µg/L	20	7/26/2019 3:19:00 AM	R61645
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,2,4-Trimethylbenzene	76	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,3,5-Trimethylbenzene	19	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,2-Dichloroethane (EDC)	67	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,2-Dibromoethane (EDB)	3.0	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Naphthalene	17	2.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1-Methylnaphthalene	ND	4.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
2-Methylnaphthalene	6.2	4.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Acetone	ND	10		µg/L	1	7/25/2019 3:39:00 PM	R61645
Bromobenzene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Bromodichloromethane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Bromoform	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Bromomethane	ND	3.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
2-Butanone	ND	10		µg/L	1	7/25/2019 3:39:00 PM	R61645
Carbon disulfide	ND	10		µg/L	1	7/25/2019 3:39:00 PM	R61645
Carbon Tetrachloride	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Chlorobenzene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Chloroethane	ND	2.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Chloroform	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Chloromethane	ND	3.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
2-Chlorotoluene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
4-Chlorotoluene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
cis-1,2-DCE	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Dibromochloromethane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Dibromomethane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,1-Dichloroethane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,1-Dichloroethene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,2-Dichloropropane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11 CRT

Project: Former Y Station

Collection Date: 7/18/2019 10:00:00 AM

Lab ID: 1907B54-002

Matrix: AQUEOUS

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: CCM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
2,2-Dichloropropane	ND	2.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,1-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Hexachlorobutadiene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
2-Hexanone	ND	10		µg/L	1	7/25/2019 3:39:00 PM	R61645
Isopropylbenzene	4.5	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
4-Isopropyltoluene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
4-Methyl-2-pentanone	ND	10		µg/L	1	7/25/2019 3:39:00 PM	R61645
Methylene Chloride	ND	3.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
n-Butylbenzene	ND	3.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
n-Propylbenzene	11	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
sec-Butylbenzene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Styrene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
tert-Butylbenzene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
trans-1,2-DCE	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Trichlorofluoromethane	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Vinyl chloride	ND	1.0		µg/L	1	7/25/2019 3:39:00 PM	R61645
Xylenes, Total	450	30		µg/L	20	7/26/2019 3:19:00 AM	R61645
Surr: 1,2-Dichloroethane-d4	98.5	70-130	%Rec		1	7/25/2019 3:39:00 PM	R61645
Surr: 4-Bromofluorobenzene	98.7	70-130	%Rec		1	7/25/2019 3:39:00 PM	R61645
Surr: Dibromofluoromethane	93.7	70-130	%Rec		1	7/25/2019 3:39:00 PM	R61645
Surr: Toluene-d8	97.2	70-130	%Rec		1	7/25/2019 3:39:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11 CRT

Project: Former Y Station

Collection Date: 7/19/2019 8:00:00 PM

Lab ID: 1907B54-003

Matrix: AQUEOUS

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8011/504.1: EDB							Analyst: CLP
1,2-Dibromoethane	3.1	0.47		µg/L	50	7/30/2019 9:31:52 AM	46435
EPA METHOD 8260B: VOLATILES							Analyst: CCM
Benzene	2000	20		µg/L	20	7/26/2019 3:43:00 AM	R61645
Toluene	9.2	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Ethylbenzene	190	20		µg/L	20	7/26/2019 3:43:00 AM	R61645
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,2,4-Trimethylbenzene	110	20		µg/L	20	7/26/2019 3:43:00 AM	R61645
1,3,5-Trimethylbenzene	31	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,2-Dichloroethane (EDC)	97	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,2-Dibromoethane (EDB)	3.7	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Naphthalene	26	2.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1-Methylnaphthalene	5.9	4.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
2-Methylnaphthalene	9.3	4.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Acetone	ND	10		µg/L	1	7/25/2019 4:03:00 PM	R61645
Bromobenzene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Bromodichloromethane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Bromoform	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Bromomethane	ND	3.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
2-Butanone	ND	10		µg/L	1	7/25/2019 4:03:00 PM	R61645
Carbon disulfide	ND	10		µg/L	1	7/25/2019 4:03:00 PM	R61645
Carbon Tetrachloride	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Chlorobenzene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Chloroethane	ND	2.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Chloroform	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Chloromethane	ND	3.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
2-Chlorotoluene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
4-Chlorotoluene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
cis-1,2-DCE	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Dibromochloromethane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Dibromomethane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,1-Dichloroethane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,1-Dichloroethene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,2-Dichloropropane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11 CRT

Project: Former Y Station

Collection Date: 7/19/2019 8:00:00 PM

Lab ID: 1907B54-003

Matrix: AQUEOUS

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: CCM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
2,2-Dichloropropane	ND	2.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,1-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Hexachlorobutadiene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
2-Hexanone	ND	10		µg/L	1	7/25/2019 4:03:00 PM	R61645
Isopropylbenzene	6.8	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
4-Isopropyltoluene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
4-Methyl-2-pentanone	ND	10		µg/L	1	7/25/2019 4:03:00 PM	R61645
Methylene Chloride	ND	3.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
n-Butylbenzene	ND	3.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
n-Propylbenzene	17	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
sec-Butylbenzene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Styrene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
tert-Butylbenzene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
trans-1,2-DCE	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Trichlorofluoromethane	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Vinyl chloride	ND	1.0		µg/L	1	7/25/2019 4:03:00 PM	R61645
Xylenes, Total	760	30		µg/L	20	7/26/2019 3:43:00 AM	R61645
Surr: 1,2-Dichloroethane-d4	97.4	70-130	%Rec		1	7/25/2019 4:03:00 PM	R61645
Surr: 4-Bromofluorobenzene	98.7	70-130	%Rec		1	7/25/2019 4:03:00 PM	R61645
Surr: Dibromofluoromethane	94.5	70-130	%Rec		1	7/25/2019 4:03:00 PM	R61645
Surr: Toluene-d8	98.0	70-130	%Rec		1	7/25/2019 4:03:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11 CRT

Project: Former Y Station

Collection Date: 7/20/2019 6:05:00 PM

Lab ID: 1907B54-004

Matrix: AQUEOUS

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8011/504.1: EDB							Analyst: CLP
1,2-Dibromoethane	3.2	0.47		µg/L	50	7/30/2019 9:47:04 AM	46435
EPA METHOD 8260B: VOLATILES							Analyst: CCM
Benzene	2000	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Toluene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Ethylbenzene	190	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,2,4-Trimethylbenzene	120	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,3,5-Trimethylbenzene	34	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,2-Dichloroethane (EDC)	91	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,2-Dibromoethane (EDB)	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Naphthalene	28	20		µg/L	20	7/25/2019 5:16:00 PM	R61645
1-Methylnaphthalene	ND	40		µg/L	20	7/25/2019 5:16:00 PM	R61645
2-Methylnaphthalene	ND	40		µg/L	20	7/25/2019 5:16:00 PM	R61645
Acetone	ND	100		µg/L	20	7/25/2019 5:16:00 PM	R61645
Bromobenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Bromodichloromethane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Bromoform	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Bromomethane	ND	30		µg/L	20	7/25/2019 5:16:00 PM	R61645
2-Butanone	ND	100		µg/L	20	7/25/2019 5:16:00 PM	R61645
Carbon disulfide	ND	100		µg/L	20	7/25/2019 5:16:00 PM	R61645
Carbon Tetrachloride	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Chlorobenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Chloroethane	ND	20		µg/L	20	7/25/2019 5:16:00 PM	R61645
Chloroform	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Chloromethane	ND	30		µg/L	20	7/25/2019 5:16:00 PM	R61645
2-Chlorotoluene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
4-Chlorotoluene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
cis-1,2-DCE	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
cis-1,3-Dichloropropene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,2-Dibromo-3-chloropropane	ND	20		µg/L	20	7/25/2019 5:16:00 PM	R61645
Dibromochloromethane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Dibromomethane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,2-Dichlorobenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,3-Dichlorobenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,4-Dichlorobenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Dichlorodifluoromethane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,1-Dichloroethane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,1-Dichloroethene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,2-Dichloropropane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: MW-11 CRT

Project: Former Y Station

Collection Date: 7/20/2019 6:05:00 PM

Lab ID: 1907B54-004

Matrix: AQUEOUS

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: CCM
1,3-Dichloropropane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
2,2-Dichloropropane	ND	20		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,1-Dichloropropene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Hexachlorobutadiene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
2-Hexanone	ND	100		µg/L	20	7/25/2019 5:16:00 PM	R61645
Isopropylbenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
4-Isopropyltoluene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
4-Methyl-2-pentanone	ND	100		µg/L	20	7/25/2019 5:16:00 PM	R61645
Methylene Chloride	ND	30		µg/L	20	7/25/2019 5:16:00 PM	R61645
n-Butylbenzene	ND	30		µg/L	20	7/25/2019 5:16:00 PM	R61645
n-Propylbenzene	19	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
sec-Butylbenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Styrene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
tert-Butylbenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,1,1,2-Tetrachloroethane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,1,2,2-Tetrachloroethane	ND	20		µg/L	20	7/25/2019 5:16:00 PM	R61645
Tetrachloroethene (PCE)	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
trans-1,2-DCE	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
trans-1,3-Dichloropropene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,2,3-Trichlorobenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,2,4-Trichlorobenzene	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,1,1-Trichloroethane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,1,2-Trichloroethane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Trichloroethene (TCE)	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Trichlorofluoromethane	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
1,2,3-Trichloropropane	ND	20		µg/L	20	7/25/2019 5:16:00 PM	R61645
Vinyl chloride	ND	10		µg/L	20	7/25/2019 5:16:00 PM	R61645
Xylenes, Total	770	15		µg/L	20	7/25/2019 5:16:00 PM	R61645
Surr: 1,2-Dichloroethane-d4	95.9	70-130		%Rec	20	7/25/2019 5:16:00 PM	R61645
Surr: 4-Bromofluorobenzene	96.7	70-130		%Rec	20	7/25/2019 5:16:00 PM	R61645
Surr: Dibromofluoromethane	92.9	70-130		%Rec	20	7/25/2019 5:16:00 PM	R61645
Surr: Toluene-d8	98.8	70-130		%Rec	20	7/25/2019 5:16:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: Trip Blank

Project: Former Y Station

Collection Date:

Lab ID: 1907B54-005

Matrix: TRIP BLANK

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8011/504.1: EDB							Analyst: CLP
1,2-Dibromoethane	ND	0.0094		µg/L	1	7/29/2019 5:46:53 PM	46435
EPA METHOD 8260B: VOLATILES							Analyst: CCM
Benzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Toluene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Ethylbenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Naphthalene	ND	2.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1-Methylnaphthalene	ND	4.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
2-Methylnaphthalene	ND	4.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Acetone	ND	10		µg/L	1	7/25/2019 5:41:00 PM	R61645
Bromobenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Bromodichloromethane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Bromoform	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Bromomethane	ND	3.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
2-Butanone	ND	10		µg/L	1	7/25/2019 5:41:00 PM	R61645
Carbon disulfide	ND	10		µg/L	1	7/25/2019 5:41:00 PM	R61645
Carbon Tetrachloride	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Chlorobenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Chloroethane	ND	2.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Chloroform	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Chloromethane	ND	3.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
2-Chlorotoluene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
4-Chlorotoluene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
cis-1,2-DCE	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Dibromochloromethane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Dibromomethane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,1-Dichloroethane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,1-Dichloroethene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,2-Dichloropropane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1907B54

Date Reported: 8/1/2019

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: Trip Blank

Project: Former Y Station

Collection Date:

Lab ID: 1907B54-005

Matrix: TRIP BLANK

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: CCM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
2,2-Dichloropropane	ND	2.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,1-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Hexachlorobutadiene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
2-Hexanone	ND	10		µg/L	1	7/25/2019 5:41:00 PM	R61645
Isopropylbenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
4-Isopropyltoluene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
4-Methyl-2-pentanone	ND	10		µg/L	1	7/25/2019 5:41:00 PM	R61645
Methylene Chloride	ND	3.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
n-Butylbenzene	ND	3.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
n-Propylbenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
sec-Butylbenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Styrene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
tert-Butylbenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
trans-1,2-DCE	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Trichlorofluoromethane	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Vinyl chloride	ND	1.0		µg/L	1	7/25/2019 5:41:00 PM	R61645
Xylenes, Total	ND	1.5		µg/L	1	7/25/2019 5:41:00 PM	R61645
Surr: 1,2-Dichloroethane-d4	99.1	70-130		%Rec	1	7/25/2019 5:41:00 PM	R61645
Surr: 4-Bromofluorobenzene	97.9	70-130		%Rec	1	7/25/2019 5:41:00 PM	R61645
Surr: Dibromofluoromethane	96.9	70-130		%Rec	1	7/25/2019 5:41:00 PM	R61645
Surr: Toluene-d8	98.8	70-130		%Rec	1	7/25/2019 5:41:00 PM	R61645

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
 Lab Order **1907B54**
 Date Reported: **8/1/2019**

CLIENT: Daniel B. Stephens & Assoc.

Client Sample ID: Air Stripper Effluent

Project: Former Y Station

Collection Date: 7/20/2019 12:10:00 PM

Lab ID: 1907B54-006

Matrix: AQUEOUS

Received Date: 7/22/2019 4:04:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 6010B: DISSOLVED METALS							Analyst: pmf
Lead	0.0052	0.0050		mg/L	1	7/30/2019 2:18:21 PM	A61754

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1907B54

01-Aug-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Sample ID: MB-46435	SampType: MBLK	TestCode: EPA Method 8011/504.1: EDB								
Client ID: PBW	Batch ID: 46435	RunNo: 61721								
Prep Date: 7/29/2019	Analysis Date: 7/29/2019	SeqNo: 2092143	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	ND	0.010								

Sample ID: LCS-46435	SampType: LCS	TestCode: EPA Method 8011/504.1: EDB								
Client ID: LCSW	Batch ID: 46435	RunNo: 61721								
Prep Date: 7/29/2019	Analysis Date: 7/29/2019	SeqNo: 2092147	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	0.098	0.010	0.1000	0	98.3	70	130			

Qualifiers:

- | | |
|---|---|
| * Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank |
| D Sample Diluted Due to Matrix | E Value above quantitation range |
| H Holding times for preparation or analysis exceeded | J Analyte detected below quantitation limits |
| ND Not Detected at the Reporting Limit | P Sample pH Not In Range |
| PQL Practical Quantitative Limit | RL Reporting Limit |
| S % Recovery outside of range due to dilution or matrix | |

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1907B54

01-Aug-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Sample ID: 100ng lcs2		SampType: LCS		TestCode: EPA Method 8260B: VOLATILES						
Client ID: LCSW		Batch ID: R61645		RunNo: 61645						
Prep Date:		Analysis Date: 7/25/2019		SeqNo: 2090381			Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	19	1.0	20.00	0	92.6	70	130			
Toluene	20	1.0	20.00	0	97.6	70	130			
Chlorobenzene	21	1.0	20.00	0	103	70	130			
1,1-Dichloroethene	17	1.0	20.00	0	85.8	70	130			
Trichloroethene (TCE)	18	1.0	20.00	0	87.6	70	130			
Surr: 1,2-Dichloroethane-d4	10		10.00		102	70	130			
Surr: 4-Bromofluorobenzene	9.8		10.00		97.6	70	130			
Surr: Dibromofluoromethane	10		10.00		100	70	130			
Surr: Toluene-d8	9.9		10.00		98.7	70	130			

Sample ID: rb		SampType: MBLK		TestCode: EPA Method 8260B: VOLATILES						
Client ID: PBW		Batch ID: R61645		RunNo: 61645						
Prep Date:		Analysis Date: 7/25/2019		SeqNo: 2090382			Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quantitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1907B54

01-Aug-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Sample ID: rb	SampType: MBLK	TestCode: EPA Method 8260B: VOLATILES								
Client ID: PBW	Batch ID: R61645	RunNo: 61645								
Prep Date:	Analysis Date: 7/25/2019	SeqNo: 2090382	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1907B54

01-Aug-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Sample ID: rb	SampType: MBLK	TestCode: EPA Method 8260B: VOLATILES								
Client ID: PBW	Batch ID: R61645	RunNo: 61645								
Prep Date:	Analysis Date: 7/25/2019	SeqNo: 2090382	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	10		10.00		99.7	70	130			
Surr: 4-Bromofluorobenzene	9.8		10.00		98.2	70	130			
Surr: Dibromofluoromethane	9.6		10.00		95.5	70	130			
Surr: Toluene-d8	9.9		10.00		98.9	70	130			

Sample ID: 1907B54-001ams	SampType: MS	TestCode: EPA Method 8260B: VOLATILES								
Client ID: MW-11 Step Test	Batch ID: R61645	RunNo: 61645								
Prep Date:	Analysis Date: 7/25/2019	SeqNo: 2090384	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1300	1.0	20.00	1265	223	70	130			ES
Toluene	63	1.0	20.00	42.47	104	70	130			
Chlorobenzene	20	1.0	20.00	0	99.7	70	130			
1,1-Dichloroethene	16	1.0	20.00	0	80.2	67.6	130			
Trichloroethene (TCE)	17	1.0	20.00	0	83.1	70	130			
Surr: 1,2-Dichloroethane-d4	9.7		10.00		96.7	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130			
Surr: Dibromofluoromethane	9.3		10.00		93.4	70	130			
Surr: Toluene-d8	9.8		10.00		97.6	70	130			

Sample ID: 1907B54-001amsd	SampType: MSD	TestCode: EPA Method 8260B: VOLATILES								
Client ID: MW-11 Step Test	Batch ID: R61645	RunNo: 61645								
Prep Date:	Analysis Date: 7/25/2019	SeqNo: 2090385	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1200	1.0	20.00	1265	-173	70	130	6.24	20	ES
Toluene	59	1.0	20.00	42.47	80.2	70	130	7.83	20	
Chlorobenzene	19	1.0	20.00	0	92.8	70	130	7.25	20	
1,1-Dichloroethene	15	1.0	20.00	0	74.6	67.6	130	7.25	20	
Trichloroethene (TCE)	16	1.0	20.00	0	77.6	70	130	6.79	20	
Surr: 1,2-Dichloroethane-d4	9.9		10.00		98.5	70	130	0	0	
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130	0	0	
Surr: Dibromofluoromethane	9.4		10.00		93.7	70	130	0	0	
Surr: Toluene-d8	9.8		10.00		97.6	70	130	0	0	

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quantitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1907B54

01-Aug-19

Client: Daniel B. Stephens & Assoc.

Project: Former Y Station

Sample ID: MB	SampType: MBLK	TestCode: EPA Method 6010B: Dissolved Metals								
Client ID: PBW	Batch ID: A61754	RunNo: 61754								
Prep Date:	Analysis Date: 7/30/2019	SeqNo: 2093338	Units: mg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	ND	0.0050								

Sample ID: LCS	SampType: LCS	TestCode: EPA Method 6010B: Dissolved Metals								
Client ID: LCSW	Batch ID: A61754	RunNo: 61754								
Prep Date:	Analysis Date: 7/30/2019	SeqNo: 2093340	Units: mg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	0.49	0.0050	0.5000	0	98.0	80	120			

Qualifiers:

- | | |
|---|---|
| * Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank |
| D Sample Diluted Due to Matrix | E Value above quantitation range |
| H Holding times for preparation or analysis exceeded | J Analyte detected below quantitation limits |
| ND Not Detected at the Reporting Limit | P Sample pH Not In Range |
| PQL Practical Quantitative Limit | RL Reporting Limit |
| S % Recovery outside of range due to dilution or matrix | |

Sample Log-In Check List

Client Name: DBS

Work Order Number: 1907B54

RcptNo: 1

Received By: Erin Melendrez

7/22/2019 4:04:00 PM

EM

Completed By: Erin Melendrez

7/23/2019 11:19:13 AM

EM

Reviewed By:

EM

7/23/19

Chain of Custody

1. Is Chain of Custody complete? Yes No Not Present
2. How was the sample delivered? Client

Log In

3. Was an attempt made to cool the samples? Yes No NA
4. Were all samples received at a temperature of >0° C to 6.0°C Yes No NA
5. Sample(s) in proper container(s)? Yes No
6. Sufficient sample volume for indicated test(s)? Yes No
7. Are samples (except VOA and ONG) properly preserved? Yes No
8. Was preservative added to bottles? Yes No NA
9. VOA vials have zero headspace? Yes No No VOA Vials
10. Were any sample containers received broken? Yes No
11. Does paperwork match bottle labels? Yes No
 (Note discrepancies on chain of custody)
12. Are matrices correctly identified on Chain of Custody? Yes No
13. Is it clear what analyses were requested? Yes No
14. Were all holding times able to be met? Yes No
 (If no, notify customer for authorization.)

# of preserved bottles checked for pH:	<u>1</u>
Adjusted? (<2 or >12 unless noted)	<u>NO</u>
Checked by:	<u>ENM 7/23/19</u>

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

16. Additional remarks:

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.6	Good	Not Present			

Chain-of-Custody Record

Client: DBSA

Mailing Address: 6000 ACADEMY NE SUITE 100
ALBUQUERQUE, NM 87109

Phone #: 505-822-9460
email or Fax#: lgoldene@geo-logic.com

QA/QC Package:
 Standard Level 4 (Full Validation)

Accreditation: Az Compliance
 NELAC Other
 EDD (Type)

Turn-Around Time:

Standard Rush

Project Name:

PDB18.1157.00.SI19.01

Project #:
FORMER Y STATION

Project Manager:

Tom Hansen

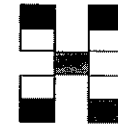
Sampler: J. Fisher

On Ice: Yes No

of Coolers: 1

Cooler Temp (including CF): 2.6 ± 0.1 (CF) 2.6°C

Container Type and #
Preservative Type
HEAL No. 1907B54



HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO ₃ , NO ₂ , PO ₄ , SO ₄	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)	6010 Lead	Field Filtered
			X				X				
			X				X				
			X				X				
			X				X				
			X				X				
			X				X			X	X

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No.
7/17/19	1133	GW	MW-11 STOP TEST	5-VOA	3HCl, 2SOM	-001
7/18/19	1000		MW-11 CRT			-002
7/19/19	2000		MW-11 CRT			-003
7/20/19	1805		MW-11 CRT	6-VOA	3HCl, 3SOM	-004
			TRIP BLANK	3-VOA	2HCl, 1SOM	-005
7/20/19	1210		AIR STRIPPER EFFLUENT	1-250mL	HNO ₃	-006

Date: 7/22/19 Time: 1604 Relinquished by: J. Fisher DBSA
Date: 7/22/19 Time: 1604 Received by: via CDO Via: via

Remarks:

Appendix G
Soil Properties
Laboratory Report

**Laboratory Report for
Daniel B. Stephens & Associates, Inc.**

**Project: DB18.1157.00.00MW019.0002,
Former Y PST Site Remediation**

September 25, 2019



Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113



September 25, 2019

Tom Golden
Daniel B. Stephens & Associates, Inc.
6020 Academy Road NE, Suite 100
Albuquerque, NM 87109
(505) 822-9400

Re: DBS&A Laboratory Report for the Daniel B. Stephens & Associates, Inc. DB18.1157, Former Y PST Site Remediation Project

Dear Mr. Golden:

Enclosed is the report for the DBS&A DB18.1157.00, Former Y PST Site Remediation project samples. Please review this report and provide any comments as the sample will be held for a maximum of 30 days. After 30 days the sample will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to DBS&A and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Adam Bland
Laboratory Operations Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
Soil Testing & Research Laboratory

4400 Alameda Blvd. NE, Suite C
Albuquerque, NM 87113

505-889-7752
FAX 505-889-0258

Summaries



Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties ¹			Saturated Hydraulic Conductivity ²			Moisture Characteristics ³							Particle Size ⁴			Specific Gravity ⁵		Air Perm-eability	Atterberg Limits	Proctor Compaction	
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K _{unsat}	DS	WS	H	F				C
MW-11 342'-345'															X	X					X	X
MW-11 342'-345' (91%)	X	X		X																		
MW-12 Saturated															X	X					X	X
MW-12 Saturated (91%)	X	X		X																		
BW-7R Saturated															X	X					X	X
BW-7R Saturated (91%)	X	X		X																		
MW-13 360'-365'															X	X					X	X
MW-13 360'-365' (91%)	X	X		X																		

¹ G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

² CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

³ HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, K_{unsat} = Calculated Unsaturated Hydraulic Conductivity

⁴ DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

⁵ F = Fine (<4.75mm), C = Coarse (>4.75mm)



Notes

Sample Receipt:

Four samples, each as loose material in a full 5-gallon bucket sealed with a lid, were hand-delivered between June 8 and August 14, 2019. All samples were received in good order.

Sample Preparation and Testing Notes:

Each of the samples were subjected to particle size analysis, Atterberg limits and standard proctor compaction testing.

A portion of each sample was remolded into a testing ring to target 91% of the maximum dry bulk density at the respective optimum moisture contents, based on the standard proctor compaction test results. The remolded sub-samples were subjected to initial properties analysis and saturated hydraulic conductivity testing.

The actual percentage of maximum dry bulk density achieved was added to each sub-sample ID.

Porosity calculations, and the particle diameter calculations in the hydrometer portion of the particle size analysis testing, are based on the use of an assumed specific gravity value of 2.65.

Based on the proctor compaction method, material larger than either 4.75mm or 3/8" (as appropriate) was removed from the bulk material prior to remolding the sub-samples. Oversize correction calculations are provided if the removed fraction was larger than 5% of the bulk sample mass.



Summary of Sample Preparation/Volume Changes

Sample Number	Proctor Data		Target Remold Parameters ¹			Actual Remold Data			Volume Change Post Saturation ²		
	Optimum Moisture Content (%, g/g)	Max. Dry Density (g/cm ³)	Moisture Content (%, g/g)	Dry Bulk Density (g/cm ³)	% of Max. Density (%)	Moisture Content (%, g/g)	Dry Bulk Density (g/cm ³)	% of Max. Density (%)	Dry Bulk Density (g/cm ³)	% Volume Change (%)	% of Max. Density (%)
MW-11 342'-345' (91%)	11.4	1.84	11.4	1.68	91.0%	11.4	1.68	91.0%	1.68	---	91.0%
MW-12 Saturated (91%)	11.3	1.75	11.3	1.59	91.0%	11.3	1.59	91.0%	1.59	---	91.0%
BW-7R Saturated (91%)	11.0	1.96	11.0	1.79	91.0%	11.0	1.79	91.0%	1.79	---	91.0%
MW-13 360'-365' (91%)	10.0	2.02	10.0	1.84	91.0%	10.4	1.83	90.8%	1.83	---	90.8%

¹Target Remold Parameters: Provided by the client: 91% of maximum dry density at optimum moisture content.

²Volume Change Post Saturation: Volume change measurements were obtained after saturated hydraulic conductivity testing.

Notes:

"+" indicates sample swelling, "-" indicates sample settling, and "---" indicates no volume change occurred.



**Summary of Initial Moisture Content, Dry Bulk Density
Wet Bulk Density and Calculated Porosity**

Sample Number	Moisture Content				Dry Bulk Density (g/cm ³)	Wet Bulk Density (g/cm ³)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm ³ /cm ³)	Gravimetric (%, g/g)	Volumetric (%, cm ³ /cm ³)			
MW-11 342'-345' (91%)	NA	NA	11.4	19.2	1.68	1.87	36.6
MW-12 Saturated (91%)	NA	NA	11.3	18.0	1.59	1.77	39.9
BW-7R Saturated (91%)	NA	NA	11.0	19.7	1.79	1.98	32.6
MW-13 360'-365' (91%)	NA	NA	10.4	19.0	1.83	2.02	30.9

NA = Not analyzed

--- = This sample was not remolded



Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K _{sat} (cm/sec)	Oversize Corrected K _{sat} (cm/sec)	Method of Analysis	
			Constant Head	Falling Head
MW-11 342'-345' (91%)	1.6E-03	---	X	
MW-12 Saturated (91%)	4.0E-03	---	X	
BW-7R Saturated (91%)	6.8E-04	5.6E-04	X	
MW-13 360'-365' (91%)	1.3E-03	1.0E-03	X	

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
 NR = Not requested
 NA = Not applicable



Summary of Particle Size Characteristics

Sample Number	d ₁₀ (mm)	d ₅₀ (mm)	d ₆₀ (mm)	C _u	C _c	Method	ASTM Classification	USDA Classification
MW-11 342'-345'	0.0069	0.13	0.15	22	7.3	WS/H	Silty sand (SM)	Loamy Sand
MW-12 Saturated	0.047	0.16	0.18	3.8	1.7	WS/H	Silty sand (SM)	Sand
BW-7R Saturated	0.0071	0.18	0.26	37	3.5	WS/H	Silty sand with gravel (SM)g	Sandy Loam †
MW-13 360'-365'	0.0019	0.25	0.57	300	1.8	WS/H	Silty sand with gravel (SM)g	Sandy Loam †

d₅₀ = Median particle diameter

Est = Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material



Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
MW-11 342'-345'	1.9	72.7	19.1	6.3
MW-12 Saturated	3.6	82.0	11.9	2.5
BW-7R Saturated	16.8	54.3	23.5	5.4
MW-13 360'-365'	25.7	38.4	25.7	10.2

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.



Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
MW-11 342'-345'	---	---	---	ML
MW-12 Saturated	---	---	---	ML
BW-7R Saturated	---	---	---	ML
MW-13 360'-365'	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity



Summary of Proctor Compaction Tests

Sample Number	Measured		Oversize Corrected	
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)
MW-11 342'-345'	11.4	1.84	---	---
MW-12 Saturated	11.3	1.75	---	---
BW-7R Saturated	11.0	1.96	9.1	2.05
MW-13 360'-365'	10.0	2.02	7.8	2.13

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NR = Not requested

NA = Not applicable

Initial Properties



**Summary of Initial Moisture Content, Dry Bulk Density
Wet Bulk Density and Calculated Porosity**

Sample Number	Moisture Content				Dry Bulk Density (g/cm ³)	Wet Bulk Density (g/cm ³)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm ³ /cm ³)	Gravimetric (%, g/g)	Volumetric (%, cm ³ /cm ³)			
MW-11 342'-345' (91%)	NA	NA	11.4	19.2	1.68	1.87	36.6
MW-12 Saturated (91%)	NA	NA	11.3	18.0	1.59	1.77	39.9
BW-7R Saturated (91%)	NA	NA	11.0	19.7	1.79	1.98	32.6
MW-13 360'-365' (91%)	NA	NA	10.4	19.0	1.83	2.02	30.9

NA = Not analyzed

--- = This sample was not remolded



**Data for Initial Moisture Content,
Bulk Density, Porosity, and Percent Saturation**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-11 342'-345' (91%)
 Project Name: Former Y PST Site Remediation
 Date Sampled: 6/5/19

	<u>As Received</u>	<u>Remolded</u>
Test Date:	NA	26-Jun-19
Field weight* of sample (g):		551.93
Tare weight, ring (g):		137.43
Tare weight, pan/plate (g):		0.00
Tare weight, other (g):		0.00
Dry weight of sample (g):		371.93
Sample volume (cm ³):		221.44
Assumed particle density (g/cm ³):		2.65
<hr/>		
Gravimetric Moisture Content (% g/g):		11.4
Volumetric Moisture Content (% vol):		19.2
Dry bulk density (g/cm ³):		1.68
Wet bulk density (g/cm ³):		1.87
Calculated Porosity (% vol):		36.6
Percent Saturation:		52.5
<hr/>		
Laboratory analysis by:		D. O'Dowd
Data entered by:		D. O'Dowd
Checked by:		J. Hines

Comments:

- * Weight including tares
- NA = Not analyzed
- = This sample was not remolded



**Data for Initial Moisture Content,
Bulk Density, Porosity, and Percent Saturation**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-12 Saturated (91%)
 Project Name: Former Y PST Site Remediation
 Date Sampled: 7/16/19

	<u>As Received</u>	<u>Remolded</u>
Test Date:	NA	30-Jul-19
Field weight* of sample (g):		750.33
Tare weight, ring (g):		246.21
Tare weight, pan/plate (g):		0.00
Tare weight, other (g):		0.00
Dry weight of sample (g):		453.01
Sample volume (cm ³):		284.47
Assumed particle density (g/cm ³):		2.65
<hr/>		
Gravimetric Moisture Content (% g/g):		11.3
Volumetric Moisture Content (% vol):		18.0
Dry bulk density (g/cm ³):		1.59
Wet bulk density (g/cm ³):		1.77
Calculated Porosity (% vol):		39.9
Percent Saturation:		45.0
<hr/>		
Laboratory analysis by:		D. O'Dowd
Data entered by:		D. O'Dowd
Checked by:		J. Hines

Comments:

- * Weight including tares
- NA = Not analyzed
- = This sample was not remolded



Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1157.00.00MW019.0002
Sample Number: BW-7R Saturated (91%)
Project Name: Former Y PST Site Remediation
Date Sampled: 8/1/19

	<u>As Received</u>	<u>Remolded</u>
Test Date:	NA	14-Aug-19
Field weight* of sample (g):		583.44
Tare weight, ring (g):		139.28
Tare weight, pan/plate (g):		0.00
Tare weight, other (g):		0.00
Dry weight of sample (g):		400.08
Sample volume (cm ³):		224.06
Assumed particle density (g/cm ³):		2.65
<hr/>		
Gravimetric Moisture Content (% g/g):		11.0
Volumetric Moisture Content (% vol):		19.7
Dry bulk density (g/cm ³):		1.79
Wet bulk density (g/cm ³):		1.98
Calculated Porosity (% vol):		32.6
Percent Saturation:		60.3
<hr/>		
Laboratory analysis by:		D. O'Dowd
Data entered by:		D. O'Dowd
Checked by:		J. Hines

Comments:

- * Weight including tares
- NA = Not analyzed
- = This sample was not remolded



**Data for Initial Moisture Content,
Bulk Density, Porosity, and Percent Saturation**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-13 360'-365' (91%)
 Project Name: Former Y PST Site Remediation
 Date Sampled: 8/10/19

	<u>As Received</u>	<u>Remolded</u>
Test Date:	NA	23-Aug-19
Field weight* of sample (g):		852.48
Tare weight, ring (g):		281.57
Tare weight, pan/plate (g):		0.00
Tare weight, other (g):		0.00
Dry weight of sample (g):		517.23
Sample volume (cm ³):		282.35
Assumed particle density (g/cm ³):		2.65
<hr/>		
Gravimetric Moisture Content (% g/g):		10.4
Volumetric Moisture Content (% vol):		19.0
Dry bulk density (g/cm ³):		1.83
Wet bulk density (g/cm ³):		2.02
Calculated Porosity (% vol):		30.9
Percent Saturation:		61.6
<hr/>		
Laboratory analysis by:		D. O'Dowd
Data entered by:		D. O'Dowd
Checked by:		J. Hines

Comments:

- * Weight including tares
- NA = Not analyzed
- = This sample was not remolded

Saturated Hydraulic Conductivity



Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K _{sat} (cm/sec)	Oversize Corrected K _{sat} (cm/sec)	Method of Analysis	
			Constant Head	Falling Head
MW-11 342'-345' (91%)	1.6E-03	---	X	
MW-12 Saturated (91%)	4.0E-03	---	X	
BW-7R Saturated (91%)	6.8E-04	5.6E-04	X	
MW-13 360'-365' (91%)	1.3E-03	1.0E-03	X	

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
 NR = Not requested
 NA = Not applicable



Saturated Hydraulic Conductivity Constant Head Method

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-11 342'-345' (91%)
 Project Name: Former Y PST Site Remediation
 Date Sampled: 6/5/19

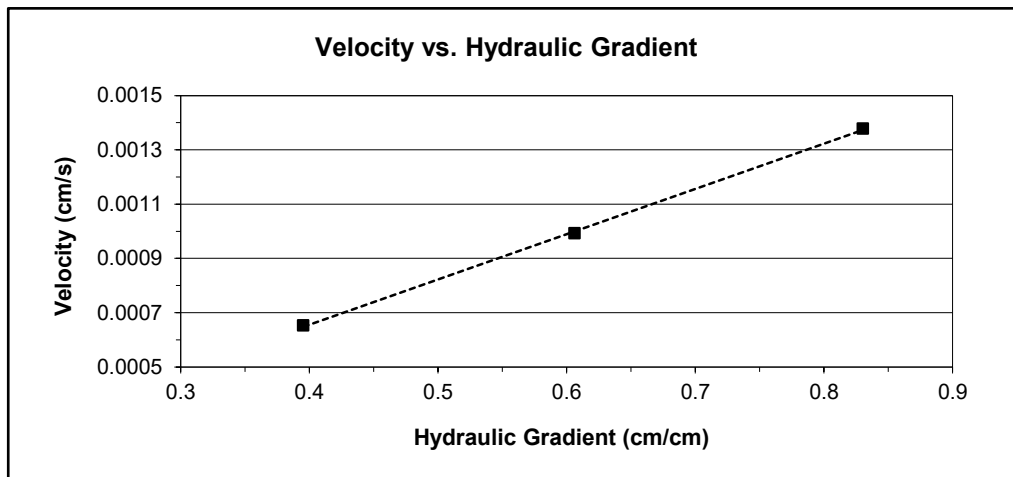
Type of water used: TAP
 Collection vessel tare (g): 29.49
 Sample length (cm): 7.59
 Sample diameter (cm): 6.10
 Sample x-sectional area (cm²): 29.19

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm ³)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
28-Jun-19	13:33:00	22.0	6.3	39.14	9.7	240	1.7E-03	1.6E-03
28-Jun-19	13:37:00							
Test # 2:								
28-Jun-19	13:47:00	22.0	4.6	36.44	7.0	240	1.6E-03	1.6E-03
28-Jun-19	13:51:00							
Test # 3:								
28-Jun-19	14:01:00	22.0	3	34.06	4.6	240	1.6E-03	1.6E-03
28-Jun-19	14:05:00							

Average Ksat (cm/sec): 1.6E-03
 Oversize Corrected Ksat (cm/sec): ---

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass



Laboratory analysis by: D. O'Dowd
 Data entered by: D. O'Dowd
 Checked by: J. Hines



Saturated Hydraulic Conductivity Constant Head Method

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-12 Saturated (91%)
 Project Name: Former Y PST Site Remediation
 Date Sampled: 7/16/19

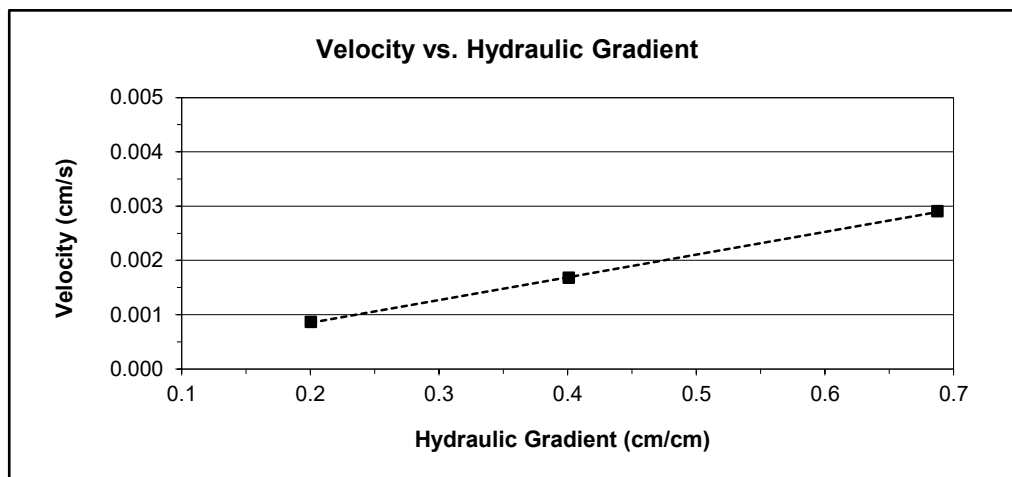
Type of water used: TAP
 Collection vessel tare (g): 67.94
 Sample length (cm): 6.98
 Sample diameter (cm): 7.20
 Sample x-sectional area (cm²): 40.76

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm ³)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
31-Jul-19	8:15:00	22.5	4.8	82.12	14.2	120	4.2E-03	4.0E-03
31-Jul-19	8:17:00							
Test # 2:								
31-Jul-19	8:27:00	22.5	2.8	76.13	8.2	120	4.2E-03	3.9E-03
31-Jul-19	8:29:00							
Test # 3:								
31-Jul-19	8:39:00	22.5	1.4	72.15	4.2	120	4.3E-03	4.0E-03
31-Jul-19	8:41:00							

Average Ksat (cm/sec): 4.0E-03
 Oversize Corrected Ksat (cm/sec): ---

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass



Laboratory analysis by: D. O'Dowd
 Data entered by: D. O'Dowd
 Checked by: J. Hines



Saturated Hydraulic Conductivity Constant Head Method

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: BW-7R Saturated (91%)
 Project Name: Former Y PST Site Remediation
 Date Sampled: 8/1/19

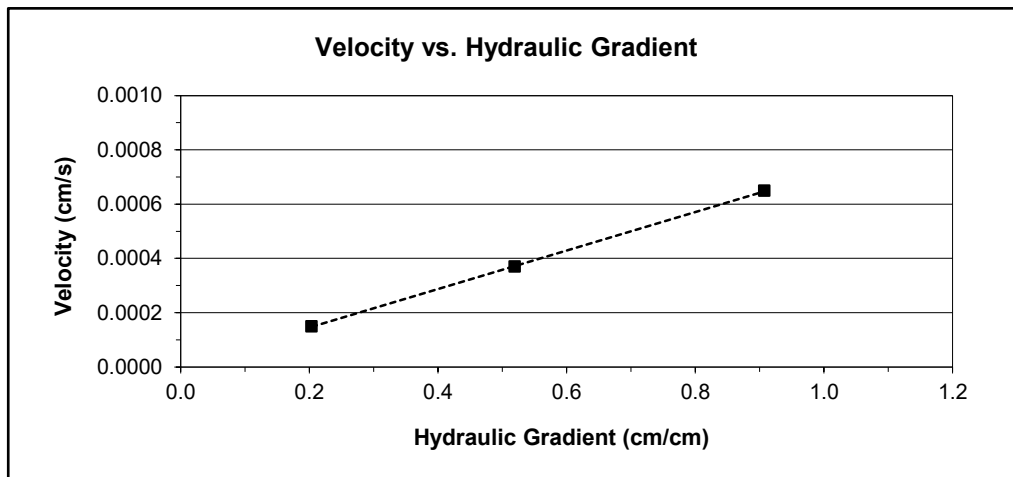
Type of water used: TAP
 Collection vessel tare (g): 29.20
 Sample length (cm): 7.60
 Sample diameter (cm): 6.13
 Sample x-sectional area (cm²): 29.47

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm ³)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
20-Aug-19	10:06:30	22.5	6.9	32.64	3.4	180	7.1E-04	6.7E-04
20-Aug-19	10:09:30							
Test # 2:								
20-Aug-19	10:19:30	22.5	3.95	31.16	2.0	180	7.1E-04	6.7E-04
20-Aug-19	10:22:30							
Test # 3:								
20-Aug-19	10:32:30	22.5	1.55	29.99	0.8	180	7.3E-04	6.9E-04
20-Aug-19	10:35:30							

Average Ksat (cm/sec): 6.8E-04
Oversize Corrected Ksat (cm/sec): 5.6E-04

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass



Laboratory analysis by: D. O'Dowd
 Data entered by: D. O'Dowd
 Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Oversize Correction Data Sheet

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1157.00.00MW019.0002
Sample Number: BW-7R Saturated (91%)
Project Name: Former Y PST Site Remediation
Date Sampled: 8/1/19

Split (3/4", 3/8", #4): #4
Calculated Porosity of Fines (% vol): 32.6

	<u>Coarse Fraction*</u>	<u>Fines Fraction</u>	<u>Composite</u>
Subsample Mass (g):	5494.08	27191.58	32685.66
Bulk Density (g/cm ³):	2.65	1.79	1.89
Volume of Solids (cm ³):	2073.24	10260.97	12334.21
Volume of Voids (cm ³):	0.00	4967.60	4967.60
Total Volume (cm ³):	2073.24	15228.58	17301.82
Volumetric Fraction (%):	11.98	88.02	100.00
Mass Fraction (%):	16.81	83.19	100.00
Ksat (cm/sec):	NM	6.8E-04	5.6E-04

* = Porosity and moisture content of coarse fraction assumed to be zero.

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NM = Not measured

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



Saturated Hydraulic Conductivity Constant Head Method

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-13 360'-365' (91%)
 Project Name: Former Y PST Site Remediation
 Date Sampled: 8/10/19

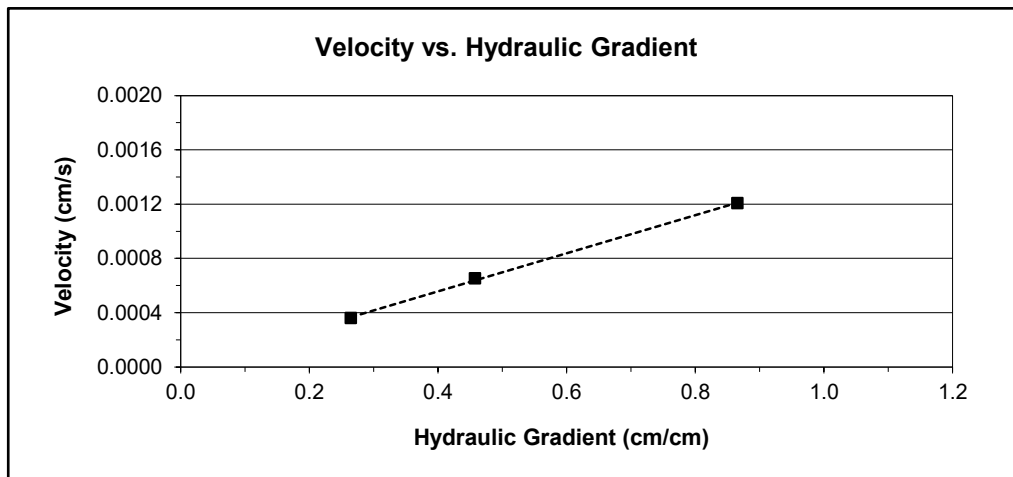
Type of water used: TAP
 Collection vessel tare (g): 29.48
 Sample length (cm): 6.99
 Sample diameter (cm): 7.17
 Sample x-sectional area (cm²): 40.41

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm ³)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
26-Aug-19	9:50:30	22.5	6.05	35.33	5.9	120	1.4E-03	1.3E-03
26-Aug-19	9:52:30							
Test # 2:								
26-Aug-19	10:06:30	22.5	3.2	32.64	3.2	120	1.4E-03	1.3E-03
26-Aug-19	10:08:30							
Test # 3:								
26-Aug-19	10:18:30	22.5	1.85	31.22	1.7	120	1.4E-03	1.3E-03
26-Aug-19	10:20:30							

Average Ksat (cm/sec): 1.3E-03
Oversize Corrected Ksat (cm/sec): 1.0E-03

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass



Laboratory analysis by: D. O'Dowd
 Data entered by: D. O'Dowd
 Checked by: J. Hines



Oversize Correction Data Sheet

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1157.00.00MW019.0002
Sample Number: MW-13 360'-365' (91%)
Project Name: Former Y PST Site Remediation
Date Sampled: 8/10/19

Split (3/4", 3/8", #4): 3/8"
Calculated Porosity of Fines (% vol): 30.9

	<u>Coarse Fraction*</u>	<u>Fines Fraction</u>	<u>Composite</u>
<i>Subsample Mass (g):</i>	6314.49	22860.26	29174.75
<i>Bulk Density (g/cm³):</i>	2.65	1.83	1.96
<i>Volume of Solids (cm³):</i>	2382.83	8626.51	11009.34
<i>Volume of Voids (cm³):</i>	0.00	3852.49	3852.49
<i>Total Volume (cm³):</i>	2382.83	12479.00	14861.83
<i>Volumetric Fraction (%):</i>	16.03	83.97	100.00
<i>Mass Fraction (%):</i>	21.64	78.36	100.00
<i>Ksat (cm/sec):</i>	NM	1.3E-03	1.0E-03

* = Porosity and moisture content of coarse fraction assumed to be zero.

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NM = Not measured

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Particle Size Analysis



Summary of Particle Size Characteristics

Sample Number	d ₁₀ (mm)	d ₅₀ (mm)	d ₆₀ (mm)	C _u	C _c	Method	ASTM Classification	USDA Classification
MW-11 342'-345'	0.0069	0.13	0.15	22	7.3	WS/H	Silty sand (SM)	Loamy Sand
MW-12 Saturated	0.047	0.16	0.18	3.8	1.7	WS/H	Silty sand (SM)	Sand
BW-7R Saturated	0.0071	0.18	0.26	37	3.5	WS/H	Silty sand with gravel (SM)g	Sandy Loam †
MW-13 360'-365'	0.0019	0.25	0.57	300	1.8	WS/H	Silty sand with gravel (SM)g	Sandy Loam †

d₅₀ = Median particle diameter

Est = Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material



Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
MW-11 342'-345'	1.9	72.7	19.1	6.3
MW-12 Saturated	3.6	82.0	11.9	2.5
BW-7R Saturated	16.8	54.3	23.5	5.4
MW-13 360'-365'	25.7	38.4	25.7	10.2

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.



**Particle Size Analysis
Wet Sieve Data (#10 Split)**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-11 342'-345'
 Project Name: Former Y PST Site Remediation
 Date Sampled: 6/5/19
 Test Date: 21-Jun-19

Initial Dry Weight of Sample (g): 31882.20
 Weight Passing #10 (g): 31239.47
 Weight Retained #10 (g): 642.73
 Weight of Hydrometer Sample (g): 80.55
 Calculated Weight of Sieve Sample (g): 82.21
 Shape: Rounded
 Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	31882.20	100.00
	2"	50	0.00	0.00	31882.20	100.00
	1.5"	38.1	0.00	0.00	31882.20	100.00
	1"	25	101.53	101.53	31780.67	99.68
	3/4"	19.0	72.74	174.27	31707.93	99.45
	3/8"	9.5	236.49	410.76	31471.44	98.71
	4	4.75	186.18	596.94	31285.26	98.13
	10	2.00	45.79	642.73	31239.47	97.98
-10	(Based on calculated sieve wt.)					
	20	0.85	0.58	2.24	79.97	97.28
	40	0.425	1.65	3.89	78.32	95.27
	60	0.250	5.71	9.60	72.61	88.33
	100	0.150	23.25	32.85	49.36	60.04
	140	0.106	19.47	52.32	29.89	36.36
	200	0.075	8.99	61.31	20.90	25.42
	dry pan		1.02	62.33	19.88	
wet pan			19.88	0.00		

d₁₀ (mm): 0.0069 d₅₀ (mm): 0.13
 d₁₆ (mm): 0.041 d₆₀ (mm): 0.15
 d₃₀ (mm): 0.087 d₈₄ (mm): 0.23

Median Particle Diameter--d₅₀ (mm): 0.13
 Uniformity Coefficient, Cu--[d₆₀/d₁₀] (mm): 22
 Coefficient of Curvature, Cc--[d₃₀²/(d₁₀*d₆₀)] (mm): 7.3
 Mean Particle Diameter--[d₁₆+d₅₀+d₈₄]/3 (mm): 0.13

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
 USDA Soil Classification: Loamy Sand

Laboratory analysis by: A. Baldrige
 Data entered by: A. Bland
 Checked by: C. Krous



Daniel B. Stephens & Associates, Inc.

**Particle Size Analysis
Hydrometer Data**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-11 342'-345'
 Project Name: Former Y PST Site Remediation
 Date Sampled: 6/5/19
 Test Date: 21-Jun-19
 Start Time: 9:36

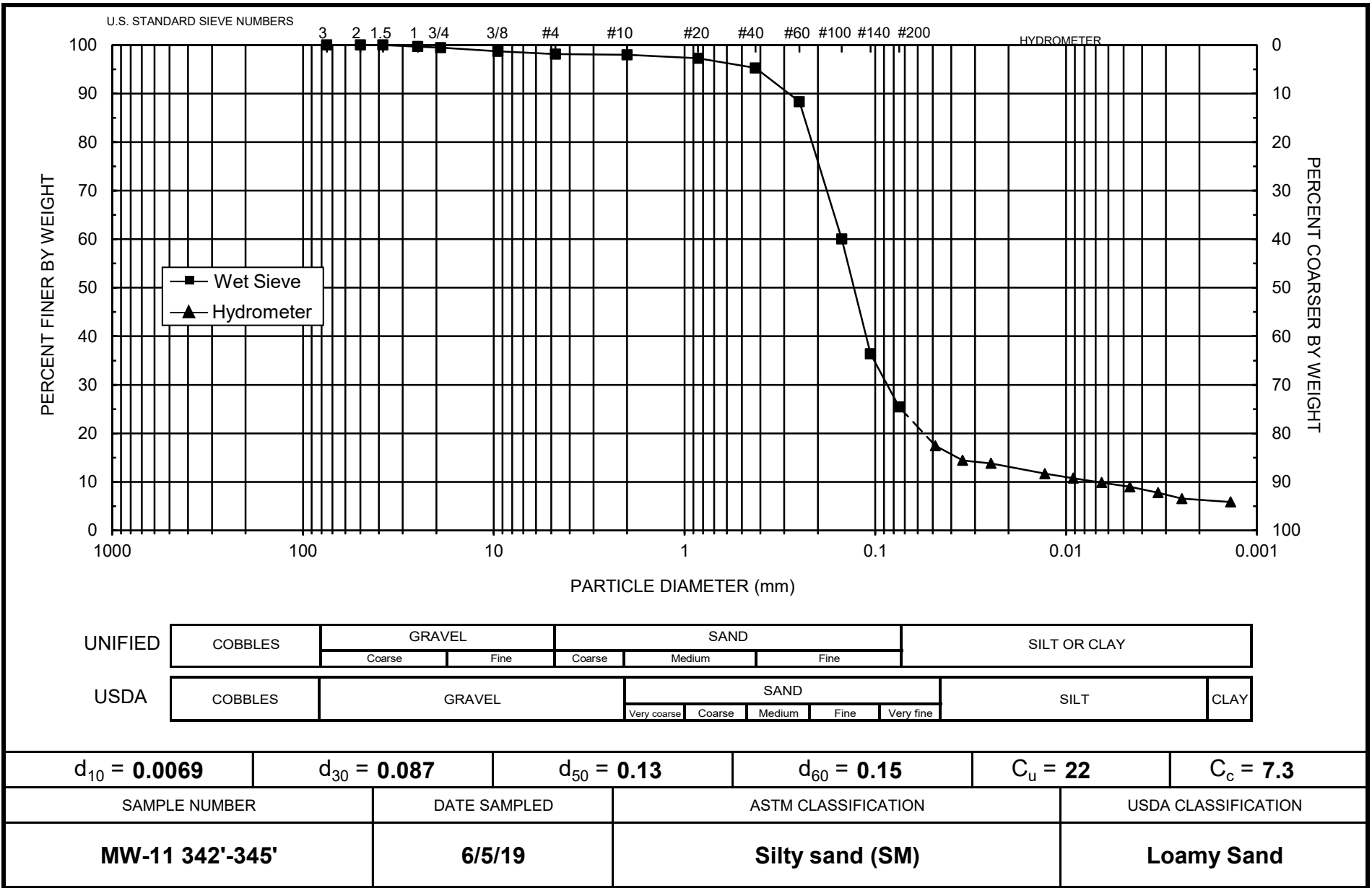
Type of Water Used: DISTILLED
 Reaction with H₂O₂: NA
 Dispersant*: (NaPO₃)₆
 Assumed particle density: 2.65
 Initial Wt. (g): 80.55
 Total Sample Wt. (g): 31882.20
 Wt. Passing #10 (g): 31239.47

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	H _m (cm)	D (mm)	P (%)	% Finer
24-Jun-19	1	21.8	19.50	5.15	14.4	13	0.0485	18	17.5
	2	21.8	17.00	5.15	11.9	13	0.0348	15	14.4
	4	21.8	16.50	5.15	11.4	13	0.0247	14	13.8
	15	21.8	14.75	5.15	9.6	13	0.0129	12	11.7
	30	21.8	14.00	5.15	8.9	14	0.0092	11	10.8
	60	21.8	13.25	5.15	8.1	14	0.0065	10	9.9
	120	21.9	12.50	5.11	7.4	14	0.0046	9	9.0
	240	21.9	11.50	5.11	6.4	14	0.0033	8	7.8
	430	21.9	10.50	5.11	5.4	14	0.0025	7	6.6
25-Jun-19	1403	21.7	10.00	5.19	4.8	14	0.0014	6	5.9

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Albay-Yenney
 Data entered by: A. Bland
 Checked by: C. Krous



Daniel B. Stephens & Associates, Inc.



**Particle Size Analysis
Wet Sieve Data (#10 Split)**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-12 Saturated
 Project Name: Former Y PST Site Remediation
 Date Sampled: 7/16/19
 Test Date: 23-Jul-19

Initial Dry Weight of Sample (g): 33489.84
 Weight Passing #10 (g): 32270.57
 Weight Retained #10 (g): 1219.27
 Weight of Hydrometer Sample (g): 65.31
 Calculated Weight of Sieve Sample (g): 67.78

Shape: Rounded
 Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	33489.84	100.00
	2"	50	0.00	0.00	33489.84	100.00
	1.5"	38.1	315.01	315.01	33174.83	99.06
	1"	25	105.03	420.04	33069.80	98.75
	3/4"	19.0	204.79	624.83	32865.01	98.13
	3/8"	9.5	549.76	1174.59	32315.25	96.49
	4	4.75	42.84	1217.43	32272.41	96.36
	10	2.00	1.84	1219.27	32270.57	96.36
-10	(Based on calculated sieve wt.)					
	20	0.85	0.20	2.67	65.11	96.06
	40	0.425	0.52	3.19	64.59	95.30
	60	0.250	4.22	7.41	60.37	89.07
	100	0.150	28.98	36.39	31.39	46.31
	140	0.106	16.44	52.83	14.95	22.06
	200	0.075	5.22	58.05	9.73	14.36
	dry pan		1.02	59.07	8.71	
wet pan			8.71	0.00		

d₁₀ (mm): 0.047 d₅₀ (mm): 0.16
 d₁₆ (mm): 0.081 d₆₀ (mm): 0.18
 d₃₀ (mm): 0.12 d₈₄ (mm): 0.24

Median Particle Diameter--d₅₀ (mm): 0.16
 Uniformity Coefficient, Cu--[d₆₀/d₁₀] (mm): 3.8
 Coefficient of Curvature, Cc--[d₃₀²/(d₁₀*d₆₀)] (mm): 1.7
 Mean Particle Diameter--[d₁₆+d₅₀+d₈₄]/3] (mm): 0.16

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
 USDA Soil Classification: Sand

Laboratory analysis by: A. Albay-Yenney/A. Baldrige
 Data entered by: A. Albay-Yenney
 Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-12 Saturated
 Project Name: Former Y PST Site Remediation
 Date Sampled: 7/16/19
 Test Date: 31-Jul-19
 Start Time: 9:00

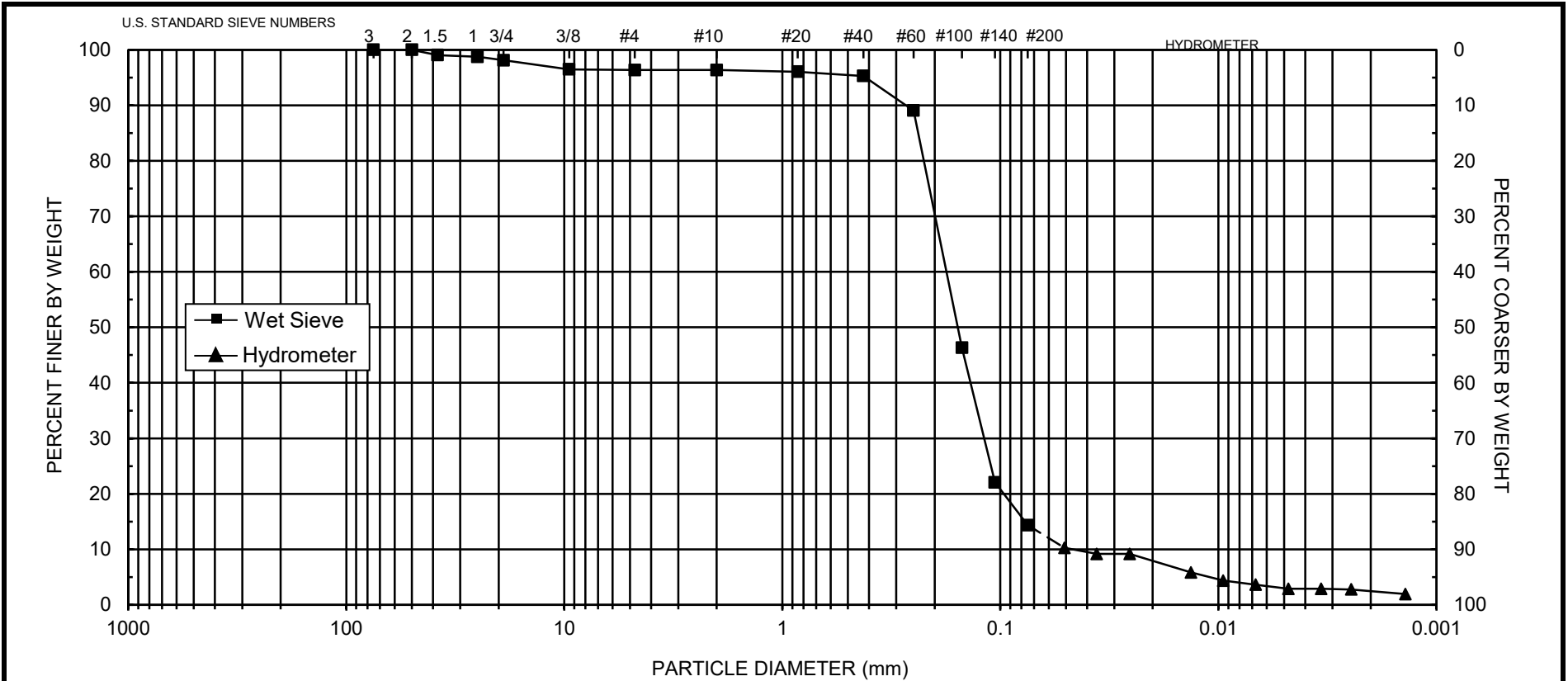
Type of Water Used: DISTILLED
 Reaction with H₂O₂: NA
 Dispersant*: (NaPO₃)₆
 Assumed particle density: 2.65
 Initial Wt. (g): 65.31
 Total Sample Wt. (g): 33489.84
 Wt. Passing #10 (g): 32270.57

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	H _m (cm)	D (mm)	P (%)	% Finer
31-Jul-19	1	22.1	12.00	5.04	7.0	14	0.0508	11	10.3
	2	22.1	11.25	5.04	6.2	14	0.0361	10	9.2
	4	22.1	11.25	5.04	6.2	14	0.0255	10	9.2
	15	22.1	9.00	5.04	4.0	14	0.0134	6	5.8
	30	22.1	8.00	5.04	3.0	15	0.0095	5	4.4
	60	22.1	7.50	5.04	2.5	15	0.0067	4	3.6
	120	22.1	7.00	5.04	2.0	15	0.0048	3	2.9
	240	22.1	7.00	5.04	2.0	15	0.0034	3	2.9
	455	23.2	6.50	4.63	1.9	15	0.0025	3	2.8
	1-Aug-19	1431	21.7	6.50	5.19	1.3	15	0.0014	2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Baldrige
 Data entered by: A. Albay-Yenney
 Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND					SILT	CLAY
				Very coarse	Coarse	Medium	Fine	Very fine		

$d_{10} = 0.047$	$d_{30} = 0.12$	$d_{50} = 0.16$	$d_{60} = 0.18$	$C_u = 3.8$	$C_c = 1.7$
SAMPLE NUMBER		DATE SAMPLED	ASTM CLASSIFICATION		USDA CLASSIFICATION
MW-12 Saturated		7/16/19	Silty sand (SM)		Sand



Daniel B. Stephens & Associates, Inc.



**Particle Size Analysis
Wet Sieve Data (#10 Split)**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: BW-7R Saturated
 Project Name: Former Y PST Site Remediation
 Date Sampled: 8/1/19
 Test Date: 20-Aug-19

Initial Dry Weight of Sample (g): 32685.66
 Weight Passing #10 (g): 26411.04
 Weight Retained #10 (g): 6274.62
 Weight of Hydrometer Sample (g): 81.42
 Calculated Weight of Sieve Sample (g): 100.76
 Shape: Angular
 Hardness: Weathered and friable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	32685.66	100.00
	2"	50	777.22	777.22	31908.44	97.62
	1.5"	38.1	670.77	1447.99	31237.67	95.57
	1"	25	1052.59	2500.58	30185.08	92.35
	3/4"	19.0	685.84	3186.42	29499.24	90.25
	3/8"	9.5	1382.59	4569.01	28116.65	86.02
	4	4.75	925.07	5494.08	27191.58	83.19
	10	2.00	780.54	6274.62	26411.04	80.80
-10	(Based on calculated sieve wt.)					
	20	0.85	2.65	21.99	78.77	78.17
	40	0.425	8.19	30.18	70.58	70.05
	60	0.250	11.30	41.48	59.28	58.83
	100	0.150	14.01	55.49	45.27	44.93
	140	0.106	9.95	65.44	35.32	35.05
	200	0.075	6.22	71.66	29.10	28.88
	dry pan			1.02	72.68	28.08
wet pan				28.08	0.00	

d₁₀ (mm): 0.0071 d₅₀ (mm): 0.18
 d₁₆ (mm): 0.030 d₆₀ (mm): 0.26
 d₃₀ (mm): 0.080 d₈₄ (mm): 5.8

Median Particle Diameter--d₅₀ (mm): 0.18
 Uniformity Coefficient, Cu--[d₆₀/d₁₀] (mm): 37
 Coefficient of Curvature, Cc--[d₃₀²/(d₁₀*d₆₀)] (mm): 3.5
 Mean Particle Diameter--[d₁₆+d₅₀+d₈₄]/3] (mm): 2.0

Classification of fines (visual method): ML

† Greater than 10% of sample is coarse material

ASTM Soil Classification: Silty sand with gravel (SM)g
 USDA Soil Classification: Sandy Loam †

Laboratory analysis by: A. Albay-Yenney/A. Baldrige
 Data entered by: A. Albay-Yenney
 Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

**Particle Size Analysis
Hydrometer Data**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: BW-7R Saturated
 Project Name: Former Y PST Site Remediation
 Date Sampled: 8/1/19
 Test Date: 14-Aug-19
 Start Time: 9:00

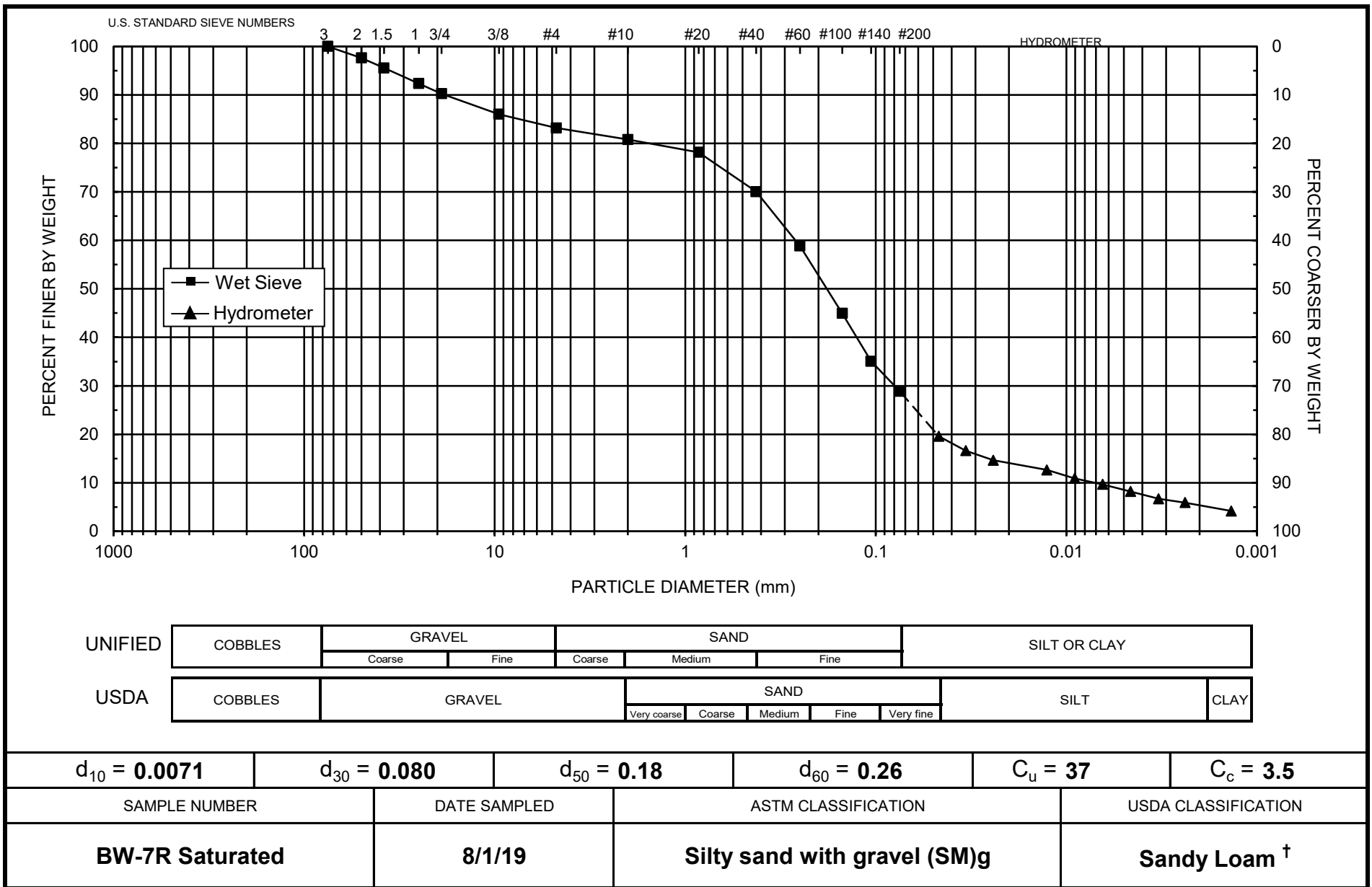
Type of Water Used: DISTILLED
 Reaction with H₂O₂: NA
 Dispersant*: (NaPO₃)₆
 Assumed particle density: 2.65
 Initial Wt. (g): 81.42
 Total Sample Wt. (g): 32685.66
 Wt. Passing #10 (g): 26411.04

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	H _m (cm)	D (mm)	P (%)	% Finer
14-Aug-19	1	21.5	25.00	5.26	19.7	12	0.0467	24	19.6
	2	21.5	22.00	5.26	16.7	12	0.0337	21	16.6
	4	21.5	20.00	5.26	14.7	13	0.0242	18	14.6
	15	21.5	18.00	5.26	12.7	13	0.0126	16	12.6
	30	21.5	16.25	5.26	11.0	13	0.0090	14	10.9
	60	21.5	15.00	5.26	9.7	13	0.0064	12	9.7
	120	21.5	13.50	5.26	8.2	14	0.0046	10	8.2
	240	21.5	12.00	5.26	6.7	14	0.0033	8	6.7
	460	22.1	11.00	5.04	6.0	14	0.0024	7	5.9
15-Aug-19	1434	21.4	9.50	5.29	4.2	14	0.0014	5	4.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Baldrige
 Data entered by: A. Albay-Yenney
 Checked by: J. Hines



† Greater than 10% of sample is coarse material



Daniel B. Stephens & Associates, Inc.



**Particle Size Analysis
Wet Sieve Data (#10 Split)**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-13 360'-365'
 Project Name: Former Y PST Site Remediation
 Date Sampled: 8/10/19
 Test Date: 6-Sep-19

Initial Dry Weight of Sample (g): 29174.75
 Weight Passing #10 (g): 20468.04
 Weight Retained #10 (g): 8706.71
 Weight of Hydrometer Sample (g): 82.91
 Calculated Weight of Sieve Sample (g): 118.18
 Shape: Rounded
 Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	29174.75	100.00
	2"	50	925.49	925.49	28249.26	96.83
	1.5"	38.1	1171.90	2097.39	27077.36	92.81
	1"	25	1132.80	3230.19	25944.56	88.93
	3/4"	19.0	1135.90	4366.09	24808.66	85.03
	3/8"	9.5	1948.40	6314.49	22860.26	78.36
	4	4.75	1181.62	7496.11	21678.64	74.31
	10	2.00	1210.60	8706.71	20468.04	70.16
-10	(Based on calculated sieve wt.)					
	20	0.85	5.95	41.22	76.96	65.12
	40	0.425	10.45	51.67	66.51	56.28
	60	0.250	7.18	58.85	59.33	50.20
	100	0.150	8.16	67.01	51.17	43.30
	140	0.106	5.05	72.06	46.12	39.03
	200	0.075	3.63	75.69	42.49	35.95
	dry pan			0.25	75.94	42.24
wet pan				42.24	0.00	

d₁₀ (mm): 0.0019 d₅₀ (mm): 0.25
 d₁₆ (mm): 0.0057 d₆₀ (mm): 0.57
 d₃₀ (mm): 0.044 d₈₄ (mm): 17

Median Particle Diameter--d₅₀ (mm): 0.25
 Uniformity Coefficient, Cu--[d₆₀/d₁₀] (mm): 300
 Coefficient of Curvature, Cc--[d₃₀²/(d₁₀*d₆₀)] (mm): 1.8
 Mean Particle Diameter--[d₁₆+d₅₀+d₈₄]/3] (mm): 5.8

Classification of fines (visual method): ML

† Greater than 10% of sample is coarse material

ASTM Soil Classification: Silty sand with gravel (SM)g
 USDA Soil Classification: Sandy Loam †

Laboratory analysis by: J. Newcomer
 Data entered by: A. Albay-Yenney
 Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

**Particle Size Analysis
Hydrometer Data**

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-13 360'-365'
 Project Name: Former Y PST Site Remediation
 Date Sampled: 8/10/19
 Test Date: 4-Sep-19
 Start Time: 9:06

Type of Water Used: DISTILLED
 Reaction with H₂O₂: NA
 Dispersant*: (NaPO₃)₆
 Assumed particle density: 2.65
 Initial Wt. (g): 82.91
 Total Sample Wt. (g): 29174.75
 Wt. Passing #10 (g): 20468.04

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	H _m (cm)	D (mm)	P (%)	% Finer
4-Sep-19	1	21.7	40.00	5.19	34.8	9	0.0414	42	29.5
	2	21.7	37.00	5.19	31.8	10	0.0301	38	26.9
	4	21.7	34.25	5.19	29.1	10	0.0218	35	24.6
	15	21.7	29.50	5.19	24.3	11	0.0117	29	20.6
	30	21.8	27.00	5.15	21.9	11	0.0084	26	18.5
	60	22.0	24.75	5.08	19.7	12	0.0060	24	16.6
	120	22.1	21.00	5.04	16.0	12	0.0044	19	13.5
	240	22.1	19.00	5.04	14.0	13	0.0031	17	11.8
	442	22.5	18.00	4.89	13.1	13	0.0023	16	11.1
5-Sep-19	1455	21.8	14.50	5.15	9.4	13	0.0013	11	7.9

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
 Data entered by: A. Albay-Yenney
 Checked by: J. Hines

Atterberg Limits/ Identification of Fines



Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
MW-11 342'-345'	---	---	---	ML
MW-12 Saturated	---	---	---	ML
BW-7R Saturated	---	---	---	ML
MW-13 360'-365'	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-11 342'-345'
 Project Name: Former Y PST Site Remediation
 Date Sampled: 6/5/19
 Test Date: 25-Jun-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve
 Liquid Limit: ---
 Plastic Limit: ---
 Plasticity Index: ---
 Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
 Data entered by: A. Albay-Yenney
 Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1157.00.00MW019.0002
Sample Number: MW-11 342'-345'
Project Name: Former Y PST Site Remediation
Date Sampled: 6/5/19
Test Date: 25-Jun-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Brown (7.5 YR 4/4)
Odor: None
Moisture Condition: Moist
HCl Reaction: Strong

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-12 Saturated
 Project Name: Former Y PST Site Remediation
 Date Sampled: 7/16/19
 Test Date: 26-Jul-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve
 Liquid Limit: ---
 Plastic Limit: ---
 Plasticity Index: ---
 Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
 Data entered by: A. Albay-Yenney
 Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1157.00.00MW019.0002
Sample Number: MW-12 Saturated
Project Name: Former Y PST Site Remediation
Date Sampled: 7/16/19

Test Date: 26-Jul-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 5/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Strong

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1157.00.00MW019.0002
Sample Number: BW-7R Saturated
Project Name: Former Y PST Site Remediation
Date Sampled: 8/1/19
Test Date: 14-Aug-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve
Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1157.00.00MW019.0002
Sample Number: BW-7R Saturated
Project Name: Former Y PST Site Remediation
Date Sampled: 8/1/19
Test Date: 14-Aug-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Brown (7.5 YR 5/4)
Odor: None
Moisture Condition: Moist
HCl Reaction: Strong

Preliminary Identification:

Dry Strength: Low
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
 Job Number: DB18.1157.00.00MW019.0002
 Sample Number: MW-13 360'-365'
 Project Name: Former Y PST Site Remediation
 Date Sampled: 8/10/19
 Test Date: 21-Aug-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve
 Liquid Limit: ---
 Plastic Limit: ---
 Plasticity Index: ---
 Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
 Data entered by: A. Albay-Yenney
 Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1157.00.00MW019.0002
Sample Number: MW-13 360'-365'
Project Name: Former Y PST Site Remediation
Date Sampled: 8/10/19
Test Date: 21-Aug-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Yellowish Brown (10YR 5/4)
Odor: None
Moisture Condition: Moist
HCl Reaction: Strong

Preliminary Identification:

Dry Strength: Medium
Dilatency: Slow
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Proctor Compaction



Summary of Proctor Compaction Tests

Sample Number	Measured		Oversize Corrected	
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)
MW-11 342'-345'	11.4	1.84	---	---
MW-12 Saturated	11.3	1.75	---	---
BW-7R Saturated	11.0	1.96	9.1	2.05
MW-13 360'-365'	10.0	2.02	7.8	2.13

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NR = Not requested

NA = Not applicable



Proctor Compaction Data

<i>Job Name:</i> Daniel B. Stephens & Associates, Inc.	<i>Split (3/4", 3/8", #4):</i> #4
<i>Job Number:</i> DB18.1157.00.00MW019.0002	<i>Mass of coarse material (g):</i> 596.94
<i>Sample Number:</i> MW-11 342'-345'	<i>Mass of fines material (g):</i> 31285.26
<i>Project Name:</i> Former Y PST Site Remediation	<i>Mold weight (g):</i> 4226
<i>Date Sampled:</i> 6/5/19	<i>Mold volume (cm³):</i> 941.43
<i>Test Date:</i> 24-Jun-19	<i>Compaction Method:</i> Standard A
	<i>Preparation Method:</i> Dry
<i>As Received Moisture Content (% g/g):</i> NA	<i>Type of Rammer:</i> Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	5990	1163.70	1101.52	207.38	1.75	6.95
2	6079	1053.00	983.39	209.59	1.81	9.00
3	6156	1327.40	1215.30	209.14	1.84	11.14
4	6175	1175.10	1063.50	210.93	1.83	13.09
5	6158	1182.80	1054.87	208.57	1.78	15.12

Soil Fractions

Coarse Fraction (% g/g): 1.9
Fines Fraction (% g/g): 98.1

Properties of Coarse Material

Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Oversize Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: A. Baldrige
Data entered by: A. Bland
Checked by: C. Krous

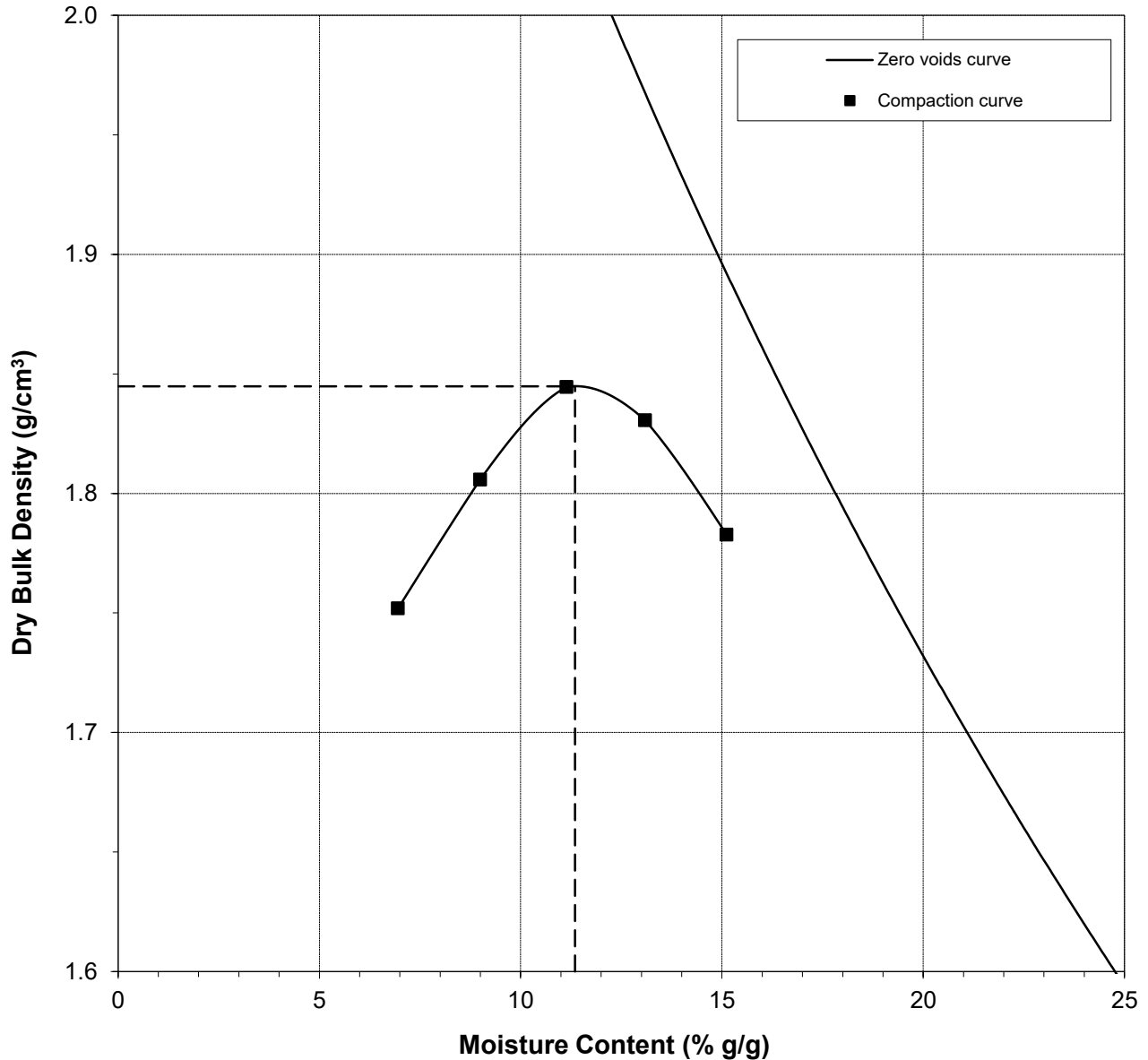


Proctor Compaction Data Points with Fitted Curve

Sample Number: MW-11 342'-345'

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.4	---
Maximum Dry Bulk Density (g/cm ³):	1.84	---

Test Date: 24-Jun-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: A. Baldrige
 Data entered by: A. Bland
 Checked by: C. Krous

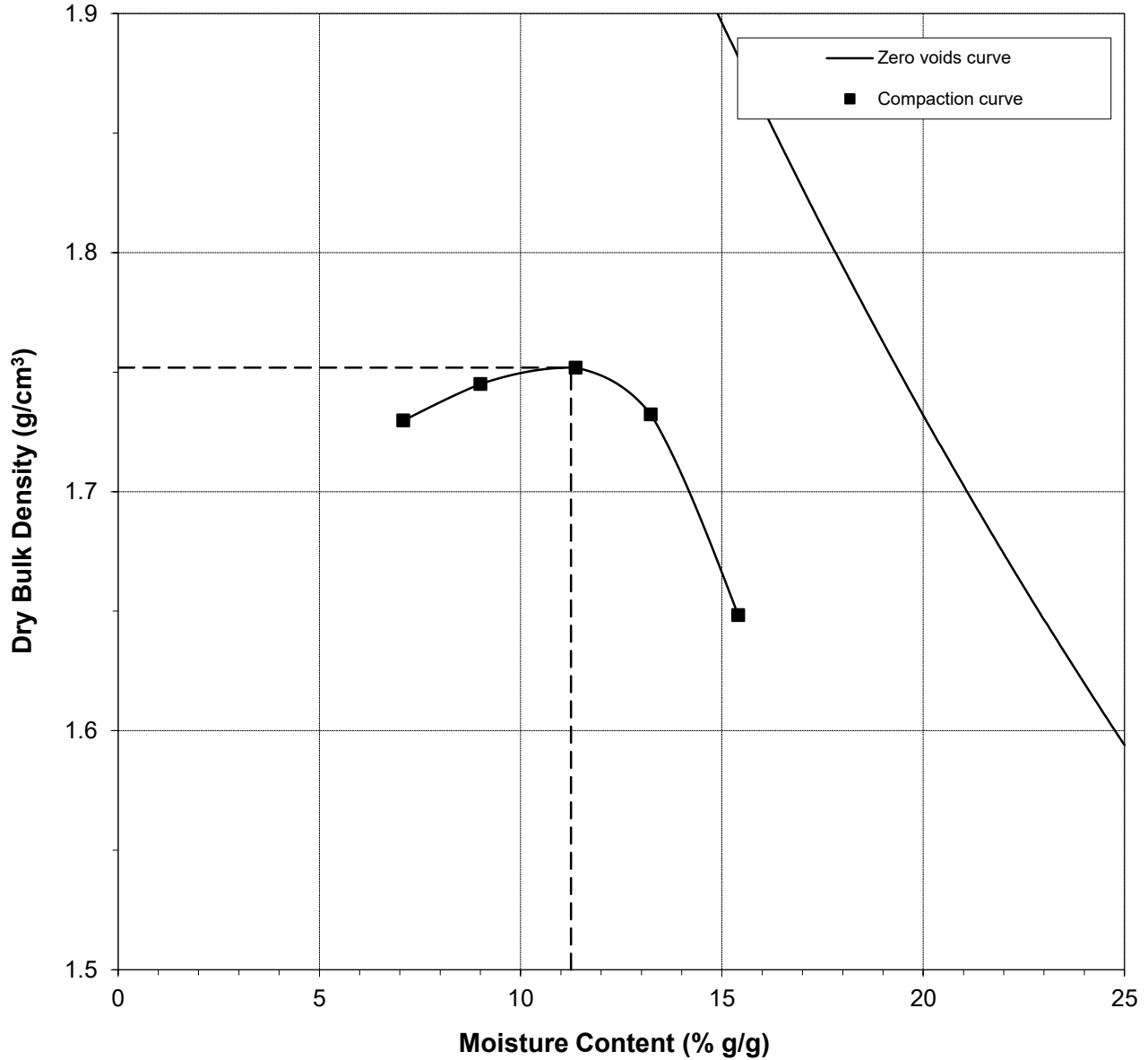


Proctor Compaction Data Points with Fitted Curve

Sample Number: MW-12 Saturated

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.3	---
Maximum Dry Bulk Density (g/cm ³):	1.75	---

Test Date: 25-Jul-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: A. Baldrige
Data entered by: A. Baldrige
Checked by: J. Hines



Proctor Compaction Data

Job Name: Daniel B. Stephens & Associates, Inc. Split (3/4", 3/8", #4): #4
 Job Number: DB18.1157.00.00MW019.0002 Mass of coarse material (g): 5494.08
 Sample Number: BW-7R Saturated Mass of fines material (g): 27191.58
 Project Name: Former Y PST Site Remediation Mold weight (g): 4205.3
 Date Sampled: 8/1/19 Mold volume (cm³): 942.44
 Test Date: 8-Aug-19 Compaction Method: Standard A
 Preparation Method: Dry
 As Received Moisture Content (% g/g): NA Type of Rammer: Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6088	909.80	867.09	268.94	1.86	7.14
2	6198	1194.00	1115.22	266.46	1.93	9.28
3	6258	1140.93	1054.17	267.60	1.96	11.03
4	6209	1179.69	1074.46	283.82	1.88	13.31
5	6140	1236.41	1109.67	292.86	1.78	15.52

Soil Fractions
 Coarse Fraction (% g/g): 16.8
 Fines Fraction (% g/g): 83.2

Properties of Coarse Material
 Assumed particle density (g/cm³): 2.65
 Assumed Initial Moisture Content (% g/g): 0.0

Oversize Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	1.96	5.94
2	2.03	7.72
3	2.05	9.18
4	1.97	11.07
5	1.88	12.91

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: A. Baldrige
 Data entered by: A. Baldrige
 Checked by: J. Hines

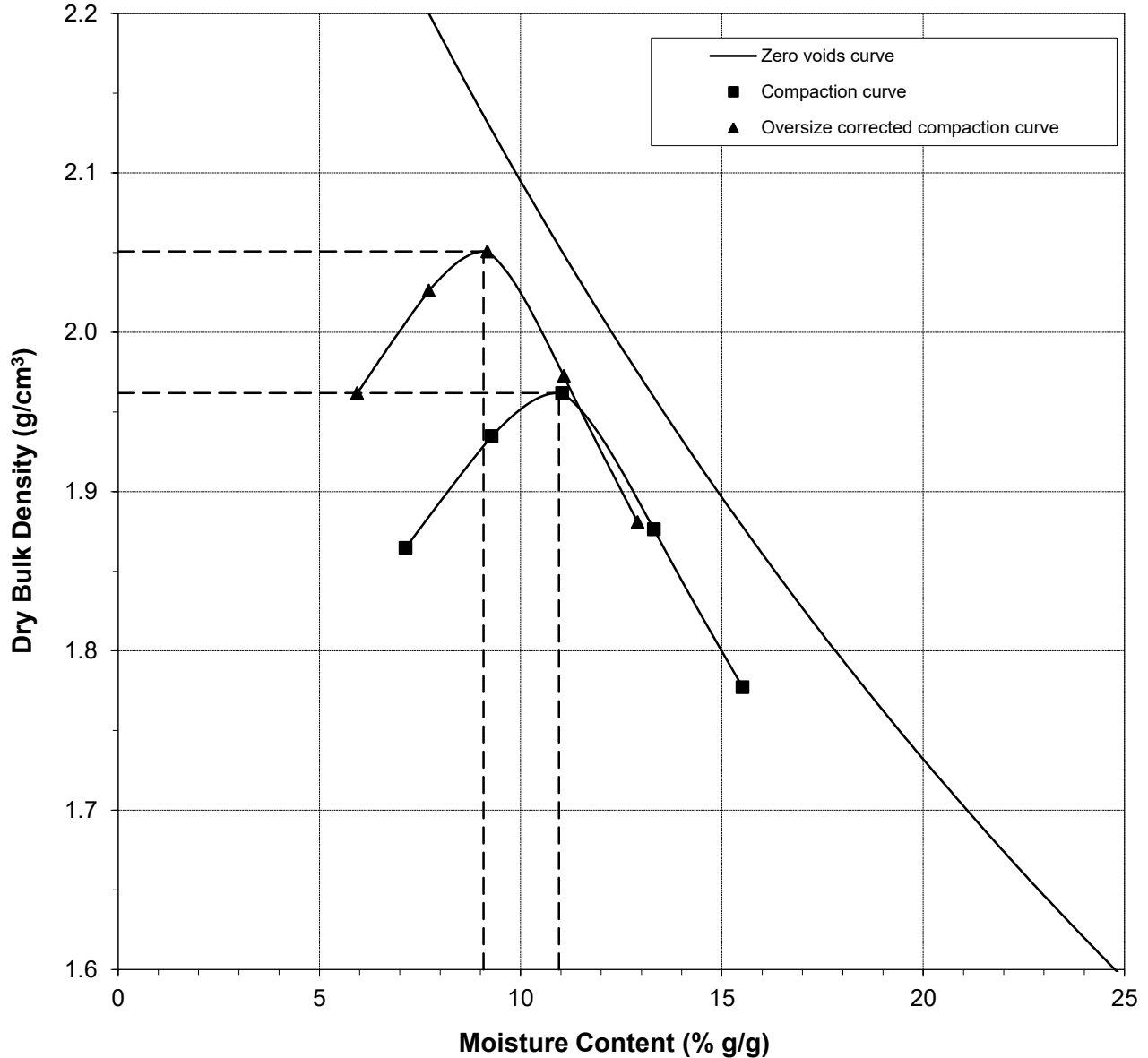


Proctor Compaction Data Points with Fitted Curve

Sample Number: BW-7R Saturated

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.0	9.1
Maximum Dry Bulk Density (g/cm ³):	1.96	2.05

Test Date: 8-Aug-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: A. Baldrige
 Data entered by: A. Baldrige
 Checked by: J. Hines

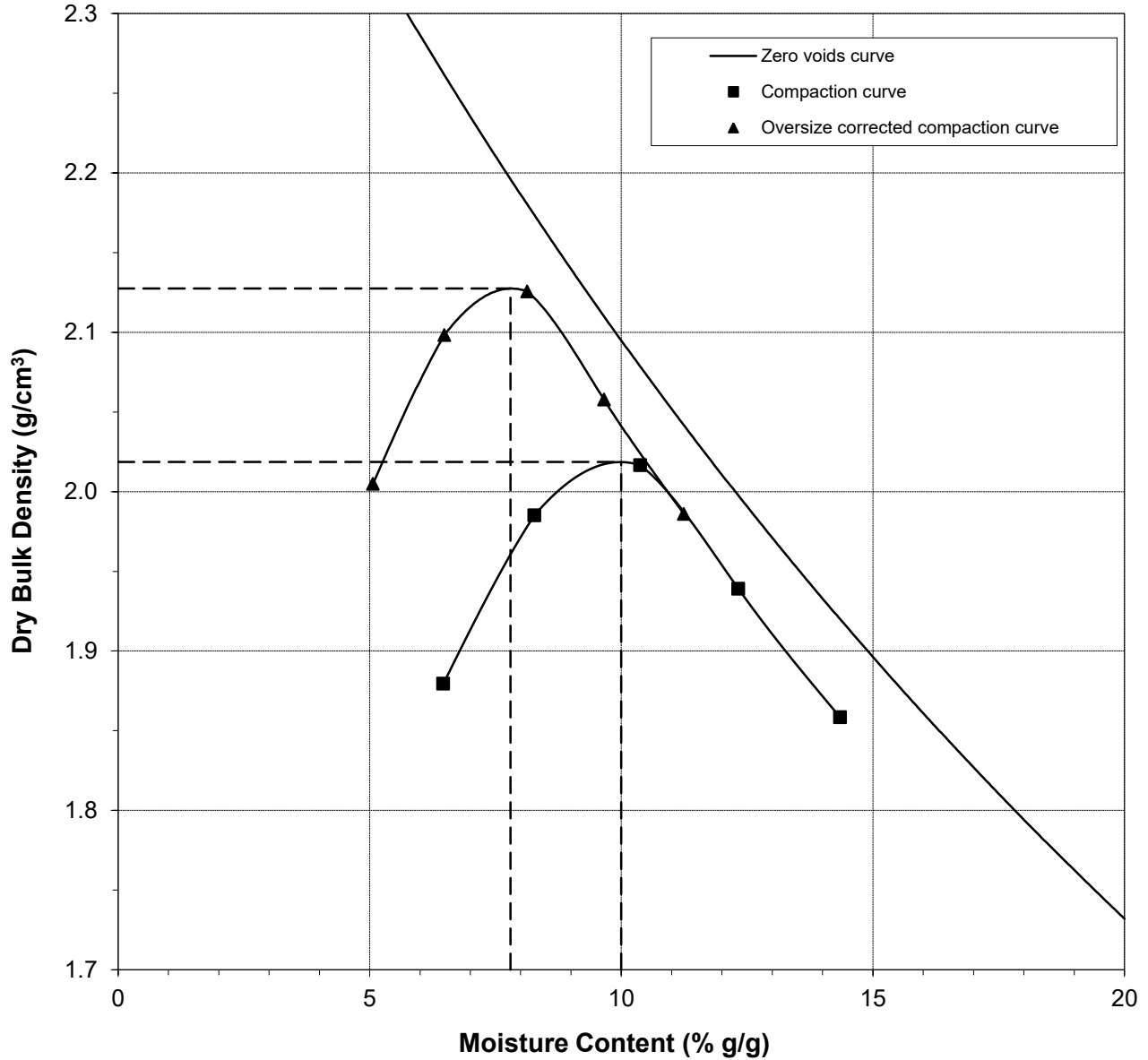


Proctor Compaction Data Points with Fitted Curve

Sample Number: MW-13 360'-365'

	Measured	Corrected
Optimum Moisture Content (% g/g):	10.0	7.8
Maximum Dry Bulk Density (g/cm ³):	2.02	2.13

Test Date: 19-Aug-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: A. Baldrige
 Data entered by: A. Bland
 Checked by: J. Hines

Laboratory Tests and Methods



Tests and Methods

Dry Bulk Density:	ASTM D7263
Moisture Content:	ASTM D7263, ASTM D2216
Calculated Porosity:	ASTM D7263
Saturated Hydraulic Conductivity:	
Falling or Constant Head:	ASTM D5856
(Rigid Wall)	
Particle Size Analysis:	ASTM D7928, ASTM D6913
USCS (ASTM) Classification:	ASTM D6913, ASTM D4318, ASTM D2487
USDA Classification:	ASTM D7928, ASTM D6913, USDA Soil Textural Triangle
Atterberg Limits:	ASTM D4318
Visual-Manual Description:	ASTM D2488
Standard Proctor Compaction:	ASTM D698