FINAL REPORT

South Tahoe Public Utility District

South Y Extraction Well Suitability Investigation

JUNE 29, 2016

SUBMITTED BY
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Project No. 1601030

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Abbreviations and Acronyms

µg/L	micrograms per liter
AOP	advanced oxidation process
CLR	Calcium, Lime & Rust Remover
CRWQCB	California Regional Water Quality Control Board
CSLT	City of South Lake Tahoe
DDW	Division of Drinking Water
District	South Tahoe Public Utility District
DWR	Department of Water Resources
EDCEMD	El Dorado County Environmental Management Division
EPA	Environmental Protection Agency
FGL	FGL Analytical Chemists
ft bgs	feet below ground surface
GAC	granular activated carbon
GEI	GEI Consultants Inc.
gpm	gallons per minute
lb/day	pounds per day
LBWC	Lukins Brothers Water Company Well
MCL	maximum contaminant level
mJ/cm^2	mill-Joules/square centimeter
mW/cm^2	mill-Watts/square centimeter
PCE	tetrachloroethylene
TDS	Total Dissolved Solids
TOC	total organic carbon
TRPA	Tahoe Regional Planning Agency
TSS	total suspended solids
UV	ultra violet light
Work Plan	*Work Plan for the South Y Extraction Well Suitability Investigation*

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Executive Summary

GEI Consultants Inc. (GEI) has performed an assessment of the Lukins Brothers Water Company Well (LBWC) Well #4 (Well #4) for the South Tahoe Public Utility District (District). The primary goal of the South Y Extraction Well Suitability Investigation (well assessment) was to determine the suitability of using Well #4 as an extraction well for the removal of tetrachloroethylene (PCE) in groundwater. The purpose of this report is to describe the methodology and results of this well assessment, the potential use of Well #4 as an extraction well for hydraulic containment and removal of PCE contaminated groundwater, and to provide reuse alternatives which include a pre-design recommendation for an extraction well and PCE treatment system.

Well #4 is located on a ¾-acre parcel (APN 023-65-518) in a residential neighborhood at 843 Hazel Drive, South Lake Tahoe, El Dorado County, California. The well was drilled in 1966 using the cable-tool drilling method and constructed of 12-inch diameter steel casing with an open bottom to a depth of 118 feet below ground surface (ft bgs). Well #4 has been inactive since 1989 after concentrations of PCE above the primary maximum contaminant level (MCL) of 5 micrograms per liter (µg/L) were detected. In 1994, Well #4 was disconnected from the LBWC water system and formally removed from service. In 2015, PCE was detected at 34 micrograms per liter (µg/L) in water quality samples collected by the Lahontan Regional Water Quality Control Board.

The objectives of this well assessment were to: identify the primary flow paths of PCE into Well #4 based on depth-discrete water sampling and a vertical flow survey; estimate aquifer hydraulic properties by performing a constant rate aquifer test in order to delineate a capture zone(s) for the use of Well #4 as an extraction well; and conduct a water treatment pilot test to provide data necessary to develop a pre-design recommendation for the removal of PCE from extracted groundwater. An inactive small community water system well (Rockwater Well) located at 787 Emerald Bay Road, approximately 1,100 feet southwest of Well #4, was used as an observation well during aquifer testing.

GEI implemented the District-approved *Work Plan for the South Y Extraction Well Suitability Investigation* (Work Plan), including initial data collection activities, from February through May 2016. These activities consisted of: (a) collecting pre-test water quality samples with HydraSleeves from three discrete depth intervals in Well #4 during non-pumping (static) conditions; (b) installing pressure transducers in Well #4 and the Rockwater Well to identify potential well interferences from neighboring pumping wells; (c) mechanical cleaning of Well #4; (d) conducting a step-drawdown aquifer test; (e) collecting pre-pilot testing baseline water quality samples; (f) conducting a 24-hour constant rate aquifer test, dynamic well profiling (spinner survey) and collecting four depth-specific groundwater samples during pumping conditions; and (g) conducting a water treatment pilot test using a high efficiency ultra violet light (UV) to decompose PCE through direct photolysis, UV advanced oxidation process (AOP) using sodium hypochlorite, and analysis of the spent granular activated carbon (GAC) media used to treat extracted groundwater for discharge compliance.

Results from analysis of field data and analytical laboratory results lead to the following conclusions: (a) in Well #4, PCE concentrations (8.6 to 39 µg/L) increased with depth (65 feet, 85 feet, and 107 feet) under static conditions; during pumping, however, PCE concentrations were higher (47 to 55.1 µg/L) but did not vary with depth (68 feet, 72 feet, 82 feet, and 110 feet); (b) in the Rockwater Well, PCE concentrations (69 µg/L) are higher than Well #4 based on a sample collected at 60 feet during static conditions; (c) the Rockwater Well is located hydraulically upgradient of Well #4 and, therefore, suggests the source of PCE contamination is located further upgradient to the south of these wells; (d) based on the general mineral and inorganic water quality results, only iron and manganese exceed their respective secondary MCLs; (e) Well #4 would be classified by the California Division of Drinking Water (DDW) as an extremely impaired source because PCE concentrations are expected to exceed 10 times the MCL of 5 µg/L; however, DDW will work with the water supplier (utility) to permit the source for drinking water, particularly in situations where a contaminant plume needs to be mitigated through pump and treat methods; (f) PCE was not effectively removed by UV, therefore, UV/AOP is not a recommended treatment technology; (g) dye test results of the spent GAC media indicated the GAC bed life would be decreased by 30 percent, likely due to iron and manganese fouling. Pre-treatment to remove iron and manganese prior to GAC filtration is recommended.

The production rate and specific capacity encountered during the constant rate aquifer test on Well #4 were higher than anticipated and resulted in the pumping rate being limited by the discharge capacity of the test pump (170 gpm) and the treatment capacity of the onsite temporary GAC treatment system. Estimated results for capture zones based on pumping Well #4 at 400 gpm, 600 gpm and 800 gpm are provided in this report. Performing an extended confirmation test at a higher pumping rate is recommended to confirm final treatment flow and contaminant loading rates for well head treatment system design. The preliminary design is based on a PCE contaminant mass loading of 0.27 pounds per day (lbs/day) at an estimated pumping rate of 400 gpm.

Based on these conclusions and discussions with the District and LBWC, GEI developed five alternatives for pumping and treating PCE at the Well #4 location and recommends Alternatives 3 and 5. Additional information collected during the feasibility study will be used to select between these two alternatives. Alternative 3, consists of drilling a new municipal supply well at the Well #4 site that will meet all of the DDW structural well standards, permitting the well with DDW as an extremely impaired source, destroying the original Well #4 in accordance with state and county well standards, and removing the onsite hydropnuematic tank. Alternative 5 is similar to Alternative 3 but includes the construction of a shallow extraction well to remove PCE contaminated groundwater from the informally designated upper aquifer zone, TK_{z5}. Due to the requirement of a 50-foot sanitary seal, the upper TK_{z5} zone may be sealed off if Alternative 3 alone is selected, which would limit removal of PCE from this horizon and may reduce the overall pumping rate. As part of a feasibility study, we recommend that a multilevel piezometer be constructed within 100' of Well #4 so that a final determination can be made between Alternatives 3 and 5.

The Alternative 3 target production rate for the new well would be approximately 400 gpm, a significant increase to the LBWC system. The same production rate is assumed for planning purposes for both the deep and shallow wells in Alternative 5. A treatment system pre-design concept was developed for Alternative 3 that assumes the new production well will be housed in a new concrete building with a pre-fabricated metal sliding door located on the roof for pump removal; two 10,000-lb GAC vessels installed in series to allow the spent carbon in the lead vessel to be changed out while maintaining continuous operation and fully utilizing carbon capacity; and a new power panel, submersible pump and motor. The pump-to-waste will be routed to the nearby sanitary sewer for discharge during start-up. Based on an average influent PCE concentration of 39 µg/L and the predicted carbon use rate of about 20 pounds/day, carbon replacement would occur approximately every 2.5 years. Both recommended alternatives include newly constructed well(s), it is assumed that iron and manganese levels in the new well will be consistent with water quality throughout the South Tahoe basin. Therefore, the pre-design treatment train does not include an iron and manganese treatment system.

The total construction cost estimate for Alternative 3 is approximately $1.825 million, including a contingency of 50%. Alternative 5 with the addition of a multi-level monitoring well and shallow extraction well would add about $400,000, including a 50% contingency. These costs do not include sampling costs, permitting or temporary treatment or disposal fees that may be needed during confirmation testing to gain approval from DDW for the operation of the new wells for extraction and drinking water sources. Annual operation and maintenance is estimated to be $23,000 with an annualized carbon cost of $15,000 and sampling and labor costs of $8,000.

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Chapter 1. Introduction

1.1 Purpose

GEI Consultants Inc. (GEI) has performed an assessment of the Lukins Brothers Water Company Well (LBWC) Well #4 (Well #4) for the South Tahoe Public Utility District (District). The primary goal of the South Y Extraction Well Suitability Investigation (well assessment) was to determine the suitability of using Well #4 as an extraction well for the removal of tetrachloroethylene (PCE) in groundwater. The purpose of this report is to describe the methodology and results of this well assessment; the potential use of Well #4 as an extraction well for hydraulic containment and removal of PCE contaminated groundwater, and to provide reuse alternatives which include a pre-design recommendation for an extraction well and PCE treatment system.

1.2 Background

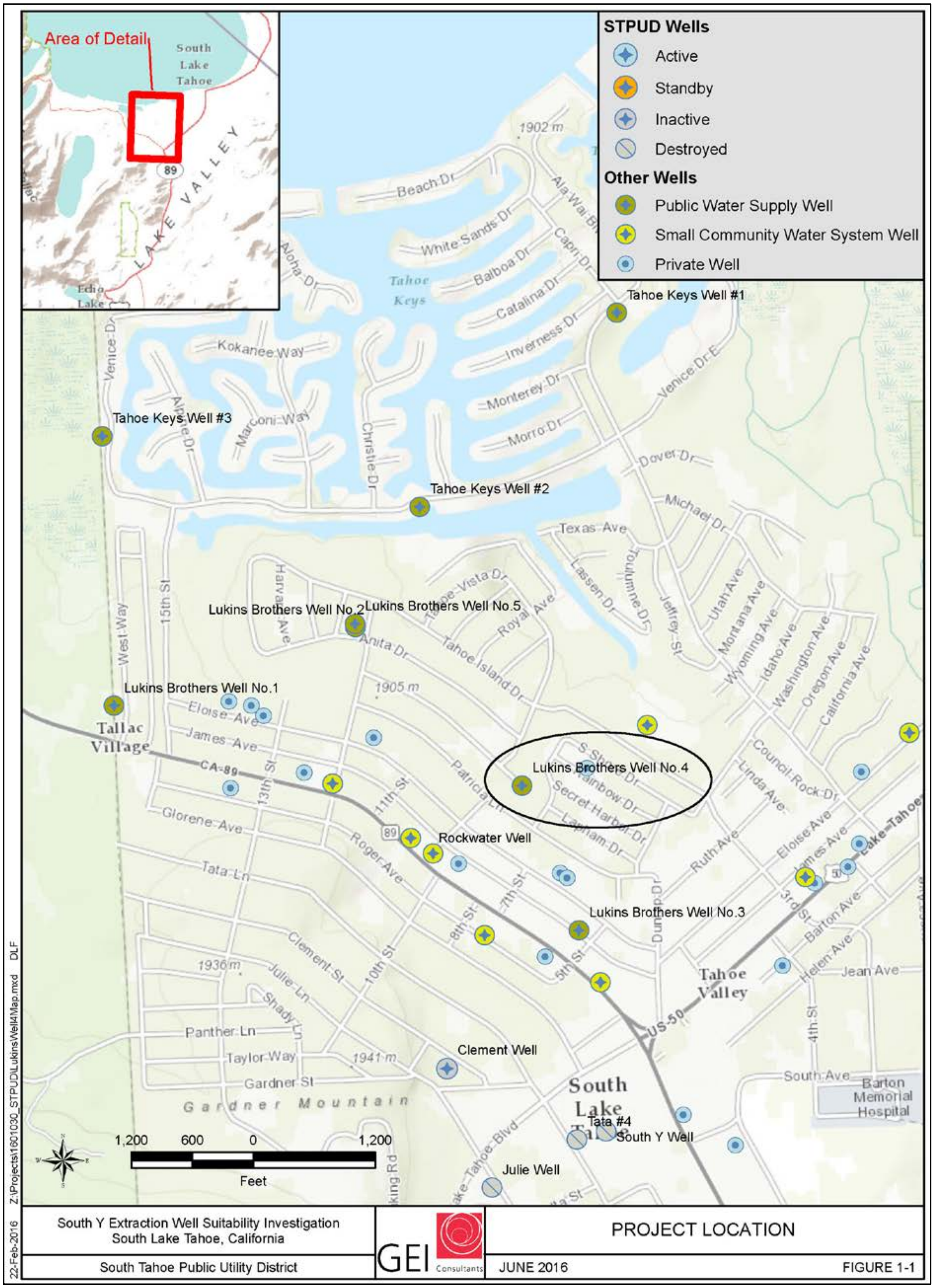
Well #4 is located on a ¾-acre parcel (APN 023-65-518) in a residential neighborhood at 843 Hazel Drive, within Section 5, Township 12 North, Range 18 East, Mount Diablo Base Line Meridian in the City of South Lake Tahoe, El Dorado County, California (Figure 1-1).

Well #4 was initially constructed in 1966 and has been inactive since 1989 after elevated concentrations of PCE above the maximum contaminant level (MCL) were detected in water samples collected from this well. In 1994, Well #4 was disconnected from the LBWC water system and formally removed from service. In 2015, PCE was detected at 34 micrograms per liter (µg/L) in water quality samples collected by the Lahontan Regional Water Quality Control Board (LRWQCB).

LBWC provided a well log that includes well construction and lithologic information for Well #4. An official California Department of Water Resources (DWR) Well Driller's Report was not found. Well #4 was drilled using the cable-tool drilling method and constructed of 12-inch diameter steel casing with an open bottom to a depth of 118 feet below ground surface (ft bgs). In 1970, the well was deepened and a 10-inch diameter steel casing liner was installed inside the 12-inch diameter steel casing from 110 ft bgs to a total depth of 174 ft bgs. Areas with perforation are noted on the well log through the following depth intervals: 43 – 63 ft bgs; 68-78 ft bgs; 105 -115 ft bgs; and 132-155 ft bgs. The well log also notes that the last 30 feet of Well #4 (144 - 174 ft bgs) was graveled back to stop sand flowing into the well. Information on the well pump was not included in the provided well log. However, the pump is believed to have been set at a depth of about 110 feet below top of casing (personal communication, Jennifer Lukins). Water production records for Well #4 were not found. However, when active, Well #4 was believed to have been a relatively low production well having a nominal yield of less than 130 gallons per minute (gpm). During water quality sampling in 2015, the well was pumped at about 30 gpm.

The Rockwater Well, is an inactive small community water system well located at 787 Emerald Bay Road (approximately 1,100 feet southwest of Well #4) and was used as an observation well during this investigation (Figure 1-1). Well information provided by the El Dorado County Environmental Management Division (EDCEMD) indicates that the Rockwater Well is constructed with nominal 8-inch diameter steel well casing to a total depth of 101 ft bgs with perforations from about 70 to 99 ft bgs. When operating, the well is believed to have produced about 30 gpm. Records indicating the pump

Figure 1-1. Project Location



setting for this well was not found. However, restrictions encountered while lowering groundwater level monitoring equipment into the well indicate that the top of the well pump is set a depth of about 65 ft bgs.

The primary objectives for the well assessment are to identify the primary flow paths of PCE into Well #4 based on depth-discrete water sampling and a vertical flow survey, and to estimate aquifer hydraulic properties by performing a constant rate-aquifer test in order to delineate a capture zone(s) for the use of Well #4 as an extraction well. The pilot test was used to provide data necessary to develop a pre-design recommendation for the removal of PCE from extracted groundwater. In accordance with the approved scope of work, GEI prepared the *Work Plan for the South Y Extraction Well Suitability Investigation* (Work Plan), dated March 16, 2016 (GEI, 2016). The Work Plan, reviewed and approved by District staff, provided guidance to GEI and our subcontractor, Carson Pump of Carson City, Nevada. A courtesy copy of this work plan was provided to the City of South Lake Tahoe (CSLT), EDCEMD, Tahoe Regional Planning Agency (TRPA) and California Regional Water Quality Control Board (CRWQCB) prior to starting field activities. A copy of this work plan is provided in Appendix A.

1.3 Project Summary

A chronological summary of field work performed is provided in Table 1-1. The detailed methodology used for water quality sampling, the aquifer testing and pilot testing is provided in the Work Plan (Appendix A). The pre-pilot testing activities are presented in Section 2.0 and the investigation results are presented in Section 3.0. The obstruction permit issued for the project by the CSLT is included in Appendix A.

Table 1-1. Chronological Summary of Field Work

Dates	Task
2/1/2016	Kick-off Meeting and Site Visit
2/17/2016	Video Survey and Deployed HydraSleeve Samplers
3/3/2016	Collected Initial Water Samples from HydraSleeves
3/16/2016	Installed Pressure Transducers in LBWC Well #4 and Rockwater Well
3/21/2016	Received City of SLT Obstruction Permit
3/21/2016	Removed Pressure Transducer from Well #4
3/21to 3/22/2016	Well #4 Mechanical Cleaning
3/23/2016	Test Pump Installation
3/24/2016	Step-drawdown Test and Pre-Pilot Test Water Quality Sampling
3/28/2016	Pre-Filter Water Quality Sampling
3/28 to 3/29/16	24-Hour Constant Rate Test
3/29/2016	Dynamic Flow Profiling and Water Quality Sampling
3/30/2016	Pilot Test Water Quality Sampling
5/20/2016	Demobilization and Site Clean Up

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Chapter 2. Pre-Pilot Testing Activities

2.1 Data Collection

2.1.1 Video Survey

A video survey of Well #4, conducted on February 17, 2016 by Carson Pump, to assess the condition of the well and to confirm the construction details provided to GEI. The video survey results were also used to select the pump setting depth for the step- and constant rate aquifer tests. The video survey results are discussed in Section 3.0.

2.1.2 Initial Water Quality Sampling

The objective of this sampling event was to characterize the pre-testing water quality at Well #4 and the Rockwater Well. The samples were analyzed by FGL Analytical Chemists (FGL) of Stockton, California for VOC's and BSK Associates Engineers & Laboratories (BSK) of Fresno, California for total organic carbon (TOC). Field parameters consisting of temperature, pH and electrical conductivity were measured during sample collection. HydraSleeve passive samplers (Hydrasleeves) were deployed in Well #4 on February 17, 2016 after the video survey was conducted. The approximately 7-foot long HydraSleeves remained in the well until March 3, 2016 prior to the collection of samples to allow the water quality in the well to equilibrate after fresh water was added to the well for a clear video survey. To collect adequate volume for each sample, two HydraSleeves were placed in tandem at three target intervals, 65 to 58 feet bgs, 78 to 85 feet bgs, and 100 to 107 feet bgs.

On February 17, 2016, one HydraSleeve was also deployed in the Rockwater Well at a depth of 60 to 63 feet bgs. A sample collected on March 3, 2016 was analyzed for VOC's by FGL. Appendix B contains field photographs of the equipment used during the project.

2.1.3 Water Level Measurements

On March 16, 2016, pressure transducers were installed in Well #4 and the Rockwater Well. The transducers were used to measure the depth to groundwater level and identify any potential well interferences from neighboring pumping wells.

2.2 Mechanical Cleaning

On March 21, 2016, Carson Pump began the mechanical cleaning of Well #4. Mechanical well cleaning consisted of using a wire-brush to remove any materials plugging the well casing liner perforations to improve well performance. Carson Pump spent a total of 8 hours on March 21 and March 22, 2016 to brush the louvered casing liner. A bailer was used to remove any sediment and debris accumulated from the bottom of the well at 135 ft bgs. Total sounding of the well confirmed that a very minor volume of debris and material were generated by brushing and bailing was conducted briefly to remove sediment to 135 ft bgs. Pump development was not conducted immediately following mechanical cleaning.

2.3 Step-Drawdown Aquifer Testing

On March 23, 2016, Carson Pump installed a Goulds Model 5CHC020 (8 stage) submersible pump mated to a Franklin 20 horsepower motor in Well #4, with the intake set at 110 ft bgs. With the lack of historical information on pumping rates and associated drawdown, the pump was set in the blank section of casing just above the open-borehole portion of the well. A temporary 1-inch diameter PVC sounding tube was installed to 105 feet bgs for collecting water level measurements. During the step-drawdown test, the pumping rate, system pressure, select field water quality parameters and pumping water levels were measured and recorded.

After the step-test was completed Carson Pump was directed to raise the pump from 110 feet bgs to 47 feet bgs to gather better data during the spinner survey that would be performed as part of the constant rate test. The curve for the temporary submersible pump used for aquifer testing is provided in Appendix A. The water was discharged to the sanitary sewer after approval and under supervision of District staff. The discharged water passed through the onsite carbon filtration vessel prior to being discharged to the sanitary sewer for removal of organic contaminants prior to discharge.

2.4 Pre-Pilot Test Water Quality Sampling

The objective of the pre-pilot test water quality sampling was to collect baseline water quality data prior to the pilot test. The data was used to finalize pilot testing plans and to assess changes in water quality under pumping conditions. The samples were collected during the step-drawdown test on March 24, 2016, by District laboratory personnel. The samples were transported to the District lab for delivery to the analytical laboratory under District chain-of-custody for analyses of the following parameters: VOCs (EPA Method 524.2), TOC (SM 5310C) and Metals (USEPA 200.7/200.8). Appendix C contains the field data sheets.

2.5 Constant rate Aquifer Testing

A 24-hour constant rate aquifer test was conducted on Well #4 during March 28 and March 29, 2016. The test was conducted at a pumping rate of 100 gpm for the initial 1,184 minutes of pumping time. After 1,184 minutes, the pumping rate was increased to about 170 gpm for the remaining 261 minutes of the test. The increased pumping rate was needed to provide sufficient flow that could be readily measured using the spinner tool for dynamic well profiling. This rate increase was approved by the District Hydrogeologist, prior to changing the pumping rate.

2.6 Dynamic Well Profiling and Water Quality Sampling

The objective of the dynamic well profiling (spinner survey) and collection of groundwater samples was to identify and quantify the flow contribution to Well #4 with depth and the corresponding contribution of PCE to the well. Samples were collected at 68 ft bgs, 72 ft bgs, 82 ft bgs and 110 ft bgs and were analyzed by FGL for VOC’s (EPA 524.2). The results of the water quality analysis are illustrated on Figure 3-1. The spinner survey was conducted by Pacific Surveys, LLC (Pacific Survey) of Claremont, California with the use of a 3-inch diameter access pipe in the well extending to a depth of about 63 feet bgs. This pipe allowed the spinner tool to safely pass the pump intake that was set a depth of 47 ft bgs. Pacific Survey was not willing to lower the spinner tool below a depth of about 115 ft bgs into the open-hole portion of the well below the bottom of the 12-inch well casing. This limited the actual depth interval surveyed by this profile from 63 to 115 ft bgs. Given these limitations, flow interpretations from this profile are deemed to be possible.

2.7 Pilot Testing

GEI conducted a water treatment pilot test at Well #4 using a high efficiency ultra violet light (UV) to decompose PCE through direct photolysis, and UV advanced oxidation process (AOP) using sodium hypochlorite. Traditionally, UV/AOP systems are costly and space prohibitive. NeoTech Aqua Solutions offers a High-Efficiency UV system which significantly reduces space requirements and operational costs by up to 90% compared to standard UV systems. The potential cost and operating efficiency made UV/AOP a technology of interest. Additional, testing was conducted on the spent GAC media used for discharge compliance.

GAC is an established best available technology for removing VOCs from groundwater. Since it has been proven to be effective, it served two purposes during the pilot test. First, to meet sanitary sewer discharge requirements during the aquifer tests and second, for efficiency in pilot testing with the spent carbon analyzed to determine treatment efficiency.

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Chapter 3. Results

3.1 Video Logging

The well video showed the actual well construction of Well #4 differed from the well construction indicated in the provided well log. The 10-inch diameter well casing liner extended from the top of casing to a depth of 118 ft bgs. The bottom of the 10-inch well casing liner opened to an open borehole that extended to a depth of at least 133 ft bgs, before fill was encountered, ending the video survey. As well casing was not observed below 118 ft bgs, it is likely that the 10-inch well casing liner never extended below this bottom depth. Video log observations suggest that the gravel noted in the well log was used to fill the bottom 30 feet of the open borehole, below the bottom of the 10-inch well casing liner. Information on the construction and condition of the 12-inch well casing could not be gleaned from the video survey. However, the bottom of the 10-inch well casing liner corresponds to the bottom depth of the 12-inch well casing as noted in the provided well log.

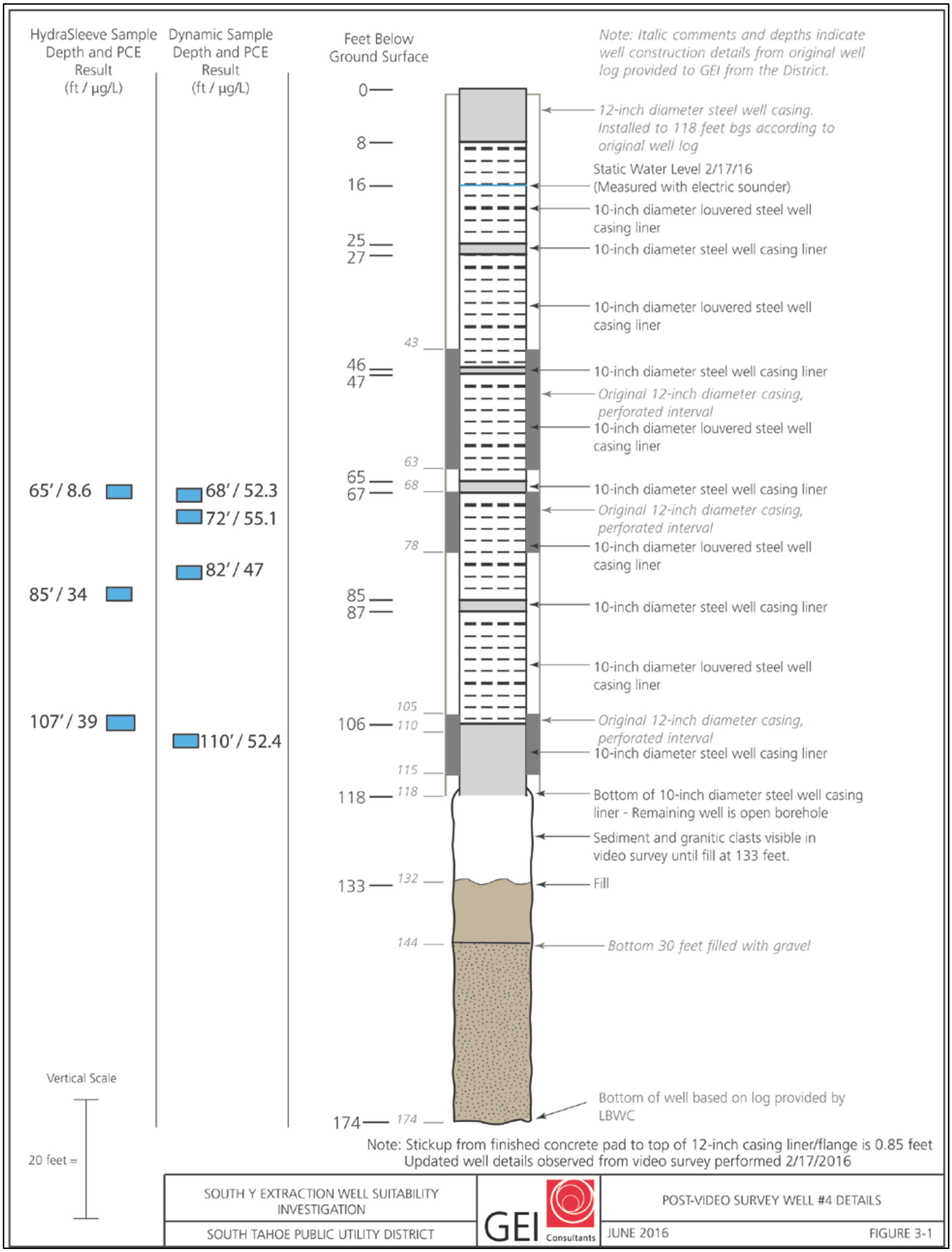
The 10-inch well casing liner appeared to be in good condition with a relatively small amount of tubercles present on the casing. Louvered perforations extended from 8 ft bgs to about 106 ft bgs and appeared to be approximately 50% open to a depth of about 90 ft bgs. Below 94 ft bgs, biological growth and scaling on the louvers and casing liner increased and the louvers were estimated to be less than 20% open.

As noted above, Well #4 was completed with an open borehole below a depth of 118 ft bgs. Inspection of the well video shows gravel and pebbles containing granitic clasts exposed along the open borehole wall to a depth of at least 133 ft bgs. Table 3-1 provides a comparison of well descriptions for the Well #4 from the well log and from the video survey. Figure 3-1 shows the well diagram developed using the results of the video survey. Field notes from the video survey are provided in Appendix C.

Table 3-1. Summary of Well Construction Details

Well Detail	Description		
	Well #4		Rockwater Well
	Well Log	Video Survey 2/17/16	Well Log
Total Well Depth	174 feet bgs	Unknown - Fill encountered 133 feet bgs	101 feet bgs
Casing Material	Steel	Steel	Steel
Casing Diameter	12-inch: -0.85 - 118 feet bgs 10-inch: 110 - 174 feet bgs	12-inch: -0.85 – 118 ft bgs 10-inch: -0.8 - 118 ft bgs	6-inch
Perforation Type	Unknown	Louvered	Unknown
Perforated Intervals	43 - 63 feet bgs 68 - 78 feet bgs 105 - 115 feet bgs 132 - 155 feet bgs	8 - 25 feet bgs 27 - 45 feet bgs 47 - 65 feet bgs 67 - 85 feet bgs 87 - 106 feet bgs	70 - 99 feet bgs

Figure 3-1. Post-Video Survey Well #4 Details



3.2 Aquifer Testing

As indicated in Section 1.1, Well #4 was expected to have a relatively low nominal capacity of less than 130 gpm. Based on this information, pumping equipment selected for aquifer testing had a discharge capacity of about 100 gpm at 130 feet of total dynamic head. The selected granular activated carbon (GAC) filter used for well head treatment was sized accordingly to accommodate flows up to 100 gpm. Using this equipment, a 4-hour step-test was planned ranging from about 50 to 165 gpm to determine an appropriate pumping rate for the 24-hour constant rate test. Pumping from the step-test was also intended to remove any remaining debris and accumulated sediment from mechanical well cleaning. During aquifer testing, sustainable pumping rates from Well #4 were greater than anticipated and the work plan was adjusted to accommodate aquifer testing performed at higher pumping rates with the equipment available in the field.

3.2.1 Step-Test

The step-test was performed on March 24, 2016 with the test pump set at a depth of 110 ft btoc and consisted of three approximately 30-minute steps with progressively higher pumping rates at about 100 gpm; 140 gpm; and 170 gpm. At approximately 40-minutes into the step test, pre-pilot test water quality samples were collected by District lab personnel. A plot showing pumping water levels measured during the step-test is provided below in Figure 3-2.

Inspection of Table 3-2 shows that the specific capacity generally declined as discharge increased in Well #4. Using these results, the constant rate test could have been performed at pumping rates ranging from between 200 and 400 gpm. However, given the discharge limitations of the test pump and the treatment limitations of the LGAC filter, the District elected to perform the constant rate test at 100 gpm.

3.2.2 24-hour Constant rate Test

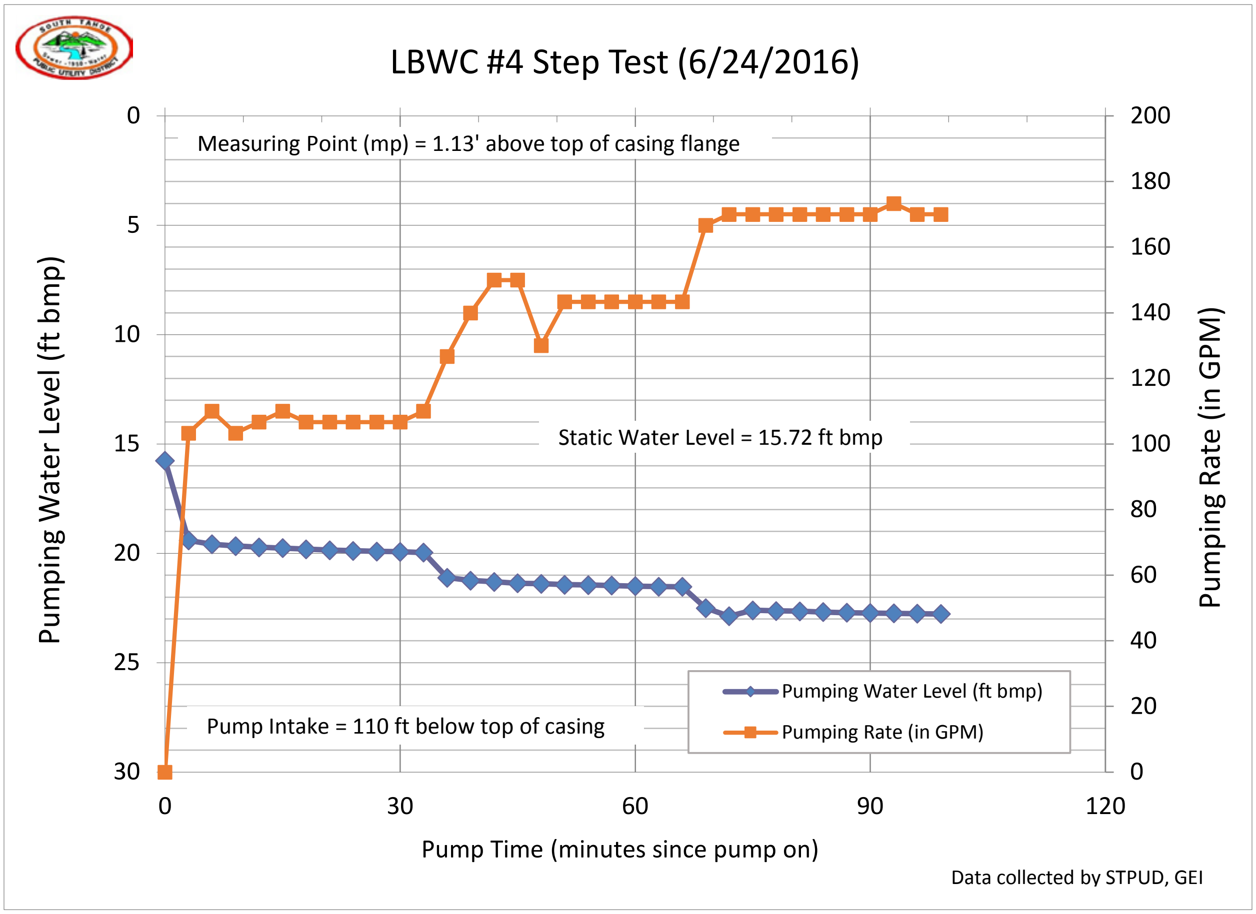
The constant rate test was performed on March 28, 2016 with the test pump set at a depth of 110 ft btoc and consisted of an approximately 24-hour pumping test at about 100 gpm. As indicated in Section 2.5, after 1,184 minutes of pumping at 100 gpm; the pumping rate was increased to 170 gpm for the remaining 261 minutes of the test to facilitate the spinner survey. A plot showing pumping rates and pumping water level measured during the constant rate test is provided below in Figure 3-3.

Aquifer Characteristics Calculations

Transmissivity

The transmissivity was estimated using water level measurements collected during the recovery period after the test-pump was turned off. Data were collected frequently for the first 90-minutes of the recovery period and another measurement was collected 1,100 minutes after the pump was shut-off. To estimate aquifer properties, the data were analyzed using the Theis Recovery Method (Theis, 1935) using the Aquifer Test Pro software. The results of this analysis include the quantification of aquifer properties presented on Table 3-4. Since the pumping rate was changed near the end of the constant test; only the recovery data were used for the analysis.

Figure 3-2. Well #4 Step Test pumping Rates and Pumping Water Levels

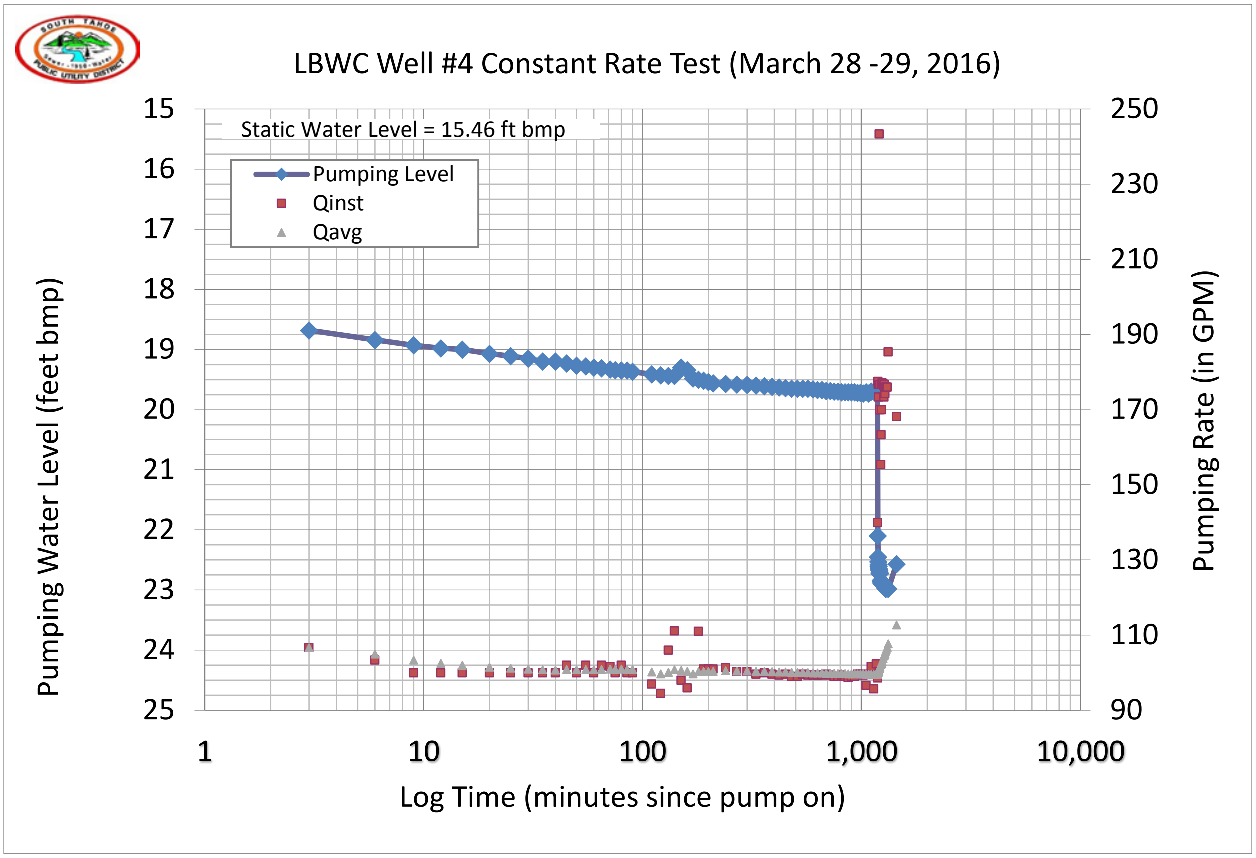


Specific capacity information derived from the step-test are provided below on Table 3-2.

Table 3-2. Step Test Results

Production Rate (gpm)	Step Duration (minutes)	Drawdown (ft)	Specific Capacity (gpm/ft)
100	33	4.20	26.19
140	33	5.77	24.84
170	33	7.01	24.25

Figure 3-3. Well #4 Constant Rate Test pumping Rates and Pumping Water Level



The pumping water level, measured drawdown and calculated specific capacities at these two pumping rates are presented below in Table 3-3.

Table 3-3. Constant rate Test Results

Production Rate (gpm)	Pumping Duration (minutes)	Pumping Water Level (ft bmp)	Drawdown (ft)	Specific Capacity (gpm/ft)
100	1,184	19.71	4.39	22.69
170	1,445 (261 min @ 170 gpm)	22.57	7.25	15.55

Note: Static Water Level at beginning of test: 15.46 feet bmp.

Water level measurements were recorded at the Rockwater Well using a pressure transducer that was installed on March 16, 2016 and measurements were gathered through the recovery period. About 0.4 feet of drawdown was observed in the Rockwater Well at the end of the 24-hour constant rate test. There was an apparent lag-time of about 55 minutes from the beginning of the constant-rate test until drawdown was observed in the Rockwater Well. The drawdown in the Rockwater Well caused by the pumping of Well #4 suggests that the aquifer is semi-confined to confined. If the aquifer were unconfined the drawdown from Well #4 would not be expected to extend so far in such a short period of time.

Storativity

Storativity is calculated using data from a nearby observation well. As the Rockwater Well is located 1,100 feet from the pumping well (Well #4) storativity could not be calculated, since it was beyond the distance considered an observation well for the Cooper-Jacob Straight-Line Method. Therefore, an estimate for storativity was generated by employing the Theis drawdown method to back-calculate a storativity value from the estimated transmissivity derived from the recovery data and the drawdown observed from the constant rate test.

Storativity was estimated in an iterative process until the calculated drawdown using the Theis equation matched the drawdown observed during the constant-rate test after 1,184 minutes of pumping at 100 gpm which was 4.39 feet. Using this method 4.38 feet of drawdown was calculated using a storativity of 0.05, indicating that the aquifer is semi-confined which agrees with data observed by the District in other nearby wells. Appendix D contains aquifer test data and graphs.

To check this estimate, the storativity value of 0.05 was used in the Theis equation to calculate the drawdown at the end of the constant rate test at a pumping rate of 170 gpm. The observed drawdown at the end of the constant rate test was 7.25 feet and the calculated drawdown was 7.52 feet. The difference between the observed and calculated drawdown is 3.5%, indicating the estimated storativity is slightly conservative and estimated drawdowns for different pumping rates and durations may be slightly greater than actually observed.

Table 3-4. Calculated Aquifer Characteristics

Aquifer Characteristics (TK_{z4} and TK_{z5} combined)			
Saturated Thickness (ft)	Average Hydraulic Conductivity (ft/day)	Transmissivity (T) (gpd/ft)	Storativity (unitless)
102	47.7	36,400	0.05

3.3 Spinner Survey

The initial spinner survey run was performed near the end of the constant rate test after 1,100 minutes of pumping at 100 gpm. A second pass was performed at an increased line speed and the operator from Pacific Surveys indicated that the 100 gpm pumping rate was inadequate for the collection of reliable flow data. At 1,184 minutes, the pumping rate was increased to 170 gpm, through the remaining 261 minutes of the constant rate test. Additional spinner runs were then completed and the results indicated the depths at which the majority of the flow was entering the well.

Based on the spinner survey data observed in the field, four depths for discrete samples were chosen. Samples were collected by Pacific Surveys using their depth discrete sampling tool at 68 ft bgs, 72 feet bgs, 82 ft bgs and 110 ft bgs. These depths were chosen to collect water quality samples from: the top of the surveyed well interval (68 foot sample); from the bottom of the surveyed well interval (110 foot sample); from a portion of the original perforations (72 foot sample); and from below the uppermost well screen interval (82 foot sample). These water quality samples were analyzed for VOC (EPA 524); results from which are presented in Table 3-5. Appendix A contains Pacific Surveys literature regarding the spinner tool and discrete sampling tools.

Following the survey, Pacific Surveys provided an analysis of the spinner survey data that included estimations of flow intervals that were based on the depths at which samples were collected. Pacific Surveys divided the flow intervals based on the louvers beginning at 8 feet bgs; but did not account for pumping water level during the constant rate test (23 ft bgs). The results of the spinner data were subsequently reevaluated using the pumping water level adjusted flow intervals which are presented in Table 3-5. The spinner log and analyses from Pacific Surveys are provided in Appendix E.

Table 3-5. Spinner Survey Results with Static and Dynamic PCE Sampling Results

HydraSleeve Samples		Dynamic Flow Samples		Flow Interval	Flow (gpm)	GPM/Ft	Percentage of Total Flow	Aquifer Zone
Depth (feet)	Result (µg/L)	Depth (feet)	Result (µg/L)					
65	8.6	68	52.3	42 -75	64.3	1.9	38%	TK_{z5}
--	--	72	55.1					
85	34	82	47.0	75 -106	13.4	0.4	8%	None
107	39	110	52.4	106 -175	92.6	1.3	54%	TK_{z4}

Note: -- = Not Analyzed

The total flow during the spinner survey was 170 gpm. Using the spinner data it is estimated that approximately 54% of the total flow (93 gpm) was from the open borehole below the cased portion of the well. Approximately 38% of the total flow (64 gpm) was from above the top of the surveyed well interval. Therefore, only 8% of the total flow (13 gpm) was directly from the surveyed well interval (75 - 106 feet).

Based on interpretative cross sections provided by the District, the two uppermost aquifer zones recognized through the South Y Area, are informally designated TK_{z4} and TK_{z5}. At Well #4, TK_{z5} is the uppermost water-bearing zone located from 42-75 feet bgs and TK_{z4} is the deeper water-bearing zone located from 106-175 feet. Table 3-5 also contains the PCE results from the initial water quality sampling (static) and from the dynamic flow samples collected during the spinner survey. The samples that were collected using HydraSleeves (static samples) had increasing PCE concentrations with depth. The dynamic flow samples collected during the constant rate test all had higher PCE results than the static samples. The results from the dynamic sampling indicated the shallowest and deepest samples were about the same.

With more than 50% of the total flow coming from the open borehole portion of the well we assumed that the entire length of the open hole portion of Well #4 consists of aquifer zone TK_{z4}. However, due to the limited well spinner survey interval, the presence of the 10-inch louvered well casing liner, and the relatively uniform PCE concentrations detected in the dynamic depth discrete samples, it is difficult to discern with any reasonable certainty, the primary flow path through which this contaminate is entering this well.

3.4 Water Quality Assessment

3.4.1 Initial Water Quality Sampling Results

Samples were collected from the Well #4 and the Rockwater Well to assess the water quality of the wells under static conditions. On February 17, 2016 HydraSleeve samplers were placed into Well #4 at three different depths and one sampler was placed into the Rockwater Well. On March 3, 2016, samples were collected from the Well #4 from 65 feet, 85 feet and 107 feet below ground surface and from 60 feet bgs from the Rockwater Well. District staff assisted GEI staff with the collection of the samples. The samples were transported to the District laboratory for delivery to the analytical laboratory, following standard chain-of-custody procedures.

The initial water quality samples were analyzed for VOCs (EPA 524). Temperature, pH and specific conductance were measured in the field as the samples were collected. PCE exceeded the maximum contaminant level (MCL) of 5 µg/L in all of the samples and increased with sample depth, with a maximum concentration of 39 µg/L. Cis-1,2-DCE and TCE were detected in the 107 ft. sample from Well #4. PCE was higher in the Rockwater well at 69 µg/L, with TCE also detected at 1.1 µg/L. Sample results are summarized in Table 3-6. Laboratory reports for all of the project water quality results are in Appendix F. Figure 3-1 shows the location and the results of the static water quality samples collected in Well #4 and the Rockwater Well.

Table 3-6. Static Water Quality Sample Results

			Well Name	Well #4	Well #4	Well #4	Rockwater
			Sample Depth (feet)	65	85	107	60
			Date	03/03/2016	03/03/2016	03/03/2016	03/03/2016
			Time	08:53	08:53	09:30	09:57
			ID#	AG50061	AG50062	AG50063	AG50064
			Type	HydraSleeve	HydraSleeve	HydraSleeve	HydraSleeve
Analytes	Method	Units	MCL				
Temperature	Thermistor	°C	None	10.5	9.0	10.1	12.1
pH-Field	SM4500H⁺B	pH Units	None	6.28	6.27	6.25	7.64
Specific Conductance	SM2510B	µS	None	352	389	416	187
PCE	EPA 524.2	µg/L	0.5	**8.6**	**34**	**39**	**69**
cis-1,2-DCE	EPA 524.2	µg/L	0.6	ND	ND	**0.7**	ND
TCE	EPA 524.2	µg/L	0.5	ND	ND	**0.9**	**1.1**
TOC	SM 5310C	mg/L	None	0.68	0.64	0.59	--

Note: **Bold** values are above MCL
-- = Not analyzed

3.4.2 Depth Discrete Sampling

During the constant rate test (March 29, 2016) Pacific Surveys collected depth discrete samples as the well was being pumped at 170 gpm. Samples were collected from four depths: 68-feet, 72-feet, 82-feet and 110-feet. The results of the sampling indicated the presence of PCE in each sample and all but one sample contained PCE concentrations greater than 10-times the MCL. The results from the sampling are listed above in Table 3-5.

The 110-foot sample consisted of water contributed from the open-borehole portion of the well. Results from this sampling suggest that PCE is present in the TK_{z4} aquifer zone from 106 to 175 feet at concentrations of 52.4 µg/L. The 68-foot sample consisted of water contributed from the top of the surveyed well interval. PCE was detected in this sample at 52.3 µg/L. On March 30, 2016, a total well sample was collected from the sample tap on the wellhead. PCE was detected in this sample at 42.3 µg/L. Figure 3-1 shows the location and the results of the dynamic water quality samples collected in Well #4.

3.4.3 Pre-pilot Test Sampling

Pre-pilot test water samples were collected on March 24th (during the step test) to assess Well #4 water quality under pumping conditions. As indicated in Section 2.4, these samples were delivered to the analytical laboratory under District chain-of-custody and analyzed for VOCs (EPA Method 524.2), TOC (SM 5310C) and Metals (USEPA 200.7/200.8). Review of these results indicates that general water quality from Well #4 is characterized as a Calcium- Chloride water type, with a relatively low pH (6.41), low alkalinity (77 mg/L) and 158 mg/L (as $CaCO_3$) of total hardness. Total Dissolved Solids (TDS) (308 mg/L) and chloride (93.1 mg/L) are below secondary MCL ranges. However, Total Iron (4.99 mg/L) and Manganese (0.728 mg/L) exceed secondary MCLs for these constituents. With the exception of the VOCs, all of the other tested constituents did not exceed MCLs.

General water quality for District drinking water wells located in the South Y Area are typically characterized as Calcium – Bicarbonate or Calcium-Sodium – Bicarbonate water types with a relatively low pH (6 – 6.5), low alkalinity (40 – 55 mg/L) and 40 – 65 mg/L (as $CaCO_3$) of total hardness. TDS is relatively low (100 – 135 mg/L) with Total Iron and Manganese below secondary MCLs. Total chloride in water samples collected from these wells is typically less than 25 mg/L.

Background water quality data for District wells located in the South Y Area were used to select treatment methods for use during pilot testing. Based on this background water quality, TOC and minerals that act as UV scavengers were not expected to be a significant issue. The greatest anticipated concern was cloudiness caused by turbidity and total suspended solids (TSS), or possibly entrained air as a consequence of the recent well cleaning: this cloudiness could interfere with the water's ability to transmit the light. To address this concern, 15 µm bag filters were used as a pre-filtration step prior to treatment through the UV unit.

Water quality parameters that are critical to the UV pilot test include total hardness as CaCO3; dissolved iron and manganese; turbidity; and total suspended solids. Table 3-7 provides a summary of these parameters and detectable VOC from Well #4.

The concentration of UV scavengers in Well #4 marginally exceeded NeoTech's recommended level in almost every parameter. Concentrations of iron and manganese were the greatest concern since these values were higher than expected. The well water was running visually clear during the pilot testing so these levels were expected to have been significantly lower than the reported results. The actual concentrations of iron and manganese during the pilot test cannot be quantified because confirmation samples for these constituents were not collected. Pre-Pilot test sample results were received after the pilot test was initiated, the budget and timing constrained additional unscheduled sampling. Additionally, the 15 µm bag filter that was in place prior to the UV unit would serve to reduce excessive solids.

Table 3-7. Background Water Quality and Recommended Water Quality for UV Treatment			
Parameter	MCL	Well #4	NeoTech Recommended Level
PCE (µg/L)	5	39	n/a
TCE (µg/L)	5	0.8	n/a
cis-1,2-DCE (µg/L)	6	0.6	n/a
TOC (mg/L)	None	0.55	<0.5
Iron (µg/L)	300	4990	<300
Manganese (µg/L)	50	728	<50
Hardness (mg/L)	None	158	<120
Turbidity (NTU)	None	0.37 – 1.66	<1
Suspended solids (mg/L)	None	11.4	<10

3.4.4 Pilot Testing

UV/AOP

There were several challenges with the onsite pilot testing of UV/AOP. The first problem identified was the plumbing configuration did not allow for strict forward flow control. Consequently, backpressure on the unit did not allow for testing until after the constant rate test was completed. The unit was left online during the entire constant rate test to monitor durability of the UV lamps and to stress test the unit itself. Over the 30 hour runtime, the quartz sleeve became coated with an iron precipitate causing a very low applied UV dose when the pilot testing was started. After cleaning the sleeves, an acceptable but lower than desired UV dose was achieved. The maximum dose achieved was 6.0 mill-Watts/square centimeter (mW/cm^2), or 1388 mill-Joules/square centimeter (mJ/cm^2) at five gallons per minute. At this dose, only 26 percent of PCE was decomposed. The following section describes the pilot testing procedures and results.

Since the UV unit is relatively compact and easy to set up, this treatment process was tested onsite. The UV chamber and controller are pictured below Figure 3-4. Initial setup included pressurizing the chamber; warming the lamps; activating the controller; allowing the controller to stabilize for a few hours; and performing some initial field water quality tests (pH, temperature, EC, turbidity, UVT, and TSS). Several field tests were conducted during the constant rate test; a summary of these test results are provided in Table 3-9. Turbidity fluctuated quite a bit throughout the test period and intermittently showed higher concentrations coming out of the UV (indicating inorganic precipitation). The field samples were collected after the bag filter, rather than the well head, to represent water quality entering the UV unit. A simple depiction of the treatment process flow is as follows:

well head → bag filter → pressure gauge → dosing pump → UV chamber → GAC → discharge

Figure 3-4. NeoTech UV Pilot Test Unit

Field water quality testing was conducted over a period of three days to monitor changes in water chemistry. The applied UV dose was also monitored, although performance sampling was not initiated until after the 24-hour constant rate test was completed. The UV unit was in operation during the entire pump test; however, the plumbing configuration to the unit did not allow for strict control of forward flow. Therefore, when the constant rate well test was completed, the well and UV system were shut down while plumbing modification were made and the 15 µm bag filter was replaced. To stress test the UV unit's performance, the UV system was in operation during the entire 24 hour test.

The well was shut down for approximately 12 hours between completing the constant rate test and plumbing reconfiguration. Water quality testing began approximately one hour after start-up. Turbidity after the bag filter was 1.66 NTU and the UV unit was turned on. With only 25 hours on the UV lamps, it was difficult to achieve the desired UV dose: several flow adjustments were made to achieve the desired UV dose, but the unit was not reaching a high enough output regardless of flow control. It was suspected that inorganic fouling on the quartz sleeve was interfering with the unit's performance since a much higher dose was achieved in the previous test period shortly after the initial start-up.

To increase the applied dose, the unit was shut down to cool and approximately one gallon of household strength Calcium, Lime & Rust Remover (CLR) was poured into the UV unit. The CLR was mixed with well water residing in the unit. The UV unit was rocked back and forth to mix the CLR and well water, then allowed to react for one hour. This cleaning resulted in a significantly increased UV dose. VOC sampling commenced immediately to measure decomposition through direct photolysis. Table 3-8 provides results of UV field testing as applied dose and percentage of PCE destroyed at the various dose rates. Table 3-9 provides a complete summary of field measurements, water quality testing and VOC results. The laboratory reports for the water quality samples are in Appendix F.

Table 3-8. Results of UV Field Testing

UV dose (mJ/cm^2)	UV Transmittance	% Removal for UV alone	% Removal for UV with Cl_2
1147	98.2%	17	NA
1388	98.5%	26	NA
1288	98.7%	19	NA
500	94.7%	NA	4

NA = Not Available

As demonstrated by the results in Table 3-8, the amount of PCE removed via direct UV photolysis was inadequate. Decomposition through UV/AOP was negligible; this is likely a consequence of the sodium hypochlorite oxidizing dissolved iron and manganese, inhibiting the unit from providing the necessary UV dose to decompose VOC's. This is displayed by the low UV dose delivered at the time of sampling. The image in Figure 3-5 shows the iron precipitate on the quartz sleeve.

Figure 3-5. Quartz Sleeve Coated with Iron Precipitate

A summary of the UV Pilot Test Results are presented in Table 3-9. Review of these results indicate that PCE is not effectively removed by UV. Even at the very high dose of 1,388 mJ/cm^2 (3/30/2016 at 13:58) a maximum of 26 percent of PCE was decomposed, and only four percent in AOP conditions (based on the "before UV" of 38.4 ppb PCE and "after UV" of 36.8 ppb of PCE results). These results indicate that a full-scale UV treatment system would need to be very large, requiring several passes through multiple UV chambers to achieve the necessary reduction. Given these pilot test results, UV/AOP is not a recommended treatment technology.

Granular Activated Carbon

Evoqua Water Technologies supplied a PV2000 model granular activated carbon (GAC) vessel with 2,000 pounds of AquaCarb 1230C coconut shell carbon. This treatment process was used onsite to meet sanitary sewer discharge requirements. Discharge samples and dye test performed on the spent carbon show the specified carbon effectively removes PCE and other co-occurring organic contaminants. The following section describes the treatment technology and site specific tests performed

Granular activated carbon (GAC) is an effective treatment method for organic contaminants; specifically, PCE because it is very well adsorbed onto carbon. GAC is identified as a best available technology for the control of 55 of the 60 regulated organic contaminants. Benefits to this treatment

Table 3-9. UV Pilot Testing Results Summary

					FIELD									LAB RESULTS			
Date	Time	Flow Rate	UV Dose			pH	Temp	EC	Free Cl_2	Total Cl_2	Turbidity	UVT	TSS	cis-1,2-DCE	PCE	TCE	TOC
		GPM	mW/cm²	mJ/cm²			°C	µS/cm			(NTU)	(%)	(mg/L)	µg/L	µg/L	µg/L	mg/L
														6[1]	**5[1]**	**5[1]**	
3/28/2016	15:47	25	--	--	Before UV	7.39	8.3	--			1.38	93.2	--	0.6	37.6	0.8	0.8
3/28/2016	17:31	10	6.7		Before UV	6.40	9.4	441			0.91	99.7	--	--	--	--	--
3/28/2016	13:10	25	6.5	1116	Before UV	6.47	10.8	421			0.45	98.6	1	--	--	--	--
					Before UV	6.46	11.2	419			0.43	96.4	4	--	--	--	--
3/28/2016	13:20	9	6.2	1147	After UV	6.86	9.8	427			0.59	96.5	5	--	--	--	--
3/30/2016	9:30	--	--	--	Well head	6.52	9.5	478			2.27	--	--	--	--	--	--
					Before UV	6.44	10.1	448			--	98.2	--	--	--	--	--
					After UV	6.54	9.3	401			--	--	--	--	--	--	--
3/30/2016	10:00	10	3.1	516	Before UV	6.52	10.6	438			0.43	100	14	--	--	--	--
					After UV	6.42	10.6	423			0.8	97.8	4	--	--	--	--
3/30/2016	10:16	--	--	--	Well head	6.88	5.5	--			5.83	92.6	--	--	--	--	--
					Before UV	6.47	5.7	--			1.63	94	--	--	--	--	--
					After UV	6.42	5.6	--			1.66	96.2	--	--	--	--	--
3/30/2016	10:47	24	--	--	Before UV	6.5	10.5	422			0.73	100	--	--	--	--	--
					After UV	6.45	10.7	423			1.44	98.9	--	--	--	--	--
3/30/2016	13:40	140	--	--	Well head	--	--	--	--	--	--	--	--	0.7	42.3	0.8	
		9	6.2	1147	Before UV	6.48	10.8	420	--	--	0.45	98.9	1	0.7	38.3	0.8	--
					After UV	6.46	11.2	419	--	--	0.77	98.2	1	0.6	35.1	0.7	--
3/30/2016	13:58	5	6.0	1388	Before UV	6.49	11	418	--	--	0.48	98.6	0	--	--	--	--
					After UV	6.46	10.9	419	--	--	0.37	98.5	0	ND	31.1	0.7	
3/30/2016	14:15	7.5	5.8	1288	Before UV	6.48	10.8	418	--	--	0.47	98.7	1	--	--	--	--
					After UV	6.46	11	419	--	--	0.42	98.7	0	0.6	34.1	0.7	--
3/30/2016	15:15	15	4.5	500	Before UV	6.49	10.5	426	1.6	2.0	0.76	94.3	6	0.6	38.4	0.8	--
					After UV	6.48	10.9	421	1.5	1.6	0.77	94.7	4	ND	36.8	0.6	--

Note: [1] MCl, gallons per minutes (gpm), mill-Watts/square centimeter (mW/cm²) and mill-Joules/square centimeter (mJ/cm²), micro-siemens per centimeter (µS/cm), nephelometric turbidity units (NTU)

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method are that it's operationally simple and is insensitive to on/off cycles. However, adsorption is a non-steady state process which requires periodic replacement of the GAC media, or reactivation. Media replacement costs typically account for the bulk of the operational costs.

Inorganic fouling from precipitated metals and TOC pose the greatest threat to effective GAC filtration as it competes for pore space that could be used for PCE removal. Iron and manganese above method detections levels also may significantly reduce GAC treatment efficiency. Generally, TOC concentrations greater than 0.5 ppm are considered a potential interference. As shown in Table 3-7, all three constituents that impact GAC treatment performance are present in Well #4. We used a high activity 12x30 mesh coconut shell carbon for the pilot test. This particular carbon has a high surface area designed to tolerate some fouling while providing VOC removal.

To determine the potential impact of site specific water chemistry, Evoqua Water Technologies performed a dye test on the spent carbon to evaluate fouling potential. The dye test uses dye loading rate as an indicator of adsorption into GAC pores of the virgin and spent carbon samples. The dye adsorption rate on the spent carbon was 30 percent slower than it was on the virgin carbon, indicating fouling but could not be quantified since operations varied during the various well tests. This fouling is likely a consequence of iron and manganese release after well cleaning. In a full scale application, this fouling would decrease the GAC bed life by 30 percent. Dye test results are presented in Appendix G.

Because GAC is operationally simple and can reliable remove PCE, it is the recommended treatment technology for Well #4. The recommended carbon is a 12x30 mesh coconut shell. Because iron and manganese levels exceed secondary MCLs and can cause significant fouling on the GAC, a pre-treatment system may be needed in the future, if Well #4 is used. However, a new replacement well may not require pre-filtration through a bag filter or iron and manganese filter. Further testing during drilling of a new extraction well and/or replacement water supply well would be needed to confirm the need for iron and manganese treatment prior to GAC filtration.

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Chapter 4. Data Evaluation

4.1 Groundwater Production

4.1.1 Estimated Yield

Based on the results from the constant rate aquifer test, the well can produce 170 gpm with a pumping water level of 22.57 feet below measuring point (bmp). The first perforated zone as indicated by the LBWC Well Log for Well #4 is from 43-63 feet bgs and the second zone is from 68-78 feet bgs. With the 10-inch liner that has been installed into the well, the louvered perforations from 8 to 106 feet bgs allow water to enter into the well from the original perforated intervals.

When determining the pumping rate for a well it is good practice to have a pumping rate that allows the pumping water level to remain above the top of the upper most perforated interval. If the water level is drawn below the top perforation then water can cascade into the well from the exposed perforations which can increase the potential for biofouling and oxidation of the perforations. The drawdown and pumping water level at pumping rates of 200 gpm, 400 gpm, 600 gpm and 800 gpm and pumping durations of 30, 90 and 365 days were estimated using the Theis drawdown equation and the aquifer characteristics from Table 3-4. The results from the analysis are in Table 4-1, below. Based on the projections a pumping rate of 400 gpm is the maximum rate that can be sustained for 365 days of pumping without having drawdown exceed the depth of the top of the original perforations.

Table 4-1. Estimated Drawdown and Pumping Water Levels for Different Pumping Durations and Pumping Rates

Pumping Rate (gpm)	Drawdown for Different Pumping Durations (days)			Pumping Water Level for Different Pumping Durations (days)		
	30	90	365	30	90	365
200	11.0	11.7	12.6	26.4	27.1	28.0
400	22.0	23.4	25.1	37.4	38.8	40.6
600	33.0	35.0	37.7	48.4	50.5	53.1
800	43.9	46.7	50.2	59.4	46.7	65.7

Note: Static Water Level 15.46

4.1.2 Capture Zones

To estimate the distance at which the Well #4 will capture PCE, a capture zone analysis was completed. The Javendal & Tsang, 1986, method of calculating the capture zone from a single groundwater extraction well was used to estimate the capture zone of the Well #4 at four different pumping rates: 200 gpm, 400 gpm, 600 gpm and 800 gpm. Figure 4-1 shows the different capture zones relative to the well location, the blue dot, for the different pumping rates. The variables for the equation consist of flow rate (Q), horizontal hydraulic conductivity (K_h), hydraulic gradient (i) and aquifer thickness (B). The figure shows the max upgradient width of the capture zone (open portion of the parabola) and the distance to the downgradient stagnation point (closed point of the parabola). These calculated distances are provided in Table 4-2.

Figure 4-1. Capture Zone Analysis Results

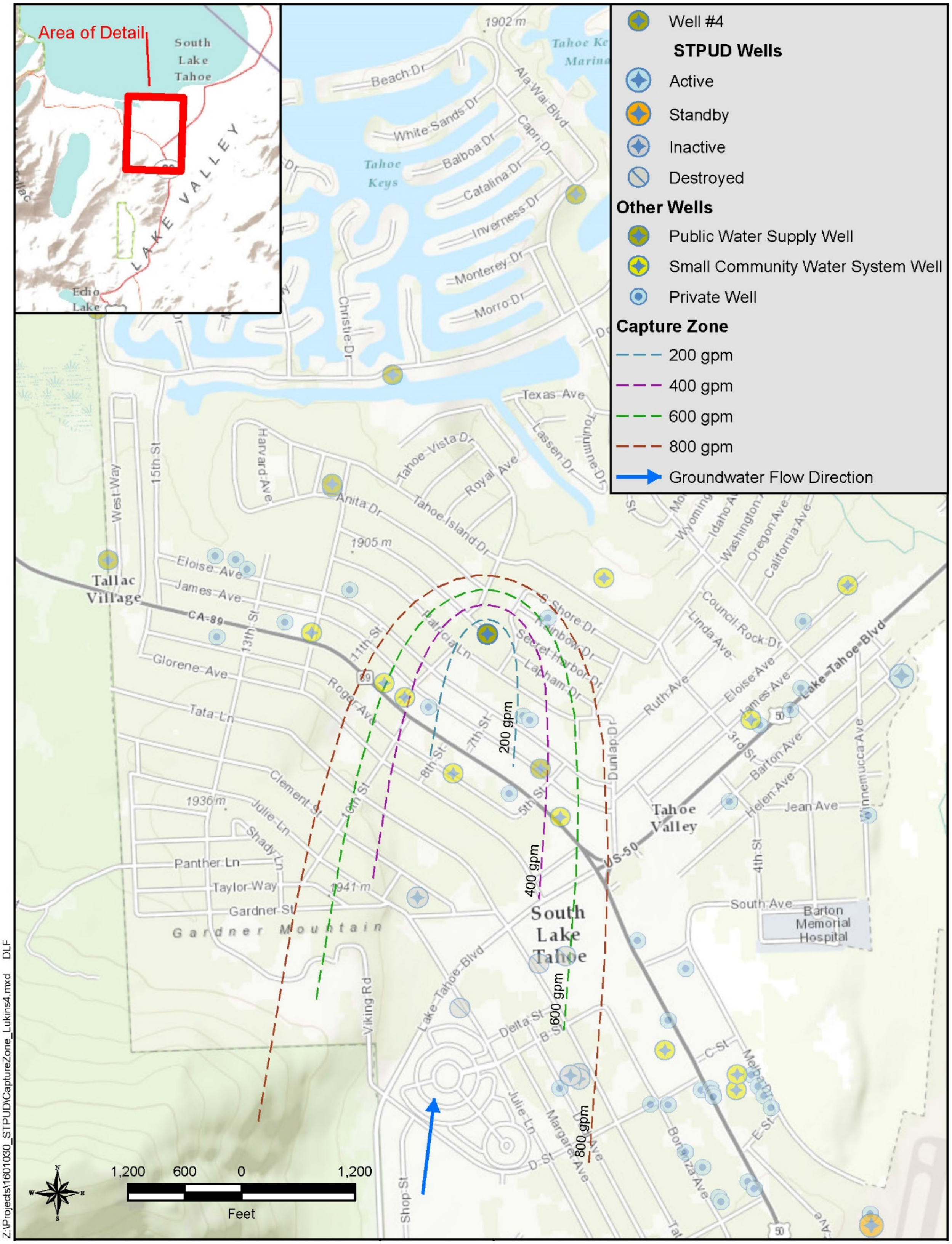

Table 4-2. Capture Zone Distances				
Pumping Rate (gpm)	Max Upgradient Width of Capture Zone (feet)	Distance to Downgradient Stagnation Point (feet)	Optimal Distance Between Two Wells on a Line (feet)	Optimal Distance Between Three or more Wells on a Line (feet)
200	989	158	317	396
400	1979	315	633	791
600	2968	473	950	1187
800	3957	630	1266	1583

The analysis performed assumes a total aquifer thickness of 102 feet which is TK_{z4} and TK_{z5}, combined. A hydraulic gradient of 0.008 and flow direction of N 7° E was provided to GEI by the District and was calculated using May 2016 water level data. The average horizontal hydraulic conductivity was calculated using the equation $T = K_hB$, where $K_h = B/T$. The transmissivity calculated from the aquifer test data is 36,400 gpd/ft or 4,866 ft^2/day. The K_h was calculated to be 47.7 feet/day. The results of the analysis also provide the optimal distances between two wells on a straight line or between three or more wells on a line for the purposes of planning an extraction network.

4.1.3 Groundwater Flow Rate and Travel Time

The data gathered during this investigation were used to calculate the velocity of groundwater flow in the aquifer. Darcy's law was used to determine the groundwater velocity (ft/day) within aquifer zones TK_{z4} and TK_{z5}.. Darcy's law states that $Q = KiA$; where Q (gpm) represents the volumetric flow of groundwater through a given area (A) of the aquifer (ft^2); under the influence of a measured hydraulic gradient (i) (dimensionless) (Fetter, 2001). To determine the groundwater flow rate or Darcy velocity, both sides of the equation are divided by a unit area to yield the equation: $Q/A = q = Ki$; where the q is the Darcy velocity (ft/day). The Darcy velocity does not account for the porosity of the aquifer, so the pore velocity of the aquifer was calculated by dividing the Darcy velocity (Ki) by the effective porosity of the aquifers (n_e).

The average hydraulic conductivity determined during the aquifer testing of Well #4, 47.7 ft/day was used and the hydraulic gradient from May 2016 groundwater data, 0.008. The calculated Darcy velocity was 0.38 ft/day. For the pore velocity calculation a range an effective porosity of 20% to 35% for a typical sand and gravel aquifer was used (Fetter, 2001). The pore velocity approximates the rate at which a single molecule of water will travel through the aquifer and is a rough estimate of the rate at which contaminants would move through the aquifer. Based on the porosity range the pore velocity would range from 1.09 ft/day (using $n_e = 0.35$) to 1.91 ft/ day (using $n_e = 0.2$). To put the pore velocity into perspective the estimated travel time for a molecule of water from Well #4 to the Tahoe Keys Property Owners Association (TKPOA) Well #2 was estimated and summarized Table 4-3. TKPOA Well #2 is approximately 3,000 feet north of Well #4. Using the two pore velocities it is estimated that it would take between 4.3 and 7.5 years for a particle of water to travel from Well #4 to TKPOA Well #2. Table 4-3 presents the calculated velocities and travel times.

Table 4-3. Aquifer Flow Velocity and Travel Time						
Groundwater Flow Velocity and Travel Time						
Darcy Velocity (ft/day)	Porosity Range (%)		Pore Seepage Velocity (ft/day)		Travel Time to TKPOA Well #2 (years)	
	Low	High	Low	High	Low	High
0.38	20%	35%	1.09	1.91	4.3	7.5

4.1.4 Vertical Hydraulic Conductivity Distribution

We proposed to utilize the spinner data to calculate the variation of the horizontal hydraulic conductivity (K_h) with respect to depth (K_z). We had planned to use the method outlined in the 'Measurement of Hydraulic Conductivity Distributions: A Manual of Practice', that was published by the United States Environmental Protection Agency (EPA) (Molz, et al, EPA/600/8-90/046).

Pacific Surveys provided the raw spinner survey data to GEI and the analysis was performed. Upon reviewing the results, a discussion with the District Hydrogeologist (I. Bergsohn) was conducted to inform Mr. Bergsohn that the method does not provide an appropriate analysis for the Well #4 data. We have identified three reasons why the spinner survey data could not be analyzed using the EPA 600 method. First, the current state of the Well #4 is atypical as it has a 10-inch louvered liner installed within a 12-inch diameter casing that has different perforated intervals than the louvered liner. There is a 1-inch annular space between these two materials which modifies the flow into the well.

Second, the EPA 600 method assumes that the radial gradients of the water enter the well bore are constant and uniform. The 1-inch annulus the is present from ground surface to about 119 feet bgs creates a void where water can enter and exit the liner at many depths. We believe there is evidence of water (flow) entering and leaving 10-inch diameter liner at different depths as shown on the spinner log provided by Pacific Surveys that is presented in Appendix E. A typical spinner survey is operated from the bottom of the screened interval to the top of the upper screened interval and the cumulative flow contributed to the well increases as the spinner tool is raised to the top of the screened interval, at which time the total flow of the well is measured. The data gathered in the Well #4 shows that the flow rate fluctuated, possibly due to water exiting the 10-inch liner through the louvers, traveling up the 1-inch annulus between the original casing and the louvered liner.

Third, information regarding the percentage of flow contributed to the well were not known prior to conducting the survey. The pump was set at 47-feet bgs and the spinner tool traveled through an access pipe that was set to about 63 feet bgs. The spinner tool operator did not want to lower the tool into the open portion of the well, therefore the only portion of the well that was surveyed was from 63 – 115 feet bgs. The results of the survey indicate that only about 8% of the total flow, or about 13 gpm, came from this interval and that the remaining of the flow came from the open portion of the borehole and from the upper aquifer zone TK_{z5} from 43 – 75 feet bgs and the open-borehole, lower aquifer zone TK_{z4} from 106 – 175 feet bgs (Table 3-5).

Due to the above reasons we could not calculate the K_z and instead an average K_h of 47.7 ft/day was calculated and used for our analyses.

4.2 Groundwater Quality

4.2.1 Zonal Water Quality Concentrations

Using the PCE results from the depth discrete sampling and the flow from the contributing zones, the mass of PCE produced in pounds per day (lb/day) were calculated for each zone for the test rate of 170 gpm. The PCE results for the 72-foot sample, 55.1 µg/L were used for the interval from 42 – 75 feet. The other PCE concentrations were chosen by the dynamic sample that represents the zone. The same contribution percentages for each zone were assigned to different pumping rates 200 gpm, 400 gpm, 600 gpm and 800 gpm and the mass of PCE produced during these rates were also calculated. The results are presented in Table 4-4.

Table 4-4. Mass Loading Calculations

Flow Interval (feet)	Percentage of Total Flow	Dynamic Flow Samples		Mass (lbs/day) of PCE at Different Flow Rates				
		Depth (feet)	Result (µg/L)	170 gpm	200 gpm	400 gpm	600 gpm	800 gpm
42 -75	38%	68	52.3	--	--	--	--	--
		72	55.1	0.04	0.05	0.10	0.15	0.20
75 -106	8%	82	47	0.01	0.01	0.02	0.03	0.04
106 -175	54%	110	52.4	0.06	0.07	0.14	0.22	0.29
		Total lbs/day		0.11	0.13	0.27	0.40	0.53

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Chapter 5. Alternatives for Aquifer and Water Quality Testing

5.1 Increased Pumping Rate and Duration

The production rate and specific capacity encountered during the constant rate test on the Well #4 were higher than anticipated. The constant rate test pumping rate was limited by the discharge capacity of the test pump and the treatment capacity of the onsite GAC filter. During the constant rate tests, bag filters were used to remove particulates from the water prior to entering the UV and GAC filters. A longer duration of pumping may remove the need for such filters. These particulates could have also been contributed to not pumping the well long enough for well development after the mechanical cleaning of the well. Pumping well development was proposed prior to the step test but ultimately not conducted due to budgetary and time constraints.

The estimated results for pumping at 400 gpm, 600 gpm and 800 gpm are contained in this report. Performing an extended confirmation test at a higher pumping rate is recommended to confirm final treatment flow and contaminant loading rates for well head treatment system design. The preliminary design is based on a PCE contaminant mass load of 0.27 pounds per day (lbs/day) at an estimated pumping rate of 400 gpm.

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Chapter 6. Conclusions and Recommendations

6.1 Groundwater Quality

6.1.1 Well #4 Static Zone Sampling

Water samples were collected from three different depths during static conditions and from four different depths while the well was pumping 170 gpm near the end of the constant rate test. The water quality samples during the static conditions indicated that the PCE concentrations increased with depth.

6.1.2 Well #4 Dynamic Zone Sampling

During the constant rate sampling the PCE concentrations were greater than those that were measured during the static condition, however, the concentrations did not vary with depth like they did under static conditions. There was a slight drop in PCE when the dynamic samples were compared to the sample collected at the well head during the constant rate test. However, these samples were not collected at the same time and the drop in PCE could be due to the concentration dropping slightly with additional pumping or it could be from dilution being caused by water produced from the upper zone that may have lower PCE concentrations but was not sampled due to the access pipe for the spinner tool that blocked this zone.

TCE and cis-1,2 DCE were detected in the sample from 107 feet bgs and their results were 0.7 µg/L and 0.9 µg/L , respectively. Regional water quality data were not analyzed as part of this study to determine if the presence of ci-1,2 DCE and TCE provide evidence of PCE degradation.

6.1.3 Well #4 Pre-Pilot Test Water Quality

In addition to VOCs, pre-pilot test water quality sampling included general mineral and inorganic chemicals. The full list of sample results are provided in Appendix F. Of the regulated constituents tested, only iron, manganese, and PCE exceed their respective MCLs. This data is not a comprehensive test to determine that the water quality will meet all drinking water standards. As the project progresses and a decision is made to use the existing Well #4, or a replacement well, a complete set of Title 22 sampling should be conducted to assess water quality and to determine if additional treatment processes are needed.

Since the PCE concentration is expected to exceed 10 times the MCL of 5 µg/L, Well #4 would be classified as an extremely impaired source. According to Policy Memo 97-005 any well that exceeds 10 times the MCL or has multiple contaminants would be classified as extremely impaired. While DDW encourages using these sources for non-potable consumption, if there is not feasible alternative (irrigation, recreation, or industrial uses) in South Tahoe, they will work with the utility to permit the source for drinking water. Particularly in situations where a contaminant plume needs to be mitigated through pump and treat methods. The District and LBWC should reference the policy memo provided in Appendix I to better understand the requirements of treating extremely impaired water sources.

GEI has experience permitting drinking water wells that are severely impacted with PCE. In our experience, DDW has required redundant GAC vessels (i.e. operating in a lead/lag configuration as recommended in Section 3.4.4) and possibly a more stringent monitoring frequency than typically required for VOC treatment systems. Additionally, the operating permits have required the carbon is replaced upon detection of the lead contaminant (PCE in LBWC#4) to minimize the risk of exceeding the MCL in water supplied to consumers.

If the project progresses as recommended, California Division of Drinking Water (DDW) should be engaged early in the process to ensure all special provisions are incorporated into the well design and treatment process.

6.1.4 Rockwater Well

Only one sample, a static sample, was collected from the Rockwater Well and it was collected from a depth of 60-feet on the same day that the static samples from the Well #4 were collected. The PCE result was 69 µg/L and TCE was detected at 1.1 µg/L. These results were higher than that of the samples collected from the Well #4. As the Rockwater well is situated hydraulically upgradient with respect to Well #4, the higher results in the upgradient well suggests that the PCE contaminant source is likely located further up-gradient, to the south of these wells.

6.2 Extraction Well Alternatives

Based on the results of our field work, analyses and discussions with the District and LBWC, we have developed five alternatives for pumping and treating PCE at the Well #4 location. The alternatives and their advantage and disadvantages are described below and Table 6-1 provides a brief overview of the alternatives and the advantages and disadvantages.

Alternative 1 would use existing Well #4 as an extraction well and limit extraction rate to 200 gpm and discharge all produced water to the District's sanitary sewer. One of the main advantage would using the existing well and property and the District's sanitary sewer system would be capable of handling up to 200 gpm discharges depending on peak demands. Another advantage would be not needing DDW permit since well would not be used for drinking water. A disadvantage would be the well could continue to be a vertical conduit for the movement of PCE contamination from TK_{z5} to TK_{z4} and the exact well design is not known.

Alternative 2 would use Well #4 as an extraction well with a pumping rate of 400 gpm and permit the well with the Division of Drinking Water for use as a public drinking water supply. This alternative would provide an additional 400 gpm to the LBWC system and would provide some level of hydraulic containment and removal of PCE from the South Y Area. The disadvantages in addition to those in Alternative 1, include the DDW permitting process which may not be possible due to the PCE concentration, and lack of sanitary seal. The iron and manganese observed during the pilot testing will also significantly reduce GAC removal capacity by up to 30-percent.

Alternative 3 would consist of properly destroying Well #4 and drilling a new extraction well located on the same site. Pumping rate could be 200 gpm or 400 gpm and would have the advantages and disadvantages of these pumping rates as listed above. The main advantage of a new well would be that it would be designed to meet DDW standards and would not provide a vertical conduit for the movement of PCE contamination from TK_{z5} to TK_{z4}. The lifespan of the well could be greater than 50-years and water quality testing could be conducted during the drilling to create the most ideal well design. PCE removal could be optimized using spinner logging data collected from the new well.

Table 6-1. Alternatives			
Alternative		Advantages	Disadvantages
1	Existing Well #4 Operating at 200 gpm for Extraction and not Municipal Water Supply	Low Cost	Vertical Conduit for Contamination
		Ease of Disposal	Poor Well Reliability
		Ease of Permitting	Poor Well Performance
			High Uncertainty in Well Design
			No Sanitary Seal
2	Existing Well #4 Operating at 400 gpm Served as Drinking Water	Low Cost	Vertical Conduit for Contamination
		Drinking Water Supply	Permitting Complexity
		Improved Remediation	Poor Well Reliability
		Improved Certainty in Remediation of PCE	Higher Treatment Cost
3	New Municipal Supply Well at Current Location	Solve Vertical Conduit Problem	Higher Costs (well construction/destruction)
		No Land Cost	Deeper Seal may Hinder Shallow GW Remediation
		Well Construction Consistent with State Standards	
		Improved Reliability / Well Life	
		Improved Certainty in Remediation of PCE	
4	New Well at New Location	Solve Vertical Conduit Problem	Cost of Land Purchase
		Well could be optimally located as needed in water system	Uncertainty in PCE Levels and Aquifer Properties
		Well Construction Consistent with State Standards	Higher Costs (well construction/destruction)
		Improved Reliability / Well Life	Deeper Seal may Hinder Shallow GW Remediation
		Improved Certainty in Remediation of PCE	Potentially More Complicated Service Connection
5	New Shallow Extraction Well and Deep Municipal Supply Well at Current Location	Solve Vertical Conduit Problem	Higher Well Cost
		No Land Cost	Higher Treatment Cost
		More Certainty Regarding PCE Levels and Hydraulic Control	Higher Permitting Complexity
		Improved Operational Flexibility	
		Less Complicated Service Connection	

One disadvantage would be the costs associated with destroying Well #4 and constructing and testing a new well. The permitting costs may be elevated due to the known contamination at the site. The new well would potentially lose 38% of the total flow when compared to Well #4 since it would have a 50-foot sanitary seal that would not allow the upper TK_{z5} aquifer to be screened.

Alternative 4 consists of drilling a new extraction well at a new site that provides either a greater benefit for use of the treated water for the District and LBWC or for easier disposal of the treated water. The pumping rate would be determined by testing performed during the drilling of the well. Well #4 will be destroyed. In addition to advantages listed for Alternative 3, this alternative would provide a source of water at a more beneficial location for LBWC. The costs associated with purchasing a new parcel of land including all the service connections for the sanitary sewer and power, would be a disadvantage to this alternative. In addition to the other disadvantages from Alternative 3, the pumping rate and PCE concentration at the new well may be less than Well #4.

Alternative 5 would consist of properly destroying Well #4; use the same site to construct a new shallow extraction well; a deeper replacement water supply well; and an on-site treatment system with sufficient capacity to treat pumped groundwater from both wells to drinking water standards. In addition to the advantages from Alternative 3, the use of two wells will allow separate well designs to best match the hydraulic requirements of the water-bearing zones from which they are designed to pump groundwater and two wells will allow greater operational flexibility to pump contaminated groundwater from specific shallow and deep water-bearing zones, as needed. There will also be benefits due to the construction of a single treatment system for both wells and the addition of a new source of drinking water for the South Y area. The disadvantages for this alternative will be similar to Alternative 3 with the addition of a more complex treatment design and DDW may not permit the shallow supply well for a municipal supply if it is not constructed in accordance with Waterworks standards.

6.3 Site Recommendations for use of Well #4 as an Extraction Well

Of the five alternatives outline above, GEI recommends that Alternatives 3 and 5 be carried forward into a feasibility study. Alternative 3, consisting of drilling a new well at the Well #4 site and getting the well permitted for use as a drinking water supply is recommended because the new well will structurally meet all of the DDW standards and may make the permitting process less complicated considering the PCE concentrations will still need to be addressed. The original Well #4 will be destroyed according to all state and county well standards. Alternative 5 is similar to Alternative 3 but consists of also constructing a shallow extraction well to remove PCE affected groundwater from the upper TK_{z5} zone.

Due to the requirement of a 50-foot sanitary seal, the upper TK_{z5} zone may be sealed off if Alternative 3 is chosen which would impact removal of PCE from this horizon and may reduce the overall pumping rate. As part of a feasibility study, we recommend that a multilevel piezometer be constructed within 100’ of Well #4 so that a final determination can be made between Alternatives 3 and 5. The multilevel piezometer will provide multiple benefits throughout all subsequent phases of the project development as shown on Table 6-2. Water quality and water level information collected from the monitoring well during the feasibility study and design phases will be used to select the preferred alternative (3 vs. 5), and to complete the design of the well and treatment system. During the operational phase of the project, changes in groundwater levels and PCE concentrations in the aquifer measured in the monitoring well will be useful for optimizing the extraction and treatment program.

The Alternative 3 target production rate for the new well would be between 200 gpm and 400 gpm which would be a significant increase to the LBWC system. The same combined production rate is assumed for planning purposes for both the deeper and shallow wells for Alternative 5.

Table 6-2. Multi-Level Monitoring Well Benefits			
Information	Project Phase		
	Feasibility Study	Pre-Design and Design	Operation and Optimization
Groundwater Samples for Each Discrete Aquifer Zone	1	1	2
Groundwater Levels in Each Discrete Aquifer Zone under Static and Pumping Conditions	1	2	1
Geologic and Geophysical Logging During Drilling	1	1	2
Collection of Formation Samples for Grainsize Analysis During Drilling	1	1	2
Applications			
Improved Understanding of Vertical Distribution of PCE	1	1	1
Trend Monitoring - Changes in PCE Concentration Over Time	2	2	1
Improved Understanding of Vertical Migration of PCE	2	2	1
Changes in Well Performance Over Time	2	2	1
Formation logs and samples improve well design and avoid standby costs during Extraction Well Construction	1	1	2

Note: 1 Primary Benefit, 2- Secondary Benefit

6.4 Treatment Pre-Design and Cost Estimate

A treatment system pre-design concept was created for Alternative 3 that assumes a new well that is capable of producing 400 gpm and is constructed at the same site as the Well #4. Site improvements will include: destruction of Well #4, removal of onsite hydropnuematic tank. A new production well will be constructed and surrounded by a new concrete building and covered with a pre-fabricated metal well house with sliding door located on the roof for pump removal. Two GAC vessels will be placed in the building for treatment of the water prior to being chlorinated in a separate room within the well house that will contain the chlorine and a dosing pump. A new power panel will be installed along with a new submersible pump and motor. The pump-to-waste will be routed to the nearby sanitary sewer for discharge during start-up.

During pilot testing of LBWC#4, iron and manganese concentrations were elevated, however, further testing will be necessary to confirm if the results were representative of the actual level or if they were a temporary result of the mechanical cleaning. Since iron and manganese significantly reduces GAC removal capacity, a pre-treatment system may be necessary. Considering that both recommended alternatives includes a newly constructed well(s), it is assumed that iron and manganese levels found in LBWC#4 will be reduced and will be consistent with lower iron and manganese concentrations observed throughout the South Tahoe basin. Therefore, the pre-design treatment train does not include an iron and manganese treatment system. Further testing during drilling of a new extraction well and/or replacement water supply well would be needed to confirm the need for iron and manganese treatment prior to GAC filtration.

Appendix J contains a flow diagram that shows the recommended treatment process for Alternative 3. The recommended operation is in-series where two GAC vessels are installed and water flows through the first vessels then the second; sometimes also referred to as a lead/lag operation. This is the preferred operation because it maximizes carbon utilization. Carbon in the lead vessel will be fully saturated while the lag vessel is still removing VOC's. During full scale operation, LBWC may opt to replace spent carbon in one vessel at a time which allows for continuous operation while fully utilizing carbon capacity. In-series operation allows the secondary, or "lag," vessel(s) to maintain final effluent quality while GAC in the lead vessel is used to remove the majority of the VOC's (PCE, TCE, cis-1,2-DCE). Once effluent concentrations from the lead vessel reach a specified level the lead vessel can be isolated for carbon replacement. The lead/lag configuration is routinely reversed as needed to maximize operating efficiency. Based on the predicted carbon usage rate, the process of switching vessels and replacing carbon would occur approximately every 12-18 months.

Table 6-3 provides the cost estimate for GAC treatment and for constructing a new well as described in Extraction Well Alternative 3. A cost estimate quote from Evoqua Water Technologies, from which the GAC system costs were derived is provided in Appendix H. These estimates are based on well production of 400 gpm and PCE concentrations around 39 µg/L. The recommended GAC system consists of an Evoqua model HP810SYS system (two 8-foot diameter absorbers that each hold 10,000 pounds of carbon and interconnecting manifold). Unit specifications are included in Appendix H. Alternative 3 costs are similar to what would be required for Alternative 5, which the exception of the shallow extraction well. The estimated costs for also constructing the multi-level monitoring well and shallow extraction well were added as a footnote to Table 6-3 to approximate the costs associated with this alternative. These costs do not include sampling costs, permitting or temporary treatment or disposal fees that may be needed during confirmation testing to gain approval from DDW for the operation of the new wells for extraction and drinking water sources.

Table 6-3. Alternative 3 Cost Estimate

Description	Unit Price	Total
Construction - Well #4 Destruction, New Well Construction, Treatment System Installation, Pre-fabricated building, etc.		
	Construction Subtotal =	**$799,468**
Other Construction Costs		
Unallocated Items	5%	$39,973
	Construction Total =	**$839,442**
Other Owner Costs		
Administration and Legal	5%	$41,972
Environmental Documentation and Permitting	12%	$100,733
Engineering Design and Investigations	15%	$125,916
Engineering During Construction	5%	$41,972
Construction Management	8%	$67,155
	Other Owner Costs Subtotal =	**$377,749**
	Project Subtotal =	**$1,217,190**

Project Contingency	*50%*	*$608,595*
	Project Total =	**$1,825,786**
Annual O&M Cost Estimate for Treatment System and Carbon Costs		**$23,000**

Notes:

1 Project contingency is an upper estimate range for total project costs based on the design level.

2 Multi-level monitoring well estimated cost: $115,000, $173,000 with contingency.

3 The shallow extraction well cost for Alternative 5 Is an additional $150,000 and $225,000 with contingency added to the estimated Alternative 3 costs.

Since PCE occurs at such high concentrations, it will breakthrough before TCE and cis-1,2-DCE and is considered the lead contaminant. Additionally, because there is a significant difference in concentration, GAC treatment will be relatively insensitive to the co-occurring VOCs.

Evoqua's modeling, using pre-pilot test water quality results (with an adjusted iron and manganese concentrations of 150 and 30 µg/L, respectively) predict the AquaCarb 1230C will treat approximately 714,000 gallons of water prior to showing PCE breakthrough at 0.5 µg/L. Assuming LBWC Well #4 operates at 400 gpm, 24 hours per day, the carbon usage rate is approximately 20 pounds per day. The recommended 20,000 pound units will last 971 days, or 2.66 years. This results in an annual carbon cost of $15,000. Operations and maintenance costs including increased sampling and labor costs are estimated at approximately $8,000 per year.

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Chapter 7. References

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Appendix A. Work Plan

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Appendix E. Spinner Log and Analysis

Appendix F. Water Quality Results

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F.3 Dynamic Flow Survey Water Quality Sample Results

F.4 Pilot Testing Water Quality Sample Results

Appendix G. Results of Dye Test

Appendix H. Evoqua Water Technologies Quote

Appendix I. Policy Memo 97-005, Extremely Impaired Sources

Appendix J. Conceptualized Treatment Pre-Design and Cost Estimate for Extraction Well Alternative 3

Appendix A: Work Plan

GEI Consultants

Consulting
Engineers and
Scientists

Work Plan for the South Y Extraction Well Suitability Investigation

South Lake Tahoe, California

Submitted to:
South Tahoe Public Utility District

Date: March 16, 2016
Project No: 1601030

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Work Plan for the South Y Extraction Well Suitability Investigation

Certifications and Seals

This work plan was prepared by the following GEI Consultants Inc. certified hydrogeologists:

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1.0 INTRODUCTION

South Tahoe Public Utility District (District) has contracted with GEI Consultants Inc. (GEI), to perform an assessment of the Lukins Brothers Water Company (LBWC) Well #4. In 1989, water samples collected from LBWC Well #4 indicated elevated concentrations of tetrachloroethylene (PCE). The well has not been in service since 1994. GEI prepared this Work Plan for the South Y Extraction Well Suitability Investigation (work plan) to describe the approach and methods to evaluate the potential use of LBWC Well #4 as an extraction well and for pilot testing for the removal of PCE from extracted groundwater. The work plan will guide GEI and District staff as well as our contractor, Carson Pumps of Carson City, Nevada, to perform the work.

LBWC Well #4 is located on a ¾-acre parcel (APN 023-65-518) in a residential neighborhood at 843 Hazel Drive, within Section 5, T 12 N, R 18 E, MDBM, in the City of South Lake Tahoe, El Dorado County, California (Figure 1). The site has silt fencing on the north-east side of the property combined with waddles as a best management practice. The project does not consist of any excavations and all produced and treated water will be contained in temporary storage tanks and pumped directly to the sanitary sewer. A site layout was created for the obstruction permit, which is included in Appendix E.

The content and organization of this work plan is summarized in this section. Section 1.0, Introduction includes location and background information on the LBWC Well #4 and describes the well evaluation and pilot test objectives and plan organization. Section 2.0, Methodology describes all methods and procedures to be followed by GEI, Carson Pump, and the District to evaluate LBWC Well #4 and perform the pilot testing. Permitting of the work, including the sanitary sewer discharge requirements and the City obstruction permit, is also described in Section 2. Section 3 describes what will be included in the final report. Section 4 presents the schedule for completion of the project.

1.1 Past Work

GEI understands that LBWC Well #4 was constructed in 1966 with 12-inch-diameter steel casing using the cable-tool drilling method to a depth of 110 feet below ground surface (bgs). In 1970, the well was deepened with 10-inch-diameter steel casing to a total depth of about 174 feet bgs. Gravel was placed in approximately the bottom 30 feet of the uncased well to keep formation materials from heaving up into the well. In 1994, LBWC disconnected Well #4 from its water system. In September 2015, the total depth of the well was measured at 135 feet bgs, consistent with the information noted above.

A well log previously used by the District indicates that perforations are present from 43 to 63 feet bgs; 68 to 78 feet bgs; 105 to 115 feet bgs; and 132 to 155 feet bgs. The type of casing perforations (i.e., field cut, mill-knife, well screen, etc.) were not described in the driller's notes. The well is believed to have been operated at a rate of less than 130 gallons per minute (gpm). The historical pump setting depth is believed to be about 110 feet bgs (personal communication, Jennifer Lukins). The well pumped at about 30 gpm during groundwater sampling in 2015 (personal communication, Danny Lukins). Laboratory results from this sampling event indicated that PCE was detected at 34 micrograms per liter (ug/L).

During 2014 and 2015, the Lahontan Regional Water Quality Control Board (LRWQCB) collected groundwater samples from neighboring small community wells and private wells to evaluate the presence and extent of PCE contamination (personal communication, Lisa Dernbach, LRWQCB). Results from this timeframe indicated a PCE concentration of 230 ug/L in the Rockwater Well serving the Rockwater Apartments located at 787 Emerald Bay Road (see Figure 1). In 2015, the Rockwater Apartments were connected to the LBWC water system and the Rockwater Well was disconnected and abandoned.

1.2 Recent Work Performed

GEI contracted with Carson Pump to perform a down-hole video survey of LBWC Well #4 on February 17, 2016, as part of this investigation. The video survey indicated that the well construction details were different than previously assumed by the District. Figure 2 shows the well construction details as observed during the video survey. GEI also inspected the abandoned Rockwater Well for potential use as an observation well for this investigation.

HydraSleeve© samplers were deployed for groundwater sample collection in the LBWC Well #4 and Rockwater Well. On March 3, 2016, the samplers were retrieved and water quality samples collected from this well and the Rockwater Well were used to characterize background water quality.

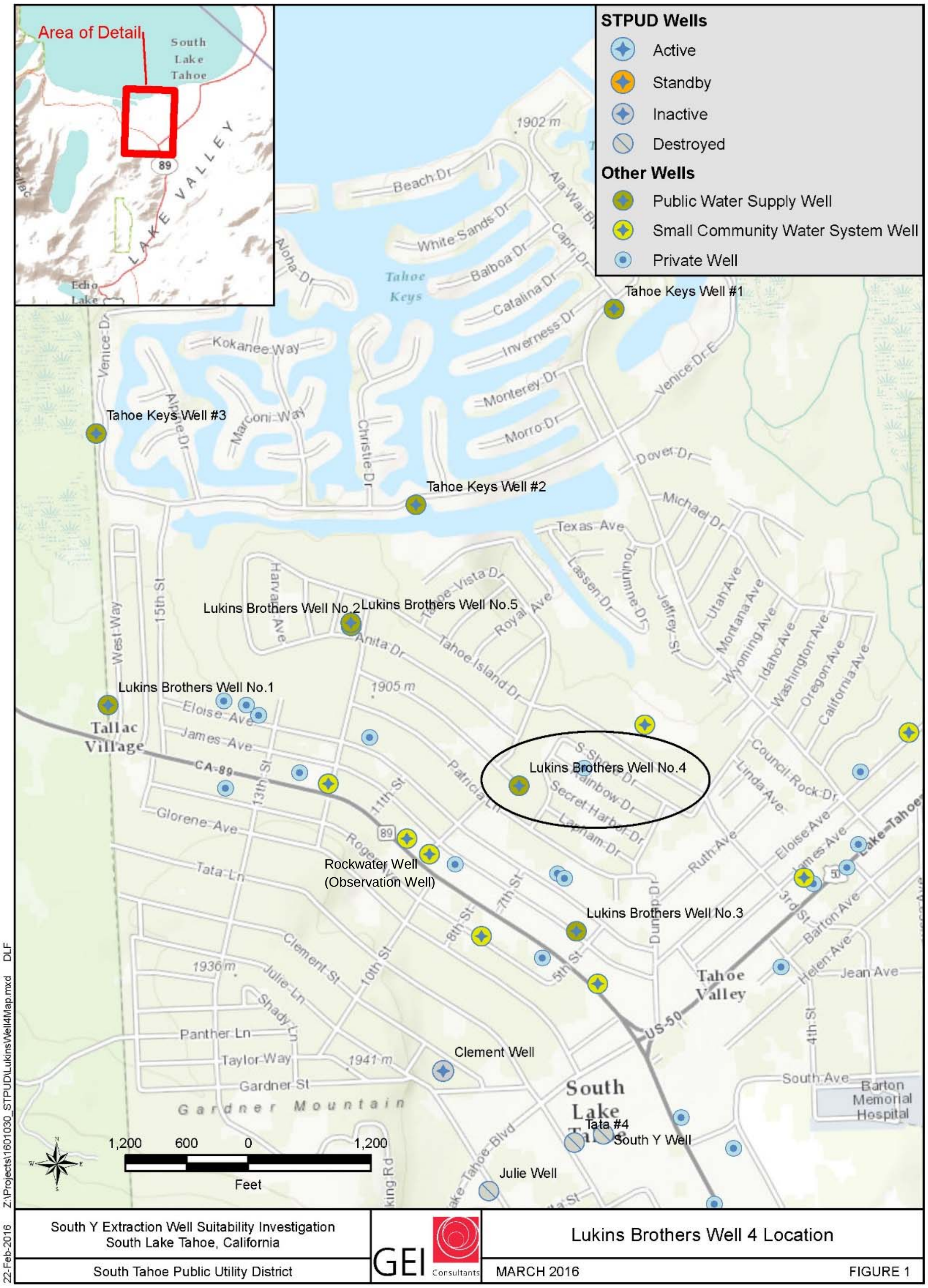

Figure 1: Project Location

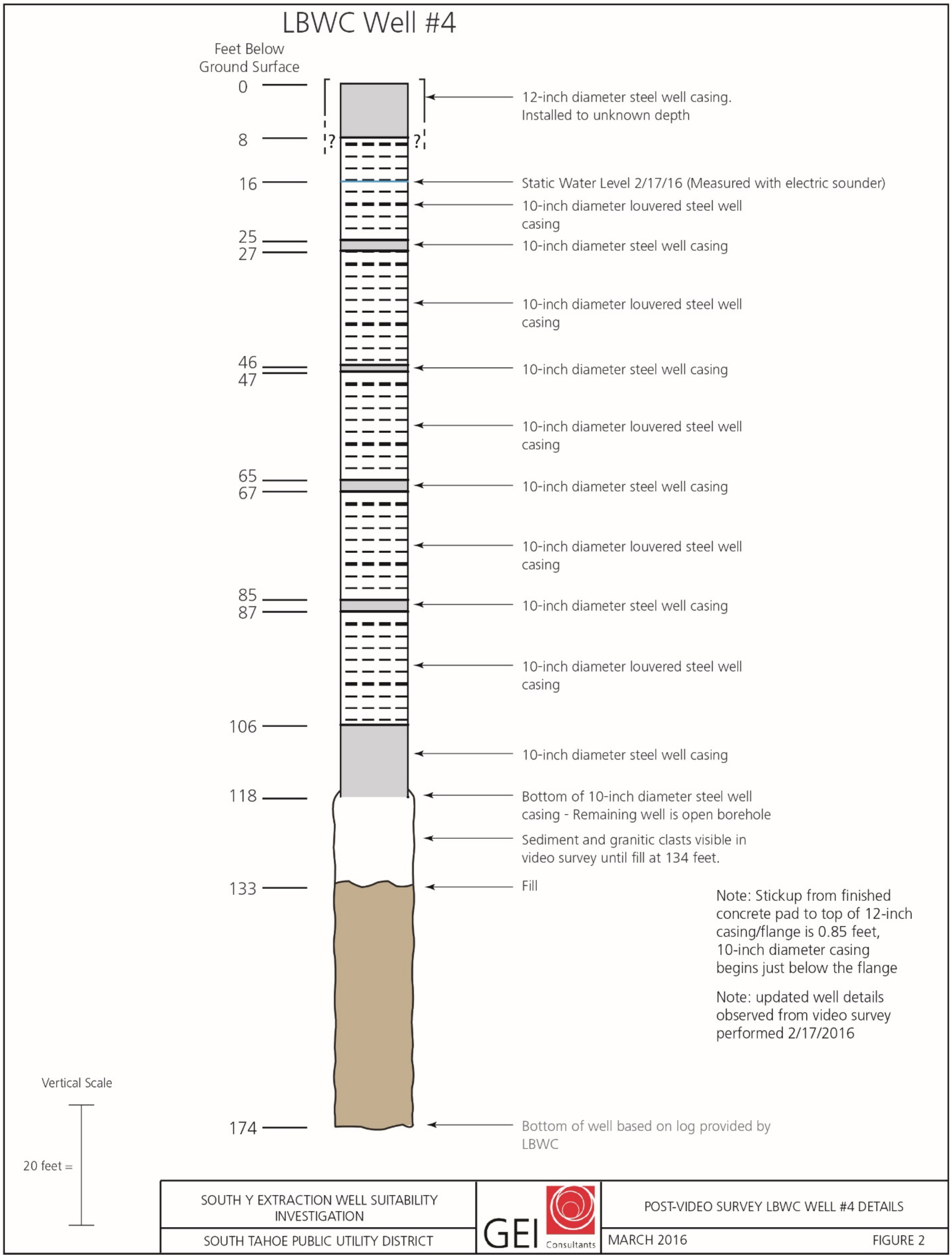

Figure 2: Post-Video Survey LBWC Well #4 Well Details

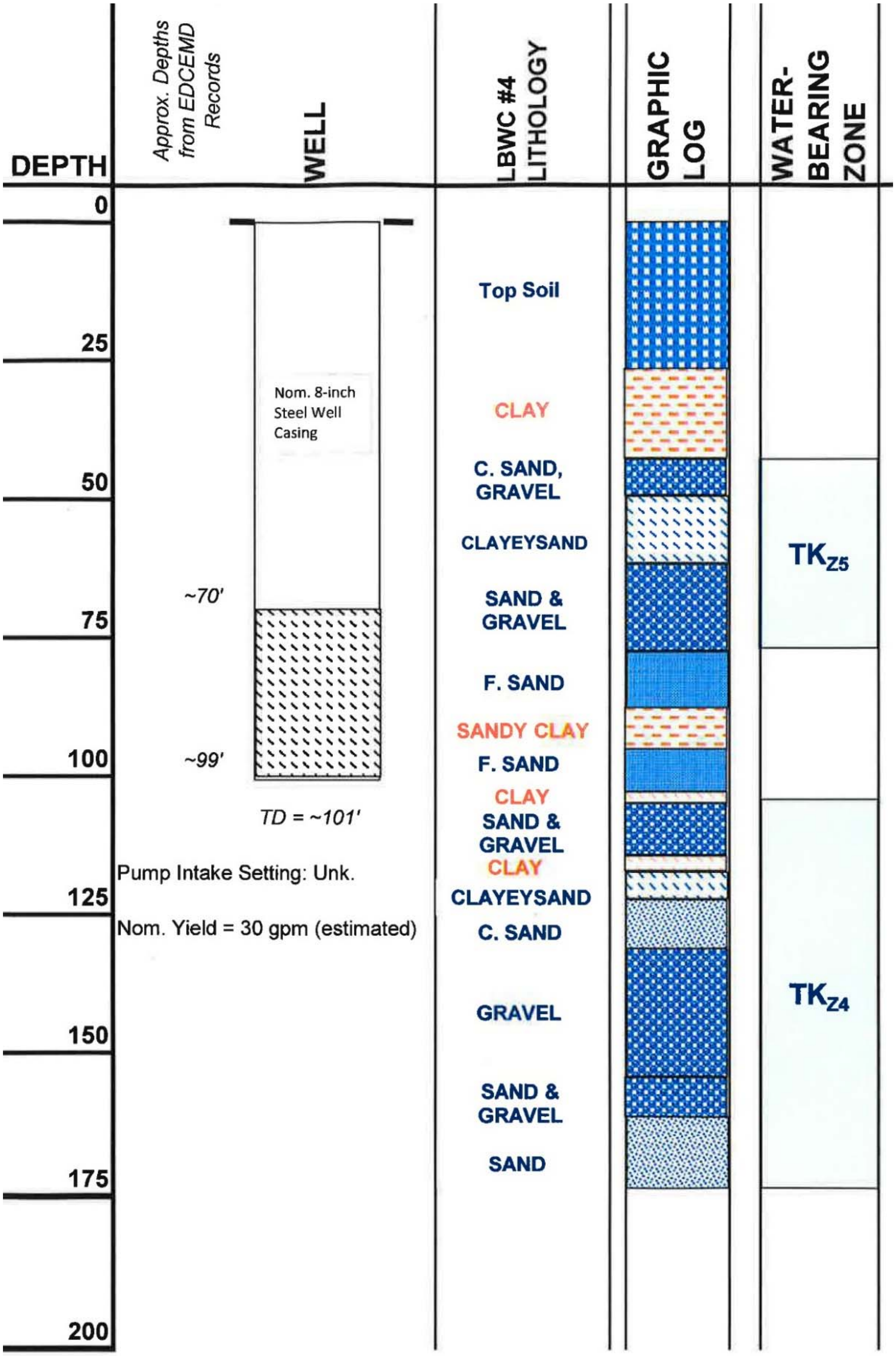

Figure 3: Rockwater Well Details

1.3 Well Evaluation and Pilot Test Objectives

GEI will provide technical oversight of Carson Pump to conduct an evaluation of LBWC Well #4 and accompanying water treatment system pilot test. This evaluation will identify primary flow paths of PCE into the well based on depth discrete sampling and a vertical flow survey, and establish aquifer properties needed to delineate capture zones(s) for the extraction well through a constant-rate aquifer test. The flow survey will allow GEI to quantify the percentage of the total flow contribution with relation to depth (vertical flow contribution). The aquifer characteristics calculated by the constant-rate test results will allow GEI to quantify the horizontal capture zones. The pilot treatment testing (pilot test) will also provide water quality data required to complete a pre-design for the accompanying treatment system.

For the pilot test, GEI has contracted with two vendors to provide alternative treatment systems. Evoqua will provide a granular activated carbon (GAC) filtration system that will be used to meet sanitary sewer discharge requirements throughout the project. NeoTech will provide a high efficiency ultra-violet (UV) light chamber and controller. Advanced oxidation process (UV/AOP) will be tested by adding a low dose of liquid sodium hypochlorite (chlorine). Traditionally, UV/AOP treatment systems used hydrogen peroxide as the primary oxidant to form hydroxyl radicals that decompose select contaminants. While hydrogen peroxide is a stronger oxidant than hypochlorite, recent research shows that hypochlorite effectively reacts with UV light to form hydroxyl radicals: a much stronger oxidant than peroxide or hypochlorite alone. The chlorine dose will be applied at dose rates that range from 1.0 part per million (ppm) up to 3.0 ppm measured as free chlorine. This dose range is expected to use a maximum of 0.072 gallons per hour.

GEI understands that total organic carbon (TOC) in LBWC Well #4 ranges from 0.5 to 2.75 parts per million (ppm). TOC concentrations less than 1 ppm are not likely to contribute to a significant level of disinfection byproduct formation; however, the higher range could contribute to forming trihalomethanes. The formation potential is difficult to predict because this depends on how much of the organic material is reactive. To characterize this, trihalomethanes will be analyzed (using VOC 524 method) at each chlorine dose considered during the pilot test.

During pilot testing, the treatment systems will be used in series with the UV/AOP expected to completely destroy the VOCs (PCE and TCE) and the GAC serving as a secondary treatment system to ensure compliance with discharge requirements. Since the project schedule is relatively short, it is not anticipated that GAC breakthrough curves will be established through the flushing filter. However, GEI is working with Evoqua to apply their proprietary test methods to evaluate actual carbon usage rates.

Rapid Small-Scale Column Tests were initially proposed; however, with a better project understanding (potential flow and water quality variables) and consultation with Evoqua Water Technologies experts, the recommended method to evaluate carbon performance involves application of their advanced modeling program (ad design) and dye testing, which accounts for the water chemistry from the pre-pilot test water quality sampling; site-specific variables as they are known at the end of the 24-hour constant-rate aquifer test; and carbon characteristics such as mesh size, pore structure, and iodine number. Due to the dye testing, the collection of other field parameters will not be necessary. Because of the number of complex variables that are input, this desktop modeling system provides a representative picture of carbon performance while allowing for more site flexibility. Modeling results will be reported and used to create preliminary design recommendations and cost estimates.

2.0 METHODOLOGY

This section describes the methods and equipment necessary for the well assessment, water quality sample collection and laboratory analyses, well development, aquifer characterization, and pilot testing. This section references photographs, dimensions, and where available, specifications for equipment to be used during the water quality sampling, flow survey and pilot testing (Appendix A). GEI field staff will oversee the subcontractors so the site activities follow the work plan and technical specifications. GEI will seek authorization from the District for any variances from the work plan that may be required. Field work will not begin until GEI has obtained all necessary permits, including the City of South Lake Tahoe obstruction permit. Table 1 lists the roles and responsibilities of the District, GEI, contractors, and vendors to complete the project including anticipated completion dates for each activity.

2.1 Well Evaluation

This task includes all field work associated with the project, including well cleaning and development, aquifer testing, constant-rate test, the dynamic flow survey and water quality sampling. During the constant-rate test, pilot testing will be used to assess the potential viability of using LBWC Well #4 as a PCE extraction well. Carson pump will provide the initial video survey (completed 2/17/2016), mechanical well cleaning and development services including installation and operation of the test pump. Carson Pump will also provide a bag filter capable of filtering sediments from the produced water, a mobile storage tank, and all necessary discharge piping/hoses to plumb the well to the pilot treatment systems and convey the treated water for disposal to the District's sanitary sewer system (Manhole TK191, shown in Appendix E, Figure E-1). The District will provide a small sodium hypochlorite pump and the sodium hypochlorite for the pilot test.

Table 2 describes each water quality sampling event in sequential order, the number of samples collected and analytical methods to be performed on each sample.

2.1.1 Static Well Video

A video survey was performed on February 17, 2016, by Carson Pump at LBWC Well #4. The results indicated that the well construction details are different than those provided by LBWC. Figure 2 is a well schematic based on new information provided by the video survey. The video survey indicates that the LBWC #4 well is constructed of 10-inch casing from ground surface to a total depth of 118 feet bgs. Louvered well casing was observed through the following depth intervals; 9 to 25 feet bgs; 27 to 46 feet bgs; 47 to 65 feet bgs; 67 to 85 feet bgs; and 87 to 106 feet bgs. Blank well casing extended below 106 feet bgs to a total depth of 118 feet bgs. The bottom of the casing was open to the underlying borehole, which extended to a depth of at least 133 feet bgs. Fill was encountered at 133 feet bgs.

GEI made a visual inspection of the Rockwater Well and some of the details observed differed from previous data. The well was found to be constructed with 6-inch steel casing with an 8-inch-diameter conductor casing. The static water level was measured at 38.78 ft btoc; total well depth was 81.05 ft btoc. The abandoned submersible well pump and column pipe were still installed in the well. The top of the pump is located at about 70 ft btoc. Figure 3 is a schematic of the Rockwater Well based on information provided to the District by the El Dorado County Environmental Management Department (EDCEMD). The EDCEMD data indicated the well was constructed with 8-inch-diameter steel casing from ground surface to a total depth of about 101 feet and perforated from about 70 to 99 feet bgs. When active, the well had a production rate of about 30 gpm.

Table 3 provides a comparison of well descriptions for the LBWC Well #4 from the provided driller's notes, and from the video survey and the available information from the EDCEMD for the Rockwater well.

Table 1: Roles and Responsibilities

No.	Task	Dates	District Staff	GEI Staff	Carson Pump	Pacific Surveys	Evoqua	NeoTech	Task Description
1	Initial Video Survey and Water Quality Sampling	2/17/2016	x	x	x				GEI and District staff will meet Carson Pump at the LBWC Well #4 site to perform an initial video survey. GEI will depoloy HydraSleeves in three zones in the well for water quality sampling. GEI will deploy one HydraSleeve into the Rockwater well to gather background water quality data.
2	Review Draft Work plan	2/23/16 to 3/4/16	x						District will provide review of the draft work plan.
3	Retrieve and Analyze Initial Water Quality Sampling	2/22/2016 to 2/26/2016	x	x					GEI staff will retrieve the HyrdaSleeves from LBWC Well #4 and Rockwater well and District staff will be available to assist and provide sample collection bottles, labels and will provide transporation to the laboratory.
4	Finalize Work Plan	3/8/2016 to 3/16/2016		x					GEI will incorporate any District comments and finalize the work plan.
5	Mobilize to Site	3/14/16 to 3/18/16		x	x		x	x	Carson Pump, Evoqua and NeoTech will deliver equipment to site. Carson Pump will plumb treatment system for discharge from well to 21,000 gallon tank, GAC and UV treatment systems and to sanitary sewer.
6	Mechanical Well Cleaning	3/22/2016		x	x				Carson pump will provide steel brush to scrub well casing and bailer and/or air-lift to clean fill out from well that is obstructing lower screen. GEI staff will be onsite to observe and provide documentation to the District.
7	Test Pump Installation	3/23/2016		x	x				Carson Pump will install submersible pump capable of pumping up to 150 gpm into the well and use on-site power and a VFD to control the flow rate. A 4-inch diameter access pipe will be installed to a depth below the pump bowls for flow survey tool access. GEI will document pump install.
8	Step-drawdown Test and Pre-Pilot Test Water Quality Sampling	3/24/2016		x	x				A 4-hour step test will be conducted with at least 3 steps to determine ideal pumping rate for 24-hour constant-rate test. Carson Pump will provide staff to measure water levels and operate the pump. A Rossum sand test device will be hooked to discharge and a flow totalizer and flow meter. GEI will observe and collect data. Water quality samples will be collected and analyzed. The results will be used to make recommendations for the Pilot Test. The District will provide sample bottles, ice chests, ice and chain-of-custody forms for GEI staff.
9	24-Hour Constant Rate and Pilot Testing	3/28/16 to 3/29/16		x	x				Carson Pump will provide staff to measure water levels and operate the pump. A Rossum sand test device will be hooked to discharge and a flow totalizer and flow meter. GEI will observe and collect data. Both GAC and UV/AOP treatment systems will be used to assess if UV may be a more cost-efficient, long-term alternative to GAC. Raw water samples will be collected pre-GAC filter and samples will be collected post-UV treatment during the pilot test. Sanitary sewer compliance will also be confirmed by the analysis of post-treament samples. The District will provide sample bottles, ice chests, ice and chain-of-custody forms for GEI staff.
10	Dynamic Flow Profiling and Water Quality Sampling	3/29/2016	x	x	x	x			Pacific Surveys will perform a dynamic flow survey using their spinner-log tool. Carson Pump will be onsite to operate pump and GEI will be onsite to observe the process and collect raw water samples for analysis. The District will provide sample bottles, ice chests, ice and chain-of-custody forms for GEI staff.
11	Test Pump Removal	4/1/2016		x	x				Carson Pump will be remove the test pump.
12	Demobilization and Site Clean Up	4/2/2016	x	x	x		x	x	Carson Pump, Evoqua and NeoTech will remove equipment from site and clean all trash.
13	Prepare Draft Report	4/3/2016 to 6/5/2016		x					GEI will prepare the draft final report for the project.
14	District Review Draft Report	6/6/2016 to 6/17/16	x						District will review the draft report provided by GEI and return comments and suggestions to GEI to incorporate into final draft.
15	Deliver Final Report	6/27/2016		x					GEI will provide final draft report to the District prior to the June 30, 2016 project deadline.

Note: Blue shaded cells indicate tasks where water quality samples will be collected. The quantity of analyses are listed in Table 2. The EPA sample methods and sample collection volume and bottle types are listed in Table 4.

Note: All on-site activities will be coordinated with the District and LBWC

Table 2: Water Quality Sampling and Analysis Plan

Line Item	Sample Description	Quantity of Analyses							
		VOC EPA 524	Total Organic Carbon	Total Suspended Solids	General Mineral	Inorganic Chemical	BOD 5-Day	TPH-DRO, TPH-GRO	Field Parameters (UVT, EC, pH, Turbidity, Temp.) *
1	**Initial Water Quality** Sampling (up to 3 zones) - *Hydrasleeves will be deployed duing video survey and collected roughly 1 week later.One sample will be placed in the Rockwater well to be analyzed for VOC 524*	4 [1]	3						*4* [1]
2	**Pre-Pilot Test Water Quality** Sampling: Used for Recommendations - *These samples will be collected prior to entering the treatment system during the Step-test. The VOC, General Mineral and TOC and TSS will need to have 1-day turn around. These samples will also verify discharge permit compliance.*	1	1	1	1	1	1	1	*1*
3	**Raw Water** Sampling Pre-GAC Filter - *These samples will be collected during 24-hour constant-rate test to compare to post-treatment samples.*	5							*5*
4	**Post-UV Filter** Sampling During Pilot Test - *These samples will be collected during the 24-hour aquifer test.*	5							*5*
5	Sampling for **Sanitary Sewer Compliance** - *Collected during the constant-rate test, post-filtration, to determine discharge permit compliance.*	1		1			1		*1*
6	**Dynamic Flow Profile Survey** Water Quality Sampling (up to 4 zones) - *This sampling will be peformed near the end of the 24-hour aquifer test immediately following the spinner survey.*	4	4						*4*
	Total of Samples to be analyzed by laboratory	20	8	2	1	1	2		20

Rush for general mineral, VOC, TOC, and general physical (LI#2) for data to be used for pilot test recommendations

Raw water sampling (LI#3) will apply to both UV and GAC pilot tests

UV treatment sampling (LI#4) will include UV alone at a dose of 1000 mJ/cm and UV/H202 or CL2 at various doses

[1] one sample will be collected from Hydrasleeve deployed in Rockwater well

The **Bold** text in the 'Sample Description' can be used as sample names to create labels from STPUD's LIMS system

Note: Select Analytes, laboratory methods and container requirements proposed for this investigation are provided in Table 4

Table 3: Construction Summary

Well Detail	Description		
	LBWC Well #4		Rockwater Well
	Well Log	Video Survey 2/17/16	Well Log
Total Well Depth	174 feet bgs	Unknown - Fill encountered 133 feet bgs	101 feet bgs
Casing/Screen Material	Steel	Steel	Steel
Casing Diameter	12-inch: -0.85 - 118 feet bgs 10-inch: 118 - 174 feet bgs	12-inch: -0.85 - Unknown 10-inch: -0.8 - 118 feet bgs	6-inch
Perforation Type	Unknown	Louvered	Unknown
Perforated Intervals	43 - 63 feet bgs 68 - 78 feet bgs 105 - 115 feet bgs 132 - 155 feet bgs	8 - 25 feet bgs 27 - 45 feet bgs 47 - 65 feet bgs 67 - 85 feet bgs 87 - 106 feet bgs 118 - Bottom: Open	70 - 99 feet bgs

2.2 Water Quality Sampling

Samples will be strategically collected at various intervals to guide decision-making throughout the project. The video survey and initial water quality sampler deployment has been completed. The sample collection for laboratory analysis and background water quality characterization has been scheduled for March 3, 2016.

2.2.1 Initial Water Quality Sampling and Analysis – Rationale and Constituents of Interest

The objective of this sampling is to characterize groundwater quality at LBWC Well #4 for water treatment efficacy. Groundwater samples will be analyzed for constituents critical to the pilot test including General Mineral, Volatile Organic Compounds (VOCs), and Total Organic Carbon (TOC) as listed in Table 4. These constituents impact treatment efficacy as they act as scavengers to UV light absorption and compete for pore space in GAC filtration. The sample tests are requested on standard turnaround time; these results will be included in the final report to document background water quality and identify constituents required for water treatment.

The initial samples were collected using HydraSleeve samplers deployed on February 17, following the initial video survey. The HydraSleeves remained in the well to equilibrate and were retrieved on March 3 for sample collection and laboratory analysis. The HydraSleeves were set at three depth intervals within the well—100 to 107 feet bgs, 85 to 78 feet bgs and 65 to 58 feet bgs. To get enough volume for sample collection, two HydraSleeves were placed in tandem at each depth interval. The length of the two HydraSleeves in tandem is roughly six-feet in length.

One HydraSleeve was also placed into the Rockwater well at a depth of 60 feet bgs and the sample collected will be analyzed for VOCs. The sample from the Rockwater well was collected the same day as from LBWC Well #4. GEI notified the District of the sample event and District staff were onsite for the sample collection. The rationale for the analyses for both wells is described below.

2.2.2 Pre-Pilot Test Water Quality Sampling

The objective of the pre-pilot test water quality sampling is to confirm that all water entering the sanitary sewer meets District discharge requirements. Initial pump start-up water quality verification samples will be collected during the step-test and will be analyzed for VOCs and TOC. These samples will be analyzed prior to discharging to the sanitary sewer for the following analytes: pH, total dissolved solids (TDS), total suspended solids (TSS), 5-Day Biological Oxygen Demand (BOD), and VOCs (refer to Table 4 for laboratory method and sample container requirements). Results from this water sampling will also be used to identify potential water treatment system requirements.

2.2.3 Pilot Test Water Quality Sampling

The objective of pilot test water quality sampling is to determine treatment efficacy and confirm sanitary sewer discharge requirements are met. Items 3 through 5 from Table 2 call for a series of raw and treated VOC samples. The numerous Field Test parameters (see Table 4) will be used to support decision-making during the pilot test. Ultraviolet absorbance (UV_A) is used to determine the amount of reactive organic material dissolved in the water. While this is not traditionally used as an indicator for UV pilot testing, it may provide some nonlinear insight to explain the dissolved PCE concentrations anticipated in the groundwater samples. Ultraviolet transmittance (UVT) is important to ensuring that the UV light is effectively transmitting through the water. Turbidity is a method to quantify and provide field understanding for potential interference of UVT. Temperature, pH, and electrical conductivity (EC) are general indicators of stability or changes in water quality; these indicators will be used to guide decision-making and to determine if modifications are needed to the sampling protocol during pilot testing. Samples to confirm sanitary discharge compliance will be collected near the end of the pilot test.

There are several analytes that are critical to the UV pilot test: total hardness as CaCO3, dissolved iron, manganese, turbidity, and TSS. Based on the background water quality data reviewed, these minerals are not expected to be a significant issue. The greatest concern is cloudiness caused by turbidity/TSS or possibly entrained air as a result of recent well cleaning. A bag filter will be provided onsite for pre-filtration, prior to water treatment, which is expected to mitigate any significant interference.

TOC poses the greatest threat to effective GAC filtration as it competes for pore space that could be used for PCE removal. Generally, TOC concentrations greater than 0.5 ppm are more strongly considered as an interference. Understanding this potential treatment interference is most important for ensuring that optimal PCE removal is maintained to meet District sanitary sewer requirements. As a precaution, this was considered in selecting the onsite carbon filter media as 12x30 coconut shell, which has enough diverse pore size distribution to balance TOC and PCE adsorption.

2.2.4 Dynamic Flow Survey and Discrete Water Quality Sampling

The objective of this sampling event is to characterize and quantify the flow zones contributing PCE to LBWC Well #4. During the constant-rate aquifer test a dynamic flow survey will be conducted by Pacific Surveys. This dynamic flow survey will quantify the flow contribution to the well with respect to different perforation depths. The results from the survey will indicate the depths at which the majority of the flow is entering the well and will be used to estimate the vertical hydraulic conductivity distribution through the well. Based on these data, GEI will recommend that water quality samples are collected from up to four (4) zones that contribute the most flow to the well. Pacific Surveys has a tool that will allow the collection of water samples from the well at discrete depths. The results will determine the water quality entering at different depths within the well. Line item 6 – Dynamic Flow Survey South Y Sampling and Analysis plan lists the analyses that will be sampled, which are General Mineral, VOCs, and TOC (see Table 4). Appendix A contains Pacific Surveys literature regarding the spinner/flowmeter and discrete sampling tools.

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Table 4: Chemical Analysis Parameters for Groundwater

Analyte	Method	Units	Volume, Bottles & Preservatives
Field Test			
pH (Field)	Field	Units	STPUD supplied handheld meter and HACH DR 2400
Conductivity	Field	µmhos/cm	
Temperature	Field	Deg C	
BOD	Field	mg/L	
UVT	Field	% transmittance	
Turbidity	Field	NTU	
Total Chlorine	Field	mg/L	
General Mineral			
pH	4500-H B	units	
Total Alkalinity (as CaCO3)	2320B	mg/L	250 mL unpreserved plastic
Hydroxide as OH	2320B	mg/L	
Carbonate as CO3	2320B	mg/L	
Bicarbonate as HCO3	2320B	mg/L	
Total Hardness as CaCO3	200.7	mg/L	125 mL unpreserved plastic
Calcium	200.7	mg/L	
Magnesium	200.7	mg/L	
Potassium	200.7	mg/L	
Sodium	200.7	mg/L	
Total Cations	200.7	meq/L	
Sulfate	300.0	mg/L	1L unpreserved plastic
Chloride	300.0	mg/L	
Nitrate as NO3	300.0	mg/L	
Nitrite as N	300.0	mg/L	
Nitrate + Nitrite as N	300.0	mg/L	
Fluoride	300.0	mg/L	
Total Anions	2320B	meq/L	
Total Suspended Solids	160.4	mg/L	
Specific Conductance	2510B	µmhos/cm	
Total Dissolved Solids	2540CE	mg/L	
Aggressiveness Index	4500-H B	--	
Langelier Index (20°C)	4500-H B	--	
General Physical			
Turbidity	Field	NTU	Field Meter
5-Day BOD	Field and/or SM 5120B	mg/L	DR 2400 and/or 1000 mL unpreserved plastic
Inorganic Chemical			
Aluminum	200.8	µg/L	500 mL unpreserved plastic
Antimony	200.8	µg/L	
Arsenic	200.8	µg/L	
Barium	200.8	µg/L	
Beryllium	200.8	µg/L	
Boron	200.8	µg/L	
Cadmium	200.8	µg/L	
Chromium	200.8	µg/L	
Copper	200.8	µg/L	
Iron	200.8	µg/L	
Lead	200.8	µg/L	
Manganese	200.8	µg/L	
Nickel	200.8	µg/L	
Selenium	200.8	µg/L	
Silver	200.8	µg/L	
Thallium	200.8	µg/L	
Vanadium	200.8	µg/L	
Zinc	200.8	µg/L	
Mercury	200.8	µg/L	
Other Inorganics			
Total Organic Carbon	SM 5310C/EPA 415.3	mg/L	3x40 mL preserved VOA vials
TPH-DRO	SM 8015	µg/L	1000 mL amber glass bottle
TPH-GRO	SM 8015	µg/L	2x40mL unpreserved VOA vials
Volatile Organics			
Volatile Organic Compounds	VOC 524.2	µg/L	3x40 mL preserved VOA vials

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2.3 Mechanical Well Cleaning and Development

After the initial water quality samples are collected, the well will be mechanically cleaned and prepared for the step-test and constant-rate test. Carson Pump will use a steel brush to remove growth from the well casing in the perforated intervals. After the brushing is complete they will use a bailer and remove the accumulated sediment from the bottom of the well, and will also remove the sediment to a depth of at least 135 feet bgs, the depth at which fill was encountered during the video survey. Technical specifications for Carson Pump are provided in Appendix B. The curve for the temporary submersible pump that will be used for this project is provided in Appendix C.

2.3.1 Waste Disposal

Mechanical well cleaning will generate relatively small volumes of waste-containing debris and sediment removed from the well. These wastes will be placed directly into a portable storage bin for subsequent transport and disposal by the pump contractor (Carson Pump) outside the Lake Tahoe Basin.

2.3.1.1 Treatment System Discharge

Treated water quality is expected to meet drinking water standards. The source water is expected to contain high concentrations of VOCs (PCE and, potentially, breakdown by-products, such as trichloroethene (TCE), dichloroethene (1,2-DCE) and vinyl chloride (VC)), which will be completely removed through the GAC filtration system. Based on review of the available water quality data provided by the District for the South Y wells, these chlorinated hydrocarbons are believed to be the primary contaminants of concern. Trace levels of total petroleum hydrocarbon (TPH) compounds and fuel oxygenates (Methyl tert-butyl ether) are also likely to occur at concentrations below applicable drinking water standards.

2.4 Aquifer Testing

GEI will perform a four-hour step-test to determine the most suitable pumping rate for a 24-hour constant-rate test. A submersible pump capable of pumping up to 165 gpm will be set to a depth of about 110 feet bgs in the LBWC Well #4. This depth was selected based on personal communication with Jennifer Lukins of LBWC where she told GEI that it is believed that the previous permanent pump was set at about 110 feet bgs. GEI does not have any previous specific capacity data for the well to estimate a drawdown based on a pumping rate and potential drawdown. We understand that the historical pumping rate has been between 50 gpm and 130 gpm. During these aquifer tests the produced water will be filtered through a GAC filtration system that will also be used for pilot testing. The step and constant-rate details are provided in the technical specification 330120-460 Well and Aquifer Testing in Appendix B.

The water will be filtered prior to pumping into the sanitary sewer. We will estimate aquifer hydraulic characteristics based on lithology and the aquifer test results. We will use a pressure transducer to record groundwater levels at one-minute intervals for at least one week prior to performing the test to obtain background groundwater levels at both the LBWC Well #4 and the Rockwater observation well to identify nearby pumping wells that may affect the test results. Pressure transducer details are presented in Appendix A. The test results will be analyzed using a commercially available aquifer test analysis program.

The flow survey will be performed under dynamic conditions using a standard spinner tool that will be lowered into the well while the well is being pumped by Carson Pumps during the constant-rate test. A description of the spinner tool is provided in Appendix A. GEI will use specific field data sheets for the aquifer testing, mechanical cleaning and water quality sampling. Examples of these sheets are provided in Appendix D.

2.5 Pilot Testing

GEI will use GAC treatment during the pilot testing to meet discharge requirements. Evaluation of the spent carbon in this treatment vessel can provide valuable filed validation of the modeling results. Using a sample of the spent carbon, Evoqua will perform a dye test to evaluate fouling potential. However, the filter is not expected to be fully utilized and, therefore, will not likely represent full-scale dynamic flow conditions. Since pilot scale data cannot be derived from the onsite treatment unit, alternative carbon performance tests (as discussed in Section 1.3), such as advanced modeling and dye testing the used carbon, will be used to develop carbon recommendations and cost estimates. UV/AOP will be pilot tested onsite. Test procedures are detailed in the following paragraphs. An aquifer test and treatment setup diagram is provided in Appendix B, Figure B-1.

The reasoning for testing using both GAC and UV/AOP is to establish efficiency and pre-design parameters for a full-scale remediation system. Due to the size of LBWC Well #4 and the relatively low discharge rate, GEI believes that potentially high concentrations of PCE may prove that the selected high-efficiency UV system may be a more cost-efficient, long-term alternative to GAC.

The UV/AOP treatment process will be tested onsite. The UV chamber and controller are pictured below. A schematic showing the equipment set-up is provided at the end of Appendix B (Figure B-1). The UV/AOP unit operates off standard power (120v); a minimum of two power outlets are recommended to accommodate the UV system and dosing pump. Initial setup will include pressurizing the chamber; warming the lamps; activating the controller; allowing the controller to stabilize for at least 10 hours prior to operation (recommended by manufacturer); and performing some initial water quality tests (UVT, pH, and temp). The UV unit is vulnerable to freezing and should be protected to maintain water temperature above 32°F. However, due to the small size and volume of water and the fact that water will not be flowing through the unit at night, we do not anticipate any issues with freezing. The UV chamber will be operated in a horizontal position on a table. Advanced oxidation will be achieved through the addition of a low dose of liquid sodium hypochlorite (expected dose range of 1 to 2 pm). A simple depiction of the treatment process flow is as follows:

well head → bag filter → pressure gauge → dosing pump → UV chamber → GAC → discharge

Pilot testing will begin early Tuesday morning, March 29, 2016, and is expected to take between six and eight hours to complete. During the pilot test, the UV dose will remain constant at ≥1000 mJ/cm^2. Variations to the test scenarios will be the oxidant (chlorine) dose and monitoring field water quality parameters that will enable us to make decisions on operational changes. Field water-quality tests will be conducted to verify the chlorine dose and to document water quality during the test. The maximum chlorine dose will be 3 ppm, which can be measured in the high range of a standard field test kit. Raw and treated laboratory samples will be collected throughout the test to determine performance results (items 3 and 4 on Table 2).

2.6 Obstruction Permit

GEI will submit an Obstruction Permit request to the City of South Lake Tahoe for approval to lay discharge hose onto Hazel Drive to the sanitary sewer discharge point in the cul-de-sac about 25-feet northwest of the LBWC Well #4 property line. The discharge hose/pipe will only be used during the discharge periods and will not be left unattended or overnight. The obstruction permit includes a traffic control plan included as Appendix E. At the time of this work plan, the obstruction permit is being approved by the City and the final permit will be included in the final report for this project.

2.7 Health and Safety

GEI will provide a site-specific Health and Safety Plan (HASP) that will be followed by GEI staff. The plan will indicate standard procedures for reacting to emergencies and will provide emergency contact information and directions to local occupational health clinics and emergency rooms. GEI staff will have a hardcopy of the HASP in the field. GEI requires that all contractors and subcontractors follow their own respective HASPs.

3.0 REPORTING

GEI will prepare a technical report describing all well inspection, mechanical cleaning, profiling, depth discrete water quality sampling, and treatment system pilot testing activities. The report will summarize our well evaluation findings and our recommendations for the design of a future treatment system for LBWC Well #4. Our report will also provide the recommended treatment technology and conceptual-level costs. All supporting documentation, including video well inspection reports, field records, photos, flow logs, and laboratory reports shall be presented in appendices to the technical report.

3.1 Evaluation of Well and Pilot Testing Data

GEI will evaluate the well characterization, aquifer profiling, aquifer testing, and pilot testing results collected in the subtasks listed above. GEI will focus our evaluation on the following objectives:

- Characterize aquifer parameters for use in determining the vertical hydraulic conductivity distribution through the well; calculating capture zones; and required extraction rates that may be needed for the removal of PCE-laden groundwater from LBWC Well #4 and the neighboring area.
- Evaluate pilot testing results to select a preferred alternative and prepare a pre-design for a full-scale wellhead treatment system.
- Using the information collected during the investigation consider LBWC Well #4 as a potential extraction well or an alternate well design that may be better suited for the removal of dissolved contaminants through this area.

As with any project there are potential challenges that may need to be mitigated. Table 5 lists a few potential challenges and possible solutions.

Table 5: Potential Challenges and Possible Solutions

Potential Challenges and Possible Solutions	
Potential Challenge	**Mitigation Measure**
Inclement Weather Creating Project Delays	GEI staff have all-weather capable field vehicles, the pilot-treatment systems will not be affected by weather. The UV system can be set-up inside the pump house or a small shelter will be devised. We selected a subcontractor that is local to the area and understands working in Tahoe weather.
Site noise levels/Neighbor concerns	The submerisble pump and UV filter will be powered by an onsite generator that will be positioned to minimize noise.
GAC filters prematurely clogging as a consequence of excessive sediment in discharge water	We will use a combination of settling tanks, bag filters and backwashing of the filters will be employed to remove fines from the GAC filter feed water and we will have a pressure gauge on the GAC filters to closely monitor pressure as a preventative measure.
Concentrations of PCE are still rising at end of 72-hour constant-rate test	GEI would discuss the data with the District and determine if pumping and sampling should continue for a longer period of time until PCE results stabilize. This would allow for the best possible data for treatment pre-design. GEI will be monitoring field parameters as an instantaneous water quality indicator. This may also require rush results on VOC 524 analyses.
Other	As unforseen challenges arise GEI in corrdination with the District and LBWC will meet and confer to identify appropriate measures.

4.0 SCHEDULE

Based on our understanding of the project, we present the following schedule, including major tasks, deadlines, duration, and projected start and finish dates for the project.

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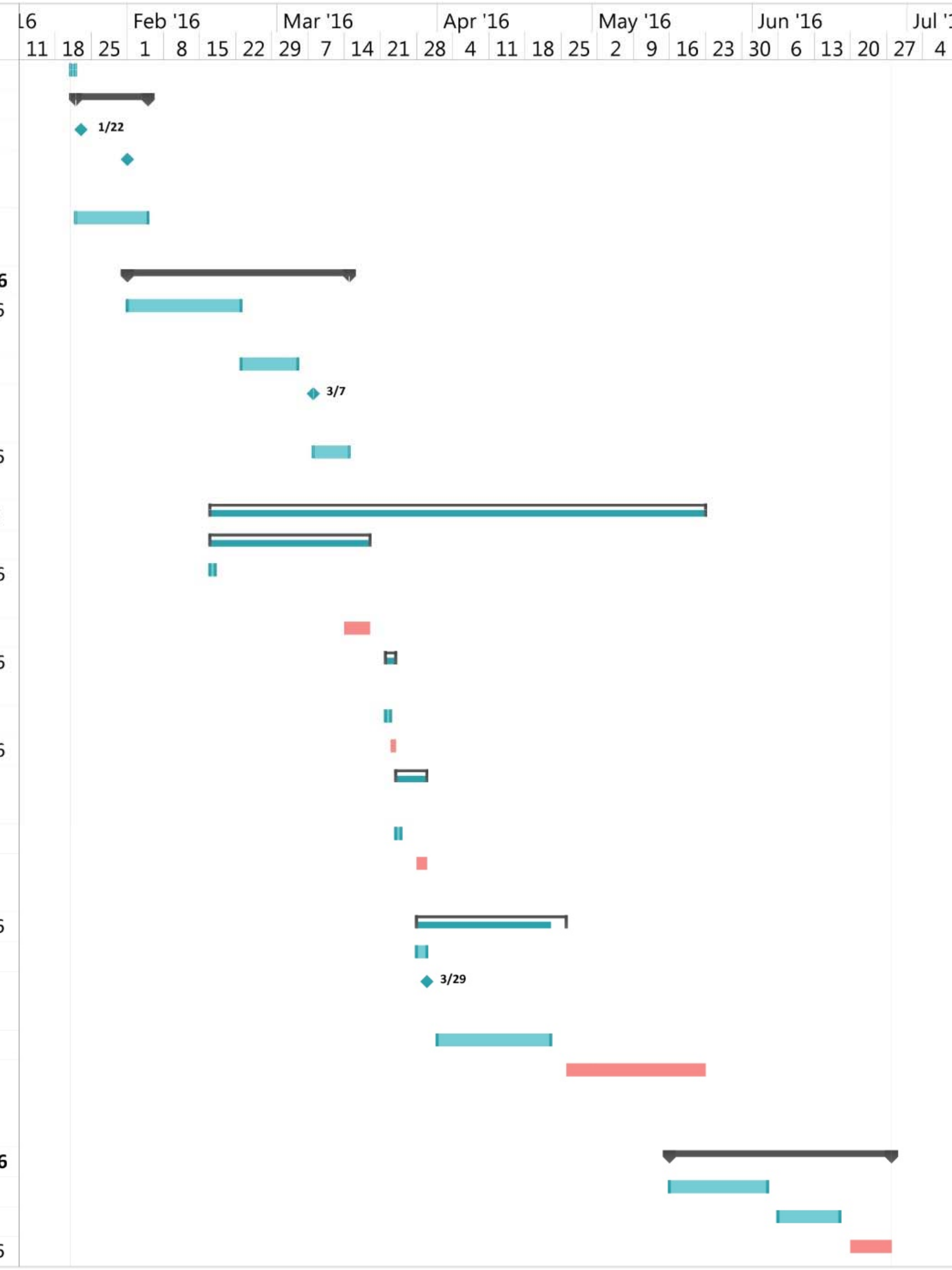
Schedule for South Y Extraction Well Suitability Investigation

ID	Task Name	Duration	Start	Finish
1	NTP	1 day	Thu 1/21/16	Thu 1/21/16
2	**Task 1 - Data Collection**	**14 days**	**Fri 1/22/16**	**Thu 2/4/16**
3	Task 1.1 Data Collection	1 day	Fri 1/22/16	Fri 1/22/16
4	Task 1.2 Kick-off meeting and site visit (with key contractor reps)	1 day	Mon 2/1/16	Mon 2/1/16
5	Task 1.3 Data Review and Assessment of Current Well Condition	14 days	Fri 1/22/16	Thu 2/4/16
6	**Task 2 - Develop Work Plan**	**43 days**	**Mon 2/1/16**	**Mon 3/14/16**
7	Task 2.1 Develop draft work plan including evaluation of Pilot Treatment Alternatives	22 days	Mon 2/1/16	Mon 2/22/16
8	Review by District	11 days	Tue 2/23/16	Fri 3/4/16
9	Task 2.2 Meet with district to discuss draft work plan	1 day	Mon 3/7/16	Mon 3/7/16
10	Task 2.3 Finalize work plan and contract documents	7 days	Tue 3/8/16	Mon 3/14/16
11	**Task 3 - Data Collection & Evaluation**	**96 days**	**Wed 2/17/16**	**Sun 5/22/16**
12	Task 3.1 Static Well Profiling	31 days	Wed 2/17/16	Fri 3/18/16
13	Initial video survey and Water quality sampling	1 day	Wed 2/17/16	Wed 2/17/16
14	Carson Pump mobilize to site	5 days	Mon 3/14/16	Fri 3/18/16
15	Task 3.2 Mechanical Well Cleaning	2 days	Tue 3/22/16	Wed 3/23/16
16	Mechanical cleaning	1 day	Tue 3/22/16	Tue 3/22/16
17	Install pump	1 day	Wed 3/23/16	Wed 3/23/16
18	Task 3.3 Step and Constant-Rate Aquifer Testing	6 days	Thu 3/24/16	Tue 3/29/16
19	Step-drawdown test	1 day	Thu 3/24/16	Thu 3/24/16
20	24-hour constant-rate test and Dynamic Flow Profile and Zone Sampling	2 days	Mon 3/28/16	Tue 3/29/16
21	Task 3.4 Pilot Testing	29 days	Mon 3/28/16	Mon 4/25/16
22	Perform pilot testing	2 days	Mon 3/28/16	Tue 3/29/16
23	Pilot Testing Status Meeting (End or Continue Test)	1 day	Tue 3/29/16	Tue 3/29/16
24	*Optional - Extend Pilot Testing up to 3 We*	22 days	Fri 4/1/16	Fri 4/22/16
25	Task 3.5 Evaluation of Well and Treatment Testing Data and Development of Well Improvements and Treatment Pre-Design	27 days	Tue 4/26/16	Sun 5/22/16
26	**Task 4 - Technical Report**	**43 days**	**Mon 5/16/16**	**Mon 6/27/16**
27	Draft Report	19 days	Mon 5/16/16	Fri 6/3/16
28	Review by District	12 days	Mon 6/6/16	Fri 6/17/16
29	Final Report	8 days	Mon 6/20/16	Mon 6/27/16



GEI Consultants

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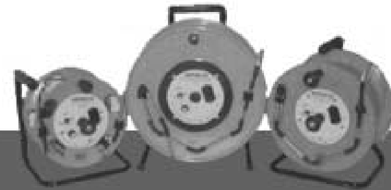
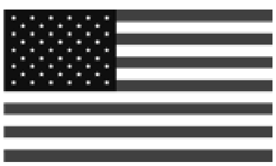
APPENDIX A. EQUIPMENT PHOTOS, EQUIPMENT SPECIFICATION SHEETS

GEI Field Equipment

WATERLINE ENVIROTECH LTD

PO Box 28220 . Bellingham . WA 98228
Phone/Fax: 360.676.9635
Email: contact@waterlineusa.com





Proudly Made In the USA For Over 30 Years

PRODUCTS

Our standard reel

Our instruments are complete and ready to use and come with a 1 year warranty (parts and labor) for defects of material or workmanship.

Probe:
A thin, stainless steel, and highly sensitive sensor, with segmented weights, which allows easy access, even through a ½ inch bolt hole, and indicating water within a fraction of an inch.

Reel:
Free standing durable plastic reel in various sizes with central brake system on strong metal frame. 1000 foot and larger sizes have metal reel.

Electronics which consists of:
1. A **select switch** with 4 positions:
   - **Off** - when not in use to avoid draining the battery.
   - **Test** - to check battery, light and buzzer will operate together.
   - **LED** - for visual signal, ultra bright LEDs light up when probe reaches water.
   - **Buzz** - for audible signal, buzzer sounds when probe reaches water.
2. A **sensitivity switch** – adjusts the probes sensitivity in individual wells and helps avoid false readings in cascading water.
3. A **battery drawer** – for one 9 volt battery.

Cable and Tape Types:
1. **Coaxial cable**: a strong, highly flexible, lightweight cable, 1/10th inch diameter, with exclusive color coded marks every 5 feet that are chemically welded and will not slip or cut your hands.
2. **Tape**: a very strong, flexible, 3/8th inch wide, steel tape with 2 stainless steel conductors with 3 different measuring scales:
   - **Engineering Scale**: marked in feet, tenths, and hundreds of feet
   - **Standard Scale**: marked in feet, inch, and 1/8 inch
   - **Metric Scale**: marked in meters, centimeters, and millimeters
3. **Bottom Sounder**: non-electric, for measuring sand pack and hole depth with a heavy stainless steel weight.

Click here for a detailed price chart

In-Situ™

Innovations in **Water Monitoring** | Spec Sheet

Level TROLL® 400, 500 & 700 Data Loggers

Get water level data the way you want it, when you want it with industry-leading water level/pressure and temperature data loggers. By partnering with In-Situ, you receive durable Level TROLL® Data Loggers that provide years of service, accurate results, intuitive software, and real-time functionality.

Be Effective

- **Increase productivity:** Reduce training and installation time with In-Situ intuitive software platform and integrated components. Patented twist-lock connectors, included on Level TROLL Loggers and RuggedCable® Systems, ensure error-free deployments.
- **Streamline analysis and reporting:** Automate water level corrections and post-processing, graph data, and accelerate report generation with Win-Situ® Software. Easily export data to Excel,® a web-based management service, or data analysis software.
- **Set up real-time networks:** Access data 24/7 and receive event notifications when you connect data loggers to Tube and Cube systems, radios, or other third-party data collection platforms. Get decision quality data when, where, and how you need it with HydroVu Data Services. Control gates, pumps, alarms, and other equipment by using built-in Modbus/RS485, SDI-12, or 4-20 mA communication protocols.

Be Reliable

- **Deploy in all environments:** Install loggers in fresh water, saltwater, and contaminated waters. Solid titanium and sealed construction outperforms and outlasts coated data loggers.
- **Log accurate data:** Get optimal accuracy under all operating conditions. Sensors undergo NIST®-traceable factory calibration across the full pressure and temperature range. For applications requiring the highest levels of accuracy, use a vented (gauged) system.
- **Get long-lasting operation:** Reduce trips to the field with low-power loggers that typically operate for 10 years.

Be In-Situ

- Receive **free**, 24/7 technical support and online resources.
- Order data loggers and accessories from the In-Situ website.
- Get guaranteed 7-day service for maintenance (U.S.A. only).

Applications

- **Aquifer characterization: slug tests & pumping tests**
- **Coastal: tide/harbor levels & wetland/estuary research**
- **Hydrologic events: crest stage gages, storm surge monitoring, & flood control systems**
- **Long-term, real-time groundwater & surface water monitoring**
- **Mining & remediation**

General	Level TROLL 400	Level TROLL 500	Level TROLL 700	Level BaroTROLL
Temperature ranges[1]	Operational: -20-80° C (-4-176° F) Storage: -40-80° C (-40-176° F) Calibrated: -5-50° C (23-122° F)	Operational: -20-80° C (-4-176° F) Storage: -40-80° C (-40-176° F) Calibrated: -5-50° C (23-122° F)	Operational: -20-80° C (-4-176° F) Storage: -40-80° C (-40-176° F) Calibrated: -5-50° C (23-122° F)	Operational: -20-80° C (-4-176° F) Storage: -40-80° C (-40-176° F) Calibrated: -5-50° C (23-122° F)
Diameter	1.83 cm (0.72 in.)	1.83 cm (0.72 in.)	1.83 cm (0.72 in.)	1.83 cm (0.72 in.)
Length	21.6 cm (8.5 in.)	21.6 cm (8.5 in.)	21.6 cm (8.5 in.)	21.6 cm (8.5 in.)
Weight	197 g (0.43 lb)	197 g (0.43 lb)	197 g (0.43 lb)	197 g (0.43 lb)
Materials	Titanium body; Delrin® nose cone	Titanium body; Delrin nose cone	Titanium body; Delrin nose cone	Titanium body; Delrin nose cone
Output options	Modbus/RS485, SDI-12, 4-20 mA	Modbus/RS485, SDI-12, 4-20 mA	Modbus/RS485, SDI-12, 4-20 mA	Modbus/RS485, SDI-12, 4-20 mA
Battery type & life[2]	3.6V lithium; 10 years or 2M readings	3.6V lithium; 10 years or 2M readings	3.6V lithium; 10 years or 2M readings	3.6V lithium; 10 years or 2M readings
External power	8-36 VDC	8-36 VDC	8-36 VDC	8-36 VDC
Memory *Data records*[3] *Data logs*	2.0 MB 130,000 50 logs	2.0 MB 130,000 50 logs	4.0 MB 260,000 50 logs	1.0 MB 65,000 2 logs
Fastest logging rate	2 per second	2 per second	4 per second	1 per minute
Fastest output rate	Modbus: 2 per second SDI-12 & 4-20 mA: 1 per second	Modbus: 2 per second SDI-12 & 4-20 mA: 1 per second	Modbus: 2 per second SDI-12 & 4-20 mA: 1 per second	Modbus: 2 per second SDI-12 & 4-20 mA: 1 per second
Log types	Linear, Fast Linear, and Event	Linear, Fast Linear, and Event	Linear, Fast Linear, Linear Average, Event, Step Linear, True Logarithmic	Linear
Sensor Type/Material	**Piezoresistive; titanium**	**Piezoresistive; titanium**	**Piezoresistive; titanium**	**Piezoresistive; titanium**
Range	Absolute (non-vented) 30 psia: 11 m (35 ft) 100 psia: 60 m (197 ft) 300 psia: 200 m (658 ft) 500 psia: 341 m (1120 ft)	Gauged (vented) 5 psig: 3.5 m (11.5 ft) 15 psig: 11 m (35 ft) 30 psig: 21 m (69 ft) 100 psig: 70 m (231 ft) 300 psig: 210 m (692 ft) 500 psig: 351 m (1153 ft)	Absolute (non-vented) 30 psia: 11 m (35 ft) 100 psia: 60 m (197 ft) 300 psia: 200 m (658 ft) 500 psia: 341 m (1120 ft) 1000 psia: 693 m (2273 ft) Gauged (vented) 5 psig: 3.5 m (11.5 ft) 15 psig: 11 m (35 ft) 30 psig: 21 m (69 ft) 100 psig: 70 m (231 ft) 300 psig: 210 m (692 ft) 500 psig: 351 m (1153 ft)	30 psia (usable up to 16.5 psi; 1.14 bar)
Accuracy[4]	±0.05% full scale (FS) ±0.1% FS	±0.05% FS ±0.1% FS	±0.05% FS ±0.1% FS	±0.05% FS ±0.1% FS
Resolution	±0.005% FS or better	±0.005% FS or better	±0.005% FS or better	±0.005% FS or better
Units of measure	Pressure: psi, kPa, bar, mbar, mmHg, inHg, cmH20, inH20 Level: in., ft, mm, cm, m	Pressure: psi, kPa, bar, mbar, mmHg, inHg, cmH20, inH20 Level: in., ft, mm, cm, m	Pressure: psi, kPa, bar, mbar, mmHg, inHg, cmH20, inH20 Level: in., ft, mm, cm, m	Pressure: psi, kPa, bar, mbar, mmHg, inHg, cmH20, inH20
Temperature Sensor	**Silicon**	**Silicon**	**Silicon**	**Silicon**
Accuracy	±0.1° C	±0.1° C	±0.1° C	±0.1° C
Resolution	0.01° C or better	0.01° C or better	0.01° C or better	0.01° C or better
Units of measure	Celsius or Fahrenheit	Celsius or Fahrenheit	Celsius or Fahrenheit	Celsius or Fahrenheit
Warranty	**3 years**	**3 years**	**3 years**	**3 years**
Notes	[1] Temperature range for non-freezing liquids. [2] Typical battery life when used within the factory-calibrated temperature range. [3] 1 data record = date/time plus 2 parameters logged (no wrapping) from device within the factory-calibrated temperature range. [4] Across factory-calibrated pressure range. [5] Across factory-calibrated pressure and temperature ranges. [6] Up to 5-year (total) extended warranties are available for all sensors—call for details. Delrin is a registered trademark of E.I. du Pont de Nemours and Company. Specifications are subject to change without notice.			

Every Application & Budget

Use maintenance-free, non-vented systems for long-term monitoring and at flood-prone or high-humidity sites. Pair with Tube and Cube Telemtry System and HydroVu for automtatic barometric compensation.

Use high-accuracy, vented systems to conduct aquifer tests and to view barometrically compensated water level data in real time.

Forgot to set a level reference at the beginning of a deployment? Automate level corrections by using Win-Situ Software's post-level correction Wizard.

BaroTROLL® Data Logger

When using a non-vented system, collect barometric pressure and temperature data with a titanium BaroTROLL Data Logger in order to post correct data for barometric pressure fluctuations.

Calculating barometric efficiency? Use the BaroTROLL Logger with vented systems.

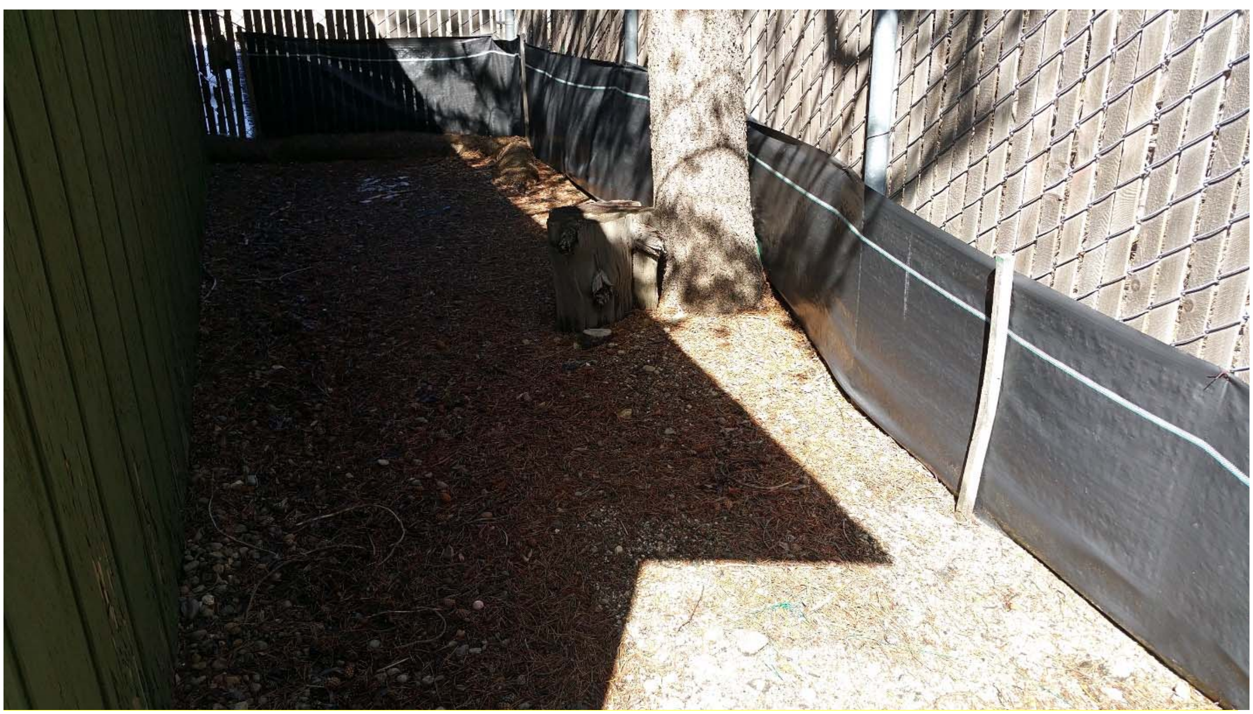
CE FC

Carson Pump Equipment

Wire Brush

Wire Brush

400 gpm bag filter



Silt Fencing

21,000 Gallon tank and Trash Pump

Wire-line Bailer

Flow Meter

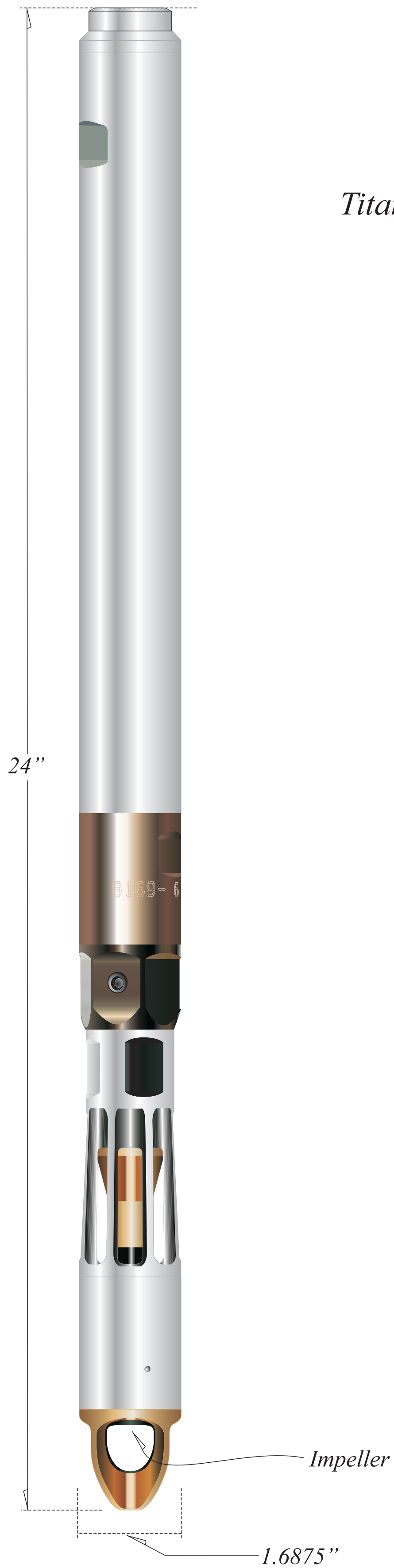
Sanitary Sewer Discharge Set-up

Pacific Surveys Equipment

EQUIPMENT LIST

TOOL NO. # 24

SPINNER/FLOWMETER



Titan Spinner/Flowmeter

Specifications At A Glance

Diameter: 1.6875"

Length: 24"

Weight: 8 Lbs (3.6 Kg)

Temperature Rating: 350° F (176.7° C)

Make Up Length (as shown): 24” (60.96 Cm)

Pressure: 15,000 Psi (103 Mpa)

4456 Via St. Ambrose
Claremont, CA 91711

(800) 919-7555 Toll Free
(909) 625-6262 Voc
(909) 399-3180 Fax

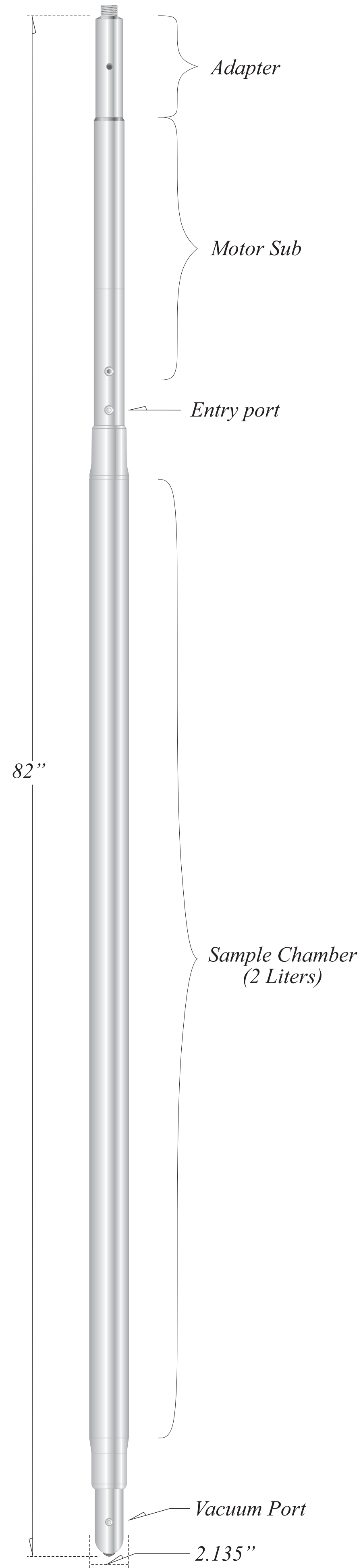
www.PacificSurveys.com

PACIFIC SURVEYS

EQUIPMENT LIST

TOOL NO. # 3

2 LITER FLUID SAMPLER



4456 Via St. Ambrose
Claremont, CA 91711

(800) 919-7555 Toll Free
(909) 625-6262 Voc
(909) 399-3180 Fax

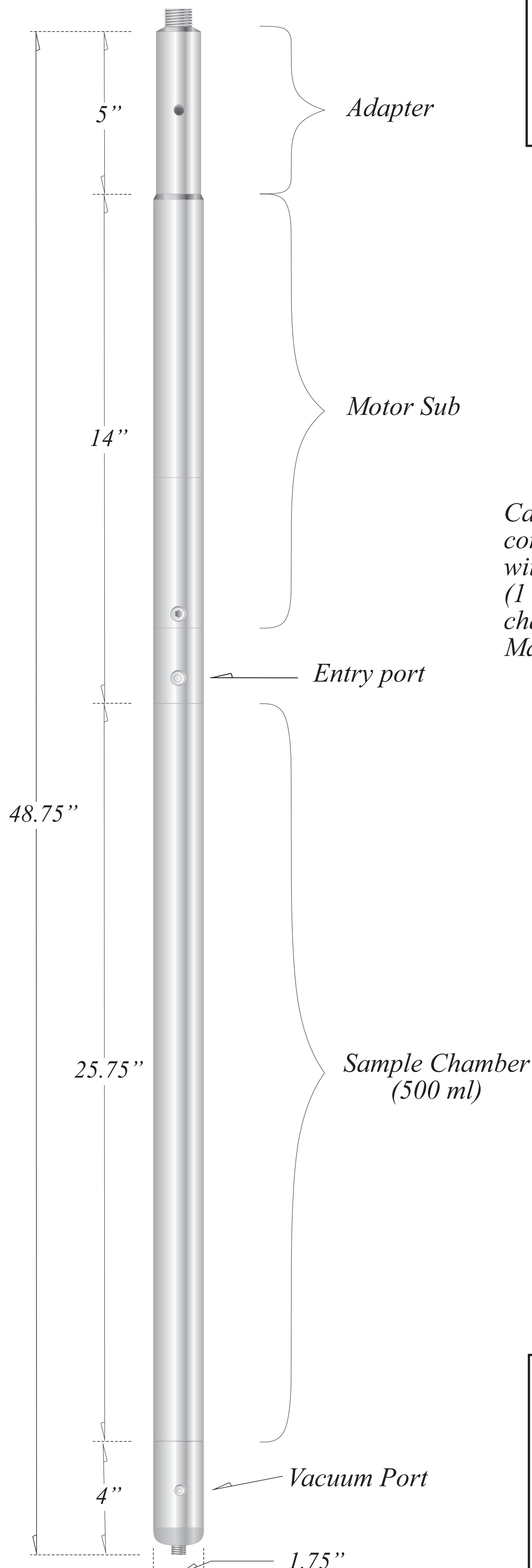
www.PacificSurveys.com

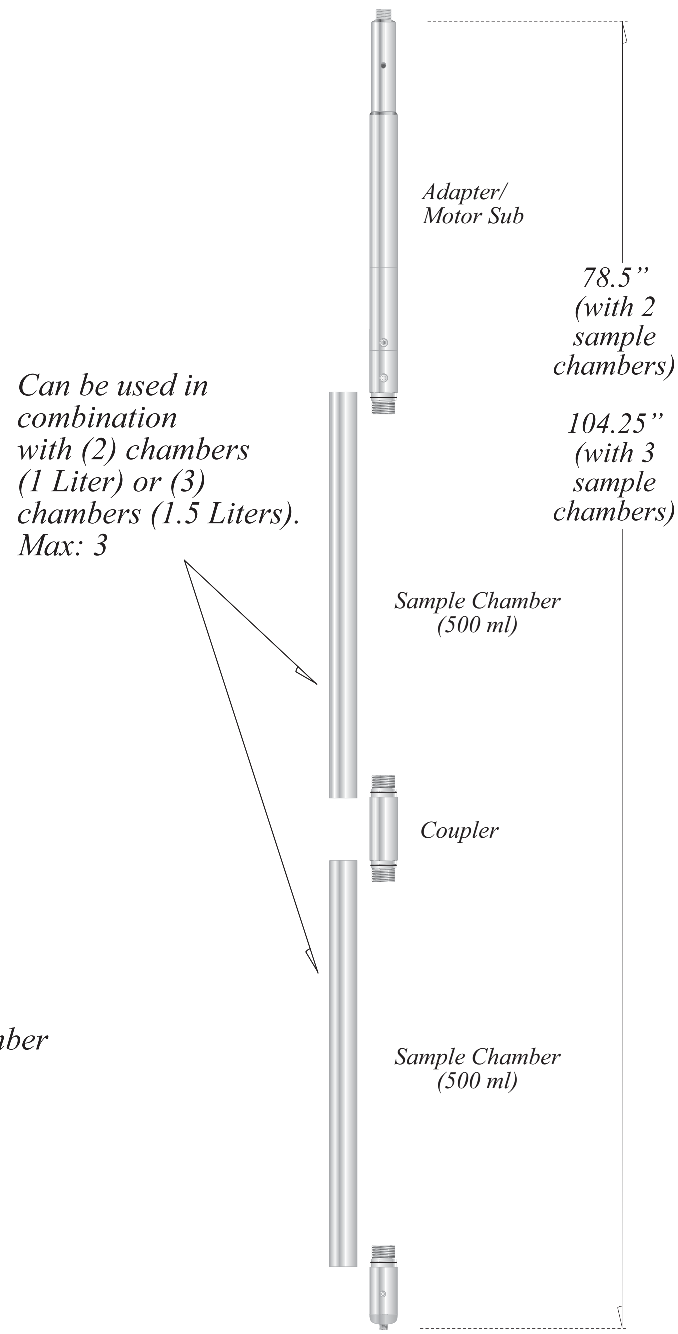
PACIFIC SURVEYS

EQUIPMENT LIST

TOOL NO. # 4

500 ML FLUID SAMPLER





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Claremont, CA 91711

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(909) 399-3180 Fax

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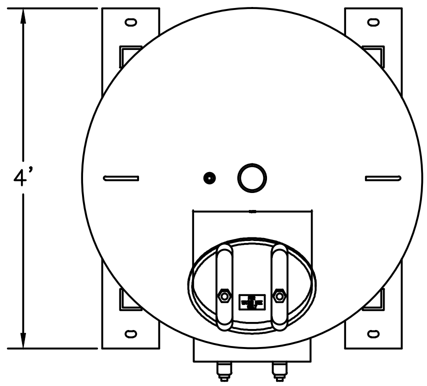
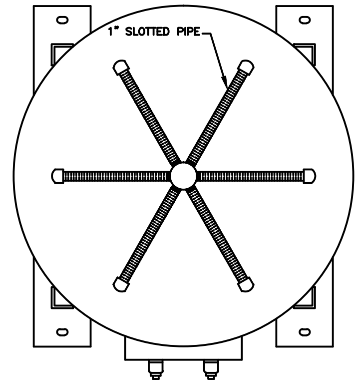
PACIFIC
SURVEYS

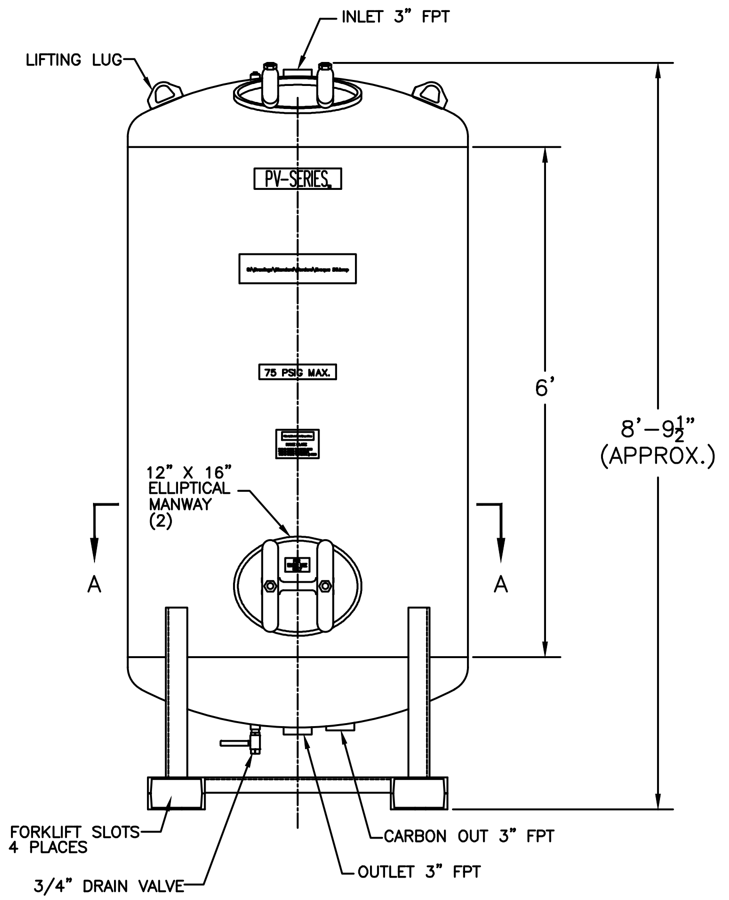
Evoqua – GAC Treatment Equipment



PLAN VIEW



SECTION "A–A"



ELEVATION

NOTES:

1. DESIGN DATA:
   48" DIAMETER PRESSURE VESSEL–75 PSIG(MAX)
   NOT ASME CODE STAMPED
   FOR WATER USE ONLY
   MAXIMUM FLOW RATE: 100 GPM
   MAXIMUM CARBON CAPACITY: 2000 LBS. ACTIVATED CARBON

2. MATERIAL:
   HEADS: STD. F & D NON CODE 3/16" THICKNESS C.S.
   SHELL: 3/16" THK. 48" OD x 72" LONG C.S.
   SKID: SA 36–HR

3. SURFACE PREPARATION:
   INTERIOR:
   SANDBLAST: SSPC–SP–5 WHITE METAL
   COATING: 3M BRAND SCOTCHKOTE 134
   THICKNESS: 10–15 DFMT – COLOR: GREEN
   EXTERIOR:
   SANDBLAST: SSPC–SP–10 NEAR WHITE METAL
   PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER
   THICKNESS: 4–6 DFMT – COLOR: RED
   FINISH COAT: HIGH BUILD POLYURETHANE
   THICKNESS: 3–4 DFMT – COLOR: BLUE (FED. I.D.#15052)

4. LIFTING REQUIREMENTS:
   5,200 LBS. MINIMUM RATING.
   EST. WEIGHTS:
   1190 LBS. – EMPTY VESSEL
   3190 LBS. – WITH CARBON
   7500 LBS. – OPERATING

DESIGNER CAR	DATE 5/13/08	TITLE PV2000 SALES GENERAL ASSEMBLY
CHECKER	DATE	CLIENT
ENGINEER ND	DATE 5/13/08	
MANAGER	DATE	EVOQUA WATER TECHNOLOGIES — Water Technologies, Red Bluff, Ca. 530–527–2664
FILE:		
SCALE: NONE		

PROJECT	CODE	DRAWING	SHEET	REV
		PV2000SALES	1 OF 1	

BAR = 1" AT PLOT SCALE

INTL REF:

STD: BORDER–0106–11X8A

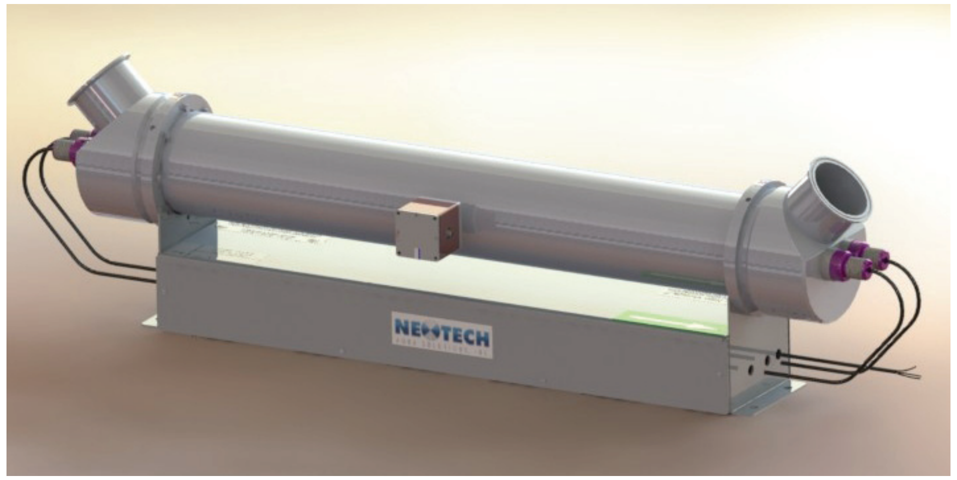
NeoTech – UV / AOP Equipment

NEOTECH AQUA SOLUTIONS
The World's Most Advanced UV Technology™

NeoTech D438™

Ultrapure Water Disinfection & Ozone Destruction

• Pharmaceutical • Microelectronics • Medical • Remediation • Beverage
• Commercial/Industrial • Pool/Spa • Waste Water • Drinking Water • AOP



The NeoTech D438™ is specially designed to disinfect water and is an essential component in advanced oxidation processes.

This high-efficiency UV system utilizes NeoTech Aqua's patented ReFleX™ chamber technology, reflecting over 99% of the 254nm UV generated. It is the highest efficiency, smallest footprint, and lowest operating cost UV system in the water treatment industry.

With only two thirty-eight inch lamps, the D438™ provides users the most convenient and lowest cost service schedule of any low pressure or medium pressure UV system today.

PRODUCT BENEFITS

- Dual lamp efficiency processes up to 500 gallons per minute
- 75% smaller footprint compared to standard UV systems
- May be mounted vertically or horizontally
- Up to four units may be controlled with a single micro-control box
- Built for 120V or 230V single phase power providing maximum flexibility
- No flow, no problem – guaranteed 60 minutes
- Water contact finish – Ra-15
- Controller- Remote
- Alarms, Remote Control, 4-20 mA output
- Real time dosimetry, 100% dosage assurance – with constant flow
- UV monitor is NIST traceable
- Sanitization in place – hot water or steam
- No-tool lamp change
- NSF Standard 50 certified
- Warranty one year parts and labor

SPECIFICATIONS

Flow Rate - gpm (m^3/hr.) - 99% UVT @ 40mJ/cm^2^	500 (90.8)
Flow Rate - gpm (m^3/hr.) - 99% UVT @ 30mJ/cm^2^	500 (90.8)
Flow Rate - gpm (m^3/hr.) - 95% UVT @ 40mJ/cm^2^	329 (74.7)
Flow Rate - gpm (m^3/hr.) - 95% UVT @ 30mJ/cm^2^	500 (90.8)
Number of High Output Amalgam Lamps	2
Lamp Life - Hours*	9000
Operating Power - watts	303
Operating Pressure - psi (bar)	150 (13)
Operating Temperature - ºF (ºC)	36 - 104 (2 - 40)
Pressure Drop at rated flow - psi (bar)	10.9 (0.95)
Dry Weight - pounds (kg)	63 (28.6)
Dimensions (L x H x D) - inches	40.6 x 7.9 x 11.4
Dimensions (L x H x D) - millimeters	1030 x 201 x 290
Sanitary Fittings - Standard+	3 in.

^ At rated pressure drop.

** Lamp life is based on a maximum of one on-off cycle per day and room temperature water.*

+ All units come standard with sanitary tri-clamp fittings for improved reliability, sanitation, and ease of installation. Alternative connections are available upon request.

MAXIMUM UV PENETRATION

The NeoTech D438™ provides users an unparalleled level of engineering sophistication by maximizing UV distribution in a patented 99% reflective chamber. This unique technical advantage also reduces the number of lamps and power requirements by up to 90% compared to standard UV systems.

MINIMAL MAINTENANCE AND SERVICE

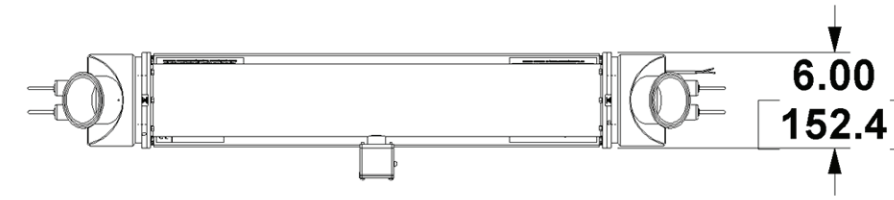
The service and maintenance requirements for the NeoTech D438™ are limited to three basic requirements:

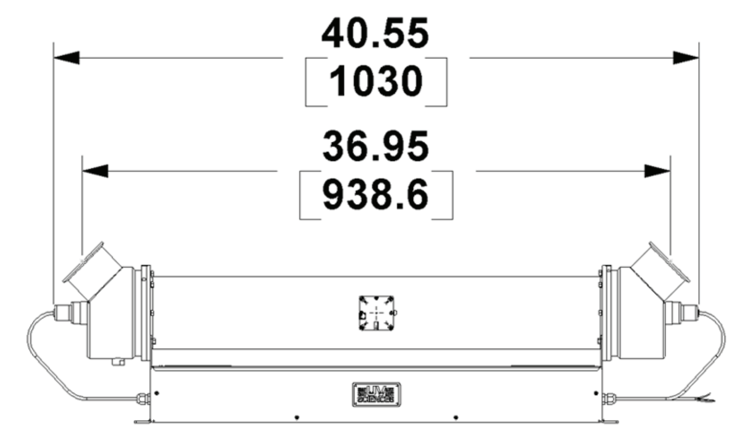
- Lamp Replacement: No Tools Required
- UV Monitor: May be changed with a single screwdriver while the system is operating
- Cleaning: May be cleaned as needed in a CIP loop or manually brushed.

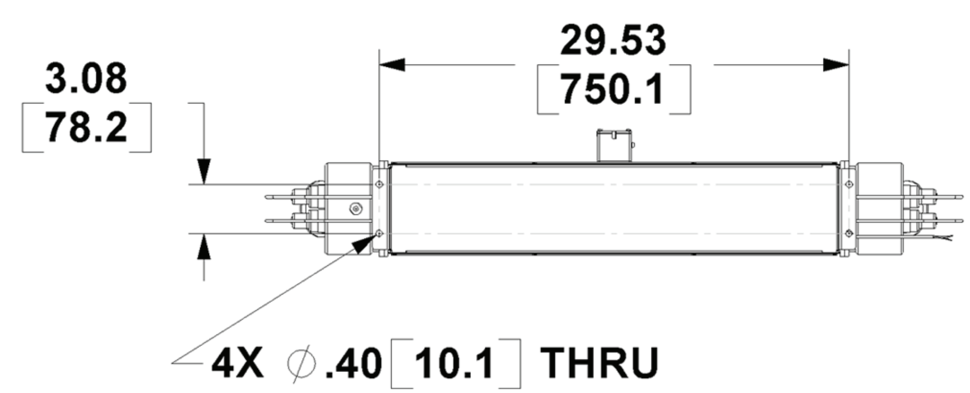
UNPARALLELED EFFICIENCY

The NeoTech D438™ boasts the smallest footprint in its class. With as few as one-tenth as many bulbs compared to standard UV systems, it has the lowest operating cost and maintenance schedule in the field.

5893 Oberlin Drive, Suite 104, San Diego, California 92121
Toll-Free 888.718.5040, ph: 858.571.6590, fx: 858.571.6596, Web: neotechaqua.com, info@neotechaqua.com



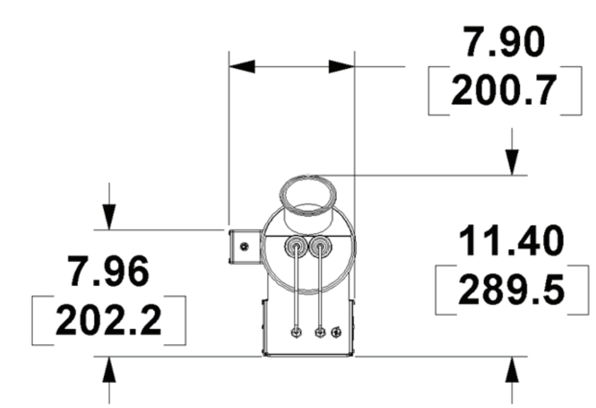




OPTIONS AND SPARES

Description	Part Number
Light Trap Kit*	UVLTK-4
Cleaning Kit	CK-4-1
Amalgam Lamp Kit	LK-38
Lamp Sleeve Kit	QSK-38
UV Monitor Calibration	UVIM-CAL
Ballast Kit, 120V	BK-120
Ballast Kit, 230V	BK-230

** Reflected UV light may be harmful to nonmetallic surfaces, such as PPL, PVC, and other plastics. Therefore, it is recommended that a light trap be installed on your unit.*



NEOTECH AQUA SOLUTIONS
The World's Most Advanced UV Technology™

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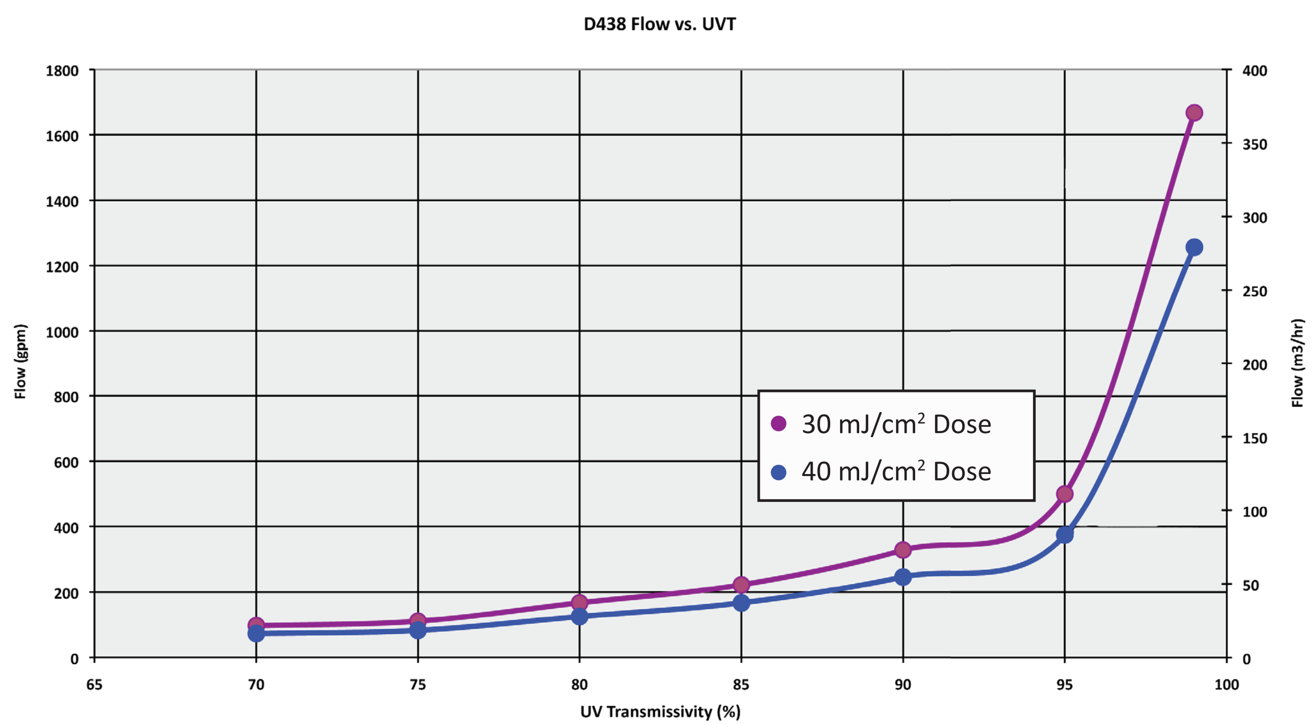

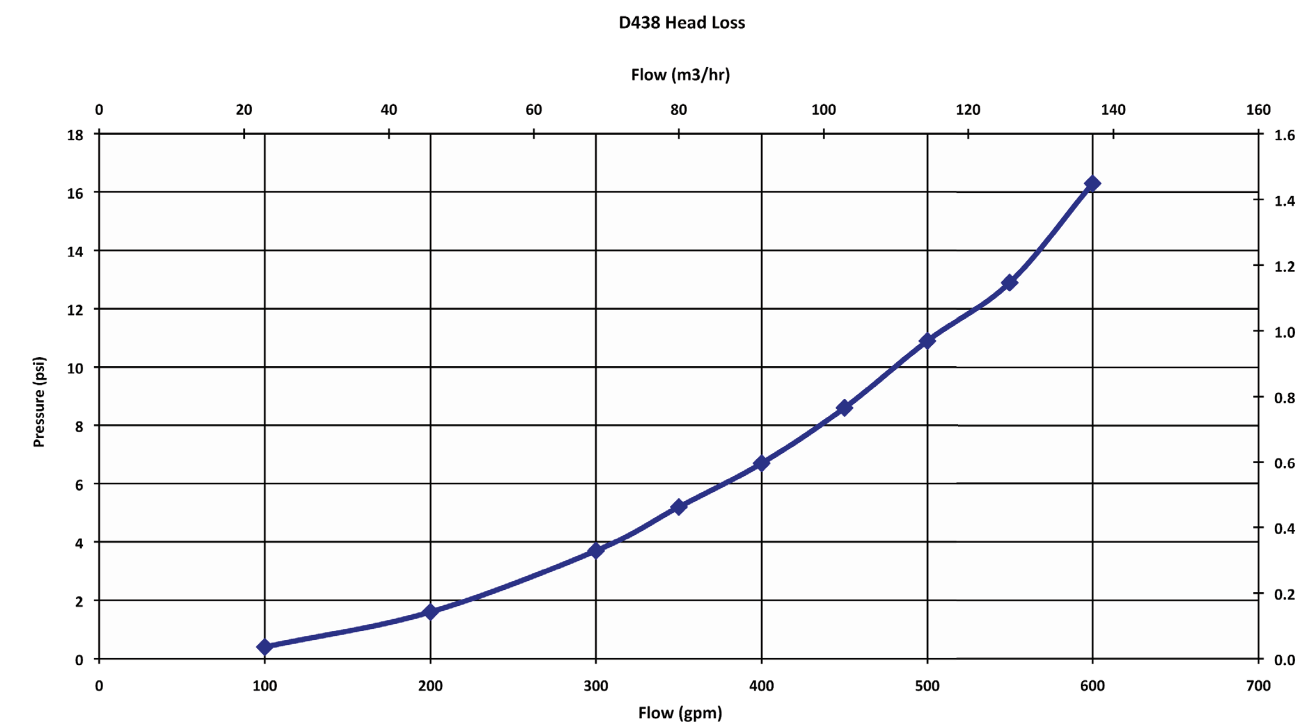

The UV transmissivity (UVT) of the treated water, combined with the flow rate through the unit, determine the UV dosage applied to the water. Particles in water typically absorb or reflect UV light which affects the water's UV transmissivity. NeoTech Aqua's units are rated based on a UVT of 95%. The above graph illustrates the appropriate rating for the D438 based on varying UVT levels. The NeoTech Aqua Solutions technical team provides complimentary UVT analysis on customer-supplied water samples to ensure proper UV equipment sizing. Please contact your NeoTech Aqua representative for assistance.

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APPENDIX B. TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

Table of Contents

SECTION 1000

SUMMARY OF WORK

PART 1. GENERAL

1.01 WORK UNDER THIS CONTRACT

A. The **CONTRACTOR** shall furnish all labor, materials, equipment and means to for the project entitled South Y Extraction Well Suitability Investigation, described herein. The work is to evaluate the condition of the Lukins Brothers Water Company (LBWC) Well #4 and will include performing a video survey, mechanically cleaning the well, aquifer testing and performing a pilot test to determine suitability of using LBWC Well #4 as a tetrachloroethylene (PCE) extraction well. The work includes, but is not limited to, the following:

1. Disinfect all downhole equipment prior being brought onto site

2. Remove access port on the roof to allow equipment to access the well.

3. Provide one 21,000 gallon temporary storage tank.

4. Provide 15-micron in-line bag filter to filter all water being produced from the well, prior to any treatment.

5. Provide all necessary discharge piping and temporary pump to transfer water from the temporary storage tank and through the GAC and UV treatment system to the sanitary sewer.

6. Video survey the well prior to performing work.

7. Mechanically clean the louvered well casing using a steel brush.

8. Furnish and Install 1-inch diameter temporary PVC sounding tube from ground surface to 10-feet above the pump in LBWC Well #4.

9. Furnish and Install temporary submersible pump and discharge piping to pump the water into the temporary storage tank. Furnish and install necessary equipment to connect the pump to onsite power.

10. Comply with South Tahoe Public Utility District (District) sanitary sewer discharge requirements

11. Disinfect the well

12. Disposal of wastes

13. Site clean-up

The above general outline of principal features does not in any way limit the responsibility of the **CONTRACTOR** to perform all work and furnish the required materials, equipment, labor and means as shown or required by the Contract Documents, Materials, equipment, labor, etc., obviously a part of the work and necessary for the proper operation and installation of same, although not specifically indicated in the Contract Documents, shall be provided as if called for in detail without additional cost to the **ENGINEER**.

All materials or additives place in the well shall be NSF certified.

1.02 WELL LOCATION AND BACKGROUND INFORMATION

All work is to be performed on property owned by Lukins Brothers Water Company. The location of the well is presented in the attached Figure 1 of this specification.

1.03 WORK BY OTHERS

A. Work described below will be provided by the **ENGINEER'S CONSULTANT.** The work shall include the following general items:

1. Coordinate, observe and document the **CONTRACTOR'S** activities.

2. Review **CONTRACTOR'S** recommendations whether to rehabilitate the existing pumping plant or to purchase new equipment.

3. Coordinate sanitary sewer permits for discharge of fluids.

4. Observe and document the video survey.

5. Arrange for laboratory analysis of water quality samples.

6. Observe and document the well and production testing by specifying the step-test and constant rate flow rates, measuring water levels, install transducers, and collecting samples.

7. Interpret the test results.

8. Document the work activities.

1.04 ENGINEER-FURNISHED PRODUCTS

A. **ENGINEERS'S** responsibilities:

1. Provide assistance to **CONTRACTOR** to obtain permits.

2. Arrange to have samples delivered to STPUD for laboratory analysis.

3. Provide water at no cost to the **CONTRACTOR**.

B. **CONTRACTOR'S** responsibilities:

1. Review **ENGINEER** reviewed shop drawing's product data, and samples.

2. Comply with the Regional Quality Control Board (RWCQB) issued NPDES discharge permit effluent limitations and conditions (provided in Appendix A), STPUD for wastewater discharge permits, or other methods of water disposal identified by the **ENGINEER**.

3. Handle, store, install and finish products.

4. Provide clean and disinfected equipment that will be used downhole during the well rehabilitation work. The CONTRACTOR shall clean all equipment by using a high-pressure washer with water with a 500 ppm solution of chlorine bleach (one-gallon of 5.25% bleach in 100 gallons of water). After the cleaning the equipment shall be allowed to thoroughly air-dry. The cleaning shall be performed prior to the equipment arriving on site at a facility verified and accepted by the **ENGINEER**.

5. Provide gasoline or diesel equipment meets or exceeds the Monterey Bay Unified Air Pollution Control Districts requirements. Permits shall be obtained by the **CONTRACTOR**, if required, for the use of portable equipment at the project sites.

1.05 CONTRACTOR USE OF SITE (AND PREMISES)

A. The **ENGINEER** must have personnel on-site during all phases of the work to be performed unless otherwise stated by the **ENGINEER.**

B. All work will be performed Monday through Friday between 8:00 A.M. and 5:00 P.M. No work shall be performed on the well sites while children are present at adjacent properties, i.e. schools or parks. If necessary, exceptions may be granted by the **ENGINEER** for work on Saturday. No work shall be allowed on Sundays and holidays except as specified herein, or as approved by the **ENGINEER** or in case of an emergency.

1.06 FUTURE WORK

A. None.

1.07 WORK SEQUENCE

A. As awarded by **ENGINEER.**

1.08 CHANGE PROCEDURES

A. The Engineer may issue to **CONTRACTOR** a Proposal Request which includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Times for executing the change and the period of time during which the requested price will be considered valid. **CONTRACTOR** will prepare and submit an estimate within 15 working days. The estimate shall contain a detailed breakdown of the labor, equipment, material, subcontract, equipment rental, contingencies, overhead, and profit costs associated with the requested change. The estimate shall also include any requested adjustments to Contract Times including the window of time the **ENGINEER** has to render a decision on the matter.

1.09 DEFINED TERMS

A. Terms used in these Specifications, which are defined in the General Conditions of the Contract Documents shall have the meanings assigned to them in the General Conditions.

1.10 ABBREVIATIONS

Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth opposite each.

ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
NEMA	National Electrical Manufacturers Association
NPDES	National Pollutant Discharge Elimination System
NPT	National Pipe Thread
UL	Underwriters' Laboratories

PART 2. MATERIALS (NOT USED)

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Temporary facilities, utilities including but not limited to water, electrical power, drainage, sanitary facilities, air quality, lighting, and security.

B. MEASUREMENT AND PAYMENT

1. No price is fixed for TEMPORARY FACILITIES in the proposal and the cost shall be distributed amongst the bid items, except as noted below. The **CONTRACTOR** is to do the work or furnish materials and equipment to complete all the work as may be needed to provide temporary facilities.

2. The cost of providing temporary storage tanks shall be on a Lump Sum price as itemized on the Bid Schedules and no additional compensation shall be paid.

1.02 WATER

A. The **CONTRACTOR** shall be provided water by the **DISTRICT**.

B. Should the contractor obtain water from a municipal fire hydrant, the **CONTRACTOR** shall provide an approved backflow prevention device for use in connecting to the hydrant. **CONTRACTOR** shall contact the water agency for questions concerning approved devices.

C. Water used for well rehabilitation shall be kept free from contamination and shall conform to the requirements of the state and local authorities for potable water.

1.03 ELECTRICAL POWER

A. The **CONTRACTOR** may use the onsite power, with permission of the **ENGINEER**. The **CONTRACTOR** shall provide a suitable motor control panel to use onsite power.

B. All other electric power required for construction, general lighting, security lighting, and all other purposes supplied through temporary facilities shall be provided by the **CONTRACTOR**. The **CONTRACTOR** may arrange with the local utility to provide adequate temporary electrical service at a mutually agreeable location or provide his own generating equipment provided it meets the ‘ultra quiet’ requirement and noise ordinances described below.

C. When power cords are used at the site, the **CONTRACTOR** shall provide adequate job site electrical distribution facilities conforming to applicable codes and safety regulations.

1.04 DRAINAGE

A. **CONTRACTOR** shall prevent any fluids other than rainwater from entering the off-site drainage facilities.

1.05 SANITARY FACILITIES

A. The **CONTRACTOR** shall provide and maintain suitable chemical toilets or water closets (cleaned a minimum of twice a week) at the site or locations reviewed by the **ENGINEER'S CONSULTANT**. Upon completion of the contract work, the **CONTRACTOR** shall remove such toilets and disinfect the premises in the event of a spill or leakage.

1.06 LIGHTING

A. The **CONTRACTOR** shall provide temporary lighting in all work areas sufficient to maintain a lighting level during working hours not less than the lighting level required by California OSHA standards. When used, lighting shall be shielded so that adjacent property owners are not adversely impacted.

1.07 NUISANCE WATER

A. It is anticipated that nuisance water, such as drilling water, rainfall, groundwater or surface runoff may be encountered within the construction site during the period of construction under this contract. The **CONTRACTOR** shall at all times protect the work from damage by such waters and shall take all due measures to prevent delays in progress of work caused by such waters. The **CONTRACTOR** shall dispose of nuisance water at his own expense and without adverse effects upon the **ENGINEER'S** property or any other property.

1.08 WATER DISPOSAL

A. The **CONTRACTOR** shall comply with the **DISTRICTS** sanitary sewer discharge permit (see Appendix A). The discharge shall meet California Department of Public Health Maximum Contaminant Levels (MCLs) for drinking water and have no objectionable visual or odors.

B. The effluent produced by well rehabilitation, development and testing the well will not be discharged to land or into streets, gutters or into any of the facilities such as the storm drains.

C. The **CONTRACTOR** will provide the conveyance mechanism and all safety measures for the transportation of water to the sanitary sewer manhole.

1.09 NOISE ABATEMENT

A. The work shall be carried out as quietly as possible to prevent possible annoyance to adjacent businesses and residents. Unnecessary noise shall be avoided at all times. The **CONTRACTOR** shall comply with the requirements of any and all local ordinances and the instructions of the **ENGINEER'S CONSULTANT**.

B. No person shall operate any machine, mechanism, device, or contrivance which produces a noise level exceeding eighty-five (85) dbA ("dbA" means decibels on the A scale) measured fifty (50) feet there from. The prohibition in this Section shall not apply to any such machine, mechanism, device or contrivance which is operated in excess of two thousand five hundred (2,500) feet from any occupied dwelling unit.

C. In general, the **CONTRACTOR** shall maintain a dbA level less than 50 decibels at the property line when the project is in residential areas, in cities, or incorporated areas. Special conditions may allow for higher levels.

1.10 AIR QUALITY

A. The **CONTRACTOR** shall comply with all applicable air quality requirements in the air quality district with jurisdiction over the construction zone as not to exceed any threshold established for any pollutant in that particular district. The project area is covered by the El Dorado County Air Pollution Control District (EDCAPCD).

B. To minimize the generation of ozone pollutants throughout the project area to the fullest extent possible, the **CONTRACTOR** shall employ the following mitigation measures: Where feasible, the **CONTRACTOR** shall utilize electricity from available power sources in place of combustion engines; **CONTRACTOR** is required to reduce idling time of vehicles wherever possible; **CONTRACTOR** will ensure all vehicles used in construction are tuned and in good working order at all times and shall undergo scheduled regular good working order at all times and shall undergo schedule regular maintenance; vehicles displaying signs of improper emissions or improper working order will be removed from use until repaired; **CONTRACTOR** shall use the minimum number of vehicles possible to complete the job and will encourage their crews to carpool to and from the construction site whenever and wherever possible; use of California smog equipped transportation equipment is encouraged; use of newer, more technologically advanced equipment is encouraged wherever possible and will aid the **CONTRACTOR** in reducing emission for all pollutants; **CONTRACTOR** shall perform the construction on schedule that will reduce vehicle miles traveled to the fullest extent practicable.

1.11 FENCES

A. Fences, Barricades, Warning Signs, and Lights.

1. When used, shall conform to CAL-OSHA regulations, other State of California and local codes, rules, regulations, and ordinances for protection of workers, public and private property, and provide, install and maintain barricades, warning devices and other protection required therefore.

2. **CONTRACTOR** shall provide temporary fencing, etc., as required to protect materials, equipment, and miscellaneous items from theft, vandalism, unauthorized access and/or harm.

3. The **CONTRACTOR** shall provide secured fencing with a visual barrier when using temporary storage tanks which are not contained entirely with the fenced enclosure of LBWC property.

PART 2 PRODUCTS

(Not used.)

PART 3 EXECUTION

(Not used.)

END OF SECTION

SECTION 330120-200

VIDEO CAMERA SURVEYS

PART 1. GENERAL

1.01 DESCRIPTION

A. This work includes all materials, labor, tools, and equipment required for color video camera survey over the entire depth of the well. A video survey is to be completed prior to the mechanical cleaning of the well.

1.02 SUBMITTALS

A. The **CONTRACTOR** shall perform the video survey or use Pacific Surveys as a **SUBCONTRACTOR**. A DVD shall be provided to the **ENGINEER'S CONSULTANT** immediately after the survey is complete.

B. The **CONTRACTOR** shall provide the **ENGINEER'S CONSULTANT** with three (3) DVDs of the camera survey upon completion of the survey.

1.03 MEASUREMENT AND PAYMENT

A. Payment for the video camera surveys shall be per Lump Sum price as itemized in the Bid Schedules.

PART 2. MATERIALS

2.01 VIDEO CAMERA

A. The camera used for the survey shall be equipped with centralizers.

B. The equipment used by the firm for the video survey shall produce a video with an automatic depth indication.

C. The camera shall provide both vertical and side scanning capabilities.

2.02 DVD

A. The **CONTRACTOR** shall use new DVD's to document the camera survey.

PART 3. EXECUTION

3.01 SURVEY

A. The surveys shall be run in the presence of the **ENGINEER'S CONSULTANT**.

B. The **CONTRACTOR** shall spray exposed surfaces of the camera with a solution having a chlorine residual of not less than 200 mg/L prior to performing the survey.

C. The **CONTRACTOR** shall be required to provide whatever assistance may be required to accomplish the camera survey, including removing and reattaching the steel cover plate on the well casing.

D. The **CONTRACTOR** shall convey at least three (3) well volumes of fresh water into the well before conducting the video survey.

E. Clarity must be sufficient to evaluate the condition of all joints, screen openings, and interior surface of all casings and screen.

F. Should the video survey fail to produce a clear picture of the internal casing conditions as determined by the **ENGINEER'S CONSULTANT**, the **CONTRACTOR** shall make arrangements to clear the water and resurvey the well at no additional expense to the **ENGINEER**.

G. A vertical scan of the well shall be completed first to the total depth of the well. A focusing side-scan of the well shall be made as the camera is returned to ground surface to inspect all points of interest, including but not limited to well screens, casing joints, sounding port, and damaged areas/spots.

H. The maximum speed of the vertical survey shall be 30 feet per minute. The side scan shall be at a rate of no more than one revolution per foot at a rate of 10 feet per minute. If the survey speed exceeds this rate, the **CONTRACTOR** shall re-run the video survey at no additional cost to the **ENGINEER**.

I. The video survey DVDs shall become the property of the **ENGINEER'S CONSULTANT** at the time the survey is completed.

END OF SECTION

SECTION 330120-202

DYNAMIC FLOW SURVEY

PART 1. GENERAL

1.01 DESCRIPTION

A. This section describes the Dynamic flow survey to be conducted by the geophysical logging firm Pacific Surveys, and to be retained by the **ENGINEERS CONSULTANT.** The survey shall be run during the aquifer testing.

1.02 RELATED SECTIONS

A. None.

1.03 SUBMITTALS

A. Five copies of the survey results will be provided at the completion of logging.

B. Within 7 days of the completion of the survey, the **CONTRACTOR** shall provide to **ENGINEER'S CONSULTANT** all survey logs and interpretation (10 paper copies) and in "pdf" format (on a compact disc or thumb-drive).

1.04 MEASUREMENT AND PAYMENT

A. Payment for the Dynamic flow survey shall be Lump Sum price as itemized on the Bid Schedule.

PART 2. MATERIALS

2.01 TESTING EQUIPMENT

A. The Dynamic flow survey tool shall consist of a device that can visually quantify volumetric flow rates into the well within 2 feet of the entry point. The tool shall be capable of detecting flow from 0.2 to 100 feet per minute (1.5 to 800 gpm).

PART 3. EXECUTION

3.01 LOGGING

A. The logs will be run in the presence of the **ENGINEER'S CONSULTANT**. The visual flow survey logs shall become the property of the **ENGINEER'S CONSULTANT** when the logging is completed.

B. The survey shall be performed in two steps. Initially the survey shall be conducted with measurement being taken on at least 20-foot intervals to assess the overall flow conditions within the well. The next step shall then be performed at smaller intervals to define entry areas.

C. The **CONTRACTOR** shall be required to provide whatever assistance may be necessary to accomplish the logging.

END OF SECTION

SECTION 330120-342

MECHANICAL WELL CLEANING

PART 1. GENERAL

1.01 DESCRIPTION

A. This section describes the well cleaning activities to be conducted after the pump and appurtenances have been removed from the well and a video log made of the initial conditions. The **CONTRACTOR** shall notify the **ENGINEER'S CONSULTANT** before work commences.

1.02 RELATED SECTIONS

A. Section 330120-200 Video Camera Surveys

1.03 SUBMITTALS

A. The **CONTRACTOR** shall provide to the **ENGINEER** a daily report describing the work accomplished, hours used, and personnel on-site.

1.04 MEASUREMENT AND PAYMENT

A. Payment for the mechanical well cleaning shall be at an hourly rate price as itemized in the Bid Schedules.

PART 2. MATERIALS

2.01 CLEANING EQUIPMENT

A. The **CONTRACTOR** shall furnish a wire brush all of whose bristles touch the edges of the casing.

B. The brush shall be attached to a wire-line, pipe or drill rods as long as the brush can freely rotate during raising and lowering the brush during the cleaning process.

C. The **CONTRACTOR** shall clean all tools and equipment, prior to arriving on site, that will be used downhole with a solution of 500 ppm chlorine bleach and water (one-gallon of 5.25% bleach in 100 gallons of water). After the cleaning the equipment shall be allowed to thoroughly air-dry.

D. The CONTRACTOR shall only use thread lubrication compound purchased and dedicated to the well.

PART 3. EXECUTION

3.01 WELL CLEANING

A. The total depth of the well shall be measured before beginning work.

B. The **CONTRACTOR** shall use a wire brush to clean and remove scale attached to the well casing.

C. The **CONTRACTOR** shall use a wire brush to clean and remove scale attached to mills knife or louvered perforations or nylon brushes for wire wrapped well screens.

D. The well screens shall be brushed for about 2 minutes per foot of screen section. The well casing shall be brushed for about 1 minute per foot of casing below the water surface.

E. The **CONTRACTOR** shall remove the brush upon completion of the mechanical cleaning and bail sediments and debris from the bottom of the well. The sediment shall be bailed to a depth of 135 feet bgs upon completion of the work.

END OF SECTION

SECTION 330120-460

WELL AND AQUIFER TESTING

PART 1. GENERAL

1.01 DESCRIPTION

A. This section includes the products, materials, and procedures associated with the well and aquifer testing. Also included but not limited to, step-drawdown test with increasing discharge rate, long-term continuous constant-rate pumping test, and sand production test. It is the **ENGINEER'S** general objective to have a well that is sand-free and hydraulically efficient.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 330120-200 Video Camera Surveys

1.03 SUBMITTAL

A. None.

1.04 MEASUREMENT AND PAYMENT

A. The measurement for work associated with well and aquifer testing is per Hour.

B. Payment for well and aquifer testing will be made in accordance with the unit prices itemized in the Bid Schedules. Payment shall include full compensation for furnishing and operating equipment.

1.05 SAND CONTENT PERFORMANCE CRITERIA

A. Sand testing and content criteria are given below:

1. Sand production shall average less than or equal to 5 parts per million (ppm) when measured over any 5-minute interval within the first 15 minutes from the commencement of pumping at the design capacity of the well.
2. The design capacity of the wells will be determined during well development.
3. Sand production shall be measured using a Rossum Centrifugal Sand Sampler as specified in Section E.2.3 of the AWWA A100-97 Standard for Water Well and in the article "Control of Sand in Water Systems, Journal of American Water Works Association, Volume 46, No. 2, February, 1954.

B. Failure of Pump Operation

1. In the case of failure of the pump operation for a period greater than one (1) percent of the elapsed pumping time from t=0, the test shall be suspended until the static water level has been attained. Should the test be aborted as a result of a deficiency on the part of the **CONTRACTOR**'s equipment or personnel, all time consumed in waiting for complete water level recovery and in resuming the pump test to the point where it was aborted shall be at no cost to the **ENGINEER**.

PART 2. EQUIPMENT

2.01 GENERAL

A. Water Level Probe and Sounding Tube

1. The **CONTRACTOR** shall furnish an electrical depth gauge capable of indicating changes in the well water level to the nearest 0.01 foot.

2. A 1-inch diameter temporary PVC sounding tube shall be installed from ground surface to 10-feet above the pump. This shall be used for the water level sounder and/or pressure transducer during testing.

B. In-Line 15-micron Bag Filter

1. Contractor shall furnish and install a temporary 15-micron bag filter sized properly to accept up to 165 gpm flow and allow flow to be filtered for entire 24-hour constant-rate test. See Figure B-1 for location of filter related to other site appurtenances. The filter shall be in-line, after the pump and prior to any treatment systems.

PART 3. EXECUTION

3.01 PROCEDURES

A. The **CONTRACTOR** shall provide whatever assistance may be required by the **ENGINEER'S CONSULTANT** to conduct the tests

B. The **CONTRACTOR** shall schedule all tests sufficiently in advance so that the **ENGINEER'S CONSULTANT** can be on site during each testing period.

C. Step Draw-down Test

1. The well shall be "step" tested for 1 hour each at rates of approximately 1/2, 3/4, 1 and 1 ¼ times the historic design capacity of the well, unless otherwise specified by the **ENGINEER'S CONSULTANT**. The furnished and installed pump shall be able to pump from 65 to 165 gallons per minute.

2. The complete test for the well is estimated to require approximately 4 hours.

3. The **CONTRACTOR** shall operate the pump and change the discharge as specified by the **ENGINEER'S CONSULTANT**.

4. Discharge rate from the pump shall be controlled by a gate valve and/or variable frequency drive. The discharge shall be controlled and maintained at the desired discharge for each step with an accuracy of at least plus or minus five (5) percent.

5. The rate of sand production will be measured by the **CONTRACTOR** using the Rossum centrifugal sand sampler. Rate of sand production will be determined at five-minute intervals within the first 20 minutes of each step and at the conclusion of each step.

6. During the test, the **ENGINEER'S CONSULTANT** and/or the **CONTRACTOR** will record the time, pumping level, discharge rate, and rate of sand production.

D. Long-Term Pumping Test

1. The rate of pumping shall be specified by the **ENGINEER'S CONSULTANT**.

2. The Contractor shall ensure that the pumping rate selected remains constant throughout the test.

3. The test duration shall be approximately 24-hours.

4. When the test is completed and the pump stopped, the **ENGINEER'S CONSULTANT** will measure recovery of the water level in the well until it has recovered to within 10 percent of the static water level.

5. During the drawdown and recovery tests, the **ENGINEER'S CONSULTANT** and/or the **CONTRACTOR** will record the time and measure the water level in the pumped well on the following schedule:

Pump Test Schedule	
First 10 minutes	once every minute
10 to 20 minutes	once every 2 minutes
20 to 60 minutes	once every 10 minutes
60- to 240 minutes	once every 30 minutes
240 to 720 minutes	once every 60 minutes
720 to 1,400 minutes	once every 120 minutes

E. The **ENGINEER'S CONSULTANT** and/or the **CONTRACTOR** will also record the discharge rate each time the pumping water level is measured.

F. The **ENGINEER'S CONSULTANT** may collect water samples near the end of the drawdown test for analyses.

G. The **CONTRACTOR** shall not remove the pump for a period of 24-hours after completion of the constant rate test to allow for recovery water level measurements. No standby time will be paid during this time.

H. The **CONTRACTOR** shall provide qualified personnel continuously during both the step-drawdown and long-term pumping test to ensure proper operation of the pumping test equipment and to measure water levels. The **ENGINEER'S CONSULTANT** will be present during start-up of each test to assist in measuring water levels.

   1. No payment will be made to the **CONTRACTOR** for an aborted pumping test interrupted by the malfunctioning or failure of pumping equipment. If a test is interrupted, the water levels will be allowed to fully recover, after which the test will be restarted.

   2. When the production tests are complete, the **CONTRACTOR** shall remove the pump and clean the well of all accumulated sediment and foreign material. The **CONTRACTOR** shall demonstrate that the well has been properly cleaned by measuring the depth of the well in the **ENGINEER'S CONSULTANT**'s presence prior to final well disinfection.

END OF SECTION

SECTION 330120-20000

SITE CLEANUP

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. This work includes all materials, labor, tools, and equipment to properly perform site cleanup.

B. RELATED SECTIONS

1. All.

C. MEASUREMENT AND PAYMENT

1. MEASUREMENT—no measurement shall be made for Site Cleanup.

2. PAYMENT—no separate payment for Site Cleanup will be made in this contract.

3. There will be no additional payment for rig time or idle time while site cleanup is being conducted.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

3.01 CLEANUP

A. The **CONTRACTOR** shall keep the premises free from accumulations of waste materials, rubbish, and other debris resulting from the work, and at completion of the work, he shall remove all waste materials, rubbish, and debris from and about the well site as well as all tools, construction equipment, fuel tanks, machinery, and surplus materials.

1. The **CONTRACTOR** shall properly dispose of debris removed from the bottom of the well and miscellaneous debris.

2. The **CONTRACTOR** shall leave the site clean and ready for use by the **ENGINEER**.

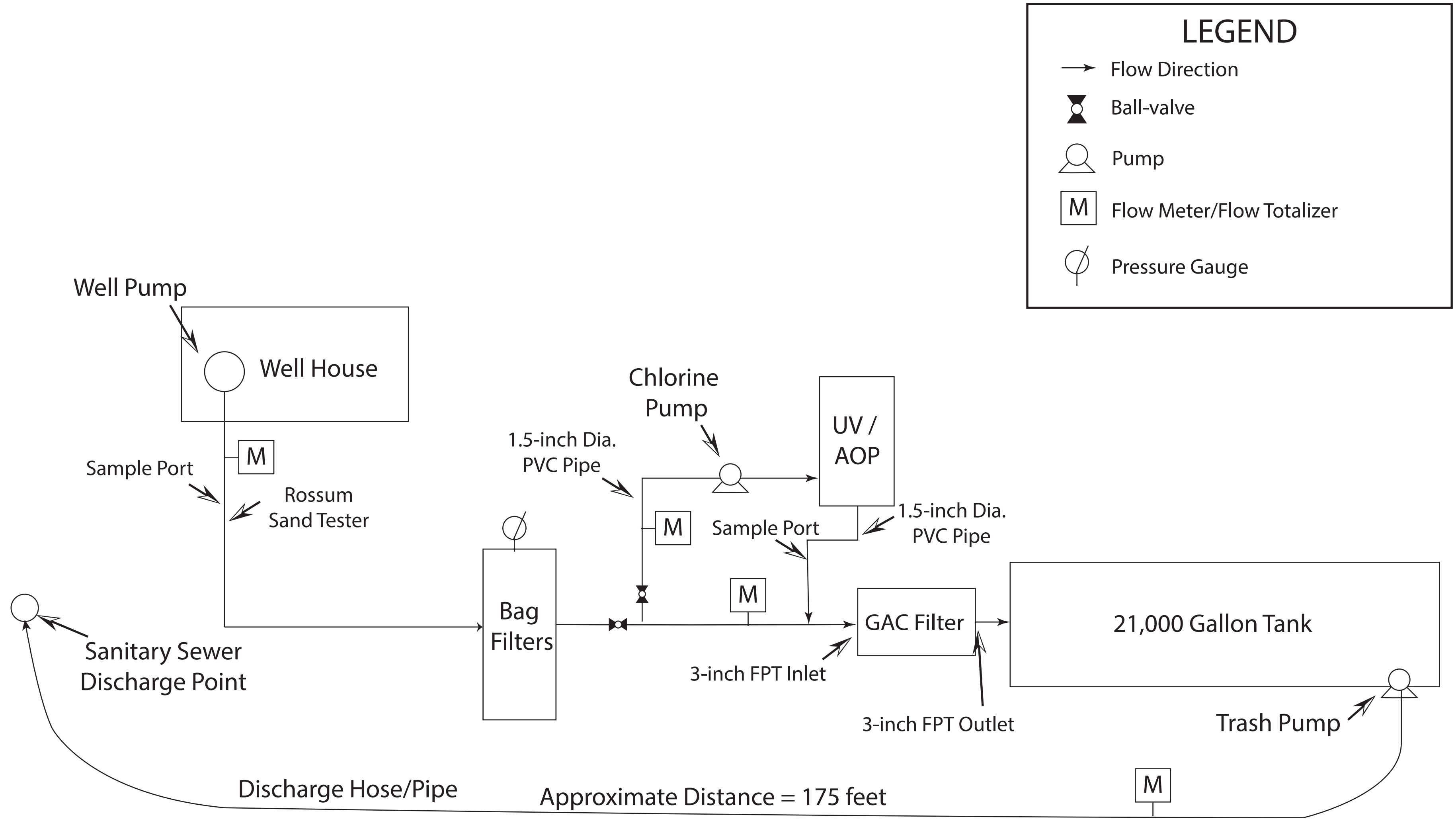
3. The **CONTRACTOR** shall restore to their original condition all temporary work areas.

4. Any oil-stained or contaminated soils created by the **CONTRACTO**R shall be removed and properly disposed of by the **CONTRACTOR**.

5. The **CONTRACTOR** is responsible for any damages to properties adjacent to the well caused by well testing activities associated with the work described in the contract documents.

END OF SECTION

FIGURES

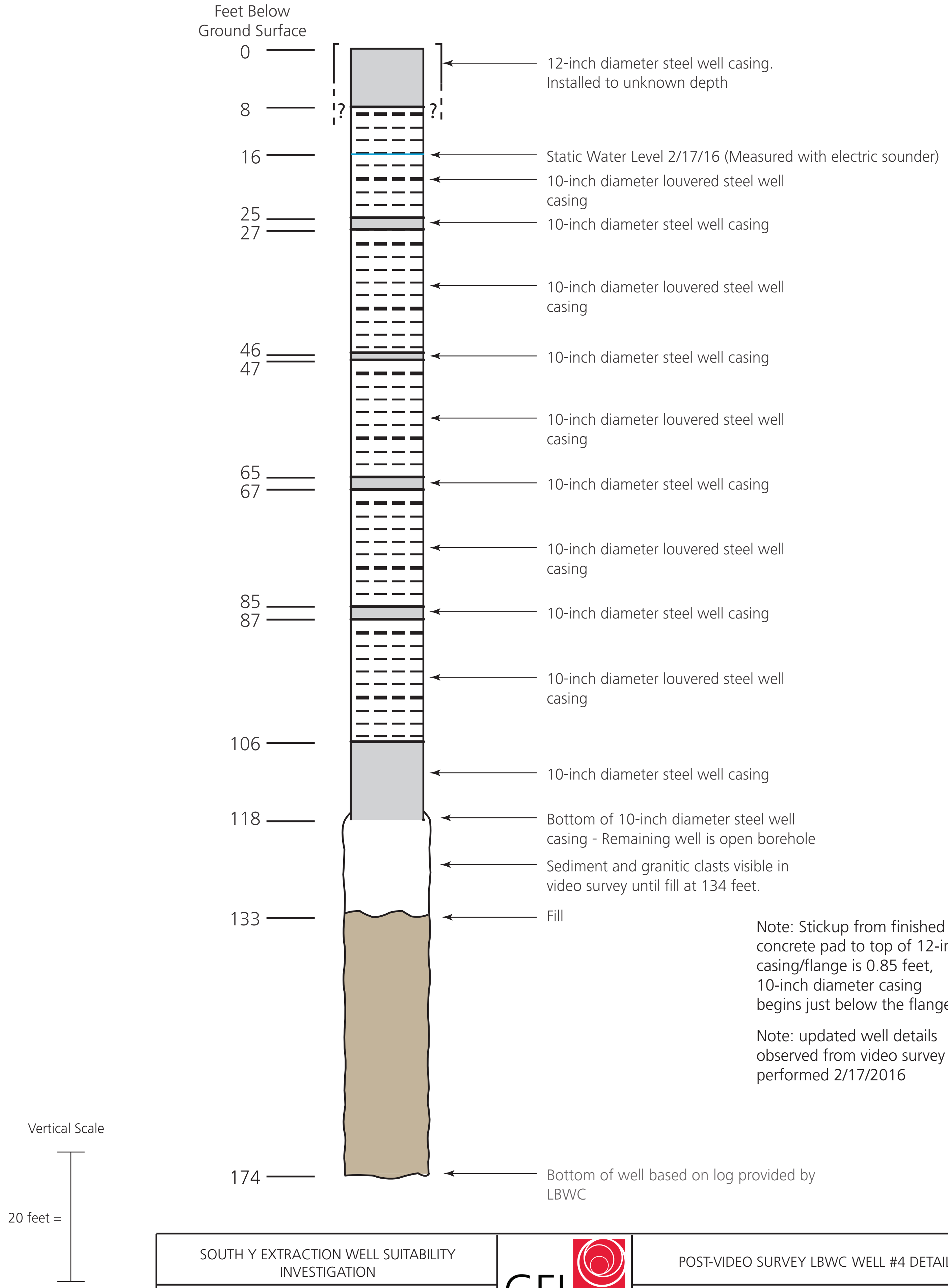


Note: 3-inch Sanitary connection to male NPT adapters will be provided for use with the UV/AOP inlet and outlet connections

Not to scale

SOUTH Y EXTRACTION WELL SUITABILITY INVESTIGATION	GEI Consultants	LBWC WELL #4 AQUIFER TEST AND TREATMENT SETUP
SOUTH TAHOE PUBLIC UTILITY DISTRICT		MARCH 2016 — FIGURE B-1

LBWC Well #4



Note: Stickup from finished concrete pad to top of 12-inch casing/flange is 0.85 feet, 10-inch diameter casing begins just below the flange

Note: updated well details observed from video survey performed 2/17/2016

SOUTH Y EXTRACTION WELL SUITABILITY INVESTIGATION	GEI Consultants	POST-VIDEO SURVEY LBWC WELL #4 DETAILS	
SOUTH TAHOE PUBLIC UTILITY DISTRICT		MARCH 2016	FIGURE B-2

SPECIAL DISCHARGE PERMIT

Revised October 16, 2014

This Special Discharge Permit (Permit) is issued by the South Tahoe Public Utility District, a California Public Agency formed in 1950 pursuant to the Public Utility District Act (District), to ______________________________ (Permittee) and (Consultant) issued at South Lake Tahoe, California, with reference to the following facts and intentions:

A. District owns and operates a wastewater collection system and treatment plant (collectively Wastewater System) and delivers treated wastewater for storage and use by customers in Alpine County;

B. Permittee is the owner of, and/or the responsible party for, the real property located at
(Property);

C. Permittee desires to discharge industrially treated wastewater, wastewater of an unusual strength or character, and/or extraordinary amounts of wastewater (collectively Discharge Water) into the Wastewater System;

D. Permittee has retained the services of Consultant to operate the treatment and discharge of the Discharge Water into the Wastewater System. Consultant represents to District that it is fully qualified, capable and available to operate the Discharge Water treatment system in accordance with the requirements of this Permit; and

E. District agrees to allow Permittee to discharge the Discharge Water into the Wastewater System, pursuant to the terms and conditions of this Permit.

NOW, THEREFORE, the parties agree as follows:

1. **Wastewater Discharge Requirements** The Discharge Water shall not compromise or damage any process, component or operation of the Wastewater System including, but not limited to the biological treatment. The Discharge Water composition must be capable of being treated by District's standard treatment process so that the treated Discharge Water complies with District's current requirements and any standards, laws, regulations or ordinances of local, state, or federal governmental agencies. The type and maximum concentration of contaminates, chemicals, or other materials contained in the Discharge Water shall be determined by District, in its sole discretion, which may be modified at anytime, and include, but not limited to, the following:

a. pH between 5.5 and 9.0
b. Benzene < 1 ppb
c. Ethylbenzene <680 ppb
d. Toluene <100 ppb
e. Xylene <620 ppb
f. Total Petroleum Hydrocarbon (TPH) <1 mg/1

g. MTBE <0.5 ppb

h. Suspended Solids <300 mg/1

2. **Discharge Water** Permittee shall submit the following information for review and approval by District prior to the connection of Permittee's facilities to the Wastewater System and discharge into the Wastewater System:

a. **Flow Rate** The proposed maximum flow rate that Discharge Water will be discharged by Permittee into the Wastewater System.

b. **Discharge Water Analysis** A detailed analysis of the Discharge Water prior to treatment, performed by certified laboratory, including analysis of organic compounds VOCs and SVOCs (by EPA method 8260-full scan), Title 22 metals, particulate matter (TDS and TSS), water chemistry (PH and alkalinity), and natural organic matter (EPA 415.1 or Standard Methods 18th Edition 531 a, b, c, or d), and such other analysis as may be requested by District.

c. **Treatment Plan** A comprehensive description of the treatment plan including, but not limited to, site plan, treatment method(s), proposed treatment medium and/or treatment equipment specifications, and any other pertinent information related to the treatment as may be requested by District. An activated carbon "polishing unit" shall be used as the final treatment of the Discharge Water prior to discharge into the Wastewater System.

d. **Feasibility Evaluation** Feasibility evaluation describing in detail that the planned treatment will comply with all permit requirements at 125% maximum pollutant influent concentrations. The feasibility evaluation shall include calculations and supporting documentation signed and stamped by a California licensed professional engineer or registered geologist with at least three (3) years in experience in designing remediation systems for the type of treated Discharge Water proposed by Permittee to be discharged into the Wastewater System. A copy of the engineer's or geologist's resume providing the above information shall be attached to the submittal.

3. **Connection to Wastewater System** Permittee shall only be entitled to connect to the Wastewater System at a point and in a manner as approved by District. District inspectors must approve all connections and disconnections to the Wastewater System. The portion of the discharge connection into the Wastewater System that is underground must remain uncovered until approved by District. Connection to the Wastewater System shall also include the installation of an approved meter to monitor the quantity of treated Discharge Water discharged into the Wastewater System. Permittee shall provide District with at least forty-eight (48) hours prior written notice of the time and date of the first planned discharge.

4. **Inspection** Permittee shall provide District with safe and unrestricted access to Permittee's Discharge Water treatment system and connection facilities during the term of this Permit. Permittee shall provide a sample tap, approved by District, to allow quick and easy sample collection during operation. The District will collect random samples at such times as determined by District at its sole discretion. Permittee, as the owner of the Property and/or as the responsible party, has the authority or has obtained the written authorization from the owner of the Property to perform and undertake all obligations required by this Permit including, but not limited to, providing District with unrestricted access to the Property and the Treatment System for any and all purposes related to this Permit. In the event the Treatment System is located on real property other than the Property (Other Property), Permittee shall obtain written permission from the owner of the Other Property in order to provide the District with unrestricted access to the Other Property and the Treatment System for any and all purposes related to this Permit.

5. **Operation** The operation of the treatment system and discharge of Discharge Water into the Wastewater System shall be in strict compliance with the requirements of this Permit. In the event the Discharge Water does not comply with the requirements of this Permit, at any time, Permittee shall immediately stop discharging into the Wastewater System and immediately notify District. Permittee shall not resume discharging into the Wastewater System until the cause of the noncompliance is ascertained and the condition creating such noncompliance is corrected by Permittee. In addition, Permittee shall immediately stop discharging into the Wastewater System if directed by the District for any reason. Afterwards, District shall notify Permittee if, when, and under what conditions that discharging may resume into the Wastewater System.

6. **Sampling** Permittee shall retain the services of a laboratory capable of analyzing to the required detection limits. The analysis of volatile organic chemical concentrations in the discharge shall be performed by a California State Health Department certified mobile or an off-site laboratory using EPA method 8260 or other method approved by the District. The laboratory shall collect a field and travel blank. The travel blank need only be tested if a suspected discharge violation occurs. Permittee shall report all Discharge Water testing results by facsimile or personal delivery, as soon as available but no later than 24 hours after receiving the test results from the designated laboratory. The test results shall include the date and time of sampling and the instantaneous and cumulative flow readings at the time of sampling. The District may require the laboratory to perform additional sampling and/or rush sampling as determined by District.

The District requires weekly sampling of the “polishing unit” influent and the system effluent until the system’s reliability is established to the District’s satisfaction. If no discharge violations occur, District may allow Permittee to reduce sampling to twice monthly and, if the “polishing unit” influent is non-detect, the effluent sample need not be analyzed. Notwithstanding, monthly sampling of the Discharge Water effluent, between each treatment unit, and the influent is required. In the event of discharge violations, District, at its sole discretion, may increase sampling requirements.

7. **Violations** In the event Permittee violates or breaches any term, condition, or requirement of this Permit, District may exercise any and all rights provided in this Permit, District’s ordinances, rules and regulations, and any other law or regulation, at law or in equity. No remedy or election shall be deemed to be exclusive but shall, wherever possible, be cumulative with other remedies. In addition, District may take any or all of the following actions with respect to any breach or violation, as determined by District in its sole discretion, require Permittee to discontinue discharges pursuant to this Permit and impose additional conditions or requirements for continued discharge of Discharge Water, and take any other actions as determined by District to protect the operation and integrity of the Wastewater System.

8. **Indemnification** To the maximum extent allowed by law, Permittee shall indemnify, defend and hold harmless District, its elected officials, directors, officers, employees, agents, and consultants, from and against all damages, liabilities, claims, actions, demands, costs and expenses, including, but not limited to, costs of investigations, lawsuits and other proceedings in law or in equity, settlement costs, attorneys' fees and costs, and penalties, administrative fines, or violations of any kind, which arise out of, or result from or relate to: (a) any injury to person or property in connection with this permit and/or the discharge of the Discharge Water; (b) any intentional or negligent act or omission on the part of Permittee or its agents, consultants, representatives, contractors, employees, invitees, or licensees; (c) any breach of the terms and conditions of this Permit by Permittee; and (d) violation of any local, state or federal law, regulation, ordinance.

9. **Costs and Expenses** Permittee shall pay all costs and expenses related to this Permit including, but not limited to the following:

A. Permit fee of six hundred dollars ($600) per year;
B. Discharge rate fee of six dollars ($6) per one thousand (1,000) gallons;
C. Laboratory and testing costs;
D. District's cost and expenses including, but not limited to, inspections, testing, and sampling.

District shall send statements to Permittee for the costs and expenses in such intervals as determined by District. Statements are due and owing upon receipt and are delinquent if not paid within sixty (60) days after the date of the statement. Delinquent statements shall be subject to penalties and interest charges.

10. **Effective Date and Term of Permit** This Permit shall be effective upon District's written notification to Permittee that all submittals and information required for the requested discharge has been received and approved by District. This Permit may be revoked and terminated with or without prior notice to Permittee for any breach of this permit or as necessary to protect the integrity of the Wastewater System, as determined at the sole discretion of District.

11. **General Provisions**

a. **Recitals** The recitals stated at the beginning of this Permit of any matters or facts shall be conclusive proof of their truthfulness thereof and the terms and conditions stated in the recitals, if any, shall be deemed a part of this Permit.

b. **Authorizations** All individuals executing this Permit and other documents on behalf of the respective parties certify and warrant that they have the capacity and have been duly authorized to so execute the documents on behalf of the entity so indicated. Each signatory shall also indemnify the other parties to this Permit, and hold them harmless, from any and all damages, costs, attorneys' fees and costs and other expenses, if the signatory is not so authorized.

c. **Construction** The provisions of this Permit should be liberally construed to effectuate its purposes. The language of all parts of this Permit shall be construed simply according to its plain meaning and shall not be construed for or against either party, as each party has had the opportunity to have their counsel review it. Whenever the context and construction so requires, all words used in the singular shall be deemed to be used in the plural, all masculine shall include the feminine and neuter, and vice versa.

d. **Notice** All notices, requests, demands, and other communications required to or permitted to be given under this Permit shall be in writing and shall be conclusively deemed to have been duly given (1) when hand delivered to the other party; or (2) when received via telex or facsimile at the address or number stated below (provided that notices given by facsimile shall not be effective unless either (a) the facsimile is a routine lab report, (b) a duplicate copy of such facsimile notice is promptly given by depositing same in a United States post office with first-class postage prepaid and addressed to the parties as stated below, or (c) the receiving party delivers a written confirmation of receipt for such notice either by facsimile or any other method permitted under this paragraph; additionally, any notice given by telex or facsimile shall be deemed received on the next business day if such notice is received on the next business day if such notice is received after 5:00 p.m. (recipient's time) or on a nonbusiness day); or (3) three business days after the same have been deposited in a United States post office with first class or certified mail return receipt requested postage prepaid and addressed to the parties as set forth below; or (4) the next business day after same have been deposited with a national overnight delivery service (Federal Express, DHL Worldwide Express, Express Mail, etc.), postage prepaid, addressed to the parties as stated below with next-business-day delivery guaranteed, provided that the sending party receives a confirmation of delivery from the delivery service provider.

DISTRICT:

General Manager
South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

With Copy to:

Gary M. Kvistad
Hatch and Parent
21 East Carrillo Street
Santa Barbara, CA 93101

Permittee:

Consultant:

Each party shall make an ordinary, good faith effort to ensure that it will accept or receive notices that are given in accordance with this paragraph and that any person to be given notice actually receives such notice. A party may change or supplement the addresses given above, or designate additional addresses, for purposes of this Section by giving the other party written notice of the new address in the manner stated above.

e. **Joint and Several** Permittee and Consultant shall be jointly and severally responsible for the obligations under this Permit. This Permit may be enforced against either Permittee or Consultant separately or against both jointly.

f. **Successors and Assigns** This Permit shall be binding on and shall inure to the benefit of the parties and their respective heirs, legal representatives, successors and assigns.

g. **Governing Law** The validity and interpretation of this Permit shall be governed by the laws of the State of California without giving effect to the principles of conflict of laws, with venue for all purposes proper only in the County of El Dorado, State of California.

h. **Severability** If any term, provision, covenant, or condition of this Permit shall be or become illegal, null, void or against public policy, or shall be held by any court of competent jurisdiction to be illegal, null, void or against public policy, the remaining provisions of this Permit shall remain in full force and effect and shall not be affected, impaired or invalidated. The term, provision, covenant or condition that is so invalidated, voided or held to be unenforceable shall be modified or changed by the parties to the extent possible to carry out the intentions and provisions of this Permit.

i. **Attorneys' Fees** If any action at law or equity, including an action for declaratory relief, is brought to enforce or interpret the provisions of this Permit, the prevailing party shall be entitled to recover actual attorneys' fees and costs which may be determined by the court in the same action or in a separate action brought for that purpose. The attorneys' fees and costs to be awarded shall be made to fully reimburse for all attorneys' fees, paralegal fees, costs and expenses actually incurred in good faith, regardless of the size of the judgment, it being the intention of the parties to fully compensate for all attorneys' fees, paralegal fees, costs and expenses paid or incurred in good faith.

j. **Waiver** The waiver of any breach of any provision of this Permit by any party to this Permit shall not be deemed to be a waiver of any proceeding or subsequent breach under the Permit, nor shall any waiver constitute a continuing waiver. No waiver shall be binding unless executed in writing by the party making the waiver.

k. Survival The covenants, representations, warranties and agreements contained in this Permit shall survive the discontinuance of Discharge Water discharges into the collection system and/or termination of this Permit.

l. Entire Agreement and Amendment This Permit contains the entire understanding and agreement of the parties and there have been no promises, representations, agreements, warranties or undertakings by any of the parties, either oral or written, of any character or nature binding except as stated in this Permit. This Permit may be altered, amended or modified only by an instrument in writing, executed by the parties to this Permit and by no other means. Each party waives their future right to claim, contest or assert that this Permit was modified, canceled, superseded or changed by any oral agreement, course of conduct, waiver or estoppel.

IN WITNESS WHEREOF, the parties have executed this Permit as of the date and place first stated above.

District _________________________

Permittee ________________________

Consultant _______________________

OWNER AUTHORIZATION

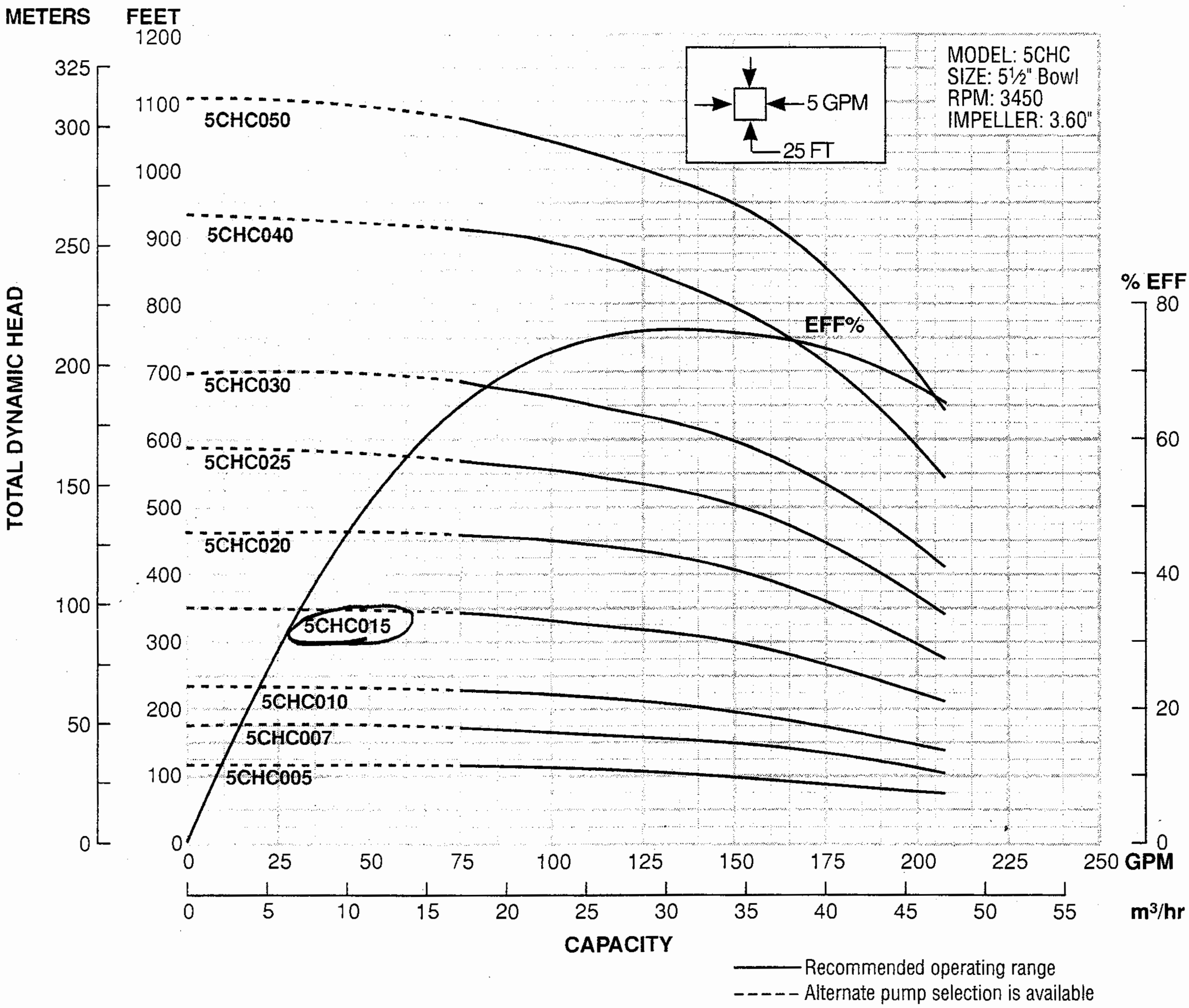
(Owner of the Property to complete in the event the owner is not the Permittee)

The undersigned (Owner) is the owner of the Property described in this Permit. The Owner has entered into an agreement with Permittee authorizing Permittee to fully perform all of the terms and conditions of this Permit. In consideration of District's issuance of this Permit, Owner unconditionally guarantees, for the benefit of District, Permittee's performance of the terms and conditions of this Permit. If Permittee fails to perform any of the terms and conditions of this Permit, District can enforce this Permit against Permittee, Consultant and Owner, individually or jointly. Owner waives the right to require District to proceed against Permittee and/or Consultant and the right to receive notices of nonperformance or demands for performance. Owner represents and warrants to District that Owner owns the entire ownership interest in the Property, or has the authority to bind all other owners to the obligations of this authorization.

OWNER _________________________

APPENDIX C. SUBMERSIBLE PUMP CURVE

Model 5CHC 150 GPM

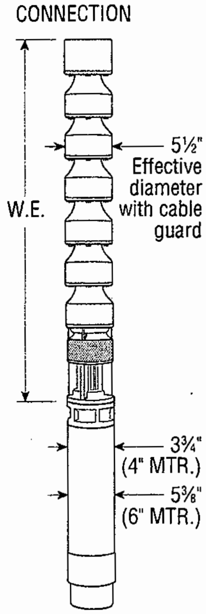


DIMENSIONS AND WEIGHTS

HP	Stages	W.E. Order Number	W.E. Length	W.E. Wt. (lbs.)
5	2	5CHC00544CTB	21 1/16	60
		5CHC00564CTB	23 7/32	62
7½	3	5CHC00744CTB	25⅞	73
		5CHC00764CTB	28 1/16	75
10	4	5CHC01064CTB	32 13/16	88
15	6	5CHC01564CTB	42 27/64	114
20	8	5CHC02064CTB	52 1/16	140
25	10	5CHC02564CTB	61⅝	166
30	12	5CHC03064CTB	71 7/32	192
40	16	5CHC04064CTB	90 27/64	244
50	19	5CHC05064CTB	104 53/64	283

(All dimensions in inches and weights in lbs. Do not use for construction purposes.)

PLEASE NOTE:
- Order motors separately.
- For intermediate horsepower pumps consult factory.
- Solid line is recommended operating range. The dotted line (- - - -) signifies an alternate pump selection is available.
- Please specify all options changes in W.E. order number.



MATERIALS OF CONSTRUCTION

Part Name	Material
Shaft	ASTM A582 TYPE 416
Coupling	ASTM A582 S41600 CD
Suction Adapter	ASTM A48 CL 40
Discharge Bowl	ASTM A48 CL 30B
Bronze Bearings	ASTM B584
Discharge Bowl Bearing	ASTM B584
Taperlocks	ASTM A108 GR 101B
Bowl	ASTM A48 CL 30B
Upthrust Collar	ASTM A276 S41400
Impeller	ASTM B584
Fasteners	SAEJ429 GR 8
Cable Guard	ASTM A240 S 30400
Suction Strainer	ASTM A240 S 30400

APPENDIX D. FIELD DATA SHEETS

GEI Consultants

DAILY LOG

Page No. ____ of ____

Proj. Name___________________ Proj. No.________

Date______________ Task No.________

Weather__________________ Contractor________________

Time	Comments

By:______________________

GEI Consultants

Aquifer Test

Proj. Name___________________
Date______________
Weather___________________

Well ID __________

DTW (ft btoc) __________

Water Column (ft) __________

Time	Purge Vol. Gallons	Flow Rate GPM	DTW ft btoc	Drawdown ft	Observation Well ______ DTW ft btoc	Specific Capacity gpm/ft	Sand cc / ppm

VIDEO SURVEY LOG

Proj. Name___________________ Proj. No.________

Date______________ Task No.________

Contractor________________

Well ID______________ Units ___ btoc, bgs (circle one) Observed By______________

Vertical Depth	Horizontal Depth	Joints	Screen		Comments
			Top	Bottom	

GEI Consultants

DAILY DEVELOPMENT REPORT

Client______________________ Page No. ___ of ____

Proj. Name__________________ Proj. No.________

Date_______________________ Task No.________

Well ID______________ Contractor__________________

Static Water Level_______________ Observed By________________

Totalizer Start __________________ Time Start__________________

Totalizer Stop __________________ Time Stop__________________

Time	**Flow**	**Pumping Level**	**Draw Down**	**Spec. Yield**	**No. Of Surges**	**Sand Read.**	**Turbidty**	**Comments**
	(gpm)	(ft btoc)	(ft)	(gpm/ft)			NTU	

By_____________________________

GEI Consultants

PURGE LOG

Page No. ____ of ____

Proj. Name____________________ Proj. No.________

Date_______________ Task No.________

Weather___________________ Contractor_________________

Well ID ___________ DTW (ft btoc) ___________ T.D. (ft btoc) ___________

Water Column (ft) ___________ I.D. (in) ________ Casing Vol. (gal) __________ x3 = ___________ gal

Time	**Purge Vol.** Gallons	**Flow Rate** GPM	**DTW** ft btoc	**Temp.** °C	**pH**	**D.O.** mg/L	**Turb.** NTUs	**Cond.** uhmos/cm	**ORP**

Calibration: ____

____

____

By__________________________________

APPENDIX E. OBSTRUCTION PERMIT

APPROVED

MAR 21 2016

City of South Lake Tahoe
Public Works

CITY OF SOUTH LAKE TAHOE
APPLICATION/PERMIT
FOR ROAD CLOSURE/OBSTRUCTION IN RIGHT OF WAY

Date: 3-14-2016 APN: 023-65-518

Name of Owner: Lukins Brothers Water Company Phone: 530-541-2606

Job Address: 843 Hazel Drive, South Lake Tahoe Nearest Cross Street: Tahoe Vista Drive

Owner's Mailing Address: 2301 West Way South Lake Tahoe, CA 96150

Name of Contractor: GEI Consultants/Carson Pump Phone: GEI: 916-630-4500
Carson: 775-888-9926

Contractor's License #: NA/745270 Current C.S.L.T. Business License #: NA

Current Liability Insurance on file: Yes ______ No ______ Traffic Control Plan: ______

Type of work: Laying a hose from a well at the project site to the sanitary sewer manhole TK 191. The manhole is located approximatly 60-feet east of the 843 Hazel Drive .

Work scheduled to begin: March 21, 2016

Obstruction in Right of Way	**$233.00**
Road Closure (One day)	**$363.00**
2-30 day Road Closure	**$597.00**

Fee: $ 233.00 Receipt #: ______

Date Issued: 3/21/2016 Public Services Department Approval: Randy Carlson

ACKNOWLEDGEMENT OF CITY CODE: Applicant has reviewed all aspects of the South Lake Tahoe City Code which may be applicable to the project. By my signature which is placed below, I certify, under penalty of perjury under the laws of the State of California, that I have reviewed the South Lake Tahoe City Code, and that I will comply with all aspects of the South Lake Tahoe City Code as it may be applicable to this project.

Signature of Owner/Contractor

RYAN ALWARD
Print Name

Call for Inspections at (530) 542-6030

GEICONS-01 C

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM 2/26/20

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Ames & Gough 859 Willard Street Suite 320 Quincy, MA 02169	PHONE (A/C, No, Ext): (617) 328-6555	FAX (A/C, No): (617) 328-6888
	E-MAIL ADDRESS: boston@amesgough.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : National Union Fire Insurance Company of Pittsburgh, PA	19445
INSURED GEI Consultants, Inc. 2868 Prospect Park Drive Suite 400 Rancho Cordova, CA 95670	INSURER B : Continental Casualty Company (CNA) A, XV	20443
	INSURER C : Steadfast Insurance Company	26387
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

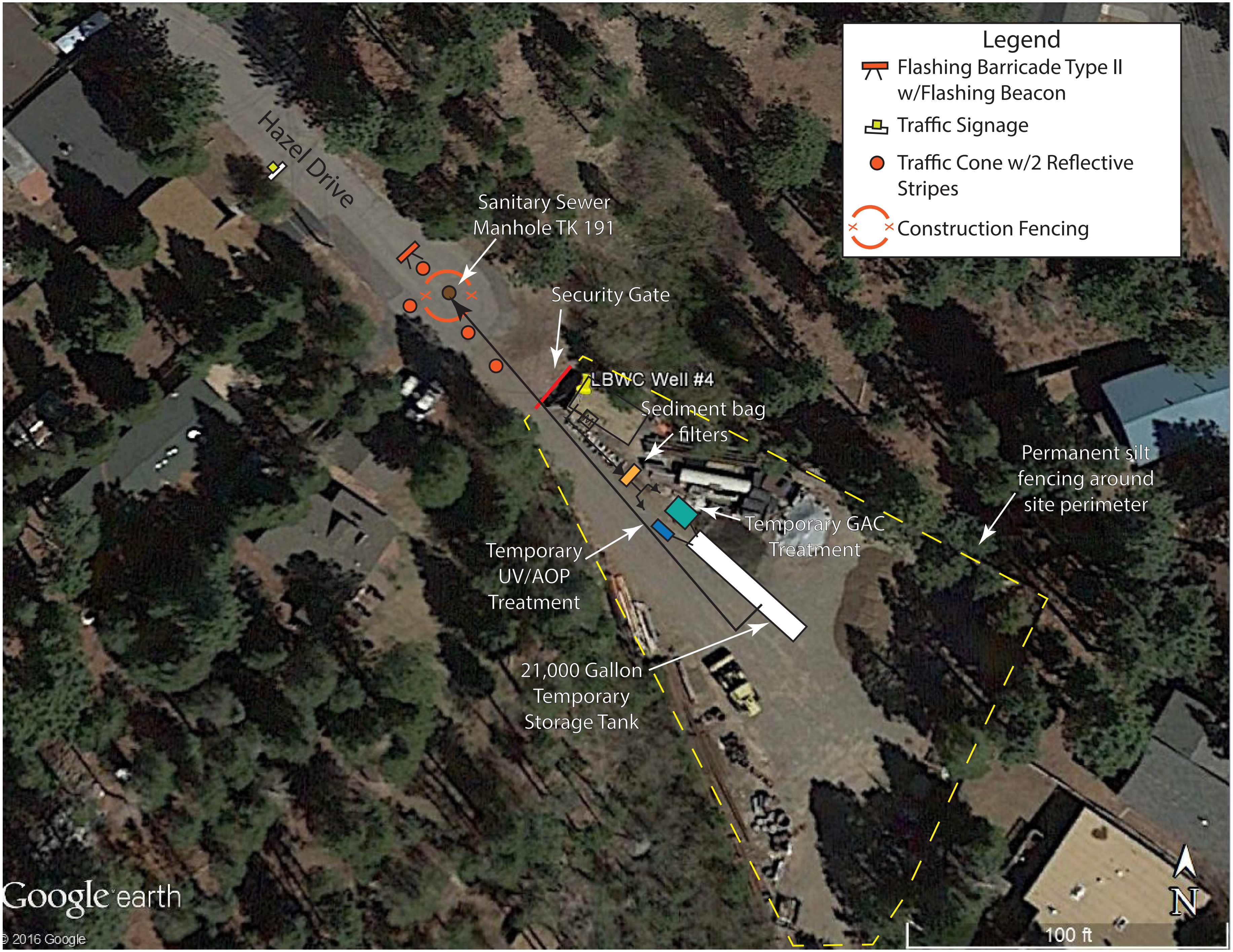
INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [X] LOC OTHER:	X	X	5180276	03/01/2016	03/01/2017	EACH OCCURRENCE	$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 300,000
							MED EXP (Any one person)	$ 25,000
							PERSONAL & ADV INJURY	$ 1,000,000
							GENERAL AGGREGATE	$ 2,000,000
							PRODUCTS - COMP/OP AGG	$ 2,000,000
								$
A	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS / SCHEDULED AUTOS X HIRED AUTOS / X NON-OWNED AUTOS	X	X	2961705	03/01/2016	03/01/2017	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	$
							PROPERTY DAMAGE (Per accident)	$
								$
B	X UMBRELLA LIAB [X] OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $ 0	X	X	6011396137	03/01/2016	03/01/2017	EACH OCCURRENCE	$ 1,000,000
							AGGREGATE	$ 1,000,000
								$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) [N] If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	X	012016046	03/01/2016	03/01/2017	X PER STATUTE / OTH-ER	
							E.L. EACH ACCIDENT	$ 1,000,000
							E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
C	Professional Liab			PEC023359500	03/01/2016	03/01/2017	Per Claim	5,000,000
C				PEC023359500	03/01/2016	03/01/2017	Aggregate	5,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

All coverages are in accordance with the policy terms and conditions.

RFP No. 620850: South Y Extraction Well Suitability Investigation
Danny Lukins; Lukins Brothers Water Company; and South Tahoe Public Utility District, its officers and employees shall be listed as additional insured with respect to general, auto and umbrella liability where required by written contract. Insurance (Excluding worker's compensation and professional liability) is primary and non-contributory. A waiver of subrogation is provided in accordance with policy terms and conditions.

CERTIFICATE HOLDER	CANCELLATION
South Tahoe Public Utility District Attn: General Manager 1275 Meadow Crest Drive South Lake Tahoe, CA 96150	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Michael Herlihy



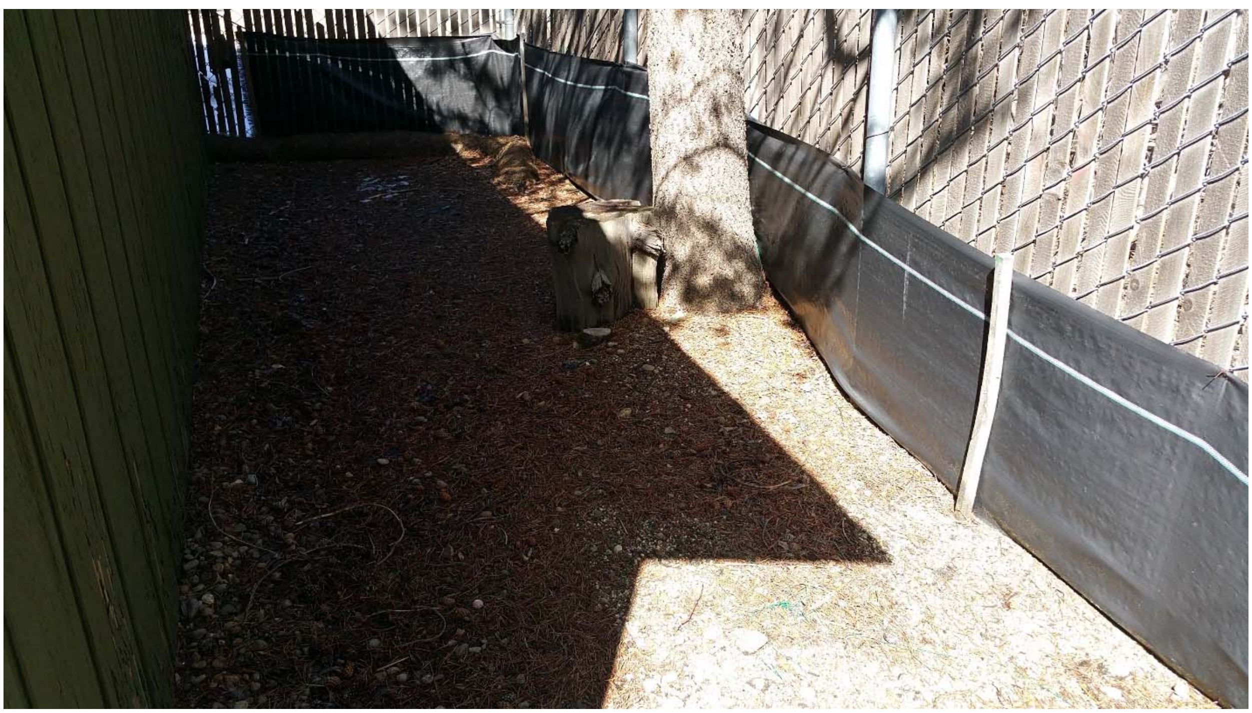
SOUTH Y EXTRACTION WELL SUITABILITY INVESTIGATION	GEI Consultants	TRAFFIC CONTROL PLAN 843 HAZEL DRIVE
SOUTH TAHOE PUBLIC UTILITY DISTRICT		MARCH 2016 FIGURE E-1

Appendix B: Field Photos

1. Sanitary sewer manhole and view of well house

2. Traffic control and protection around sanitary sewer discharge to manhole

3. Column Pipe and PVC sounding tube, submersible pump and motor



4. Silt fencing present on side of site adjacent to SEZ

5. Frac Tank for storing water prior to discharge to sanitary sewer

6. Rented 15 micron bag filters

7. Evoqua PV2000 GAC vessel

8. Wire brush used for mechanical cleaning

9. Bailer used after mechanical cleaning

10. UV Pilot Testing with chlorine solution and chlorine pump

11. Pump discharge head and access pipe for spinner tool

12. Pilot-test sample station

13. Pacific Surveys spinner tool

14. Pacific Surveys depth discrete sampling tool

15. Transducer installed into Rockwater Well

16. Pressure transducer installed into LBWC #4 Well

17. Rockwater Well pump column, looking down the well

18. Flow meter at well head

19. Carson Pump rig

20. 032816 Constant-Rate Imhoff Cones time 1449

21. 032816 Constant-Rate Imhoff Cones time 1649

Appendix C: Field Data Sheets

Appendix C.1 – Video Survey Data

GEI Consultants

VIDEO SURVEY LOG

Proj. Name: South Y Investigation
Proj. No.1601030
Date: February 17, 2016
Task No.3
Contractor: Carson Pumps
Well ID: Well #4
Units: btoc
Observed By: Ryan Alward
Note: Stick-up is 0.85 feet above floor

Vertical Depth	Horizontal Depth	Joints	Screen Top	Screen Bottom	Comments
	9		x		Corrosion, Louvered Casing
	15				SWL: 16.22 ft btoc measured with sounder
	26			x	
	28		x		
	40				Louvers
	41				
	47			x	Bottom of louver (50% open)
	48		x		
	54				Well cleaned up
	66			x	
	68				Louvers are more open (>50% open)
	86				
	88		x		
94					Increased growth on casing (<20% open)
	107			x	Louvers < 20% open
	119				Bottom of 10-inch, Open Hole
	121				Formation gravel, granite.
123					Hole deviating
133					Fill - Bottom
Raising Camera:					
	101				Tubercols, louvers <20% open
	93				Louvers ~50% open
	7	x			

Appendix C.2 – Step-test Data

SOUTH Y EXTRACTION WELL EVALUATION

LBWC #4 Step-Test

Field Data provided by Ivo Bergsohn of STPUD

Totalizer multiplier: 10

Date	Time	Pumping Time (min)	Totalizer (Galls x 10)	Total Sand Reading (ml)	Line Press. (psi)	DTW (ft bmp)	Gallons Pumped Since Last Reading (galls)	Total Gallons Pumped (galls)	Pumping Rate (gpm)	Drawdown (s)	Specific Capacity (Q/s)	Sand Since Last Reading (ml)	1/ Specific Capacity (s/Q)	NOTES
06/24/16	8:17 AM	0	509902	nr	0	15.72	0	0	0	0.00		nr		Pump Off
06/24/16	9:02 AM	0.0	509902	nr	0	15.72	0	0	0	0.00		nr		
06/24/16	9:16 AM	0.0	509902	nr	0	15.72	0	0	0	0.00		nr		Pump On
06/24/16	9:18 AM	2.0	509947	nr	nr	nr	455	455	228	--	--	nr		Pump Off
06/24/16	11:09 AM	0.0	509947	nr	0	15.76	0	0	0	0.00	--	nr		Pump On
06/24/16	11:12 AM	3.0	509978	nr	120	19.41	310	310	103	3.65	28.31	nr	0.04	
06/24/16	11:15 AM	6.0	510011	nr	120	19.58	330	640	110	3.82	28.80	nr	0.03	
06/24/16	11:18 AM	9.0	510042	nr	120	19.66	310	950	103	3.90	26.50	nr	0.04	
06/24/16	11:21 AM	12.0	510074	nr	120	19.72	320	1,270	107	3.96	26.94	nr	0.04	Imhoff Sample 1
06/24/16	11:24 AM	15.0	510107	nr	120	19.76	330	1,600	110	4.00	27.50	nr	0.04	
06/24/16	11:27 AM	18.0	510139	nr	120	19.81	320	1,920	107	4.05	26.34	nr	0.04	
06/24/16	11:30 AM	21.0	510171	nr	120	19.85	320	2,240	107	4.09	26.08	nr	0.04	
06/24/16	11:33 AM	24.0	510203	nr	120	19.88	320	2,560	107	4.12	25.89	nr	0.04	
06/24/16	11:36 AM	27.0	510235	nr	120	19.91	320	2,880	107	4.15	25.70	nr	0.04	
06/24/16	11:39 AM	30.0	510267	nr	120	19.93	320	3,200	107	4.17	25.58	nr	0.04	Imhoff Sample 2
06/24/16	11:42 AM	33.0	510300	nr	120	19.96	330	3,530	110	4.20	26.19	nr	0.04	
06/24/16	11:45 AM	36.0	510338	nr	100	21.11	380	3,910	127	5.35	23.68	nr	0.04	
06/24/16	11:48 AM	39.0	510380	nr	100	21.24	420	4,330	140	5.48	25.55	nr	0.04	
06/24/16	11:51 AM	42.0	510425	nr	100	21.30	450	4,780	150	5.54	27.08	nr	0.04	
06/24/16	11:54 AM	45.0	510470	nr	100	21.37	450	5,230	150	5.61	26.74	nr	0.04	
06/24/16	11:57 AM	48.0	510509	nr	100	21.39	390	5,620	130	5.63	23.09	nr	0.04	
06/24/16	12:00 PM	51.0	510552	nr	100	21.43	430	6,050	143	5.67	25.28	nr	0.04	
06/24/16	12:03 PM	54.0	510595	nr	100	21.45	430	6,480	143	5.69	25.19	nr	0.04	
06/24/16	12:06 PM	57.0	510638	nr	100	21.47	430	6,910	143	5.71	25.10	nr	0.04	
06/24/16	12:09 PM	60.0	510681	nr	100	21.50	430	7,340	143	5.74	24.97	nr	0.04	
06/24/16	12:12 PM	63.0	510724	nr	100	21.52	430	7,770	143	5.76	24.88	nr	0.04	
06/24/16	12:15 PM	66.0	510767	nr	100	21.53	430	8,200	143	5.77	24.84	nr	0.04	
06/24/16	12:18 PM	69.0	510817	nr	80	22.50	500	8,700	167	6.74	24.73	nr	0.04	
06/24/16	12:21 PM	72.0	510868	nr	80	22.87	510	9,210	170	7.11	23.91	nr	0.04	
06/24/16	12:24 PM	75.0	510919	nr	80	22.60	510	9,720	170	6.84	24.85	nr	0.04	Imhoff Sample 3
06/24/16	12:27 PM	78.0	510970	nr	80	22.63	510	10,230	170	6.87	24.75	nr	0.04	
06/24/16	12:30 PM	81.0	511021	nr	80	22.65	510	10,740	170	6.89	24.67	nr	0.04	
06/24/16	12:33 PM	84.0	511072	nr	80	22.68	510	11,250	170	6.92	24.57	nr	0.04	
06/24/16	12:36 PM	87.0	511123	nr	80	22.71	510	11,760	170	6.95	24.46	nr	0.04	
06/24/16	12:39 PM	90.0	511174	nr	80	22.73	510	12,270	170	6.97	24.39	nr	0.04	Imhoff Sample 4

SOUTH Y EXTRACTION WELL EVALUATION

LBWC #4 Step-Test

Field Data provided by Ivo Bergsohn of STPUD

Totalizer multiplier: 10

Date	Time	Pumping Time (min)	Totalizer (Galls x 10)	Total Sand Reading (ml)	Line Press. (psi)	DTW (ft bmp)		Gallons Pumped Since Last Reading (galls)	Total Gallons Pumped (galls)	Pumping Rate (gpm)	Drawdown (s)	Specific Capacity (Q/s)	Sand Since Last Reading (ml)	1/ Specific Capacity (s/Q)	NOTES
06/24/16	12:42 PM	93.0	511226	nr	80	22.74		520	12,790	173	6.98	24.83	nr	0.04	
06/24/16	12:45 PM	96.0	511277	nr	80	22.76		510	13,300	170	7.00	24.29	nr	0.04	
06/24/16	12:48 PM	99.0	511328	nr	80	22.77		510	13,810	170	7.01	24.25	nr	0.04	Pump Off
06/24/16	12:49 PM	100	511328	nr	0	nr			13,810	139	7.01	19.90			end of test

SOUTH Y EXTRACTION WELL EVALUATION

LBWC #4 Step-Test: Field Water Quality Parameters

Data provided by Ivo Bergsohn of STPUD

Date	Time	Pumping Time (min)	pH (SU)	E.C. (us/cm)	Temp (deg C)	Turbidity (NTU)		NOTES
06/24/16	11:09 AM	0						Pump On @ 11:09
06/24/16	11:22 AM	13.0	7.21	627	10.3			Imhoff 1
06/24/16	11:39 AM	30.0	6.47	483	7.8			Imhoff 2
06/24/16	11:50 AM	41.0						Lab Sample
06/24/16	12:25 PM	76.0	6.70	477	10.0	26.00		Imhoff 3
06/24/16	12:46 PM	97.0	6.74	474	10.3			Imhoff 4

Appendix C.3 – Constant-rate Test Data

Aquifer Test Data - Pumping

Project: South Y Extraction Well Suitability Inv. | Pump Well: LBWC Well #4
Location: 843 Hazel Drive, SLT, CA | Pump On: 3/28/2016: 14:00
Hydrogeologist: I. Bergsohn; R. Allward | Pump Off: 3/29/2016: 14:05
Pump Contractor: Carson Pump (Omar) | Pump Make/Model: Goulds/5CHC020 (8 Stage)

Comments: Pump mated to Franklin 20 Hp Motor # 2366149020 (3450 RPM); Discharge to STPUD sewer MF: 10

Total Discharge (galls): 162,870 Total Time (min): 1445 Rate (gpm): 113 page _____of______

Time			Water Level		Discharge			Line Press	Water Quality				Specific Capacity	Comments
Date	Time	Total(min)	Depth	Drawdown	Total x MF	Q_{inst}	Q_{avg}	PSI	Sand	˚C	pH	EC	(gpm/ft d.d.)	
3/28/2016	13:57:00	0	15.32	0.00	511375									Pump OFF
3/28/2016	13:59:00	0	15.46	0.00	511375									
3/28/2016	14:00:00	0	15.46	0.00	511375									Pump ON
3/28/2016	14:03:00	3	18.68	3.22	511407	107	107	124					33.13	
3/28/2016	14:06:00	6	18.84	3.52	511438	103	105	124					29.83	
3/28/2016	14:09:00	9	18.93	3.61	511468	100	103	124					28.62	
3/28/2016	14:12:00	12	18.98	3.66	511498	100	103	124					28.01	
3/28/2016	14:15:00	15	19.00	3.68	511528	100	102	124					27.72	
3/28/2016	14:20:00	20	19.07	3.75	511578	100	102	124					27.07	
3/28/2016	14:25:00	25	19.11	3.79	511628	100	101	124					26.70	
3/28/2016	14:30:00	30	19.15	3.83	511678	100	101	124		9.60	6.68	447	26.37	
3/28/2016	14:35:00	35	19.20	3.88	511728	100	101	124					25.99	
3/28/2016	14:40:00	40	19.20	3.88	511778	100	101	124					25.97	
3/28/2016	14:45:00	45	19.23	3.91	511829	102	101	124					25.80	
3/28/2016	14:50:00	50	19.27	3.95	511879	100	101	124					25.52	
3/28/2016	14:55:00	55	19.28	3.96	511930	102	101	124					25.48	
3/28/2016	15:00:00	60	19.30	3.98	511980	100	101	124		8.70	6.80	447	25.34	
3/28/2016	15:05:00	65	19.31	3.99	512031	102	101	124					25.29	
3/28/2016	15:11:00	71	19.33	4.01	512092	102	101	124					25.18	
3/28/2016	15:15:00	75	19.34	4.02	512132	100	101	124					25.11	
3/28/2016	15:20:00	80	19.35	4.03	512183	102	101	124					25.06	
3/28/2016	15:25:00	85	19.35	4.03	512233	100	101	124					25.05	
3/28/2016	15:30:00	90	19.37	4.05	512283	100	101	124		9.40	6.40	436	24.91	
3/28/2016	15:50:00	110	19.41	4.09	512477	97	100	124					24.49	
3/28/2016	16:01:00	121	19.43	4.11	512581	95	100	124					24.25	Reading error (?)
3/28/2016	16:11:00	131	19.44	4.12	512687	106	100	124					24.31	
3/28/2016	16:20:00	140	19.44	4.12	512787	111	101	124					24.48	
3/28/2016	16:30:00	150	19.30	3.98	512885	98	101	124					25.29	see Field Notes
3/28/2016	16:40:00	160	19.34	4.02	512981	96	100	124					24.97	
3/28/2016	16:50:00	170	19.48	4.16	513070	89	100	124					23.97	see Field Notes
3/28/2016	17:00:00	180	19.50	4.18	513181	111	100	124					24.00	Adjusted valve
3/28/2016	17:10:00	190	19.52	4.20	513282	101	100	124					23.90	
3/28/2016	17:20:00	200	19.54	4.22	513383	101	100	124					23.79	
3/28/2016	17:30:00	210	19.56	4.24	513484	101	100	124					23.69	
3/28/2016	18:00:00	240	19.57	4.25	513788	101	101	124					23.66	
3/28/2016	18:30:00	270	19.58	4.26	514089	100	101	124					23.60	
3/28/2016	19:00:00	300	19.59	4.27	514390	100	101	124					23.54	
3/28/2016	19:30:00	330	19.60	4.28	514689	100	100	124					23.46	
3/28/2016	20:00:00	360	19.61	4.29	514989	100	100	124					23.40	
3/28/2016	20:30:00	390	19.62	4.30	515288	100	100	124					23.33	
3/28/2016	21:00:00	420	19.63	4.31	515586	99	100	124					23.26	
3/28/2016	21:30:00	450	19.64	4.32	515885	100	100	124					23.20	
3/28/2016	22:00:00	480	19.65	4.33	516182	99	100	124					23.13	
3/28/2016	22:30:00	510	19.65	4.33	516479	99	100	124					23.11	
3/28/2016	23:00:00	540	19.65	4.33	516778	100	100	124					23.11	
3/28/2016	23:30:00	570	19.65	4.33	517076	99	100	124					23.10	
3/29/2016	0:00:00	600	19.66	4.34	517374	99	100	124					23.04	
3/29/2016	0:30:00	630	19.67	4.35	517672	99	100	124					22.98	
3/29/2016	1:00:00	660	19.67	4.35	517970	99	100	124					22.97	

Aquifer Test Data - Pumping

Project: South Y Extraction Well Suitability Inv.
Location: 843 Hazel Drive, SLT, CA
Hydrogeologist: I. Bergsohn; R. Allward
Pump Contractor: Carson Pump (Omar)

Pump Well: LBWC Well #4
Pump On: 3/28/2016: 14:00
Pump Off: 3/29/2016: 14:05
Pump Make/Model: Goulds/5CHC020 (8 Stage)

Comments: Pump mated to Franklin 20 Hp Motor # 2366149020 (3450 RPM); Discharge to STPUD sewer   MF: 10

Total Discharge (galls): 162,870   Total Time (min): 1445   Rate (gpm): 113   page ____ of ______

Time			Water Level		Discharge			Line Press	Water Quality				Specific Capacity	Comments
Date	Time	Total(min)	Depth	Drawdown	Total x MF	Q_{inst}	Q_{avg}	PSI	Sand	˚C	pH	EC	(gpm/ft d.d.)	
3/29/2016	1:30:00	690	19.69	4.37	518269	100	100	124					22.86	
3/29/2016	2:00:00	720	19.69	4.37	518567	99	100	124					22.86	
3/29/2016	2:30:00	750	19.70	4.38	518864	99	100	124					22.80	
3/29/2016	3:00:00	780	19.70	4.38	519161	99	100	124					22.79	
3/29/2016	3:30:00	810	19.71	4.39	519459	99	100	124					22.73	
3/29/2016	4:00:00	840	19.71	4.39	519756	99	100	124					22.73	
3/29/2016	4:30:00	870	19.71	4.39	520052	99	100	124					22.72	
3/29/2016	5:00:00	900	19.71	4.39	520349	99	100	124					22.71	
3/29/2016	5:30:00	930	19.71	4.39	520646	99	100	124					22.71	
3/29/2016	6:00:00	960	19.72	4.40	520945	100	100	124					22.66	
3/29/2016	6:30:00	990	19.72	4.40	521244	100	100	124					22.66	
3/29/2016	7:00:00	1020	19.73	4.41	521542	99	100	124					22.60	
3/29/2016	7:30:00	1050	19.71	4.39	521832	97	100	124					22.69	
3/29/2016	8:00:00	1080	19.73	4.41	522131	100	100	124					22.58	
3/29/2016	8:30:00	1110	19.70	4.38	522436	102	100	124					22.75	
3/29/2016	9:00:00	1140	19.70	4.38	522723	96	100	124					22.73	
3/29/2016	9:30:00	1170	19.70	4.38	523030	102	100	124					22.74	
3/29/2016	9:44:00	1184	19.71	4.39	523168	99	100	124					22.69	
3/29/2016	9:46:00	1186	22.10	6.78	523196	140	100	80					14.70	Opened valve
3/29/2016	9:50:00	1190	22.45	7.13	523267	178	100	80					14.02	
3/29/2016	9:53:00	1193	22.53	7.21	523320	177	100	80					13.89	
3/29/2016	9:56:00	1196	22.58	7.26	523373	177	100	80					13.82	
3/29/2016	9:59:00	1199	22.61	7.29	523425	173	101	80					13.79	
3/29/2016	10:02:00	1202	22.65	7.33	523478	177	101	80					13.74	
3/29/2016	10:05:00	1205	22.67	7.35	523551	243	101	80					13.75	Reading error (?)
3/29/2016	10:08:00	1208	22.70	7.38	523602	170	101	80					13.72	
3/29/2016	10:11:00	1211	22.73	7.41	523655	177	101	80					13.68	
3/29/2016	10:14:00	1214	22.73	7.41	523708	177	102	80					13.71	
3/29/2016	10:27:00	1227	22.84	7.52	523910	155	102	80					13.59	IB time
3/29/2016	10:30:00	1230	22.86	7.54	523959	163	102	80					13.57	
3/29/2016	10:33:00	1233	22.87	7.55	524010	170	102	80					13.57	
3/29/2016	10:36:00	1236	22.89	7.57	524063	177	103	80					13.56	
3/29/2016	10:43:00	1243	22.89	7.57	524187	177	103	80					13.62	
3/29/2016	10:56:00	1256	22.90	7.58	524417	177	104	80					13.70	
3/29/2016	11:07:00	1267	22.90	7.58	524611	176	104	80					13.78	
3/29/2016	11:10:00	1270	22.93	7.61	524663	173	105	80					13.75	
3/29/2016	11:13:00	1273	22.93	7.61	524716	177	105	80					13.77	
3/29/2016	11:20:00	1280	22.96	7.64	524838	174	105	80					13.77	
3/29/2016	11:30:00	1290	22.98	7.66	525014	176	106	80					13.80	
3/29/2016	11:40:00	1300	22.97	7.65	525190	176	106	80					13.89	
3/29/2016	11:50:00	1310	22.97	7.65	525366	176	107	80					13.96	
3/29/2016	12:05:00	1325	22.98	7.66	525644	185	108	80					14.06	RA time
3/29/2016	14:05:00	1445	22.57	7.25	527662	168	113	80					15.55	Pump OFF

Aquifer Test Data - Recovery

Project: South Y Extraction Well Suitability Inv.
Location: 843 Hazel Drive, SLT, CA
Hydrogeologist: I. Bergsohn; R. Allward
Pump Contractor: Carson Pump (Omar)
Comments:

Pumping Well: LBWC Well #4
Pump On: 3/28/2016: 14:00
Pump Off: 3/29/2016: 14:05
Pump Make/Model: Goulds/5CHC020 (8 Stage)
SWL= 15.46

TIME					WATER LEVEL		
Date	Time	Time since Pump Start, t (min)	Time since Pump Stop, t'(min)	t/t'	Depth	Residual Drawdown, s'	Comments
3/29/2016	14:05	1445	0		22.57		Pump OFF (Total = 527662 x 10)
3/29/2016	14:06	1446	1	1446.00	17.51	2.05	
3/29/2016	14:07	1447	2	723.50	17.28	1.82	
3/29/2016	14:08	1448	3	482.67	17.11	1.65	
3/29/2016	14:09	1449	4	362.25	17.02	1.56	
3/29/2016	14:10	1450	5	290.00	16.95	1.49	
3/29/2016	14:11	1451	6	241.83	16.88	1.42	
3/29/2016	14:12	1452	7	207.43	16.83	1.37	
3/29/2016	14:13	1453	8	181.62	16.78	1.32	
3/29/2016	14:14	1454	9	161.56	16.73	1.27	
3/29/2016	14:15	1455	10	145.50	16.71	1.25	
3/29/2016	14:20	1460	15	97.33	16.58	1.12	
3/29/2016	14:25	1465	20	73.25	16.48	1.02	
3/29/2016	14:30	1470	25	58.80	16.41	0.95	
3/29/2016	14:35	1475	30	49.17	16.34	0.88	
3/29/2016	14:40	1480	35	42.29	16.29	0.83	
3/29/2016	14:45	1485	40	37.12	16.24	0.78	
3/29/2016	14:50	1490	45	33.11	16.20	0.74	
3/29/2016	14:55	1495	50	29.90	16.17	0.71	
3/29/2016	15:00	1500	55	27.27	16.13	0.67	
3/29/2016	15:05	1505	60	25.08	16.10	0.64	
3/29/2016	15:15	1515	70	21.64	16.05	0.59	
3/29/2016	15:25	1525	80	19.06	16.01	0.55	
3/29/2016	15:35	1535	90	17.06	15.98	0.52	
3/30/2016	8:25	2545	1100	2.31	15.52	0.06	

Appendix D: Aquifer Test Data and Graphs

Appendix D.1 – Theis Calibration and Calculation Sheets

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

Calibration for LBWC #4 from 24-hour Constant-Rate Data. Note: Last 4.25 hours of test, the flow rate was increased from about 100 gpm to 170 gpm. The average pumping rate for the entire 24-hour test was 113 gpm. The data from the well pumping 100 gpm was used (duration was 1,184 minute) for the Theis calibration. Aquifer thickness (b) for TK_{z5} + TK_{z4} is 102 feet.

Answer :

Static Water Level =	15.46	feet
Drawdown =	**4.36**	feet
Pumping Water Level =	19.8	feet

u = 5.4237E-07

Thickness (b)	**102**	ft
Flow (Q)	**100**	gpm
Flow (Q)	144000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**0.82222222**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*5.4237E-07*		
IF u <= 1 THEN W(u) =	*13.8501113*		
IF u > 1 THEN W(u) =	*124734.759*		
u =	*13.8501113*		
DRAWDOWN IN OB. WELL =	*4.36050209*		*4.362392456*
TOTAL VOLUME PUMPED =	*132.608*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

Calibration check using storativity of 0.05, pumping rate of 170 gpm for entire 24-hour test.

Answer :

Static Water Level =	15.46	feet
Drawdown =	**7.52**	feet
Pumping Water Level =	23.0	feet

u = 4.4441E-07

Thickness (b)	**102**	ft
Flow (Q)	**170**	gpm
Flow (Q)	244800	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**1.00347222**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*4.4441E-07*		
IF u <= 1 THEN W(u) =	*14.049322*		
IF u > 1 THEN W(u) =	*152230.802*		
u =	*14.049322*		
DRAWDOWN IN OB. WELL =	*7.51947505*		*7.522734897*
TOTAL VOLUME PUMPED =	*275.128*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 200 gpm - 30 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**10.99**	feet
Pumping Water Level =	26.4	feet

u = 1.4865E-08

Thickness (b)	**102**	ft
Flow (Q)	**200**	gpm
Flow (Q)	288000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**30**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*1.4865E-08*		
IF u <= 1 THEN W(u) =	*17.4470528*		
IF u > 1 THEN W(u) =	*4551070.9*		
u =	*17.4470528*		
DRAWDOWN IN OB. WELL =	*10.9858915*		*10.99065408*
TOTAL VOLUME PUMPED =	*9676.8*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 200 gpm - 90 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**11.68**	feet
Pumping Water Level =	27.1	feet

u = 4.955E-09

Thickness (b)	**102**	ft
Flow (Q)	**200**	gpm
Flow (Q)	288000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**90**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*4.955E-09*		
IF u <= 1 THEN W(u) =	*18.545665*		
IF u > 1 THEN W(u) =	*13653209.2*		
u =	*18.545665*		
DRAWDOWN IN OB. WELL =	*11.677655*		*11.68271753*
TOTAL VOLUME PUMPED =	*29030.4*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 200 gpm - 365 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**12.56**	feet
Pumping Water Level =	28.0	feet

u = 1.2218E-09

Thickness (b)	**102**	ft
Flow (Q)	**200**	gpm
Flow (Q)	288000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**365**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*1.2218E-09*		
IF u <= 1 THEN W(u) =	*19.9457527*		
IF u > 1 THEN W(u) =	*55371343.1*		
u =	*19.9457527*		
DRAWDOWN IN OB. WELL =	*12.5592487*		*12.56469339*
TOTAL VOLUME PUMPED =	*117734.4*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 400 gpm - 30 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**21.97**	feet
Pumping Water Level =	37.4	feet

u = 1.4865E-08

Thickness (b)	**102**	ft
Flow (Q)	**400**	gpm
Flow (Q)	576000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**30**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*1.4865E-08*		
IF u <= 1 THEN W(u) =	*17.4470528*		
IF u > 1 THEN W(u) =	*4551070.9*		
u =	*17.4470528*		
DRAWDOWN IN OB. WELL =	*21.9717829*		*21.98130817*
TOTAL VOLUME PUMPED =	*19353.6*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 400 gpm - 90 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**23.36**	feet
Pumping Water Level =	38.8	feet

u = 4.955E-09

Thickness (b)	**102**	ft
Flow (Q)	**400**	gpm
Flow (Q)	576000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**90**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*4.955E-09*		
IF u <= 1 THEN W(u) =	*18.545665*		
IF u > 1 THEN W(u) =	*13653209.2*		
u =	*18.545665*		
DRAWDOWN IN OB. WELL =	*23.35531*		*23.36543507*
TOTAL VOLUME PUMPED =	*58060.8*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 400 gpm - 365 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**25.12**	feet
Pumping Water Level =	40.6	feet

u = 1.2218E-09

Thickness (b)	**102**	ft
Flow (Q)	**400**	gpm
Flow (Q)	576000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**365**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*1.2218E-09*		
IF u <= 1 THEN W(u) =	*19.9457527*		
IF u > 1 THEN W(u) =	*55371343.1*		
u =	*19.9457527*		
DRAWDOWN IN OB. WELL =	*25.1184974*		*25.12938679*
TOTAL VOLUME PUMPED =	*235468.8*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 600 gpm - 30 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**32.96**	feet
Pumping Water Level =	48.4	feet

u = 1.4865E-08

Thickness (b)	**102**	ft
Flow (Q)	**600**	gpm
Flow (Q)	864000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**30**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*1.4865E-08*		
IF u <= 1 THEN W(u) =	*17.4470528*		
IF u > 1 THEN W(u) =	*4551070.9*		
u =	*17.4470528*		
DRAWDOWN IN OB. WELL =	*32.9576744*		*32.97196225*
TOTAL VOLUME PUMPED =	*29030.4*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 600 gpm - 90 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**35.03**	feet
Pumping Water Level =	50.5	feet

u = 4.955E-09

Thickness (b)	**102**	ft
Flow (Q)	**600**	gpm
Flow (Q)	864000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**90**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*4.955E-09*		
IF u <= 1 THEN W(u) =	*18.545665*		
IF u > 1 THEN W(u) =	*13653209.2*		
u =	*18.545665*		
DRAWDOWN IN OB. WELL =	*35.0329651*		*35.0481526*
TOTAL VOLUME PUMPED =	*87091.2*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 600 gpm - 365 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**37.68**	feet
Pumping Water Level =	53.1	feet

u = 1.2218E-09

Thickness (b)	**102**	ft
Flow (Q)	**600**	gpm
Flow (Q)	864000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**365**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*1.2218E-09*		
IF u <= 1 THEN W(u) =	*19.9457527*		
IF u > 1 THEN W(u) =	*55371343.1*		
u =	*19.9457527*		
DRAWDOWN IN OB. WELL =	*37.6777461*		*37.69408018*
TOTAL VOLUME PUMPED =	*353203.2*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 800 gpm - 30 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**43.94**	feet
Pumping Water Level =	59.4	feet

u = 1.4865E-08

Thickness (b)	**102**	ft
Flow (Q)	**800**	gpm
Flow (Q)	1152000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**30**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*1.4865E-08*		
IF u <= 1 THEN W(u) =	*17.4470528*		
IF u > 1 THEN W(u) =	*4551070.9*		
u =	*17.4470528*		
DRAWDOWN IN OB. WELL =	*43.9435659*		*43.96261634*
TOTAL VOLUME PUMPED =	*38707.2*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 800 gpm - 90 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**46.71**	feet
Pumping Water Level =	62.2	feet

u = 4.955E-09

Thickness (b)	**102**	ft
Flow (Q)	**800**	gpm
Flow (Q)	1152000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**90**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

u =	*4.955E-09*		
IF u <= 1 THEN W(u) =	*18.545665*		
IF u > 1 THEN W(u) =	*13653209.2*		
u =	*18.545665*		
DRAWDOWN IN OB. WELL =	*46.7106201*		*46.73087014*
TOTAL VOLUME PUMPED =	*116121.6*	*ac-ft/yr*	
	0.00112022	*conversion gal to ft & day to yr.*	

South Y Investigation

GEI Consultants, Inc.

By: Ryan Alward
Date: 5-22-16

LBWC #4 - 800 gpm - 365 days pumping. *Note: Storativity was calibrated using constant-rate data from LBWC #4.*

Answer :

Static Water Level =	15.46	feet
Drawdown =	**50.24**	feet
Pumping Water Level =	65.7	feet

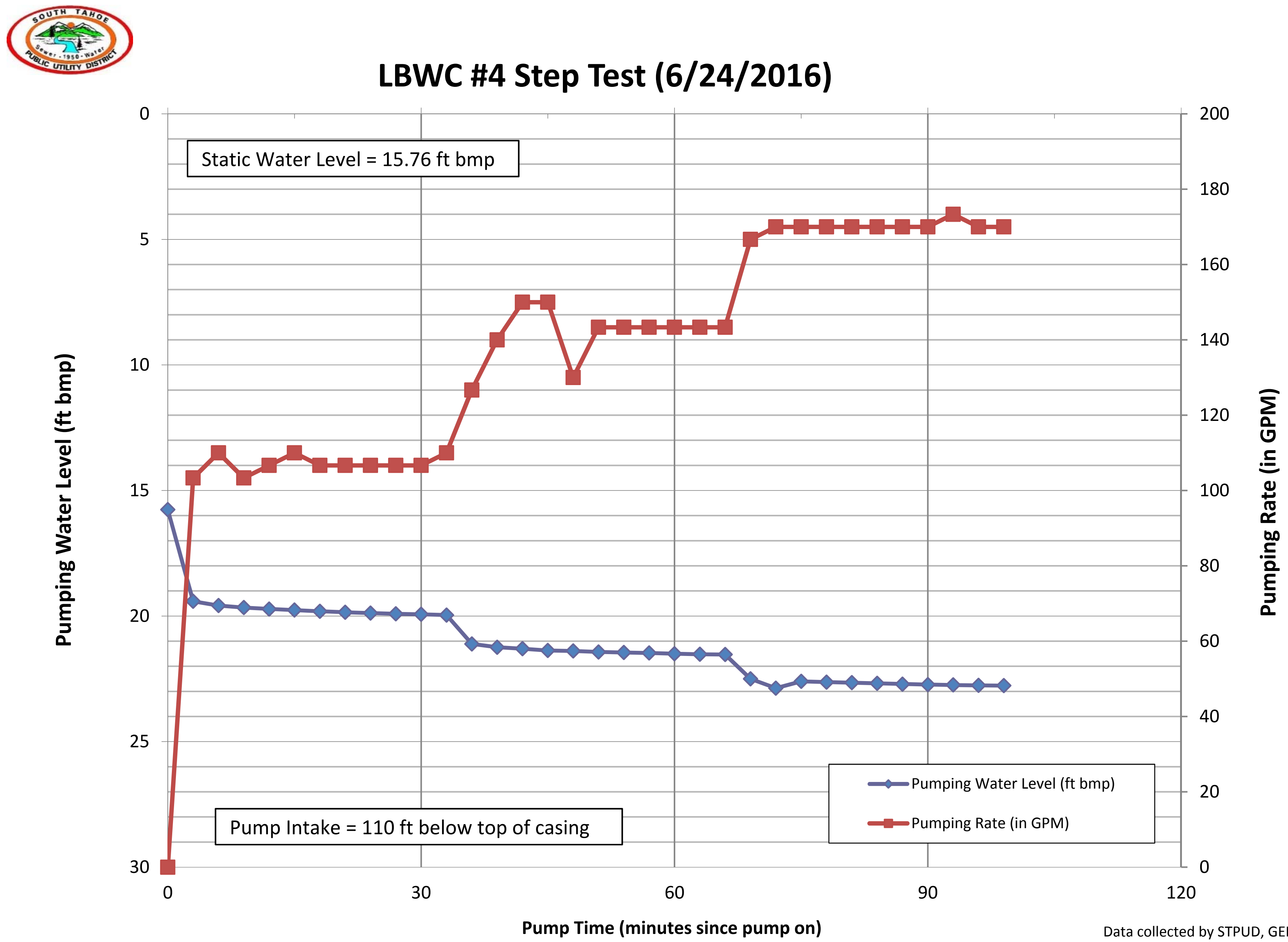
u = 1.2218E-09

Thickness (b)	**102**	ft
Flow (Q)	**800**	gpm
Flow (Q)	1152000	gpd
Transmissivity (T)	**36,400**	gpd/ft
Transmissivity (T)	4866.31016	ft^2/day
Radius	**0.41666667**	feet
Storativity	**5.0.E-02**	unitless
Time	**365**	days
Hydraulic Conductivity	47.7089231	ft/day

CALCULATIONS

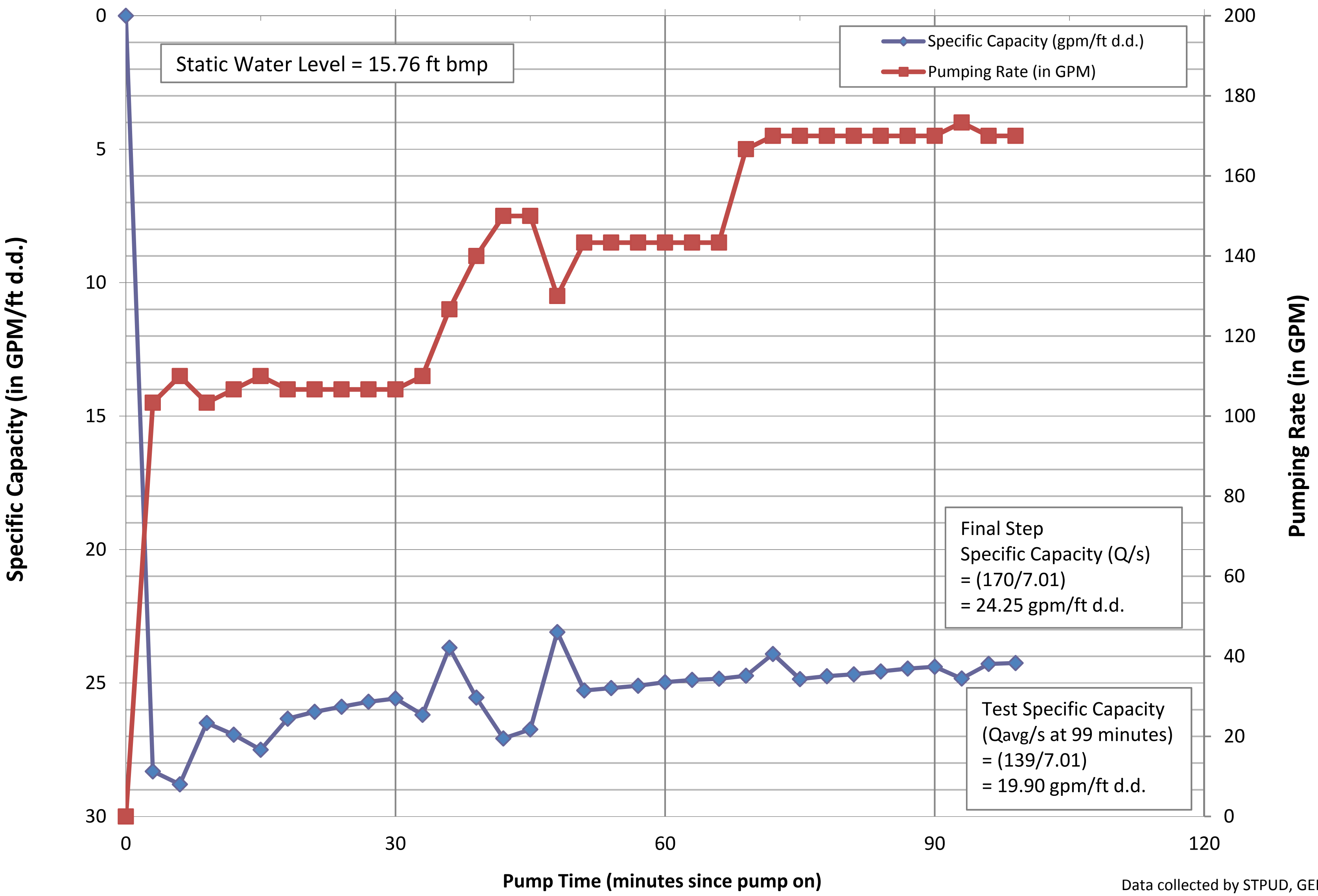
	u =	*1.2218E-09*	
IF u <= 1 THEN W(u) =		*19.9457527*	
IF u > 1 THEN W(u) =		*55371343.1*	
u =		*19.9457527*	
DRAWDOWN IN OB. WELL =		*50.2369948*	*50.25877358*
TOTAL VOLUME PUMPED =		*470937.6*	*ac-ft/yr*
		0.00112022	*conversion gal to ft & day to yr.*

Appendix D.2 - Step-test Graphs



LBWC #4 Step Test (6/24/2016)
Static Water Level = 15.76 ft bmp
Pump Intake = 110 ft below top of casing
Pumping Water Level (ft bmp)
Pumping Rate (in GPM)
Pump Time (minutes since pump on)
0
30
60
90
120
0
5
10
15
20
25
30
200
180
160
140
120
100
80
60
40
20
0
Data collected by STPUD, GEI

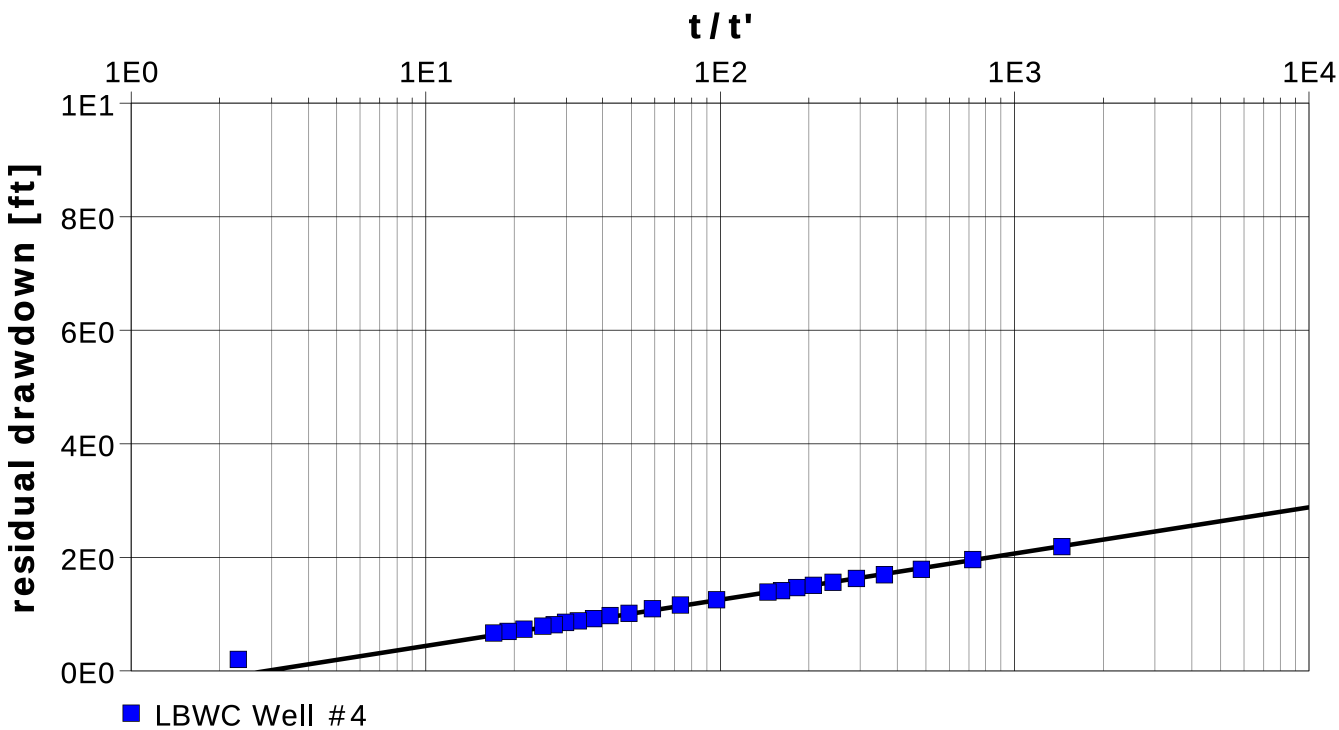
LBWC #4 Step Test (6/24/2016)



Data collected by STPUD, GEI

Appendix D.3 – Constant-rate Test Graph

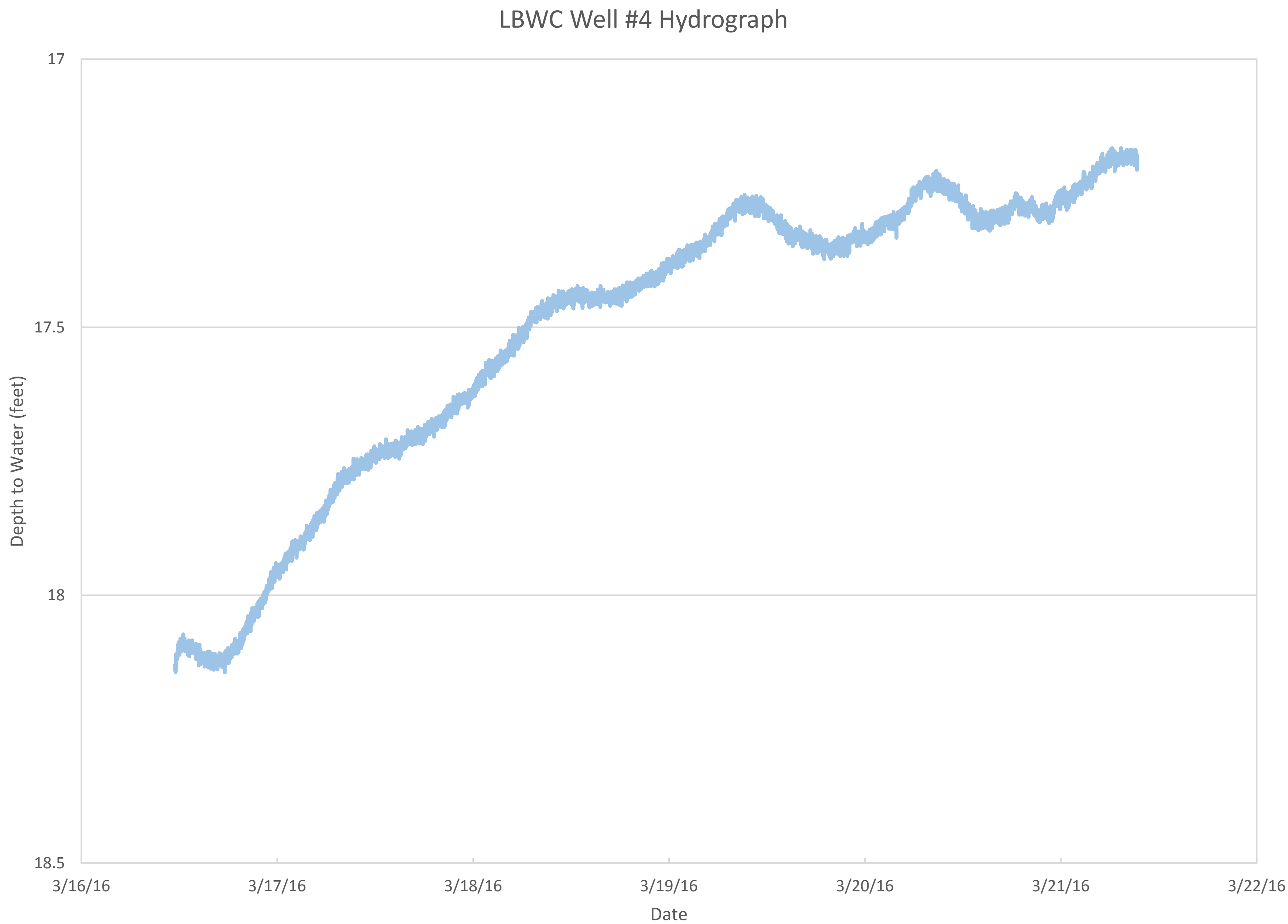
GEI Consultants Inc. **2868 Prospect Park Dr., Suite 400** **Rancho Cordova, CA 95670**		**Pumping Test Analysis Report** Project: South Y Investigation Number: 1601030 Client: South Tahoe Public Utility District
Location: LBWC Well #4	Pumping Test: Constant-Rate Test	Pumping Well: LBWC Well #4
Test Conducted by: Ryan Alward		Test Date: 3/28/2016
Analysis Performed by: Ryan Alward	Constant-Rate Recovery Data	Analysis Date: 5/11/2016
Aquifer Thickness: 103.00 ft	Discharge: variable, average rate 112 [U.S. gal/min]	



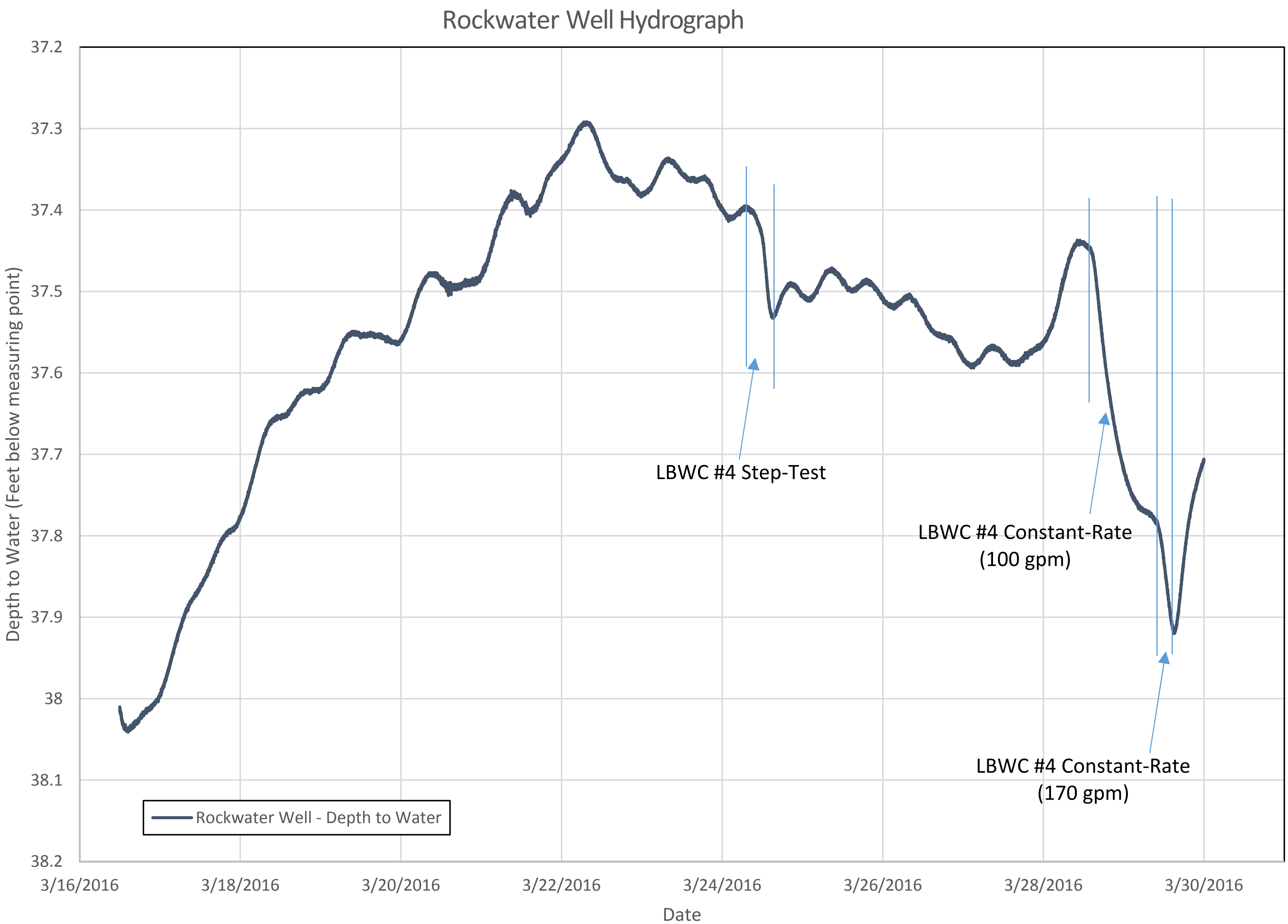
Calculation using THEIS & JACOB

Observation Well	Transmissivity [U.S. gal/d-ft]	Hydraulic Conductivity [U.S. gal/d-ft²]	Radial Distance to PW [ft]	
LBWC Well #4	3.64×10^4	3.53×10^2	0.42	

Appendix D.4 – LBWC #4 Well Transducer Data


LBWC Well #4 Hydrograph
17
17.5
18
18.5
Depth to Water (feet)
3/16/16
3/17/16
3/18/16
3/19/16
3/20/16
3/21/16
3/22/16
Date

Appendix D.5 – Rockwater Well Transducer Data



Rockwater Well Hydrograph
Depth to Water (Feet below measuring point)
37.2
37.3
37.4
37.5
37.6
37.7
37.8
37.9
38
38.1
38.2
3/16/2016
3/18/2016
3/20/2016
3/22/2016
3/24/2016
3/26/2016
3/28/2016
3/30/2016
Date
LBWC #4 Step-Test
LBWC #4 Constant-Rate
(100 gpm)
LBWC #4 Constant-Rate
(170 gpm)
Rockwater Well - Depth to Water

Appendix E: Spinner Log and Analysis

PACIFIC SURVEYS

SPINNER
FLUID VELOCITY
SPINNER ANALYSIS
PUMPING CONDITION

Job No. 21068	Company	GEI CONSULTANTS, INC.
	Well	LBWC WELL #4
	Field	SOUTH LAKE TAHOE
File No.	County	ELDORADO State CA

Location:

843 HAZEL DR.
GPS: N 38o 55.234' W 120o 0.507'

Sec. Twp. Rge.

Other Services:

STOP COUNTS
DOWN RUNS
FLUID SAMPLES

Permanent Datum	T.O.C.	Elevation above perm. datum	Elevation K.B. D.F. G.L.
Log Measured From	T.O.C.		
Drilling Measured From	N/A		

Date	03-29-2016		
Run Number	TWO		
Depth Driller	133'		
Depth Logger	N/A		
Bottom Logged Interval	118'		
Top Log Interval	55'		
Pump Set @	42'		
Time Pumping Prior to Survey	1/2 HR		
Pumping Water Level	23'		
Max. Recorded Temp.	N/A		
Pump Rate (GPM)	170		
Time Well Ready	0800		
Time Logger on Bottom	0815		
Equipment Number	PS-7		
Location	LA		
Recorded By	SCHUMACHER		
Witnessed By	R. ALWARD		

Perforation Record				Perforation Record			
Type	Slot Size	From	To	Type	Slot Size	From	To
LOUVERS	N/A	8'	106'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String				
Camera Tube				
Production String	12"	N/A	0'	?
Liner	10"	N/A	0'	118'

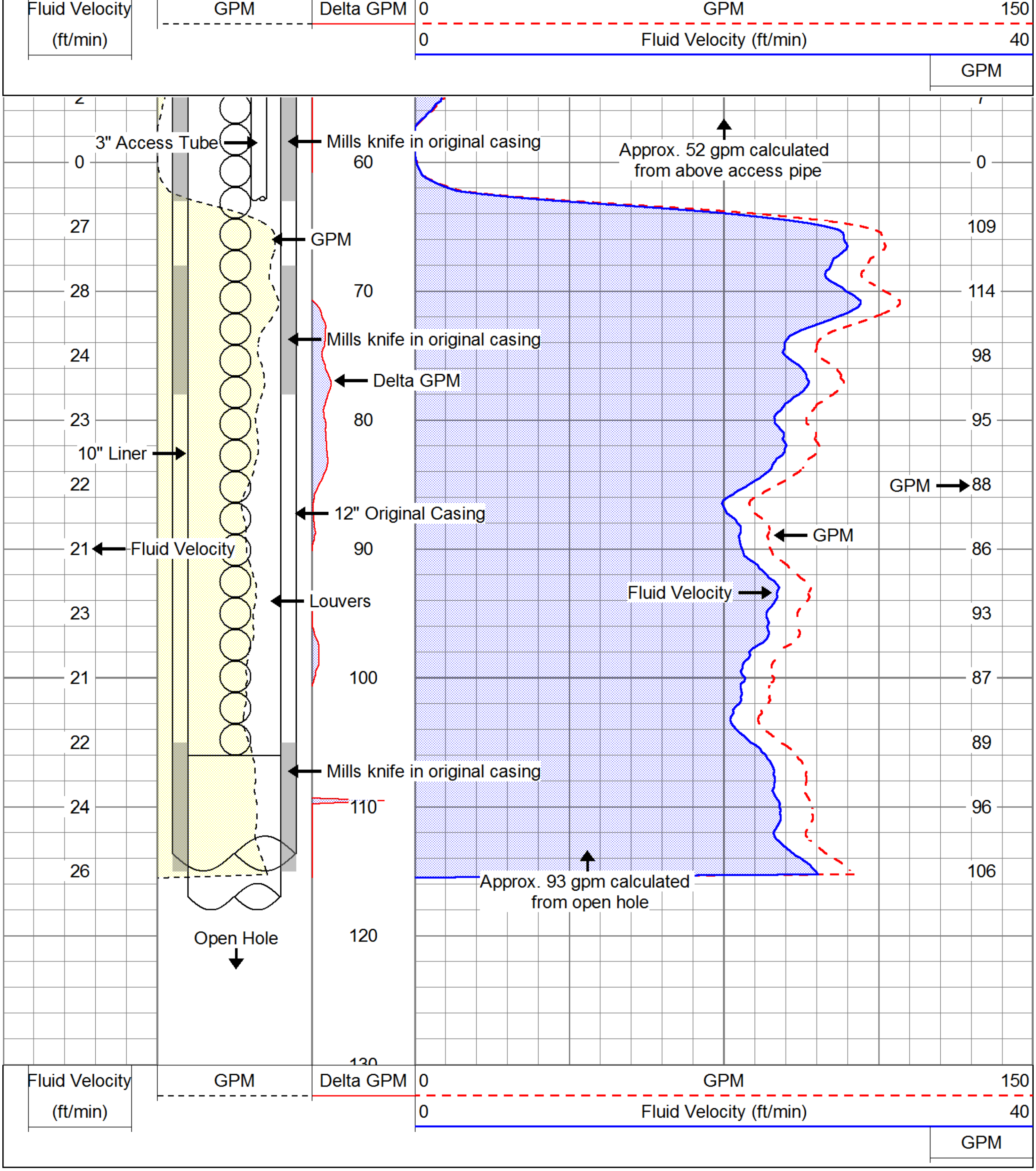
<<< Fold Here >>>

Comments

ORIGINAL 12" CASING REPORTEDLY SCREENED WITH MILLS KNIFE FROM:
43 FT - 63 FT
68 FT - 78 FT
105 FT - 115 FT

FLUID SAMPLES COLLECTED AT:
68 FT
72 FT
82 FT
110 FT

Database File	21068b.db
Dataset Pathname	21068_fldgpm
Presentation Format	spinmerg
Dataset Creation	Fri Apr 08 14:41:09 2016
Charted by	Depth in Feet scaled 1:120



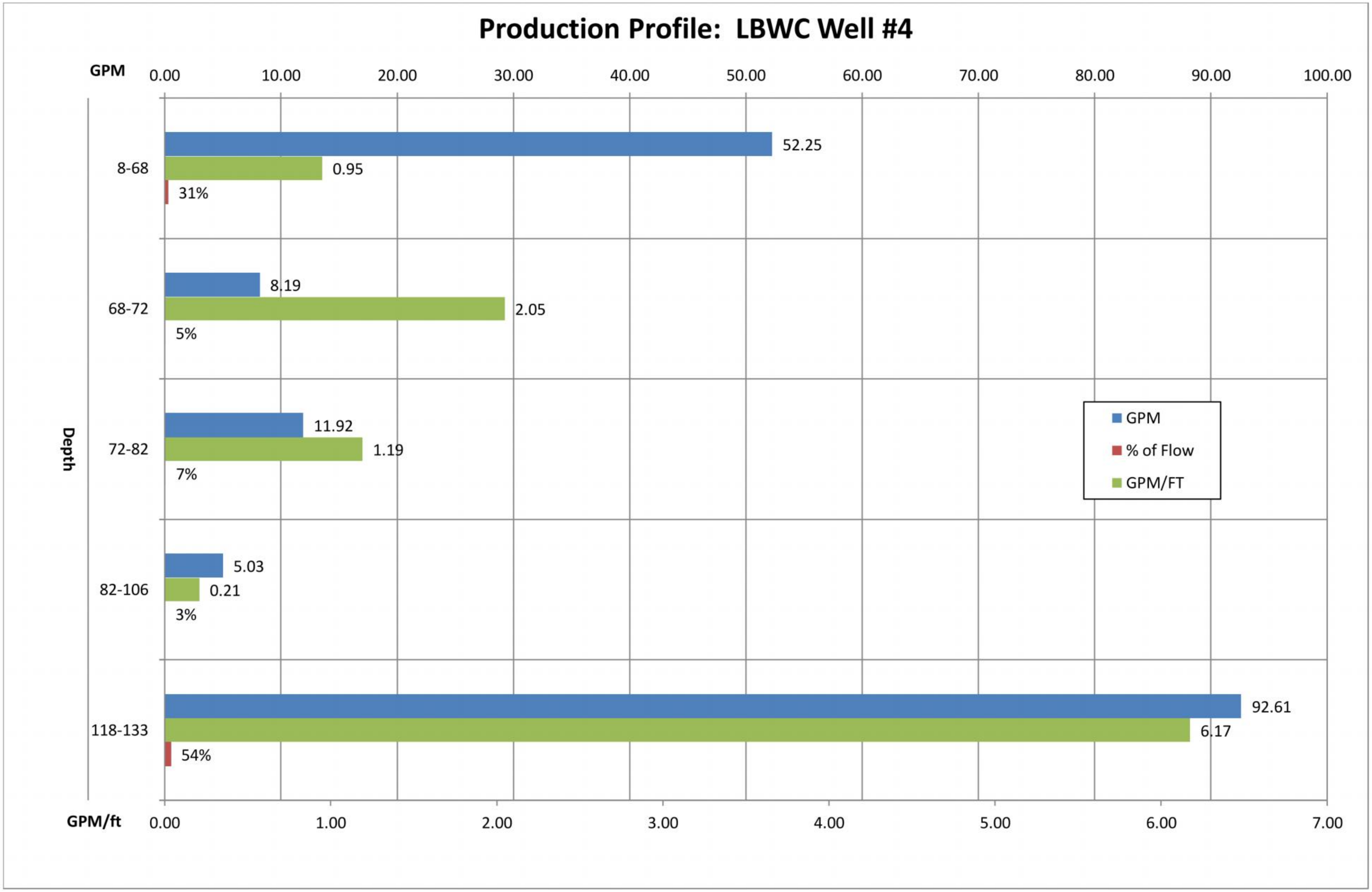
Fluid Velocity (ft/min)
GPM
Delta GPM
0 GPM 150
0 Fluid Velocity (ft/min) 40
GPM
3" Access Tube
Mills knife in original casing
Approx. 52 gpm calculated from above access pipe
GPM
Mills knife in original casing
Delta GPM
10" Liner
GPM
12" Original Casing
Fluid Velocity
GPM
Louvers
Fluid Velocity
Mills knife in original casing
Approx. 93 gpm calculated from open hole
Open Hole
0
27
28
24
23
22
21
23
21
22
24
26
60
70
80
90
100
110
120
130
109
114
98
95
88
86
93
87
89
96
106
Fluid Velocity (ft/min)
GPM
Delta GPM
0 GPM 150
0 Fluid Velocity (ft/min) 40
GPM

SPINNER LOG ANALYSIS

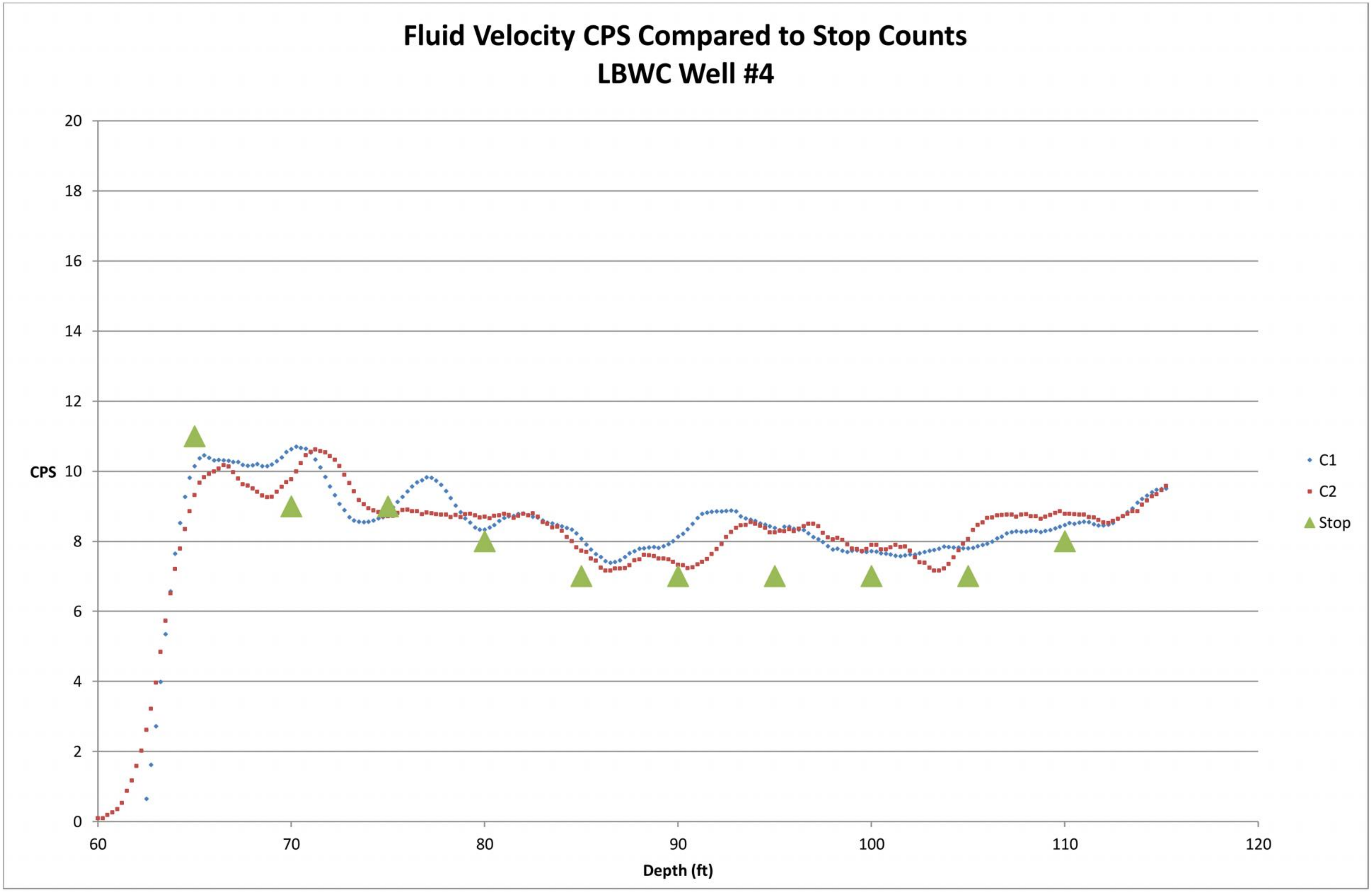
Pacific Surveys

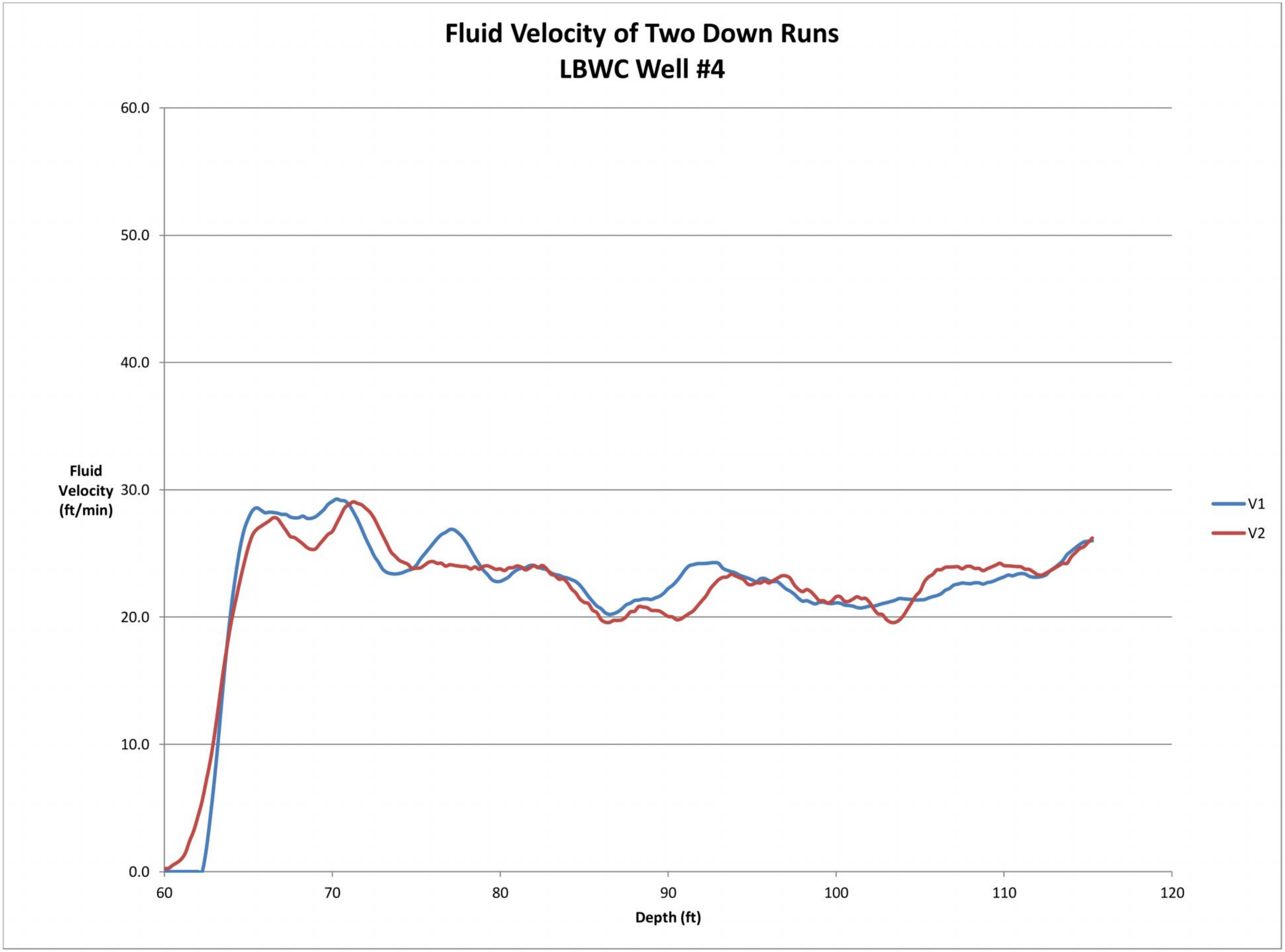
MAX
FLOW RATE 170.00 GPM

SAMPLED DEPTHS	PRODUCTION GPM	% OF FLOW ZONES	GPM/FT	THICKNESS ft
8-68	52.25	31%	0.95	55
68-72	8.19	5%	2.05	4
72-82	11.92	7%	1.19	10
82-106	5.03	3%	0.21	24
118-133	92.61	54%	6.17	15



Production Profile: LBWC Well #4
GPM
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.00
Depth
8-68
68-72
72-82
82-106
118-133
52.25
0.95
31%
8.19
2.05
5%
11.92
1.19
7%
5.03
0.21
3%
92.61
6.17
54%
GPM
% of Flow
GPM/FT
GPM/ft
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00


Fluid Velocity CPS Compared to Stop Counts
LBWC Well #4
CPS
20
18
16
14
12
10
8
6
4
2
0
60
70
80
90
100
110
120
Depth (ft)
C1
C2
Stop


Fluid Velocity of Two Down Runs
LBWC Well #4
Fluid Velocity (ft/min)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
60
70
80
90
100
110
120
Depth (ft)
V1
V2

Appendix F: Water Quality Results

Appendix F.1 – HydraSleeve (Static) Water Quality Sample Results

March 8, 2016

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Lab ID : SP 1602476
Customer : 2-11369

Laboratory Report

Introduction: This report package contains total of 19 pages divided into 3 sections:

Case Narrative	(2 pages)	: An overview of the work performed at FGL.
Sample Results	(10 pages)	: Results for each sample submitted.
Quality Control	(7 pages)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
Travel Blank	03/03/2016	03/04/2016	SP 1602476-000	LBW
Well #4 @ 65 Feet	03/03/2016	03/04/2016	SP 1602476-001	DW
Well #4 @ 85 Feet	03/03/2016	03/04/2016	SP 1602476-002	DW
Well #4 @ 107 Feet	03/03/2016	03/04/2016	SP 1602476-003	DW
Rockwater Well @ 60 Feet	03/03/2016	03/04/2016	SP 1602476-004	DW

Sampling and Receipt Information: All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples arrived at 6 °C. All samples were prepared and analyzed within the method specified hold time. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Organic QC

524.2	03/08/2016:203293 All analysis quality controls are within established criteria, except: The following note applies to 1,2-Dichlorobenzene-d4, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, Bromomethane (Methyl Bromide), Hexachlorobutadiene: 360 CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted. The following note applies to 1,2-Dichlorobenzene-d4: 362 Surrogates are qualified on Control Chart Limits, these are CCV limits. See individual sample reports.
	03/08/2016:202713 All preparation quality controls are within established criteria, except: The following note applies to 1,2-Dichlorobenzene-d4: 435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery. The following note applies to 1,1-Dichloropropene, 1,2,3-Trichlorobenzene, Xylenes m,p, Xylenes o, p-Isopropyltoluene, Toluene: 435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

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March 8, 2016

South Tahoe Public Utility District

Lab ID : SP 1602476

Customer : 2-11369

Certification:: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:VT

Approved By **David Terz, B.A., M.B.A.**

Digitally signed by David Terz, B.A., M.B.A.
Title: QA Director
Date: 2016-03-08

March 8, 2016

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Lab ID : SP 1602476-000
Customer ID : 2-11369

Sampled On : March 3, 2016-00:00
Sampled By : LOD
Received On : March 4, 2016-11:00
Matrix : Lab. Blank Water

Description : Travel Blank
Project : Travel Blank

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	86.8	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene-d4‡	105	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
Benzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromodichloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromoform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
sec-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Carbon Tetrachloride	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butanol	ND	2	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
2-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
4-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dichloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
2,2-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloropropene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293

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CA ELAP Certification No. 2810

March 8, 2016 | Lab ID : SP 1602476-000
Description : Travel Blank | Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl Benzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Hexachlorobutadiene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Isopropylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
p-Isopropyltoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Naphthalene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Propylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Styrene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Tetrachloroethylene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Toluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Trichloroethylene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Trichlorofluoromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Vinyl Chloride	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes (Total)	ND	--	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes m,p	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes o	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Total Trihalomethanes	ND	--	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

March 8, 2016

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Lab ID : SP 1602476-001
Customer ID : 2-11369

Sampled On : March 3, 2016-08:53
Sampled By : LOD
Received On : March 4, 2016-11:00
Matrix : Drinking Water

Description : Well #4 @ 65 Feet
Project : South Y-PCE- Luckins

Sample Result - Organic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
4-Bromofluorobenzene‡	87.2	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene-d4‡	98.9	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
Benzene	ND	0.5	ug/L	1	524.2	03/08/16:202713	524.2	03/08/16:203293
Bromobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromodichloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromoform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
sec-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Carbon Tetrachloride	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butanol	ND	2	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chlorobenzene	ND	0.5	ug/L	70	524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
2-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
4-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene	ND	0.5	ug/L	600	524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,4-Dichlorobenzene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloroethane	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethylene	ND	0.5	ug/L	6	524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,2-Dichloroethylene	ND	0.5	ug/L	6	524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,2-Dichloroethylene	ND	0.5	ug/L	10	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloropropane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dichloromethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
2,2-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloropropene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293

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March 8, 2016
Description : Well #4 @ 65 Feet

Lab ID : SP 1602476-001
Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,3-Dichloropropene	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,3-Dichloropropene	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl Benzene	ND	0.5	ug/L	300	524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Hexachlorobutadiene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Isopropylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
p-Isopropyltoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L	13	524.2	03/08/16:202713	524.2	03/08/16:203293
Naphthalene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Propylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Styrene	ND	0.5	ug/L	100	524.2	03/08/16:202713	524.2	03/08/16:203293
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	1	524.2	03/08/16:202713	524.2	03/08/16:203293
Tetrachloroethylene	8.6	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Toluene	ND	0.5	ug/L	150	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trichlorobenzene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1-Trichloroethane	ND	0.5	ug/L	200	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichloroethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Trichloroethylene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Trichlorofluoromethane	ND	0.5	ug/L	150	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L	1200	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Vinyl Chloride	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes (Total)	ND	--	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes m,p	ND	0.5	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes o	ND	0.5	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Total Trihalomethanes	ND	--	ug/L	80	524.2	03/08/16:202713	524.2	03/08/16:203293

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.
MCL = Maximum Contamination Level. 2 - Secondary Standard. 3 - CDPH Notification Level. AL = Regulatory Action Level.

March 8, 2016

Lab ID : SP 1602476-002
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 3, 2016-08:53
Sampled By : LOD
Received On : March 4, 2016-11:00
Matrix : Drinking Water

Description : Well #4 @ 85 Feet
Project : South Y-PCE- Luckins

Sample Result - Organic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	90.3	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene-d4‡	95.0	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
Benzene	ND	0.5	ug/L	1	524.2	03/08/16:202713	524.2	03/08/16:203293
Bromobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromodichloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromoform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
sec-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Carbon Tetrachloride	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butanol	ND	2	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chlorobenzene	ND	0.5	ug/L	70	524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
2-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
4-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene	ND	0.5	ug/L	600	524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,4-Dichlorobenzene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloroethane	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethylene	ND	0.5	ug/L	6	524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,2-Dichloroethylene	ND	0.5	ug/L	6	524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,2-Dichloroethylene	ND	0.5	ug/L	10	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloropropane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dichloromethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
2,2-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloropropene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293

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CA ELAP Certification No. 2810

March 8, 2016 | Lab ID : SP 1602476-002
Description : Well #4 @ 85 Feet | Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,3-Dichloropropene	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,3-Dichloropropene	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl Benzene	ND	0.5	ug/L	300	524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Hexachlorobutadiene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Isopropylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
p-Isopropyltoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L	13	524.2	03/08/16:202713	524.2	03/08/16:203293
Naphthalene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Propylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Styrene	ND	0.5	ug/L	100	524.2	03/08/16:202713	524.2	03/08/16:203293
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	1	524.2	03/08/16:202713	524.2	03/08/16:203293
Tetrachloroethylene	34	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Toluene	ND	0.5	ug/L	150	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trichlorobenzene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1-Trichloroethane	ND	0.5	ug/L	200	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichloroethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Trichloroethylene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Trichlorofluoromethane	ND	0.5	ug/L	150	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L	1200	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Vinyl Chloride	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes (Total)	ND	--	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes m,p	ND	0.5	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes o	ND	0.5	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Total Trihalomethanes	ND	--	ug/L	80	524.2	03/08/16:202713	524.2	03/08/16:203293

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.
MCL = Maximum Contamination Level. 2 - Secondary Standard. 3 - CDPH Notification Level. AL = Regulatory Action Level.

March 8, 2016

Lab ID : SP 1602476-003
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 3, 2016-09:30
Sampled By : LOD
Received On : March 4, 2016-11:00
Matrix : Drinking Water

Description : Well #4 @ 107 Feet
Project : South Y-PCE- Luckins

Sample Result - Organic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	92.3	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene-d4‡	96.1	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
Benzene	ND	0.5	ug/L	1	524.2	03/08/16:202713	524.2	03/08/16:203293
Bromobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromodichloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromoform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
sec-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Carbon Tetrachloride	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butanol	ND	2	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chlorobenzene	ND	0.5	ug/L	70	524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
2-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
4-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene	ND	0.5	ug/L	600	524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,4-Dichlorobenzene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloroethane	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethylene	ND	0.5	ug/L	6	524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,2-Dichloroethylene	0.7	0.5	ug/L	6	524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,2-Dichloroethylene	ND	0.5	ug/L	10	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloropropane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dichloromethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
2,2-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloropropene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293

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March 8, 2016
Description : Well #4 @ 107 Feet

Lab ID : SP 1602476-003
Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2 VOA:1'3								
1,3-Dichloropropene (Total)	ND	--	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,3-Dichloropropene	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,3-Dichloropropene	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl Benzene	ND	0.5	ug/L	300	524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Hexachlorobutadiene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Isopropylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
p-Isopropyltoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L	13	524.2	03/08/16:202713	524.2	03/08/16:203293
Naphthalene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Propylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Styrene	ND	0.5	ug/L	100	524.2	03/08/16:202713	524.2	03/08/16:203293
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	1	524.2	03/08/16:202713	524.2	03/08/16:203293
Tetrachloroethylene	39	2.5*	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Toluene	ND	0.5	ug/L	150	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trichlorobenzene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1-Trichloroethane	ND	0.5	ug/L	200	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichloroethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Trichloroethylene	0.9	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Trichlorofluoromethane	ND	0.5	ug/L	150	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L	1200	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Vinyl Chloride	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes (Total)	ND	--	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes m,p	ND	0.5	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes o	ND	0.5	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Total Trihalomethanes	ND	--	ug/L	80	524.2	03/08/16:202713	524.2	03/08/16:203293

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.
MCL = Maximum Contamination Level. 2 - Secondary Standard. 3 - CDPH Notification Level. AL = Regulatory Action Level.

March 8, 2016

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Lab ID : SP 1602476-004
Customer ID : 2-11369

Sampled On : March 3, 2016-09:57
Sampled By : LOD
Received On : March 4, 2016-11:00
Matrix : Drinking Water

Description : Rockwater Well @ 60 Feet
Project : South Y-PCE- Luckins

Sample Result - Organic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	93.9	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene-d4‡	95.9	70-130	%		524.2	03/08/16:202713	524.2	03/08/16:203293
Benzene	ND	0.5	ug/L	1	524.2	03/08/16:202713	524.2	03/08/16:203293
Bromobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromodichloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromoform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Bromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
sec-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Carbon Tetrachloride	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
tert-Butanol	ND	2	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chlorobenzene	ND	0.5	ug/L	70	524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloroform	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Chloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
2-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
4-Chlorotoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromochloromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dibromomethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichlorobenzene	ND	0.5	ug/L	600	524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,4-Dichlorobenzene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloroethane	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloroethylene	ND	0.5	ug/L	6	524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,2-Dichloroethylene	ND	0.5	ug/L	6	524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,2-Dichloroethylene	ND	0.5	ug/L	10	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2-Dichloropropane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,3-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Dichloromethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
2,2-Dichloropropane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1-Dichloropropene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293

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CA ELAP Certification No. 2810

March 8, 2016
Description : Rockwater Well @ 60 Feet

Lab ID : SP 1602476-004
Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	MCL/AL	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
cis-1,3-Dichloropropene	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
trans-1,3-Dichloropropene	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl Benzene	ND	0.5	ug/L	300	524.2	03/08/16:202713	524.2	03/08/16:203293
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Hexachlorobutadiene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Isopropylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
p-Isopropyltoluene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L	13	524.2	03/08/16:202713	524.2	03/08/16:203293
Naphthalene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
n-Propylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Styrene	ND	0.5	ug/L	100	524.2	03/08/16:202713	524.2	03/08/16:203293
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	1	524.2	03/08/16:202713	524.2	03/08/16:203293
Tetrachloroethylene	69	5*	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Toluene	ND	0.5	ug/L	150	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trichlorobenzene	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,1-Trichloroethane	ND	0.5	ug/L	200	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichloroethane	ND	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Trichloroethylene	1.1	0.5	ug/L	5	524.2	03/08/16:202713	524.2	03/08/16:203293
Trichlorofluoromethane	ND	0.5	ug/L	150	524.2	03/08/16:202713	524.2	03/08/16:203293
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L	1200	524.2	03/08/16:202713	524.2	03/08/16:203293
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	03/08/16:202713	524.2	03/08/16:203293
Vinyl Chloride	ND	0.5	ug/L	0.5	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes (Total)	ND	--	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes m,p	ND	0.5	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Xylenes o	ND	0.5	ug/L	1750	524.2	03/08/16:202713	524.2	03/08/16:203293
Total Trihalomethanes	ND	--	ug/L	80	524.2	03/08/16:202713	524.2	03/08/16:203293

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.
MCL = Maximum Contamination Level. 2 - Secondary Standard. 3 - CDPH Notification Level. AL = Regulatory Action Level.

March 8, 2016 Lab ID : SP 1602476
South Tahoe Public Utility District Customer : 2-11369

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
1,1,1,2-Tetrachloroethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	85.2 %	12-178	
		(SP 1602429-001)	MSD	ug/L	10.00	95.9 %	12-178	
			MSRPD	ug/L	10.00	11.9%	≤39	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	114 %	70-130	
1,1,1-Trichloroethane(TCA)	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	69.1 %	9-176	
		(SP 1602429-001)	MSD	ug/L	10.00	82.8 %	9-176	
			MSRPD	ug/L	10.00	18.0%	≤33	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	94.1 %	70-130	
1,1,2,2-Tetrachloroethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	73.2 %	23-180	
		(SP 1602429-001)	MSD	ug/L	10.00	89.3 %	23-180	
			MSRPD	ug/L	10.00	19.8%	≤34	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	98.9 %	70-130	
1,1,2-Trichloroethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	68.2 %	25-173	
		(SP 1602429-001)	MSD	ug/L	10.00	76.9 %	25-173	
			MSRPD	ug/L	10.00	12.0%	≤29	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	95.1 %	70-130	
1,1-Dichloroethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	56.3 %	15-161	
		(SP 1602429-001)	MSD	ug/L	10.00	66.7 %	15-161	
			MSRPD	ug/L	10.00	17.0%	≤36	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	81.2 %	70-130	
1,1-Dichloroethylene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	41.3 %	0-162	
		(SP 1602429-001)	MSD	ug/L	10.00	38.2 %	0-162	
			MSRPD	ug/L	10.00	7.7%	≤33	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	93.1 %	70-130	
1,1-Dichloropropene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	38.3 %	0-171	
		(SP 1602429-001)	MSD	ug/L	10.00	23.0 %	0-171	
			MSRPD	ug/L	10.00	50.1%	≤31	435
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	82.4 %	70-130	
1,2,3-Trichlorobenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	68.1 %	14-181	
		(SP 1602429-001)	MSD	ug/L	10.00	126 %	14-181	
			MSRPD	ug/L	10.00	59.4%	≤34	435
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	150 %	70-130	360
1,2,4-Trichlorobenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	94.7 %	10-180	
		(SP 1602429-001)	MSD	ug/L	10.00	123 %	10-180	
			MSRPD	ug/L	10.00	26.1%	≤32	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	147 %	70-130	360
1,2,4-Trimethylbenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	76.5 %	2-192	
		(SP 1602429-001)	MSD	ug/L	10.00	63.3 %	2-192	
			MSRPD	ug/L	10.00	18.9%	≤39	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	105 %	70-130	
1,2-Dichlorobenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	91.5 %	13-191	
		(SP 1602429-001)	MSD	ug/L	10.00	113 %	13-191	
			MSRPD	ug/L	10.00	20.6%	≤35	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	132 %	70-130	360

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March 8, 2016 Lab ID : SP 1602476
South Tahoe Public Utility District Customer : 2-11369

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
1,2-Dichlorobenzene-d4	524.2	03/08/16:202713VRG	Blank	ug/L	10.00	103 %	70-130	
			MS	ug/L	10.00	123 %	70-130	
		(SP 1602429-001)	MSD	ug/L	10.00	132 %	70-130	435
			MSRPD	ug/L	10.00	7.1%	≤20	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	135 %	70-130	362
1,2-Dichloroethane (EDC)	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	57.7 %	18-162	
		(SP 1602429-001)	MSD	ug/L	10.00	64.9 %	18-162	
			MSRPD	ug/L	10.00	11.8%	≤33	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	82.5 %	70-130	
1,2-Dichloropropane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.6 %	10-163	
		(SP 1602429-001)	MSD	ug/L	10.00	71.2 %	10-163	
			MSRPD	ug/L	10.00	11.3%	≤34	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	85.7 %	70-130	
1,3,5-Trimethylbenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	2.9 %	0-210	
		(SP 1602429-001)	MSD	ug/L	10.00	2.4 %	0-210	
			MSRPD	ug/L	10.00	0.055	≤0.5	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	106 %	70-130	
1,3-Dichlorobenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	88.2 %	17-182	
		(SP 1602429-001)	MSD	ug/L	10.00	111 %	17-182	
			MSRPD	ug/L	10.00	23.1%	≤39	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	133 %	70-130	360
1,3-Dichloropropane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	70.1 %	0-178	
		(SP 1602429-001)	MSD	ug/L	10.00	81.8 %	0-178	
			MSRPD	ug/L	10.00	15.3%	≤29	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	97.9 %	70-130	
1,4-Dichlorobenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	88.5 %	19-183	
		(SP 1602429-001)	MSD	ug/L	10.00	113 %	19-183	
			MSRPD	ug/L	10.00	23.9%	≤37	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	136 %	70-130	360
2,2-Dichloropropane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	62.6 %	0-288	
		(SP 1602429-001)	MSD	ug/L	10.00	73.8 %	0-288	
			MSRPD	ug/L	10.00	16.5%	≤33	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	85.7 %	70-130	
2-Chlorotoluene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	79.9 %	17-180	
		(SP 1602429-001)	MSD	ug/L	10.00	115 %	17-180	
			MSRPD	ug/L	10.00	35.7%	≤38	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	100 %	70-130	
4-Bromofluorobenzene	524.2	03/08/16:202713VRG	Blank	ug/L	10.00	90.1 %	70-130	
			MS	ug/L	10.00	102 %	70-130	
		(SP 1602429-001)	MSD	ug/L	10.00	108 %	70-130	
			MSRPD	ug/L	10.00	5.9%	≤30	
4-Bromofluorobenzene (BFB)	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	105 %	70-130	
4-Chlorotoluene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	66.2 %	11-177	
		(SP 1602429-001)	MSD	ug/L	10.00	91.4 %	11-177	
			MSRPD	ug/L	10.00	32.0%	≤41	

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Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
4-Chlorotoluene	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	100 %	70-130	
Benzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.7 %	12-158	
		(SP 1602429-001)	MSD	ug/L	10.00	73.0 %	12-158	
			MSRPD	ug/L	10.00	13.6%	≤36	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	90.8 %	70-130	
Bromobenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	90.4 %	23-177	
		(SP 1602429-001)	MSD	ug/L	10.00	112 %	23-177	
			MSRPD	ug/L	10.00	21.8%	≤40	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	125 %	70-130	
Bromochloromethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	75.2 %	4-186	
		(SP 1602429-001)	MSD	ug/L	10.00	83.8 %	4-186	
			MSRPD	ug/L	10.00	10.9%	≤30	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	106 %	70-130	
Bromodichloromethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	55.0 %	11-164	
		(SP 1602429-001)	MSD	ug/L	10.00	65.7 %	11-164	
			MSRPD	ug/L	10.00	11.2%	≤34	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	82.9 %	70-130	
Bromoform	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	120 %	0-235	
		(SP 1602429-001)	MSD	ug/L	10.00	150 %	0-235	
			MSRPD	ug/L	10.00	12.6%	≤39	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	119 %	70-130	
Bromomethane (Methyl Bromide)	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	100 %	0-196	
		(SP 1602429-001)	MSD	ug/L	10.00	122 %	0-196	
			MSRPD	ug/L	10.00	19.5%	≤40	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	132 %	70-130	360
Carbon Tetrachloride	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	71.1 %	5-175	
		(SP 1602429-001)	MSD	ug/L	10.00	87.1 %	5-175	
			MSRPD	ug/L	10.00	20.2%	≤32	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	98.1 %	70-130	
Chlorobenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	80.3 %	14-175	
		(SP 1602429-001)	MSD	ug/L	10.00	93.7 %	14-175	
			MSRPD	ug/L	10.00	15.4%	≤35	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	107 %	70-130	
Chloroethane (Ethyl Chloride)	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	81.3 %	0-184	
		(SP 1602429-001)	MSD	ug/L	10.00	95.5 %	0-184	
			MSRPD	ug/L	10.00	16.0%	≤40	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	102 %	70-130	
Chloroform	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.1 %	15-163	
		(SP 1602429-001)	MSD	ug/L	10.00	70.2 %	15-163	
			MSRPD	ug/L	10.00	14.9%	≤36	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	84.7 %	70-130	
Chloromethane(Methyl Chloride)	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	124 %	0-224	
		(SP 1602429-001)	MSD	ug/L	10.00	141 %	0-224	

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Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Chloromethane(Methyl Chloride)	524.2	03/08/16:202713VRG	MSRPD	ug/L	10.00	12.6%	≤39	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	117 %	70-130	
cis-1,2-Dichloroethylene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	76.6 %	16-172	
		(SP 1602429-001)	MSD	ug/L	10.00	88.7 %	16-172	
			MSRPD	ug/L	10.00	14.6%	≤34	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	96.9 %	70-130	
cis-1,3-Dichloropropene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.4 %	5-158	
		(SP 1602429-001)	MSD	ug/L	10.00	50.7 %	5-158	
			MSRPD	ug/L	10.00	15.8%	≤38	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	95.0 %	70-130	
Dibromochloromethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	90.0 %	1-180	
		(SP 1602429-001)	MSD	ug/L	10.00	101 %	1-180	
			MSRPD	ug/L	10.00	5.7%	≤34	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	114 %	70-130	
Dibromomethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.9 %	11-168	
		(SP 1602429-001)	MSD	ug/L	10.00	73.4 %	11-168	
			MSRPD	ug/L	10.00	13.9%	≤28	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	90.9 %	70-130	
Dichlorodifluoromethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	56.2 %	0-334	
		(SP 1602429-001)	MSD	ug/L	10.00	81.0 %	0-334	
			MSRPD	ug/L	10.00	36.1%	≤39	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	82.1 %	70-130	
Dichloromethane	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.6 %	20-157	
		(SP 1602429-001)	MSD	ug/L	10.00	72.8 %	20-157	
			MSRPD	ug/L	10.00	13.5%	≤36	
Ethyl tert-Butyl Ether	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<3	
			MS	ug/L	10.00	66.9 %	11-165	
		(SP 1602429-001)	MSD	ug/L	10.00	76.6 %	11-165	
			MSRPD	ug/L	10.00	0.98	≤3	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	97.4 %	70-130	
Ethylbenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	50.3 %	9-174	
		(SP 1602429-001)	MSD	ug/L	10.00	37.1 %	9-174	
			MSRPD	ug/L	10.00	30.3%	≤37	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	96.3 %	70-130	
Freon-11	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	99.3 %	0-232	
		(SP 1602429-001)	MSD	ug/L	10.00	124 %	0-232	
			MSRPD	ug/L	10.00	21.9%	≤35	
Hexachlorobutadiene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	112 %	14-200	
		(SP 1602429-001)	MSD	ug/L	10.00	142 %	14-200	
			MSRPD	ug/L	10.00	24.0%	≤40	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	159 %	70-130	360
Isopropyl Ether	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<3	
			MS	ug/L	10.00	61.9 %	8-165	
		(SP 1602429-001)	MSD	ug/L	10.00	71.3 %	8-165	
			MSRPD	ug/L	10.00	0.94	≤3	

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Isopropyl Ether	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	90.9 %	70-130	
Isopropylbenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	58.2 %	4-159	
		(SP 1602429-001)	MSD	ug/L	10.00	50.9 %	4-159	
			MSRPD	ug/L	10.00	13.5%	≤37	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	106 %	70-130	
Methyl tert-Butyl Ether	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	112 %	70-130	
Methyl tert-Butyl Ether (MTBE)	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<1.0	
			MS	ug/L	10.00	74.9 %	11-168	
		(SP 1602429-001)	MSD	ug/L	10.00	84.5 %	11-168	
			MSRPD	ug/L	10.00	12.1%	≤29	
Methylene Chloride	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	97.3 %	70-130	
Naphthalene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	3.9 %	0-189	
		(SP 1602429-001)	MSD	ug/L	10.00	1.6 %	0-189	
			MSRPD	ug/L	10.00	0.24	≤0.5	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	124 %	70-130	
n-Butylbenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	47.7 %	4-186	
		(SP 1602429-001)	MSD	ug/L	10.00	35.9 %	4-186	
			MSRPD	ug/L	10.00	28.3%	≤37	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	105 %	70-130	
n-Propylbenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	50.6 %	0-174	
		(SP 1602429-001)	MSD	ug/L	10.00	39.6 %	0-174	
			MSRPD	ug/L	10.00	24.3%	≤37	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	96.4 %	70-130	
p-Isopropyltoluene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	26.4 %	0-193	
		(SP 1602429-001)	MSD	ug/L	10.00	12.3 %	0-193	
			MSRPD	ug/L	10.00	1.4	≤0.5	435
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	118 %	70-130	
sec-Butylbenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.3 %	0-177	
		(SP 1602429-001)	MSD	ug/L	10.00	50.7 %	0-177	
			MSRPD	ug/L	10.00	18.9%	≤40	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	117 %	70-130	
Styrene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	1.1 %	0-198	
		(SP 1602429-001)	MSD	ug/L	10.00	0.8 %	0-198	
			MSRPD	ug/L	10.00	0.034	≤0.5	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	108 %	70-130	
TAME	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<3	
			MS	ug/L	10.00	71.5 %	15-162	
		(SP 1602429-001)	MSD	ug/L	10.00	82.2 %	15-162	
			MSRPD	ug/L	10.00	1.1	≤3	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	105 %	70-130	
tert-Butanol	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<2	
			MS	ug/L	50.00	76.8 %	0-198	
		(SP 1602429-001)	MSD	ug/L	50.00	80.5 %	0-198	
			MSRPD	ug/L	10.00	4.8%	≤39	
	524.2	03/08/16:203293VRG	CCV	ug/L	50.00	102 %	70-130	
tert-Butylbenzene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	74.3 %	9-179	

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Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
tert-Butylbenzene	524.2	(SP 1602429-001)	MSD	ug/L	10.00	72.3 %	9-179	
			MSRPD	ug/L	10.00	2.7%	≤38	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	113 %	30-130	
Tetrachloroethylene (PCE)	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	86.1 %	14-186	
		(SP 1602429-001)	MSD	ug/L	10.00	103 %	14-186	
			MSRPD	ug/L	10.00	17.8%	≤33	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	123 %	70-130	
Toluene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	50.2 %	3-174	
		(SP 1602429-001)	MSD	ug/L	10.00	33.9 %	3-174	
			MSRPD	ug/L	10.00	38.6%	≤37	435
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	100 %	30-130	
trans-1,2-Dichloroethylene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	54.9 %	5-165	
		(SP 1602429-001)	MSD	ug/L	10.00	64.5 %	5-165	
			MSRPD	ug/L	10.00	16.0%	≤40	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	95.4 %	70-130	
trans-1,3-Dichloropropene	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	55.3 %	0-169	
		(SP 1602429-001)	MSD	ug/L	10.00	47.3 %	0-169	
			MSRPD	ug/L	10.00	15.6%	≤31	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	94.6 %	70-130	
Trichloroethylene (TCE)	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	67.3 %	11-167	
		(SP 1602429-001)	MSD	ug/L	10.00	84.1 %	11-167	
			MSRPD	ug/L	10.00	22.2%	≤35	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	95.5 %	70-130	
Trichlorofluoromethane F-11	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	126 %	70-130	
Trichlorotrifluoroethane F-113	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	55.4 %	0-183	
		(SP 1602429-001)	MSD	ug/L	10.00	65.8 %	0-183	
			MSRPD	ug/L	10.00	17.1%	≤33	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	92.7 %	70-130	
Vinyl Chloride	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	17.6 %	0-208	
		(SP 1602429-001)	MSD	ug/L	10.00	15.7 %	0-208	
			MSRPD	ug/L	10.00	0.19	≤0.5	
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	106 %	30-130	
Xylenes m,p	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	20.00	9.5 %	0-193	
		(SP 1602429-001)	MSD	ug/L	20.00	4.6 %	0-193	
			MSRPD	ug/L	10.00	0.98	≤0.5	435
	524.2	03/08/16:203293VRG	CCV	ug/L	20.00	109 %	70-130	
Xylenes o	524.2	03/08/16:202713VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	23.3 %	0-188	
		(SP 1602429-001)	MSD	ug/L	10.00	12.6 %	0-188	
			MSRPD	ug/L	10.00	1.1	≤0.5	435
	524.2	03/08/16:203293VRG	CCV	ug/L	10.00	110 %	70-130	

Definition

CCV : Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
Blank : Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
MS : Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.

March 8, 2016		Lab ID	: SP 1602476
South Tahoe Public Utility District		Customer	: 2-11369

Quality Control - Organic

Definition	
MSD	: Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSRPD	: MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.
ND	: Non-detect - Result was below the DQO listed for the analyte.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.

Explanation	
360	: CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted.
362	: Surrogates are qualified on Control Chart Limits, these are CCV limits. See individual sample reports.
435	: Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

16024716

SOUTH TAHOE PUBLIC UTILITY DISTRICT — CHAIN OF CUSTODY

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150
Phone: (530)-543-6231
FAX: (530)-541-4296

Lab Sent to: FGL

Sampler: UDD

Project: South Y-PCE-Lukins

Turnaround Time: Standard ____ 24 Hr ____ 48 Hr ✓ Other ____

Lab ID#	Sample Site	Date	Time	Preserve	Matrix	524.2 EPA	# of Containers	Remarks
AG50061	Well #4 @ 65 feet	03-03-16	0853	Hcl	DW	✓	3	
AG50062	Well #4 @ 85 feet	↓	0853	↓	↓	✓	3	
AG50063	Well #4 @ 107 feet	↓	0930	↓	↓	✓	3	
AG50064	Rockwater Well @ 60 feet	↓	0957	↓	↓	✓	3	
AG50065	VOC Trip Blank	↓	-	↓	↓	✓	1	

Comments:
- ☑ Report MTBE to 0.5 µg/L. Note any detection of MTBE ≥ 0.2 µg/L
- ☑ Analyze Travel and Field Blanks only if VOCs detected in samples.
- ☐ Use Calif State Write-On form to report results of Potable Water Wells

Please Return all STPUD ice chests & Blue Ice.

Relinquished by:
Signature: Daniel Arce
Print: Daniel Arce
Company: South Tahoe Public Utility District
Date: 03-03-16 Time: 1230

Received by:
Signature: ____
Print: ____
Company: ____
Date: ____ Time: ____

Sample Receipt	Yes/No	Comment
Received intact		
Received cold		
Custody seals		
Correct container		

Relinquished by:
Signature: ONTRAC
Print: D10010904466201
Company: ____
Date: ____ Time: ____

Received by:
Signature: [signature]
Print: Naddie P
Company: FGL
Date: 3/4 Time: 1100

Condition Upon Receipt (Attach to COC)

Sample Receipt at SP:

1. Number of ice chests/packages received: **1**
2. Shipper tracking numbers ______
3. Were samples received in a chilled condition?
   Temps: **6** / ___ / ___ / ___ / ___ / ___ / ___
4. Surface water (SWTR) bact samples: A sample that has a temperature upon receipt of >10C, whether iced or not, should be flagged unless the time since sample collection has been less than two hours.
5. Do the number of bottles received agree with the COC? **[Yes]** **No** **N/A**
6. Verify sample date, time, sampler **[Yes]** **No** **N/A**
7. Were the samples received intact? (i.e. no broken bottles, leaks, etc.) **[Yes]** **No**
8. Were sample custody seals intact? **Yes** **No** **[N/A]**

Sample Verification, Labeling and Distribution:

1. Were all requested analyses understood and acceptable? **[Yes]** **No**
2. Did bottle labels correspond with the client's ID's? **[Yes]** **No**
3. Were all bottles requiring sample preservation properly preserved? **Yes** **No** **[N/A]** **FGL**
   [Exception: Oil & Grease, VOA and CrVI verified in lab]
4. VOAs checked for Headspace? **[Yes]** **No** **N/A**
5. Were all analyses within holding times at time of receipt? **[Yes]** **No**
6. Have rush or project due dates been checked and accepted? **Yes** **No** **[N/A]**

Include a copy of the COC for lab delivery. (Bacti. Inorganics and Radio)

Sample Receipt, Login and Verification completed by:

Reviewed and Approved By **Nicole Parson** Digitally signed by Nicole Parson Title: Sample Receiving Date: 03/04/2016-12:06:42

Discrepency Documentation:

Any items above which are "No" or do not meet specifications (i.e. temps) must be resolved.

1. Person Contacted: ______ Phone Number: ______
   Initiated By: ______ Date: ______
   Problem:

   Resolution:

2. Person Contacted: ______ Phone Number: ______
   Initiated By: ______ Date: ______
   Problem:

   Resolution:

BSK Associates Fresno
1414 Stanislaus St
Fresno, CA93706
559-497-2888 (Main)
559-485-6935 (FAX)

A6C0515
3/08/2016
Invoice: A604663

Terry Powers
South Tahoe PUD
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

RE: Report for A6C0515 Chemistry

Dear Terry Powers,

Thank you for using BSK Associates for your analytical testing needs. In the following pages, you will find the test results for the samples submitted to our laboratory on 3/4/2016. The results have been approved for release by our Laboratory Director as indicated by the authorizing signature below.

The samples were analyzed for the test(s) indicated on the Chain of Custody (see attached) and the results relate only to the samples analyzed. BSK certifies that the testing was performed in accordance with the quality system requirements specified in the 2009 TNI Standard. Any deviations from this standard or from the method requirements for each test procedure performed will be annotated alongside the analytical result or noted in the Case Narrative. Unless otherwise noted, the sample results are reported on an "as received" basis.

If additional clarification of any information is required, please contact your Project Manager, John Montierth , at (800) 877-8310 or (559) 497-2888 x201.

Thanks again for using BSK Associates. We value your business and appreciate your loyalty.

Sincerely,

John Montierth, Project Manager

Accredited in Accordance with NELAP
ORELAP #4021

BSK Associates Engineers & Laboratories

Case Narrative

Project and Report Details		Invoice Details	
Client:	South Tahoe PUD	**Invoice To:**	South Tahoe PUD
Report To:	Terry Powers	**Invoice Attn:**	Terry Powers
Project #:	South Y - PCE - Lukins	**Project PO#:**	-
Received:	3/04/2016 - 09:25		
Report Due:	3/08/2016		

Sample Receipt Conditions

Cooler: Default Cooler
Temperature on Receipt °C: 2.2

Containers Intact
COC/Labels Agree
Received On Blue Ice
Packing Material - Bubble Wrap
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Data Qualifiers

The following qualifiers have been applied to one or more analytical results:

None applied

Report Distribution

Recipient(s)	Report Format	CC:
Terry Powers	FINAL.RPT	

Certificate of Analysis

Sample ID: A6C0515-01
Sampled By: client
Sample Description: Well #4 @ 65 feet // AG50061

Sample Date - Time: 03/03/16 - 08:53
Matrix: Drinking Water
Sample Type: Grab

BSK Associates Fresno

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Total Organic Carbon	SM 5310C	**0.68**	0.20	mg/L	1	A602621	03/04/16	03/04/16	

Certificate of Analysis

Sample ID: A6C0515-02
Sampled By: client
Sample Description: Well #4 @ 85 feet // AG50062

Sample Date - Time: 03/03/16 - 08:53
Matrix: Drinking Water
Sample Type: Grab

BSK Associates Fresno

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Total Organic Carbon	SM 5310C	**0.64**	0.20	mg/L	1	A602621	03/04/16	03/04/16	

Certificate of Analysis

Sample ID: A6C0515-03
Sampled By: client
Sample Description: Well #4 @ 107 feet // AG50063

Sample Date - Time: 03/03/16 - 09:30
Matrix: Drinking Water
Sample Type: Grab

BSK Associates Fresno

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Total Organic Carbon	SM 5310C	**0.59**	0.20	mg/L	1	A602621	03/04/16	03/04/16	

BSK Associates Fresno

General Chemistry Quality Control Report

SM 5310C - Quality Control

Batch: A602621 Prepared: 3/4/2016
Prep Method: Method Specific Preparation Analyst: CEG

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
Blank (A602621-BLK1)											
Total Organic Carbon	ND	0.20	mg/L							03/04/16	
Blank Spike (A602621-BS1)											
Total Organic Carbon	9.9	0.20	mg/L	10		99	80-120			03/04/16	
Blank Spike Dup (A602621-BSD1)											
Total Organic Carbon	9.8	0.20	mg/L	10		98	80-120	1	20	03/04/16	
Matrix Spike (A602621-MS1), Source: A6C0125-01											
Total Organic Carbon	9.9	0.20	mg/L	10	ND	98	80-120			03/04/16	
Matrix Spike (A602621-MS2), Source: A6C0523-02											
Total Organic Carbon	10	0.20	mg/L	10	ND	100	80-120			03/04/16	
Matrix Spike Dup (A602621-MSD1), Source: A6C0125-01											
Total Organic Carbon	9.9	0.20	mg/L	10	ND	98	80-120	0	20	03/04/16	
Matrix Spike Dup (A602621-MSD2), Source: A6C0523-02											
Total Organic Carbon	10	0.20	mg/L	10	ND	101	80-120	2	20	03/04/16	

BSK Associates Engineers & Laboratories

Certificate of Analysis

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of according to BSK's sample retention policy unless other arrangements are made in advance.
- All positive results for EPA Methods 504.1 and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.
- Due to the subjective nature of the Threshold Odor Method, all characterizations of the detected odor are the opinion of the panel of analysts. The characterizations can be found in Standard Methods 2170B Figure 2170:1.
- The MCLs provided in this report (if applicable) represent the primary MCLs for that analyte.

Definitions

mg/L:	Milligrams/Liter (ppm)	MDL:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit: DL x Dilution	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)	ND:	None Detected at RL	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	pCi/L:	Picocuries per Liter	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	RL Mult:	RL Multiplier	Present:	1 or more CFU/100mLs
NR:	Non-Reportable	MCL:	Maximum Contaminant Limit		

Please see the individual Subcontract Lab's report for applicable certifications.

BSK is not accredited under the NELAC program for the following parameters: **NA**

Certifications: **Please refer to our website for a copy of our Accredited Fields of Testing under each certification.**

Fresno

State of California - ELAP	1180	State of Hawaii	4021
State of Nevada	CA000792016-1	State of Oregon - NELAC	4021
EPA - UCMR3	CA00079	State of Washington	C997-15

Sacramento

State of California - ELAP	2435

Vancouver

State of Oregon - NELAC	WA100008-007	State of Washington	C824-14a

A6C0515

03042016

South6474

Turnaround: Standard

Due Date: 3/8/2016

South Tahoe PUD

SOUTH TAHOE PUBLIC UTILITY DISTRICT

20

CHAIN OF CUSTOD

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150
Phone: (530)-543-6231
FAX: (530)-541-4296

Lab Sent to: BSK

Sampler: WD

Project: South Y-PCE-Lukins

A6C0515 03/04/2016
South6474 2

Turnaround Time: Standard ___ 24 Hr ___ 48 Hr ✓ Other ___

Lab ID#	Sample Site	Date	Time	Preserve	Matrix	TOC	# of Containers	Remarks
A6C50061	Well #4 @ 65 Feet	03-03-16	0853	H_3PO_4	DW	✓	3	
A6C50062	Well #4 @ 85 Feet	↓	0853	↓	↓	✓	3	
A6C50063	Well #4 @ 107 Feet	↓	0930	↓	↓	✓	3	

Comments:
- ☐ Report MTBE to 0.5 µg/L. Note any detection of MTBE ≥ 0.2 µg/L
- ☐ Analyze Travel and Field Blanks only if VOCs detected in samples.
- ☐ Use Calif State Write-On form to report results of Potable Water Wells

Please Return all STPUD ice chests & Blue Ice.

Relinquished by:
Signature: Daniel Arce
Print: Daniel Arce
Company: South Tahoe Public Utility District
Date: 03-03-16 Time: 1230

Received by:
Signature ___
Print ___
Company ___
Date: ___ Time ___

Sample Receipt	Yes/No	Comment
Received intact		
Received cold		
Custody seals		
Correct container		

Relinquished by:
Signature ___
Print ___
Company ___
Date: ___ Time ___

Received by:
Signature
Print: Ryan Harris
Company: BSK
Date: 3-4-16 Time: 925

\Lab\Forms\Chain of Custody.doc

OnTrac
BL

BSK Associates SR-FL-0002-15

A6C0515 03/04/2016
South6474 2

Sample Integrity

BSK Bottles: Yes No Page 1 of 1

COC Info

Was temperature within range? Chemistry ≤ 6°C Micro < 10°C	Yes No NA	Were correct containers and preservatives received for the tests requested?	Yes No NA
If samples were taken today, is there evidence that chilling has begun?	Yes No NA	Were there bubbles in the VOA vials? (Volatiles Only)	Yes No NA
Did all bottles arrive unbroken and intact?	Yes No	Was a sufficient amount of sample received?	Yes No
Did all bottle labels agree with COC?	Yes No	Do samples have a hold time <72 hours?	Yes No
Was sodium thiosulfate added to CN sample(s) until chlorine was no longer present?	Yes No NA	Was PM notified of discrepancies? PM: By/Time:	Yes No NA

Bottles Received — "_" means preservation/chlorine checks are either N/A or are performed in the lab

250ml(A) 500ml(B) 1Liter(C) 40ml VOA(V)	Checks	Passed?	1-3				
Bacti $Na_2S_2O_3$	—	—					
None (P) White Cap	—	—					
Cr6 (P) Br. Green Label/Blue Cap NH4OH(NH4)2SO4 DW	Cl, pH > 8	Y N					
Cr6 (P) Pink Label/Blue Cap NH4OH(NH4)2SO4 WW	pH 9.3-9.7	Y N					
Cr6 (P) Black Label/Blue Cap NH4OH(NH4)2SO4 7199 ***24 HOUR HOLD TIME***	pH 9.0-9.5	Y N					
HNO_3 (P) Red Cap	—	—					
H_2SO_4 (P) or (AG) Yellow Cap/Label	pH < 2	Y N					
NaOH (P) Green Cap	Cl, pH >10	Y N					
NaOH + ZnAc (P)	pH > 9	Y N				NA	
Dissolved Oxygen 300ml (g)	—	—					
None (AG) 608/8081/8082, 625, 632/8321, 8151, 8270	—	—					
HCl (AG) Lt. Blue Label O&G, Diesel	—	—				3/4/16	
Na_2O_3S+HCl (AG) Lt. Pink Label 525	—	—					
$Na_2S_2O_3$ 1 Liter (Brown P) 549	—	—					
$Na_2S_2O_3$ (AG) Blue Label 547,515,548,THM,524	—	—					
$Na_2S_2O_3$ (CG) Blue Label 504, 505	—	—					
$Na_2S_2O_3$ + MCAA (CG) Orange Label 531	pH < 3	Y N					
NH_4Cl (AG) Purple Label 552	—	—					
EDA (AG) Brown Label DBPs	—	—					
HCL (CG) 524.2,BTEX,Gas, MTBE, 8260/624	—	—					
Buffer pH 4 (CG)	—	—					
None (CG)	—	—					
H_3PO_4 (CG) Salmon Label	—	—	3V				
Other:							
Asbestos 1Liter Plastic w/ Foil	—	—					
Low Level Hg / Metals Double Baggie	—	—					
Bottled Water	—	—					
Clear Glass Jar: 250 / 500 / 1 Liter	—	—					
Soil Tube Brass / Steel / Plastic	—	—					
Tedlar Bag / Plastic Bag	—	—					

Split

	Container	Preservative	Date/Time/Initials		Container	Preservative	Date/Time/Initials
S P				S P			
S P				S P			

Comments

Labeled by: JU @ 11:08 Labels checked by: ce @ 11:20 RUSH Paged by: ____ @

Appendix F.2 – Pre-Pilot Testing Water Quality Sample Results

South Y PCE Study - Spring 2016
LBWC#4 Pre-Pilot Test Results

Date		03/24/2016				
Time		12:00				
Hours Pumping		0.68				
Flow	gpm	143				
Total Flow	gallons	4,780				
Parameter	Units	**Results**	***Standard**	**Exceeds Standard?**	**DLR**	**Method**
Temperature	°C	10.1	--	--		Thermistor
pH-Field		6.41	--	--		SM4500H$^+$B
Specific Conductance	µS	484	900-1600-2200	No	5	SM2510B
Alkalinity, HCO_3	mg/L	77.0	--	--	5	SM 2320B
Alkalinity, CO_3	mg/L	0	--	--	5	SM 2320B
Alkalinity, OH	mg/L	0	--	--	5	SM 2320B
Alkalinity, Total	mg/L	77.0	--	--	5	SM 2320B
Fluoride	mg/L	< 0.05	2.0	No	0.05	EPA 300
Chloride	mg/L	93.1	250-500-600	No	0.5	EPA 300
NO_2-N	mg/L	< 0.01	1	No	0.01	EPA 300
Bromide	mg/L	0.051	--	--	0.01	EPA 300
NO_3-N	mg/L	1.25	10	No	0.01	EPA 300
PO_4-P	mg/L	< 0.01	--	--	0.01	EPA 300
SO_4	mg/L	3.41	250-500-600	No	0.5	EPA 300
TDS	mg/L	308	500-1000-1500	No	5	SM 2540C
SS	mg/L	11.4	--	--	1	SM 2540D
Hardness, Total	mg/L	158	--	--	5	SM 2340B
Ca	mg/L	41.0	--	--	1	EPA 200.7
Mg	mg/L	14.1	--	--	0.1	EPA 200.7
K	mg/L	4.46	--	--	1	EPA 200.7
Na	mg/L	15.9	--	--	1	EPA 200.7
Anions		4.05	--	--		Calculation
Cations		4.01	--	--		Calculation
Langlier Index		-1.66	--	--		Calculation
Aggressive Index		10.31	--	--		Calculation
cis-1,2-DCE	µg/L	0.6	6.0	No	0.5	EPA 524.2
PCE	µg/L	**39**	**5**	**Yes**	2.5	EPA 524.2
Toluene	µg/L	16	15000	No	0.5	EPA 524.2
TCE	µg/L	0.8	5.0	No	0.5	EPA 524.2
TPH-Gas	µg/L	ND	--	--	50	EPA 8015B
TPH-Diesel	mg/L	ND	--	--	0.5	EPA 8015
TOC	mg/L	0.55	--	--	0.20	SM 5310C

Recommended-Upper-Short Term levels

South Y PCE Study - Spring 2016
LBWC#4 Pre-Pilot Test Results

Parameter	Units	Results	*Standard	Exceeds Standard?	DLR	Method
Aluminum	µg/L	ND	1000	No	20	EPA 200.8
Antimony	µg/L	ND	6	No	1	EPA 200.8
Arsenic	µg/L	1.91	10	No	1	EPA 200.8
Barium	µg/L	123	1000	No	2	EPA 200.8
Beryllium	µg/L	ND	4	No	1	EPA 200.8
Cadmium	µg/L	ND	5	No	0.5	EPA 200.8
Chromium	µg/L	3.75	50	No	1	EPA 200.8
Copper	µg/L	37.8	--	--	2	EPA 200.8
Lead	µg/L	0.817	--	--	0.5	EPA 200.8
Manganese	µg/L	**728**	**50**	**Yes**	2	EPA 200.8
Mercury	µg/L	ND	2	No	0.2	EPA 245.1
Nickel	µg/L	10.4	100	No	5	EPA 200.8
Selenium	µg/L	ND	50	No	5	EPA 200.8
Silver	µg/L	ND	10	No	0.5	EPA 200.8
Thallium	µg/L	ND	2	No	1	EPA 200.8
Vanadium	µg/L	2.97	50	No	3	EPA 200.8
Zinc	µg/L	40.8	5000	No	20	EPA 200.8
Boron	mg/L	ND	1	No	0.05	EPA 200.7
Iron	mg/L	**4.99**	**0.3**	**Yes**	0.02	EPA 200.7

*Standard refers to Primary and Secondary MCL's or Notification Level

Appendix F.3 – Dynamic Flow Survey Water Quality Sample Results

April 6, 2016

South Tahoe Public Utility District		Lab ID	: SP 1603610
1275 Meadow Crest Drive		Customer	: 2-11369
South Lake Tahoe, CA 96150			

Laboratory Report

Introduction: This report package contains total of 17 pages divided into 3 sections:

Case Narrative	(2 pages)	: An overview of the work performed at FGL.
Sample Results	(8 pages)	: Results for each sample submitted.
Quality Control	(7 pages)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
LBWC #4 110 ft	03/29/2016	04/01/2016	SP 1603610-001	GW
LBWC #4 82 ft	03/29/2016	04/01/2016	SP 1603610-002	GW
LBWC #4 72 ft	03/29/2016	04/01/2016	SP 1603610-003	GW
LBWC #4 68 ft	03/29/2016	04/01/2016	SP 1603610-004	GW

Sampling and Receipt Information: All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples arrived at 4 °C. All samples were prepared and analyzed within the method specified hold time. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Organic QC

524.2	04/04/2016:204708 All analysis quality controls are within established criteria, except: The following note applies to Bromomethane (Methyl Bromide), Trichlorofluoromethane F-11, Chloroethane (Ethyl Chloride), Vinyl Chloride: 360 CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted.
	04/05/2016:204722 All analysis quality controls are within established criteria.
	04/04/2016:203877 All preparation quality controls are within established criteria.

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

April 6, 2016 | Lab ID : SP 1603610
South Tahoe Public Utility District | Customer : 2-11369

Certification:: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Approved By **David Terz, B.A., M.B.A.** Digitally signed by David Terz, B.A., M.B.A. Title: QA Director Date: 2016-04-06

April 6, 2016

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Lab ID : SP 1603610-001
Customer ID : 2-11369

Sampled On : March 29, 2016-12:10
Sampled By : Alward
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC #4 110 ft
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
4-Bromofluorobenzene‡	82.4	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	76.2	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.7	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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CA ELAP Certification No. 2810

April 6, 2016
Description : LBWC #4 110 ft

Lab ID : SP 1603610-001
Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	52.4	2.5*	ug/L		524.2	04/04/16:203877	524.2	04/05/16:204722
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	1.0	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603610-002
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 29, 2016-12:40
Sampled By : Alward
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC #4 82 ft
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	83.6	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	75.9	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.7	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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April 6, 2016
Description : LBWC #4 82 ft

Lab ID : SP 1603610-002
Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	47.0	2.5*	ug/L		524.2	04/04/16:203877	524.2	04/05/16:204722
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	1.0	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Lab ID : SP 1603610-003
Customer ID : 2-11369

Sampled On : March 29, 2016-13:10
Sampled By : Alward
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC #4 72 ft
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
4-Bromofluorobenzene‡	85.8	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	80.2	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.8	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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CA ELAP Certification No. 2810

April 6, 2016 Lab ID : SP 1603610-003
Description : LBWC #4 72 ft Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	55.1	2.5*	ug/L		524.2	04/04/16:203877	524.2	04/05/16:204722
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	1.0	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603610-004
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 29, 2016-13:40
Sampled By : Alward
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC #4 68 ft
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
4-Bromofluorobenzene‡	84.5	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	80.2	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.8	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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April 6, 2016 | Lab ID : SP 1603610-004
Description : LBWC #4 68 ft | Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	52.3	2.5*	ug/L		524.2	04/04/16:203877	524.2	04/05/16:204722
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	1.1	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016 Lab ID : SP 1603610
South Tahoe Public Utility District Customer : 2-11369

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
1,1,1,2-Tetrachloroethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.8 %	12-178	
		(CC 1680990-001)	MSD	ug/L	10.00	64.3 %	12-178	
			MSRPD	ug/L	10.00	7.2%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.1 %	70-130	
1,1,1-Trichloroethane(TCA)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	62.4 %	9-176	
		(CC 1680990-001)	MSD	ug/L	10.00	67.0 %	9-176	
			MSRPD	ug/L	10.00	7.1%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	96.0 %	70-130	
1,1,2,2-Tetrachloroethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	69.7 %	23-180	
		(CC 1680990-001)	MSD	ug/L	10.00	76.0 %	23-180	
			MSRPD	ug/L	10.00	8.6%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	110 %	70-130	
1,1,2-Trichloroethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.7 %	25-173	
		(CC 1680990-001)	MSD	ug/L	10.00	68.4 %	25-173	
			MSRPD	ug/L	10.00	10.3%	≤29	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	
1,1-Dichloroethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.9 %	15-161	
		(CC 1680990-001)	MSD	ug/L	10.00	64.7 %	15-161	
			MSRPD	ug/L	10.00	7.8%	≤36	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	95.5 %	70-130	
1,1-Dichloroethylene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	56.4 %	0-162	
		(CC 1680990-001)	MSD	ug/L	10.00	63.9 %	0-162	
			MSRPD	ug/L	10.00	12.4%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	90.1 %	70-130	
1,1-Dichloropropene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	57.7 %	0-171	
		(CC 1680990-001)	MSD	ug/L	10.00	62.6 %	0-171	
			MSRPD	ug/L	10.00	8.1%	≤31	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	88.8 %	70-130	
1,2,3-Trichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	66.0 %	14-181	
		(CC 1680990-001)	MSD	ug/L	10.00	69.3 %	14-181	
			MSRPD	ug/L	10.00	4.9%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	104 %	70-130	
1,2,4-Trichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.8 %	10-180	
		(CC 1680990-001)	MSD	ug/L	10.00	66.4 %	10-180	
			MSRPD	ug/L	10.00	4.0%	≤32	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	99.2 %	70-130	
1,2,4-Trimethylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	44.4 %	2-192	
		(CC 1680990-001)	MSD	ug/L	10.00	49.4 %	2-192	
			MSRPD	ug/L	10.00	10.8%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
1,2-Dichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.3 %	13-191	
		(CC 1680990-001)	MSD	ug/L	10.00	70.3 %	13-191	
			MSRPD	ug/L	10.00	10.5%	≤35	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	

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Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
1,2-Dichlorobenzene-d4	524.2	04/04/16:203877VRG	Blank	ug/L	10.00	79.6 %	70-130	
			MS	ug/L	10.00	89.8 %	70-130	
		(CC 1680990-001)	MSD	ug/L	10.00	92.6 %	70-130	
			MSRPD	ug/L	10.00	3.1%	≤20	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	94.9 %	70-130	
1,2-Dichloroethane (EDC)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	67.2 %	18-162	
		(CC 1680990-001)	MSD	ug/L	10.00	72.2 %	18-162	
			MSRPD	ug/L	10.00	7.2%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	107 %	70-130	
1,2-Dichloropropane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.0 %	10-163	
		(CC 1680990-001)	MSD	ug/L	10.00	70.2 %	10-163	
			MSRPD	ug/L	10.00	7.7%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	105 %	70-130	
1,3,5-Trimethylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	52.0 %	0-210	
		(CC 1680990-001)	MSD	ug/L	10.00	57.8 %	0-210	
			MSRPD	ug/L	10.00	10.7%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
1,3-Dichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.7 %	17-182	
		(CC 1680990-001)	MSD	ug/L	10.00	69.5 %	17-182	
			MSRPD	ug/L	10.00	8.7%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	101 %	70-130	
1,3-Dichloropropane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	69.9 %	0-178	
		(CC 1680990-001)	MSD	ug/L	10.00	74.7 %	0-178	
			MSRPD	ug/L	10.00	6.6%	≤29	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	112 %	70-130	
1,4-Dichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	64.1 %	19-183	
		(CC 1680990-001)	MSD	ug/L	10.00	69.5 %	19-183	
			MSRPD	ug/L	10.00	8.1%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	104 %	70-130	
2,2-Dichloropropane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	51.3 %	0-288	
		(CC 1680990-001)	MSD	ug/L	10.00	57.7 %	0-288	
			MSRPD	ug/L	10.00	11.8%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	80.9 %	70-130	
2-Chlorotoluene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.3 %	17-180	
		(CC 1680990-001)	MSD	ug/L	10.00	71.6 %	17-180	
			MSRPD	ug/L	10.00	9.1%	≤38	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	
4-Bromofluorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L	10.00	87.7 %	70-130	
			MS	ug/L	10.00	93.3 %	70-130	
		(CC 1680990-001)	MSD	ug/L	10.00	95.2 %	70-130	
			MSRPD	ug/L	10.00	2.0%	≤30	
4-Bromofluorobenzene (BFB)	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	95.3 %	70-130	
4-Chlorotoluene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.3 %	11-177	
		(CC 1680990-001)	MSD	ug/L	10.00	70.1 %	11-177	
			MSRPD	ug/L	10.00	10.2%	≤41	

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South Tahoe Public Utility District Customer : 2-11369

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
4-Chlorotoluene	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	104 %	70-130	
Benzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.3 %	12-158	
		(CC 1680990-001)	MSD	ug/L	10.00	67.3 %	12-158	
			MSRPD	ug/L	10.00	9.3%	≤36	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.2 %	70-130	
Bromobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.2 %	23-177	
		(CC 1680990-001)	MSD	ug/L	10.00	65.9 %	23-177	
			MSRPD	ug/L	10.00	7.3%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.9 %	70-130	
Bromochloromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	57.9 %	4-186	
		(CC 1680990-001)	MSD	ug/L	10.00	62.5 %	4-186	
			MSRPD	ug/L	10.00	7.7%	≤30	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.2 %	70-130	
Bromodichloromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.5 %	11-164	
		(CC 1680990-001)	MSD	ug/L	10.00	67.7 %	11-164	
			MSRPD	ug/L	10.00	6.5%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.8 %	70-130	
Bromoform	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	53.7 %	0-235	
		(CC 1680990-001)	MSD	ug/L	10.00	62.0 %	0-235	
			MSRPD	ug/L	10.00	14.4%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	78.8 %	70-130	
Bromomethane (Methyl Bromide)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	68.4 %	0-196	
		(CC 1680990-001)	MSD	ug/L	10.00	65.9 %	0-196	
			MSRPD	ug/L	10.00	3.7%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	141 %	70-130	360
Carbon Tetrachloride	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.5 %	5-175	
		(CC 1680990-001)	MSD	ug/L	10.00	64.2 %	5-175	
			MSRPD	ug/L	10.00	7.5%	≤32	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	89.4 %	70-130	
Chlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.8 %	14-175	
		(CC 1680990-001)	MSD	ug/L	10.00	69.5 %	14-175	
			MSRPD	ug/L	10.00	8.6%	≤35	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	105 %	70-130	
Chloroethane (Ethyl Chloride)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	78.5 %	0-184	
		(CC 1680990-001)	MSD	ug/L	10.00	73.0 %	0-184	
			MSRPD	ug/L	10.00	7.2%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	156 %	70-130	360
Chloroform	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.2 %	15-163	
		(CC 1680990-001)	MSD	ug/L	10.00	69.7 %	15-163	
			MSRPD	ug/L	10.00	6.8%	≤36	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
Chloromethane(Methyl Chloride)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	55.6 %	0-224	
		(CC 1680990-001)	MSD	ug/L	10.00	56.4 %	0-224	

April 6, 2016 | Lab ID : SP 1603610
South Tahoe Public Utility District | Customer : 2-11369

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Chloromethane(Methyl Chloride)	524.2	04/04/16:203877VRG	MSRPD	ug/L	10.00	1.5%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	118 %	70-130	
cis-1,2-Dichloroethylene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.1 %	16-172	
		(CC 1680990-001)	MSD	ug/L	10.00	66.1 %	16-172	
			MSRPD	ug/L	10.00	7.9%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	93.8 %	70-130	
cis-1,3-Dichloropropene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	58.4 %	5-158	
		(CC 1680990-001)	MSD	ug/L	10.00	62.8 %	5-158	
			MSRPD	ug/L	10.00	7.3%	≤38	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	91.4 %	70-130	
Dibromochloromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	60.1 %	1-180	
		(CC 1680990-001)	MSD	ug/L	10.00	67.0 %	1-180	
			MSRPD	ug/L	10.00	10.8%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	89.9 %	70-130	
Dibromomethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.5 %	11-168	
		(CC 1680990-001)	MSD	ug/L	10.00	64.3 %	11-168	
			MSRPD	ug/L	10.00	7.8%	≤28	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
Dichlorodifluoromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.7 %	0-334	
		(CC 1680990-001)	MSD	ug/L	10.00	58.4 %	0-334	
			MSRPD	ug/L	10.00	2.1%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	119 %	70-130	
Dichloromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	58.5 %	20-157	
		(CC 1680990-001)	MSD	ug/L	10.00	64.6 %	20-157	
			MSRPD	ug/L	10.00	9.8%	≤36	
Ethyl tert-Butyl Ether	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<3	
			MS	ug/L	10.00	72.1 %	11-165	
		(CC 1680990-001)	MSD	ug/L	10.00	78.9 %	11-165	
			MSRPD	ug/L	10.00	0.67	≤3	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	114 %	70-130	
Ethylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.7 %	9-174	
		(CC 1680990-001)	MSD	ug/L	10.00	67.5 %	9-174	
			MSRPD	ug/L	10.00	12.2%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	101 %	70-130	
Freon-11	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	69.8 %	0-232	
		(CC 1680990-001)	MSD	ug/L	10.00	75.2 %	0-232	
			MSRPD	ug/L	10.00	7.4%	≤35	
Hexachlorobutadiene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	66.5 %	14-200	
		(CC 1680990-001)	MSD	ug/L	10.00	68.2 %	14-200	
			MSRPD	ug/L	10.00	2.6%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	93.9 %	70-130	
Isopropyl Ether	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<3	
			MS	ug/L	10.00	74.7 %	8-165	
		(CC 1680990-001)	MSD	ug/L	10.00	82.4 %	8-165	
			MSRPD	ug/L	10.00	0.78	≤3	

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Isopropyl Ether	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	120 %	70-130	
Isopropylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	64.1 %	4-159	
		(CC 1680990-001)	MSD	ug/L	10.00	69.9 %	4-159	
			MSRPD	ug/L	10.00	8.7%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
Methyl tert-Butyl Ether	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	124 %	70-130	
Methyl tert-Butyl Ether (MTBE)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<1.0	
			MS	ug/L	10.00	77.6 %	11-168	
		(CC 1680990-001)	MSD	ug/L	10.00	83.9 %	11-168	
			MSRPD	ug/L	10.00	7.8%	≤29	
Methylene Chloride	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.8 %	70-130	
Naphthalene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	60.7 %	0-189	
		(CC 1680990-001)	MSD	ug/L	10.00	65.7 %	0-189	
			MSRPD	ug/L	10.00	7.9%	≤32	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.2 %	70-130	
n-Butylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.0 %	4-186	
		(CC 1680990-001)	MSD	ug/L	10.00	69.8 %	4-186	
			MSRPD	ug/L	10.00	7.2%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	100 %	70-130	
n-Propylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.1 %	0-174	
		(CC 1680990-001)	MSD	ug/L	10.00	70.0 %	0-174	
			MSRPD	ug/L	10.00	7.2%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	
p-Isopropyltoluene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.1 %	0-193	
		(CC 1680990-001)	MSD	ug/L	10.00	66.4 %	0-193	
			MSRPD	ug/L	10.00	8.3%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	99.1 %	70-130	
sec-Butylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.7 %	0-177	
		(CC 1680990-001)	MSD	ug/L	10.00	72.2 %	0-177	
			MSRPD	ug/L	10.00	9.5%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	
Styrene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	32.6 %	0-198	
		(CC 1680990-001)	MSD	ug/L	10.00	39.6 %	0-198	
			MSRPD	ug/L	10.00	19.3%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	73.7 %	70-130	
TAME	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<3	
			MS	ug/L	10.00	69.6 %	15-162	
		(CC 1680990-001)	MSD	ug/L	10.00	75.6 %	15-162	
			MSRPD	ug/L	10.00	0.60	≤3	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	111 %	70-130	
tert-Butanol	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<2	
			MS	ug/L	50.00	81.8 %	0-198	
		(CC 1680990-001)	MSD	ug/L	50.00	71.7 %	0-198	
			MSRPD	ug/L	10.00	13.1%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	50.00	91.3 %	70-130	
tert-Butylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	66.3 %	9-179	

April 6, 2016 | Lab ID : SP 1603610
South Tahoe Public Utility District | Customer : 2-11369

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
tert-Butylbenzene	524.2	(CC 1680990-001)	MSD	ug/L	10.00	72.3 %	9-179	
			MSRPD	ug/L	10.00	8.7%	≤38	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	30-130	
Tetrachloroethylene (PCE)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	56.3 %	14-186	
		(CC 1680990-001)	MSD	ug/L	10.00	60.1 %	14-186	
			MSRPD	ug/L	10.00	6.5%	≤33	
	524.2	04/05/16:204722VRG	CCV	ug/L	10.00	76.1 %	70-130	
Toluene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	47.9 %	3-174	
		(CC 1680990-001)	MSD	ug/L	10.00	67.3 %	3-174	
			MSRPD	ug/L	10.00	24.3%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.5 %	30-130	
trans-1,2-Dichloroethylene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	56.1 %	5-165	
		(CC 1680990-001)	MSD	ug/L	10.00	60.2 %	5-165	
			MSRPD	ug/L	10.00	7.2%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	88.8 %	70-130	
trans-1,3-Dichloropropene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	52.0 %	0-169	
		(CC 1680990-001)	MSD	ug/L	10.00	58.9 %	0-169	
			MSRPD	ug/L	10.00	12.4%	≤31	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	82.5 %	70-130	
Trichloroethylene (TCE)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	60.1 %	11-167	
		(CC 1680990-001)	MSD	ug/L	10.00	64.8 %	11-167	
			MSRPD	ug/L	10.00	7.6%	≤35	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	92.4 %	70-130	
Trichlorofluoromethane F-11	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	149 %	70-130	360
Trichlorotrifluoroethane F-113	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	77.1 %	0-183	
		(CC 1680990-001)	MSD	ug/L	10.00	83.7 %	0-183	
			MSRPD	ug/L	10.00	8.2%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	118 %	70-130	
Vinyl Chloride	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	69.9 %	0-208	
		(CC 1680990-001)	MSD	ug/L	10.00	70.5 %	0-208	
			MSRPD	ug/L	10.00	0.9%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	145 %	30-130	360
Xylenes m,p	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	20.00	55.8 %	0-193	
		(CC 1680990-001)	MSD	ug/L	20.00	61.7 %	0-193	
			MSRPD	ug/L	10.00	10.1%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	20.00	97.1 %	70-130	
Xylenes o	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	58.7 %	0-188	
		(CC 1680990-001)	MSD	ug/L	10.00	65.4 %	0-188	
			MSRPD	ug/L	10.00	10.8%	≤36	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	

Definition

CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
MS	: Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.

Quality Control - Organic

Definition	
MSD	: Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSRPD	: MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.
ND	: Non-detect - Result was below the DQO listed for the analyte.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.
Explanation	
360	: CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted.

SOUTH TAHOE PUBLIC UTILITY DISTRICT

1603010

CHAIN OF CUSTODY

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150
Phone: (530)-543-6231
FAX: (530)-541-4296

Lab Sent to: FGL

Sampler: Alward

Project: South Y PCE Study

Turnaround Time: Standard ✓ | 24 Hr ___ | 48 Hr ___ | Other ___

Lab ID#	Sample Site	Date	Time	Preserve	Matrix	524+oxys										# of Containers	Remarks
AG50384	LBWC #4 110 ft	03-29-16	1210	4°/HCl	GW	✓										3	
AG50385	LBWC #4 82 ft	03-29-16	1240		GW	✓										3	
AG50386	LBWC #4 72 ft	03-29-16	1310		GW	✓										3	
AG50387	LBWC #4 68 ft	03-29-16	1340		GW											3	

Comments:
- ☐ Report MTBE to 0.5 µg/L. Note any detection of MTBE ≥ 0.2 µg/L
- ☐ Analyze Travel and Field Blanks only if VOCs detected in samples.
- ☐ Use Calif State Write-On form to report results of Potable Water Wells

Please Return all STPUD ice chests & Blue Ice.

Sample Receipt	Yes/No	Comment
Received intact		
Received cold		
Custody seals		
Correct container		

Relinquished by:
Signature: Terry Powers
Print: Terry Powers
Company: South Tahoe Public Utility District
Date: 03-31-16 Time: 1430

Received by:
Signature: ___
Print: ___
Company: ___
Date: ___ Time: ___

Relinquished by:
Signature: ONTRAC-D10010917769204
Print: ___
Company: ___
Date: ___ Time: ___

Received by:
Signature: [signature]
Print: Nicole P.
Company: FGL
Date: 4/1 Time: 1000

Condition Upon Receipt (Attach to COC)

Sample Receipt at SP:

1. Number of ice chests/packages received: **1**
2. Shipper tracking numbers ____________
3. Were samples received in a chilled condition?
   Temps: **4** / ___ / ___ / ___ / ___ / ___ / ___
4. Surface water (SWTR) bact samples: A sample that has a temperature upon receipt of >10C, whether iced or not, should be flagged unless the time since sample collection has been less than two hours.
5. Do the number of bottles received agree with the COC? **[Yes]** No N/A
6. Verify sample date, time, sampler **[Yes]** No N/A
7. Were the samples received intact? (i.e. no broken bottles, leaks, etc.) **[Yes]** No
8. Were sample custody seals intact? Yes No **[N/A]**

Sample Verification, Labeling and Distribution:

1. Were all requested analyses understood and acceptable? **[Yes]** No
2. Did bottle labels correspond with the client's ID's? **[Yes]** No
3. Were all bottles requiring sample preservation properly preserved? Yes No **[N/A]** FGL
   [Exception: Oil & Grease, VOA and CrVI verified in lab]
4. VOAs checked for Headspace? **[Yes]** No N/A
5. Were all analyses within holding times at time of receipt? **[Yes]** No
6. Have rush or project due dates been checked and accepted? Yes No **[N/A]**

Include a copy of the COC for lab delivery. (Bacti. Inorganics and Radio)

Sample Receipt, Login and Verification completed by:

Reviewed and Approved By **Nicole Parson** Digitally signed by Nicole Parson Title: Sample Receiving Date: 04/01/2016-13:46:00

Discrepency Documentation:

Any items above which are "No" or do not meet specifications (i.e. temps) must be resolved.

1. Person Contacted: ____________ Phone Number: ____________
   Initiated By: ____________ Date: ____________
   Problem:

   Resolution:

2. Person Contacted: ____________ Phone Number: ____________
   Initiated By: ____________ Date: ____________
   Problem:

   Resolution:

(2011369)
South Tahoe Public Utility District
SP 1603610
NMP-04/01/2016-13:46:00

Appendix F.4 – Pilot Testing Water Quality Sampling Results

April 6, 2016

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Lab ID : SP 1603611
Customer : 2-11369

Laboratory Report

Introduction: This report package contains total of 29 pages divided into 3 sections:

Case Narrative	(2 pages)	: An overview of the work performed at FGL.
Sample Results	(20 pages)	: Results for each sample submitted.
Quality Control	(7 pages)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
Travel Blank	03/30/2016	04/01/2016	SP 1603611-000	LBW
LBWC Well #4 Well Head	03/30/2016	04/01/2016	SP 1603611-001	GW
LBWC Well #4 Before UV	03/30/2016	04/01/2016	SP 1603611-002	GW
LBWC Well #4 After UV 9 gpm @	03/30/2016	04/01/2016	SP 1603611-003	GW
LBWC Well #4 After UV @ 5 gpm	03/30/2016	04/01/2016	SP 1603611-004	GW
LBWC Well #4 After UV @ 7.5 gp	03/30/2016	04/01/2016	SP 1603611-005	GW
LBWC Well #4 Before UV+1.6 Cl2	03/30/2016	04/01/2016	SP 1603611-006	GW
LBWC Well #4 Before UV+1.5 Cl2	03/30/2016	04/01/2016	SP 1603611-007	GW
LBWC Well #4 Sanitary Discharg	03/29/2016	04/01/2016	SP 1603611-008	GW
LBWC Well #4 Pre Filter	03/28/2016	04/01/2016	SP 1603611-009	GW

Sampling and Receipt Information: All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples arrived at 4 °C. All samples were prepared and analyzed within the method specified hold time. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Organic QC

524.2	04/04/2016:204708 All analysis quality controls are within established criteria, except: The following note applies to Bromomethane (Methyl Bromide), Trichlorofluoromethane F-11, Chloroethane (Ethyl Chloride), Vinyl Chloride: 360 CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted.
	04/05/2016:204722 All analysis quality controls are within established criteria.
	04/04/2016:203877 All preparation quality controls are within established criteria.

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CA ELAP Certification No. 2810

April 6, 2016	Lab ID	: SP 1603611
South Tahoe Public Utility District	Customer	: 2-11369

Certification:: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Approved By **David Terz, B.A., M.B.A.** Digitally signed by David Terz, B.A., M.B.A. Title: QA Director Date: 2016-04-06

April 6, 2016

Lab ID : SP 1603611-000
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 30, 2016-00:00
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Lab. Blank Water

Description : Travel Blank
Project : Travel Blank

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	85.2	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	78.3	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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FAX: (559)734-8435
CA ELAP Certification No. 2810

April 6, 2016 | Lab ID : SP 1603611-000
Description : Travel Blank | Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603611-001
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 30, 2016-13:30
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC Well #4 Well Head
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	87.5	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	78.7	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.7	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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CA ELAP Certification No. 2810

April 6, 2016 Lab ID : SP 1603611-001
Description : LBWC Well #4 Well Head Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	42.3	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	0.8	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603611-002
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 30, 2016-13:40
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC Well #4 Before UV
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	85.2	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	80.5	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.7	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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April 6, 2016 Lab ID : SP 1603611-002
Description : LBWC Well #4 Before UV Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2VOA:1'3								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	38.3	2.5*	ug/L		524.2	04/04/16:203877	524.2	04/05/16:204722
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	0.8	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603611-003
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 30, 2016-13:50
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC Well #4 After UV 9 gpm @
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	84.3	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	77.5	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.6	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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April 6, 2016 Lab ID : SP 1603611-003
Description : LBWC Well #4 After UV 9 gpm @ Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	35.1	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	0.7	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603611-004
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 30, 2016-14:05
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC Well #4 After UV @ 5 gpm
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
4-Bromofluorobenzene‡	88.6	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	80.3	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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April 6, 2016 Lab ID : SP 1603611-004
Description : LBWC Well #4 After UV @ 5 gpm Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2VOA:1'3								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	31.1	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	0.7	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Lab ID : SP 1603611-005
Customer ID : 2-11369

Sampled On : March 30, 2016-14:15
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC Well #4 After UV @ 7.5 gp
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	87.7	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	77.8	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.6	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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CA ELAP Certification No. 2810

April 6, 2016 | Lab ID : SP 1603611-005
Description : LBWC Well #4 After UV @ 7.5 gp | Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2 VOA:1'3								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	34.1	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	0.7	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603611-006
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 30, 2016-15:20
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC Well #4 Before UV+1.6 Cl2
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2VOA:1'3								
4-Bromofluorobenzene‡	87.0	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	79.9	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.6	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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April 6, 2016 | Lab ID : SP 1603611-006
Description : LBWC Well #4 Before UV+1.6 Cl2 | Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	38.4	2.5*	ug/L		524.2	04/04/16:203877	524.2	04/05/16:204722
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	0.8	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603611-007
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 30, 2016-15:15
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC Well #4 Before UV+1.5 Cl2
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2 VOA:1'3								
4-Bromofluorobenzene‡	85.5	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	78.4	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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CA ELAP Certification No. 2810

April 6, 2016 | Lab ID : SP 1603611-007
Description : LBWC Well #4 Before UV+1.5 Cl2 | Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	36.8	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	0.6	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603611-008
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 29, 2016-13:20
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC Well #4 Sanitary Discharg
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2 VOA:1'3								
4-Bromofluorobenzene‡	87.4	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	79.7	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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April 6, 2016 Lab ID : SP 1603611-008
Description : LBWC Well #4 Sanitary Discharg Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
EPA 524.2 [VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Toluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016

Lab ID : SP 1603611-009
Customer ID : 2-11369

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Sampled On : March 28, 2016-05:40
Sampled By : S. Hearn
Received On : April 1, 2016-10:00
Matrix : Ground Water

Description : LBWC Well #4 Pre Filter
Project : South Y PCE Study

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
4-Bromofluorobenzene‡	86.0	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene-d4‡	78.3	70-130	%		524.2	04/04/16:203877	524.2	04/04/16:204708
Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromodichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromoform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Bromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
sec-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Carbon Tetrachloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
tert-Butanol	ND	2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloroform	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Chloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
4-Chlorotoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromochloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dibromomethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,4-Dichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichlorodifluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,2-Dichloroethylene	0.6	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,2-Dichloroethylene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Dichloromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
2,2-Dichloropropane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

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CA ELAP Certification No. 2810

April 6, 2016 | Lab ID : SP 1603611-009
Description : LBWC Well #4 Pre Filter | Customer ID : 2-11369

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 524.2[VOA:1'3]								
1,3-Dichloropropene (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
cis-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
trans-1,3-Dichloropropene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Di-isopropyl ether (DIPE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl Benzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Ethyl tert-Butyl Ether (ETBE)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Hexachlorobutadiene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Isopropylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
p-Isopropyltoluene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Methyl tert-Butyl Ether (MTBE)	ND	0.2	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Naphthalene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
n-Propylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Styrene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tert-amyl-methyl Ether (TAME)	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Tetrachloroethylene	37.6	2.5*	ug/L		524.2	04/04/16:203877	524.2	04/05/16:204722
Toluene	13.3	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,3-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trichlorobenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,1-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichloroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichloroethylene	0.8	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Trichlorofluoromethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,1,2-Trichlorotrifluoroethane	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,2,4-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
1,3,5-Trimethylbenzene	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Vinyl Chloride	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes (Total)	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes m,p	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Xylenes o	ND	0.5	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708
Total Trihalomethanes	ND	--	ug/L		524.2	04/04/16:203877	524.2	04/04/16:204708

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (VOA) VOA Preservatives: HCl pH < 2 ‡Surrogate. * PQL adjusted for dilution.

April 6, 2016
South Tahoe Public Utility District

Lab ID : SP 1603611
Customer : 2-11369

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
1,1,1,2-Tetrachloroethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.8 %	12-178	
		(CC 1680990-001)	MSD	ug/L	10.00	64.3 %	12-178	
			MSRPD	ug/L	10.00	7.2%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.1 %	70-130	
1,1,1-Trichloroethane(TCA)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	62.4 %	9-176	
		(CC 1680990-001)	MSD	ug/L	10.00	67.0 %	9-176	
			MSRPD	ug/L	10.00	7.1%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	96.0 %	70-130	
1,1,2,2-Tetrachloroethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	69.7 %	23-180	
		(CC 1680990-001)	MSD	ug/L	10.00	76.0 %	23-180	
			MSRPD	ug/L	10.00	8.6%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	110 %	70-130	
1,1,2-Trichloroethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.7 %	25-173	
		(CC 1680990-001)	MSD	ug/L	10.00	68.4 %	25-173	
			MSRPD	ug/L	10.00	10.3%	≤29	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	
1,1-Dichloroethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.9 %	15-161	
		(CC 1680990-001)	MSD	ug/L	10.00	64.7 %	15-161	
			MSRPD	ug/L	10.00	7.8%	≤36	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	95.5 %	70-130	
1,1-Dichloroethylene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	56.4 %	0-162	
		(CC 1680990-001)	MSD	ug/L	10.00	63.9 %	0-162	
			MSRPD	ug/L	10.00	12.4%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	90.1 %	70-130	
1,1-Dichloropropene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	57.7 %	0-171	
		(CC 1680990-001)	MSD	ug/L	10.00	62.6 %	0-171	
			MSRPD	ug/L	10.00	8.1%	≤31	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	88.8 %	70-130	
1,2,3-Trichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	66.0 %	14-181	
		(CC 1680990-001)	MSD	ug/L	10.00	69.3 %	14-181	
			MSRPD	ug/L	10.00	4.9%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	104 %	70-130	
1,2,4-Trichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.8 %	10-180	
		(CC 1680990-001)	MSD	ug/L	10.00	66.4 %	10-180	
			MSRPD	ug/L	10.00	4.0%	≤32	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	99.2 %	70-130	
1,2,4-Trimethylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	44.4 %	2-192	
		(CC 1680990-001)	MSD	ug/L	10.00	49.4 %	2-192	
			MSRPD	ug/L	10.00	10.8%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
1,2-Dichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.3 %	13-191	
		(CC 1680990-001)	MSD	ug/L	10.00	70.3 %	13-191	
			MSRPD	ug/L	10.00	10.5%	≤35	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	

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Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
1,2-Dichlorobenzene-d4	524.2	04/04/16:203877VRG	Blank	ug/L	10.00	79.6 %	70-130	
			MS	ug/L	10.00	89.8 %	70-130	
		(CC 1680990-001)	MSD	ug/L	10.00	92.6 %	70-130	
			MSRPD	ug/L	10.00	3.1%	≤20	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	94.9 %	70-130	
1,2-Dichloroethane (EDC)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	67.2 %	18-162	
		(CC 1680990-001)	MSD	ug/L	10.00	72.2 %	18-162	
			MSRPD	ug/L	10.00	7.2%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	107 %	70-130	
1,2-Dichloropropane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.0 %	10-163	
		(CC 1680990-001)	MSD	ug/L	10.00	70.2 %	10-163	
			MSRPD	ug/L	10.00	7.7%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	105 %	70-130	
1,3,5-Trimethylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	52.0 %	0-210	
		(CC 1680990-001)	MSD	ug/L	10.00	57.8 %	0-210	
			MSRPD	ug/L	10.00	10.7%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
1,3-Dichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.7 %	17-182	
		(CC 1680990-001)	MSD	ug/L	10.00	69.5 %	17-182	
			MSRPD	ug/L	10.00	8.7%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	101 %	70-130	
1,3-Dichloropropane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	69.9 %	0-178	
		(CC 1680990-001)	MSD	ug/L	10.00	74.7 %	0-178	
			MSRPD	ug/L	10.00	6.6%	≤29	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	112 %	70-130	
1,4-Dichlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	64.1 %	19-183	
		(CC 1680990-001)	MSD	ug/L	10.00	69.5 %	19-183	
			MSRPD	ug/L	10.00	8.1%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	104 %	70-130	
2,2-Dichloropropane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	51.3 %	0-288	
		(CC 1680990-001)	MSD	ug/L	10.00	57.7 %	0-288	
			MSRPD	ug/L	10.00	11.8%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	80.9 %	70-130	
2-Chlorotoluene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.3 %	17-180	
		(CC 1680990-001)	MSD	ug/L	10.00	71.6 %	17-180	
			MSRPD	ug/L	10.00	9.1%	≤38	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	
4-Bromofluorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L	10.00	87.7 %	70-130	
			MS	ug/L	10.00	93.3 %	70-130	
		(CC 1680990-001)	MSD	ug/L	10.00	95.2 %	70-130	
			MSRPD	ug/L	10.00	2.0%	≤30	
4-Bromofluorobenzene (BFB)	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	95.3 %	70-130	
4-Chlorotoluene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.3 %	11-177	
		(CC 1680990-001)	MSD	ug/L	10.00	70.1 %	11-177	
			MSRPD	ug/L	10.00	10.2%	≤41	

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
4-Chlorotoluene	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	104 %	70-130	
Benzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.3 %	12-158	
		(CC 1680990-001)	MSD	ug/L	10.00	67.3 %	12-158	
			MSRPD	ug/L	10.00	9.3%	≤36	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.2 %	70-130	
Bromobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.2 %	23-177	
		(CC 1680990-001)	MSD	ug/L	10.00	65.9 %	23-177	
			MSRPD	ug/L	10.00	7.3%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.9 %	70-130	
Bromochloromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	57.9 %	4-186	
		(CC 1680990-001)	MSD	ug/L	10.00	62.5 %	4-186	
			MSRPD	ug/L	10.00	7.7%	≤30	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.2 %	70-130	
Bromodichloromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.5 %	11-164	
		(CC 1680990-001)	MSD	ug/L	10.00	67.7 %	11-164	
			MSRPD	ug/L	10.00	6.5%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.8 %	70-130	
Bromoform	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	53.7 %	0-235	
		(CC 1680990-001)	MSD	ug/L	10.00	62.0 %	0-235	
			MSRPD	ug/L	10.00	14.4%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	78.8 %	70-130	
Bromomethane (Methyl Bromide)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	68.4 %	0-196	
		(CC 1680990-001)	MSD	ug/L	10.00	65.9 %	0-196	
			MSRPD	ug/L	10.00	3.7%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	141 %	70-130	360
Carbon Tetrachloride	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.5 %	5-175	
		(CC 1680990-001)	MSD	ug/L	10.00	64.2 %	5-175	
			MSRPD	ug/L	10.00	7.5%	≤32	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	89.4 %	70-130	
Chlorobenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	63.8 %	14-175	
		(CC 1680990-001)	MSD	ug/L	10.00	69.5 %	14-175	
			MSRPD	ug/L	10.00	8.6%	≤35	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	105 %	70-130	
Chloroethane (Ethyl Chloride)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	78.5 %	0-184	
		(CC 1680990-001)	MSD	ug/L	10.00	73.0 %	0-184	
			MSRPD	ug/L	10.00	7.2%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	156 %	70-130	360
Chloroform	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.2 %	15-163	
		(CC 1680990-001)	MSD	ug/L	10.00	69.7 %	15-163	
			MSRPD	ug/L	10.00	6.8%	≤36	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
Chloromethane(Methyl Chloride)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	55.6 %	0-224	
		(CC 1680990-001)	MSD	ug/L	10.00	56.4 %	0-224	

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Chloromethane(Methyl Chloride)	524.2	04/04/16:203877VRG	MSRPD	ug/L	10.00	1.5%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	118 %	70-130	
cis-1,2-Dichloroethylene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.1 %	16-172	
		(CC 1680990-001)	MSD	ug/L	10.00	66.1 %	16-172	
			MSRPD	ug/L	10.00	7.9%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	93.8 %	70-130	
cis-1,3-Dichloropropene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	58.4 %	5-158	
		(CC 1680990-001)	MSD	ug/L	10.00	62.8 %	5-158	
			MSRPD	ug/L	10.00	7.3%	≤38	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	91.4 %	70-130	
Dibromochloromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	60.1 %	1-180	
		(CC 1680990-001)	MSD	ug/L	10.00	67.0 %	1-180	
			MSRPD	ug/L	10.00	10.8%	≤34	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	89.9 %	70-130	
Dibromomethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.5 %	11-168	
		(CC 1680990-001)	MSD	ug/L	10.00	64.3 %	11-168	
			MSRPD	ug/L	10.00	7.8%	≤28	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
Dichlorodifluoromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.7 %	0-334	
		(CC 1680990-001)	MSD	ug/L	10.00	58.4 %	0-334	
			MSRPD	ug/L	10.00	2.1%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	119 %	70-130	
Dichloromethane	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	58.5 %	20-157	
		(CC 1680990-001)	MSD	ug/L	10.00	64.6 %	20-157	
			MSRPD	ug/L	10.00	9.8%	≤36	
Ethyl tert-Butyl Ether	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<3	
			MS	ug/L	10.00	72.1 %	11-165	
		(CC 1680990-001)	MSD	ug/L	10.00	78.9 %	11-165	
			MSRPD	ug/L	10.00	0.67	≤3	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	114 %	70-130	
Ethylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	59.7 %	9-174	
		(CC 1680990-001)	MSD	ug/L	10.00	67.5 %	9-174	
			MSRPD	ug/L	10.00	12.2%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	101 %	70-130	
Freon-11	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	69.8 %	0-232	
		(CC 1680990-001)	MSD	ug/L	10.00	75.2 %	0-232	
			MSRPD	ug/L	10.00	7.4%	≤35	
Hexachlorobutadiene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	66.5 %	14-200	
		(CC 1680990-001)	MSD	ug/L	10.00	68.2 %	14-200	
			MSRPD	ug/L	10.00	2.6%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	93.9 %	70-130	
Isopropyl Ether	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<3	
			MS	ug/L	10.00	74.7 %	8-165	
		(CC 1680990-001)	MSD	ug/L	10.00	82.4 %	8-165	
			MSRPD	ug/L	10.00	0.78	≤3	

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Isopropyl Ether	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	120 %	70-130	
Isopropylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	64.1 %	4-159	
		(CC 1680990-001)	MSD	ug/L	10.00	69.9 %	4-159	
			MSRPD	ug/L	10.00	8.7%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	70-130	
Methyl tert-Butyl Ether	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	124 %	70-130	
Methyl tert-Butyl Ether (MTBE)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<1.0	
			MS	ug/L	10.00	77.6 %	11-168	
		(CC 1680990-001)	MSD	ug/L	10.00	83.9 %	11-168	
			MSRPD	ug/L	10.00	7.8%	≤29	
Methylene Chloride	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.8 %	70-130	
Naphthalene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	60.7 %	0-189	
		(CC 1680990-001)	MSD	ug/L	10.00	65.7 %	0-189	
			MSRPD	ug/L	10.00	7.9%	≤32	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.2 %	70-130	
n-Butylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.0 %	4-186	
		(CC 1680990-001)	MSD	ug/L	10.00	69.8 %	4-186	
			MSRPD	ug/L	10.00	7.2%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	100 %	70-130	
n-Propylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.1 %	0-174	
		(CC 1680990-001)	MSD	ug/L	10.00	70.0 %	0-174	
			MSRPD	ug/L	10.00	7.2%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	
p-Isopropyltoluene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	61.1 %	0-193	
		(CC 1680990-001)	MSD	ug/L	10.00	66.4 %	0-193	
			MSRPD	ug/L	10.00	8.3%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	99.1 %	70-130	
sec-Butylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	65.7 %	0-177	
		(CC 1680990-001)	MSD	ug/L	10.00	72.2 %	0-177	
			MSRPD	ug/L	10.00	9.5%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	
Styrene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	32.6 %	0-198	
		(CC 1680990-001)	MSD	ug/L	10.00	39.6 %	0-198	
			MSRPD	ug/L	10.00	19.3%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	73.7 %	70-130	
TAME	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<3	
			MS	ug/L	10.00	69.6 %	15-162	
		(CC 1680990-001)	MSD	ug/L	10.00	75.6 %	15-162	
			MSRPD	ug/L	10.00	0.60	≤3	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	111 %	70-130	
tert-Butanol	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<2	
			MS	ug/L	50.00	81.8 %	0-198	
		(CC 1680990-001)	MSD	ug/L	50.00	71.7 %	0-198	
			MSRPD	ug/L	10.00	13.1%	≤39	
	524.2	04/04/16:204708VRG	CCV	ug/L	50.00	91.3 %	70-130	
tert-Butylbenzene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	66.3 %	9-179	

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
tert-Butylbenzene	524.2	(CC 1680990-001)	MSD	ug/L	10.00	72.3 %	9-179	
			MSRPD	ug/L	10.00	8.7%	≤38	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	102 %	30-130	
Tetrachloroethylene (PCE)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	56.3 %	14-186	
		(CC 1680990-001)	MSD	ug/L	10.00	60.1 %	14-186	
			MSRPD	ug/L	10.00	6.5%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	89.9 %	70-130	
	524.2	04/05/16:204722VRG	CCV	ug/L	10.00	76.1 %	70-130	
Toluene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	47.9 %	3-174	
		(CC 1680990-001)	MSD	ug/L	10.00	67.3 %	3-174	
			MSRPD	ug/L	10.00	24.3%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	97.5 %	30-130	
trans-1,2-Dichloroethylene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	56.1 %	5-165	
		(CC 1680990-001)	MSD	ug/L	10.00	60.2 %	5-165	
			MSRPD	ug/L	10.00	7.2%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	88.8 %	70-130	
trans-1,3-Dichloropropene	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	52.0 %	0-169	
		(CC 1680990-001)	MSD	ug/L	10.00	58.9 %	0-169	
			MSRPD	ug/L	10.00	12.4%	≤31	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	82.5 %	70-130	
Trichloroethylene (TCE)	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	60.1 %	11-167	
		(CC 1680990-001)	MSD	ug/L	10.00	64.8 %	11-167	
			MSRPD	ug/L	10.00	7.6%	≤35	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	92.4 %	70-130	
Trichlorofluoromethane F-11	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	149 %	70-130	360
Trichlorotrifluoroethane F-113	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	77.1 %	0-183	
		(CC 1680990-001)	MSD	ug/L	10.00	83.7 %	0-183	
			MSRPD	ug/L	10.00	8.2%	≤33	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	118 %	70-130	
Vinyl Chloride	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	69.9 %	0-208	
		(CC 1680990-001)	MSD	ug/L	10.00	70.5 %	0-208	
			MSRPD	ug/L	10.00	0.9%	≤40	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	145 %	30-130	360
Xylenes m,p	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	20.00	55.8 %	0-193	
		(CC 1680990-001)	MSD	ug/L	20.00	61.7 %	0-193	
			MSRPD	ug/L	10.00	10.1%	≤37	
	524.2	04/04/16:204708VRG	CCV	ug/L	20.00	97.1 %	70-130	
Xylenes o	524.2	04/04/16:203877VRG	Blank	ug/L		ND	<0.5	
			MS	ug/L	10.00	58.7 %	0-188	
		(CC 1680990-001)	MSD	ug/L	10.00	65.4 %	0-188	
			MSRPD	ug/L	10.00	10.8%	≤36	
	524.2	04/04/16:204708VRG	CCV	ug/L	10.00	103 %	70-130	

Definition

CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
MS	: Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.

Quality Control - Organic

Definition	
MSD	: Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSRPD	: MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.
ND	: Non-detect - Result was below the DQO listed for the analyte.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.
Explanation	
360	: CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted.

SOUTH TAHOE PUBLIC UTILITY DISTRICT 1603611 CHAIN OF CUSTODY

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150
Phone: (530)-543-6231
FAX: (530)-541-4296

Lab Sent to: FGL

Sampler: S. Hearn

Project: South Y PCE Study

Analyses Requested: 524 + Oxys

Turnaround Time: Standard ✓ | 24 Hr ___ | 48 Hr ___ | Other ___

Lab ID#	Sample Site	Date	Time	Preserve	Matrix	524 + Oxys	# of Containers	Remarks
AG50388	LBWC Well #4 Well head	03/30/16	1330	4°/HCl	GW	✓	3	
AG50389	LBWC Well #4 Before UV	03/30/16	1340		GW	✓	3	
AG50390	LBWC Well #4 After UV 9gpm @ 6mW/cm²	03/30/16	1350		GW	✓	3	
AG50391	LBWC Well #4 After UV @ 5gpm	03/30/16	1405		GW	✓	3	
AG50392	LBWC Well #4 After UV @ 7.5gpm	03/30/16	1415		GW	✓	3	
AG50393	LBWC Well #4 Before UV + 1.6 Cl_2	03/30/16	1520		GW	✓	3	
AG50394	LBWC Well #4 After UV + 1.5 Cl_2	03/30/16	1515		GW	✓	3	
AG50395	LBWC Well #4 Sanitary Discharge	03-29-16	1320		GW	✓	3	
AG50396	Trip Blank	03-30-16	—		GW	✓	3	
AG50397	LBWC Well #4 Pre filter	03-28-16	540		GW	✓	3	

Comments:
- Report MTBE to 0.5 µg/L. Note any detection of MTBE ≥ 0.2 µg/L
- Analyze Travel and Field Blanks only if VOCs detected in samples.
- Use Calif State Write-On form to report results of Potable Water Wells

Please Return all STPUD ice chests & Blue Ice.

Relinquished by:
Signature: Terry Powers
Print: Terry Powers
Company: South Tahoe Public Utility District
Date: 03-31-16 Time: 1430

Received by:
Signature: ___
Print: ___
Company: ___
Date: ___ Time: ___

Sample Receipt	Yes/No	Comment
Received intact		
Received cold		
Custody seals		
Correct container		

Relinquished by:
Signature: ONTRAC-D10010917769204
Print: ___
Company: ___
Date: ___ Time: ___

Received by:
Signature: [signature]
Print: Nicole P.
Company: FGL
Date: 4/1 Time: 1000

Condition Upon Receipt (Attach to COC)

Sample Receipt at SP:

1. Number of ice chests/packages received: **1**
2. Shipper tracking numbers ______
3. Were samples received in a chilled condition?
   Temps: **4** / ___ / ___ / ___ / ___ / ___ / ___
4. Surface water (SWTR) bact samples: A sample that has a temperature upon receipt of >10C, whether iced or not, should be flagged unless the time since sample collection has been less than two hours.
5. Do the number of bottles received agree with the COC? **$\boxed{\text{Yes}}$ No N/A**
6. Verify sample date, time, sampler **$\boxed{\text{Yes}}$ No N/A**
7. Were the samples received intact? (i.e. no broken bottles, leaks, etc.) **$\boxed{\text{Yes}}$ No**
8. Were sample custody seals intact? **Yes No $\boxed{\text{N/A}}$**

Sample Verification, Labeling and Distribution:

1. Were all requested analyses understood and acceptable? **$\boxed{\text{Yes}}$ No**
2. Did bottle labels correspond with the client's ID's? **$\boxed{\text{Yes}}$ No**
3. Were all bottles requiring sample preservation properly preserved? **Yes No $\boxed{\text{N/A}}$ FGL**
   [Exception: Oil & Grease, VOA and CrVI verified in lab]
4. VOAs checked for Headspace? **$\boxed{\text{Yes}}$ No N/A**
5. Were all analyses within holding times at time of receipt? **$\boxed{\text{Yes}}$ No**
6. Have rush or project due dates been checked and accepted? **Yes No $\boxed{\text{N/A}}$**

Include a copy of the COC for lab delivery. (Bacti. Inorganics and Radio)

Sample Receipt, Login and Verification completed by:

Reviewed and Approved By **Nicole Parson**
Digitally signed by Nicole Parson
Title: Sample Receiving
Date: 04/01/2016-13:45:42

Discrepency Documentation:

Any items above which are "No" or do not meet specifications (i.e. temps) must be resolved.

1. Person Contacted: ______ Phone Number: ______
   Initiated By: ______ Date: ______
   Problem:

   Resolution:

2. Person Contacted: ______ Phone Number: ______
   Initiated By: ______ Date: ______
   Problem:

   Resolution:

(2011369)
South Tahoe Public Utility District
SP 1603611
NMP-04/01/2016-13:45:42

Appendix G: Results of Dye Test

Ms. Stephanie Hearn
GEI Consultants, Inc.
shearn@geiconsultants.com

Name Adam M. Redding, PhD
Department Activated Carbon Products
Telephone (724) 719-0805
E-mail adam.redding@evoqua.com
Date 11 May 2016

Evoqua Water Technologies has completed the Dye Testing for the South Lake Tahoe PUD spent granular activated carbon (GAC) sample. This testing involved sieving full-scale 20×30 US-mesh size grains from the GAC sample and immersing that sample in a solution of xylenol orange dye. The sample was then stirred and the dye adsorption was measured over a period of approximately 6 hours. The test procedure is similar to that used in the 325×400 US-mesh size dye testing (see method attached). This full-scale grain procedure differs however in that a larger mass of carbon sample (0.5 g v. 0.05 g) is used since: 1) adsorption is slower on the larger grains and 2) a larger sample size decreases the influence of slight differences in the grain size and shape.

A particular advantage to this test, where the grains are not ground to a smaller size, is that the morphology of the grain and any internal fouling remain unchanged. As such, we can directly observe the influence of the fouling as it occurs in full-scale use. Conversely, grinding of the carbon sample may serve to negate the influence of fouling.

Notably, the adsorption observed in this testing with 20×30 grains (Figures 1 & 2) showed a slower adsorption rate than that measured for both virgin AquaCarb® 1230C, the virgin carbon used here, and for comparison, virgin AquaCarb® 1230CX, an enhanced coconut-based carbon known for a fast adsorption rate. The adsorption rate on the spent sample was ~30% slower than that measured for its virgin parent. Because sample preparation involved degassing/drying at 105°C and 15 inches of mercury, it is likely that few, if any, low-molecular weight organics remain in the structure. The difference in adsorption rate is more likely due to any remaining high-molecular weight organics (e.g. natural organic matter) or deposited inorganics, both accumulated during the service life of the GAC. The remaining organic content would however be removable during GAC reactivation, while inorganics such as calcium and magnesium will remain.

Evoqua has observed dye adsorption rate decreases greater than 50% between virgin and spent carbons. In that case, the impact on removal of low-molecular weight VOCs was quite consequential. In this case however, the rate drop is considerably less. Without tying this change to performance however, we cannot speculate as to the consequence of this level of fouling.

In this set of tests the carbon samples were allowed to wet for a period of ~24 hours, as opposed to the 20 minute period used with the 325×400 mesh grains. This longer wetting is necessary since the grains are considerably larger and must fully degas before beginning the test. As a additional observation and conclusion, this extended soaking period did not decrease the influence of fouling and therefore the foulant is not readily desorbable or soluble.

Thank you again for the opportunity to work with GEI and please feel free to contact me with any questions.

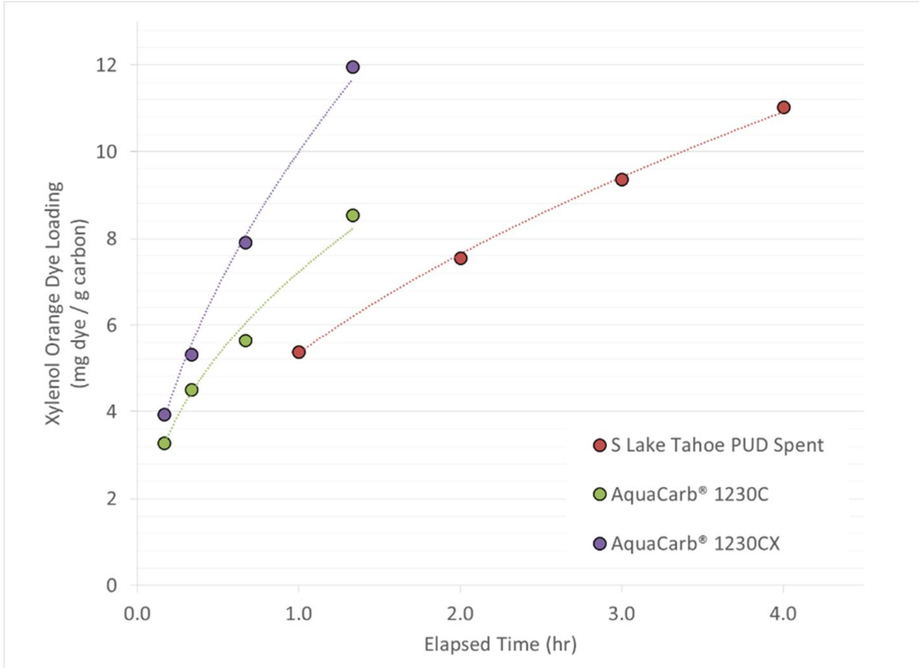


Fig. 1 - Adsorption of Xylenol Orange Dye on 20x30 grains of South Lake Tahoe PUD Spent as compared to virgin AquaCarb® 1230C and virgin AquaCarb® 1230CX. Note: x-axis is in units of hours.

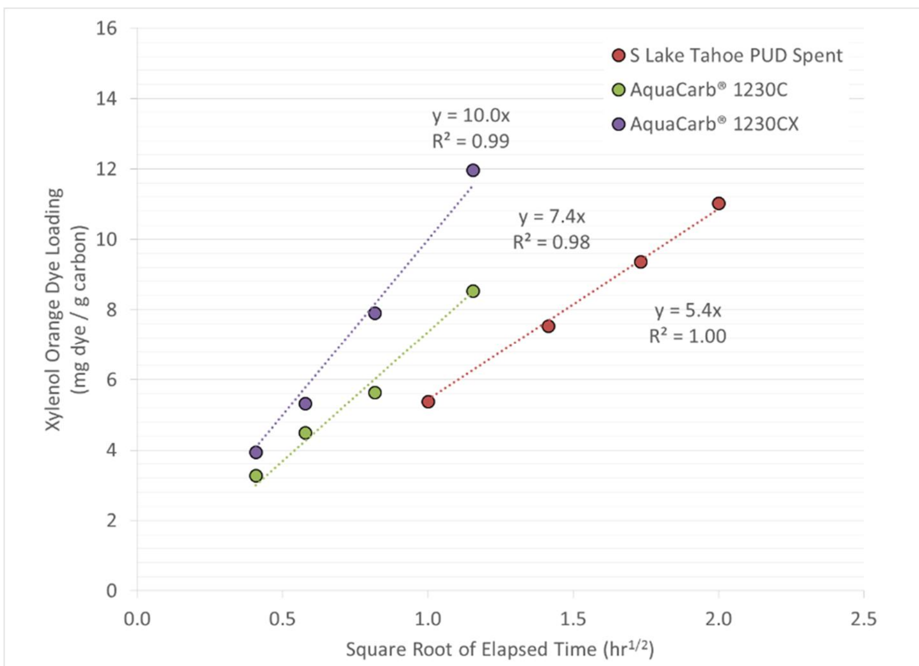


Fig. 2 – Linearized data for the adsorption of Xylenol Orange Dye on 20x30 grains of South Lake Tahoe PUD Spent as compared to virgin AquaCarb® 1230C and virgin AquaCarb® 1230CX. Note: x-axis is in units of square root of elapsed time

Xylenol Orange Dye Test Method

1. **Scope**
   1.1 This test method covers the determination of the relative adsorption rate (i.e. mass transfer rate) of unused or reactivated carbons by adsorption of xylenol orange from aqueous solution. The rate of xylenol orange adsorption (in milligrams per gram per hour$^{1/2}$) by 0.05 g of carbon using test conditions listed herein is called the xylenol orange number.
   1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*
2. **Referenced Documents**
   2.1 ASTM Standards:
   D 1193 Specification for Reagent Water[1]
   D 2652 Terminology Relating to Activated Carbon[2]
   D 2867 Test Method for Moisture in Activated Carbon[2]
   D 3860 Practices for Determination of Adsorptive Capacity of Carbon by Isotherm Technique[2]
   E 11 Specification for Wire-Cloth Sieves for Testing Purposes[3]
   E 177 Practice for Laboratory Glass Graduated Burets[3]
   E 288 Specification for Laboratory Glass Volumetric Flasks[3]
   E 300 Practice for Sampling Industrial Chemicals[4]
   2.2 *NIST Publication:*
   Circular 602 – Testing of Glass Volumetric Apparatus[5]

3. **Summary of Test Method**

3.1 This method determines how activated carbon will perform when removing the dye xylenol orange by adding a known concentration of dye to a known concentration of activated carbon and then measuring the dye concentration remaining in solution as a function of time.

3.2 Once completed, the loading rate in mg/g/hr^{½} is calculated, providing the rate of removal of the adsorbate Xylenol Orange. This method quantifies a carbon's performance under kinetic limitations.

3.3 The loading rate in mg/g/hr^{½} is reported as the xylenol orange number.

4. **Significance and Use**
   4.1 The xylenol orange number is a relative indicator of the rate of adsorption in an activated carbon. It does not necessarily provide a measure of the carbon's ability to adsorb a particular contaminant. A carbon's ability may vary with changes in carbon raw material, processing conditions, and pore volume distribution (see Definitions D 2652).
   4.2 The presence of adsorbed volatiles may affect the measured xylenol orange number of an activated carbon.

[1] *Annual Book of ASTM Standards, Vol 11.01.*
[2] *Annual Book of ASTM Standards, Vol 15.01.*
[3] *Annual Book of ASTM Standards, Vol 14.02.*
[4] *Annual Book of ASTM Standards, Vol 15.05.*
[5] Available from National Institute of Standards and Technology, U.S. Department of Commerce, Gaithersburg, MD 20899.

5. Apparatus

NOTE 1—All volumetric measuring equipment should meet or exceed the requirements of NIST Circular 602. Volumetric glassware meeting these specifications is generally designated as “Class A”. See also Specifications E 287 and E 288.

5.1 *Analytical Balance*, accuracy ±0.0001 g.

5.2 *Oven*, capable of temperature regulation between 145 and 155°C.

5.3 *Pipettes*, 100-1000 µL and 1-10mL.

5.4 *Disposable Syringes*, 5 mL syringe with Luer-Lok™ tips (e.g. Becton, Dickinson, and Company).

5.5 *Syringe Filters,* 0.1 micron nylon syringe filters with polypropylene housing; 13 mm diameter.

5.6 *Semi-micro Cuvettes,* 1.5-3.0 mL disposable, 1 cm path, Brandtech Model 759165.

5.7 *Spectrophotometer*, with an accuracy of three decimal places at a wavelength of 487 nm.

5.8 *Stir Plate and Stir Bar,* where the stir bar is between 2-3 cm in length.

5.9 *Grinding Mill,* capable of grinding material to a size between a 325-mesh and 400-mesh sieve.

5.10 *Sieves*, 325-mesh and 400-mesh U.S. Standard sieves or equivalent conforming to Specification E 11. The sieves shall be either 2 in. (51 mm) (full height) or 1 in. (25 mm.) (half height) in height, and 8 in. (203 mm or equivalent) in diameter.

5.11 *Mechanical Sieve Shaker*, this is a mechanically operated sieve shaker that imparts a uniform rotating and tapping motion or vibration to a stack of 8-in. (203-mm or equivalent) sieves as described in 5.10.

5.12 *Bottom Receiver Pan* and *Top Sieve Cover*.

5.13 *Volumetric flasks,* 4 × 10 mL, 200 mL, and 1 L.

6. Reagents

6.1 *Xylenol Orange Disodium Salt*, CAS # 1611-35-4, MW 716.62.

6.2 *Sodium Phosphate Monobasic Anhydrous*, ACS Reagent Grade, CAS # 7558-80-7, MW 119.98.

6.3 *Sodium Phosphate Dibasic Anhydrous,* ACS Reagent Grade, CAS # 7558-79-4, MW 141.96.

7. Activated Carbon Preparation

7.1 Proper GAC sampling (Practice E300) and preparation (grinding, classification, and washing) are required for reproducible results.

7.2 A sieve nest is constructed with a top cover, a 325-mesh sieve, a 400-mesh sieve, and a receiver pan.

7.3 The ground carbon sample is added to the upper sieve (325-mesh) and the sieve nest is then placed on the sieve shaker for several minutes.

7.4 Step 7.3 is repeated until a sufficient quantity (~0.1 g dry) of ground GAC can be recovered from the 400-mesh sieve.

7.5 Ground sample on the 325-mesh sieve is washed through to the 400-mesh sieve using reagent grade water. This step is continued until the water passing the 325-mesh sieve appears clear.

7.6 Sample collected on the 400-mesh sieve is washed reagent grade water until the water passing the sieve appears clear. Approximately 5-10 L of reagent water are required for Steps 7.5 and 7.6.

7.7 Sample remaining on the 400-mesh sieve is then washed into a ceramic drying dish. The sample should be allowed to settle for 1 minute and then decanted, removing any particles that float or do not readily settle. This step should be repeated until the supernatant appears clear (approximately 3 times).

7.8 The drying dish is covered with foil and dried according to ASTM D 2867 (150±5°C for 3h).

7.9 The dry carbon should be cooled to room temperature and stored in a dessicator until use.

7.10 The prepared sample, when shaken in a clear glass container, should produce little to no visible dust.

8. Preparation of Solutions

8.1 For a 10 mM, pH 7.2 phosphate buffer solution, measure out 0.379 gram of sodium phosphate monobasic anhydrous and 0.964 gram of sodium phosphate dibasic anhydrous and add these to 1 liter of reagent water. Mix the solution until no solids are visible to the naked eye. The buffer solution must be prepared monthly to ensure consistent results.

8.2 A xylenol orange dye standard is prepared at 2200 mg/L by adding 440 mg of dye to 200 mL of phosphate buffer. Stir solution for at least one hour then store in a brown glass bottle in a cool dark area. The dye standard must be prepared monthly to ensure consistent results.

9. Calibration Curve

9.1 A calibration curve is prepared from the xylenol orange dye standard. This curve will be used to calculate the concentration of the samples taken during the dye test after the sample has been passed through a 0.1 micron syringe filter to separate the dye from the carbon. A small amount of dye will be lost in the syringe filters during filtration and the calibration curve must account for this lost dye.

9.2 The 2200 mg/L xylenol orange standard is diluted with phosphate buffer to four selected concentrations of 50, 100, 150, and 200 mg/L using the volumes listed in *Table 1*.

9.3 2 mL of each concentration are pipetted into separate 5 mL syringes fitted with 0.1 micron syringe tip filters. The syringes are then emptied into separate cuvettes. The spectrophotometer is zeroed using a cuvette containing only the phosphate buffer solution and thereafter the absorbance of each sample is measured at a wavelength of 487 nm. The absorbance (cm^{-1}) is recorded to three decimal places. Measurement of the standards should be completed within 20 minutes of preparation to ensure that values do not change due to evaporation. Consult the manufacturer's recommendation for the pre-analysis warm-up time required for the specific spectrophotometer.

9.4 A plot of the standard concentration (mg/L) vs. absorbance (cm^{-1}) is created (See *Figure 1* for an example). A linear fit to the filtered curve points must produce a coefficient of determination (R^2) of 0.98 or greater. If the R^2 does not meet these limits, the calibration must be repeated.

9.5 A new standard curve should be prepared for any change in reagents or materials, i.e. cuvette or syringe filter lot numbers.

Table 1 - Reference table for preparing the calibration curve. Pipette the listed volume of dye standard into the flask size listed and dilute to the volumetric mark with phosphate buffer to obtain the concentration listed.

Concentration (mg/L)	Flask Size (mL)	Dye to add (mL)
50	10	0.227
100	10	0.455
150	10	0.682
200	10	0.909

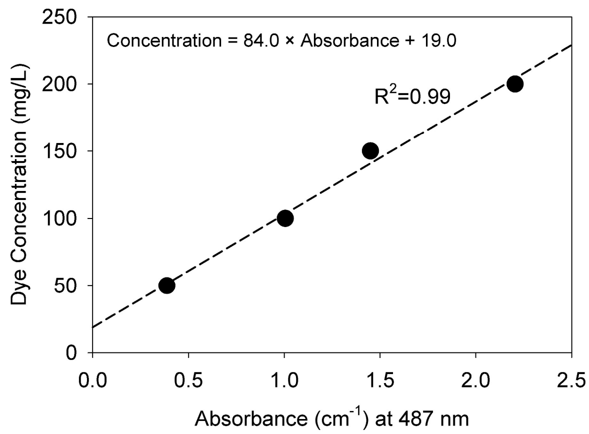


Figure 1 – Xylenol Orange calibration curve at 487 nm. The curve does not intersect the origin because some dye is adsorbed in the syringe filter.

10. Dye Test

10.1 To begin, 50 mL of phosphate buffer solution are added to a 100 mL beaker. The beaker is placed on a stir plate and a stir bar is added to the beaker.

10.2 A sample of 325×400-mesh carbon is weighed to 0.0500 +- 0.0005 grams and added to the 50 mL of phosphate buffer solution. The stir plate is started and set to a rate sufficient to suspend the carbon sample completely.

10.3 The slurry of carbon and phosphate buffer is covered with a watch glass to ensure minimal evaporation during the test.

10.4 The carbon and phosphate buffer solution are allowed to mix for at least 20 minutes. This ensures that the carbon pores are degassed and will be accessible to the dye during the test.

10.5 Once 20 minutes has elapsed, 5.00 mL of dye from the 2200 mg/L solution are added to the slurry using a 1–10 mL pipette. The test timer is started immediately once the dye has been fully added to the slurry.

10.6 At four sample times (10 min., 20 min., 40 min., 80 min.), 2 mL of slurry are collected from the carbon/dye solution and are pipetted into syringes equipped with 0.1 micron filters. The syringes are then emptied into cuvettes. A small amount of liquid will remain in the syringe filter, but there should be no liquid left in the syringe after emptying them into the cuvettes. After each sample is taken it should be analyzed within 5 minutes as detailed in step 7.7.

10.7 The spectrophotometer is zeroed (as it was for the calibration curve) and each sample is analyzed at a wavelength of 487 nm. The absorbance is recorded to 3 decimal places.

11. Calculations

11.1 Using the equation obtained for the filtered curve produced in steps 9.4 and 9.5, the concentration in mg/L from the absorbance obtained in step 10.7 is calculated as follows:

$$C = m \cdot A + b \qquad (1)$$

where:
C = concentration of dye, mg/L
m = slope of calibration curve, cm·mg/L
A = absorbance of sample at 487 nm, cm^{-1}
b = y-intercept of calibration curve, mg/L

11.2 From the concentrations determined in 11.1, the dye loading (mg dye / g carbon) is calculated as follows:

$$Q_{T2} = \left(C_{T1} - C_{T2}\right) \cdot \frac{V_{T1}}{M_{T1}} \cdot \frac{L}{1000mL} \qquad (2)$$

where:
Q_{T2} = dye loading at end of sampling period, mg/g
C_{T1} = concentration of dye at start of sampling period, mg/L
C_{T2} = concentration of dye at end of sampling period, mg/L
V_{T1} = volume of solution at start of sampling period, mL
M_{T1} = mass of carbon at start of sampling period, g

For each sample point, 2 mL is removed from the solution volume, and with that volume, ~0.002 g of carbon is assumed to be removed; these reductions must be accounted for with each subsequent loading calculation. *Table 2* shows these values.

Table 2 – Solution volume and carbon mass per sampling point

Sample Time (min)	Remaining Carbon (M_{T1}, g)	Remaining Solution (V_{T1}, mL)
10	0.0500	55.00
20	0.0481	53.00
40	0.0462	51.00
80	0.0442	49.00

11.3 The loading rate vs. the square root of the sample time is plotted for each carbon. Time should be converted from minutes to hours for this plot. See *Figure 2* for an example. A linear fit through the origin must produce an R^2 of 0.95 or greater, or the test should be repeated.

11.4 From the linear regression of the loading data through the origin the xylenol orange number can be determined as follows:

$$Q_t = M_{XON} \cdot t^{1/2} \tag{3}$$

where:

Q_t = dye loading at time (t), mg/g
t = elapsed time, hr
M_{XON} = xylenol orange number, mg/g/hr$^{1/2}$

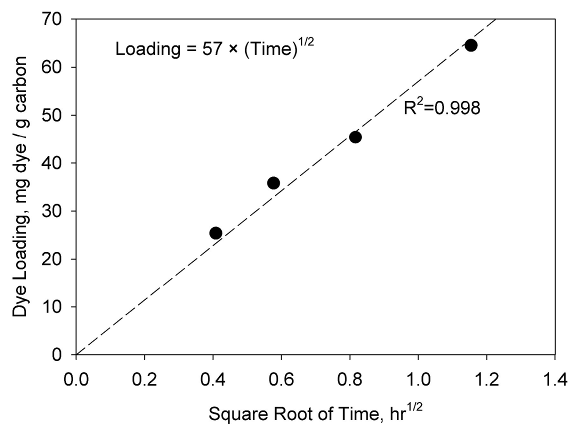


Figure 2 – Plot of xylenol orange dye loading versus the square root of elapsed time. The xylenol orange number is determined from the slope of a linear regression through the origin. Here the xylenol orange number is 57 mg/g/hr$^{1/2}$.

LIQUID PHASE ISOTHERM DESIGN PARAMETERS

Water Flow Rate 400.00000 gpm

LIQUID PHASE DESIGN

Component Name	Concentration	#GAC/1000 gallons of water
ETHENE,TETRACHLORO- (PCE)	39.0000 ppbw	0.0215
TOLUENE	16.0000 ppbw	0.0142

Total Carbon Usage Estimated at Breakthrough

20.5871 #GAC/day

0.0357 #GAC/1000 gallons of water

The above carbon usage estimates are based on both experimental data as well as predictive models. Actual carbon usage rates observed at various stages of breakthrough depend on many factors, and may therefore differ from the above estimates. Please contact Westates Carbon Products for further assisitance.

LIQUID PHASE ISOTHERM DESIGN PARAMETERS

Water Flow Rate	400.00000 gpm

LIQUID PHASE DESIGN

Component Name	Concentration	Q [Wt %]	#GAC/1000 gallons of water	Suitability
ETHENE,TETRACHLORO- (PCE)	39.0000 ppbw	2.6466	0.0123	In Range
TOLUENE	16.0000 ppbw	1.6390	0.0081	In Range

Total Carbon Usage Estimated at Breakthrough

20.5871 #GAC/day

0.0357 #GAC/1000 gallons of water

(Both totals have been multiplied by a factor of 1.75)

The above carbon usage estimates are based on both experimental data as well as predictive models. Actual carbon usage rates observed at various stages of breakthrough depend on many factors, and may therefore differ from the above estimates. Please contact Westates Carbon Products for further assisitance.

Appendix H: Evoqua Water Technologies Quote

June 1, 2016

GEI Consultants, Inc
843 Hazel Drive
South Lake Tahoe, CA 96150
Attn: Stephanie Hearn

Re: Budgetary Information

Dear Stephanie,

Evoqua Water Technologies (Evoqua) is pleased to submit this budgetary proposal. Please be advised that this budgetary proposal is a non-binding commitment, is being utilized for review and informational purposes, and does not constitute an offer for acceptance.

MAJOR COMPONENTS

Major mechanical components include:

- One (1) HP810SYS: (2) 8-Foot Diameter Carbon Adsorbers and Interconnecting Manifold Assembly.
- Initial fill of 20,000 lbs of AC1230C, 12 x 30 mesh virgin coconut granular activated carbon. Each adsorber has a capacity of 10,000lbs.
- Freight to the S. Lake Tahoe (FOB Red Bluff, CA)
- Installation supervision of all equipment outlined in this proposal, start-up and training. This is limited to 1 trip, 2 days on site. Additional service time can be provided at a per diem rate.
- Offloading and Installation of equipment on customer supplied level pad. Evoqua Water Technologies includes crane, labor, and anchoring. Clear access to site is required by client.

SYSTEM PRICING

HP810SYS System *Supply and Delivery of one (1) HP810SYS as described in proposal to jobsite, initial fill of 20,000 lbs. of AC1230C carbon. Offloading and installation on customer provided pad.*	$240,000

This quote is for budgetary purposes only. It was formulated by reviewing the data provided and based on our experience with similar systems. The ultimate price may be improved through value engineering, however, the final scope of work will dictate the actual dollar value for the equipment package

COMMERCIAL TERMS

Prices Do Not Include The Following:

- Sales tax
- Site preparation including developing a concrete pad, grouting, weather protection, etc.
- Site piping / fabrication other than final connections.
- Well, vessel or piping disinfection.

Also Please Note:

- Budgetary information pricing valid for 30 days from date of proposal.
- Evoqua Water Technologies LLC's price does not include, and Evoqua Water Technologies LLC shall not be responsible for, any taxes, permits, tariffs, duties or fees (or any incremental increases to such taxes, permits, tariffs, duties or fees enacted by governmental agencies) unless specifically agreed herein or otherwise by Evoqua Water Technologies LLC in writing.

Thank you for this opportunity to provide this budgetary quotation. Please contact me at (916) 316-1935 if you have questions or if we may be of further assistance. We look forward to working with you on this project.

Sincerely,

Tom Morrical
Evoqua Water Technologies LLC
Industry Sector

Attachments:
Standard Terms and Conditions
Product Bulletins

EVOQUA WATER TECHNOLOGIES LLC

Standard Terms of Sale

1. **Applicable Terms.** These terms govern the purchase and sale of equipment, products, related services, leased products, and media goods if any (collectively herein "Work"), referred to in Seller's proposal ("Seller's Documentation"). Whether these terms are included in an offer or an acceptance by Seller, such offer or acceptance is expressly conditioned on Buyer's assent to these terms. Seller rejects all additional or different terms in any of Buyer's forms or documents.

2. **Payment.** Buyer shall pay Seller the full purchase price as set forth in Seller's Documentation. Unless Seller's Documentation specifically provides otherwise, freight, storage, insurance and all taxes, levies, duties, tariffs, permits or license fees or other governmental charges relating to the Work or any incremental increases thereto shall be paid by Buyer. If Seller is required to pay any such charges, Buyer shall immediately reimburse Seller. If Buyer claims a tax or other exemption or direct payment permit, it shall provide Seller with a valid exemption certificate or permit and indemnify, defend and hold Seller harmless from any taxes, costs and penalties arising out of same. All payments are due within 30 days after receipt of invoice. Buyer shall be charged the lower of 1 ½% interest per month or the maximum legal rate on all amounts not received by the due date and shall pay all of Seller's reasonable costs (including attorneys' fees) of collecting amounts due but unpaid. All orders are subject to credit approval by Seller. Back charges without Seller's prior written approval shall not be accepted.

3. **Delivery.** Delivery of the Work shall be in material compliance with the schedule in Seller's Documentation. Unless Seller's Documentation provides otherwise, delivery terms are ExWorks Seller's factory (Incoterms 2010). Title to all Work shall pass upon receipt of payment for the Work under the respective invoice. Unless otherwise agreed to in writing by Seller, shipping dates are approximate only and Seller shall not be liable for any loss or expense (consequential or otherwise) incurred by Buyer or Buyer's customer if Seller fails to meet the specified delivery schedule.

4. **Ownership of Materials and Licenses.** All devices, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data, software and other documents or information prepared or disclosed by Seller, and all related intellectual property rights, shall remain Seller's property. Seller grants Buyer a non-exclusive, non-transferable license to use any such material solely for Buyer's use of the Work. Buyer shall not disclose any such material to third parties without Seller's prior written consent. Buyer grants Seller a non-exclusive, non-transferable license to use Buyer's name and logo for marketing purposes, including but not limited to, press releases, marketing and promotional materials, and web site content.

5. **Changes.** Neither party shall implement any changes in the scope of Work described in Seller's Documentation without a mutually agreed upon change order. Any change to the scope of the Work, delivery schedule for the Work, any Force Majeure Event, any law, rule, regulation, order, code, standard or requirement which requires any change hereunder shall entitle Seller to an equitable adjustment in the price and time of performance.

6. **Force Majeure Event.** Neither Buyer nor Seller shall have any liability for any breach or delay (except for breach of payment obligations) caused by a Force Majeure Event. If a Force Majeure Event exceeds six (6) months in duration, the Seller shall have the right to terminate the Agreement without liability, upon fifteen (15) days written notice to Buyer, and shall be entitled to payment for work performed prior to the date of termination. "Force Majeure Event" shall mean events or circumstances that are beyond the affected party's control and could not reasonably have been easily avoided or overcome by the affected party and are not substantially attributable to the other party. Force Majeure Event may include, but is not limited to, the following circumstances or events: war, act of foreign enemies, terrorism, riot, strike, or lockout by persons other than by Seller or its sub-suppliers, natural catastrophes or (with respect to on-site work), unusual weather conditions.

7. **Warranty.** Subject to the following sentence, Seller warrants to Buyer that the (i) Work shall materially conform to the description in Seller's Documentation and shall be free from defects in material and workmanship and (ii) the Services shall be performed in a timely and workmanlike manner. Determination of suitability of treated water for any use by Buyer shall be the sole and exclusive responsibility of Buyer. The foregoing warranty shall not apply to any Work that is specified or otherwise demanded by Buyer and is not manufactured or selected by Seller, as to which (i) Seller hereby assigns to Buyer, to the extent assignable, any warranties made to Seller and (ii) Seller shall have no other liability to Buyer under warranty, tort or any other legal theory. The Seller warrants the Work, or any components thereof, through the earlier of (i) eighteen (18) months from delivery of the Work or (ii) twelve (12) months from initial operation of the Work or ninety (90) days from the performance of services (the "Warranty Period"). If Buyer gives Seller prompt written notice of breach of this warranty within the Warranty Period, Seller shall, at its sole option and as Buyer's sole and exclusive remedy, repair or replace the subject parts, re-perform the Service or refund the purchase price. Unless otherwise agreed to in writing by Seller, (i) Buyer shall be responsible for any labor required to gain access to the Work so that Seller can assess the available remedies and (ii) Buyer shall be responsible for all costs of installation of repaired or replaced Work. If Seller determines that any claimed breach is not, in fact, covered by this warranty, Buyer shall pay Seller its then customary charges for any repair or replacement made by Seller. Seller's warranty is conditioned on Buyer's (a) operating and maintaining the Work in accordance with Seller's instructions, (b) not making any unauthorized repairs or alterations, and (c) not being in default of any payment obligation to Seller. Seller's warranty does not cover (i) damage caused by chemical action or abrasive material, misuse or improper installation (unless installed by Seller) and (ii) media goods (such as, but not limited to, resin, membranes, or granular activated carbon media) once media goods are installed. THE WARRANTIES SET FORTH IN THIS SECTION 7 ARE THE SELLER'S SOLE AND EXCLUSIVE WARRANTIES AND ARE SUBJECT TO THE LIMITATION OF LIABILITY PROVISION BELOW. SELLER MAKES NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

8. **Indemnity.** Seller shall indemnify, defend and hold Buyer harmless from any claim, cause of action or liability incurred by Buyer as a result of third party claims for personal injury, death or damage to tangible property, to the extent caused by Seller's negligence. Seller shall have the sole authority to direct the defense of and settle any indemnified claim. Seller's indemnification is conditioned on Buyer (a) promptly, within the Warranty Period, notifying Seller of any claim, and (b) providing reasonable cooperation in the defense of any claim.

9. **Assignment.** Neither party may assign this Agreement, in whole or in part, nor any rights or obligations hereunder without the prior written consent of the other party; provided, however, the Seller may assign its rights and obligations under these terms to its affiliates or in connection with the sale or transfer of the Seller's business and Seller may grant a security interest in the Agreement and/or assign proceeds of the agreement without Buyer's consent.

10. **Termination.** Either party may terminate this agreement, upon issuance of a written notice of breach and a thirty (30) day cure period, for a material breach (including but not limited to, filing of bankruptcy, or failure to fulfill the material obligations of this agreement). If Buyer suspends an order without a change order for ninety (90) or more days, Seller may thereafter terminate this Agreement without liability, upon fifteen (15) days written notice to Buyer, and shall be entitled to payment for work performed, whether delivered or undelivered, prior to the date of termination.

11. **Dispute Resolution.** Seller and Buyer shall negotiate in good faith to resolve any dispute relating hereto. If, despite good faith efforts, the parties are unable to resolve a dispute or claim arising out of or relating to this Agreement or its breach, termination, enforcement, interpretation or validity, the parties will first seek to agree on a forum for mediation to be held in a mutually agreeable site. If the parties are unable to resolve the dispute through mediation, then any dispute, claim or controversy arising out of or relating to this Agreement or the breach, termination, enforcement, interpretation or validity thereof, including the determination of the scope or applicability of this agreement to arbitrate, shall be determined by arbitration in Pittsburgh, Pennsylvania before three arbitrators who are lawyers experienced in the discipline that is the subject of the dispute and shall be jointly selected by Seller and Buyer. The arbitration shall be administered by JAMS pursuant to its Comprehensive Arbitration Rules and Procedures. The Arbitrators shall issue a reasoned decision of a majority of the arbitrators, which shall be the decision of the panel. Judgment may be entered upon the arbitrators' decision in any court of competent jurisdiction. The substantially prevailing party as determined by the arbitrators shall be reimbursed by the other party for all costs, expenses and charges, including without limitation reasonable attorneys' fees, incurred by the prevailing party in connection with the arbitration. For any order shipped outside of the United States, any dispute shall be referred to and finally determined by the International Center for Dispute Resolution in accordance with the provisions of its International Arbitration Rules, enforceable under the New York Convention (Convention on the Recognition and Enforcement of Foreign Arbitral Awards) and the governing language shall be English.

12. **Export Compliance**. Buyer acknowledges that Seller is required to comply with applicable export laws and regulations relating to the sale, exportation, transfer, assignment, disposal and usage of the Work provided under this Agreement, including any export license requirements. Buyer agrees that such Work shall not at any time directly or indirectly be used, exported, sold, transferred, assigned or otherwise disposed of in a manner which will result in non-compliance with such applicable export laws and regulations. It shall be a condition of the continuing performance by Seller of its obligations hereunder that compliance with such export laws and regulations be maintained at all times. BUYER AGREES TO INDEMNIFY AND HOLD SELLER HARMLESS FROM ANY AND ALL COSTS, LIABILITIES, PENALTIES, SANCTIONS AND FINES RELATED TO NON-COMPLIANCE WITH APPLICABLE EXPORT LAWS AND REGULATIONS.

13. **LIMITATION OF LIABILITY.** NOTWITHSTANDING ANYTHING ELSE TO THE CONTRARY, SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER INDIRECT DAMAGES, AND SELLER'S TOTAL LIABILITY ARISING AT ANY TIME FROM THE SALE OR USE OF THE WORK, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR ALL WARRANTY CLAIMS OR FOR ANY BREACH OR FAILURE TO PERFORM ANY OBLIGATION UNDER THE CONTRACT, SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE WORK. THESE LIMITATIONS APPLY WHETHER THE LIABILITY IS BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER THEORY.

14. **Rental Equipment / Services.** Any leased or rented equipment ("Leased Equipment") provided by Seller shall at all times be the property of Seller with the exception of certain miscellaneous installation materials purchased by the Buyer, and no right or property interest is transferred to the Buyer, except the right to use any such Leased Equipment as provided herein. Buyer agrees that it shall not pledge, lend, or create a security interest in, part with possession of, or relocate the Leased Equipment. Buyer shall be responsible to maintain the Leased Equipment in good and efficient working order. At the end of the initial term specified in the order, the terms shall automatically renew for the identical period unless canceled in writing by Buyer or Seller not sooner than three (3) months nor later than one (1) month from termination of the initial order or any renewal terms. Upon any renewal, Seller shall have the right to issue notice of increased pricing which shall be effective for any renewed terms unless Buyer objects in writing within fifteen (15) days of issuance of said notice. If Buyer timely cancels service in writing prior to the end of the initial or any renewal term this shall not relieve Buyer of its obligations under the order for the monthly rental service charge which shall continue to be due and owing. Upon the expiration or termination of this Agreement, Buyer shall promptly make any Leased Equipment available to Seller for removal. Buyer hereby agrees that it shall grant Seller access to the Leased Equipment location and shall permit Seller to take possession of and remove the Leased Equipment without resort to legal process and hereby releases Seller from any claim or right of action for trespass or damages caused by reason of such entry and removal.

15. **Miscellaneous.** These terms, together with any Contract Documents issued or signed by the Seller, comprise the complete and exclusive statement of the agreement between the parties (the "Agreement") and supersede any terms contained in Buyer's documents, unless separately signed by Seller. No part of the Agreement may be changed or cancelled except by a written document signed by Seller and Buyer. No course of dealing or performance, usage of trade or failure to enforce any term shall be used to modify the Agreement. To the extent the Agreement is considered a subcontract under Buyer's prime contract with an agency of the United States government, in case of Federal Acquisition Regulations (FARs) flow down terms, Seller will be in compliance with Section 44.403 of the FAR relating to commercial items and those additional clauses as specifically listed in 52.244-6, Subcontracts for Commercial Items (OCT 2014). If any of these terms is unenforceable, such term shall be limited only to the extent necessary to make it enforceable, and all other terms shall remain in full force and effect. The Agreement shall be governed by the laws of the Commonwealth of Pennsylvania without regard to its conflict of laws provisions. Both Buyer and Seller reject the applicability of the United Nations Convention on Contracts for the international sales of goods to the relationship between the parties and to all transactions arising from said relationship.

evoqua
WATER TECHNOLOGIES

HP® SERIES LIQUID PHASE ADSORPTION SYSTEMS (ASME CODE)

Applications

The HP® Series Adsorption Systems are designed to remove dissolved organic contaminants from water. These systems are cost effectively used in applications including:

- Groundwater remediation
- Wastewater filtration
- Tank rinse water treatment
- Pilot testing
- Underground storage tank clean up
- Leachate treatment
- Dechlorination
- Spill cleanup
- Food grade
- Drinking water

Installation, Startup and Operation

The HP 810, HP 1020 and HP 1220 systems are shipped as separate components—two adsorbers and a piping skid module. The piping module allows the adsorbers to operate in series or parallel configurations. The systems requires minimal field assembly and site connections.

Evoqua can provide a total service package that includes utilizing OSHA trained personnel providing on-site carbon changeouts, packaging and transportation of spent carbon for recycling at our RCRA permitted reactivation facilities, where the contaminants are thermally destroyed.

We can provide instructions on sampling the spent carbon and completion of our spent carbon profile form. Spent carbon acceptance testing can be performed at our certified laboratory. When requested, a certificate of reactivation will be issued.

FEATURES AND BENEFITS

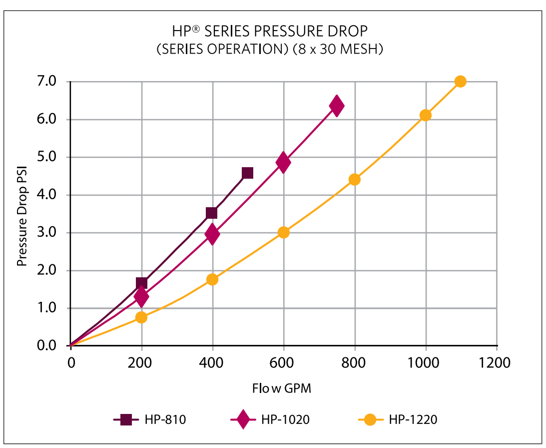
- ASME code section VIII (stamped), carbon steel vessel
- SSPC-SP5 surface preparation, NSF approved Plasite vinyl ester lining; rust preventative epoxy/urethane exterior
- Uniform, continuous internal lining flange to flange (HP 1020/1220 Systems)
- Proprietary vertical 316 stainless steel externally removable septa nozzles (HP 1020/1220 Systems) allows maintenance of underdrain without vessel entry
- Modular design for easy handling and installation
- Internal spray nozzle ensures complete removal of all spent carbon
- Schedule 40 carbon steel pipe, supplied with cast iron gear/wheel operated butterfly valves with EPDM seats
- Carbon slurry piping made from schedule 40 carbon steel
- In-bed water sample collection ports —25 - 50 - 75% bed depths
- Top and side manway allows for easy internal inspection

SPECIFICATIONS/TYPICAL PROPERTIES

	HP® 810SYS	HP® 1020SYS	HP® 1220SYS
Dimensions (each adsorber - dia. x sidewall height)	96″ x 84″	120″ x 96″	144″ x 60″
Overall Height	15′ 2″	18′ 2″	16′ 4″
System Length	22′ 8″	26′ 10″	28′ 10″
System Width	10′	11′ 3″	13′ 2″
Process Piping	6″	8″	8″
Flanged Inlet/Outlet (150# ANSI)	6″	8″	8″
Carbon Fill/Discharge	4″	4″	4″
Flanged Backwash/Vent	6″	8″	8″
Manway (dia., side shell location)	20″	20″	20″
Manway (top)	14″ x 18″	14″ x 18″	14″ x 18″
Utility Water/Air (hose connection)①	2″	2″	2″
Interior Coating	Vinyl Ester	Vinyl Ester	Vinyl Ester
Exterior Coating	Urethane	Urethane	Urethane
Empty System Weight (lbs.)	15,500	34,000	35,000
Carbon Weight/Vessel (lbs.) ②	10,000	20,000	20,000
Operating Weight (lbs.)	85,000	138,000	155,000
Design Pressure (PSIG) @ 140°F	125	125	125
Max. Flow (GPM) Series/Parallel	500/1,000	750/1,500	1,100/2,200
Backwash Rate (GPM) (8 x 30 mesh @ 55°F)	450	710	1,000

① Kamlock type
For detailed specifications or dimensional information or drawings, contact your local Evoqua sales representative.

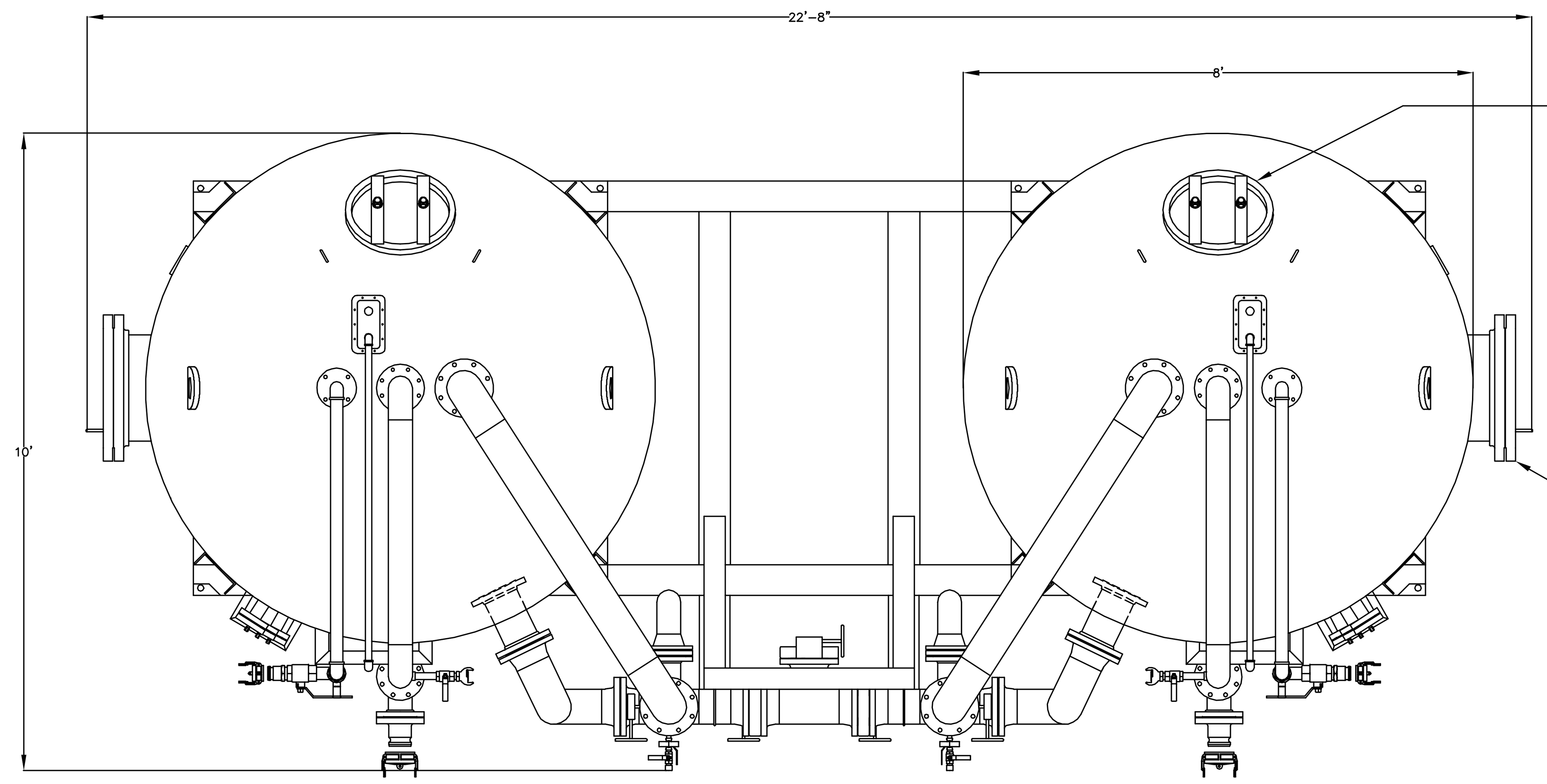
② Weight of carbon based on density of 29.5 lb./ft3. Loaded weight can vary depending on actual density of GAC.



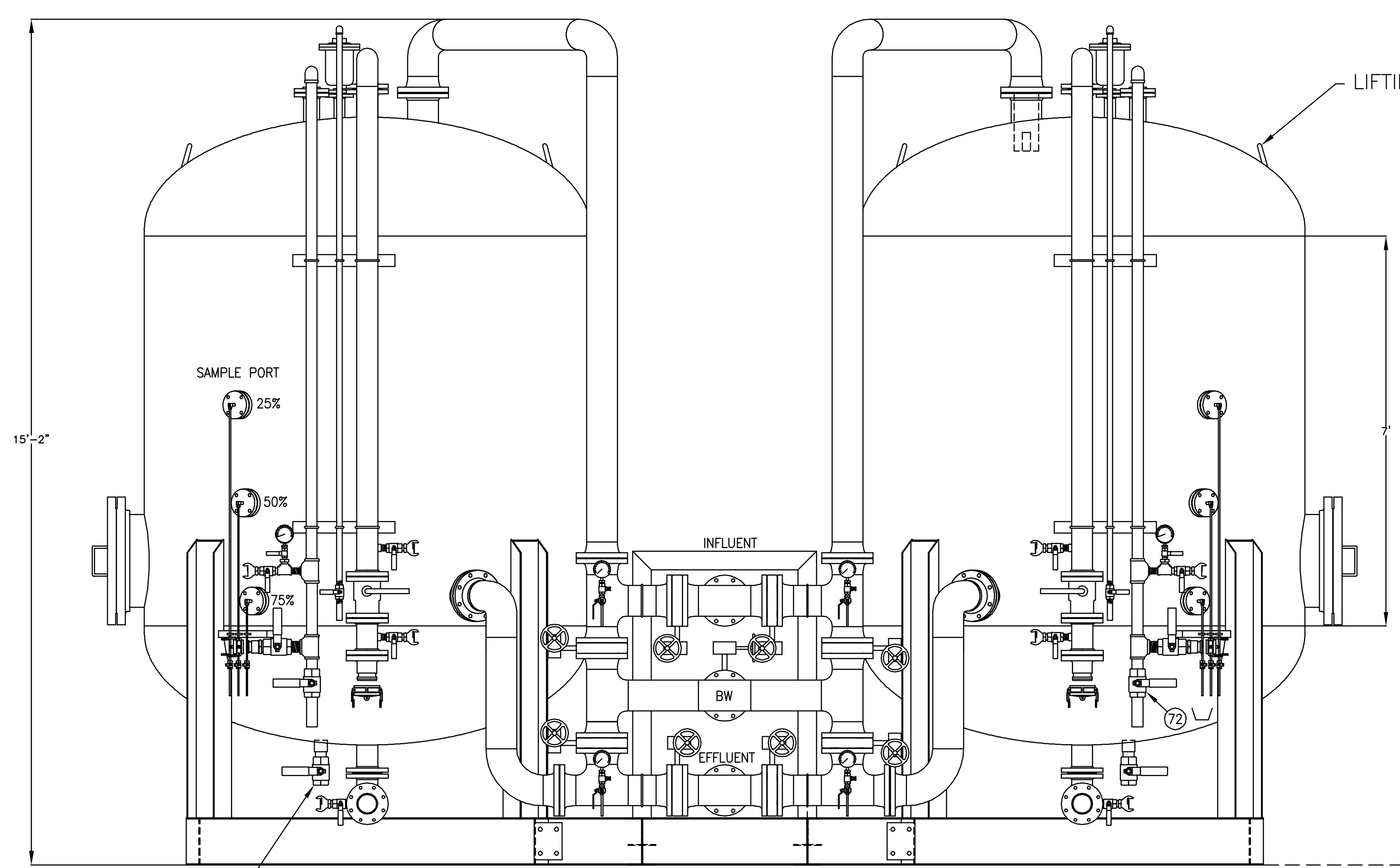
Safety Note: Wet activated carbon readily adsorbs atmospheric oxygen. Dangerously low oxygen levels may exist in closed vessels or poorly ventilated storage areas. Workers should follow all applicable state and federal safety guidelines for entering oxygen depleted areas.

evoqua
WATER TECHNOLOGIES

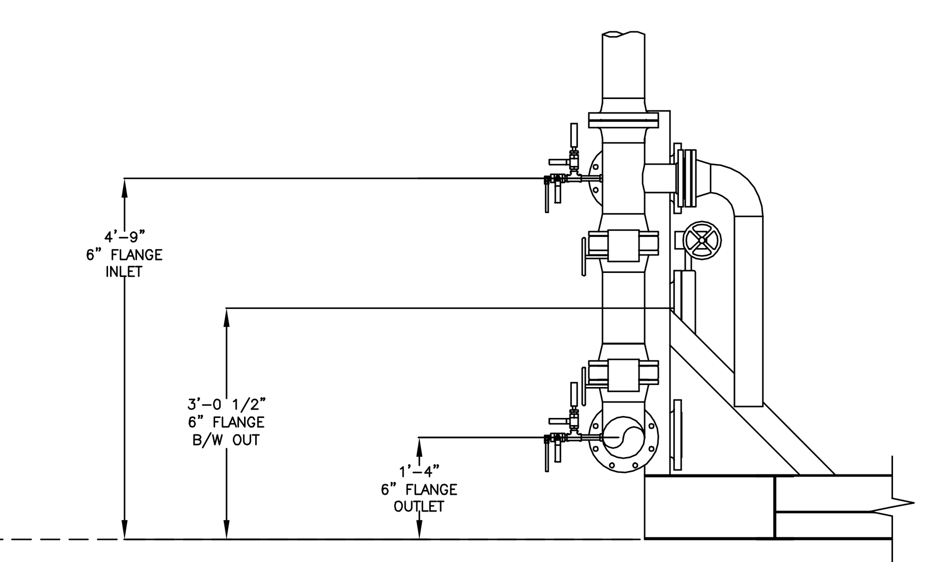
4800 North Point Parkway, Suite 250, Alpharetta, GA 30022
+1 (866) 926-8420 (toll-free) **+1 (978) 614-7233** (toll) **www.evoqua.com**



PLAN VIEW



ELEVATION



MANIFOLD SIDE VIEW

NOTES:

1. MATERIALS OF CONSTRUCTION
   - VESSEL:.. CARBON STEEL
   - EXTERNAL COATING:.. HIGH SOLIDS URETHANE, BLUE
   - INTERNAL COATING:.. PLASITE 4110
   - INTERNAL DISTRIBUTION:... SST
   - PIPING... CARBON STEEL

2. SPECIFICATIONS
   - FLOW * – GPM PARALLEL (MAX): 1000
   - FLOW * – GPM SERIES (MAX): 500
   - PRESSURE – PSIG (MAX): 125
   - TEMPERATURE – DEG F (MAX):..................................... 140
   - CROSS SECTION PER VESSEL– SQ. FT:...............................49.2
   - EMPTY SYSTEM WEIGHT – LBS: (APPROX,) 15,500
   - CARBON CAPACITY – LBS: PER VESSEL (APPROX,) 10,000
   - OPERATING SYSTEM WEIGHT – LBS: (APPROX,) 85,000

3. ALL DIMENSIONS ARE ± 1"

* NOTE: ACTUAL DESIGN SHOULD BE BASED ON SUPERFICIAL BED VELOCITY AS REQUIRED FOR SPECIFIC CONTAMINANTS.

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN

DESIGNER	DATE
CAR	2-6-14
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE:	

TITLE HP810 SYS GENERAL ASSEMBLY

CLIENT

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES
RED BLUFF, CA
530-527-2664

PROJECT	CODE	DRAWING	SHEET	REV
		HP810 SYS	1 OF 1	0

STD: BORDER-0106-24X36D1

INTL REF:

BAR = 1" AT PLOT SCALE

WESTATES® COCONUT SHELL BASED GRANULAR ACTIVATED CARBON - AQUACARB® 830C, 1230C AND 1240C CARBONS

FOR USE IN POTABLE WATER AND PROCESS WATER APPLICATIONS

AquaCarb® 830C, 1230C and 1240C carbons are high activity coconut shell based granular activated carbons. These hard, attrition resistant high surface area carbons are designed to remove difficult to adsorb organics from potable, waste and process water. They are especially effective for adsorbing chlorine, disinfection by-products, TCE, PCE, MTBE and other trace level organics.

Applications

Cost effective AquaCarb activated carbons developed by Evoqua have been demonstrated to provide superior performance in an extensive array of liquid phase treatment applications. AquaCarb activated carbons are available for:

- Removal of trace organic contaminants
- Pesticide removal
- MTBE removal
- Disinfection by-product (DBP) removal
- Drinking water treatment
- Industrial process water treatment
- Home water filtration systems

Quality Control

AquaCarb activated carbons are extensively quality checked at our State of California certified environmental and carbon testing laboratory located in Los Angeles, CA. Evoqua's laboratory is fully equipped to provide complete quality control analyses using ASTM standard test methods in order to assure the consistent quality of all Westates® carbons.

Our technical staff offers hands-on guidance in selecting the most appropriate system, operating conditions and carbon to meet your needs. For more information, contact your nearest Evoqua representative.

Features and Benefits

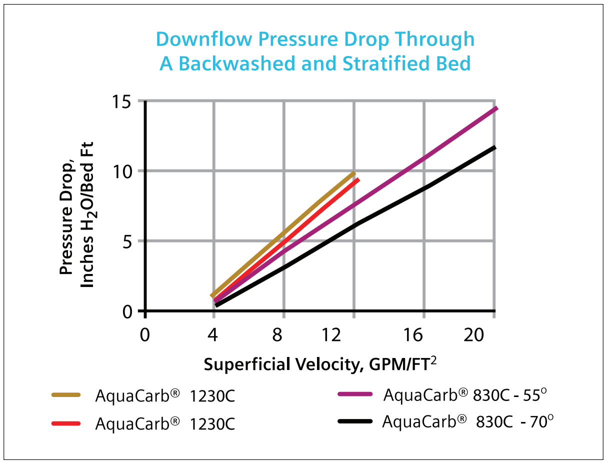
- ANSI/NSF Standard 61 classified for use in potable water applications
- Fully conforms to physical, performance and leachability requirements established by the current ANSI/AWWA B604 (which includes the Food Chemical Codex requirements)
- A detailed quality assurance program guarantees consistent quality from lot to lot and shipment to shipment

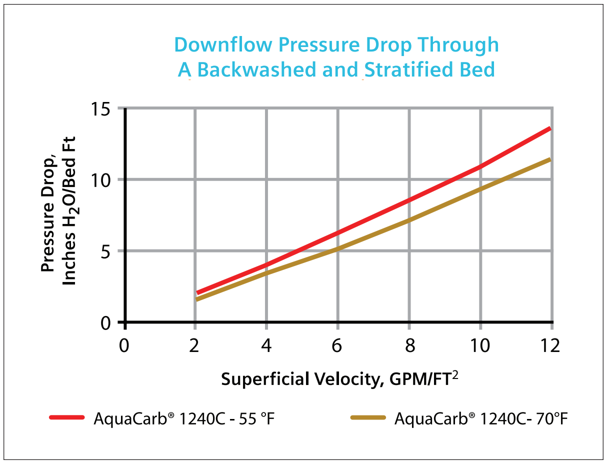
TYPICAL PROPERTIES

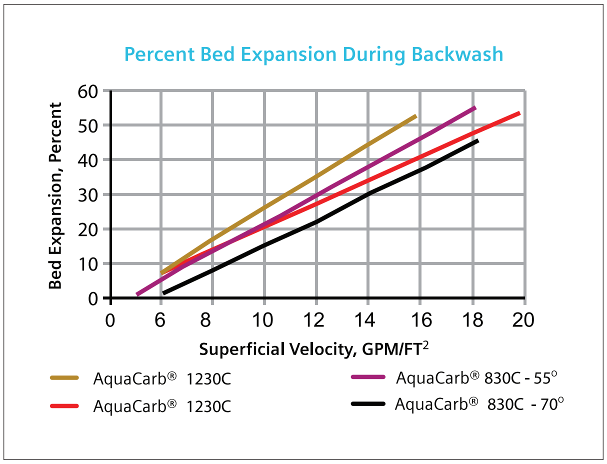
Parameter	AquaCarb® 830C	AquaCarb 1230C	AquaCarb 1240C
Carbon Type	Coconut Shell	Coconut Shell	Coconut Shell
Mesh Size, U.S. Sieve	8 x 30	12 x 30	12 x 40
Effective Size, mm	0.8 - 1.1	0.6 - 0.85	0.55 - 0.75
Uniformity Coefficient	2.1	2.0	1.9
Iodine No., mg I_2/g	1100	1100	1100
Hardness No., Wt. %	95	95	95
Abrasion No., Wt. %	85	85	85
Apparent Density, g/cc	0.46 - 0.52	0.46 - 0.52	0.46 - 0.52
Water Soluble Ash, Wt. %	2	2	2

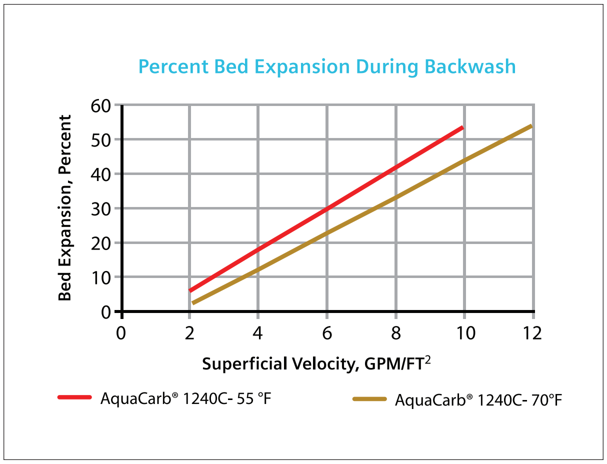
Safety Note: Under certain conditions, some compounds may oxidize, decompose or polymerize in the presence of activated carbon causing a carbon bed temperature rise that is sufficient to cause ignition. Particular care must be exercised when compounds that have a peroxide-forming tendency are being adsorbed. In addition the adsorption of VOCs will lead to the generation of heat within a carbon bed. These heats of reaction and adsorption need to be properly dissipated in order to fully assure the safe operation of the bed.

Wet activated carbon readily adsorbs atmospheric oxygen. Dangerously low oxygen levels may exist in closed vessels or poorly ventilated storage areas. Workers should follow all applicable state and federal safety guidelines for entering oxygen depleted areas.









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181 Thorn Hill Road, Warrendale, PA 15086

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Appendix I: Policy Memo 97-005, Extremely Impaired Sources

Memorandum

Date: November 5, 1997

To: Drinking Water Program
Regional and District Engineers

From: Division of Drinking Water and
Environmental Management

Subject: Policy Memo 97-005 Policy Guidance for Direct Domestic Use of Extremely Impaired Sources

A. General Philosophy

The primary goal of the Drinking Water Program (DWP) is to assure that all Californians are, to the extent possible, provided a reliable supply of safe drinking water. In furtherance of this goal, the DWP continues to subscribe to the basic principle that only the best quality sources of water reasonably available to a water utility should be used for drinking. When feasible choices are available, the sources presenting the least risk to public health should be utilized. Furthermore, these sources should be protected against contamination. Whenever possible, lower quality source waters should be used for nonconsumptive uses, such as irrigation, recreation, or industrial uses, which pose lower health risk.

The use of contaminated water as a drinking water source always poses a greater health risk and hazard to the public than the use of an uncontaminated source because of the chance that the necessary treatment may fail.

The use of an extremely impaired source should not be approved unless the additional health risk, relative to the use of other available drinking water sources, are known, minimized, and considered acceptable.

Water utilities (including wholesalers) should be encouraged to minimize the concentration of man-made toxic substances, naturally occurring contaminants, and pathogenic microorganisms in drinking water supplies, maximum contaminant levels (MCLs) notwithstanding.

Extremely impaired sources that contain or are likely to contain high concentrations of contaminants, multiple contaminants, or unknown contaminants (such as groundwater subject to contamination from a hazardous waste disposal site) should not be considered for direct human consumption where alternatives are available.

Where reasonable alternatives are available, high quality drinking water should not be allowed to be degraded by the planned addition of contaminants. In other words, the MCLs should not be used to condone contamination up to those levels where the addition of those contaminants can be reasonable avoided.

Drinking water quality and public health shall be given greater consideration than costs or cost savings when evaluating alternative drinking water sources or treatment processes.

The DWP recognizes that there are extremely impaired sources in California that need to be cleaned up and for which the resulting product water represents a significant resource that should not be wasted. In some situations, it may be reasonable to consider the use of these treated extremely impaired sources for domestic use. Some communities may not have any choice. In such cases, the public health principles as set forth in this policy should be used to guide the evaluation of such situations.

B. Purpose of Policy Guidance

The purpose of this guidance document is to set forth the position and the basic tenets by which DWP would evaluate proposals, establish appropriate permit conditions, and approve the use of an extremely impaired source for any direct potable use.

An extremely impaired source meets one or more of the following criteria:

- exceeds 10 times an MCL or action level (AL) based on chronic health effects,
- exceeds 3 times an MCL or AL based on acute health effects,
- is a surface water that requires more than 4 log *Giardia*/5 log virus reduction,
- is extremely threatened with contamination due to proximity to known contaminating activities
- contains a mixture of contaminants of health concern
- is designed to intercept known contaminants of health concern.

Examples include:

- Extremely contaminated ground water
- Effluent dominated surface water
- Oilfield produced water
- Water that is predominantly recycled water; urban storm drainage; treated or untreated wastewater; or agricultural return water
- Products of toxic site cleanup programs

It is recognized that the circumstances surrounding each situation may be different. Proposals for the use of extremely impaired sources, therefore, must be considered on a case-by-case basis.

C. Elements of an Evaluation Process for an Extremely Impaired Drinking Water Source

1. Source Water Assessment:

The purpose of the source water assessment for the extremely impaired source is to determine the extent to which the aquifer or surface water is vulnerable to contaminating activities in the area. There may be other contaminants associated with activities that contribute to the known contamination, or other contamination sources that have yet to impact the drinking water source. There may not be drinking water MCLs, Als or monitoring requirements established for these additional contaminants, but health related information may be available through other programs. The appropriate level of monitoring and treatment to produce a safe drinking water cannot be determined unless the activities that are affecting or may impact raw water quality are understood. The assessment should include:

- Delineation of the source water capture zone
- Identification of contaminant sources
    - Identify the origin of known contaminants found in the source water and predict contaminant level trends
    - Identify chemicals or contaminants used at or generated by facilities responsible for the known contamination
    - Identify all potential contaminant sources and determine the vulnerability of the water source to these contaminant sources

2. Full characterization of the raw water quality:

The appropriate level of monitoring and treatment to produce a safe drinking water cannot be determined unless the raw water quality is fully understood. The following categories should be considered to fully characterize the source water quality:

- Title 22 drinking water regulated and unregulated chemicals
- All chemicals for which drinking water action levels are established
- All chemicals listed pursuant to Safe Drinking Water and Toxic Enforcement Act of 1986
- Microbiological quality
- Priority pollutants
- Gross contaminant measures [total organic carbon (TOC), etc.]
- Any compounds identified under source water assessment.
- Determine variability of contaminant concentrations with time (seasonal and long term)
- Determine variability of contaminant concentrations with pumping rate.
- The detection of any contaminant identified in the raw water quality characterization (step 2) should require assessment of the impact on the source water pursuant to the source water assessment (step 1).

3. Source Protection:

There must be a program in place to control the level of contamination. At a minimum, best management practices for waste handling and waste reduction should be required. In addition, monitoring at the source should be conducted to determine the level of contamination and to reasonable assure that the contamination level will not increase. Unless the level of contamination is known a determination cannot be made that the proposed treatment is sufficiently adequate and reliable to render the water potable.

If the use of an extremely impaired source is to be approved, the source of the contamination must be controlled to:

- Prevent the level of contamination from rising.
- Minimize the dependence on treatment.

4. Effective Monitoring and Treatment:

The treatment process used to treat the extremely impaired source prior to direct usage in a domestic water distribution system must be commensurate with the degree of risk associated with the contaminants present. As a minimum, treatment of extremely impaired sources shall include use of the best available treatment technology defined for the contaminant(s) by the Environmental Protection Agency. Furthermore, the treatment processes must have reliability features consistent with the type and degree of contamination.

All treatment processes used must be optimized to reliably produce water that contains the lowest concentration of contaminants feasible at all times. The entire flow from the extremely impaired source must pass through the complete treatment process or processes. Any water from other sources that is available for blending prior to entry into the distribution system should be used to provide an additional safety factor.

Multi-barrier treatment is a set of independent treatment processes placed in series, and designed and operated to reduce the levels of a contaminant. Each barrier should effectively reduce the contaminant by a significant fraction of the total required reduction. The treatment processes should address all the contaminants of public health concern in an extremely impaired source. Multi-barrier treatment may be appropriate when:

- The primary treatment is not sufficiently reliable;
- The primary treatment is of uncertain effectiveness;
- There is no direct way to measure the contaminant (e.g., pathogenic microorganism);
- The health effect of the contaminant is acute; and/or
- Very large reductions in contaminant concentration are required.

The description of the proposed monitoring and treatment should include the following:

- Performance standards (field measurable indicator of treatment efficiency);
    - Identify level to assure compliance with the treatment objective
    - The treatment objective for all contaminants should be optimized to the lowest extent feasible and must assure compliance with the MCL/AL at all times.

  - Facilities for treating water containing specific contaminants for which the MCL is higher than the maximum contaminant level goal (MCLG) should be designed and operated to meet the MCLG where this can be accomplished in a cost effective manner.

- Operations plan that identifies all operational procedures, failure response triggers, and loading rates, including:
  - Process monitoring plan
  - Process optimization procedures
  - Established water quality objectives or goals
  - Level of operator qualification

- Reliability features
  - Response Plan for failure to meet the treatment objective
  - Alternative disposal methods
  - Shutdown triggers and restart procedures

- Compliance monitoring and reporting program
- Notification plan
- Extremely impaired source water quality surveillance plan

  The water quality surveillance plan should include monitoring between the origin of the contamination and the extremely impaired source that is proposed for drinking water.

5. Human Health Risks Associated with Failure of Proposed Treatment:

   Treatment technologies are not failure proof, and insufficiently treated or untreated water may, on occasion, pass through the treatment process and into the distribution system. An assessment must be performed that includes:

   - An evaluation of the risks of failure of the proposed treatment system.

     The proposed treatment system must be evaluated in terms of its probability to fail, thereby exposing customers to insufficiently treated or untreated drinking water from the extremely impaired source.

     All treatment failure modes are to be evaluated. The evaluation must include an assessment of the proposed frequency of monitoring as it relates to protection of the public from insufficiently treated or untreated drinking water.

   - An assessment of potential health risks associated with failure of the proposed treatment system. The health assessment must take into account:

- the duration of exposure to contaminated drinking water that would result from such a failure

- the human health risks associated with such exposure to insufficiently treated or untreated water over the course of that failure, considering the risks of disease from microbiological organism, and the risks of acute and chronic effects (including cancer risks) from chemical contaminants

- potential cumulative risks, due to multiple failures

When risks of adverse health effects from treatment failure are not acceptable, then additional treatment safeguards must be used for the protection of public health, or the proposal must be rejected.

6. Identification of alternatives to the use of the extremely impaired source and compare the potential health risk associated with these to the project's potential health risk.

Use of alternative sources of drinking water reasonably available to a water utility should be evaluated as to health risk (assuming MCLs are, or can be, met), and compared to the use of the extremely impaired source.

In evaluating the relative risk comparison of the extremely impaired source and alternative drinking water sources, additive effects of multiple contaminants are an important consideration. Generally, consideration of allowing direct potable use of an extremely impaired source should be limited to a single toxic contaminant or a limited number of similar chemicals that can be reliably treated with the same process.

The comparison of alternatives should include a comparison of the risks of treatment failure for the alternatives, as well as for the extremely impaired source (step 5).

7. Completion of the California Environmental Quality Act (CEQA) review of the project:

CEQA review of the project must be completed.

8. Submittal of a permit application:

The public water system(s) collecting, treating and distributing water from the extremely impaired source must submit a permit application for the use of the extremely impaired source that includes the items identified above. A supplier of treated water to a public water system is a water wholesaler and must be permitted as a public water system, as required by the Safe Drinking Water Act.

9. Public hearing:

   A public hearing must be held to identify concerns of consumers who will be served water from the extremely impaired source and to assure that all parties have a chance to provide relevant information.

10. DHS evaluation:

    DHS staff shall conduct an evaluation of the application and make recommendations.

11. Requirements for DHS approval:

    The following findings are required of DHS for approval to use an extremely impaired source:

    - Drinking water MCLs and Als will not be exceeded if the permit is complied with, and

    - The potential for human health risk is minimized, and the risk associated with the project is less than or equal to the alternatives.

12. Issuance or denial of permit:

    DHS either issues a permit or denies a permit for the use of the extremely impaired source. If a permit is issued, it shall include all necessary treatment, compliance monitoring, operational, and reporting requirements.

<Original signed by>

David P. Spath, Ph.D., P.E., Chief

Appendix J: Conceptualized Treatment Pre-Design and Cost Estimate for Extraction Well Alternative 3

GEI Consultants

Client Name:	South Tahoe Public Utilities District	**Date:**	June 2, 2016
Project Title:	South Y Project	**GEI Project No.:**	1601030
Basis for Estimate:		**Prepared By:**	Mark Hargrove
	[X] Conceptual [ ] Feasibility [ ] Preliminary	**Checked By:**	Ryan Alward
	[ ] Final [ ] Other Enter "Other" description here		

Note: Estimate based on design level.

Item	Description	Quantity	Unit	Unit Price	Total
Construction					
1	Mobilization/Demobilization	1	LS	$82,456.36	$82,456
2	Destroy Existing Well	1	LS	$15,000.00	$15,000
3	Demolish of Existing Site, Mechanical, and Electrical Facilities	1	LS	$22,600.00	$22,600
4	Construct New Well	1	LS	$250,000.00	$250,000
5	Furnish and Install New Prefab. Well Building	1	LS	$14,800.00	$14,800
6	Construct New Building Concrete Foundation	22	CY	$775.54	$17,062
7	Furnish and Install New 400 gpm Pump with 40 hp Submersible	1	EA	$35,000.00	$35,000
8	Furnish and Install Water Supply Discharge Piping and Valves	1	LS	$3,700.00	$3,700
9	Furnish and Install Pump-to-Waste Discharge Piping and Valves	1	LS	$4,250.00	$4,250
10	Furnish and Install Hydropneumatic Tank System	1	LS	$25,000.00	$25,000
11	Furnish and Install Chlorine Treatment System	1	LS	$10,000.00	$10,000
12	Furnish and Install Carbon Treatment System	1	LS	$241,600.00	$241,600
13	Construct Electrical and Instrumentation System	1	LS	$70,000.00	$70,000
14	Testing and Start-up	1	LS	$8,000.00	$8,000
Construction Subtotal =					**$799,468**
Other Construction Costs					
Unallocated Items				5%	$39,973
Construction Total =					**$839,442**
Other Owner Costs					
Administration and Legal				5%	$41,972
Environmental Documentation and Permitting				12%	$100,733
Engineering Design and Investigations				15%	$125,916
Engineering During Construction				5%	$41,972
Construction Management				8%	$67,155
Other Owner Costs Subtotal =					**$377,749**
Project Subtotal =					**$1,217,190**
Project Contingency				50%	$608,595
Project Total =					**$1,825,786**

Notes:

1. O&M Costs are not included in this cost estimate.
2. Project contingency is an upper estimate range for total project costs based on the design level.

GAC treating to non-detect (<0.5 µg/L)	Units	Usage	Carbon Usage Rate	
Media based on 100% utilization:				
Gallons treated	#GAC/1,000 gal	0.0357	714,000 gallons per exchange	
Usage per day	#GAC/day	26.7632	971 days between exchanges	
Usage per year	lbs/yr	9,769	2.66 years between exchanges	
GAC media costs	$/lb	2.00	**$15,028.58 per year**	
Labor & Sampling	**Units**	**Unit Cost**	**Total Units**	**Cost**
Operator labor for daily site visits	$/yr	30.00	110	3,300
Labor for media replacements	$/hr	30.00	12	360
Increased sampling per year assuming three sample per parameter per month	VOC 524	75.00	36	2,700
	Quantitray	20.00	36	720
	HPC	30.00	36	1,080
Total annual O&M costs				**$8,160**

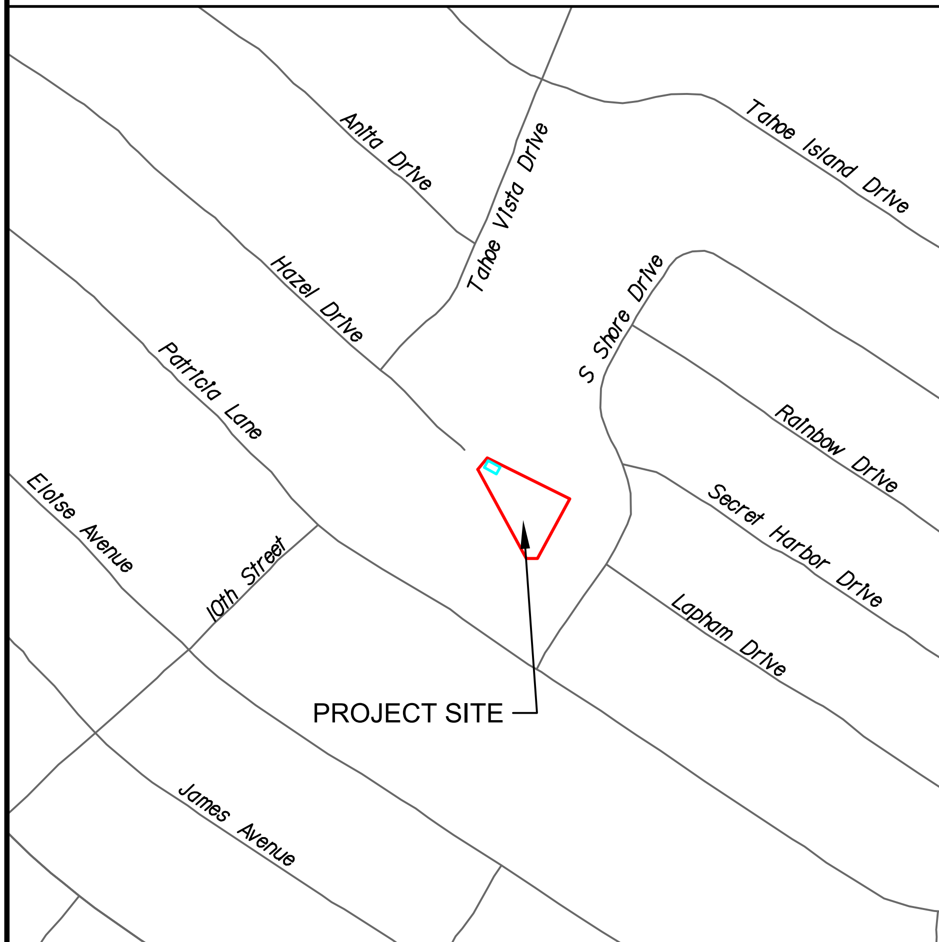
Operator labor rates are assumed at $30 per hour including overhead costs.

The DDW typically requires daily site visits for groundwater treatment sites. A site visit will consist of recording station operation (flow rates, difference pressures, chlorine residual, etc.). These daily visits are estimated to take 15-20 minutes per day resulting in an annual total of 110 hours.

Labor costs for media replacement are estimated assuming one carbon vessel will be replaced per year and an operator will be present for 12 hours to support and oversee the operation.

Increased sampling per year is based on collecting a monthly sample from the well head, lead vessel and lag vessel. These sampling points will allow LBWC to monitoring breakthrough (lead vessel) and demonstrate compliance to the DDW (lag vessel). The increased bacteriological and heterotrophic plate count (HPC) monitoring is expected to be required by DDW since carbon fosters microbial growth.

South Tahoe Public Utilities District
South Y Extraction Well Suitability Investigation

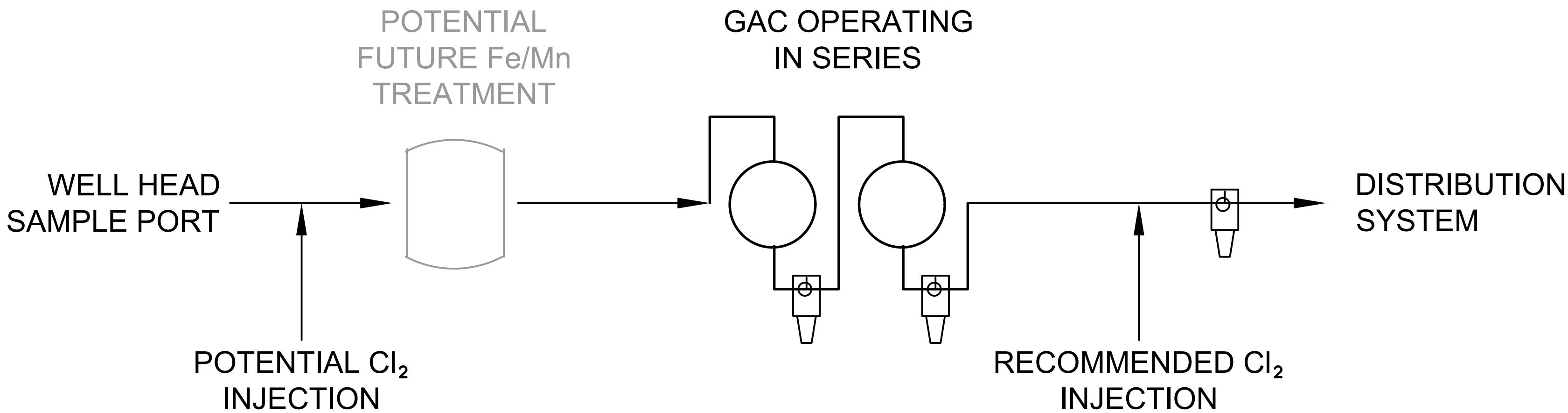


PROJECT LOCATION
NOT TO SCALE

AREA MAP
NOT TO SCALE

South Y Extraction Well Suitability Investigation South Lake Tahoe, California	GEI Consultants	PROJECT LOCATION (843 Hazel Drive, South Lake Tahoe, CA)	
South Tahoe Public Utility District South Lake Tahoe, California	Project 1601030	JUNE 2016	Appendix J-1

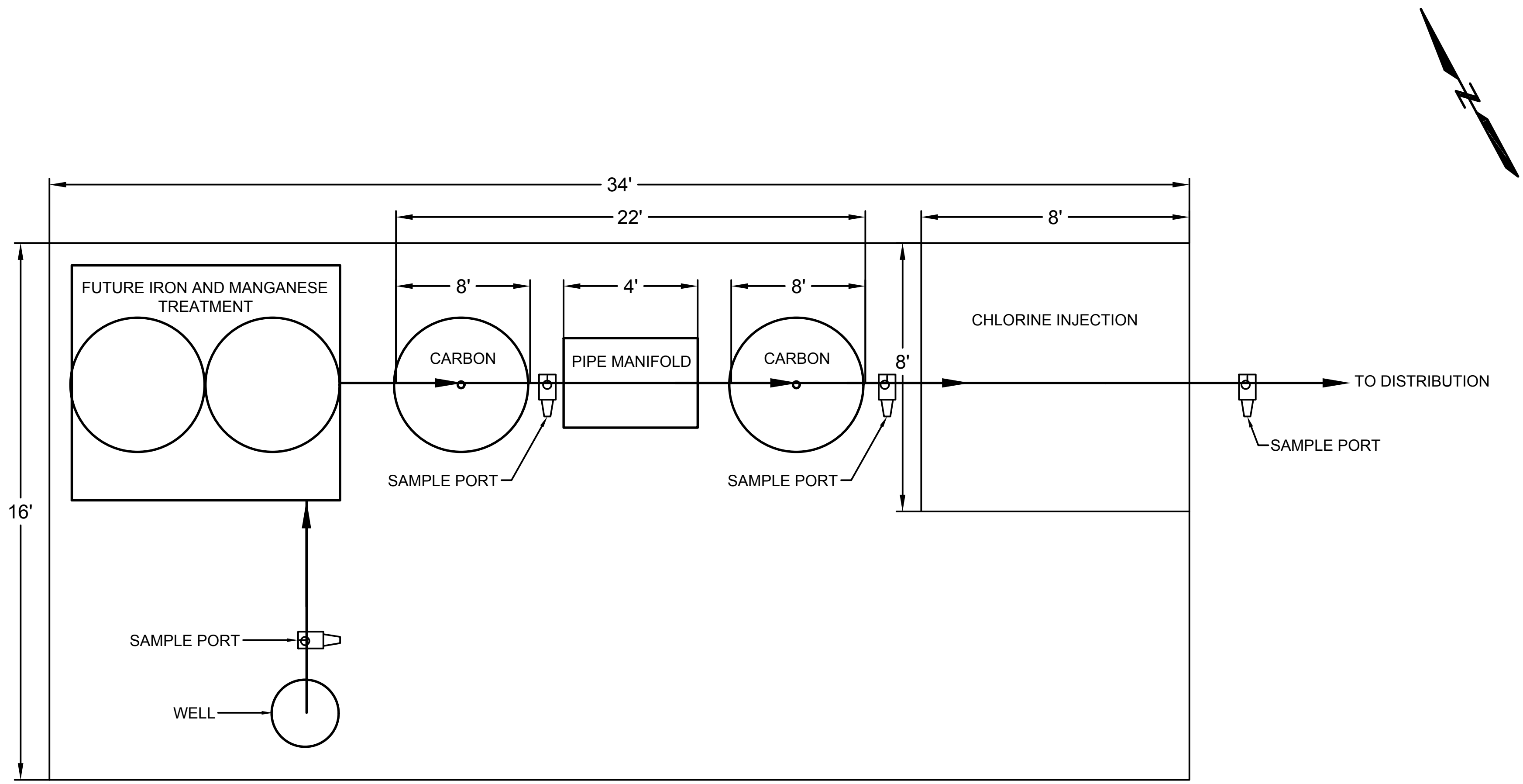
\\sac1v-fs01\ J:\South Tahoe Public Utilities District□roject\1601030 South Y Project\Task 4 - Final Report\CAD\STPUD - Project Area Map.dwg - 6/1/2016



LEGEND:

SAMPLE PORT

South Y Extraction Well Suitability Investigation South Lake Tahoe, California	GEI Consultants	TREATMENT PROCESS FLOW DIAGRAM
South Tahoe Public Utility District South Lake Tahoe, California	Project 1601030	JUNE 2016 Appendix J-2



NOTES:

1. CONCRETE SURFACES OF FINISH FLOOR, SUMP AND TRENCH DRAIN ARE EPOXY COATED.

2. THE DIMENSIONS AND LOCATIONS OF EQUIPMENT SHOWN ON THIS DRAWING ARE APPROXIMATE. THE ACTUAL DIMENSIONS AND LOCATIONS MAY VARY.

0 5 10

SCALE: 1" = 5'

South Y Extraction Well Suitability Investigation South Lake Tahoe, California	GEI Consultants	TREATMENT SYSTEM LAYOUT	
South Tahoe Public Utility District South Lake Tahoe, California	Project 1601030	JUNE 2016	Appendix J-3

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GEI Consultants

FINAL REPORT

South Tahoe Public Utility District

South Y Extraction Well Suitability Investigation

June 29, 2016