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Olivenhain Municipal Water District

August 2021

Prepared By:

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The First Name in Groundwater

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REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION PROJECT

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Acronyms, Abbreviations, and Initialisms

Abbrev.	Description
acre-ft/yr	acre-feet per year
ACU	Apparent Color Unit
amsl	above mean sea level
ft bgs	feet below ground surface
µg/L	micrograms per liter
mg/L	milligrams per liter
meq/L	milliequivalents per liter
pCi/L	picocuries per liter
µmhos/cm	micromhos per centimeter
NTU	Nephelometric Turbidity Units
MGD	million gallons per day
TON	Threshold Odor Number





REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION PROJECT

EX 1.0 Executive Summary

Olivenhain Municipal Water District (OMWD) proposed the San Dieguito Valley Groundwater Desalination Design Pilot (Project) to evaluate the feasibility of desalinating brackish water. A test well was installed, and a one-year pump test was conducted to verify the water balance of the San Dieguito Valley Groundwater Basin, verify water quality and potential impacts to wells of current basin users, and verify effective manganese treatment by piloting pre-treatment technologies. This report combines all the data and data analysis that was collected and prepared from the drilling, construction, development, and testing procedures for the OMWD Desalter Test Well; long-term pumping test monitoring; and model update of the San Dieguito Valley Groundwater Basin Model.

Groundwater levels in the shallow aquifer showed no change during the long-term pumping whereas the deep aquifer was only locally affected by the Desalter Test Well. Based on this evidence, pumping in the deep aquifer does not impact groundwater levels in the shallow aquifer and therefore surface water in the San Dieguito River. The potential impact from the full-scale project assessed using the updated groundwater model suggest additional stream percolation and less outflow to the ocean. The details will be discussed below. Additionally, as anticipated, water levels showed the most decline during the dry period of 2020. Once the long-term pumping test was completed, water levels showed complete recovery suggesting that inflows into the basin can support current groundwater uses. Specific conductivity remained constant throughout the long-term pumping test with the exception of the Morgan Run piezometer, P-11B. This piezometer showed an increase in total dissolved solids (TDS) during the second sampling period. As this well screen crosses the aquitard separating the shallow and deep aquifers, it is likely that higher salinity water from the shallow aquifer moved downward into P-11B. It is recommended that this piezometer be considered for destruction to eliminate this pathway during long-term operations.

The San Dieguito Valley Groundwater Model was updated and recalibrated to 2020 using recent data collected from the construction of the Desalter Test Well and long-term pumping test. Of greatest uncertainty was the specific volume of basin pumping since very few wells are equipped with totalizing flow meters and pumping is unreported. The initial assessment of basin pumping was estimated by applying assumed water demands for the various land uses in the basin along with what data was available for actual well production. The estimated basin pumping was 2,100 acre-ft/yr. This estimation of well production was used as an outflow component for the groundwater model. With additional data collected since the Geoscience 2017 San Dieguito Brackish Groundwater model, the change in storage calculated for





the calibration period only decreased by 20 acre-ft/yr (from 130 acre-ft/yr to 110 acre-ft/yr) compared to the 2017 modeling results. The results of the updated scenario run indicate that the proposed extraction of 1,600 acre-ft/yr at the Desalter Test Well, and in the general vicinity of Sites 2 and 2A will create a minor decrease in storage of 150 acre-ft/yr based on the hydrology of the modeling period and current (2020) groundwater in storage, less than 1% of basin storage. During above average rainfall periods, it is likely that groundwater storage will be replenished, as is typical for many shallow basins in Southern California.

The Project operation may decrease the groundwater elevations at nearby Morgan Run pumping well sites, No. 3 Green North and GunR, by approximately 19 feet and 15 feet beyond the baseline pumping water levels. The cumulative drawdown after 20-year Project pumping at a rate of 1,600 acre ft/yr, in GunR and No. 3 Green North wells are predicted to remain approximately 27 feet above the present pump settings. With the current configuration of modeled Project pumping and assumed continuation of existing basin pumping, including Morgan Run pumping volumes, the water level at the No. 3 Green North well has the potential to reach the top of screen. It appears the top of screen in the No. 3 Green North well is about 29 feet shallower than the GunR well. It should be noted that the model simulated a singular well pumping at lower rates over a wider area. The modeled drawdown indicates that pump lifts may increase in nearby wells, but this drawdown should not affect the overall production of these wells. Depending on the pump installation depths of area wells, there may be a potential need to lower the pump elevations to maintain an adequate water level above the pump intake.

Findings from the long-term pumping test indicated that pumped water from the Desalter Test Well contained concentrations of iron that were nearly three times the Division of Drinking Water (DDW) secondary maximum contaminant level (MCL) and high levels of manganese. These elevated metal concentrations caused fouling and performance issues and required iron and manganese bacterial treatment. When groundwater levels fall below the well screen this allows the groundwater to become oxygenated, which can result in an increased bacterial growth rate. The on-site pretreatment tests were successful at reducing iron and manganese concentrations in the discharged water to acceptable levels. We recommend that this and any other desalter wells are operated to keep pumping water levels above the well screens to help prevent premature fouling.





1.0 Introduction

1.1 Background

Olivenhain Municipal Water District (OMWD) is a public agency in north San Diego County, providing water, wastewater, and recycled water service; hydroelectric power generation; and the operation of Elfin Forest Recreational Reserve. The surface area of OMWD covers 48 square miles and serves an estimated 2020 population of 72,179 (DLM, 2021). To evaluate the feasibility of desalinating the brackish groundwater in the San Dieguito Valley Groundwater Basin, OMWD proposed the San Dieguito Valley Groundwater Desalination Design Pilot (Project). As part of the San Dieguito Brackish Groundwater Desalination Study (2017), Geoscience Support Services, Inc. (Geoscience) prepared two reports: 1) "OMWD San Dieguito Valley Groundwater Desalination Feasibility Sustainable Yield Assessment" (Appendix B of the study), and 2) "Hydrogeologic Investigation for the San Dieguito Valley Brackish Groundwater Desalination Study Technical Memorandum" (Appendix C of the study). The previous studies investigated and reported on the hydrogeologic conditions of the San Dieguito Groundwater Basin and provided a preliminary estimate of the availability of unused increment of groundwater in the basin.

The San Dieguito Groundwater Basin extends from the mouth of the San Dieguito River to the head of Osuna Valley, approximately 6.5 miles upstream (USGS, 1983). The groundwater boundary was modified from the basin boundary re-published by DWR for the SGMA program and drawn based on the assumption that the groundwater basin aquifers are contained in the valley floor Quaternary sediments flanked and underlain by low permeability Tertiary rocks (Geoscience, 2017a). The alluvium typically ranges in thickness from 125 to 180 feet along the axis of the basin with coarse-grained sand and gravel comprising the eastern-most basin alluvium (Hargis, 2004). The western portion of the basin has not been well-characterized. The San Dieguito Groundwater Basin consists of an upper basin forebay area and middle and lower basin areas. Groundwater recharge occurs mainly in the upper basin forebay area primarily from infiltration of surface flow in the San Dieguito River bottom during the wet season (Geoscience, 2017b). River flows are controlled by the dam at Lake Hodges owned and operated by the City of San Diego. The middle and lower basin areas are where a medial clay zone divides groundwater into two aquifers: a shallow upper unconfined aquifer and a deep lower confined aquifer (Geoscience, 2017b).

The preliminary estimate of available unused increment of groundwater was evaluated using two methods. Initially, a water budget was prepared based on estimated values of historical groundwater basin inflow and outflow. Of greatest uncertainty was the specific volume of basin pumping since very few wells are equipped with totalizing flow meters and pumping is unreported. The initial assessment of basin pumping was estimated by applying assumed water demands for the various land uses in the basin along with what data was available for actual well production. The initial assessment of basin pumping was 2,100 acre-ft./yr. The purpose of the long-term test was to further validate the basin pumping by placing a constant additional pumping stress on the basin through both wet and dry seasons. Since the





initial assessment of the available increment of groundwater provided in the 2017 feasibility study, new information of basin pumping was obtained. In 2017, a groundwater model was constructed and calibrated using basin groundwater levels for calibration. The analysis conducted in 2017 showed that 1 MGD of groundwater could be developed without impact to the basin users.

The groundwater model developed in 2017 was updated at the end of the long-term pumping test discussed in this report along with a revised estimation of well production based on data collected since the feasibility study. The revised pumping estimate was used as an outflow component for the groundwater model. In 2017, four model scenarios created using four potential well sites in two general areas—and various pumping rates, project scenario pumping rates, and maximum pumping rates—were run and compared (Geoscience, 2017b). Further details on the four modeling scenarios can be found in Section 8.3 Model Scenarios. Utilizing these two methods, both in 2017 and 2020, an estimate of the additional volume of groundwater that could be developed for the project, while accounting for the groundwater pumping by current basin users, was reported in the sustainable yield assessment provided in the 2017 feasibility study with the update presented here. The model scenario with the least impact on the San Dieguito Groundwater Basin proposed the use of the project extraction volume, 1,600 acre-ft/yr, with potential well sites centrally located in the basin (Geoscience, 2017b). The changes in groundwater elevations between the Project Scenario Run and Baseline Run for model Layer 1 (shallow aquifer) and Layer 3 (deep aquifer) are depicted on Figures 56 and 57, respectively. Assuming existing pumping in the Valley continues, the modelling indicates the Project operation with centrally located wells, as simulated, may decrease the groundwater elevations at nearby Morgan Run pumping well sites, Morgan Run No. 3 Green North and Morgan Run GunR, by approximately 19 feet and 15 feet (see Section 8.3 Model Scenarios for more information). An extraction volume of 1,600 acre-ft/yr allows for 1.0 MGD of potable water to be produced from the brackish groundwater after the desalination process, accounting for the loss to brine (OMWD, 2017). The Desalter Test Well site is located within the area suggested by the sustainable yield assessment. The updated model was used to recalculate the available increment. The result is similar and will be discussed below.

The Project plan for the Design Pilot was to install a test well and conduct a one-year pump test to validate the unused portion of groundwater available to support OMWD in pursuing brackish groundwater desalination in the San Dieguito Valley Groundwater Basin. In order to select a well site, OMWD considered areas of current pipeline easements. However, none of the pipeline easements in the Valley were located in the appropriate locations to accommodate a new well site. Subsequently, OMWD sent out a general request for partnerships. Del Mar Country Club and Surf Cup Sports responded. The Del Mar Country Club location was not located in an area hydrogeologically suitable for a new well. The Surf Cup site was deemed the best of the two available sites. The location of the Desalter Test Well was selected based on several factors including hydrogeologic conditions and the reported historic capacity of area wells. Exploratory borings confirmed the geology at the Surf Cup site was generally appropriate for a test





well. However, the deciding factor was the availability of a site for well installation. The Project plan included installation and operation of a test well, along with installation and operation of a manganese field test. Therefore, the Project involved four major components: 1) pilot hole drilling and test well construction, 2) long-term pump testing, 3) field testing manganese pre-treatment system, and 4) updating the groundwater model to reassess the basin water balance.

The overall purpose of the Project was to verify the water balance of the San Dieguito Valley Groundwater Basin using data from a long-term pumping test and verify water quality and potential impacts to water levels in wells of current basin users, as well as verify effective manganese treatment by piloting pretreatment technologies.

1.2 Geophysical Borehole Logs and Pilot Borehole Reaming

Upon completion of the pilot borehole, several geophysical borehole logs were run on the entire depth of the pilot borehole by Pacific Surveys of Claremont, California. The logs were run in the presence of Geoscience personnel on April 18, 2019, and provided to Olivenhain Municipal Water District (OMWD). The geophysical borehole logs can be found in Appendix E and consisted of the following:

- (1) 16-inch and 64-inch normal resistivity with point resistance
- (2) Spontaneous potential (SP)
- (3) Laterolog 3 (focused resistivity guard)
- (4) Gamma ray
- (5) Acoustic (sonic) with Variable Density Log (VDL)
- (6) Caliper (following borehole enlargement)

The normal resistivity, spontaneous potential, Laterolog 3, gamma ray, and acoustic (sonic) logs are conducted to provide an understanding of the subsurface lithology. The screen interval of a well is determined by reviewing the results of logs run on a borehole for the most porous subsurface lithology, usually with the highest concentration of sand and gravel layers. Spontaneous potential logs distinguish finer-grained material from coarser-grained material. Gamma ray logs help determine locations of clay layers. Resistivity logs record the resistivity of a formation, the reciprocal of which is conductivity, and provide information about the relative porosity of the aquifer layers. A high resistivity signifies greater porosity or freshwater. Laterolog 3 logs also measure resistivity but are especially useful in higher saline environments. Acoustic (sonic) logs help identify changes in lithology by observing changes of acoustic impedance. After the review and comparison of all five logs, the Desalter Test Well screen interval was selected for placement from 60 to 125 ft below ground surface (ft bgs).

The pilot borehole was later reamed to a depth of 160 ft bgs during the period between April 18 to 19, 2019 and a caliper log was performed on the reamed borehole prior to the start of well casing and screen installation. A caliper log measures the diameter of an uncased borehole versus depth to ensure a





proper borehole diameter for the installation of casing and screen. The caliper log is provided in Appendix E.

1.3 Purpose and Scope

The purpose of this Design Pilot report is to combine all the data and data analysis collected and prepared from the drilling, construction, development, and testing procedures for the OMWD Desalter Test Well, long-term pumping test monitoring, and model update of the San Dieguito Valley Groundwater Basin Model.

In addition to a detailed summary report from the exploratory borehole (EX-1) and completion of the Desalter Test Well, a detailed analysis of the approximately one-year long-term pumping test is included. The purpose of the long-term pumping test was to verify water quality and potential impacts to water levels in wells of current basin users to include impacts to water levels and water quality in nearby wells, changes in water levels (piezometric levels) in both upper and lower aquifers, and any changes in groundwater storage in the aquifers. The report includes as-built well completion details for the Desalter Test Well as well as additional documentation such as a chronology of Desalter Test Well construction and long-term pumping test (Appendix C), borehole lithologic logs (Appendices A & D), borehole geophysical logs (Appendix E), final video survey (Appendix F), the DWR well completion report (Appendix G), water quality results from the completed Desalter Test Well and quarterly long-term pumping test sampling events (Appendix I), and the Desalter Test Well permanent pump technical specifications (Appendix L). Finally, a description of model refinements made with the collected data and a summary of the updated water balance and available increments of water is provided.

1.4 Hydrogeologic Conditions in the Desalter Test Well Area

The OMWD boundaries overlie several groundwater basins including the San Dieguito Groundwater Basin, which OMWD is not currently pumping. Historical seawater intrusion has degraded the water quality in the basin, where treating groundwater for total dissolved solids is required for a potential new potable supply.

Historically, groundwater recharge to the San Dieguito Groundwater Basin is primarily the result of infiltration of surface flow in the stream bottom during the wet season. Typically, groundwater levels in the shallow narrow groundwater basins in Southern California, respond quickly to rainfall events. However, with the construction of Lake Hodges, less recharge occurs from natural run-off since run-off is captured in Lake Hodges and some recharge to the aquifer system will occur as a result of occasional spills from the Lake Hodges dam.





2.0 Exploratory Borehole (EX-1) Drilling

Prior to drilling of the OMWD Desalter Test Well (Desalter Test Well) an exploratory borehole (EX-1) was drilled to define aquifer and aquitard thickness and location, as well as depth to bedrock. EX-1 was drilled approximately 20 ft east of the proposed Desalter Test Well location (see Figure 1). The EX-1 field investigation was performed between September 9 to 12, 2018 and included borehole drilling, borehole lithology logging, and destruction. Data from this borehole showed that the thickness of the aquitard was thicker than expected and that bedrock was shallower than expected. The findings from EX-1 would be used to design the Desalter Test Well screen intervals prior to drilling. The following sections describe in detail the various stages of the field investigation and their findings.

2.1 Exploratory Borehole Drilling

Jensen Drilling Company (Jensen) of Eugene, Oregon performed the borehole drilling using a sonic drilling method (see inset Figure 2-1) to a total of 147 ft bgs. Below 147 ft bgs, the formation did not allow for additional advancement of the borehole using this drilling method. Sonic drilling produced continuous core samples that were minimally disturbed. The cores from all borings were logged by the field geologist, photographed, and placed in cardboard boxes to be brought to the office of Geoscience. A detailed borehole log is provided in Appendix A.



Figure 2-1. Sonic drill rig.

2.2 Exploratory Borehole Core Sampling

Core sampling was conducted using an 8-inch diameter inner casing. The core barrel was attached to small-diameter drill rods and vibrated ahead of the outer casing to collect undisturbed formation materials as core samples. With each 10-ft advance of the casing, the core barrel was extracted and brought to the surface to retrieve the core. Soil core samples were collected continuously during drilling. Upon collection, all soil cores were placed in 6-millimeter polyethylene plastic sleeves measuring approximately 5 ft in length. Each bag was photographed and properly labeled in the field with the boring number and sample depth interval. The core samples were then split longitudinally in half and visually classified (logged) in the field in accordance with the Unified Soil Classification System (USCS).

2.3 Exploratory Borehole Mechanical Grading Analysis

Mechanical grading analyses (i.e., sieve analyses) were performed on six (6) formation samples taken from EX-1 between 57 and 108 ft bgs (i.e., 57-59, 62-64, 67-69, 78-79, 90-92, and 106-108 ft bgs). The filter pack was designed using Terzaghi criteria. The mean grain-size diameter (i.e., the 50 percent passing size)





of the aquifer materials ranged from 0.15 to 0.30 mm Uniformity coefficients of aquifer materials ranged from 2.6 to 3.8. The mechanical grading analytical results for formation samples and filter pack are shown in Figure 2. A Tacna Sand & Gravel (Yuma, Arizona) ¼ in. x 40 custom blend filter pack material was selected for use in the Desalter Test Well. The design for the custom blend filter pack is shown in the Table 3-3 in Section 3.5 - Filter Pack and Annular Seal.

2.4 Exploratory Borehole Destruction

The exploratory borehole, EX-1, was destroyed following completion to total depth and borehole lithology logging. The borehole was filled with bentonite chips and destruction was accomplished in accordance with the San Diego County Environmental Health Department and in accordance with DWR Bulletins 74 - 81 and 74 - 90. A copy of the borehole well permit can be found in Appendix B.





3.0 Construction of the OMWD Desalter Test Well

Prior to drilling of the Desalter Test Well, the exploratory borehole, EX-1, was drilled. Analysis of EX-1 was performed and a well design created for the Desalter Test Well between September 9 to 12, 2018. EX-1 was drilled approximately 20 ft east of the proposed Desalter Test Well location (see Figure 1). The original Desalter Test Well location was adjusted since the well is located within the San Dieguito River 100-year flood plain. The well was finished above the minimum requirement of 24-inches above the 100-year flood plain elevation (see Figure 3- 1).

Drill rig set-up at the proposed Desalter Test Well site was on April 1, 2019. Drilling and construction of Desalter Test Well began on April 9, 2019, with installation of the conductor casing to a total depth



Figure 3-1. Wellhead completed 24-inches above 100-year flood plain.

of 50 ft bgs by Barney's Hole Digging Service, Inc., (Barney's) of Long Beach, California. Drilling of the pilot borehole began on April 12, 2019, and was completed to a depth of 165 ft bgs on April 17, 2019. Installation of the Desalter Test Well completed on April 19, 2019. All drilling and construction activities were conducted by Jensen. The Desalter Test Well was drilled and constructed using the fluid reverse circulation rotary drilling method. The reverse circulation drill rig set up at the Desalter Test Well is shown in inset Figure 3-2. Desalter Test Well development was completed on May 17, 2019. Initial aquifer testing at the Desalter Test Well was completed on May 22, 2019. The chronology of the Desalter Test Well construction and testing is summarized in Table 3-1 and Appendix C.

Dates	
	Desalter Test Well Construction Phase
April 1 to 17, 2019	Set up, Conductor Install & Pilot Borehole Drilling to 165 ft bgs
April 19, 2019	Installation of 18-inch ID Well Screen, Well Casing, and Filter Pack
April 22, 2019	Installation of Sanitary Seal
April 23 to 29, 2019	Swab and Airlift
May 1, 2019	Installation of Test Pump
May 2 to 17, 2019	Well Development
May 20, 2019	Transducer Installation
May 20, 2019	Step-Drawdown Pumping Test
May 21 to 22, 2019	1-Day Constant Rate Pumping Test and 4-Hour Recovery Test
May 22, 2019	Water Quality Sampling
May 23, 2019	Video Survey

Table 3-1. OMWD Desalter Test Well Construction and Testing Chronology





3.1 General Desalter Test Well As-Built Construction Details

The Desalter Test Well is located at latitude 32.985331 N, longitude -117.212779 W within the Surf Cup Sports Park at 14989 Via De La Valle, Del Mar, California. The Desalter Test Well as-built construction details and location are shown in Figures 3 and 4 and Appendix D.

3.2 Conductor Casing Installation and Pilot Borehole Drilling

The Desalter Test Well 48-inch diameter conductor borehole was drilled by Barney's to a depth of approximately 50 ft bgs on April 9, 2019, using a rig equipped with a solid stem auger. The 36-inch outside diameter (OD) by 0.375-inch wall mild steel (American Petroleum Institute (API) 5L Grade B mild steel) conductor casing was installed to 50 ft bgs and cemented in place from the bottom of the borehole to the ground surface with 10.3-sack sand-cement slurry. Soundwalls, shown in Figure 3-2, were placed surrounding the drill rig to suppress noise to the appropriate levels during the drilling operation, minimizing noise impacts on the surrounding community.

Below the bottom of the conductor casing, the 17 ½-inch pilot borehole was drilled by Jensen using a fluid reverse circulation rotary drilling rig. Drilling of the pilot borehole began on April 12, 2019, and was advanced to a total depth of 165 ft bgs on April 17, 2019 and was witnessed by Geoscience Support Services, Inc. (Geoscience) personnel. At each change of formation and at 10-foot intervals between changes in formation, large representative grab samples of

Figure 3-2. Reverse circulation drill rig set up.

material were collected, labeled, and preserved from the sampling trough to prepare a lithologic log. The materials encountered during pilot borehole drilling from ground surface to approximately 39 ft bgs consisted primarily of interbedded layers of silts and fine- to medium-grained sands. From 39 to 56 ft bgs was an aquitard consisting of clays, silts, and fine-grained sands, and below that to 122 ft bgs was fine- to coarse-grained sand and gravels. From approximately 122 to total borehole depth 165 ft bgs was bedrock with consisted of sandstone and mudstone. The detailed lithologic log for the Desalter Test Well borehole is included in Appendix D.

3.3 Casing and Screen Design

After the Desalter Test Well borehole was completed to a total depth of 160 ft bgs, the recommended casing and screen design was submitted to OMWD for review and approval. The casing and screen installation was completed on April 19, 2019, with the bottom of the well casing placed at 145 ft bgs. 18-inch ID by ¼-inch wall, ASTM A928 Super Duplex 2507 stainless steel blank casing was installed from





Aug-21 and fitted with an end plate of like steel.

2.5 ft above ground surface (ags) to 60 bgs, and 125 to 145 ft bgs and fitted with an end plate of like steel. Well screen consisting of 18-inch ID by ¼-inch wall, ASTM A928 Super Duplex 2507 stainless steel louvered screen with 0.050-inch openings was installed from 60 to 125 ft bgs. Super Duplex 2507 steel was recommended due to the brackish water in the aquifer which can cause pitting in lower grade steels. Pitting and corrosion caused from brackish water on lower grade steel usually reduces the efficiency and operational lifespan of a well. The general construction details are summarized in Table 3-2, Figures 3 and 4, and Appendix D.

Interval	Borehole Diameter	Casing Diameter	Wall Thickness	Screen Slot Size	Material Type
ft bgs	in.	in.	in.	in.	
+0.5 - 50	48	36 OD	3/8	-	Conductor Casing (API 5L Grade B Mild Steel)
+2 - 40	Annulus	3 in.	Sch. 40	-	Gravel Feed Pipe (316L stainless steel)
+2 - 58	Annulus	2 in.	Sch. 40	-	Sounding Tube (316L stainless steel)
0 - 25	35.25 (Conductor)	-	-	-	Sand-Cement Seal (10.3-Sack Sand-Cement Slurry)
25 - 30	35.25 (Conductor)	-	-	-	Bentonite-Sand Layer
30 - 160	35.25 (30-50) 28 (50-160)	-	-	-	¼-Inch x 40 Custom Blend Gravel Pack Material
+2.5 - 60	35.25 (0-50) 28 (50-160)	18 ½ OD (18 ID)	1/4	-	Blank Casing (ASTM A928 Super Duplex 2507 Stainless Steel)
60 - 125	28	18 ½ OD (18 ID)	1/4	1/20 (0.050)	Ful-Flo Louvered Screen (ASTM A928 Super Duplex 2507 Stainless Steel)
125 - 145	28	18 ½ OD (18 ID)	1/4	-	Blank Casing with End Cap (ASTM A928 Super Duplex 2507 Stainless Steel)
145 - 160	28	-	-	-	Gravel Filled Borehole
160 - 165	17.5	-	-	-	Backfill

Table 3-2. Construction Details OMWD Desalter Test Well

3.4 Filter Pack and Annular Seal

Tacna Sand & Gravel (Yuma, Arizona) ¼ in. x 40 custom blend filter pack material was installed via tremie pipe from 30 to 165 ft bgs in the annular space between the 28-inch diameter borehole and the well casing and screen on April 19, 2019 (see Figure 3). This filter pack blend was selected after performing mechanical grading analyses (i.e., sieve analyses) on formation samples taken from EX-1 (see Figure 2 and <u>Section 2.3</u> <u>- Exploratory Borehole Mechanical Grading Analysis</u>). The design for the custom blend filter pack is shown in the following table.





U.S. Standard	Sieve Opening	Sieve Opening	Cumulative Percent
Sieve No.	Sieve opening	Sieve opening	Passing
Sieve No.	in.	mm	%
1/4"	0.250	6.35	100.0
4	0.187	4.75	95.0
6	0.132	3.36	87.0
8	0.094	2.38	70.0
10	0.079	2.00	58.0
14	0.056	1.41	27.0
16	0.047	1.19	18.0
18	0.039	1.00	13.0
20	0.033	0.84	10.0
30	0.023	0.59	6.0
40	0.017	0.42	2.0

Table 3-3. Mechanical Grading Analysis Tacna Sand and Gravel 1/4-inch x 40 Custom Blend Gravel Pack Material

Following installation of the filter pack material, a 5-ft layer of bentonite-sand seal (50/50 mixture of granular bentonite and sand) was placed above the filter pack material to protect the underlying gravel pack from the 10.3-sack sand-cement grout. On April 22, 2019, the annular space between the borehole and well casing was filled with a 10.3-sack sand-cement grout from the top of the bentonite layer (at 25 ft bgs) to the ground surface.

One (1) 3-inch diameter Sch. 40 316L stainless steel gravel feed pipe was installed in the annulus from 2 ft ags to 40 ft bgs. The purpose of the gravel feed pipe is to allow for future addition of filter pack material to the annulus. A 2-inch diameter Sch. 40 316L stainless steel sounding tube was also installed in the annulus from 2 ft ags to 58 ft bgs. 316L stainless steel was used for the sounding tube and gravel feed tube instead of Super Duplex 2507 steel due to the brackish water in the aquifer which can cause pitting in lower grade steels. Pitting and corrosion caused from brackish water on lower grade steel usually reduces the efficiency and operational lifespan of a well.

3.5 Well Development

Initial well development was conducted using a combination of airlifting and swabbing to consolidate the filter pack after placement, and to remove colloidal and fine-grained sediments from within the well, filter pack, and near-well zone. The swabbing and airlifting process was repeated, making upward and additional downward passes through the screen sections as necessary, when continued circulation of sand, silt, or mud to the surface from the section of the screen being cleaned was observed. 10-ft intervals were swabbed and airlifted simultaneously until relatively clean water was discharged. The work was





conducted from April 23 to 29, 2019 and a total of 40 hours were used to airlift and swab the screened sections of the well.

Final development (i.e., pumping development) was conducted using a vertical turbine test pump from May 2 to 17, 2019. Final development consisted of pumping the well at gradually increasing discharge rates until the sand concentration reached a minimum threshold. The well was then "surged¹" repeatedly, starting at low rates, increasing to higher and higher rates of discharge as the sand content decreased; then increasing the number of surges.

During final development, the discharge rate was measured using an in-line propeller meter, or totalizer; water level measurements were collected using an electric wireline water level indicator; and sand concentration was measured using a centrifugal Rossum Sand Tester. Well development was considered complete when there was no increase in the specific capacity (discharge rate divided by drawdown) during at least 24 hours of continuous pumping and surging, turbidity remained stable at less than 1 Nephelometric Turbidity Units (NTU), and sand content was negligible.

During final well development pumping, a maximum short-term discharge rate of approximately 338 gallons per minute (gpm) was achieved with approximately 80 ft of drawdown in the well. However, most of the development was conducted at lower discharge rates. A total of approximately 90 hours were used for final development by pumping and surging.

3.6 Initial Desalter Test Well and Aquifer Testing

After final development was completed, a 6-hour step drawdown and a 24-hour constant rate pumping test were conducted. During both tests the pumping water level, discharge rate, and sand content were closely monitored. Aquifer pumping tests were analyzed using the Theis equation and Jacob's Straight-Line Method, Jacob (1950). The aquifer test data collection and analyses are described in <u>Section 4.0 - Initial Pump Test Procedures, Analysis, and Results</u>.

3.7 Alignment Survey

A line from the center of the well casing at ground surface should not deviate from vertical by more than 0.0067 times the smallest inside diameter of that part of the well being tested per foot of depth (ANSI/AWWA A100-15). Pacific Surveys conducted a gyroscopic (drift/alignment) survey on May 23, 2019, to measure the verticality of the well in the downwards direction. The survey shows approximately 0.84 inches (0.07 feet) of deviation at the anticipated pump setting depth of 130 ft bgs. This is within the

¹ To surge a well refers to the act of forcing water into and out of a well by pumping and then abruptly stopping pumping at regular intervals.





maximum allowable deviation at this depth (i.e., the maximum allowable deviation at 130 ft bgs is 15.68 inches (1.31 feet)).

The maximum reported deviation within the Desalter Test Well is 1.20 inches (0.10 feet) at 140 ft bgs is well within the allowable deviation of 16.88 inches (1.41 feet) at that depth. Appendix E contains the gyroscopic survey log provided by Pacific Surveys.

3.8 Downhole Video Survey

A video survey of the post-construction condition of the well was performed on May 23, 2019, by Pacific Surveys. The video survey is a permanent record of the Desalter Test Well construction details, and condition of the Desalter Test Well following development and testing. The well casing and screen were shown to be clean and in good condition with no observable structural flaws or defects. The water column visibility was poor throughout the blank section of casing below the static water level but improved roughly 10 ft above the screened portion of the well. The video survey report is included in Appendix F.

3.9 Well Completion Report

A copy of the well completion report was prepared and submitted to the State of California Department of Water Resources (DWR) by Jensen upon the completion of the construction contract. The final DWR well completion report for the Desalter Test Well is included in Appendix G.





4.0 Initial Pump Test Procedures, Analysis, and Results

4.1 Data Collection

After development pumping was completed, two separate pumping tests were conducted at the Desalter Test Well. A step drawdown test was performed to determine specific capacity and well efficiency relationships for the Desalter Test Well. Following the step drawdown test, a constant rate pumping test was conducted to determine aquifer transmissivity and assist in short- and long-term drawdown estimates. Water level recovery measurements were collected for four hours upon completion of the constant rate pumping test.

During both tests the pumping water level, discharge rate, and sand content were closely monitored at the Desalter Test Well. Groundwater levels were measured using a downhole In-Situ Aqua TROLL 200 pressure transducer programmed to collect measurements at one-minute intervals. The field procedure for these tests followed the American Society for Testing and Material (ASTM), standard test method D 4050 (ASTM 1994).

Two (2) wells located within less than a quarter mile of the Desalter Test Well were used as observation wells during all test phases. These wells were selected based on distance and position in relation to the Desalter Test Well. Groundwater levels were measured using downhole In-Situ Level TROLL 400 pressure transducers programmed to collect measurements at five-minute intervals. Information on the observation wells used during testing is summarized in the following Table 4-1:

Well Name			Distance from Desalter Test Well
	ft	ft bgs	ft
Surf Cup No. 2	99.6*	50 to 110	1,011
E. Riverbank Turbine Pump Well	65.8*	-	480

Table 4-1. Summary of Observation Well Details

* Monitoring well depths shown are measured depths, as ft bgs, evaluated in the field.

4.2 Basic Assumptions Used in Analysis of Pumping Test Data

The purpose of a pumping test is to obtain field data, which when substituted into an equation or set of equations, will yield estimates of well and aquifer properties. As certain assumptions have been used to derive these equations, it is important to observe or control these factors during the test.

These assumptions are:

• The aquifer material is assumed to consist of porous media, with flow velocities being laminar and obeying Darcy's Law.





- The aquifer is considered to be homogeneous, isotropic, of infinite aerial extent, and of constant thickness throughout.
- Water is released from (or added to) internal aquifer storage instantaneously upon change in water level.
- No storage occurs in the semi-confining layers of leaky aquifers.
- The storage in the well is negligible.
- The pumping well penetrates the entire aquifer and receives water from the entire aquifer thickness by horizontal flow.
- The slope of the water table or piezometric surface is assumed to be flat during the test with no natural, or other, recharge occurring.
- The pumping rate is assumed constant during the entire time period of a constant rate test, as well as during the time period of each discharge step in a step drawdown test.

Actual field conditions do not perfectly adhere to these assumptions; however, the equations are appropriate and customized to estimate aquifer parameters.

4.3 Pumping Test Data Analysis Methods

4.3.1 Step Drawdown Test Method

The purpose of the step drawdown test is to determine formation losses, well losses, and well efficiency – all of which are necessary in creating the final pump design. In an actively pumping well, the total drawdown in the well is composed of both laminar and turbulent head loss components. Laminar losses generally occur away from the borehole (where approach velocities are low), while turbulent losses are confined to the area in and around the immediate vicinity of the well screen and within the well borehole. The total drawdown in a pumping well may be expressed as:

 $s_w = BQ + CQ^2$ Drawd

Drawdown in a Pumping Well

(1)

where:

- s_w = Total drawdown measured in the well [ft]
- B = Formation loss coefficient [ft/gpm]
- Q = Discharge rate of the well [gpm]
- C = Well loss coefficient [ft/gpm²]





The first and second terms in equation (1) are referred to as formation loss or aquifer $loss^2$ (BQ) and well $loss^3$ (CQ²), respectively. Formation loss and well loss coefficients are determined from the step drawdown test. The test procedure involves pumping the well at multiple (at least three) discharge rates with each "step" being a fraction of the maximum discharge. Analysis of the step drawdown data requires plotting of specific drawdown (s_w/Q) for each step against discharge rate. The formation loss coefficient (B) is the y-intercept of the best-fit straight line through the specific drawdown data points. The slope of the line is equal to the well loss coefficient (C).

Well Efficiency (E) is defined as the ratio of the formation loss component (BQ) to the total drawdown measured in the well (s_w) and is expressed as a percent:

$$E = 100 \frac{BQ}{s_w} = \frac{100}{1 + CQ/B}$$
 Well Efficiency (2)

where:

- E = Well Efficiency [percent]
- B = Formation loss coefficient [ft/gpm]
- Q = Discharge rate of the well [gpm]
- s_w = Total drawdown measured in the well [ft]
- C = Well loss coefficient [ft/gpm²]

4.3.2 Constant Rate Test Method

Calculation of aquifer parameters from pumping test data is based on analytical solutions for the basic differential equation of groundwater flow that can be derived from fundamental laws of physics. One of the most widely used solutions of this equation for non-steady radial flow to wells is the Theis Equation:

³ Well losses are head losses associated with the entrance of water into and through the well screen, in addition to those losses incurred as the flow moves axially towards the pump intake. These turbulent flow losses vary as the square of the velocity.





² Aquifer loss is the head loss measured at the interface between the aquifer and the filter pack. The magnitude of the aquifer loss can be found from consideration of radial flow into the well and calculated using, for example, Jacob's Equation.

where:

s(r,t)	=	Drawdown in the vicinity of an artesian well [ft]
r	=	Distance from pumping well [ft]
Q	=	Discharge rate of pumping well [gpm]
Т	=	Transmissivity of aquifer [gallon per day per ft (gpd/ft)]
W(u)	=	Well Function of Theis
u	=	1.87 x r ² x S / (T x t)

where:

S = Storativity [fraction]

t = Time after pumping started [days]

4.3.2.1 Jacob's Straight-Line (Modified Theis Non-Equilibrium) Method

According to Jacob (1950), for small values of u, u < 0.05, the Theis Equation may be approximated by Jacob's Equation:

$$s(r,t) = \frac{264Q}{T} \log \left(\frac{0.3 \text{ Tt}}{r^2 \text{ S}} \right) \qquad \text{Jacob's Equation} \qquad (4)$$

Jacob's Equation is valid for most hydrogeologic problems of practical interest, is easier to use than the Theis equation, and involves a simple graphical procedure to calculate transmissivity and storativity. This method (D 4105) is summarized by ASTM (1994).

Transmissivity can be calculated as:

$$T = \frac{264Q}{\Delta s}$$
(5)

where:

T = Transmissivity [gpd/ft]

Q = Pumping rate [gpm]

- Δs = Change in drawdown over one log cycle of time [ft]
- Δs = Change in drawdown over one log cycle of distance [ft]





4.4.1 Desalter Test Well Step Drawdown Pumping Test

The step drawdown test was performed on May 20, 2019, at average discharge rates of 163 gpm, 238 gpm, and 283 gpm. The static water level at the beginning of the test was approximately 10.47 ft bgs. Figure 5 and Appendix H show the step drawdown test data and the time-drawdown curve for each step.

4.4.2 Desalter Test Well Constant Rate Pumping Test

A 1-day constant rate pumping test was conducted from May 21 to 22, 2019 following recovery from the step drawdown test. The static water level at the start of the test was 11.02 ft bgs and the average discharge rate was 197 gpm. Water level drawdown in the Desalter Test Well was 4.4 ft per log cycle. Evaluation of test data obtained from the pumping well using Jacob's straight-line interpretation method shows a transmissivity of approximately 11,800 gpd/ft from the designated Lower aquifer (see Figure 6). Transmissivity is the product of the hydraulic conductivity and thickness of the aquifer (T = KB, where T = transmissivity, K = hydraulic conductivity, and B = aquifer thickness).

4.4.2.1 Observation Wells Time-Drawdown Analyses

During the constant rate pumping test measurable drawdown was observed in the two observation wells Surf Cup No. 2 and E. Riverbank Turbine Pump Well. Time-drawdown plots were created (see Figures 7 and 8) and analyses were performed to determine aquifer parameters. Table 4-2 provides a summary of aquifer characteristics calculated from the observation well data obtained during the constant rate pumping test. However, it should be noted that the aquifer parameters determined from the East Riverbank Turbine Pump Well time-drawdown analysis (Figure 8) are likely artificially high due to the wells casing integrity and proximity to the river. Well screen depth for this abandoned agriculture well site is unknown, and the steel casing was likely deteriorated, resulting in pressure influence from both the shallow aquifer and the river.

Well Name	Distance from Desalter Test Well ft	Drawdown ¹ ft	Transmissivity gpd/ft	Storativity
Surf Cup No. 2	1,011	1.7	30,500	0.001
E. Riverbank Turbine Pump Well	480	0.4	130,000	0.033

Table 4-2. Observation Wells Time-Drawdown Results

¹ Water level drawdown value is per log cycle.

4.4.3 Specific Capacity and Well Efficiency

The specific drawdown chart (see Figure 9) shows the relationship between specific drawdown (s/Q) and the discharge rate (Q). Analysis of the data resulted in a formation loss coefficient (B) of 0.1350 ft/gpm





and a well loss coefficient (C) of 4.441×10^{-4} ft/gpm². Data used to generate the specific drawdown chart is shown in Table 4-3.

Aquifer Test	Discharge Rate (Q) gpm	Cumulative Drawdown ¹ (s) ft	Specific Drawdown (s/Q) ft/gpm
Step 1	163	32.98	0.203
Step 2	238	54.92	0.231
Step 3	283	74.42	0.263
Constant Rate	197	45.81	0.233

¹ Drawdown at 1,440 minutes after the start of each step.

The specific capacity and well efficiency diagram (see Figure 10) shows estimated drawdown (44.8 ft) and well efficiency (60.3%) based on the formation and well loss coefficients. Estimated drawdown and well efficiency may also be calculated for any given pumping rate (Q) using equations (1) and (2) described above in <u>Section 4.3.1 - Step Drawdown Test Method</u>. The specific capacity and estimated well efficiency are low but consistent with the aquifer materials and thickness at the Desalter Test Well site.

4.4.4 Design Discharge Rate, Total Lift, and Pump Setting

Based on the pumping test data, a continuous design discharge rate of 200 gpm was recommended for the Desalter Test Well. At this discharge rate, and assumed water level conditions similar to those during the May 2019 pumping tests, the short-term (i.e., after one day of continuous pumping) drawdown of approximately 44.8 ft was expected with a total lift (to the land surface) of 56.8 ft. Assuming continuous operation of the Desalter Test Well at this design rate, a long-term (i.e., after one year of continuous pumping) drawdown of approximately 56.9 ft was expected with a total lift of 67.9 ft. Under the May 2019 static water level conditions (i.e., 11.02 ft bgs), the specific capacity of the Desalter Test Well was approximately 4.5 gpm/ft at the recommended discharge rate of 200 gpm (see Figure 10).

Table 4-4 summarizes the pumping parameters based on the May 2019 depth to static water level as well as the assumed pump setting of 103 ft bgs.

Parameters	Short Term (1-Day)	Long Term (1-Year)
Design Pumping Rate	200 gpm	200 gpm
Design Drawdown	44.8 ft	56.9 ft
Pump Intake Setting	103 ft bgs	103 ft bgs
Static Water Level Depth	11 ft bgs	11 ft bgs
Total Lift to Surface (does not include regional decline in static water levels)	55.8	67.9

Table 4-4. Recommended Desalter Test Well Pumping Parameters





The above recommendation is based on the May 2019 pumping tests, however following the 1-year long-term pumping test, conducted from December 2019 to December 2020 (see <u>Section 6.0 – Long-Term</u> <u>Desalter Test Well Pumping Test</u>), a continuous (24 hours, 365 days) 200 gpm discharge rate is not sustainable as determined by pumping water levels below the top of the screen (dewatering) causing cascading water. It is recommended that pumping operations maintain the pumping water levels above the top of the well screen (located at 60 ft bgs) as to prevent dewatering and cascading water. Cascading water is known to reduce well efficiency and can contribute to aerobic bacterial growth in the well (see <u>Section 9.1.1 - Desalter Test Well Test Pump Iron & Manganese Fouling & Filtration System Pilot Study</u> for iron and manganese fouling encountered during the long-term pump testing). Cyclic pumping of Desalter Test Well at this rate is highly recommended.⁴

4.5 Desalter Test Well Groundwater Quality

Groundwater samples were collected by Geoscience personnel at the end of the constant rate pumping test on May 22, 2019. The samples were submitted to Eurofins Eaton Analytical LLC (Eurofins) located in Monrovia, California, for analysis of constituents required by the State of California Code of Regulations Title 22 Rule, in addition to other selected constituents. Selected constituents from the completed well water quality results are presented in Table 4-5. For the complete record of laboratory water quality analyses from the completed well see Appendix I.

The total dissolved solids (TDS) concentration for the completed Desalter Test Well was reported at 3,200 milligrams per liter (mg/L), above both the 500 mg/L lower limit of the State Water Resources Control Board Division of Drinking Water (DDW) secondary maximum contaminant level (MCL) and the upper limit of 1,000 mg/L DDW secondary MCL for TDS. Specific conductance (at 25°C) was reported at 5,500 µmho/cm, above both the 900 µmho/cm lower limit of the DDW secondary MCL, and the upper limit of 1,000 µmho/cm DDW secondary MCL. The brackish nature of the groundwater was anticipated having been reported by previous studies in the basin (USGS, 1983) as well as from data collected on local wells and reported in our previous work presented in the feasibility study (OMWD, 2017). The elevated salinity has been attributed to seawater intrusion and to natural groundwater in rocks of marine origin. The chloride concentration was reported above the both the 250 mg/L lower limit and the upper limit of 500 mg/L DDW secondary MCL of chloride at 1,300 mg/L. Iron Total ICAP was reported at a concentration

⁴ OMWD will need to monitor the pumping levels in this and any future desalter wells to ensure that water levels are kept above the screen. The period the well can be pumped before water levels reach the top of the screen will be dependent on flow rate and duration, and seasonal local water level conditions. For reference, during the Long Term Test the desalter was pumped for approximately 76 days at an average rate of 193 gpm before the water level reached the top of the screen. Cyclic pumping of the Desalter Test Well is recommended to allow the well to recover. In addition, continuous monitoring using a dedicated pressure transducer with the ability to remotely monitor will provide the advanced notice when water levels are approaching the well screen.





of 0.63 mg/L, above the DDW secondary MCL of 0.3 mg/L. Manganese Total ICAP/MS was detected at a

concentration of 1.1 mg/L above the DDW secondary MCL of 0.050 mg/L and the DDW notification level of 0.5 mg/L. Odor at 60C (TON) was reported above the DDW secondary MCL of 3 TON, at 8 TON. Perfluorooctanesulfonic acid (PFOS)⁵ had a concentration of 0.01 micrograms per liter (μ g/L), above the current DDW notification level of 0.0065 μ g/L but below the DDW response level of 0.040 μ g/L. The sulfate concentration was reported above both the 250 mg/L lower limit of the DDW secondary MCL, and the upper limit of 500 mg/L DDW secondary MCL at 730 mg/L. Turbidity was reported just above the DDW secondary MCL of 5 NTU at 5.4 NTU. All other constituents were reported to be below their respective MCL's. Due to the water quality, groundwater from most of the San Dieguito groundwater basin south of Calzada del Bosque is unusable as potable water and for some agricultural applications without treatment.

Constituent	Method	Units	Result	Regulatory Standard
Aggressiveness Index-Calculated	SM 2330	-	14	NA ⁷
Alkalinity in CaCO3 units	SM 2320B	mg/L	380	NA ⁷
Alpha, Min Detectable Activity	SM 7110C	pCi/L	0.2	NA ⁷
Alpha, Two Sigma Error	SM 7110C	pCi/L	0.46	NA ⁷
Anion Sum - Calculated	SM 1030E	meq/L	60	NA ⁷
Apparent Color	SM 2120B	ACU	10	15 ²
Arsenic Total ICAP/MS	EPA 200.8	μg/L	5.7	10 ¹
Barium Total ICAP/MS	EPA 200.8	mg/L	0.13	1.0 ¹
Beta, Gross	EPA 900.0	pCi/L	35	50 ¹
Beta, Min Detectable Activity	EPA 900.0	pCi/L	8	NA ⁷
Beta, Two Sigma Error	EPA 900.0	pCi/L	2.8	NA ⁷
Bicarb. Alkalinity as HCO3calc	SM2330B	mg/L	460	NA ⁷
Boron Total ICAP	EPA 200.7	mg/L	0.81	1.0 ³
Calcium Total ICAP	EPA 200.7	mg/L	400	NA ⁷
Carbon Dioxide, Free(25C)-Calc.	SM4500-CO2-D	mg/L	12	NA ⁷
Carbonate as CO3, Calculated	SM 2330B	mg/L	ND	NA ⁷
Cation Sum - Calculated	SM 1030E	meq/L	57	NA ⁷
Chloride	EPA 300.0	mg/L	<u>1,300</u>	250 - 500 ²
Chromium, Hexavalent	EPA 218.6	μg/L	ND	50 ⁸
Chromium, Total	EPA 200.8	mg/L	ND	0.050 ¹
Copper	EPA 200.8	mg/L	ND	1.0 ²

Table 4-5. Summary of Desalter Test Well Completed Well Laboratory Water Quality Result

⁵ In August 2019, DDW revised the notification level for PFOS to 0.0065 ug/L. On February 6, 2020, DDW issued an updated drinking water health advisory response level for PFOS to 0.040 ug/L.





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Constituent	Method	Units	Result	Regulatory Standard
Fluoride	SM 4500F-C	mg/L	0.27	21
Gross Alpha + adjusted error	SM 7110C	pCi/L	11	15 ¹
Gross Alpha by Coprecipitation	SM 7110C	pCi/L	11	15 ¹
Iron Total ICAP	EPA 200.7	mg/L	<u>0.63</u>	0.3 ²
Langelier Index - 25 degree	SM 2330B	-	1.6	NA ⁷
Langelier Index at 60 degrees C	SM 2330B	-	2	NA ⁷
Magnesium Total ICAP	EPA 200.7	mg/L	100	NA ⁷
Manganese Total ICAP/MS	EPA 200.8	mg/L	<u>1.1</u>	0.050 ² / 0.5 ³
Nitrate as N	EPA 300.0	mg/L	ND	10 ¹
Nitrate as NO3 (calc)	EPA 300.0	mg/L	ND	45 ¹
Nitrite as N	EPA 353.2	mg/L	ND	11
Odor at 60 C (TON)	SM 2150B	TON	<u>8</u>	3 ²
Perfluorobutanesulfonic acid (PFBS)	EPA 537 Rev 1.1	μg/L	ND	0.5 ³ / 5 ⁴
Perfluorohexanesulfonic acid (PFHxS)	EPA 537 Rev 1.1	μg/L	0.0062	NA ⁷
Perfluorooctanesulfonic acid (PFOS)	EPA 537 Rev 1.1	μg/L	<u>0.01</u>	0.0065 ³ / 0.040 ⁴
Perfluorooctanoic acid (PFOA)	EPA 537 Rev 1.1	μg/L	0.0032	0.0051 ³ / 0.010 ⁴
pH (H3=past HT not compliant)	SM4500-HB	pH Units	7.8	6.5 - 8.5 ⁵
pH of CaCO3 saturation(25C)	SM 2330B	pH Units	6.2	NA ⁷
pH of CaCO3 saturation(60C)	SM 2330B	pH Units	5.7	NA ⁷
Potassium Total ICAP	EPA 200.7	mg/L	39	NA ⁷
Radon 222	SM 7500RN	pCi/L	240	4,000 ⁶
Radon 222, Two Sigma Error	SM 7500RN	pCi/L	12	NA ⁷
Silica	EPA 200.7	mg/L	31	NA ⁷
Sodium Total ICAP	EPA 200.7	mg/L	620	NA ⁷
Specific Conductance, 25°C	SM2510B	µmho/cm	<u>5,500</u>	900 – 1,600²
Sulfate	EPA 300.0	mg/L	<u>730</u>	250 - 500 ²
Surfactants	SM 5540C/EPA 425.1	mg/L	0.19	0.5 ²
Total Dissolved Solids (TDS)	E160.1/SM2540C	mg/L	<u>3,200</u>	500 – 1,000 ²
Total Hardness as CaCO3 by ICP (calc)	SM 2340B	mg/L	1,400	NA ⁷
Turbidity	EPA 180.1	NTU	<u>5.4</u>	5 ²
Uranium by ICPMS as pCi/L	EPA 200.8	pCi/L	14	20 ¹
Uranium ICAP/MS	EPA 200.8	μg/L	21	30 ¹
Zinc	EPA 200.8	mg/L	ND	5.0 ²

¹ Division of Drinking Water (DDW) primary maximum contaminant level (MCL).

² DDW secondary MCL.

³ DDW notification level for unregulated chemicals.

⁴ DDW response level.

⁵ United States Environmental Protection Agency (USEPA) secondary standard for pH.





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<u>Underline</u> Equal to or above current DDW MCLs or notification levels.





⁶ US EPA MCL advisory level.

⁷ Not Applicable – no current MCL.

⁸ Chromium-6 is currently regulated under the 50-µg/L DDW primary MCL for total chromium.

ND - Not detected above laboratory detection limits.

5.0 Long-Term Monitoring Network

In order to investigate the impacts of long-term pumping of the Desalter Test Well, the groundwater monitoring network was developed to:

- Evaluate potential impacts to water levels in wells of current basin users
- Verify water quality
- Collect data to calibrate groundwater models
- Verify manganese treatment by piloting pre-treatment technologies

Over 480 driller's logs were collected, reviewed, and vetted during a two day well canvas performed by Geoscience personal from November 22 to 23, 2016. The 16 monitoring wells and piezometers selected for the long-term pumping test best fit the criteria of proximity to the Desalter Test Well, spatial positioning relative to the Desalter Test Well, and suitable well construction to ensure screen interval placement targeted both the shallow and deep aquifers present in the basin. A summary of the monitoring well details is provided in Table 5-1. Additional monitoring well information is provided in attached Table 1.

Monitoring Well	Location Relative to Desalter Test Well	Approximate Distance from Desalter Test Well ft	Monitoring Well Depth ft bgs	Screen Interval ft bgs
Morgan Run P-1	East Northeast	1,646	23	8 - 23
Morgan Run P-2	East Northeast	1,641	23	8 - 23
Morgan Run P-4D	North Northeast	3,215	89	74.5 - 89.5
Morgan Run P-7	Northwest	906	36	15 - 35
Morgan Run P-11A	Northeast	1,935	27	17 - 27
Morgan Run P-11B	Northeast	1,935	45	40 - 45
Morgan Run P-11D	Northeast	1,939	99	84 - 99
Morgan Run Test Well	Northeast	1,900	133.5*	87 - 137
Morgan Run GunR	North Northeast	5,367	120.8*	81.3 - 120.8
Morgan Run No. 3 Green North	North Northeast	4,476	80.2*	52 - 92
Valley 7 Well	Southeast	2,598	123.5*	-
Surf Cup No. 1	West	1,207	61.9*	-
Surf Cup No. 1 (Abandoned)	West	1,216	65	-
Surf Cup No. 2	West	1,011	99.6*	50 - 110
Rancho Paseana Well	North Northeast	8,251	101	68 - 98
Fairbanks HOA Well	Northeast	6,765	-	-

Table 5-1. Monitoring Network Summary

* Monitoring well depths shown are measured depths, as ft bgs, evaluated in the field.





5.1 Baseline Monitoring of Water Levels and Water Quality in the Desalter Test Well

Groundwater quality samples were collected from the Desalter Test Well at the end of the constant rate test on May 22, 2019. The water quality data from the long-term pumping test sampling events are summarized in Table 6-3, attached Table 2, and the full laboratory water quality reports can be found in Appendix I.

Data monitoring in the Desalter Test Well started on September 10, 2019, to provide nearly three months of baseline data. Pressure data and specific conductance was continuously recorded at 15-minute intervals using an In-Situ Aqua TROLL 200 data logger installed inside the Desalter Test Well at a depth of approximately 117 ft bgs, above the submersible pump. An In-Situ BaroTroll was installed in Surf Cup No. 1 to normalize for atmospheric barometric variation. A summary of the method used to convert transducer pressure measurements to groundwater elevations can be found in Appendix J. During non-pumping periods the specific conductivity data recorded by this instrument represents a depth specific sample of water column. A summary of the method used to estimate total dissolved solids from electrical conductivity (EC) measurements can be found in Appendix K.

Presented in Figures 11 and 12 are the baseline non-pumping period and long-term test pumping period for groundwater elevation. Figure 13 is the baseline long-term test pumping for specific conductivity. The Desalter Test Well showed an increasing groundwater elevation trend leading up to the start of the long-term pumping test while entering the rainy season. The manual hand water level taken during the installation of the Desalter Test Well transducer measured the depth to water at 13.75 ft bgs while the hand water level taken before the start of the long-term test measured depth to water at 9.56 ft bgs. The increase in groundwater elevation was roughly 4.19 ft over nearly 85 days. Specific conductivity measured in the Desalter Test Well stayed relatively level at roughly 6,000 microsiemens per centimeter (μ S/cm) during the baseline period.

5.2 Baseline Monitoring of Water Levels and Water Quality in the Monitoring Network

The designated monitoring network had 14 wells and piezometers equipped with water level transducers that continually logged pressure data in 15-minute intervals. Level transducers installed consisted of Solinst[®] Levelogger[®] Model 3001, non-vented In-Situ AquaTroll devices, and TD-Diver[®] and Mini-Diver[®] dataloggers. Groundwater elevation was also measured manually during each data logger download. A Baro-Diver[®] and In-Situ BaroTroll were installed in Surf Cup No. 1 to normalize for atmospheric barometric variation. A summary of the method used to convert transducer pressure measurements to groundwater elevations can be found in Appendix J. Presented in Figures 14 through 24 are the baseline non-pumping period and long-term test pumping period for groundwater elevation in the monitoring network.





Figure 14 shows groundwater elevations and precipitation during the baseline and long-term testing period. Figure 15 shows the locations and plots of the Desalter Test Well, Morgan Run Wells, and monitoring wells. Figures 16 through 24 show plots of groundwater elevations for specific wells and groups of monitoring wells. The locations of these wells are shown in Figure 15 for reference. Table 5-2 provides a summary of the water level trends in the monitoring wells and piezometers. Additional monitoring network and transducer installation information is provided in attached Table 1.

Monitoring Well	Beginning of Record	Figure Numbers	Observation of Groundwater Level Trends
Morgan Run P-1	09/10/2019	14, 15, 30 ,31	Groundwater levels show a slight upward trend and react to precipitation events.
Morgan Run P-2	09/10/2019	14, 15, 30, 31	Groundwater levels show a slight upward trend and react to precipitation events.
Morgan Run P-4D	09/10/2019	14, 15, 30, 32	Groundwater levels show influence from Morgan Run pumping wells ¹ and an overall upward trend. Groundwater levels react to precipitation events.
Morgan Run P-7	11/29/2019	14, 15, 30, 31	Groundwater levels show a slight upward trend.
Morgan Run P-11A	09/10/2019	14, 15, 30, 31	Groundwater levels show a slight upward trend and react to precipitation events.
Morgan Run P-11B	09/10/2019	14, 15, 30, 32	Groundwater levels show an upward trend and react to precipitation events.
Morgan Run P-11D	09/10/2019	14, 15, 29, 30, 32	Groundwater levels show muted response from Morgan Run pumping wells ¹ and an overall upward trend. Groundwater levels react to precipitation events.
Morgan Run Test Well	09/10/2019	14, 15, 19, 24, 29	Groundwater levels show muted response from Morgan Run pumping wells ¹ and an overall upward trend. Groundwater levels react to precipitation events.
Morgan Run GunR	09/10/2019	14, 15, 16, 17	Groundwater levels show a pumping signature from the GunR pump and an overall upward trend.
Morgan Run No. 3 Green North	11/19/2019	14, 15, 16, 18	Groundwater levels show an overall upward trend.
Valley 7 Well	11/19/2019	14, 15, 19, 23, 29	Groundwater levels show an upward trend and react to precipitation events.
Surf Cup No. 1	09/10/2019	14, 15, 19, 20	Groundwater levels show a level trend.
Surf Cup No. 1 (Abandoned)	11/19/2019	14, 15, 19, 22	Groundwater levels show a slight upward trend.
Surf Cup No. 2	09/10/2019	14, 15, 19, 21, 29	Groundwater levels show an overall upward trend and react to precipitation events.

Table 5-2. Monitoring Wells and Piezometers Baseline Groundwater Level Trend Observations

¹ Morgan Run pumping wells refers to Morgan Run GunR and No. 3 Green North.

In summary, the monitoring well network shows an overall upward trend before the start of the Desalter Test Well long-term pumping test caused by the start of the rainy season and precipitation events. A select few Morgan Run piezometers reflect the pumping signature from the Morgan Run pumping wells (Morgan Run GunR and No. 3 Green North).

Select monitoring wells had transducers capable of recording specific conductivity values as well. Specific conductivity data was also continually logged in 15-minute intervals. Presented in Figures 25 through 27





are the baseline non-pumping period and long-term test pumping period for specific conductivity in select wells of the monitoring network. Table 5-3 provides a summary of the specific conductivity trends in the monitoring wells during the baseline period.

Monitoring Well	Beginning of Record	Figure Number	Observation of Specific Conductivity Trends
Morgan Run Test Well	09/10/2019	27	Specific conductivity shows an overall upward trend.
Morgan Run GunR	09/10/2019	26	Specific conductivity shows a pumping signature from the GunR pump and an overall level trend.
Morgan Run No. 3 Green North	11/19/2019	26	Specific conductivity shows a reaction to precipitation events and an overall downward trend.
Valley 7 Well	11/19/2019	27	Specific conductivity shows a slight downward trend.
Surf Cup No. 1	09/10/2019	27	Specific conductivity shows a level trend.
Surf Cup No. 2	09/10/2019	27	Specific conductivity shows a reaction to precipitation events and a level trend that spikes before the start of the long-term pumping test.

Table 5-3. Monitoring Wells Baseline Specific Conductivity Trend Observations

The only significant change observed in specific conductivity before the start of the long-term pumping test was the observed spike in Surf Cup No. 2. Each monitoring well shows a slight variation in specific conductivity trend compared to each other. Nearly all the trends examined show a gradual change from the start of logging to the start of the long-term pumping test.

5.3 Baseline Monitoring of Pumping Demands in the Monitoring Network

The monitoring network included four (4) high-capacity pumping wells. Flowmeters were installed in available wells to record pumping rate and total production volume.

Morgan Run GunR and Morgan Run No. 3 Green North had flowmeters installed and production rate and volumes recorded. Morgan Run GunR was brought back online around the same time the Desalter Test Well began pumping. Approximately 270 acre-ft pumped from Morgan Run GunR during the long-term pumping test, and 244 acre-ft from Morgan Run No. 3 Green North. For daily volumes pumped from Morgan Run GunR and Morgan Run No. 3 Green North between December 1, 2019 through December 9, 2020, see Figure 28.





6.0 Long-Term Desalter Test Well Pumping Test

The Desalter Test Well long-term pump test was implemented as part of the pilot testing during the period of December 4, 2019, to December 2, 2020. There were 358 total days of pumping of the Desalter Test Well at an average discharge rate of approximately 215 gpm with a total discharge volume of approximately 340 acre-ft. The Desalter Test Well was pumped continuously apart from a few shutdowns related to Desalter Test Well maintenance and repair.

Data collection for the long-term pumping test started on December 4, 2019, from the Desalter Test Well and monitoring network. Water level and conductivity data were downloaded monthly. For quality control, groundwater levels were recorded in each well and piezometer using a wire-line sounder at the time of transducer installation and replacement, during water quality sampling, during monthly transducer data downloads, and at any other time the wells and piezometers were accessed. Water quality was also monitored in the Desalter Test Well and select monitoring wells during the long-term aquifer testing.

6.1 Groundwater Levels in Desalter Test Well During Long-Term Pumping Test

During the long-term pumping test groundwater levels were recorded every 15 minutes in the Desalter Test Well using an In-Situ Aqua TROLL 200 pressure transducer. Hand water levels were taken monthly using an electronic water level indicator during the monthly transducer data download. A plot of the groundwater level data collected from the Desalter Test Well is presented in attached Figures 11 and 12. The total drawdown during the long-term pumping test was 57.5 ft. The groundwater level in the Desalter Test Well did not show significant influence from precipitation events or Lake Hodges Dam releases. The change in the Desalter Test Well pumping rate is apparently the only factor causing changes to the groundwater level. For discussion of the long-term pumping test groundwater levels see <u>Section 9.1.3.2</u> - <u>Desalter Test Well Trends in Groundwater Elevation</u>.

6.1.1 Pumping Interruptions and Rate Adjustments

On several occasions the Desalter Test Well had pumping interruptions, some unexpected and others intentional, to perform installation, repair, and maintenance cleaning during the long-term pumping test. Planned and unplanned rate adjustments were additional occurrences during the long-term aquifer test. Planned rate adjustments were used to regulate flow rate to closely follow the 200 gpm rate selected for the long-term pumping test. Unplanned rate adjustments were observed during continuous monitoring and pumping rates were corrected back to the 200 gpm rate. The details of the pumping interruptions during the long-term pumping test are summarized in Table 6-1.





Table 0-1. Desaiter Test weir Long-Territ Puthping Test Puthping Interruptions						
Pump	Off	Pump	On	Time Off	Course	
Date	Time	Date	Time	Hours	Cause	
05/06/2020	10:04 AM	05/06/2020	3:49 PM	5.75	Installation of secondary 6-inch flowmeter.	
05/13/2020	8:04 AM	05/18/2020	4:04 PM	128	Repair leak in discharge pipe.	
10/27/2020	10:15 AM	10/27/2020	10:45 AM	0.5	Clean the Iron and Manganese fouling of Flowmeter 2.	

Table 6-1. Desalter Test Well Long-Term Pumping Test Pumping Interruptions

6.2 Groundwater Levels in Monitoring Network During Long-Term Pumping Test

Groundwater levels in 14 monitoring wells and piezometers were recorded every 15 minutes using pressure transducers. Hand water levels were collected during the monthly transducer data downloads using an electronic water level indicator. Plots of the groundwater level data collected from the project monitoring wells are presented in attached Figures 14 through 24. Monitoring network details are summarized above in Table 6-1 and with additional transducer installation information in attached Table 1.

Of the 14 monitoring wells and piezometers, **four** (4) (Surf Cup No. 2, Valley 7 Well, Morgan Run P-11D, and Morgan Run Test Well) showed impacts from Desalter Test Well pumping (see Figure 29). The four (4) impacted wells and piezometers are all screened within the deep aquifer. The largest drawdown observed within the area of influence wells and piezometers during the long-term pumping test was 10 ft in Morgan Run P-11D. The drawdown in each of the four (4) impacted wells and piezometers at the end of the long-term pumping test was about five (5) feet. Table 6-2 summarizes the changes on the monitoring network from the Desalter Test Well pumping.

Monitoring Well	Well Depth ft bgs	Screen Interval ft bgs	Maximum Drawdown During Long-Term Test ft	Drawdown at the End of the Long-Term Test ft
Surf Cup No. 2	99.6*	50 - 110	7.94	5.5
Valley 7 Well	123.5*	-	6.53	4.99
Morgan Run Test Well	133.5*	87 - 137	9.81	4.8
Morgan Run P-11D	99	84 - 99	10.06	4.92

Table 6-2. Summary of Monitoring Network Impacted by Desalter Test Well Pumping

* Monitoring well depths shown are measured depths, as ft bgs, evaluated in the field.

The ten (10) additional monitoring wells and piezometers did not show any changes from the Desalter Test Well pumping (see Figure 30). Nearly all the shallow piezometers (Morgan Run P-1, P-2, and P-11A) have several upward trends, spikes, observed in the water level record that do not correlate to Desalter Test Well pump off events (see Figure 31). The deep piezometers Morgan Run P-11B and 11D show similar, but muted, upward trends that also do not correlate to Desalter Test Well pump off events. The deep piezometer Morgan Run P-4D displays oscillations from cyclical pumping of the nearby Morgan Run No. 3 Green North well. The deep piezometer water levels are presented in Figure 32. The Morgan Run pumping





wells, No. 3 Green North and GunR, show pumping signatures reflecting their own pumping schedule (see Figure 28). Morgan Run P-7, Surf Cup No. 1, and Surf Cup No. 1 (Abandoned) do not show any variation in groundwater trends.

6.2.1 Precipitation and Lake Hodges Dam Release

During the long-term pumping test, the project area experienced rainfall during the months of December, January, February, March, and April 2020. Minor rain events also occurred in June and November 2020. Several large precipitation events in mid-April resulted in the City of San Diego's calibrated release of approximately 6,200 acre-ft of water from Lake Hodges reservoir over 17 days (April 11 to 27, 2020) to maintain a lower lake level as ordered by the State of California. Precipitation records from PRISM (Parameter-elevation Regressions on Independent Slopes Model) are overlaid on all the water level plots. The larger precipitation events that took place between December and mid-April 2020 likely contributed (through precipitation recharge and/or impacts of precipitation events on basin pumping) to the upward trend of groundwater levels in the shallow piezometers, Morgan Run P-1, P-2, and P-11A, and deep piezometers, Morgan Run P-11B and P-11D (see Figures 31 and 32, respectively).

6.3 Water Quality During Long-Term Pumping Test

Groundwater samples were collected quarterly⁶ from the Desalter Test Well and monitoring network piezometers and wells by groundwater consultant Ian Goltz (IKG Environmental, Inc.) during the Long-Term Pumping Test on April 21, 2020, September 16, 2020, and December 1, 2020. The samples were submitted to EnviroMatrix Analytical, Inc. (EMA) located in San Diego, California, for General Mineral and General Physical water quality analyses. These constituents from the newly constructed Test Well and observation well water quality reports are presented in Table 6-3 and attached Table 2, along with relevant regulatory standards. The laboratory water quality reports for samples collected from the Test Well and observation wells can be found in Appendix I. The purpose of the sample collection was to evaluate whether water quality changes would result from the long-term pumping. With the exception of water quality in Monitoring Well P-11B, water quality results remained essentially the same in the lower or upper aquifer. The well screen in P-11B is at an intermediate level. The increase in TDS in P-11B in the last two sampling events may reflect localized mixing of groundwater from the upper aquifer. Future plans should include abandonment of P-11B to eliminate local mixing of shallow and deeper aquifer water for long-term groundwater development.

⁶ Due to site access restrictions and laboratory safety protocols during the COVID 19 pandemic only three of the four planned quarterly water quality samples were collected.





Table 6-3. Notable Desalter Test Well and Observation Well Laboratory Water Quality During the Long-Term Pumping Test - Minimum, Maximum, and Average Water Quality Results

Well c	or Piezometer:	Desalter Test Well	Morgan Run P-2	Morgan Run P-11B	Morgan Run P-11D	Morgan Run GunR	
Screen In	terval (ft bgs):	60 - 125	8 - 23	40 - 45	84 - 99	81.3 - 120.8	Regulatory
Constituent	Units			Min - Max (Avg)*		-	Standard(s)
Boron, Total	mg/L	ND - 0.96 (0.64)	0.46 - 0.76 (0.62)	0.51 - 0.73 (0.59)	ND - 0.53 (0.33)	ND - 0.38 (0.25)	1.0 ³
Calcium, Total	mg/L	452 - 462 (457)	ND - 624 (390)	68 - 468 (214)	142 - 145 (143)	369 - 403 (385)	NA ⁵
Chloride	mg/L	1,290 – 1,340 (1320)	2,200 – 2,480 (2,333)	380 – 1,790 (953)	590 - 630 (607)	1,110 – 1,270 (1,203)	250 - 500 ²
Hardness (Dissolved)	mg CaCO3/L	1,570 – 1,750 (1677)	ND – 3,210 (2,013)	406 – 2,750 (1,338)	800 - 860 (835)	1,820 – 1,880 (1,847)	NA ⁵
Iron, Total	mg/L	0.70 - 0.88 (0.81)	0.04 - 0.45 (0.26)	0.31 - 2.04 (0.95)	0.82 - 1.15 (1.03)	0.19 - 0.26 (0.21)	0.3 ²
Manganese, Total	mg/L	0.92 - 1.07 (1.0)	3.03 - 4.86 (3.75)	0.10 - 1.91 (0.71)	0.45 - 0.48 (0.46)	1.81 - 2.29 (2.03)	0.050 ² / 0.5 ³
pH at 25°C	pH Units	6.96 - 7.04 (7.00)	7.03 - 7.08 (7.06)	7.17 - 7.54 (7.40)	7.30 - 7.37 (7.34)	6.77 - 7.19 (6.93)	6.5 - 8.5 ⁴
Silicon, Total	mg/L	15 - 17 (16)	11 - 20 (17)	16 - 20 (18)	14 - 15 (14)	15 - 16 (15)	NA ⁵
Sodium, Total	mg/L	820 – 900 (847)	2.78 – 1,250 (736)	321 – 976 (624)	474 - 514 (497)	652 – 688 (674)	NA ⁵
Specific Conductance (EC)	µmhos/cm	4,930 – 5,440 (5,160)	7,800 – 8,330 (8,063)	1,950 – 6,030 (3,633)	2,810 – 3,150 (2,937)	4,150 – 5,190 (4,697)	900 - 1,600²
Sulfate as SO4	mg/L	746 - 802 (765)	1,240 – 1,430 (1,357)	183 – 1,080 (533)	346 - 376 (360)	657 – 853 (751)	250 - 500 ²
Total Dissolved Solids (TDS)	mg/L	3,500 – 3,590 (3,557)	5,460 – 5,990 (5,763)	1,080 – 4,690 (2,517)	1,850 – 1,890 (1,870)	3,210 – 3,330 (3,287)	500 - 1,000²
Turbidity	NTU	6.4 - 6.9 (6.6)	1.1 - 50 (18.7)	1.3 - 18.0 (6.87)	4.1 - 10.0 (7.5)	1.2 - 1.6 (1.4)	5 ²

* Water quality samples were collected for laboratory analysis on April 21, 2020, September 16, 2020, and December 1, 2020.

¹ Division of Drinking Water (DDW) primary maximum contaminant level (MCL).

² DDW secondary MCL.

³ DDW notification level for unregulated chemicals.

⁴ United States Environmental Protection Agency (USEPA) secondary standard for pH.

⁵ Not Applicable – no current MCL.

ND - Not detected above laboratory detection limits.

BOLD Equal to or above current DDW MCLs or notification levels.

6.3.1 Water Quality in Desalter Test Well During Long-Term Pumping Test

Notable well water quality findings during the Long-Term Test are summarized in Table 6-3 above. The total dissolved solids (TDS) concentration for the Desalter Test Well ranged from 3,500 to 3,590 mg/L, above both the 500 mg/L lower limit of the SWRCB DDW secondary maximum contaminant level (MCL) and the upper limit of 1,000 mg/L for TDS. Specific conductance (at 25°C) was reported above both the 900 μ mho/cm lower limit of the DDW secondary MCL, and the upper limit of 1,000 μ mho/cm DDW secondary MCL at 4,930 to 5,440 μ mho/cm. The chloride concentration was reported above both the





250 mg/L lower limit and the upper limit of 500 mg/L DDW secondary MCL of chloride at 1,290 to 1,340 mg/L. Total iron was reported at a concentration of 0.70 to 0.88 mg/L, above the DDW secondary MCL of 0.3 mg/L. Total manganese was detected at concentrations ranging from 0.92 to 1.07 mg/L, above the DDW secondary MCL of 0.050 mg/L and the DDW notification level of 0.5 mg/L. The sulfate concentration was reported above both the 250 mg/L lower limit of the DDW secondary MCL, and the upper limit of 500 mg/L at 746 to 802 mg/L. Turbidity was reported above the DDW secondary MCL of 5 NTU at 6.4 to 6.9 NTU, however these results may be artificially high due to oxidation of iron and/or manganese prior to running the laboratory turbidity analysis. Total boron was reported at elevated levels including two results at 0.95 and 0.96 mg/L, just below the DDW notification level of 1.0 mg/L. Sampled Desalter Test Well water was found to have high total calcium (457 mg/L average) and can be categorized as hard water (1,677 mg CaCO3/L average). As expected for a brackish groundwater environment, total sodium was found to be between 820 and 900 mg/L. See Figure 33 for a Trilinear Diagram (Piper Diagram) containing the completed well and long-term testing water chemistry for the Desalter Test Well. A Trilinear Diagram is a specialized graph used to plot the relative abundance of common ions in multiple water samples, allowing the grouping of water samples based on water chemistry. Cations, ions with a positive charge (magnesium, calcium, and sodium plus potassium), are represented in the lower left ternary diagram while anions, ions with a negative charge (chloride, sulfate, and carbonate plus bicarbonate), are represented in the lower right ternary diagram. The combination diamond plot in the middle is a projection from the other two ternary diagrams and displays the kind of groundwater (e.g., calcium bicarbonate, sodium chloride, etc.) the water samples represent.

6.3.2 Water Quality in Monitoring Network Selected Wells During Long-Term Pumping Test

In addition to the pumping Desalter Test Well, water quality samples were collected quarterly from three piezometers (Morgan Run P-2, P-11B, and P-11D) and one irrigation well (Morgan Run GunR) during the Long-Term Pumping Test as described in <u>Section 6.3 Water Quality During Long-Term Pumping Test</u>. The notable results are summarized in Table 6-3 above, and in complete detail in attached Table 2. The laboratory water quality reports for samples collected from the test well and observation wells can be found in Appendix I.

All monitoring location results exceeded the Total Dissolved Solids and Specific Conductance (at 25°C) DDW secondary MCL upper limits of 1,000 mg/L and 1,600 mg/L respectively, with the highest concentrations found in Morgan Run P-2 (5,990 mg/L TDS and 8,330 mg/L EC). The shallow piezometer laboratory TDS and EC results proved to have the most fluctuation during the long-term test in comparison to the two pumping wells and deep piezometer. Piezometer samples occasionally exceeded the desired turbidity level for metals analyses. The DDW chloride secondary MCL upper limit of 500 mg/L was exceeded in all samples with the exception of one Morgan Run P-11B sample, which only exceeded the 250 mg/L secondary MCL lower limit at 380 mg/L. Total manganese results exceeded the DDW secondary MCL of 0.050 mg/L at all sampling locations, and three of the four locations had at least one result exceed





the DDW notification level of 0.5 mg/L. Generally, total iron was found to be high in most samples, over the DDW secondary MCL of 0.3 mg/L, with the exception of Morgan Run GunR and P-2. Sulfate concentrations ranged from elevated (Morgan Run P-11B) to nearly three times the DDW secondary MCL upper limit of 500 mg/L (Morgan Run P-2). Most results were found to be above the DDW sulfate secondary MCL lower limit of 250 mg/L, with seven of the twelve results exceeding the secondary MCL upper limit of 500 mg/L. See Figure 34 for a Trilinear Diagram (Piper Diagram) containing the completed well and long-term testing water chemistry for the selected monitoring wells.

6.3.2.1 Specific Conductance Measurements in Monitoring Network Selected Wells During Long-Term Pumping Test

As mentioned in Section 6.3.2 above, all monitoring location results exceeded the specific conductance (EC) (at 25°C) DDW secondary MCL upper limit of 1,600 mg/L with the highest concentration found in Morgan Run P-2 at 8,330 mg/L EC. The shallow piezometer laboratory EC results had the most fluctuation during the long-term test in comparison to the two pumping wells and deep piezometer. See attached Table 2 and laboratory water quality reports in Appendix I for specific sampling date EC results. Figures 26 and 27 display the continuous EC reading throughout the long-term pumping test at the selected wells.

6.4 Determination of Transmissivity

Multiple constant rate pumping test analyses were performed using data collected from the long-term pumping test to provide a range of aquifer characteristics for the model update. Several time periods of the long-term test were selected to analyze the Desalter Test Well constant rate pumping tests. Average discharge rates were determined for each time period using field recorded totalizer readings.

Three of the impacted monitoring wells, within a half mile of the Desalter Test Well, were used as observation wells in order to conduct additional calculations for aquifer parameters. These wells were selected due to the measurable drawdown observed during the long-term pumping test and the distance and position in relation to the Desalter Test Well. Information on the observation wells used is summarized in the following Table 6-4.

Well Name	Well Depth ft bgs	Screen Interval ft bgs	Distance from Desalter Test Well ft	Static Water Level ft bgs
Surf Cup No. 2	99.6*	50 - 110	1,011	8.03
Morgan Run Test Well	133.5*	87 - 137	1,900	4.64
Valley 7 Well	123.5*	-	2,598	1.98

Table 6-4. Summary of Long-Term Test Observation Well Details

* Monitoring well depths shown are measured depths, as ft bgs, evaluated in the field.





6.4.1 Desalter Test Well Long-Term Pumping Test

The static water level at the start of the constant rate pumping test was 9.56 ft bgs. The long-term constant rate pumping test was analyzed at four (4) time periods throughout the test: start of the test (1-day), first 14-days of the test, until mid-way of the test, and for the entire long-term test. Plots showing the evaluation of the long-term test data using Jacob's straight-line interpretation method are presented in Figures 35 through 38. Table 6-5 provides a summary of aquifer characteristics calculated from the four (4) time periods of the Desalter Test Well long-term pumping test.

Period of	Date Range	Number	Average Pumping Rate	Drawdown ¹	Transmissivity
Long-Term Test		of Days	gpm	ft	gpm/ft
Start of Test	12/04/2019 to 12/05/2019	1	185	3.6	13,600
First 14 Days of Test	12/04/2019 to 12/18/2019	14	185	3.5	14,000
Until Mid-Way of Test	12/04/2019 to 06/06/2020	185	194	3.9	13,100
Entire Test	12/04/2019 to 12/02/2020	364	215	10.6	5,400

Table 6-5. Desalter Test Well Long-Term Pumping Test Results

¹ Water level drawdown value is per log cycle.

The long term (entire test) transmissivity estimation is low due to fluctuations in pumping rates recorded in the last four months of the pumping test. The rate fluctuations are likely due in part to iron and manganese bacterial fouling of the discharge pipe and flow meter, as well as manual adjustments to the Desalter Test Well pumping rate. Earlier Desalter Test Well pumping periods, observation well, and recovery analysis used to estimate transmissivity are likely more reflective of actual aquifer parameters.

6.4.1.1 Observation Wells Long-Term Pumping Test Time-Drawdown Analyses

Time-drawdown plots were created for the three (3) observation wells Surf Cup No. 2, Morgan Run Test Well, and Valley 7 Well for the start of the long-term pumping test 1-day time period (see Figures 39 through 41). Analyses were performed to determine aquifer parameters based on measurable drawdown due to the Desalter Test Well pumping and time. A summary of the aquifer characteristics calculated from the observation well data is provided below in Table 6-6.

Well	Start of Long-Term Test Date Range	Number of Days	Average Pumping Rate gpm	Drawdown ¹ ft	Transmissivity gpm/ft	Storativity
Surf Cup No. 2	12/04/2019 to 12/05/2019	1	185	1.5	32,600	0.00122
Morgan Run Test Well	12/04/2019 to 12/05/2019	1	185	0.8	61,100	0.00111
Valley 7 Well	12/04/2019 to 12/05/2019	1	185	1.2	40,700	0.000359

Table 6-6. Observation Wells Long-Term Pumping Test Results

¹ Water level drawdown value is per log cycle.





6.4.2 Long-Term Pumping Test – Recovery Results

On December 2, 2020, at the end of the Desalter Test Well long-term pumping test water levels recovered when the Desalter Test Well pump was turned off at 8:30 am. The recovery period started at 8:30 am on December 2, 2020, and ended at 8:30 am on December 10, 2020. Recovery analysis plots created for the Desalter Test Well and the three (3) observation wells are shown in Figures 42 through 45. Table 6-7 provides a summary of the aquifer characteristics calculated from the recovery analysis plots. The transmissivity is relatively low but consistent with the materials and relatively low thickness of the aquifer at this location. The storativity values are consistent with a confined aquifer (Todd, 1980).

Well	End of Long-Term Test	Number	Average Pumping Rate	Drawdown ¹	Transmissivity
	Date Range	of Days	gpm	ft	gpm/ft
Desalter Test Well	12/02/2020 to 12/10/2020	8	220	3.0	19,500
Surf Cup No. 2	12/02/2020 to 12/10/2020	8	220	2.4	24,100
Morgan Run Test Well	12/02/2020 to 12/10/2020	8	220	1.8	33,100
Valley 7 Well	12/02/2020 to 12/10/2020	8	220	1.3	43,500

Table 6-7. Recovery Results for End of Long-Term Pumping Test

¹ Water level drawdown value is per log cycle.





7.0 Permanent Pump Installation

The permanent pump was installed in the Desalter Test Well on March 9, 2021. The permanent pump installation was witnessed by DLM Engineering, Inc. of San Diego, California, Geoscience, and Jensen personnel. See Table 7-1 below and Appendix L for submersible pump information.

Table 7-1. Desalter Test Well Permanent Pump Information

Submersible Pump Information				
Ритр Туре	Grundfos SP 230S			
Design Operating Point	200 gpm @ 200 ft TDH (Total Dynamic Head)			
Pump Intake	103 ft bgs			
Motor Volts	460 V			
Motor Hertz	60 Hz			
Motor Speed	3,500 rpm			
Motor Horsepower	20 HP			
Pump Diameter	6 IN.			
Pump Material	304 Stainless Steel			



Figure 7-1. Permanent pump prior to installation.



Figure 7-2. Permanent Pump testing.

Once the permanent pump was installed into the Desalter Test Well to its intake depth of 103 ft bgs the pump power supply line was connected to the on-site Variable Frequency Drive (VFD) panel. Following confirmation that the pump was powered properly attempts to start the pump and conduct a pump test were made.

Jensen made attempts to start pump using the on-site VFD panel. The pump would shut off after approximately 2 minutes of pumping. Multiple attempts to increase the "pump on" time were made

by adjusting the hertz and amps to power the pump. A short pump test was performed following success of maintaining pump power duration. Geoscience performed a pump test at approximately 200 gpm for 1-hour with flowmeter readings taken at the intervals listed in Table 7-2. Jensen continued to monitoring pump properties following Geosciences departure from the well site.





Total Time Following Pump Start Up minutes	Flowmeter Reading Intervals minutes
0-10	2
10 - 30	5
30 - 60	10

Table 7-2. Measurement Intervals During Permanent Pump Installation Pump Test





In 2017, a feasibility study was performed for the Project where Geoscience developed the San Dieguito Valley Groundwater Basin Model to evaluate the water budget of the groundwater basin and estimate the groundwater production at various proposed extraction well sites. Since new information (e.g., groundwater elevation measurements and aquifer parameters) was obtained after the construction of the Desalter Test Well and Long-Term pump test, the San Dieguito Valley Groundwater Model was updated and recalibrated to December 2020 to incorporate additional data collected during recent field efforts. One updated scenario model run was also performed to evaluate the water balance and extraction capacity using the updated groundwater model. The following sections describe the model update efforts in detail.

8.1 San Dieguito Valley Groundwater Model Update

8.1.1 Model Description

8.0

The groundwater flow model was developed using MODFLOW-NWT⁷. The San Dieguito Valley Groundwater Basin consists of an unconsolidated quaternary alluvial aquifer system flanked and underlain by low permeability Tertiary rocks. The San Dieguito Valley Groundwater Model is a five-layer model with a grid of 660 nodes (i.e., model cells) in the north-to-south direction (i-direction) and 920 nodes in the east-to-west direction (j-direction), for a total of 3,036,000 nodes (Figure 46). Each model cell of the San Dieguito Valley Groundwater Model represents an area of 50 ft by 50 ft.

For the purposes of this investigation, the Tertiary rocks surrounding the quaternary alluvial materials were assumed to be impermeable. As such, they were designated as no-flow boundaries in the groundwater model. The model boundary conditions are shown on Figure 47, where cells shown in green, blue, and red were used to simulate the underflow outflow to the ocean, recharge from streambed percolation and groundwater extraction, respectively.

8.1.2 Aquifer Properties

8.1.2.1 Model Layers

The initial conceptual groundwater model consisted of five layers: Layers 1 and 3 represent the shallow and deep aquifer, respectively, while Layers 2, 4, and 5 represent low permeability layers (e.g., aquitards). A three-dimensional representation of the original model layers is shown on Figure 48. During the recent

⁷ MODFLOW-NWT is the Newton-Raphson formulation for MODFLOW-2005 which allows for an improved solution of unconfined groundwater flow problems (Niswonger, Panday, and Ibaraki 2011). MODFLOW-2005 a block-centered, finite-difference groundwater flow code developed by the USGS (Harbaugh 2005).





model update, following review of the Long-Term Pumping Test data, the bottom layer elevations for layers 1, 2 and 3 for the area close to the Test Well were refined based on the new lithologic information. In this report the shallow aquifer is referred to as Layer 1 and the deep aquifer as Layer 3. The intermediate zone between Layer 1 and Layer 3 is an aquitard, referenced as Layer 2.

8.1.2.2 Hydraulic Conductivity

Horizontal and vertical hydraulic conductivity was revised using data collected from the Long-Term Pump Test, and then were further adjusted during model recalibration. The recalibrated horizontal hydraulic conductivity values are shown on Figure 49 and range from less than 5 ft/day to 900 ft/day. Vertical hydraulic conductivity was assumed to be 10% of the horizontal hydraulic conductivity.

8.1.2.3 Storativity

Both specific yield and specific storage values were used in the San Dieguito Valley Groundwater Model. The type of storativity value used depended on the nature of the model layer through time (i.e., unconfined or confined). The model storativity values were refined based on the Long-Term pump test results for the area close to the Test Well and were further adjusted during the model recalibration. The recalibrated specific yield values are shown on Figure 50 and range from 0.01 to 0.2. Calibrated specific storage is shown on Figure 51 and ranges from 0.00001 ft⁻¹ to 0.0001 ft⁻¹.

8.1.3 Recharge Terms

8.1.3.1 Deep Percolation from Precipitation and Mountain Front Runoff

The initial empirical estimates of deep percolation from precipitation and mountain front runoff for the extended modeling period (i.e., from 2016 to 2020) were estimated from PRISM precipitation data following the same approach described in the 2017 Feasibility Study and were iteratively adjusted during model recalibration. The recalibrated amount of recharge from the deep percolation of precipitation and mountain front runoff averages 1,090 acre-ft/yr during the model calibration period from 2001 through 2020.

8.1.3.2 Streambed Percolation

The recharge from streambed percolation is calculated by the groundwater model via the Stream Flow Routing Package using the input data of Hodge Dam release and spills provided by the OMWD, and runoff from precipitation, which was assumed to be 16% of the precipitation (DWR, 1949). The modeled average recharge from streambed percolation is approximately 1,900 acre-ft/yr during the model calibration period from 2001 through 2020. Streambed percolation is applied along the length of the river.





8.1.3.3 Recharge from Spreading

The recharge from spreading of 570 acre-ft/yr was used in the previous 2017 groundwater model for the combined spreading of the CSDs. For this model update, the same amount was assumed over the updated model calibration period of 2001 through 2020. Detailed approach to estimate the recharge from spreading can be found in the Feasibility Study Report (Woodard & Curran, 2017).

8.1.3.4 Return Flow

This model update used the same return flow amount in the 2017 groundwater model, which averages 1,100 acre-ft/yr. Return flow is the amount of applied irrigation water that moves past the root zone into the underlying aquifer. Detailed approach to estimate the return flow can be found in the Feasibility Study Report (Woodard & Curran, 2017).

8.1.3.5 Underflow Inflow

Underflow inflow to the groundwater basin was calculated by the model using a general head boundary (GHB). Underflow is the groundwater that flows into the basin in the aquifer from outside the basin. During the model, underflow comes from upstream through the alluvium and periodically from the ocean. The average annual model-calculated underflow inflow was approximately 200 acre-ft/yr for the updated model calibration period from 2001 through 2020.

8.1.4 Discharge Terms

8.1.4.1 Groundwater Pumping

Additional groundwater pumping for the extended modeling period was collected and assigned to the San Dieguito Valley Groundwater Model. Groundwater pumping was estimated by combining known groundwater extractions from wells with totalizing meters with an estimate of groundwater demand based on land use. The annual pumping for the updated model calibration period averaged 1,830 acre-ft/yr from 2001 through 2020, revised from the 2017 value of 2,100 acre-ft/yr.

8.1.4.2 Evapotranspiration

Evapotranspiration represents a model-calculated value. California Irrigation Management Information System (CIMIS) evapotranspiration rates were applied to the model area with an extinction depth of 15 ft. The model-calculated evapotranspiration averaged 2,580 acre-ft/yr for the updated calibration period from 2001 through 2020.





8.1.4.3 Discharge to Streams

Similar to streambed percolation, discharge to streams is also calculated by the groundwater model via the Stream Flow Routing Package, and the average discharge to streams during the updated calibration period is approximately 60 acre-ft/yr.

8.1.4.4 Underflow Outflow

Underflow outflow to the ocean was calculated by the model using a GHB. The average annual modelcalculated underflow outflow was approximately 100 acre-ft/yr from 2001 through 2020.

8.2 San Dieguito Valley Groundwater Model Recalibration

8.2.1 Model Calibration

Calibration is the process of adjusting the model parameters and flux terms to produce the best fit between simulated and observed groundwater system responses. Properties adjusted during the model calibration include:

- Horizontal and vertical hydraulic conductivity,
- Storativity, and
- Deep percolation from precipitation and mountain front runoff.

The San Dieguito Valley Groundwater Model was recalibrated against 2,451 observed water level measurements from 41 target wells from January 2001 through December 2020 (Figure 52). Water level residual⁸ statistics from the model calibration are summarized in the Table 8-1 below.

Model Calibration Water Leve	el Statistics
Residual Mean, ft	0.01
Residual Standard Deviation, ft	4.02
Minimum Residual, ft	-34.16
Maximum Residual, ft	22.31
Relative Error, %	6.8

Table 8-1. Model Calibration Water Level Statistics

The relative error (standard deviation of the residuals divided by the range) for the calibration period was 6.8%. Common modeling practice is to consider a good fit between measured and model-calculated water

⁸ Measured minus model-calculated water levels.





levels if the relative error is below 10% (Spitz and Moreno 1996). Therefore, the updated San Dieguito Valley Groundwater Model performs within acceptable limits.

Figure 53 shows hydrographs for selected wells, which illustrates similar water level trends between the observed water level measurements and model-calculated water levels. This indicates that the model is performing well and can simulate realistic hydrologic response in the San Dieguito Valley Groundwater Basin.

Table 8-2 below summarizes the average annual water balance for the San Dieguito Valley Groundwater Basin from both the 2017 model calibration and updated 2021 model calibration. Comparing to the 2017 groundwater model results, the change in storage slightly decreased by 20 acre-ft/yr calculated by the updated groundwater model.

	Term	2017 Model Calibration (2001-2015) acre-	2021 Model Calibration (2001-2020) ft/yr
	Underflow Inflow	30	20
Ž	Deep Percolation from Areal Precipitation and Mountain Front Runoff	1,020	1,090
INFLOW	Streambed Percolation	1,790	1,900
Z	Recharge from Spreading	570	570
	Return Flow	1,090	1,100
>	Groundwater Pumping	2,090	1,830
²	Evapotranspiration	2,180	2,580
OUTFLOW	Rising Discharge to Streamflow	40	60
o	Underflow Outflow to the Ocean	60	100
	Change in Storage	130	110

Table 8-2. Comparison of Water Budget Terms for Sustainable Yield Assessment

8.3 Model Scenarios

Once the San Dieguito Valley Groundwater Model was updated and recalibrated, it was used to run one scenario to evaluate the impact on the groundwater balance from the proposed Project groundwater pumping. The scenario assumption was developed based on one of the 2017 modeling scenarios and modified to incorporate the Desalter Test Well extraction. Table 8-3 lists the major assumptions for the scenario model run. The locations of Site 2 and 2A are depicted on Figure 54.





Assumptions	2017 Assumptions	2021 Assumptions
Number of Wells	2 (Site 2 and Site 2A)	3 (Desalter Test Well, Site 2 and Site 2A)
Single Well Capacity	Site 2 = 500 gpm; Site 2A = 500 gpm	Desalter Test Well = 200 gpm; Site 2 = 400 gpm; Site 2A = 400 gpm
Total Pumping Capacity	1,000 gpm	1,000 gpm
Total Annual Pumping, AFY	1,600 AFY	1,600 AFY

Table 8-3. Assumptions for Model Scenarios

The same hydrology and pumping by existing users from the recalibration period, 2001 through 2020, were used for the scenario model run. The water balance results are summarized in the following table and on Figure 55.

	Term	2017 Calibration Run (2001 - 2015)	2021 Calibration Run (2001 - 2020)	2017 Scenario Run	2021 Scenario Run
			acre-ft	:/yr	
	Underflow Inflow	30	20	50	20
≥	Deep Percolation from Areal Precipitation and Mountain Front Runoff	1,020	1,090	1,020	1,090
INFLOW	Streambed Percolation	1,790	1,900	1,860	2,020
Z	Recharge from Spreading	570	570	570	570
	Return Flow	1,090	1,100	1,090	1,100
2	Groundwater Pumping	2,090	1,830	3,690	3,430
ſŎ	Evapotranspiration	2,180	2,580	1,090	1,400
UTFLOW	Rising Discharge to Streamflow	40	60	30	50
ō	Underflow Outflow to the Ocean	60	100	40	70
	Change in Storage	130	110	-260	-150

Table 8-4. Water Budget Terms for Model Scenarios

Feedwater extraction of 1,600 acre-ft./yr will result in 1,120 AFY of product water to the project (1 MGD) assuming a 70 percent desalination plant efficiency. Results from the updated scenario run indicated that pumping 1,600 acre-ft/yr at the Desalter Test Well, Site 2, and Site 2A would decrease the groundwater basin's storage by 150 acre-ft/yr, which is 110 acre-ft/yr less in decrease compared to the 2017 modeling results. The changes in groundwater elevations between the Project Scenario Run and Baseline Run for model layers 1 and 3 are depicted on Figures 56 and 57. As shown in Figure 57 (Layer 3), the Project operation may decrease the groundwater elevations at nearby Morgan Run pumping well sites, No. 3 Green North and GunR, by approximately 19 feet and 15 feet beyond the baseline pumping water levels. The cumulative drawdown after 20-year Project pumping at a rate of 1,600 acre-ft/yr, in the GunR and No. 3 Green North wells are predicted to remain approximately 27 feet above the present pump settings.





With the current modelled Project pumping configuration, assumed existing pumping conditions, and assumed Morgan Run pumping volumes, the water level at the No. 3 Green North well has the potential to reach the top of screen at 52 ft bgs. The model simulated a singular well pumping location of 800 gpm. Therefore, distribution of drawdown could be accomplished by multiple wells pumping at lower rates over a wider area. The modeled drawdown indicates that pump lifts may increase in area wells however this drawdown should not affect the overall production of these nearby wells. Depending on the pump installation depths of nearby wells, there may be a potential need to lower the pump elevations to maintain an adequate water level above the pump intake. During the Long-Term Pumping Test, the shallow aquifer (Layer 1) did not show any impacts from Desalter Test Well pumping, but it should be noted that the full-scale pumping project will have nearly five times the volume extracted from the planned desalter wells screened in the deep aquifer (Layer 3) and there will be drawdown in the shallow aquifer (Layer 1) through the aquitard (Layer 2) due to leakance. The modelling suggests that the increase in streambed percolation (river loss) is about 120 acre-ft/yr and a reduction in evapotranspiration of 1,180 acre-ft/yr and surface outflow at the Ocean of approximately 30 acre-ft/yr (See Table 8-4). This represents beneficial use of water that would otherwise flow to the ocean.





9.0 Findings

9.1 Long-Term Pumping Test

9.1.1 Desalter Test Well Test Pump Iron & Manganese Fouling & Filtration System Pilot Study

Pumped groundwater from the Desalter Test Well contained high concentrations of iron and manganese. Total iron was found to be as high as 0.881 mg/L, nearly three times the DDW secondary MCL of 0.3 mg/L. Total manganese results were high but relatively stable during the short- and long-term pumping tests, averaging 1.02 mg/L, or over twenty times DDW secondary MCL for manganese at 0.050 mg/L and twice the DDW notification level for unregulated chemicals. The effects of these elevated metal concentrations were noticeable within the discharge piping and test pump intake upon dismantling. Iron and manganese consuming bacteria deposits caused fouling and performance issues with the propeller style flow meter as shown in inset Figure 9-1 below. Iron and manganese bacterial treatment at the wellhead will likely be necessary and will need to be incorporated into future facility design plans.



Figure 9-1. Iron and Manganese fouling of the Desalter Test Well. A) Iron fouling of propeller style flow meter. B) Iron fouling deposits in discharge piping. C) Iron fouling on test pump intake. D) Iron (orange) and Manganese (black) fouling on screen located in discharge piping.

During the long-term pumping test, pumping water levels reached as low as 20 feet below the elevation of the Desalter Test Well top of screen causing a cascading water effect. This oxygenation of the less aerobic well water and upper screen section likely increased iron and manganese oxidizing bacteria population growth rates. It is recommended that future system pumping operations always maintain pumping water levels above the top of the well screen, as a transition from a de-oxygenated to





oxygenated environment could contribute to bacteria growth and ultimately lead to fouling of the screens, maintenance downtime, and increased filtration and rehabilitation costs.



Figure 9-2. On site trailer housing Pilot Study equipment.

Iron and manganese bacterial treatment at the wellhead will be necessary and should be incorporated into future pretreatment design plans as these deposits will adversely impact the discharge piping and filtration efficiency of reverse osmosis membranes at the planned desalination facility. Woodard and Curran, Inc. contracted with Loprest (a division of WRT) to perform a site-specific pilot test (Figure 9-2) for manganese and iron removal on June 2 to 3, 2020 using

greensand filtration equipment, a method in which

manganese dioxide ore or coated filter media oxidizes iron and manganese upon contact. During this two-day test, specific system configurations (Figure 9-3) and two types of media were able to effectively reduce iron and manganese concentrations to levels below their respective DDW Secondary MCL's. A Technical Memorandum summarizing the findings of the Filtration System Pilot Study was issued to OMWD on August 26, 2020, and can be found in Appendix M of this report.



Figure 9-3. Pilot Study Filter Test Column Units setup.

9.1.2 Desalter Test Well Specific Capacity Calculations for Long-Term Pumping Test Period

Specific capacity is a function of water levels and well production. <u>Section 4.4.3 – Specific Capacity and</u> <u>Well Efficiency</u> describes the calculation of specific capacity at various times during the project. Figure 10 shows the specific capacity for the Desalter Test Well at a pumping rate of 200 gpm. However, specific capacity and thus well production will change with changing groundwater levels.

9.1.3 Desalter Test Well and Monitoring Network Long-Term Pumping Test Observations

9.1.3.1 Desalter Test Well Long-Term Pumping Observations

During the Desalter Test Well Long-Term Pumping Test groundwater samples were collected on three separate occasions to evaluate whether water quality changes would occur as a result of the pumping. As anticipated, ambient elevated concentrations of iron, manganese, sulfate, chloride, boron, calcium, sodium, TDS, EC, and turbidity were encountered in the Desalter Test Well during the 24-Hour Constant Rate Test and the Long-Term Pumping Test. See <u>Sections 4.5 – Desalter Test Well Groundwater Quality</u>





Aug-21

and <u>6.3 – Water Quality During Long-Term Pumping Test</u> for detailed water quality summaries and the constituents found to be over drinking water regulatory standards.

Odor observed in the 24-Hour Constant Rate Test sample over the DDW secondary MCL was potentially the result of the presence of hydrogen sulfide gas (H2S) as was also noted by the Loprest pilot study technician during the filtration system tests (see Appendix M). H2S concentrations were not measured, but the chemical's presence was inferred from the characteristic odor and higher chlorine oxidant demand during the test. Iron/manganese bacteria and sulfur bacteria in the groundwater can use iron and sulfur as an energy source to chemically change sulfates to produce H2S gas. During the Long-Term Pumping Test high levels of iron and sulfate were found to be in the Desalter Test Well with average concentrations of 0.81 mg/L and 765 mg/L respectively. However, future water quality analysis should include on-site H2S testing to confirm these assumptions.

Total iron and manganese results were found to be stable but in high concentrations. Iron and manganese bacteria produced orange and black slime within the discharge piping and flowmeter assembly and impacted the propeller-style meters rate and volume measurements, requiring dismantling and cleaning. Section 9.1.1 - Desalter Test Well Test Pump Iron & Manganese Fouling & Filtration System Pilot Study describes the iron and manganese fouling issues and the pilot study filtration system testing in more detail. The results and recommendations of the pilot study can be found in Appendix M. Iron and manganese pretreatment and pump operational recommendations will need to be implemented to reduce maintenance costs and prevent premature fouling of a future desalination systems reverse osmosis membranes.

Additionally, future water quality analyses might also include total organic carbon (TOC) and humic acids. Humic substances are naturally occurring organic compounds that result from the decomposition of plant, animal, and microbial matter. Colloidal natural organic matter (NOM) from reactions with humic substances with calcium and high TDS has the potential to cause fouling issues in reverse osmosis membranes (WRD, 2018).

9.1.3.2 Desalter Test Well Trends in Groundwater Elevation

Trends in groundwater levels in both the shallow and deeper aquifer are discussed in <u>Section 5.2 - Baseline</u> <u>Monitoring of Water Levels and Water Quality in the Monitoring Network</u>. Overall, the continuously monitored groundwater levels during the long-term pumping test showed no change in the shallow aquifer. Groundwater levels in the deeper aquifer were only locally affected by the Desalter Test Well. Changes in groundwater levels in the deeper aquifer were also affected by operations of the production wells in Morgan Run. The long-term test showed:

1. Pumping in the deeper aquifer does not affect groundwater surface water in the San Dieguito River at pumping rates used for the Long-Term Pumping Test.





This suggests that even during a single dry year, inflows into the basin can supply current groundwater uses.

9.1.3.3 Desalter Test Well Trends in Groundwater Quality & Specific Conductivity

The major cations and anions results from Desalter Test Well laboratory water quality samples collected during the short- and long-term pumping tests were plotted on a Trilinear Diagram (Piper Diagram) to determine the predominant water type (see Figure 33). The cations were found to be sodium and potassium type, with the prevailing anions of the chloride type. Ion clusters remained in relatively the same configuration throughout both pumping tests and the groundwater was determined to be sodium chloride type, as expected for marine and brackish groundwaters.

Most General Mineral and General Physical constituents reported for the Desalter Test Well during the Long-Term Pumping Test remained stable, and those with increasing or decreasing trends were unremarkable. Between April 2020 and December 2020, the water's hardness had increased by 180 mg CaCO3/L. Elevated but stable boron concentrations were reported in the May 2019, April 2020, and September 2020 samples, but was found to be below the laboratory reporting limit near the end of the pumping test in December 2020. Chloride, magnesium, potassium had slight upward trends based on the reported lab results from the three samples collected during the long-term test. Nitrate as N, sulfate as SO4, manganese, and fluoride were found to have slight decreasing trends. Table 6-3 and attached Table 2 contain a summary of all the laboratory water quality results from samples collected from the Desalter Test Well during the long-term pumping test.

Continuous depth-specific electrical conductivity (EC) was recorded in the Desalter Test Well at a depth of 117 ft bgs, within the screen portion of the well, using an In Situ AquaTROLL 200 data logger for the duration of the long-term pumping test. This data was recorded every 15 minutes and provided high frequency recordings to monitor EC changes. Quarterly laboratory "blended" (water contribution from the entirety of the screen) EC samples were also collected from the discharge line near the well head for comparison. The downhole data logger reported EC between 5,800 to 6,200 μ S/cm @ 25°C for the majority of the long-term test, with a small increase of 200 to 400 μ S/cm during the last quarter of the test. The three laboratory blended samples collected during the long-term test were 500 to 1,000 μ S/cm lower than the corresponding depth-specific data logger EC values. This is expected in that mixing of waters through-out the well screen interval can result in different EC values. The lab samples indicate that there was a slight decreasing EC trend in the pumped test well water. Precipitation did not appear to have a noticeable effect on the desalter test well discharges which pumps from the deep aquifer. Figure 13 presents the specific conductivity recorded by the data logger and laboratory results, in addition to precipitation.





It is possible that basin pumping and desalting could result in improving water quality by allowing additional percolation of high-quality storm water during wet seasons and wet hydrological cycles. This potentially beneficial result cannot be assessed from the Long-Term Pumping test data discussed in this report, and it was not the purpose of the study. The Desalter Test Well pumping test rate and duration were not sufficient to make this long-term determination. Additional work and collection of controlled water quality data over a greater time period would be needed to analyze whether the amount of salts removed by the full-scale project would be more than the salts added to the groundwater through irrigation return flows. An initial analysis could be conducted using the calibrated groundwater model. But physical validation would require more significant pumping volumes and collection of water quality data for a period greater than one year.

9.1.3.4 Monitoring Network Trends in Groundwater Quality & Specific Conductivity

Specific conductivity acts as a surrogate for determination of TDS (see Appendix K). Laboratory conductivity remained consistent throughout the long-term test with the exception of Morgan Run P-11B. This suggests that the additional pumping from the Desalter Test Well and increased pumping from the Morgan Run wells did not increase the salinity in the middle basin where pumping occurred.

Of the 6 observation wells equipped with depth-specific electrical conductivity data loggers, Valley 7 Well and Morgan Run Test Well were the only locations to present slight changes in their EC signatures after the Desalter Test Well pump was turned on or off (see Figure 27). These influences were expected due to their proximity to the pumping well and their deep aquifer screen completions. The point of influence in the EC Figure mimics the observation well water level effects from the desalter well pumping seen in Figure 19.

9.1.3.5 Trends in Groundwater Quality in Morgan Run P-11B

Piezometer P-11B showed a significant increase in TDS in the second sampling period (4,690 mg/L). The TDS concentration in the third sampling period (2,517 mg/L) was less than the second period, but still significantly higher than the first sampling period (1,080 mg/L).

The well screen in P-11B crosses the aquitard which separates the shallow and deeper aquifer. Groundwater levels in the shallow aquifer are slightly higher than the deeper aquifer. During the long-term test, it is likely that higher salinity water in the shallow aquifer moved downward into P-11B. This piezometer should be considered for destruction to eliminate a pathway during long-term operations.

9.2 San Dieguito Valley Groundwater Model Update and Recalibration Findings

• San Dieguito Valley Groundwater Model was updated and recalibrated to 2020 using recent data collected from the construction of the Desalter Test Well and long-term pumping test,





which improved the accuracy of the model simulation, especially for the area close to the Test Well.

- The annual average water balance for the calibration period calculated by the updated groundwater model was similar to previous 2017 modeling results. The change in storage calculated by the updated groundwater model for the calibration period only decreased by 20 acre-ft/yr (from 130 acre-ft/yr to 110 acre-ft/yr) comparing to the 2017 modeling results.
- The results of the updated scenario run indicate that the proposed extraction of 1,600 acre-ft/yr at the Desalter Test Well, Sites 2 and 2A will create a minor decrease in storage of 150 acre-ft/yr based on the hydrology of the modeling period and current (2020) groundwater in storage. Comparing to the 2017 scenario run results, which has a decrease in storage of 260 acre-ft/yr, the updated model results indicate an increase in change in storage by 110 acre-ft/yr.
- Full scale production will result in a drawdown in both the shallow and deep aquifers. Wider distribution of Project pumping will lessen the impacts on the Morgan Run pumping wells and other nearby wells. Some area wells may require lowering of pumps depending on proximity to future desalter test wells.

The modelling suggests that the increase in streambed percolation (river loss) is about 120 acre-ft/yr and a reduction in evapotranspiration of 1,180 acre-ft/yr and surface outflow at the Ocean of approximately 30 acre-ft/yr. This represents beneficial use of water that would otherwise flow to the ocean. Figure 55 summarizes the groundwater budget for all the calibration model runs and scenario model runs in performed during the 2017 feasibility study and this model update. The blue arrows in the figure indicate inflows into the groundwater basin. Yellow arrows indicate outflow from the basin. The yellow arrow for change in storage indicates a decrease in basin storage under the project extraction of 1,600 acre-ft/yr at the Desalter Test Well, Site 2 and Site 2A.

The decrease in basin storage of 150 acre-ft/yr from pumping 1,600 acre-ft/yr over 20 years represents less than 1% of basin storage. It should be noted that the base period used for modeling (2001 - 2020) was selected because of the maximum availability of data but represents a drier than average period.

During above average rainfall periods, it is likely that groundwater storage will be replenished as is typical for many shallow basins in Southern California.





10.0 References

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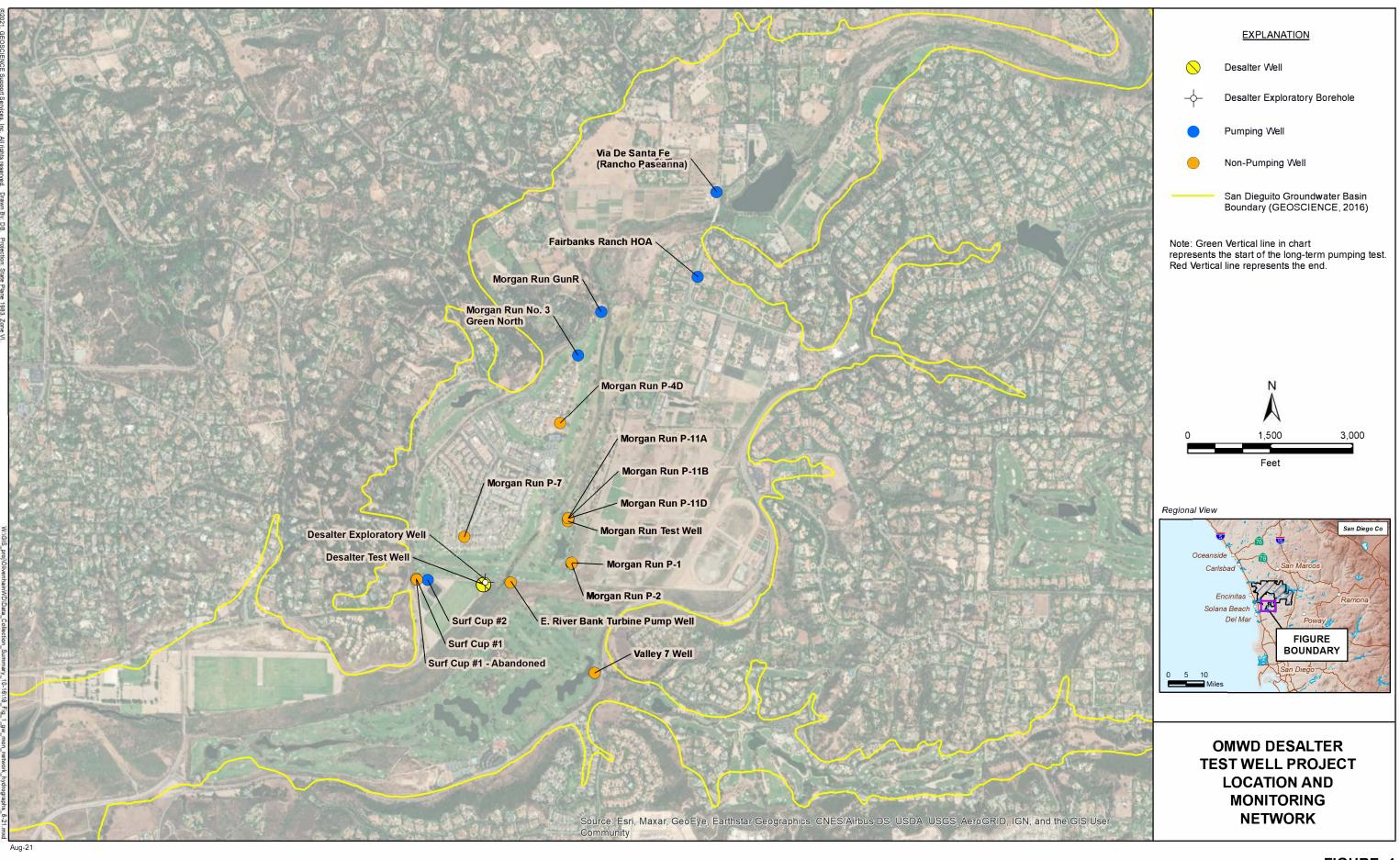
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FIGURES



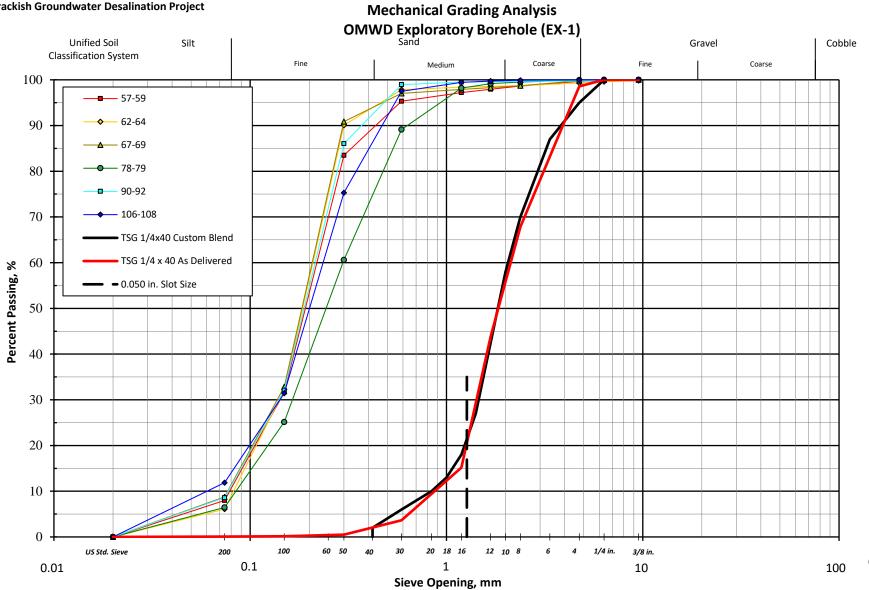


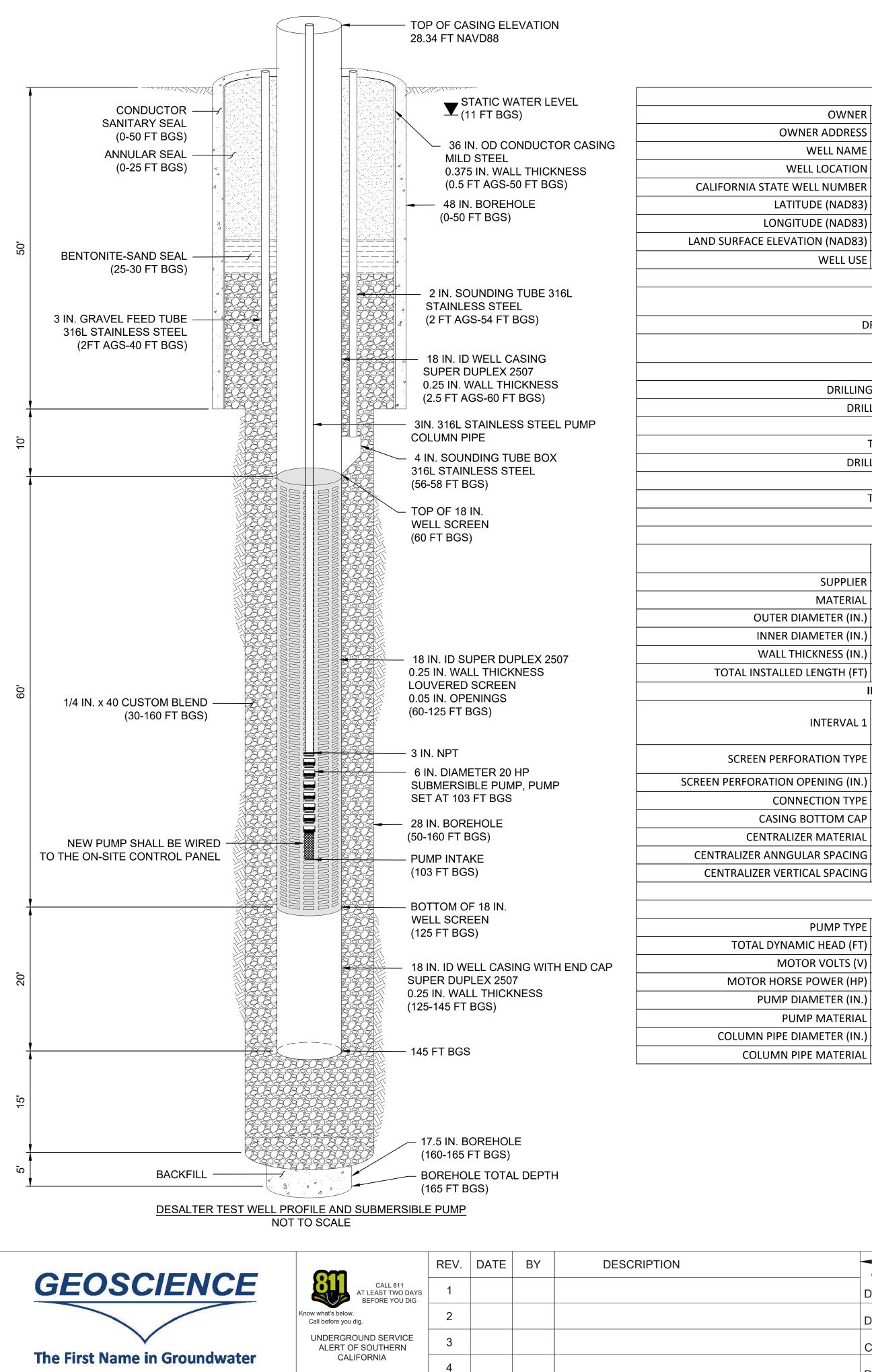
OLIVENHAIN MUNICIPAL WATER DISTRICT

REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION DESIGN PROJECT



Olivenhain Municipal Water District Report of Design Pilot Testing for the San Dieguito Valley Brackish Groundwater Desalination Project





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WELL INFORMATION					GROUTING AND SEALIN	IG		
OWNER		OLIVEHAIN MUNIC	PAL WATER DISTRICT			CONDUCTOR CASING		WELL CASING
OWNER ADDRESS		1966 OLIVEHAIN RD, ENCINITAS, CALIFORNIA			MATERIAL	10.3 SACK SAND-CEMENT SLURRY	10.3 SACI	K SAND-CEMENT SLURRY
WELL NAME			TEST WELL		DEPTH (FT BELOW GROUND SURFACE)	0 - 50		0 - 25
WELL LOCATION	14989 VIA I	DE LA VALLE, DEL MAR, (•	PORTS PARK)	CALCULATED VOLUME (CUBIC YD)	10.5		5
ORNIA STATE WELL NUMBER			BD		MAXIMUM LIFT HEIGHT (FT)	50		25
LATITUDE (NAD83)		32.98	35331 N		NUMBER OF LIFTS	1		1
LONGITUDE (NAD83)		-117.2	12779 W				IFNT	▲
JRFACE ELEVATION (NAD83) 28						GRAVEL FEE		SOUNDING TUBE
WELL USE		TEST	WELL		PLACEMENT (QUADRANT)	NW		SW
	BOR	EHOLE			MATERIAL		316L STAINLESS ST	
		CONDUCTOR BOREHOLE	PILOT BOREHOLE	FINAL BOREHOLE	NOMINAL PIPE DIAMETER	2	STOL STAINLESS ST	2
סט	RILLING CONTRACTOR		NSEN DRILLING COMPA	NV	PIPE SCHEDULE	40		40
				ROLLER CONE HOLE	INSTALLED LENGTH (FT)	40		58
	DRILL BIT TYPE	SOLID STEM AUGER	TRICONE MILL TOOTH	OPENER				
	DRILLING METHOD	SOLID STEM AUGER	FLUID REVERSE	FLUID REVERSE	CONNECTION METHOD CENTRALIZER ANGULAR SPACING (DEGREES)	WELD	,	WELD
DRILLING	FLUID COMPOSITION	WATER	WATER/BENTONITE	WATER/BENTONITE		-		-
DRILL	ING PASS NUMBER 1:		-		LENGTH OF OPENING FOR SOUNDING TUBE			3 IN. x 3 IN. x 2 FT
	DIAMETER (IN.)	48	17.5	35.25 (CONDUCTOR)		FILTER PACK DESIGN		
T	OTAL DEPTH (FT BGS)	50	165	50	FILTER PACK SUPPLIER		TACNA SAND AND GI	
DRILL	ING PASS NUMBER 2:		-		SUPPLIER'S PRODUCT DESIGNATION		1/4 IN. X 40 CUSTOM	BLEND
	DIAMETER (IN.)	_	-	28	ESTIMATED FILTER PACK VOLUME (CU. YDS.)		14	
T	OTAL DEPTH (FT BGS)		_	160	FLUID TO BE ADDED TO FILTER PACK		WATER	
					CHLORINE TO BE ADDED TO FILTER PACK (GAL/% CHLORINE)	1-2 GALLONS (12.5% SC	DIUM HYPOCHLORITE) PER CUBIC YARD FILTER PACK
	CASING AND S	CREEN SCHEDULE			FILTER PACK INTERVAL (FT BGS)		30 - 160	
	CONDUCTOR CASING	WELL CASING DIAMETER 1	WELL CASING DIAMETER 2	WELL SCREEN	BENTONITE-SAND LAYER (FT BGS)		25 - 30	
SUPPLIER ROSCOE MOSS CO. ROSCOE MOSS CO.				MECH	ANCIAL GRADING ANALYSIS C			
MATERIAL	MILD STEEL		SUPER DUPLEX 2507		U.S. STANDARD SIEVE SIZE	OPENIN		CUMULATIVE PERCENT PASSIN
OUTER DIAMETER (IN.)	36	18.50	18.50	18.50		(IN.)	(MM)	
INNER DIAMETER (IN.)	35.25	18	18	18	1/4"	0.250	6.35	100.0
WALL THICKNESS (IN.)	0.375	0.250	0.250	0.250	4	0.187	4.75	95.0
TAL INSTALLED LENGTH (FT)	50.5	57.5	20	65	6	0.132	3.36	87.0
		(FT BGS) AND LENGTH (8	0.094	2.38	70.0
			, 125 FT BGS - 145 FT		10	0.079	2.00	58.0
INTERVAL 1	BGS	2.5 FT AGS - 60 FT BGS (57.5 FT TOTAL)	BGS	60 FT BGS - 125 FT BGS (65 FT TOTAL)	14	0.056	1.41	27.0
	(50.5 FT TOTAL)		(20 FT TOTAL)		16	0.047	1.19	18.0
SCREEN PERFORATION TYPE	-	-	-	HORIZONTAL FUL-FLO LOUVERED PATTERN	18	0.039	1.00	13.0
ERFORATION OPENING (IN.)	_			0.050	20	0.033	0.84	10.0
CONNECTION TYPE	BUTT WELD		LLAR CONNECTION TWO		30	0.023	0.59	6.0
CASING BOTTOM CAP	-		SUPER DUPLEX 2507		40	0.017	0.42	2.0
CENTRALIZER MATERIAL	MILD STEEL		SUPER DUPLEX 2507					
ALIZER ANNGULAR SPACING	90°							
RALIZER VERTICAL SPACING	- 90							
	-		120 L1					
	SUBMERSIBL	E PUMP DESIGN						
PUMP TYPE		GRUNDF	OS SP 230S					
TOTAL DYNAMIC HEAD (FT)		2	200					
	460							

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6

304 STAINLESS STEEL

3

316L STAINLESS STEEL

MOTOR VOLTS (V)

PUMP MATERIAL

PUMP DIAMETER (IN.)

ABBREVIATIONS LIST:

AGS	ABOVE GROUND SURFACE
BGS	BELOW GROUND SURFACE
ID	INSIDE DIAMETER
OD	OUTSIDE DIAMETER



OLIVENHAIN MUNICIPAL WATER DISTRICT DESALTER TEST WELL

FIGURE NO.

3

AS-BUILT WELL PROFILE AND COMPLETION DETAILS

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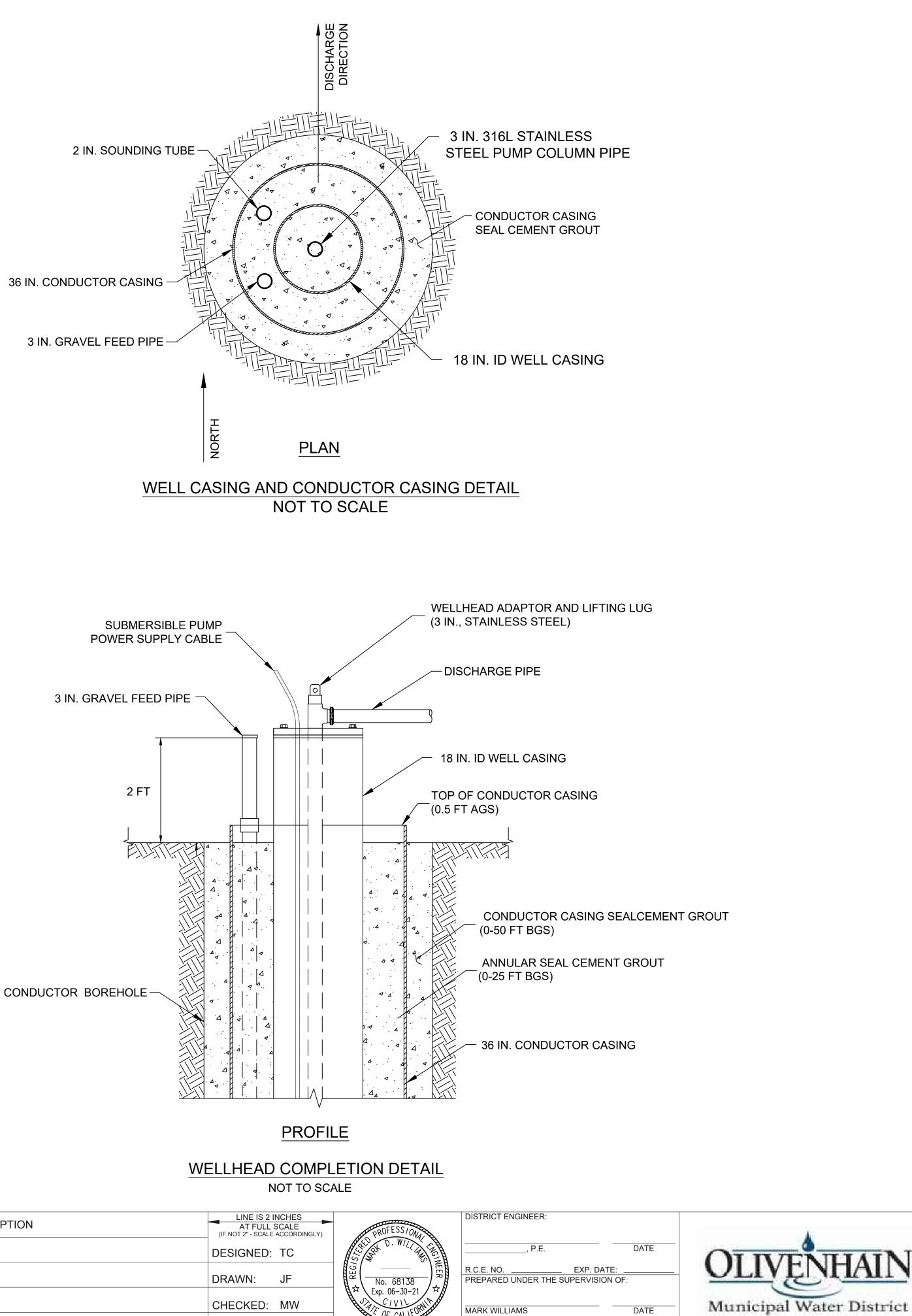
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3			
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ABBREVIATIONS LIST:

AGS	ABOVE GROUND SURFACE
BGS	BELOW GROUND SURFACE
ID	INSIDE DIAMETER
OD	OUTSIDE DIAMETER



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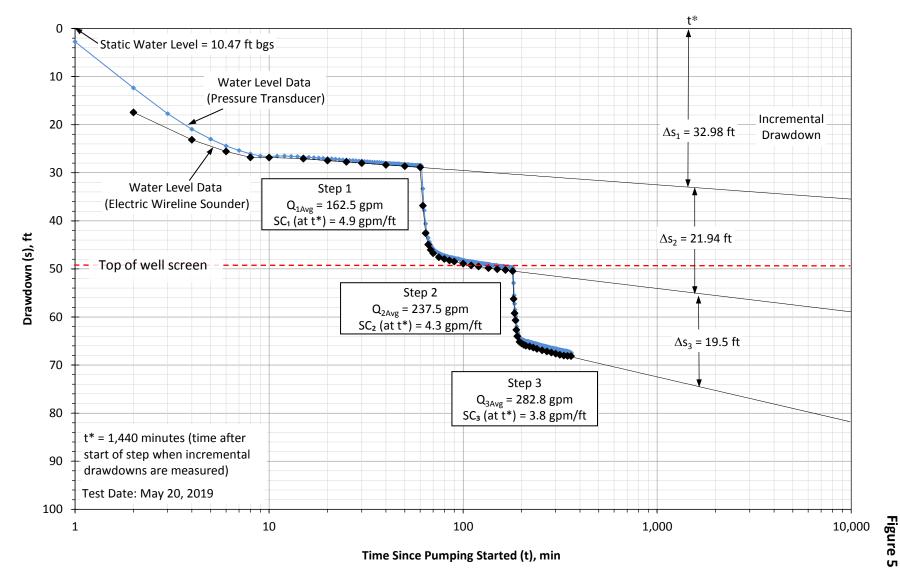
OLIVENHAIN MUNICIPAL WATER DISTRICT DESALTER TEST WELL

FIGURE NO.

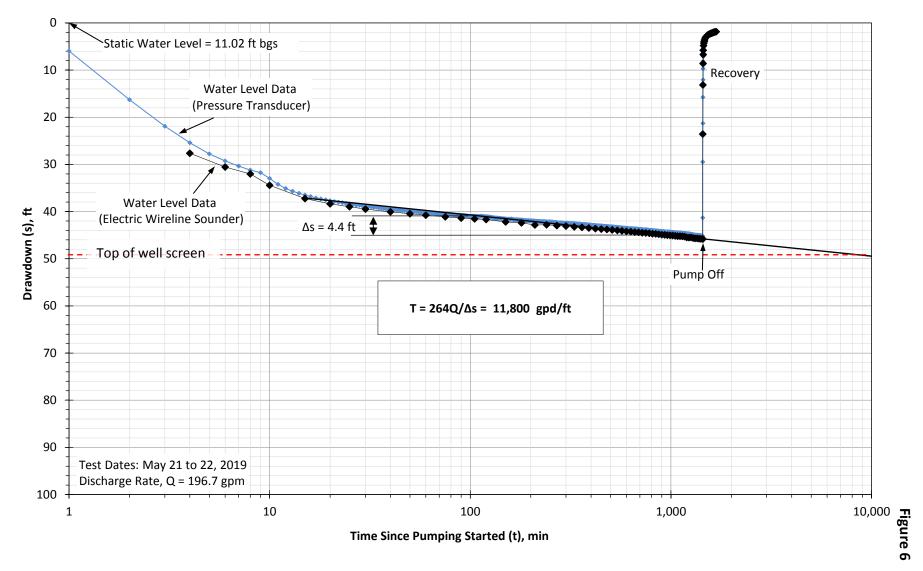
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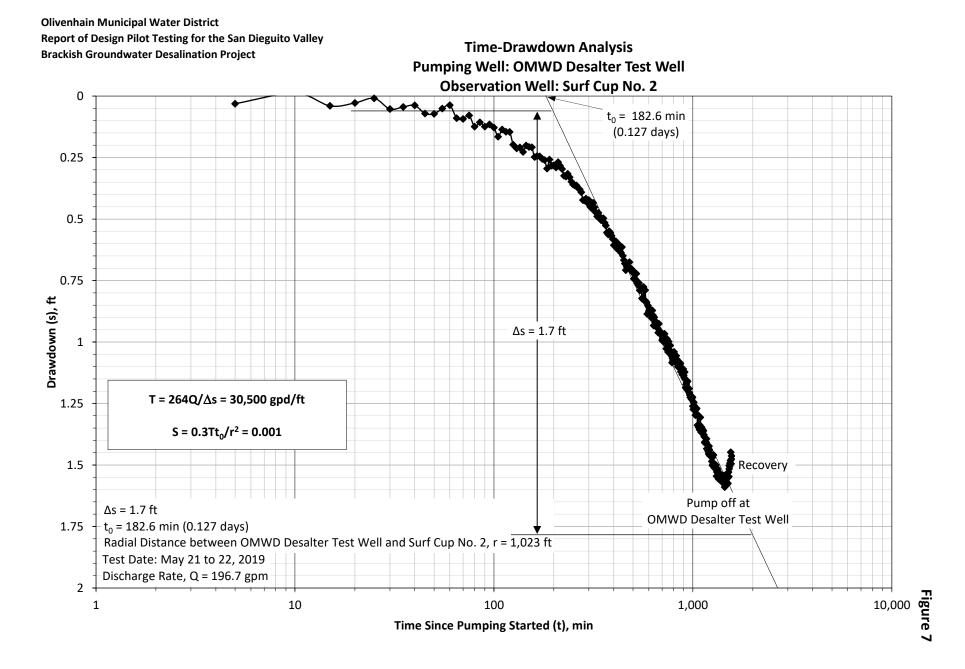
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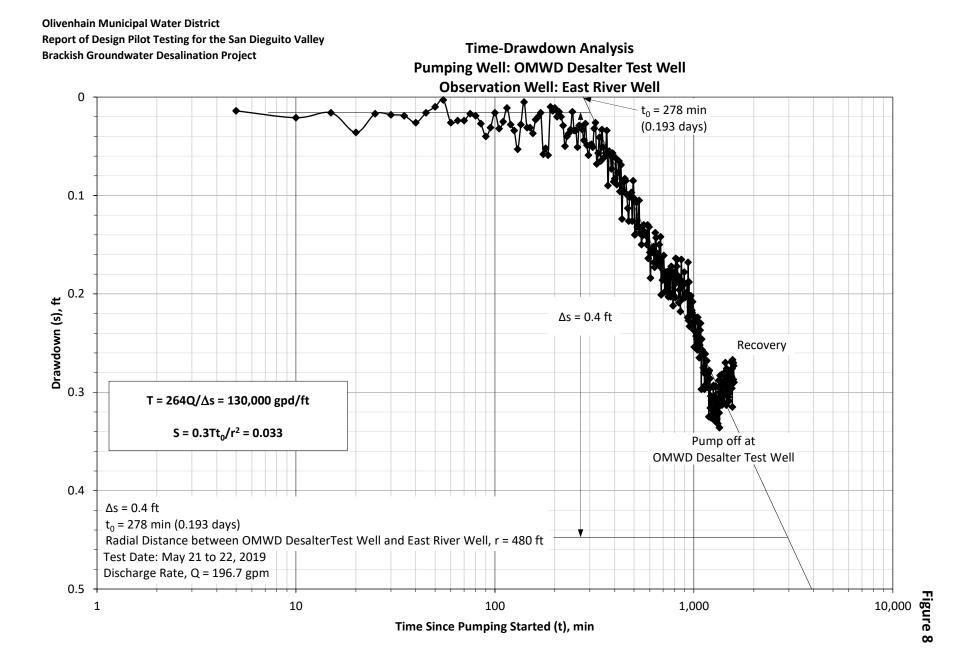
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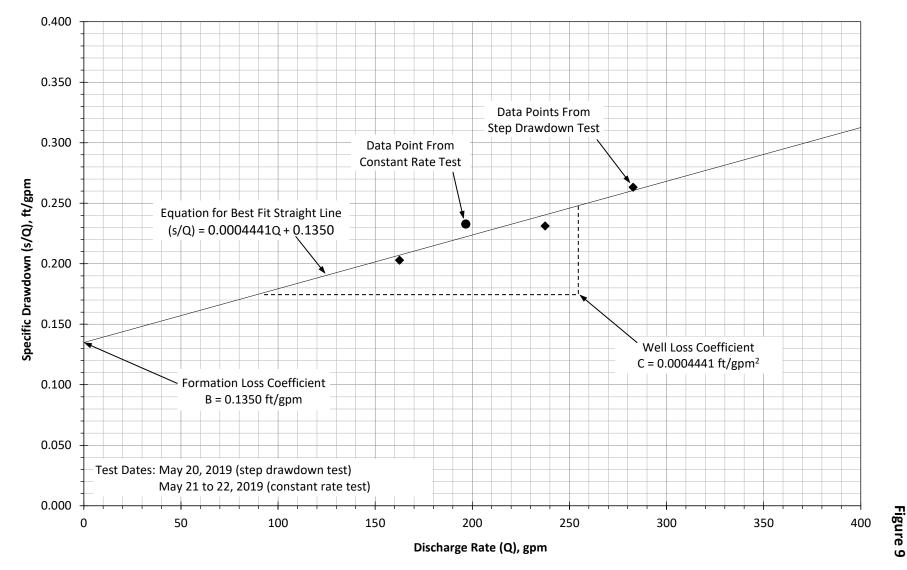
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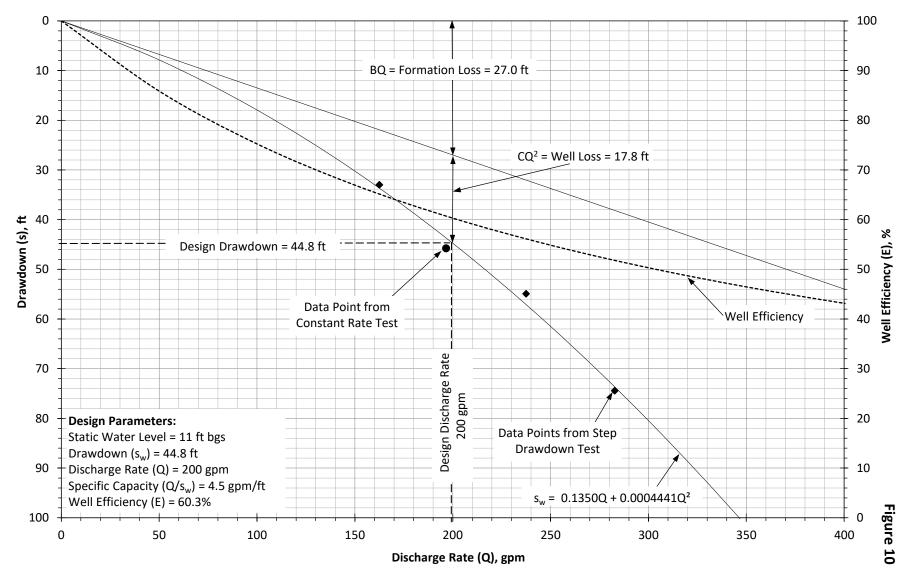


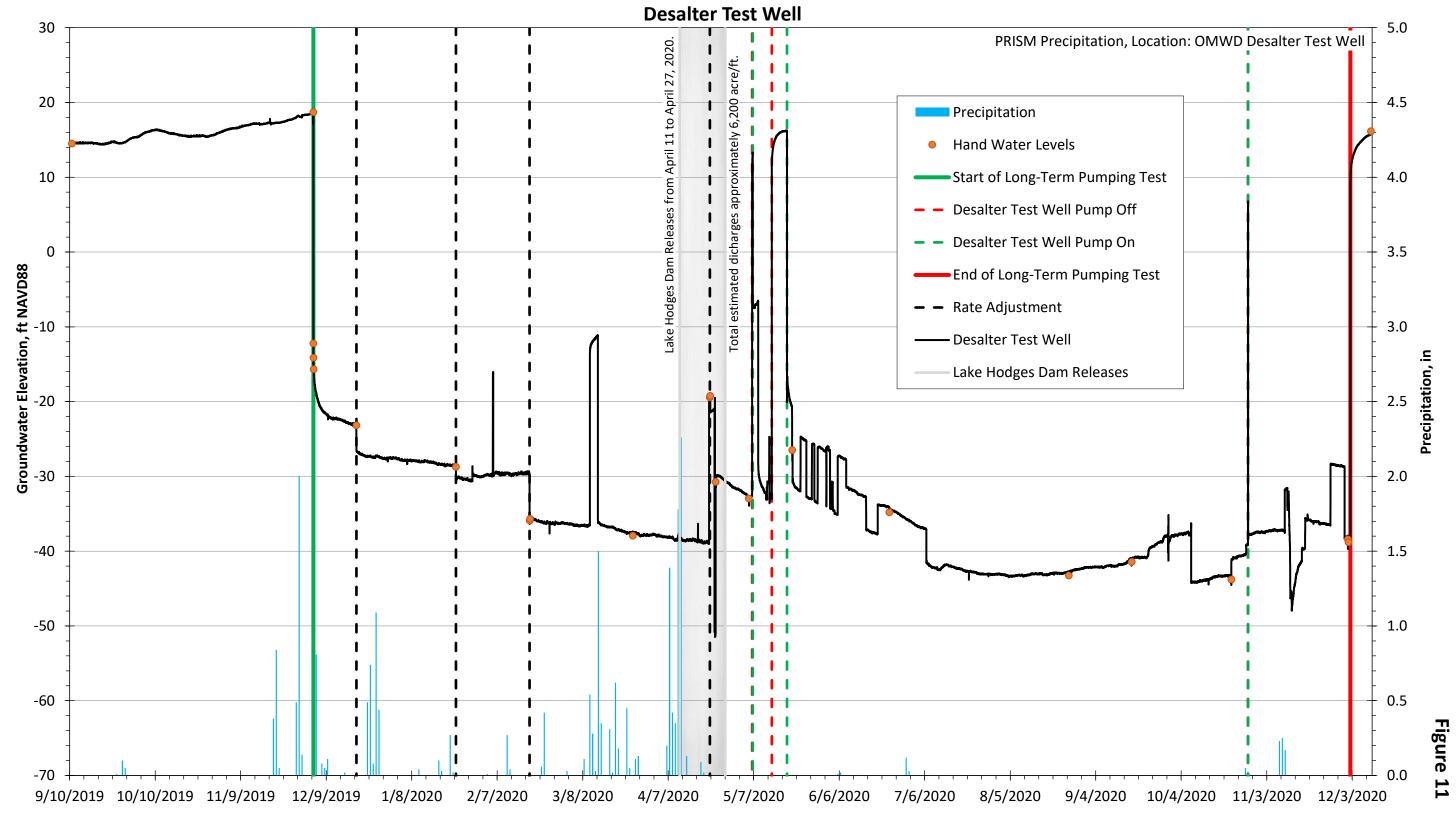


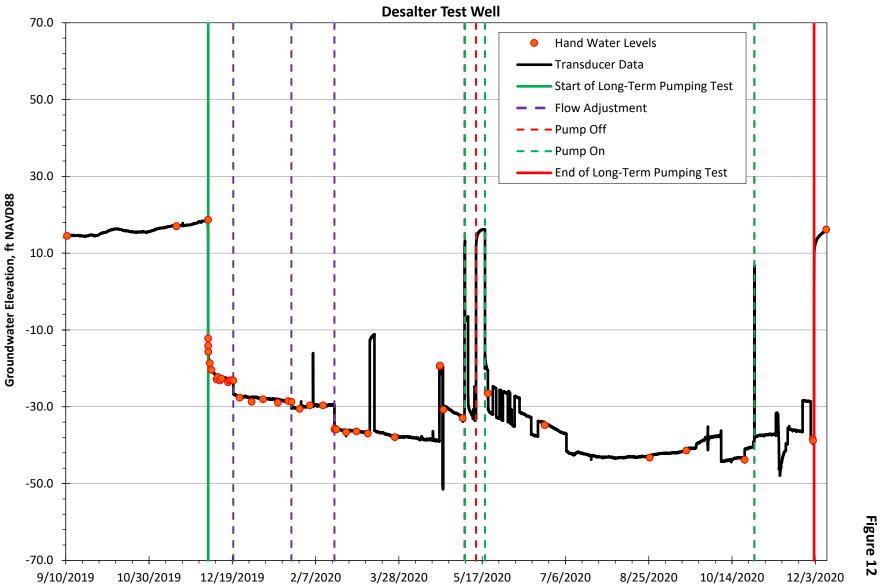
Specific Drawdown OMWD Desalter Test Well



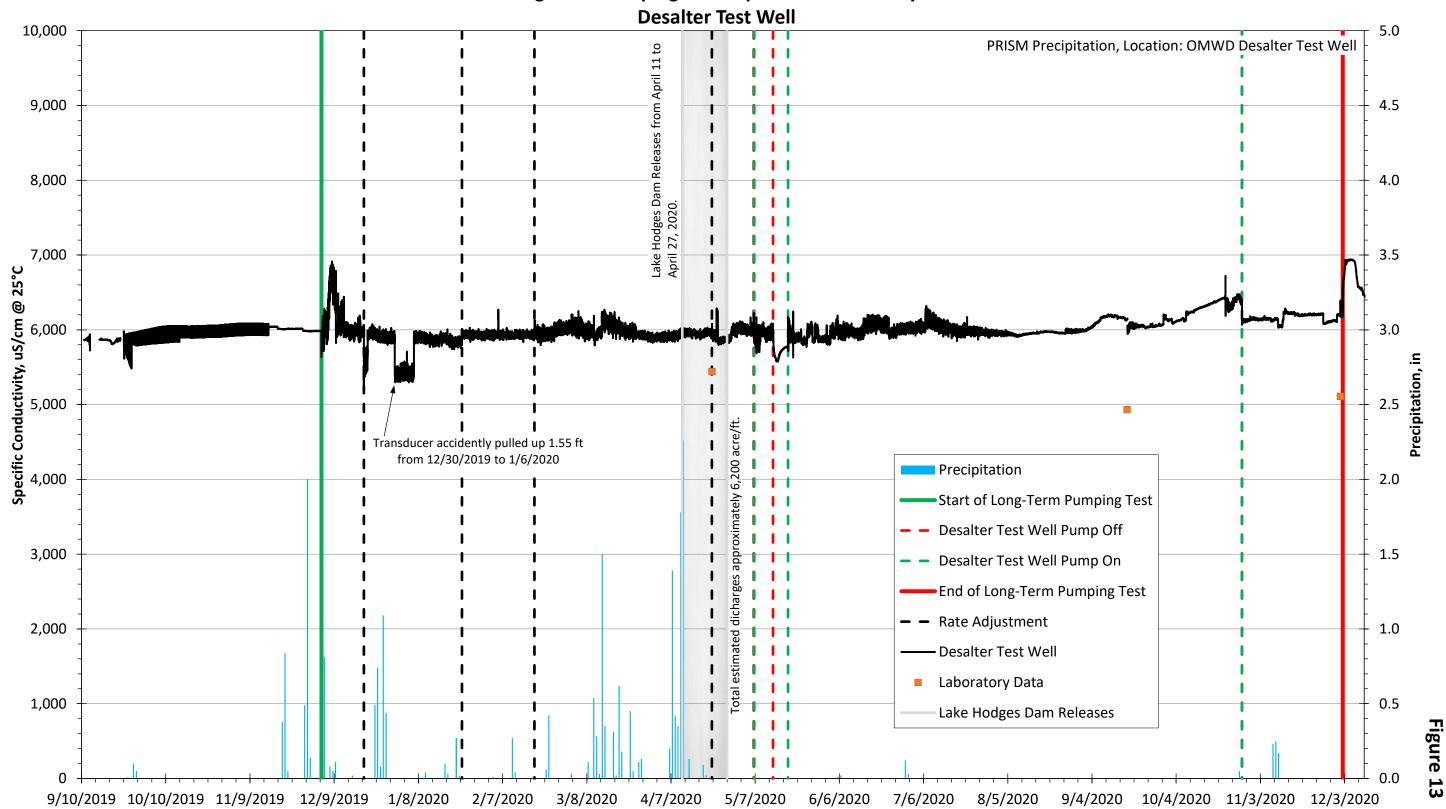
Specific Capacity and Well Efficiency Diagram OMWD Desalter Test Well



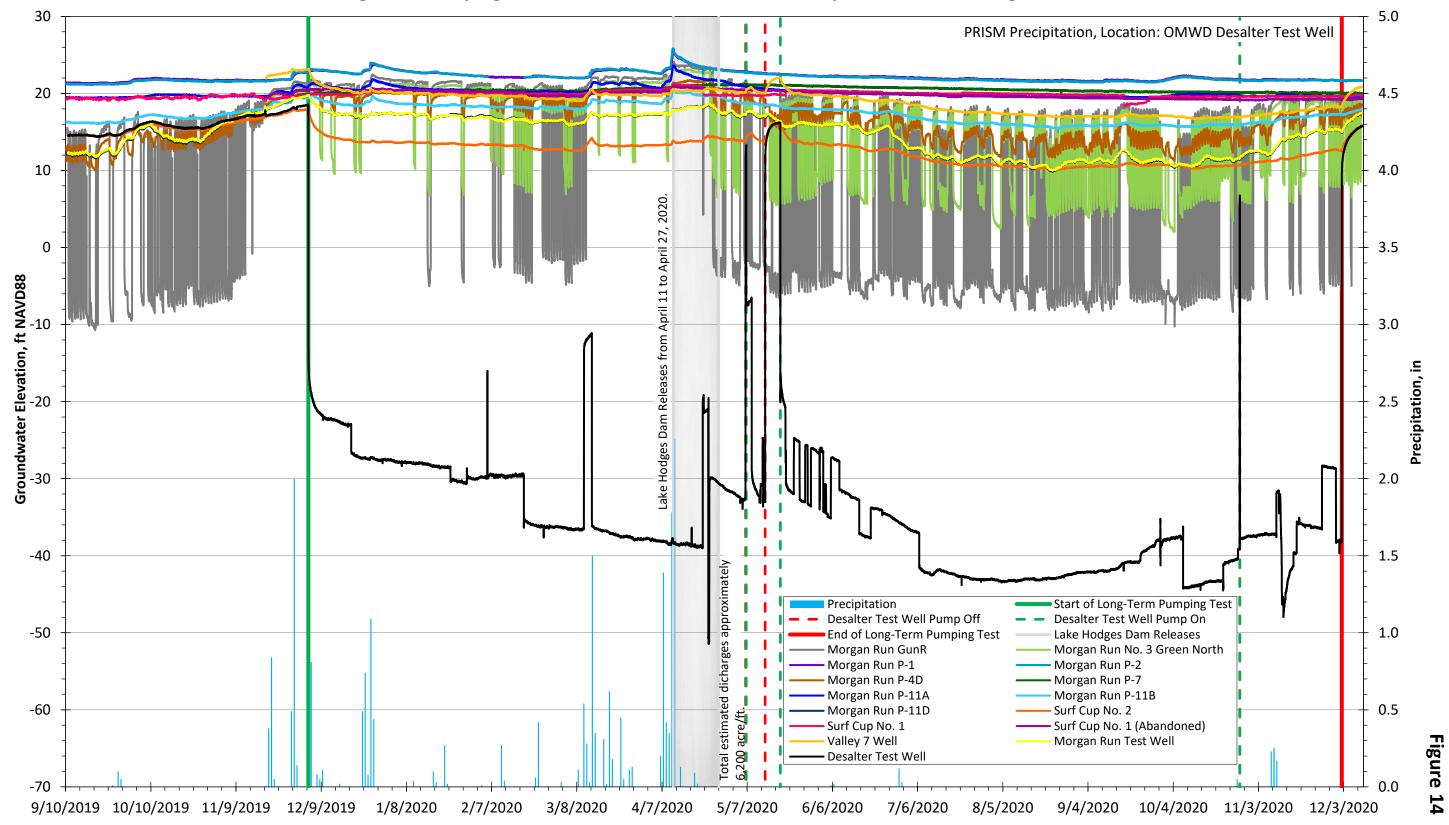




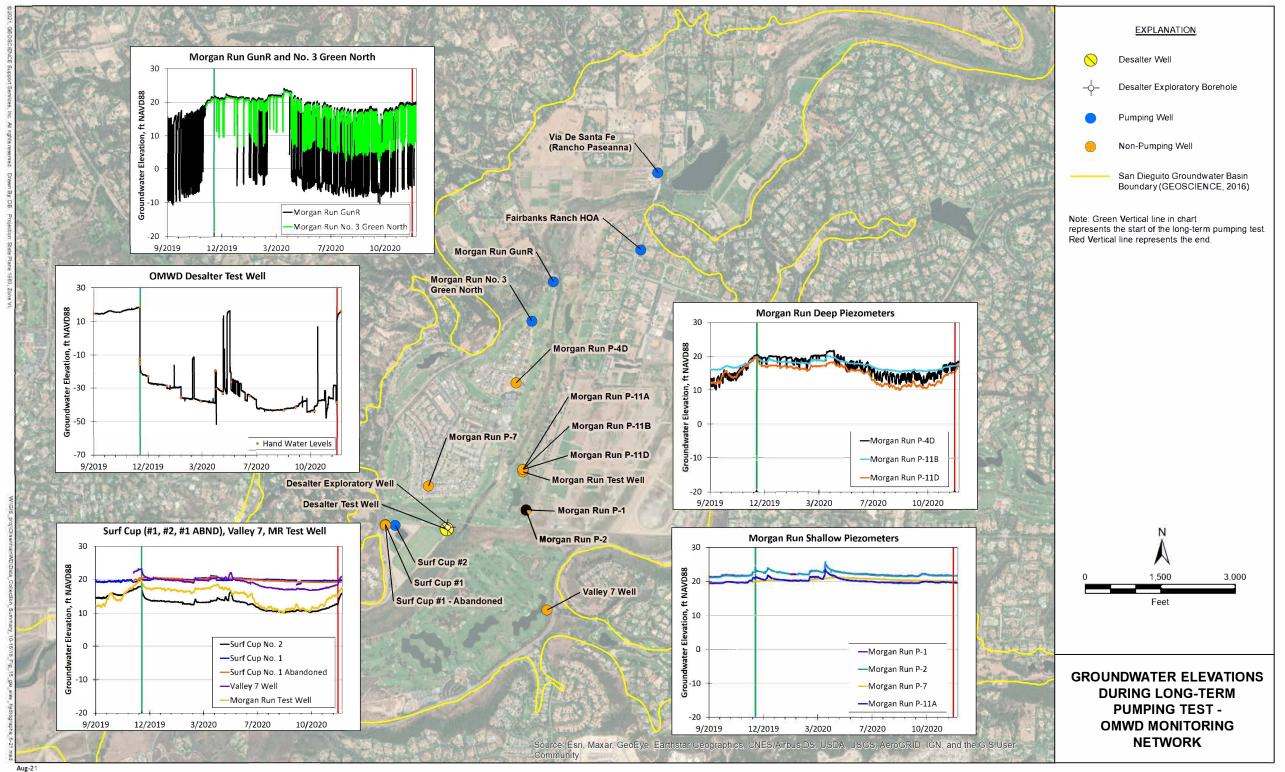
Long-Term Pumping Test - Groundwater Elevation -



Long-Term Pumping Test - Specific Conductivity -



Long-Term Pumping Test - Groundwater Elevation & Precipitation - Monitoring Network

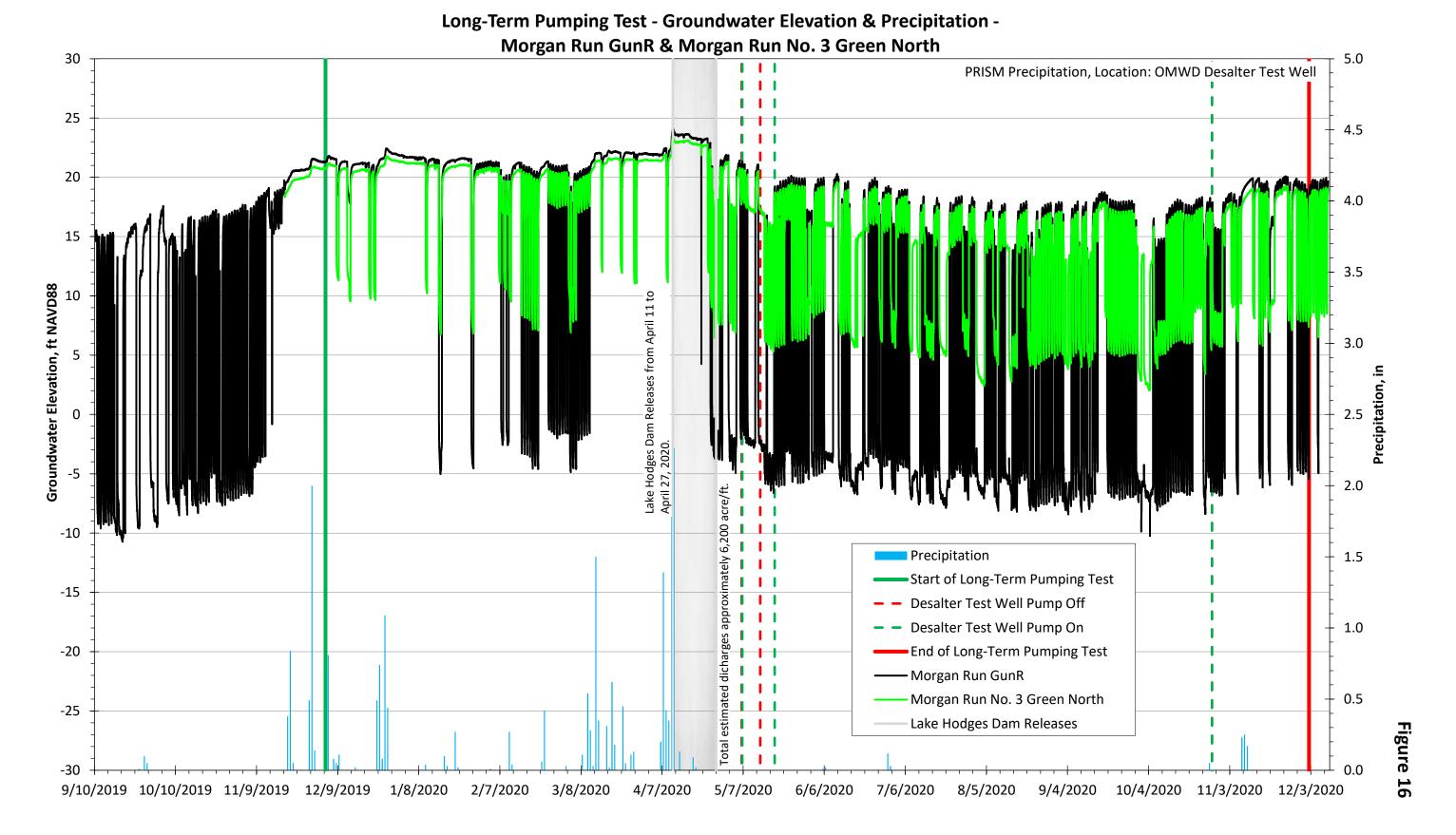


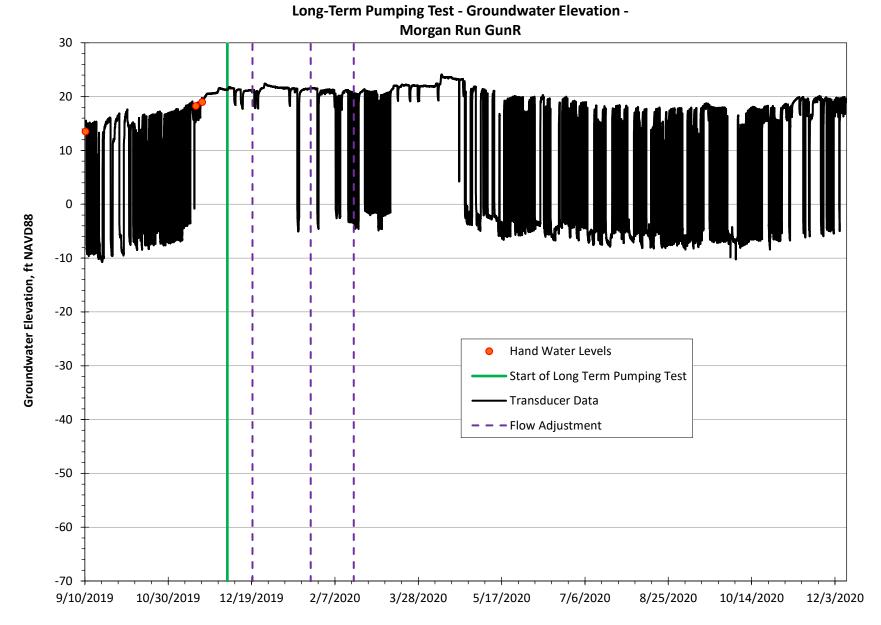
OLIVENHAIN MUNICIPAL WATER DISTRICT

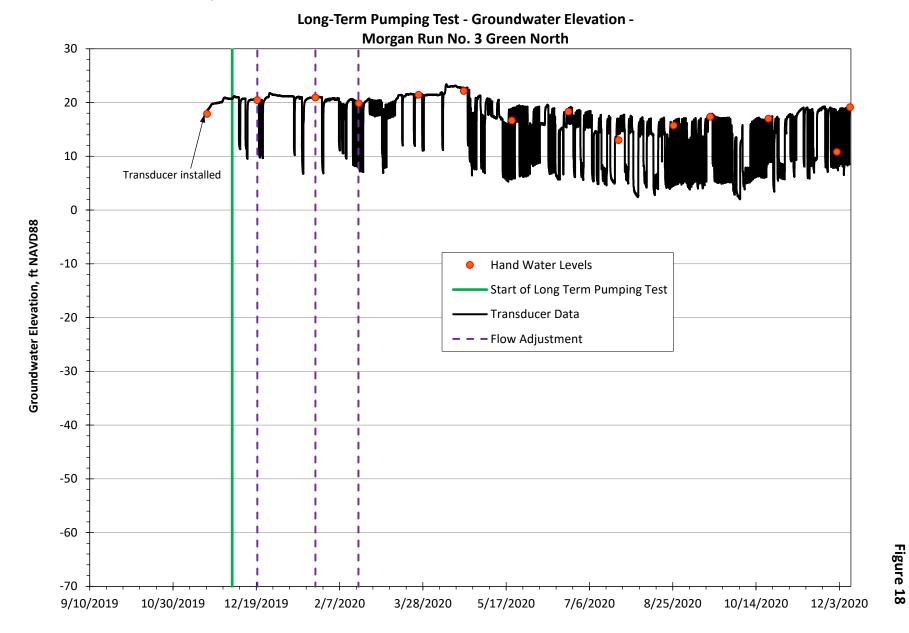
REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION DESIGN PROJECT

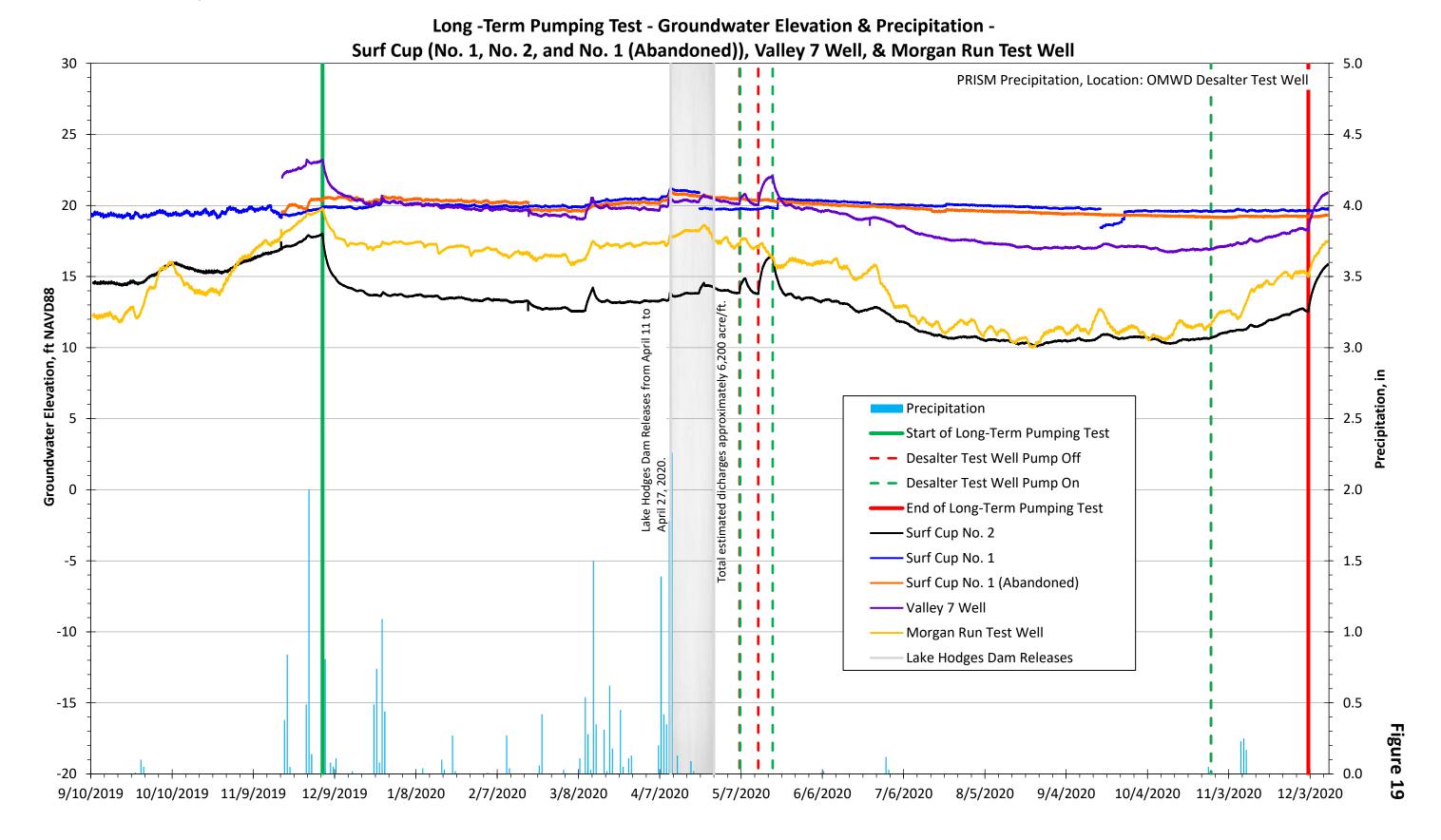
FIGURE 15

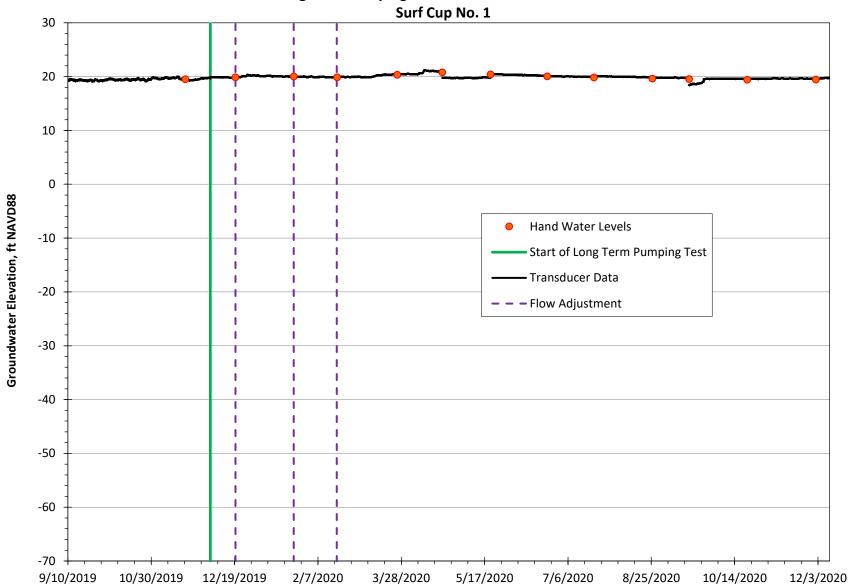




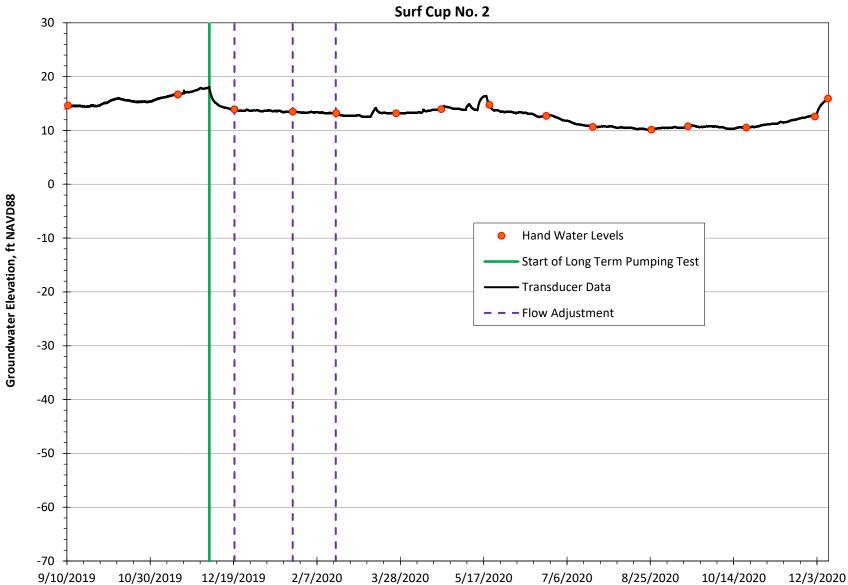




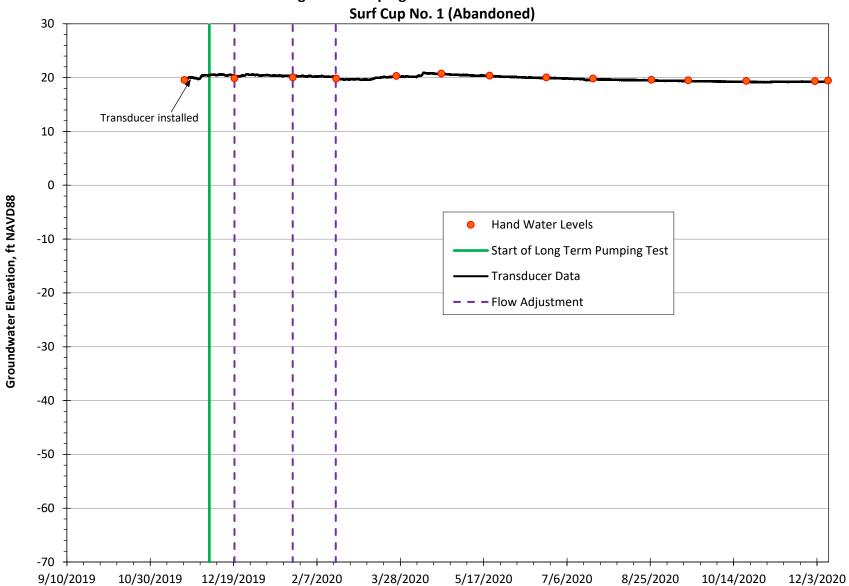




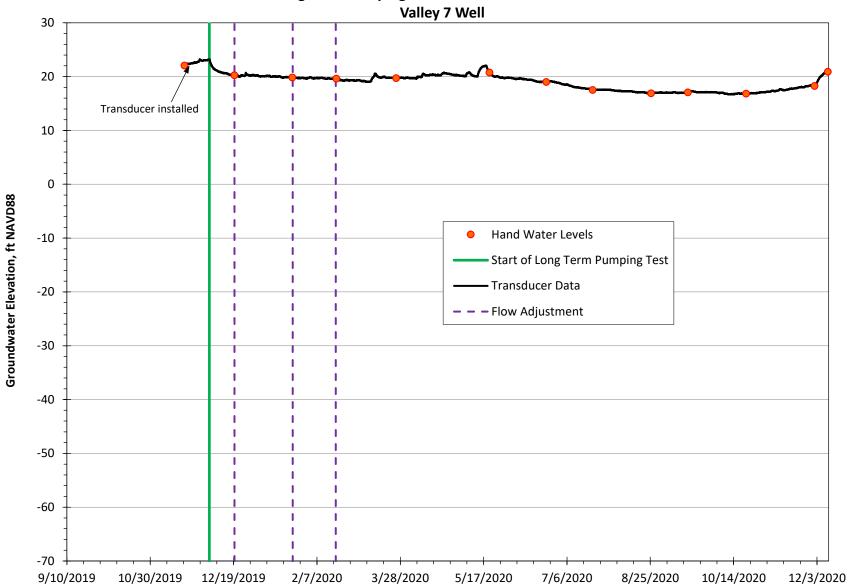
Long-Term Pumping Test - Groundwater Elevation -

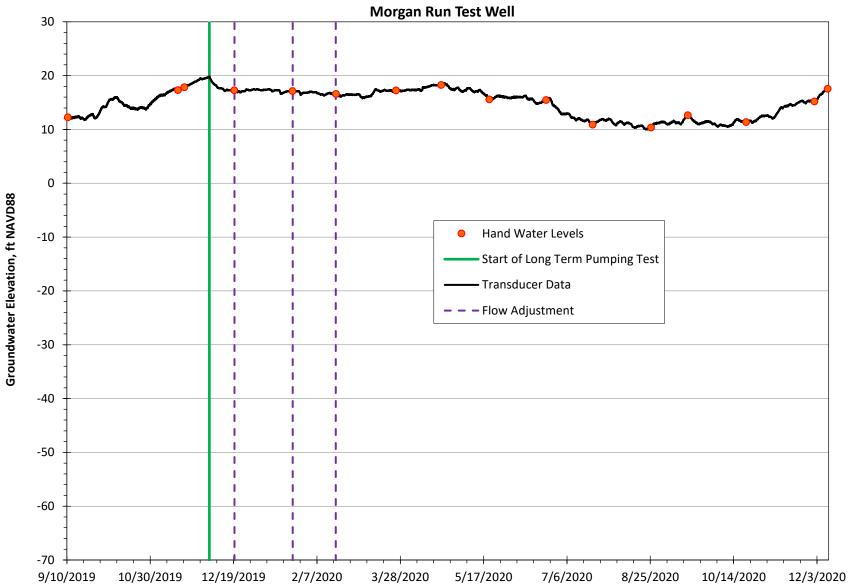


Long-Term Pumping Test - Groundwater Elevation -

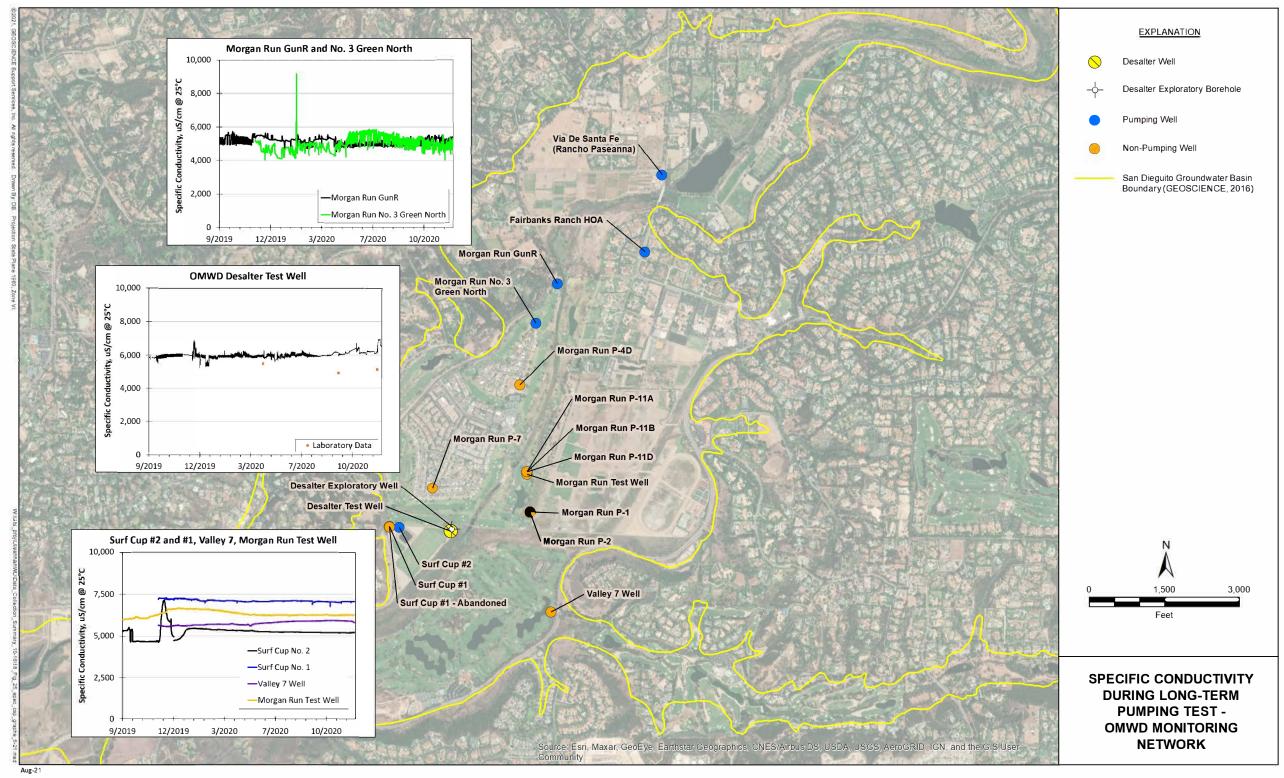


Long-Term Pumping Test - Groundwater Elevation -





Long-Term Pumping Test - Groundwater Elevation -



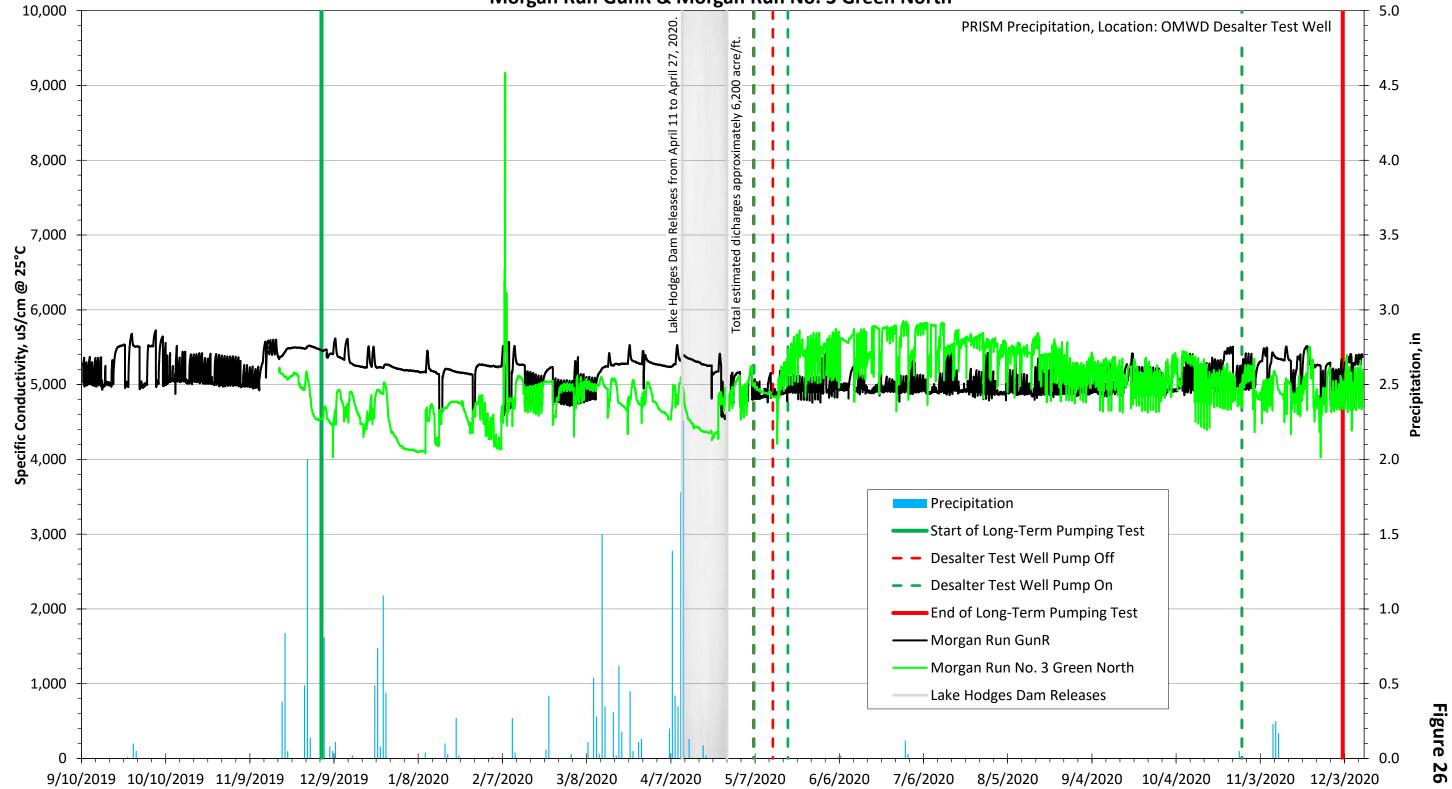
OLIVENHAIN MUNICIPAL WATER DISTRICT

REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION DESIGN PROJECT

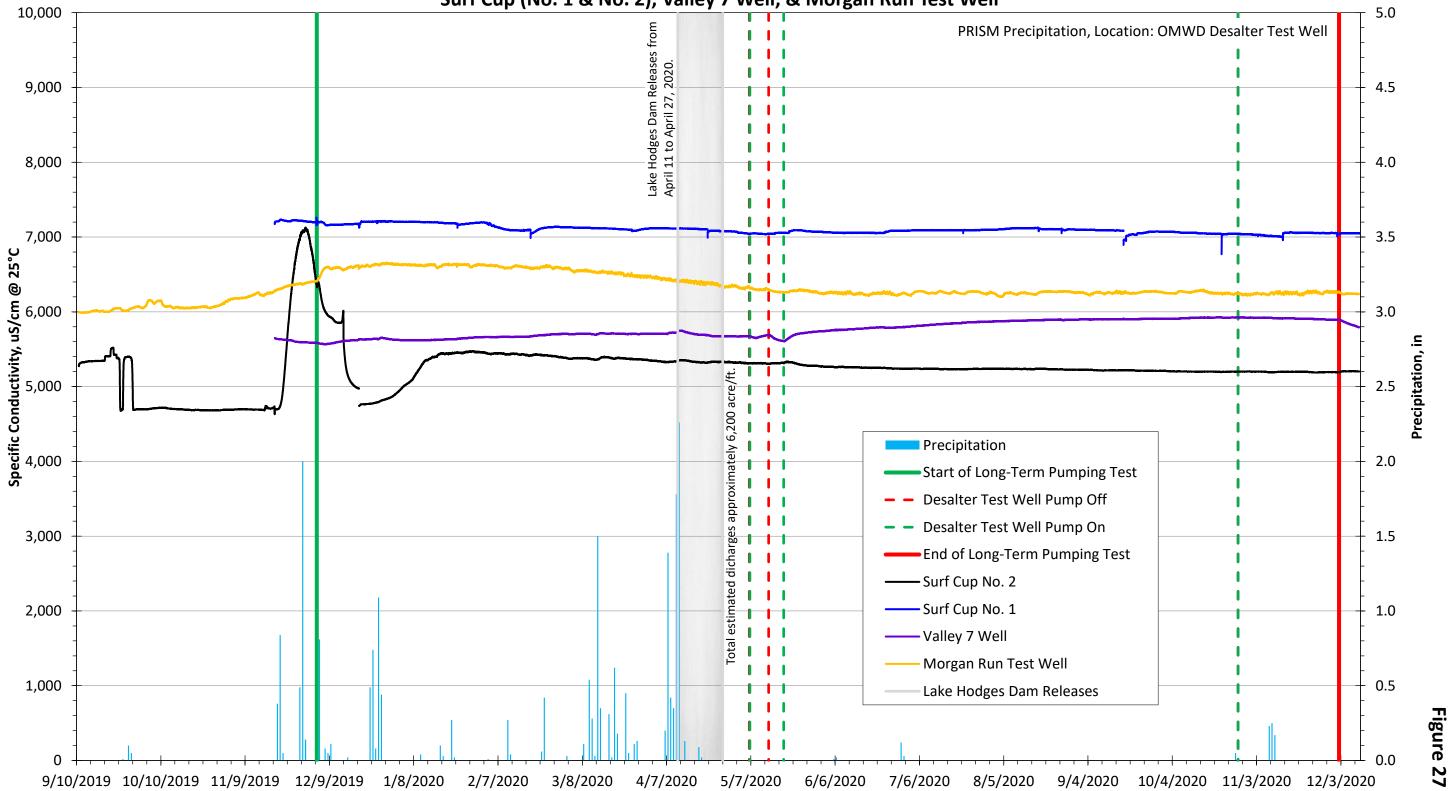
FIGURE 25

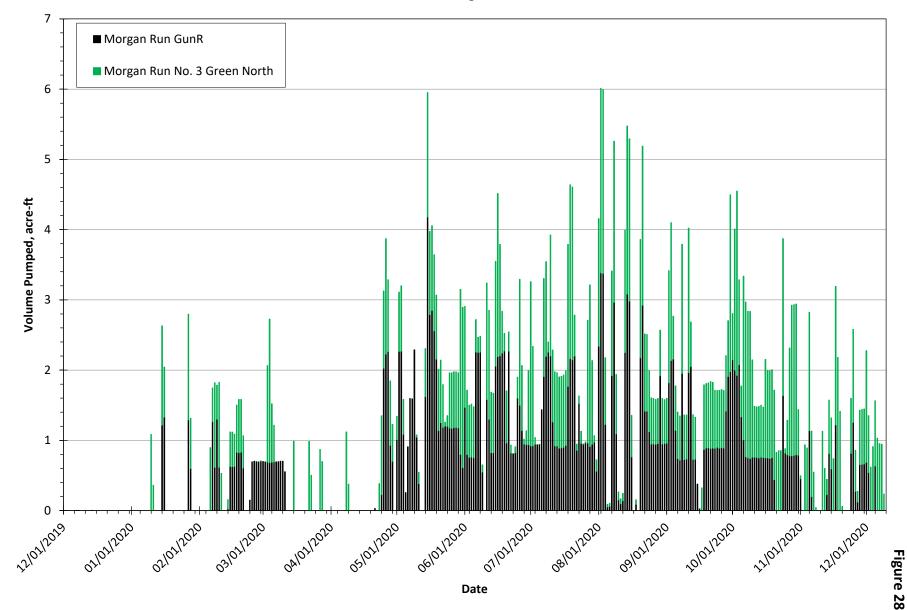


Long-Term Pumping Test - Specific Conductivity -Morgan Run GunR & Morgan Run No. 3 Green North

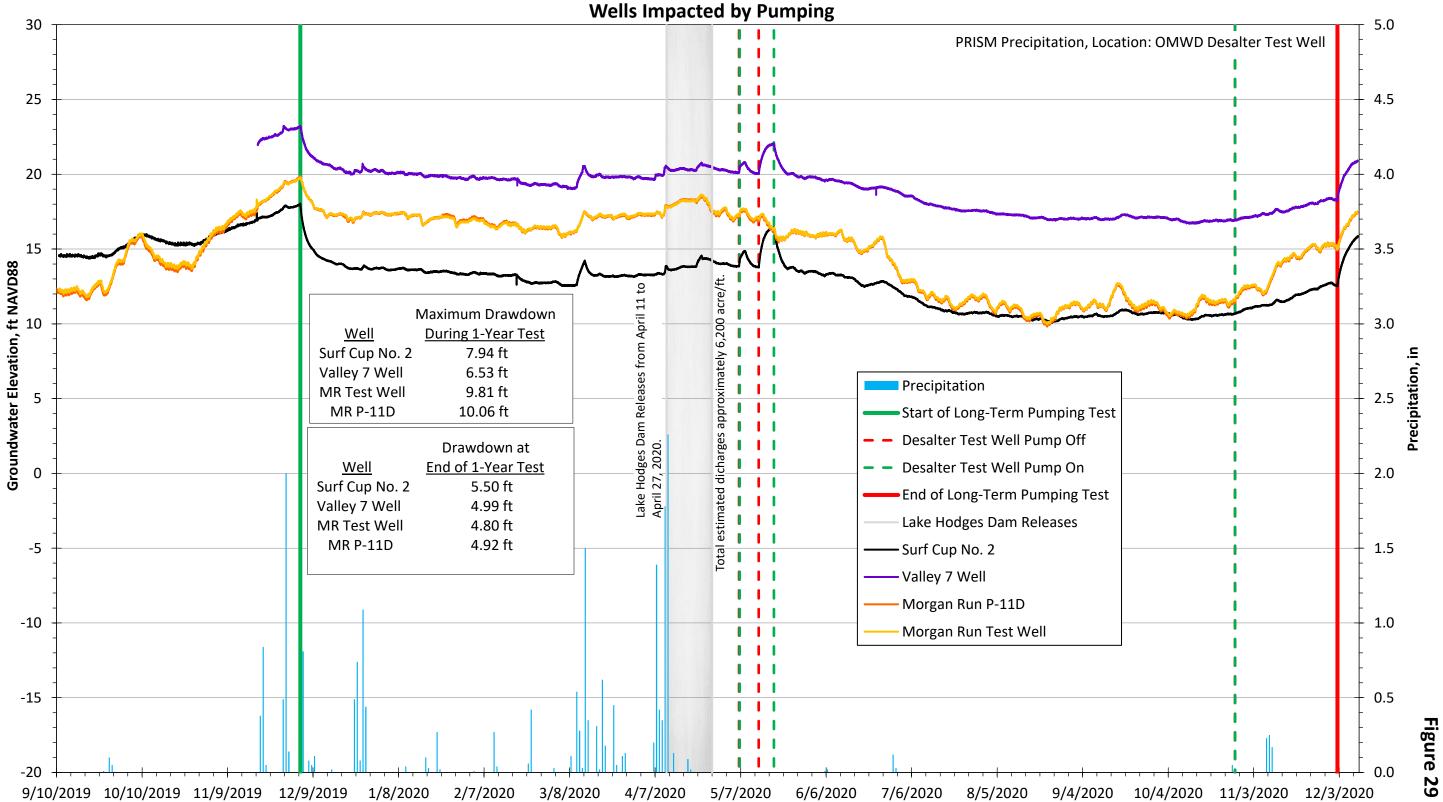


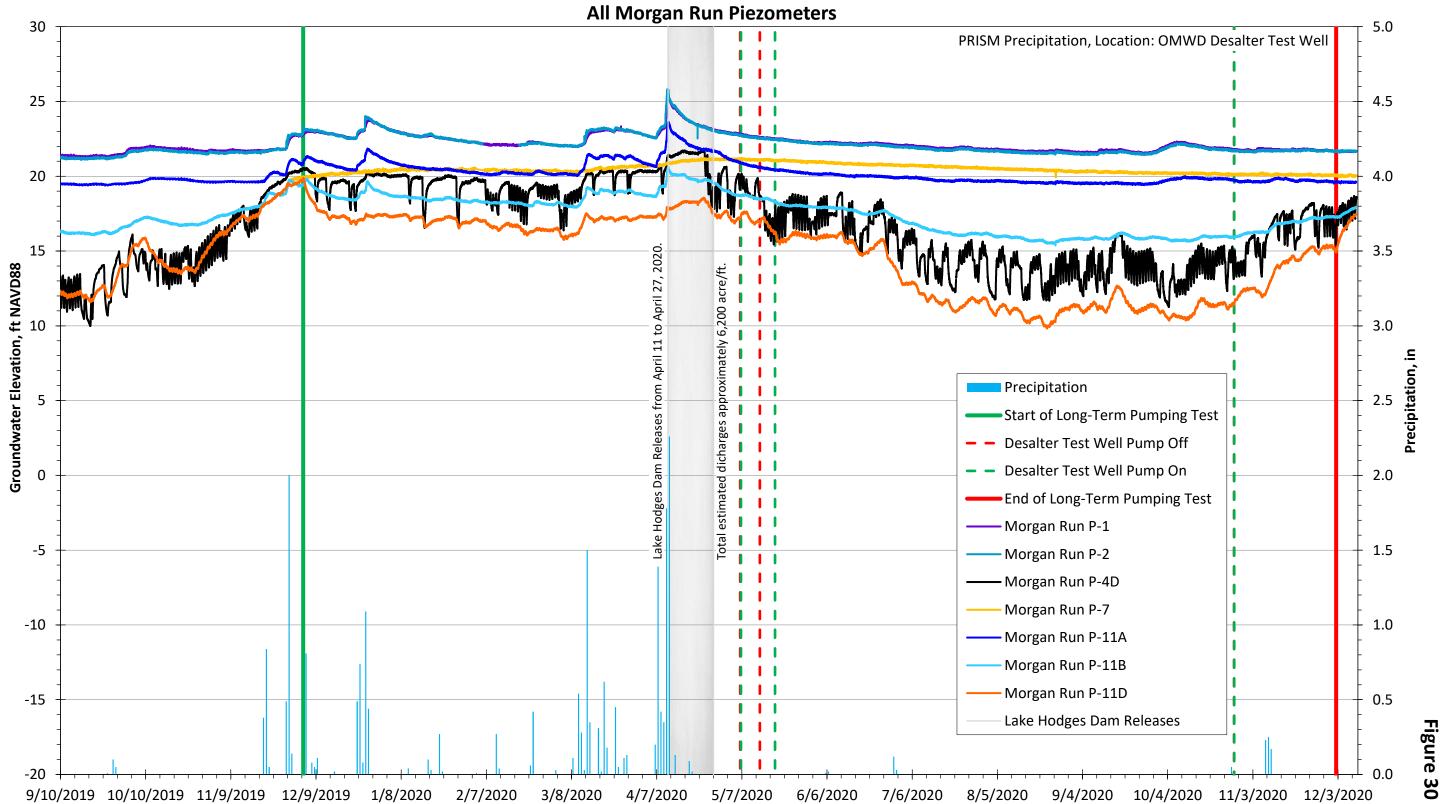
Long-Term Pumping Test - Specific Conductivity -Surf Cup (No. 1 & No. 2), Valley 7 Well, & Morgan Run Test Well

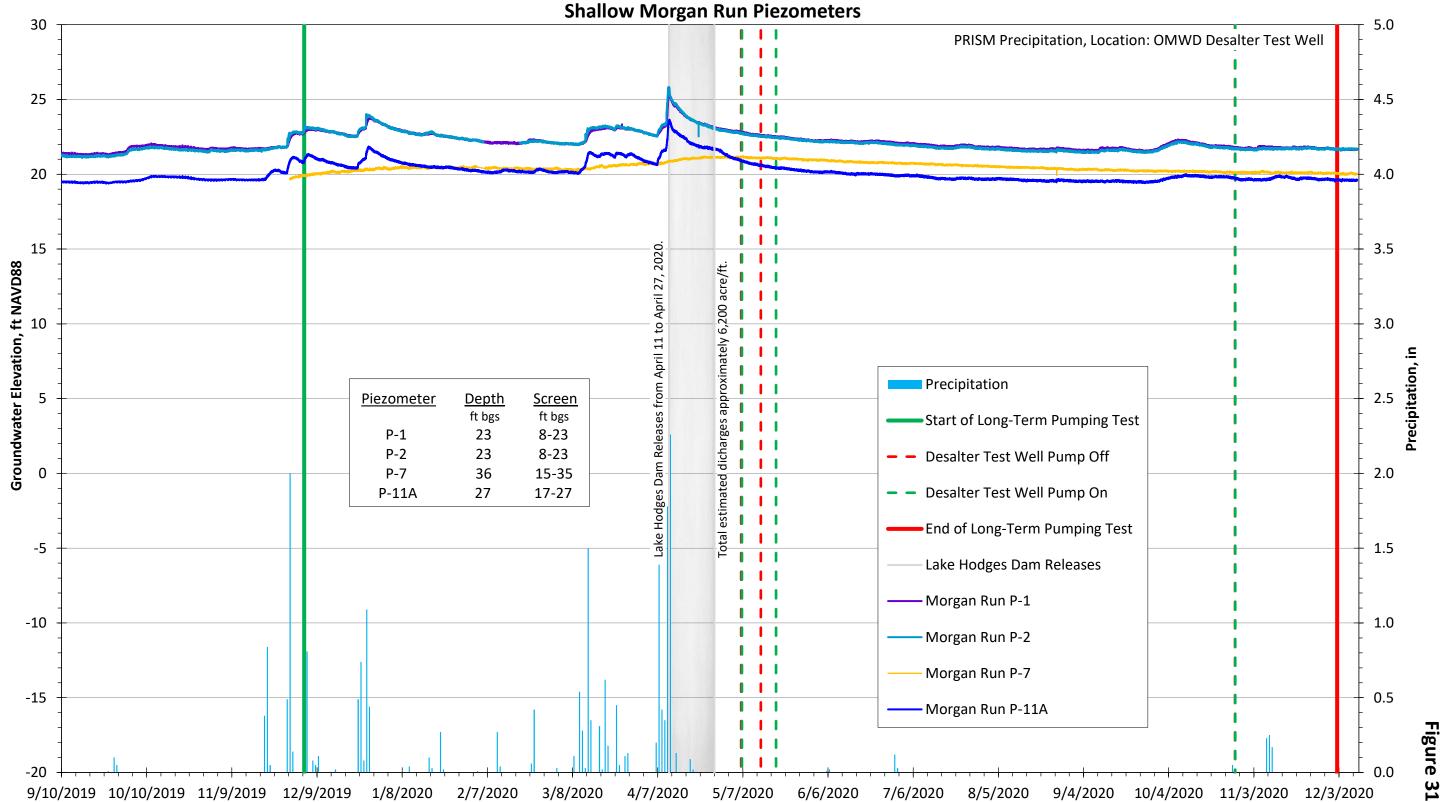


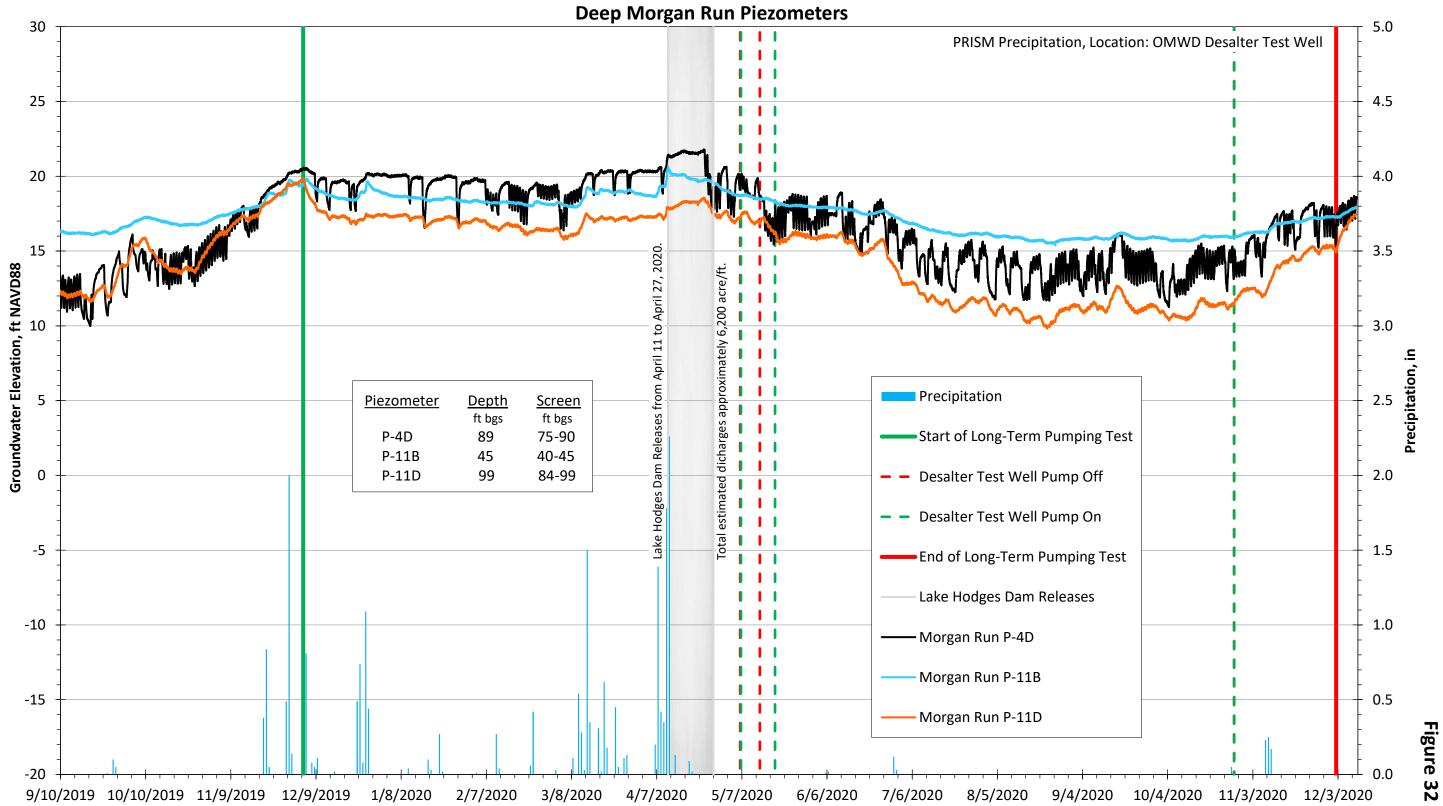


Daily Volumes Pumped from Morgan Run Wells December 1, 2019 through December 9, 2020

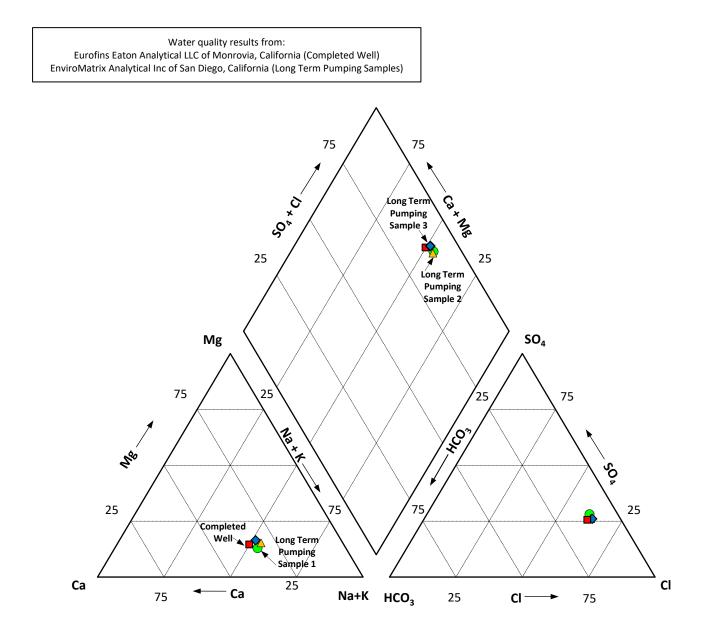




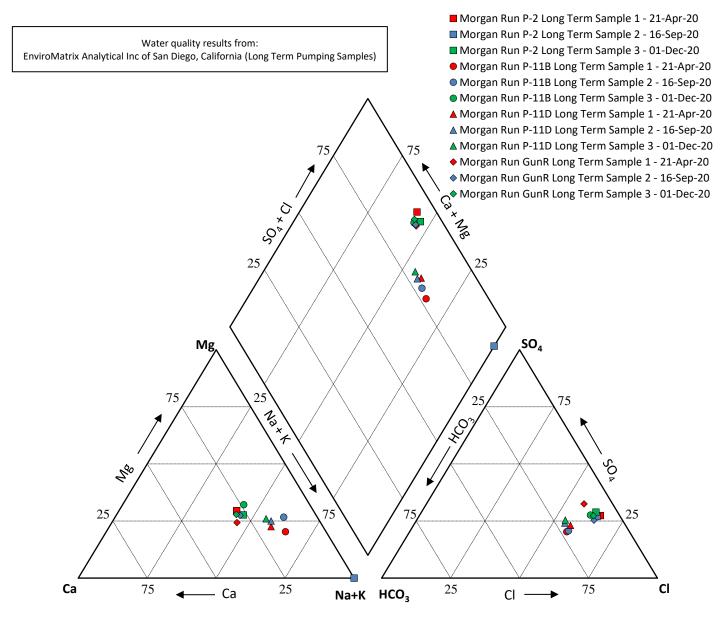




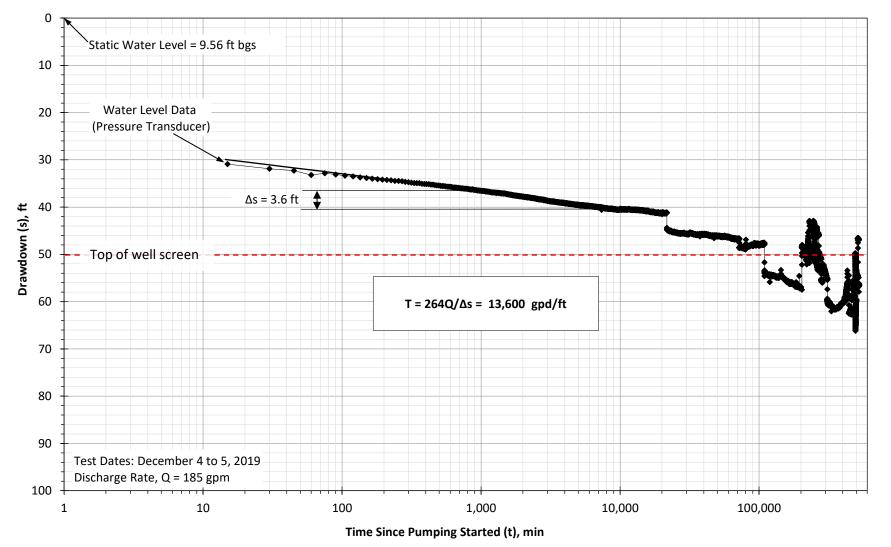
Trilinear Diagram Completed Well & Long Term Testing Water Chemistry OMWD Desalter Test Well



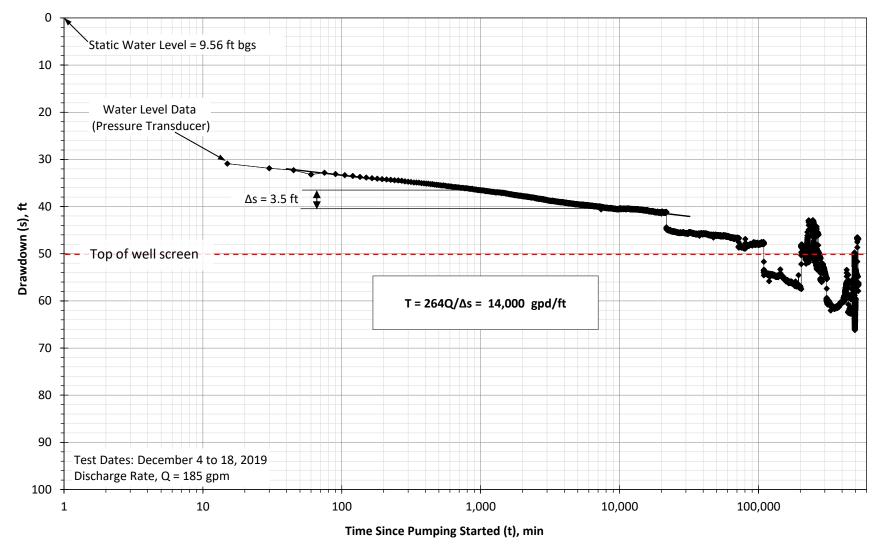
Trilinear Diagram Long Term Testing Water Chemistry Select Monitoring Wells



Long-Term Pumping Test - 1-Day Plot OMWD Desalter Test Well

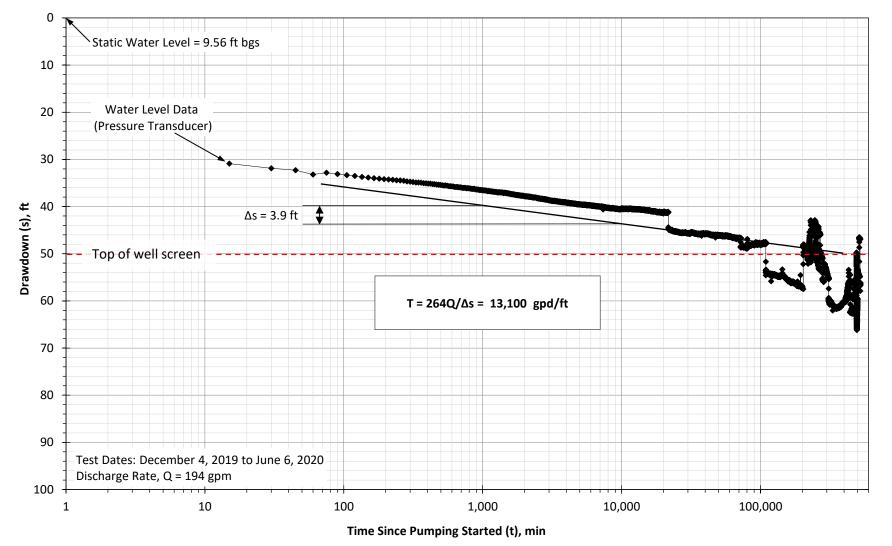


Long-Term Pumping Test - First 14-Days Plot OMWD Desalter Test Well

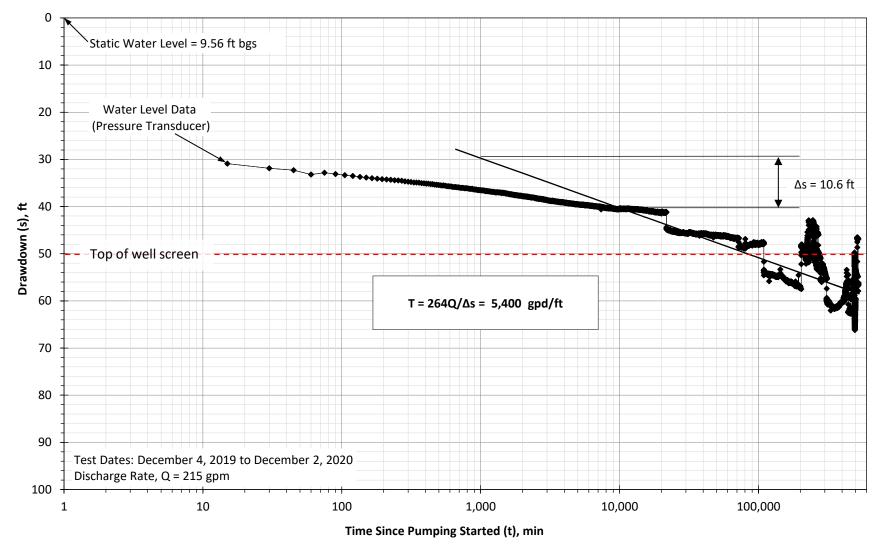


Olivenhain Municipal Water District Report of Design Pilot Testing for the San Dieguito Valley Brackish Groundwater Desalination Project Long-Term Pumping Test - Start of Test to Mi

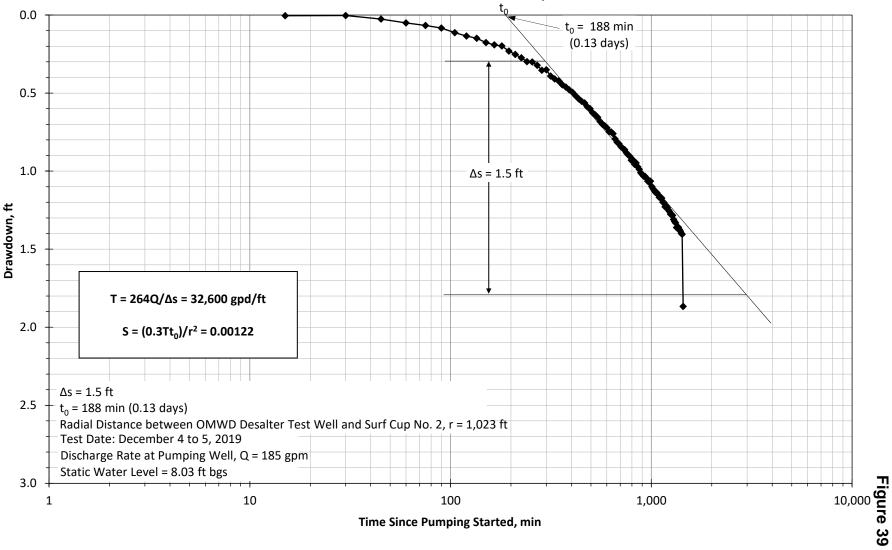




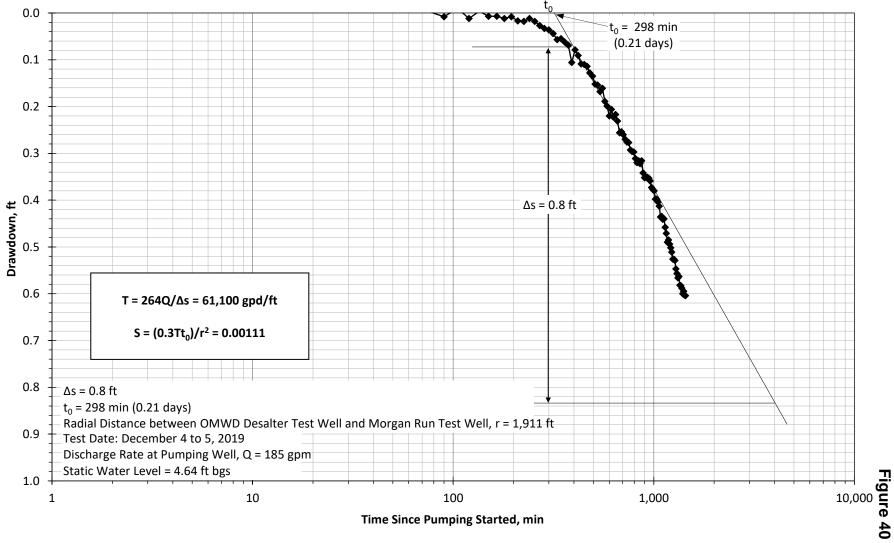
Long-Term Pumping Test - Entire Test Plot OMWD Desalter Test Well



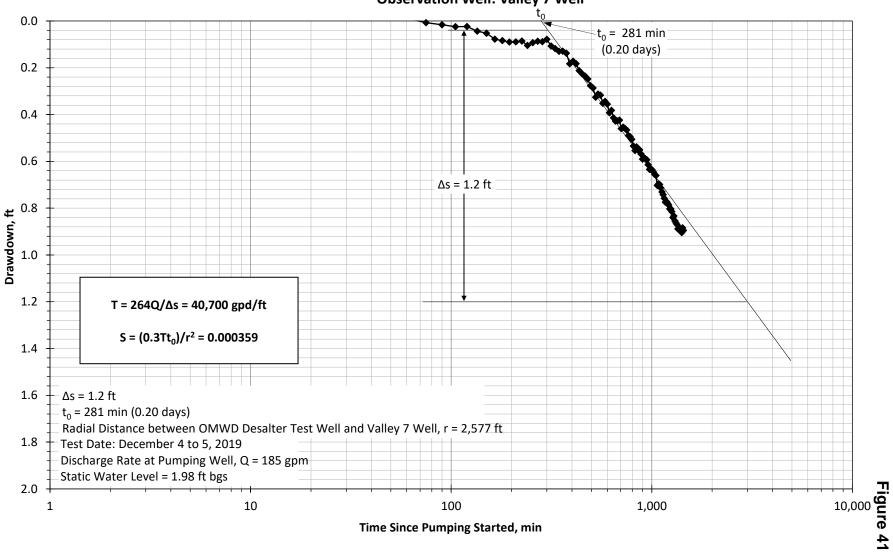
Time-Drawdown Analysis Pumping Well: OMWD Desalter Test Well Observation Well: Surf Cup No. 2

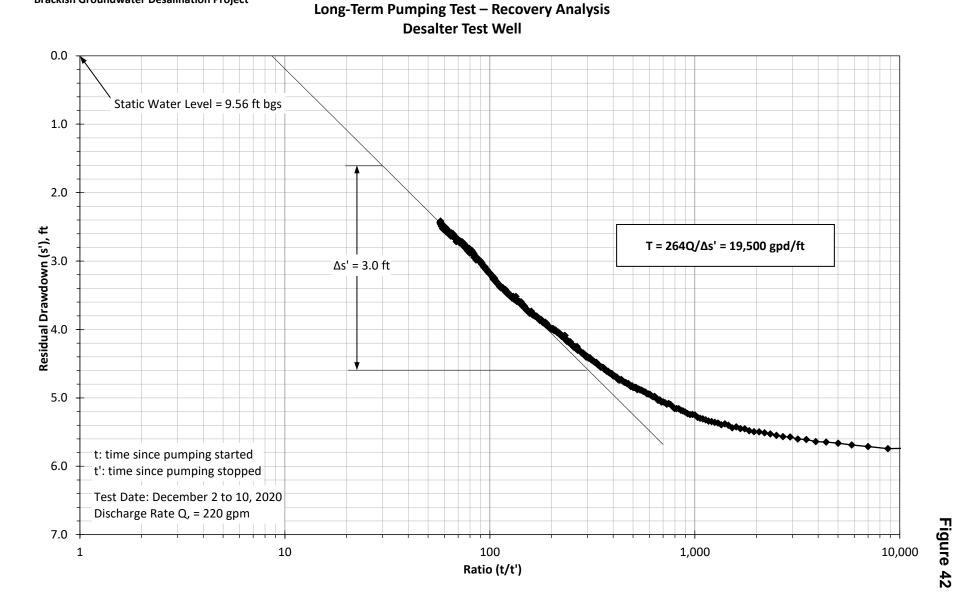


Time-Drawdown Analysis Pumping Well: OMWD Desalter Test Well Observation Well: Morgan Run Test Well

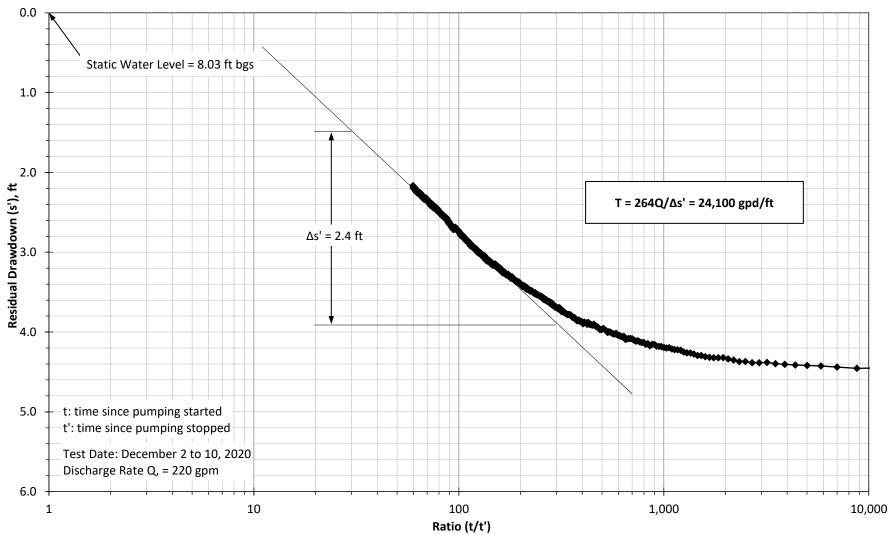


Time-Drawdown Analysis Pumping Well: OMWD Desalter Test Well Observation Well: Valley 7 Well



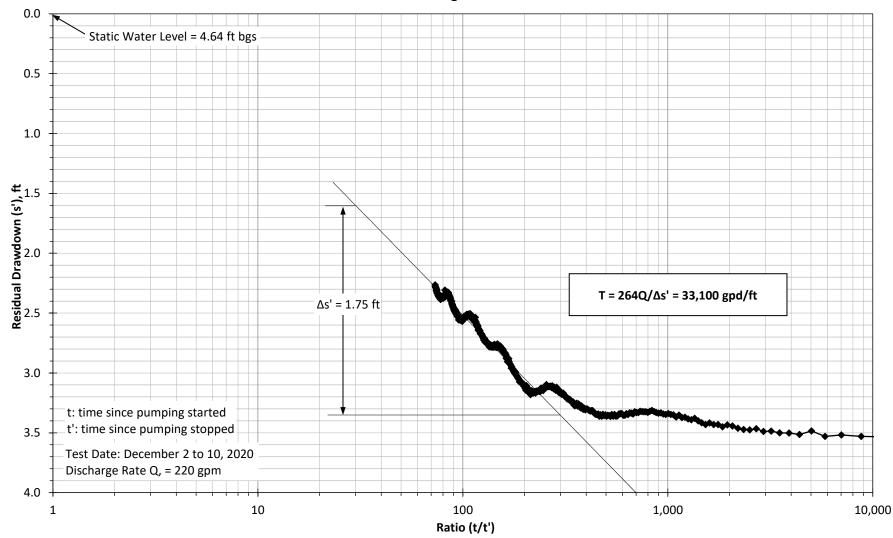


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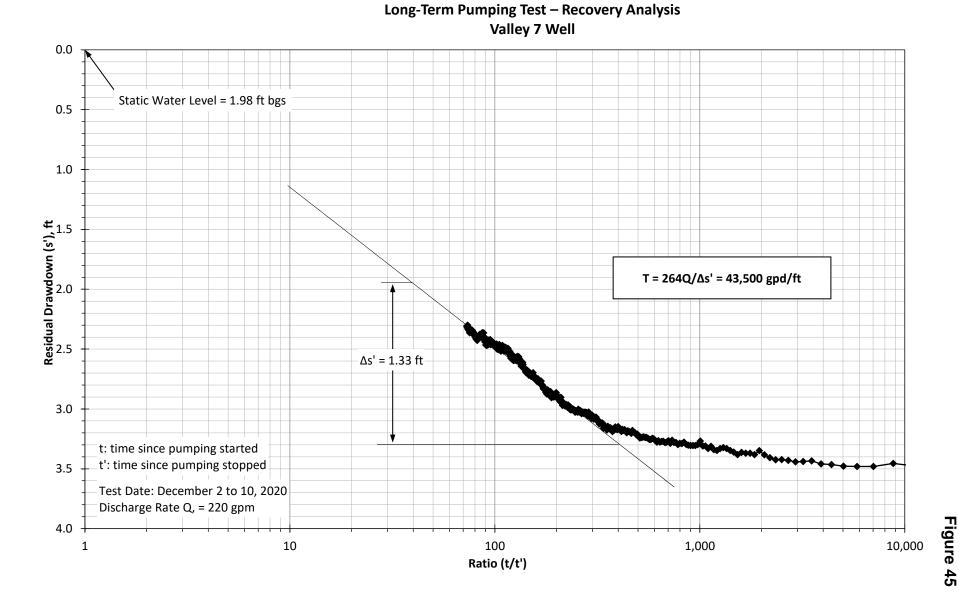
Long-Term Pumping Test – Recovery Analysis Surf Cup No. 2

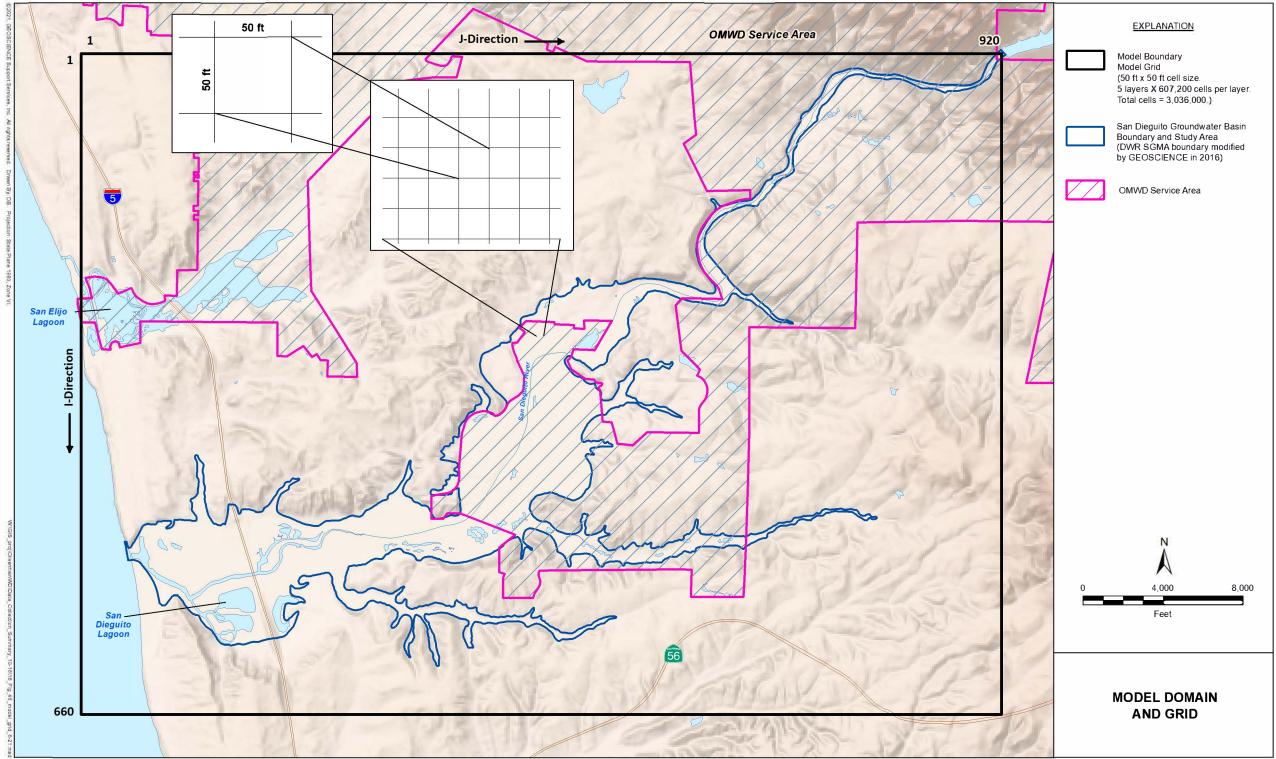
Figure 43



Long-Term Pumping Test – Recovery Analysis Morgan Run Test Well

Figure 44

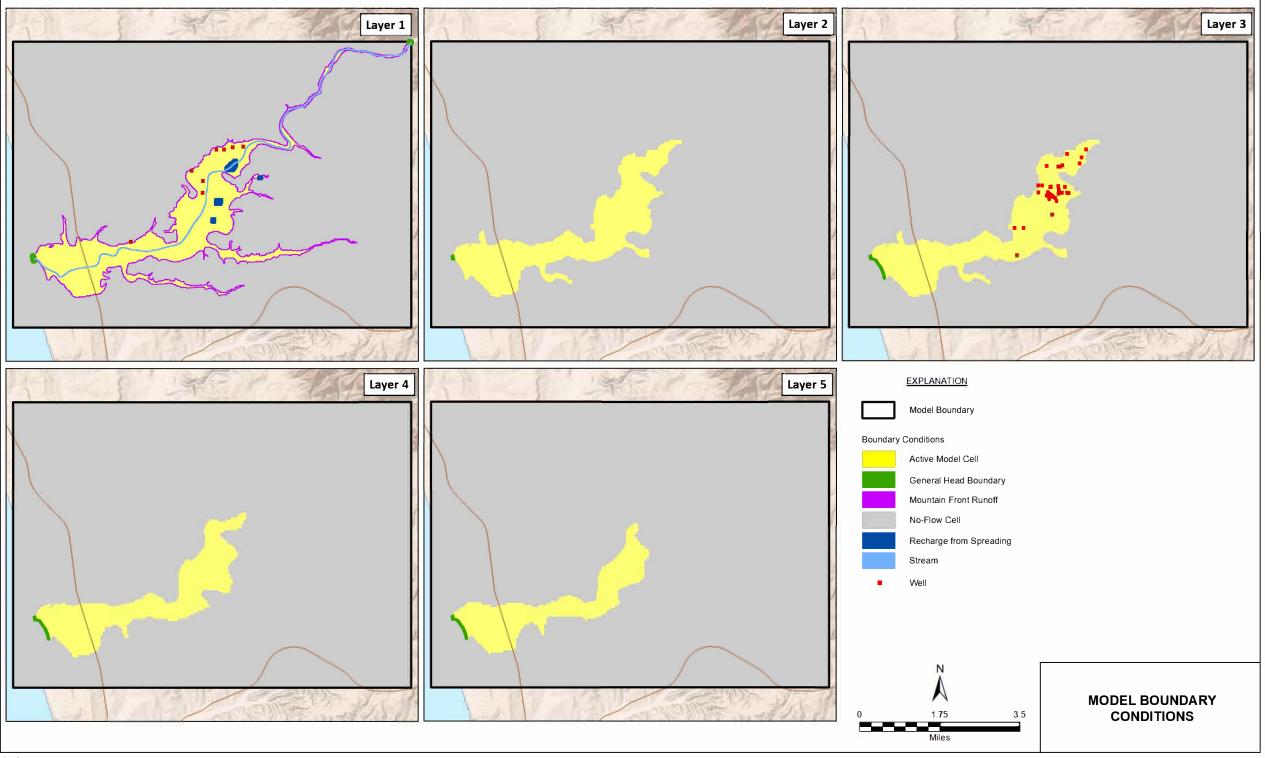




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OLIVENHAIN MUNICIPAL WATER DISTRICT

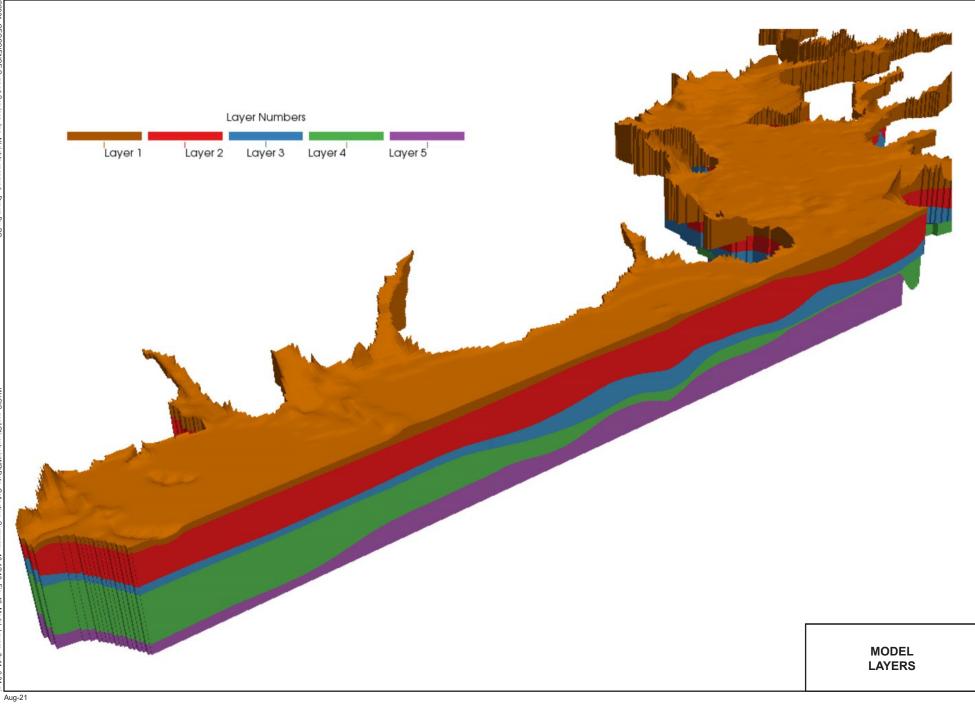




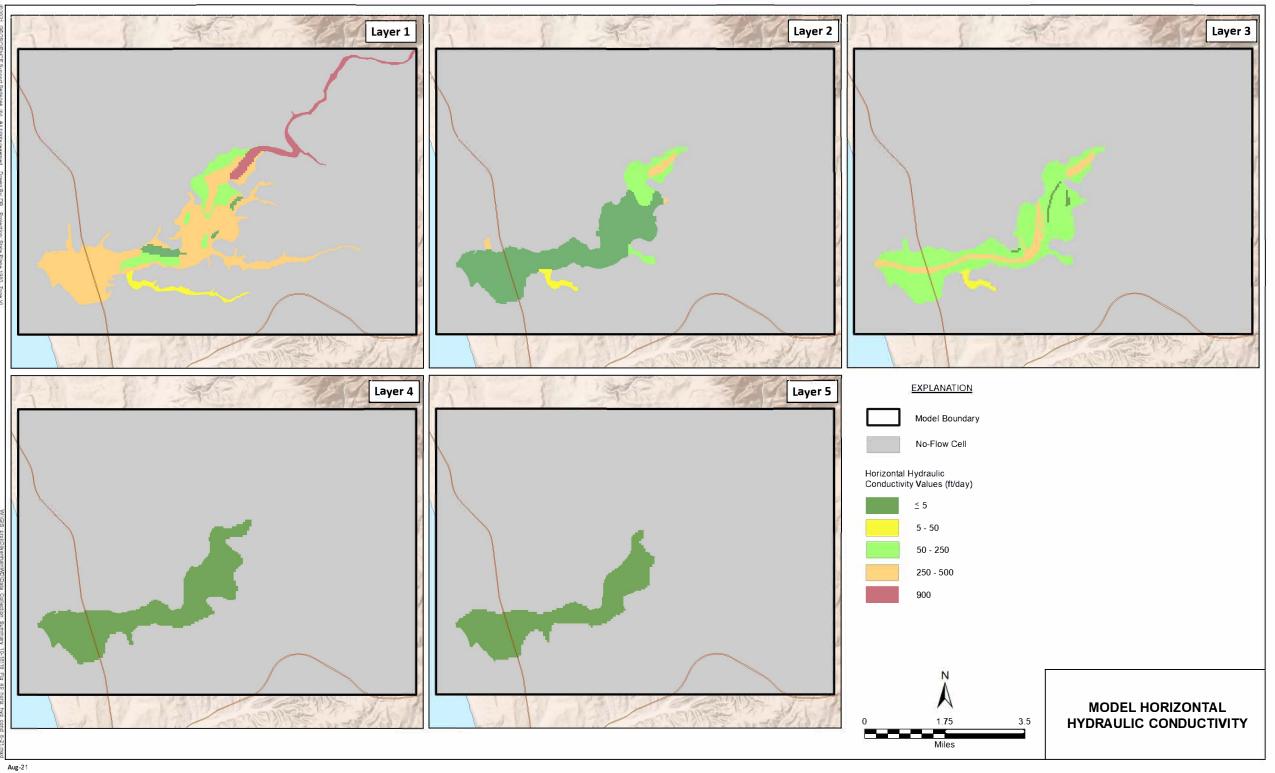
Aug-21

OLIVENHAIN MUNICIPAL WATER DISTRICT

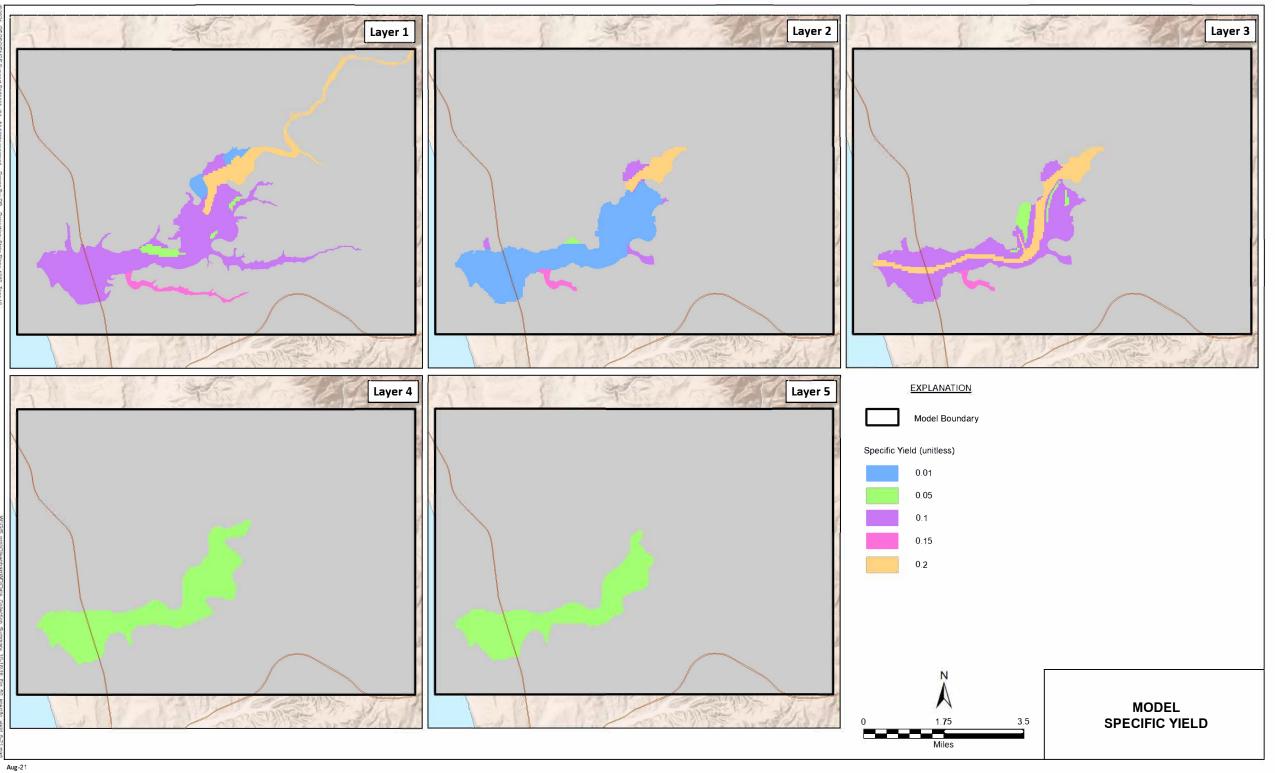
FIGURE 47



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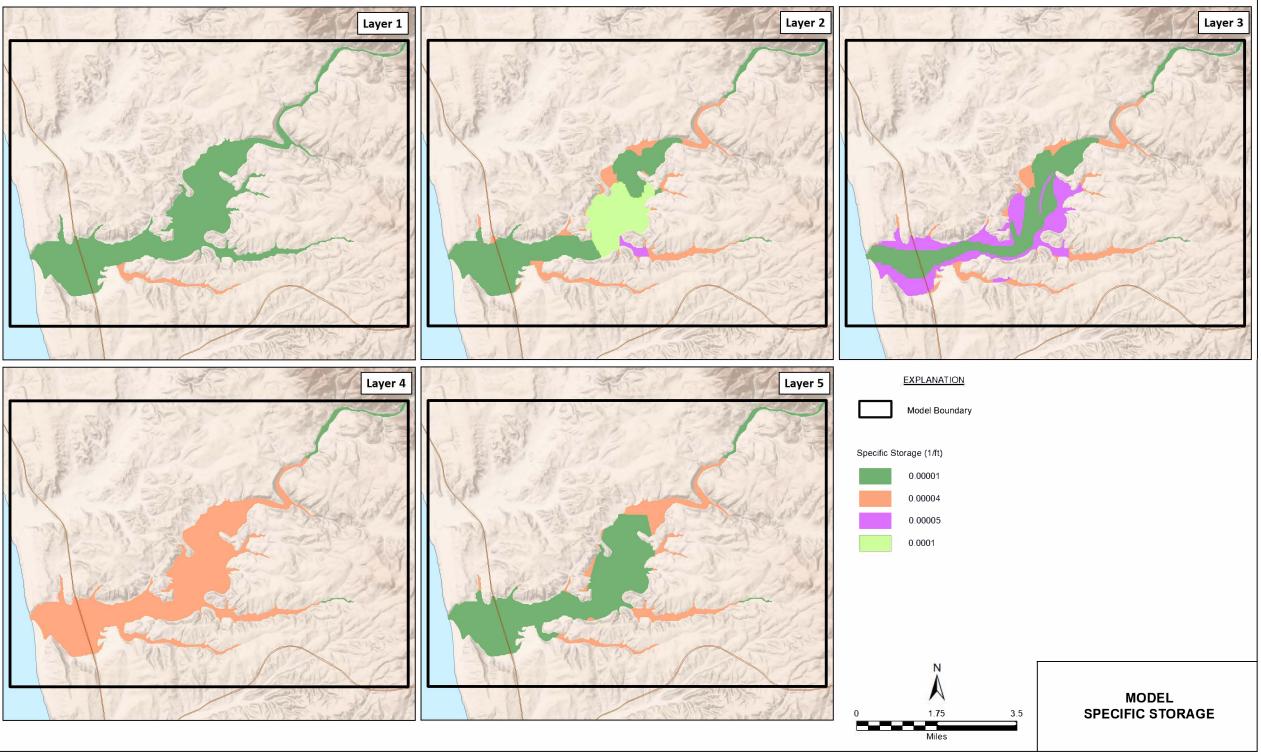






OLIVENHAIN MUNICIPAL WATER DISTRICT

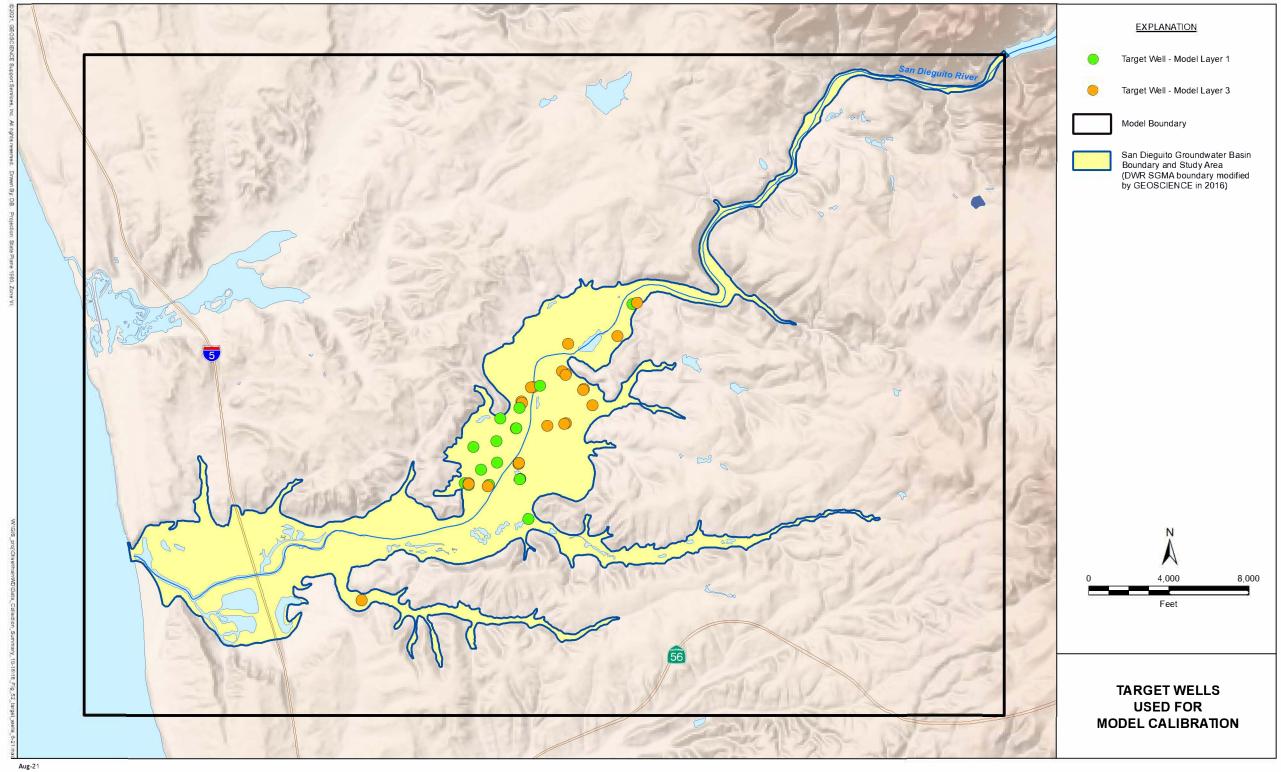




Aug-21

OLIVENHAIN MUNICIPAL WATER DISTRICT

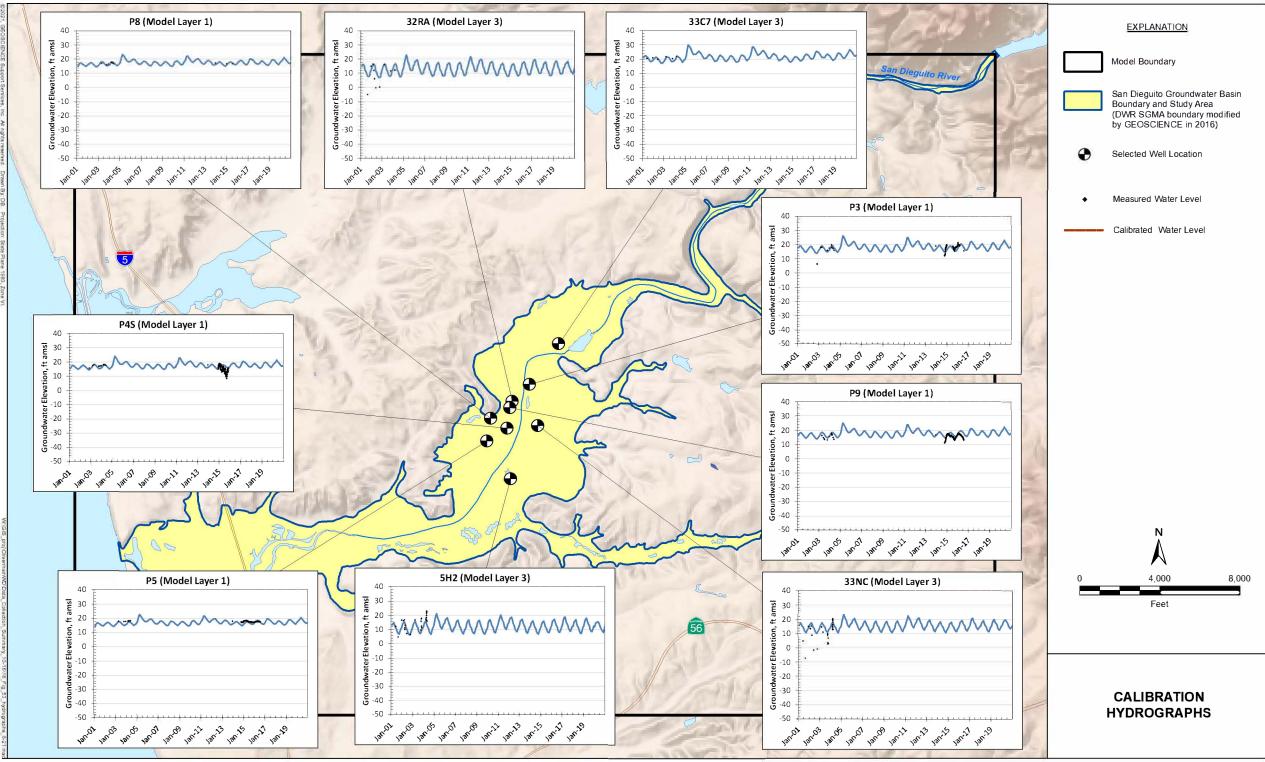
FIGURE 51



OLIVENHAIN MUNICIPAL WATER DISTRICT

REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION DESIGN PROJECT





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OLIVENHAIN MUNICIPAL WATER DISTRICT

FIGURE 53

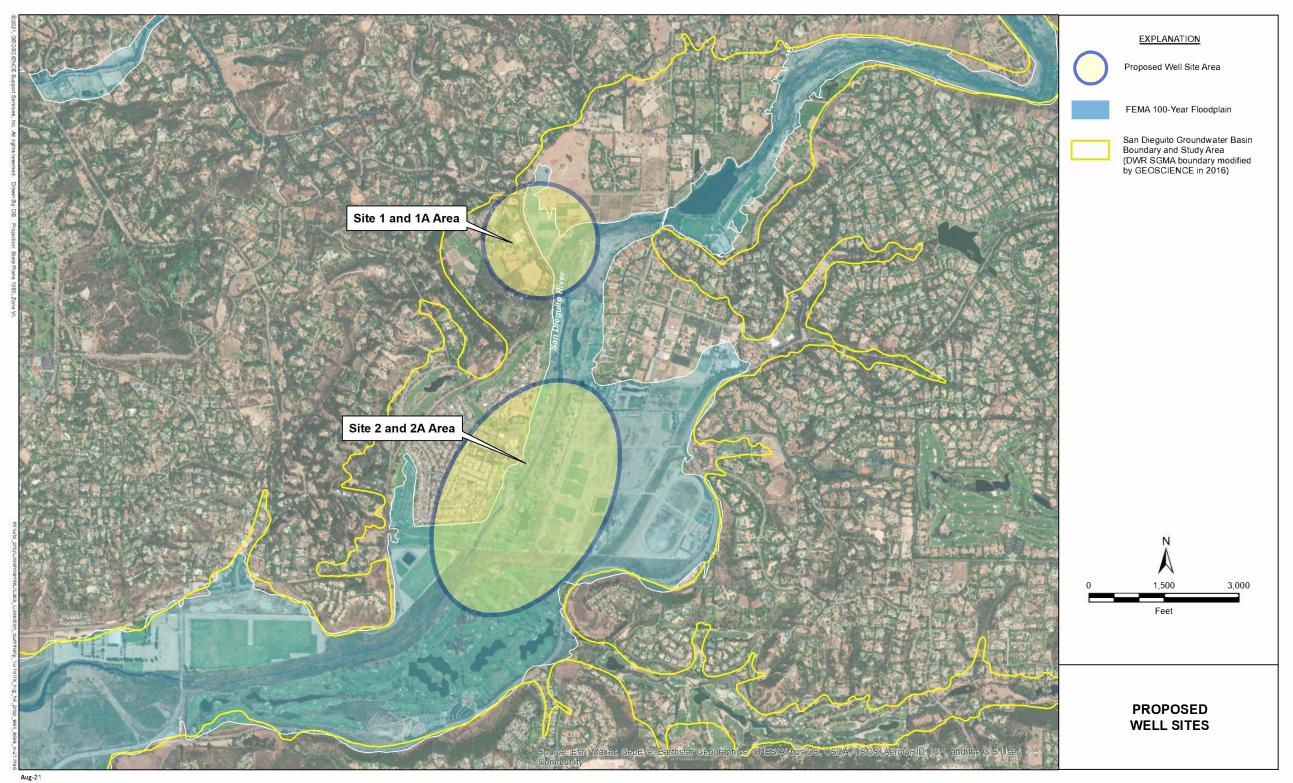


FIGURE 54

REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION DESIGN PROJECT

GEOSCIENCE

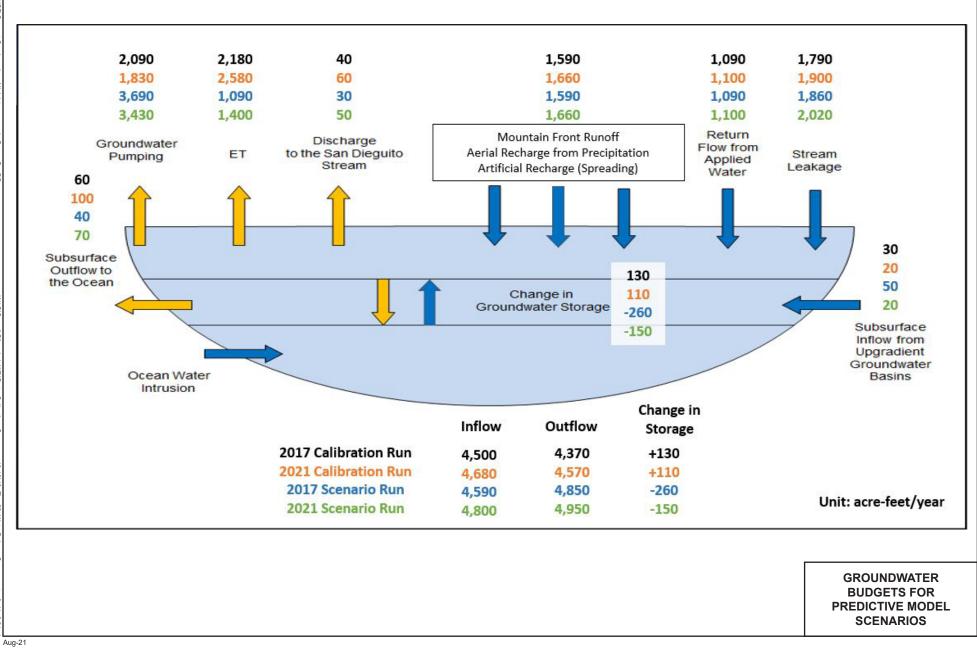
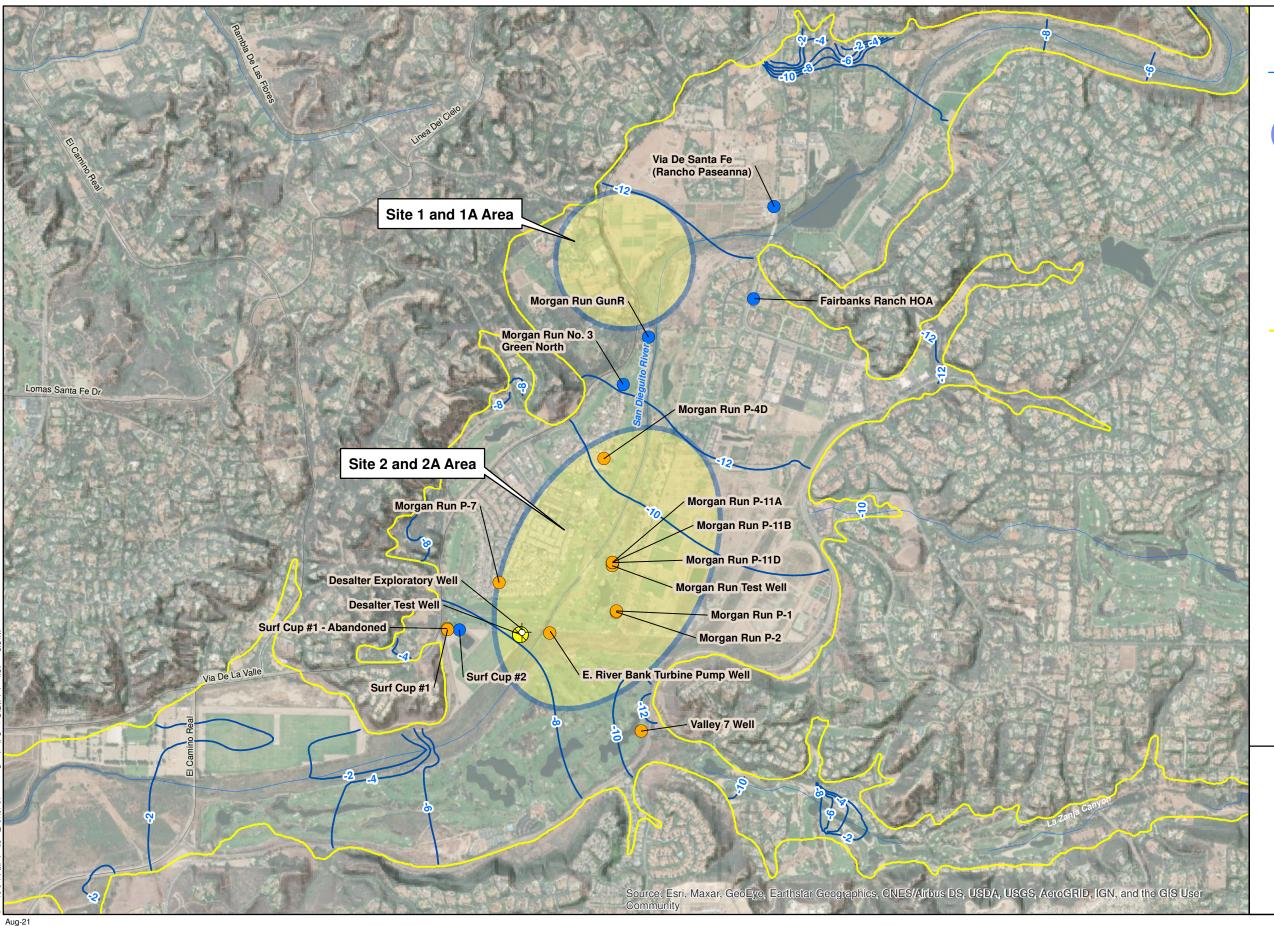


FIGURE 55 GEOSCIENCE

REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION DESIGN PROJECT



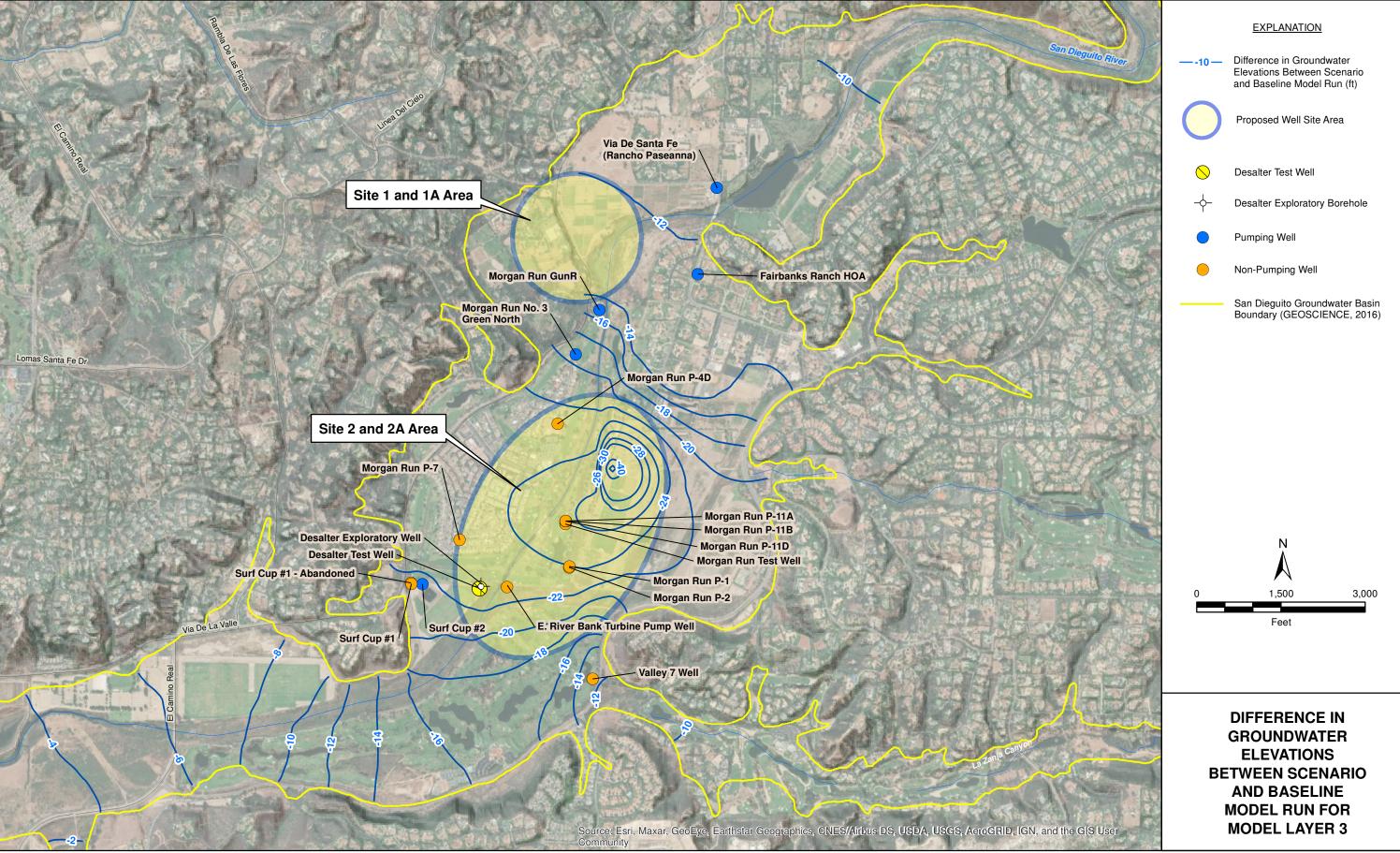
REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION DESIGN PROJECT

~....

EXPLANATION Difference in Groundwater Elevations Between Scenario and Baseline Model Run (ft) Proposed Well Site Area \bigcirc Desalter Test Well Desalter Exploratory Borehole -¢-Pumping Well Non-Pumping Well San Dieguito Groundwater Basin Boundary (GEOSCIENCE, 2016) N 1,500 3,000 Feet

DIFFERENCE IN GROUNDWATER ELEVATIONS BETWEEN SCENARIO AND BASELINE MODEL RUN FOR MODEL LAYER 1





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REPORT OF DESIGN PILOT TESTING FOR THE SAN DIEGUITO VALLEY BRACKISH GROUNDWATER DESALINATION DESIGN PROJECT

FIGURE 57 GEOSCIENCE TABLES



Olivenhain Municipal Water District

Report of Design Pilot Testing for the San Dieguito Valley Brackish Groundwater Desalination Project

Table 1: Summary of Desalter Test Well and Monitoring Network

				Total Depth	Well	Reference	Screen	Screen	Pump	Location Relative	Approximate		Details of Inst	alled Transducers			2019
Well Name	Well Type	Status	Year Constructed	Measured ft bgs		Point Elevation ft NAVD88	Intervals ft bgs	Thickness ft	Depth ft	to Desalter Test Well	Distance from Desalter Test Well ft	Model	Vented/ Non-vented	Level/Level+EC/ Air Pressure	Recording Frequency	Installation Depth ft bgs	Transducer Installations
Morgan Run P-1	Monitoring	-	2002	-	23	26.76	8 - 23	15	-	East Northeast	1,646	Solinst Levelogger	Non-vented	Level	15	-	-
Morgan Run P-2	Monitoring	-	2002	-	23	26.5	8 - 23	15	-	East Northeast	1,641	TD-Diver	Non-vented	Level	15	-	-
Morgan Run P-4D	Monitoring	-	2002	-	89	33.93	74.5 - 89.5	15	-	North Northeast	3,215	Solinst Levelogger	Non-vented	Level	15	-	-
Morgan Run P-7	Monitoring	-	2003	-	36	30.86	15 - 35	20	-	North West	906	In-Situ Aqua Troll 400	Non-vented	Level	15	-	11/19/19
Morgan Run P-11A	Monitoring	-	2003	-	27	24.26	17 - 27	10	-	North East	1,935	Solinst Levelogger	Non-vented	Level	15	-	-
Morgan Run P-11B	Monitoring	-	2003	-	45	24.22	40 - 45	5	-	North East	1,935	Mini-Diver	Non-vented	Level	15	-	-
Morgan Run P-11D	Monitoring	-	2003	-	99	24.28	84 - 99	15	-	North East	1,939	TD-Diver	Non-vented	Level	15	-	-
Morgan Run Test Well	Monitoring	-	2003	133.5	137	24.42	87 - 137	50	-	North East	1,900	In-Situ Aqua Troll 200	Non-vented	Level+EC	15	115.6	09/10/19
Morgan Run GunR	Irrigation	Inactive	2001	89.6	100+	34.32	81.3 - 120.8	39.5	80	North Northeast	5,367	In-Situ Aqua Troll 200	Non-vented	Level+EC	15	89.1	09/10/19
Morgan Run No. 3 Green North	Irrigation	Active	1995	80.2	120	40.89	-	-	80 ¹	North Northeast	4,476	In-Situ Aqua Troll 200	Non-vented	Level+EC	15	-	11/19/19
OMWD Desalter Test Well	Test Well	Active	2019	-	145	29.88	60 - 125	65	130²	-	-	In-Situ Aqua Troll 200	Non-vented	Level+EC	15	119.1	09/10/19
Valley 7 Well	Unused	Inactive	-	123.5	-	25.19	-	-	-	South East	2,598	In-Situ Aqua Troll 200	Non-vented	Level+EC	15	-	11/19/19
												In-Situ Aqua Troll 200	Non-vented	Level+EC	15	-	11/19/19
Surf Cup No. 1	Irrigation	Active	1986	61.9	-	26.11	-	-	-	West	1,207	In-Situ BaroTroll	Non-vented	Air Pressure	15	-	11/19/19
												Baro-Diver	Non-vented	Air Pressure	15	-	-
Surf Cup No. 1 (Abandoned)	Irrigation	Abandoned	-	-	65	27.15	-	-	-	West	1,216	In-Situ Aqua Troll 400	Non-vented	Level	15	-	11/19/19
Surf Cup No. 2	Irrigation	Active	2001	99.6	110	26.06	50 - 110	60	-	West	1,011	In-Situ Aqua Troll 200	Non-vented	Level+EC	15	81.6	09/10/19
Rancho Paseana Well	Irrigation	Active	1983	-	101	-	68 - 98	30	-	North Northeast	8,251	-	-	-	-	-	-
Fairbanks Ranch HOA Well	Irrigation	Active	-	-	-	-	-	-	-	North East	6,765	-	-	-	-	-	-

¹Morgan Run No. 3 Green North pump depth is approximated based on the known pump depth of Morgan Run GunR.

²Test Pump Installation depth. Permanent pump installed to 103 ft bgs.

Olivenhain Municipal Water District

Report of Design Pilot Testing for the San Dieguito Valley

Brackish Groundwater Desalination Project

	Well or Piez	ometer Name:	Des	alter Test W	/ell	Mo	organ Run P	-2	Mo	rgan Run P-1	L1B	Mor	gan Run P-1	.1D	Moi	rgan Run Gu	nR	Regulatory
	Sample C	ollection Date:	21-Apr-20	16-Sep-20	1-Dec-20	21-Apr-20	16-Sep-20	1-Dec-20	21-Apr-20	16-Sep-20	1-Dec-20	21-Apr-20	16-Sep-20	1-Dec-20	21-Apr-20	16-Sep-20	1-Dec-20	
Constituent	Method	Units	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Standard(s)
Ammonia as N	EPA 350.1	mg/L	0.99	0.95	1.06	0.35	0.08	0.14	4.52	6.26	1.44	2.05	2.16	2.17	0.08	0.23	0.22	NA ⁵
Barium, Total	EPA 200.8	mg/L	0.132	0.132	0.126	0.064	0.070	0.063	0.185	0.348	0.308	0.348	0.357	0.362	0.099	0.093	0.094	1.0 ¹
Bicarbonate Alkalinity	SM2320B	mg CaCO3/L	384	408	386	404	556	496	260	452	520	380	408	390	346	340	330	NA ⁵
Boron, Total	EPA 200.7	mg/L	0.95	0.96	ND	0.46	0.76	0.65	0.54	0.73	0.51	0.47	0.53	ND	0.36	0.38	ND	1.0 ³
Calcium, Total	EPA 200.7	mg/L	452	457	462	546	ND	624	68.0	107	468	145	142	142	403	369	382	NA ⁵
Carbonate Alkalinity	SM2320B	mg CaCO3/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA ⁵
Chloride	SM4500 C1 B	mg/L	1,290	1,330	1,340	2,200	2,480	2,320	380	690	1,790	630	600	590	1,110	1,230	1,270	250 - 500 ²
Chromium, Hexavalent	EPA 218.6	μg/L	0.36	ND	ND	0.25	ND	ND	0.37	ND	ND	0.28	ND	ND	0.39	ND	ND	50 ⁶
Chromium, Total	EPA 200.8	mg/L	0.0003	ND	0.0002	0.0003	0.0002	ND	0.0009	0.0002	0.0005	0.0006	ND	0.0002	0.0004	ND	ND	0.050 ¹
Copper, Total	EPA 200.8	mg/L	0.002	0.001	0.002	0.002	0.004	0.004	0.002	0.0008	0.005	0.003	0.0008	0.003	0.010	0.002	0.005	1.0 ²
Fluoride	SM4500 F C	mg/L	0.275	0.253	0.243	0.277	0.408	0.424	0.405	0.616	0.469	0.298	0.303	0.294	0.271	0.292	0.277	2 ¹
Hardness (Dissolved)	EPA 200.7	mg CaCO3/L	1,570	1,710	1,750	2,830	ND	3,210	406	858	2,750	800	860	844	1,820	1,840	1,880	NA ⁵
Hydroxide Alkalinity	SM2320B	mg CaCO3/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA ⁵
ron, Total	EPA 200.8	mg/L	0.858	0.700	0.881	0.035	0.453	0.283	0.490	0.305	2.04	0.820	1.15	1.12	0.262	0.195	0.185	0.3 ²
Magnesium, Total	EPA 200.7	mg/L	107	139	144	355	ND	400	57.3	143	383	106	123	119	197	224	226	NA ⁵
Manganese, Total	EPA 200.8	mg/L	1.07	1.00	0.918	4.86	3.36	3.03	0.095	0.127	1.91	0.464	0.476	0.450	2.29	1.99	1.81	$0.050^2 / 0.5^3$
Nitrate as N	EPA 353.2	mg/L	0.05	0.02	0.01	1.41	4.25	2.05	0.03	0.02	0.03	0.04	0.02	0.02	0.70	1.84	1.73	10 ¹
Nitrite as N	SM4500 NO2 B	mg/L	ND	ND	ND	0.13	0.45	0.30	ND	ND	ND	ND	ND	ND	0.009	0.02	0.01	1 ¹
Orthophosphate as P	SM4500 P E	mg/L	0.33	0.31	0.27	3.72	0.62	0.47	1.88	0.74	0.51	0.68	0.44	0.37	0.11	0.11	0.08	NA ⁵
oH at 25 deg C	SM4500-H+ B	pH Units	7.04	6.96	6.99	7.03	7.07	7.08	7.54	7.49	7.17	7.37	7.30	7.34	7.19	6.83	6.77	6.5 - 8.5 ⁴
Phosphorus, Total	EPA 365.1	mg/L	0.32	0.33	0.34	2.08	0.58	0.50	1.76	0.69	0.62	0.66	0.46	0.42	0.10	0.11	0.08	NA ⁵
Potassium, Total	EPA 200.7	mg/L	31.5	34.0	40.0	17.0	5.22	4.70	41.1	70.0	15.6	27.4	30.5	3.03	11.5	13.0	16.6	NA ⁵
Silicon, Total	EPA 200.7	mg/L	16	17	15	20	11	19	16	20	19	14	15	14	15	16	15	NA ⁵
Sodium, Total	EPA 200.7	mg/L	820	900	822	954	2.78	1,250	321	576	976	504	514	474	688	682	652	NA ⁵
Specific Conductance (EC)	SM2510 B	µmhos/cm	5,440	4,930	5,110	8,330	8,060	7,800	1,950	2,920	6,030	3,150	2,850	2,810	5,190	4,150	4,750	900 - 1,600 ²
Strontium, Total	EPA 200.7	mg/L	2.1	2.2	2.1	3.5	1.7	3.1	0.60	1.1	3.0	1.0	1.0	0.97	1.8	1.7	1.7	NA ⁵
Sulfate as SO4	SM4500 SO4 E	mg/L	802	748	746	1,240	1,400	1,430	183	337	1,080	346	359	376	853	657	743	250 - 500 ²
Total Alkalinity	SM2320B	mg CaCO3/L	384	408	386	404	556	496	260	452	520	380	408	390	346	340	330	NA ⁵
Total Dissolved Solids	SM2540 C	mg/L	3,500	3,590	3,580	5,460	5,990	5,840	1,080	1,780	4,690	1,890	1,870	1,850	3,320	3,210	3,330	500 - 1,000 ²
Turbidity	SM2130 B	NTU	6.50	6.40	6.90	50.0	5.00	1.10	1.30	1.30	18.0	4.10	10.0	8.40	1.60	1.40	1.20	5 ²
Zinc, Total	EPA 200.8	mg/L	0.039	0.006	0.015	0.003	0.004	0.006	0.010	0.002	0.012	0.004	0.001	0.009	0.009	0.003	0.011	5 ²

Notes:

¹ California Division of Drinking Water (DDW) primary maximum contaminant level (MCL).

² DDW secondary MCL.

³ DDW notification level for unregulated chemicals.

⁴ United States Environmental Protection Agency (USEPA) secondary standard for pH.

⁵ Not Applicable - no current MCL.

⁶ Chromium-6 is currently regulated under the 50-μg/L DDW primary MCL for total chromium.

mg/L = Milligrams per Liter

NTU = Nephelometric Turbidity Units

 μ g/L = Micrograms per Liter

µmhos/cm = Micromhos per Centimeter

BOLD Equal to or above current DDW MCLs or Notification Levels

Italic Elevated, but not above current DDW MCLs or Notification Levels

RED Possible erroneous reading

	Dum	nina	Toot
:111	Pull	ihilik	Test

APPENDICES



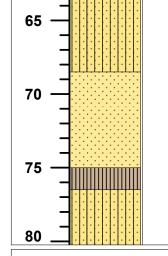
APPENDIX A

Exploratory Borehole (EX-1)

Borehole Lithologic Log



GEOSCIENC	Telephor	nt, CA 91711 Appendix A
The First Name in Groundwa	•) 451-6638 Exploratory Borehole (EX-1) Lithology
		Olivenhain Municipal Water District (OMWD)
		Report of Design Pilot Testing for the San Dieguito Valley
		Brackish Groundwater Desalination Project
Depth (ft bgs) (f	Blows ber 6-inche	s)* Note: Grain size distribution percentages are approximate. Material code (e.g. SP) reference United Soil Classification visual method. Color code (e.g. 10YR 5/2) reference Munsell Soil Color Charts
0 	5ft 10,8,8	SAND WITH GRAVEL (SP): brown (7.5YR 4/3); 70% fine-coarse, subangular-subrounded sand; 30% fine-coarse, subangular-subrounded gravel up to 70mm ; trace fines; very loose, dry,, trace cobbles max 120mm
0	10ft 4,4,6	SAND (SP): brown (7.5YR 4/2); 100% fine-medium grained sand; trace fines; loose, moist, mottled, micaceous
	15ft 2,2,2	SILTY SAND (SM): brown (10YR 4/3); 80% fine-medium grained sand; 20% silt; trace fine-coarse, subangular-subrounded gravel up to 20mm; loose, wet, laminated, micaceous
20 —	20ft 2,1,1	SILT WITH SAND (ML): dark brown (10YR 3/3); 75% silt; 5% clay; 20% fine grained sand; soft, saturated, micaceous
25 —	2011 2, 1, 1	SILTY SAND (SM): very dark grayish brown (2.5Y 3/2); 60% fine-coarse grained sand; 40% silt; trace fine, subangular-subrounded gravel up to 5mm; trace clay; loose, saturated, micaceous SAND WITH SILT (SP-SM): very dark gray (2.5Y 3/1); 90% fine-medium grained sand; 10% silt; trace clay; loose, saturated, laminated, micaceous
	25ft 2,5,7	 SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded sand; 5% silt; trace fine, subangular-subrounded gravel up to 5mm; trace clay; loose, saturated, micaceous SILTY SAND (SM): black (2.5Y 2.5/1); 65% fine-medium grained sand; 35% silt; trace clay; loose, saturated, micaceous, with pink shell fragments
	30ft 4,6,5	SAND (SP): black (2.5Y 2.5/1); 95% fine-medium grained sand; 5% silt; loose, saturated, micaceous, with pink shell fragments SILT WITH SAND (ML): black (2.5Y 2.5/1); 75% silt; 25% fine-medium grained sand; tracy clay; soft, saturated, micaceous, laminated, with pink shell fragments SAND (SP): black (2.5Y 2.5/1); 95% sand; 5% silt; trace clay; loose, saturated, micaceous
35 — 1111 - 11111 - 11111 - 11111 - 1111 - 1111 - 1111 - 1111 - 1111 - 1111 - 1	35ft 4,3,3	SANDY SILT (ML): black (2.5Y 2.5/1); 55% silt; 45% fine-medium grained sand; trace clay; soft, saturated, interbedded CLAYS, SILTS, and SANDS ~4-6"; micaceous, (See descriptions above) SAND (SP): black (2.5Y 2.5/1); 95% fine-medium grained sand; 5% silt; trace clay; loose, saturated, micaceous, with smashed and layered cream colored shell fragments
40	40ft 2,2,6	CLAY(CL): black (2.5Y 2.5/1); 90% clay; 40% silt; 10% fine grained sand; soft, saturated, organic material (roots?); iron staining
45 — -	45ft 2,2,4	CLAYEY SAND (SC): black (2.5Y 2.5/1); 80% fine-medium grained sand; 15% clay; 5% silt; loose, saturated, micaceous, with shell fragments SILTY SAND (SM): black (2.5Y 2.5/1); 85% fine-medium grained sand; 15% silt; loose, saturated, micaceous, with shell fragments increasing downward and coarseness
50 —	F0# 0 0 4	SILT WITH SAND (ML): black (2.5Y 2.5/1); 85% silt; 20% clay; 15% fine grained sand; soft, saturated, micaceous, with shell fragments SILTY SAND (SM): black (2.5Y 2.5/1); 75% fine grained sand; 20% silt; 5% clay; loose, saturated, laminated clays blueish-green; micaceous, with shell fragments
	50ft 2,3,4	SAND (SP): black (2.5Y 2.5/1); 95% fine-medium grained sand; 5% silt; loose, saturated, micaceous, with shell fragments SILT WITH SAND (ML): black (2.5Y 2.5/1); 80% silt; 15% fine-medium grained sand; 5% clay; soft, saturated, laminated; micaceous; with pink and cream shell fragments
		FAT CLAY (CH): black (2.5Y 2.5/1); 100% clay; trace fine grained sand; trace silt; soft, saturated, moderately plastic SAND (SP): black (2.5Y 2.5/1); 95% fine grained sand; 5% silt; trace clay; loose, saturated, micaceous
60 — _ _		SILTY SAND (SM): black (2.5Y 2.5/1); 85% fine-medium grained sand; 15% silt; trace clay; loose, saturated, micaceous, with shell fragments



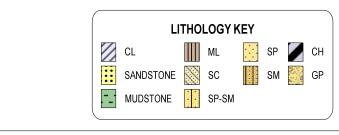
Aug-21

SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% fine-medium grained sand; 10% silt; loose, saturated, micaceous, with little shell fragments

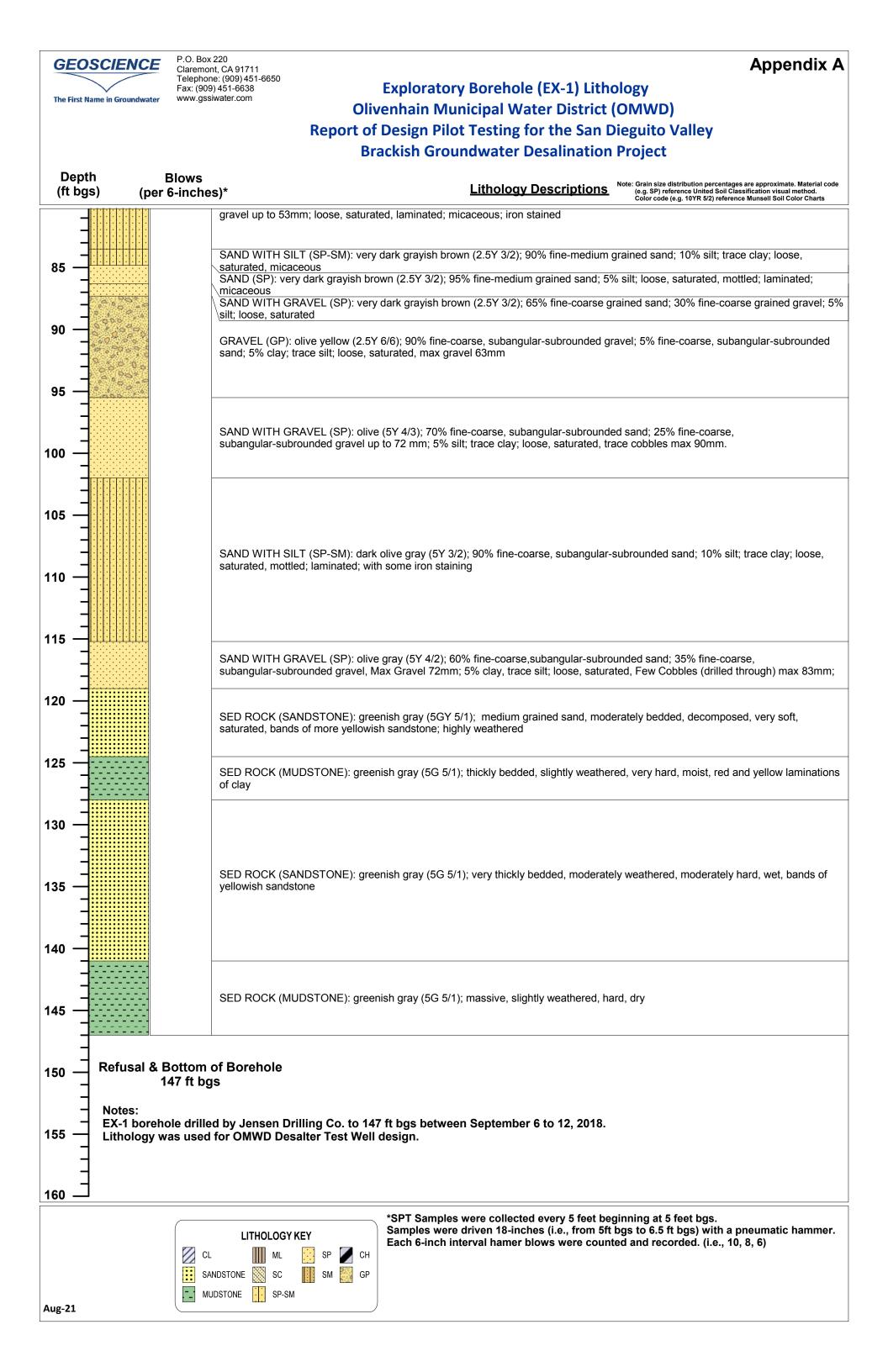
SAND (SP): black (2.5Y 2.5/1); 95% fine-medium grained sand; 5% silt; trace clay; loose, saturated, micaceous, with few shell fragments

SILT WITH SAND (ML): black (2.5Y 2.5/1); 70% silt; 25% fine grained sand; 5% clay; soft, saturated, laminated; micaceous, with shell fragments

SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% fine-medium grained sand; 10% silt; trace fine-coarse, subangular-subrounded



*SPT Samples were collected every 5 feet beginning at 5 feet bgs. Samples were driven 18-inches (i.e., from 5ft bgs to 6.5 ft bgs) with a pneumatic hammer. Each 6-inch interval hamer blows were counted and recorded. (i.e., 10, 8, 6)



APPENDIX B

Permits





PERMIT #: LMWP-003615 A.P.N.: 760-146-07 EST #: None

COUNTY OF SAN DIEGO DEPARTMENT OF ENVIRONMENTAL HEALTH LAND AND WATER QUALITY DIVISION MONITORING WELL PROGRAM

GEOTECHNICAL BORING CONSTRUCTION PERMIT

SITE NAME: SURF CUP SITE ADDRESS: 14989 VIA DE LA VALLE, DEL MAR 92014 PERMIT FOR: **CONSTRUCTION OF GEOTECHINCAL BORING (1)** PERMIT APPROVAL DATE: 9/6/2018 PERMIT EXPIRES ON: 12/4/2018 RESPONSIBLE PARTY: OLIVEHAIN (Joseph Randall)

PERMIT CONDITIONS:

- 1. All borings must be sealed from the bottom of the boring to the ground surface with an approved sealing material as specified in California Well Standards Bulletin 74-90, Part III, Section 19.D. Drill cuttings are not an acceptable fill material. Bentonite slurries are not an acceptable fill material in the unsaturated zone.
- 2. All borings must be properly destroyed within 24 hours of drilling.
- 3. Placement of any sealing material at a depth greater than 30 feet must be done using the tremie method.
- 4. This work is not connected to any known unauthorized release of hazardous substances. Any contamination found in the course of drilling and sampling must be reported to DEH. All water and soil resulting from the activities covered by this permit must be managed, stored and disposed of as specified in the SAM Manual in Section 5, II, D-4. (<u>http://www.sdcounty.ca.gov/deh/lwq/sam/manual_guidelines.html</u>) In addition, drill cuttings must be properly handled and disposed in compliance with the Stormwater Best Management Practices of the local jurisdiction.
- 5. Within 60 days of completing work, submit a well/boring construction report, including all well and/or boring logs and laboratory data to the Well Permit Desk. This report must include all items required by the SAM Manual, Section 5, Pages 6 & 7.
- 6. This office must be given 24-hour notice of any drilling activity on this site and advanced notification of drilling cancellation. Please contact the Well Permit Desk at (858) 505-6688.

APPROVED BY:

_____ DATE: 9/6/2018



PERMIT APPLICATION GROUNDWATER AND VADOSE MONITORING WELLS AND EXPLORATORY OR TEST BORINGS

OFFICE USE ONLY PERMIT LMWP# 003615 SAM CASE Y/N # None DATE RECEIVED: 9/4/2018 FEE PAID: \$235.00 CHECK # Online

A. RESPONSIBLE PARTY (The person, persons, or company responsible for the construction, maintenance, and destruction of the proposed borings and/or wells.)							
Mailing Address 1966 Olivehai		City Encinitas	State CAZip 92024				
Contact Person <u>Joseph Randa</u>	1	Phone <u>760-753-6466</u>	Ext				
B. SITE ASSESSMENT PROJEC	T NUMBER - IF APPLI	CABLE #					
C. CONSULTING FIRM GEOSCIE	NCE Support Services,	Inc					
Mailing Address PO Box 220		CityClaremont	State CAZip 91711				
Registered Professional Terry	Watkins	Phone <u>9094516550</u> Registration # <u>9046(</u> PG)					
E-mail twatkins@geoscience-v	ater.com						
Contact Person <u>Terry Watkins</u>		Phone <u>9094516550</u>	Ext Email				
D. DRILLING COMPANY Jensen	Drilling		C57#_340115				
Contact Name Chris Humphrie	2	E-mail chris@	jensendrilling.com				
Mailing Address 1775 Henders	on Ave	City Eugene	State OR Zip 97403				
Phone <u>541-912-0907</u> Ext							
E. CONSTRUCTION INFORMATION							
TYPE OF WELLS/ BORINGS TO	MATERIA	ALS TO BE USED	PROPOSED CONSTRUCTION				
BE CONSTRUCTED #	CASING	SEAL/BORING	Estimated Groundwater Depth:				
Groundwater	Not Applicable V		<u>12</u> ft.				
☐ Vadose	Not Applicable X Type	☑ Neat Cement ☑ Cement & Bentonite	Estimated Depth of Boring:				
Boring <u>1</u>	Gauge	Sand-Cement	<u>200</u> ft.				
Other	Diameter	Bentonite	Concrete Seal: <u>0</u> to <u>3</u>				
	Screen Size	Other	Annular Seal:to				
NUMBER OF WELLS TO BE	Filter Pack	Borehole diameter 8"	Filter Pack:to				
DESTROYED	Dri	Iling Method	Perforation:to				
Destruction	Auger	Air Rotary					
	Direct Push	🛛 Sonic	NOTE: Attach a well				
	Other	Percussion	construction diagram				
I agree to comply with the requirement	ents of the current Site A	ssessment and Mitigation Man	ual, and with all ordinances and				
laws of the County of San Diego and	The State of Cautornia	bertaining to well/boring constru	uction and destruction.				
DRILLER'S SIGNATURE		DATE	8/31/18				
Within 60 days of completion, I will find the second secon	Within 60 days of completion, I will furnish the Monitoring Well Permit Desk (858) 505-6688 with a complete well/boring log. I will certify the design and construction or destruction of the well/borings in accordance with the permit application.						
PG/RCE/CEG SIGNATURE	1,6	DATE 8	3/30/2018				

ope	SITE INFORM n LOP/SAM itional parcel	site assessme	operty Owner Co ent cases, Caltra	onsent agree ns propertie	ement is requ is and military	ired for all appl y properties. S	ications, except for onsite, ubmit a separate sheet for
	4000000						
1			IUMBER <u>760-146</u>	-07- 00			
	Site Name						
Zip <u>9</u>	92014	s <u>14989 Via D</u>	e La Valle, Del Ma	ar, CA 92014			City <u>Del Mar</u>
	PROPERTY	OWNER Surf	Cup Sports, LLC				
	Phone (925			Ext	Fax _		
	Mailing Add	ress <u>2631 Via</u> (-	City <u>Del Mar</u>	State CA Zip92014
	NUMBER (DF WELLS 1		TYPE	OF WELLS B	orehole	
2.	ASSESSOR	S PARCEL N	UMBER				
	Site Address				City		Zin
		OWNER					Zip
	Phone		Ext.		Fax		
	Mailing Addr					State	Zin
	J				Only		ZIP
	NUMBER C	F WELLS			TYPE OF W	ELLS	
SL	ipportive doc	cumentation.			stions comple	etely and subr	nit any required
1.	What is the	purpose of the	well/boring invest	igation?			
	🗌 а.	Part of an one If yes, indicate	going site assessr e which governme	ment case in v ent regulator is	which a govern s the lead ager	ment regulator is acy and the case	the lead agency. number.
			DEH	RWQCE	3	DTSC	
	🗌 b.	Part of a Pha	se I investigation f	for property o	wnership trans	fer.	
	🛛 с.	Geotechnical	investigation for p	proposed con	struction or lan	d stabilization.	
	🗌 d.	Other:					

- 2. If wells are to be destroyed, provide a description of method of destruction <u>Borehole will be backfilled with</u> <u>neat cement</u>
- 3. Are you proposing a variation from current SAM Manual Requirements for the construction or destruction of borings, Vadose and/or Groundwater Monitoring Wells? If yes, specify these variations and include a well construction diagram and all required supporting documentation. Refer to the SAM Manual Appendix B for monitoring well guidelines (www.sdcdeh.org). Yes No

ACTIVITY	FEE SCHEDULE	AMOUN	IT
Permit for Well Installations Only Groundwater Monitoring Wells, Vadose,	\$351.00 for the first monitoring well	\$351.00	
Vapor Extraction Wells)	\$224.00 for each additional well installation	x \$224.00	
Permit for Borings Only	\$235.00 for the first boring	\$235.00	235.00
(CPT's, Hydropunch, Geoprobes, Temporary Well Points, etc.)	\$62.00 for each additional boring	x \$ 62.00	
Permit for	\$235.00 for the first destruction	\$235.00	
Well Destructions Only	\$143.00 for each additional destruction	x \$143.00	
Permit for any Combination of Well Installations, Borings, & Destructions	First Activity: \$351.00 (if monitoring wells will be installed) OR \$235.00 (for borings and destructions only)	\$351.00 OR \$235.00	
(Except Enhanced Leak Detection & Soil Vapor Survey)	\$224.00 for each additional well	x \$224.00	
	\$ 62.00 for each additional boring	x \$ 62.00	
	\$143.00 for each additional well destruction	x \$143.00	
Permit for Soil Vapor Survey	\$388.00 (flat fee per site)	\$388.00	
Permit for Enhanced Leak Detection	\$235.00 for the first boring	\$368.00	
	TOTAL COST OF PERMIT	an a na san an ann an Anna an A	\$ <u>235.00</u>

JACK MILLER DIRECTOR

an Dieg jounty

ELIZABETH POZZEBON ASSISTANT DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH LAND AND WATER QUALITY DIVISION P.O. BOX 129261, SAN DIEGO, CA 92112-9261 (858)505-6688 www.sdcdeh.org

PROPERTY OWNER CONSENT

Proposed locations for subsurface work:

Property Address:

Assessor's Parcel Number (APN):

14989 Via De La Valle, Del Mar, CA 92014

760-146-07-00

I, <u>Robert Haskell</u>, owner of the property/properties listed above, give my permission to <u>GEOSCIENCE Support Services</u>, Inc. and Jensen Drilling (consulting company, contractor) to conduct the following work at the locations stated above.

Install monitoring wells

Destroy ____ monitoring wells

Drill 1 soil borings

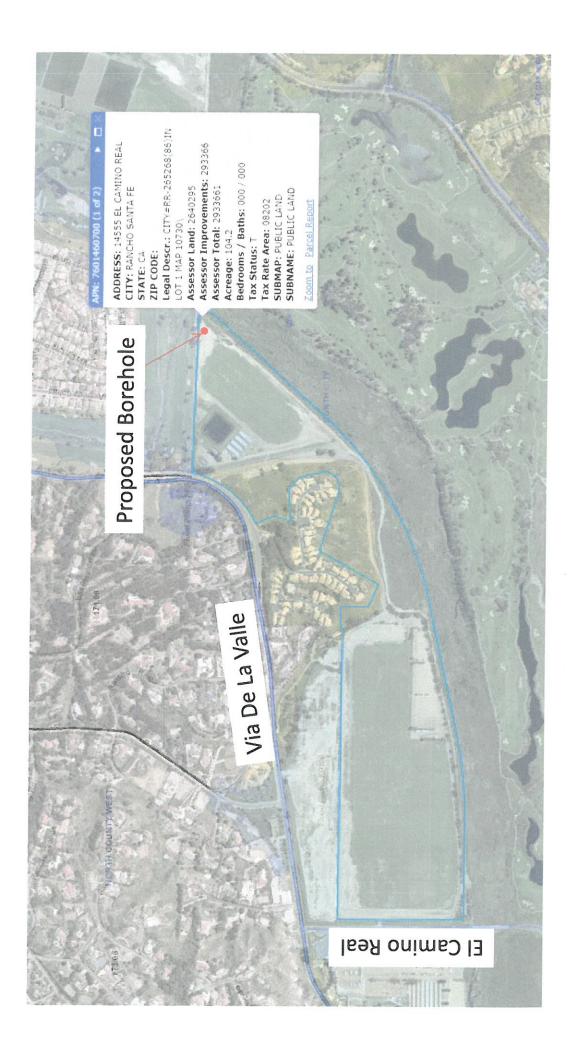
I understand that <u>Terry Watkins, PG</u> (registered professional) of <u>GEOSCIENCE Support Servises, Inc.</u> (consulting company) and an authorized signer for <u>Jensen Drilling Co.</u> (drilling company) have submitted a signed application to the Department of Environmental Health in which they have agreed to complete the above-stated work according the requirements of the current SAM Manual, all ordinances and laws of the County of San Diego and the State of California pertaining to well/boring construction and destruction. I have arranged with the Responsible Party, the person who causes to have monitoring wells/borings installed or existing wells destroyed on this property, to ensure proper closure of the monitoring wells/borings.

Property Owner Signature: Date: Date: Date: B 30 KB	rty Owner Signature:	- Voolel	Date:	8 30	18	
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Print Name: Robert Haskell Title: President

Company: Surf Cup Sports, LLC

Mailing Address: 2631 Via de la Valle, Del Mar, CA 92014



DEPARTMENT OF	THE REAL PROPERTY OF SAW OF SA	LAND AND WATE	DIEGO ENVIRONMENTAL HE R QUALITY DIVISION ERMIT APPLICATION		DEH 2019 - LWFU PERMIT # FEE: 027.0 WATER DIST:	3/8/19
1.	Property Ov	wner:Olivenhain M	unicipal Water District	PI	hone: _760-753-6466	
		Iress:1966 Olivenhain		City:Encinitas		Zip: <u>92024</u>
2.	Well Locatio	on – Assessor's Parcel	Number: 760-146-07-00)		
	GPS Coord		al Degrees): <u>32.9850722</u>	<u>2/-117.21</u>	284167 Elevati State: CA	
3.	Mailing Add Email Addre	iress: 1775 Henders کلیم ess: <u>chirs@j</u> ensend	imphries son Ave irilling.cc _{Phone:} 541-7	_ _{City:} Eugene 726-7435	State: OR	<u>Zip:</u> <u>97403</u>
4.	Use:	Private 🗌 Public	Industrial X Other:	Feasibility Test Well		
5.	Type of Wo		econstruction 🗌 Destruc		me Extension:	2 nd
6.	Type of Equ		er & Flood Reverse C	irculation Drill		· · · · · · · · · · · · · · · · · · ·
7.	Depth of W	ell: Proposed: 160		Existing:		
8:	- [Diameter: <u>18</u> in. Wall/Gauge: <u>0.2</u> 50	Depth: <u>50</u> Diameter: <u>36</u> in. Wall/Gauge: <u>0.375</u>	From: <u>30</u> To: <u></u> Type: <u>Gravel Pac</u>	From: <u>60</u> To 160 From: To	
9.	Annular Sea Borehole D	•	Sealing Material Conductor Diameter: <u>36</u>		ickness: 8 3_in.	
10:	Best Manag		ng well drilling waste on the)
11.	Date of Wo	rk: Start: <u>3/18/19</u>		Complete: <u>4/30/19</u>)	
I hereby of San completi report).	agree to con Diego and ion of work, I accept resp	mply with all regulations the State of California I will furnish the Depa ponsibility for all work do	the local water agency for s of the Department of Envir a pertaining to well constr rtment of Environmental H one as part of this permit an S Determine the termine the termine but reference to the termine	ronmental Health, and uction, repair, modifi ealth with a complete Id all work will be perfo	with all ordinances and ication and destruction and accurate log of the arcourate of the	Immediately upon e well (well driller's supervision.
DISPC	SITION C	F APPLICATION	Department of Enviror	nmental Health Us	se Only)	
	INIED					
	PROVED	1				
This a	pproval is	s valid for 120 day	's. A maximum of two e:	xtensions, each 120) days in length can b	e requested.
			ing associated with acces mits from the County of S			or destruction of
Specia	alist:	finna too	540	Date	e: 4/3/2019	
		V				



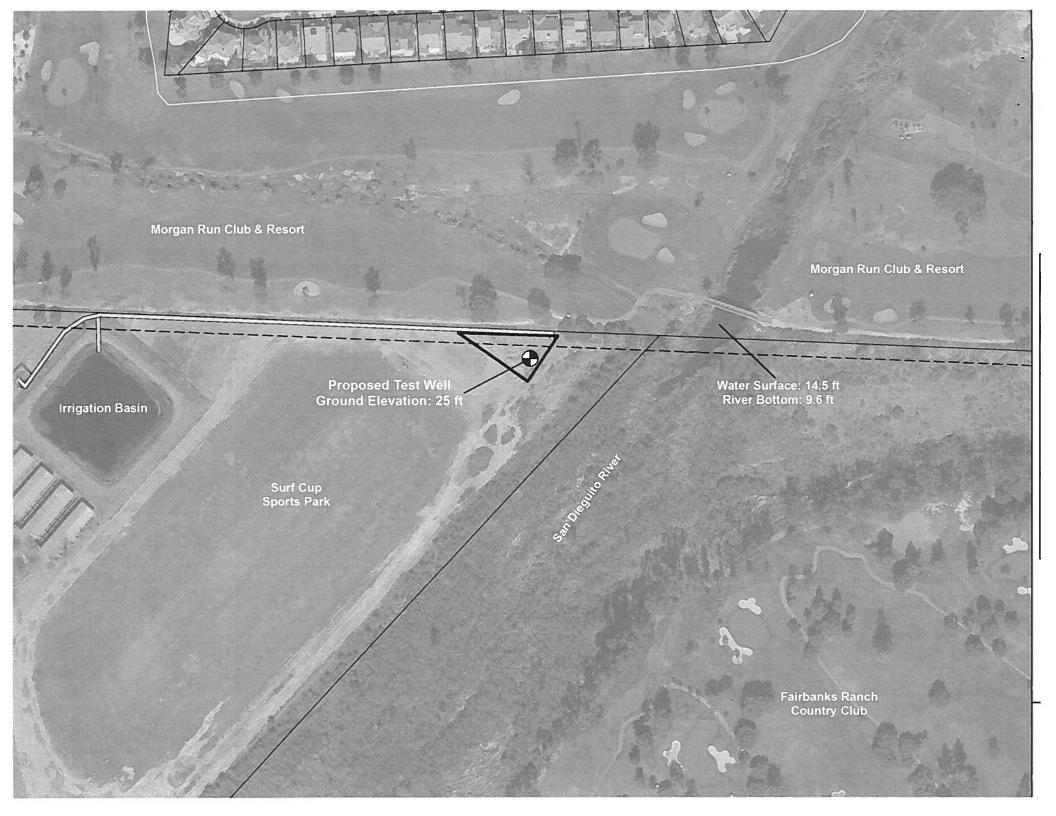
COUNTY OF SAN DIEGO DEPARTMENT OF ENVIRONMENTAL HEALTH LAND AND WATER QUALITY DIVISION WATER WELL PERMIT APPLICATION

	e-	
DEH USE ONLY	Y	
PERMIT #		
APN:	1 Sec.	

SITE PLAN

Indicate below the vicinity and exact location of the well with respect to, and including, the following items: property lines, transmission lines, water bodies/courses (ponds, lakes, and streams within 300 ft), drainage pattern, roads, existing wells, sewer laterals, existing or proposed septic systems, livestock/fowl enclosures, and other potential contamination sources. Please include lot dimensions, and please draw the plot plan to a standard engineer's scale.

Please see attached



DEPARTMENT OF	ALL HARD HARD	LAND AND WA	OF ENVIRONM TER QUALITY	MENTAL HEALTH DIVISION /ELL PERMIT AF andated basins)		PERMIT	DEH USE ONLY #
1. F	Proposed Wat	ter Use (e.g. irriga	tion, stock, dome	stic, industrial, etc.):	Municipal		
2. E	Estimated Anr	nual Extraction Vo	lume: 968 Acre-	ft			
				ms 3 through 6 and e used for domesti			
		oy Well (acres):					. ,
4. F	Proposed Pro	duction Capacity:	600 gpm		Estimated Purr	ping Rate:	600 gpm
(Cumulative Ex	traction Volume t	pefore 1/1/2020: _	887 acre-ft			
		Imping Schedule:					
					Estimated Seas	onal Groundw	vater Fluctuations:
F	Recharge Are	a (if known):	NA		Recharge Rate (if	known):	NA
I	Location relati	ve to flood plain:	Inside 1	100-year flood plane			
	Pum	ping Rate:	ıme:	Screen Measure e):	 d	Estima	
5	Pum Annu Spec	ping Rate:	ıme:	Measure e):	 d	Estima	
c N	Pum Annu Spec Resu DECLARATIC I, Chris Hu (Name of defined in the domestic purp Management	ping Rate: ial Extraction Volu ific Production Ca ilts of Pumping Te DN OF DE MINIMI Imphries owner or legally auth California Water ioses, two acre-fe Act (SGMA) exclu	ime: pacity (if available): sts (if available): S EXTRACTOR S norized representative Code, Division 6, et or less per year the an applicant for	Measure e): STATUS , declare f ve) , Part 2.74, Chapter r". I further understa	hat I understand th 2, Section 10721(and that the Water who would be a de	Estima e definition of e), to mean "a Code and the	
C N f	Pum Annu Spec Resu DECLARATIC I, Chris Hu (Name of defined in the domestic purp Management for new wells i Furthermore, 4, Article 5, Sc	ping Rate: al Extraction Volu- ific Production Ca ilts of Pumping Te DN OF DE MINIMI Imphries owner or legally auth California Water oses, two acre-fe Act (SGMA) exclu- in critically overdra I declare that I ection 67.446 stat	Ime: Ipacity (if available ests (if available): S EXTRACTOR S norized representation Code, Division 6, et or less per year of an applicant for afteo groundwater understand that y es, "a permit may	Measure e): Measure STATUS , declare f ve) , Part 2.74, Chapter r". I further understa or a new water well w r basins and SGMA- San Diego County C	hat I understand th 2, Section 10721(and that the Water who would be a de mandated basins. code of Regulatory ended by the Direct	Estima e definition of e), to mean "a Code and the minimis extrac Ordinances, T ctor if he/she c	a de minimis extractor, as a person who extracts, for Sustainable Groundwater ator from the requirements Fitle 6, Division 7, Chapter determines that the person
6 1 1 2 2 1	Pum Annu Spec Resu DECLARATIO I, Chris Hu (Name of defined in the domestic purp Management for new wells for new wells for new wells for new wells for new wells for new wells for new wells	ping Rate: ral Extraction Volu- tific Production Ca filts of Pumping Te ON OF DE MINIMI Imphries owner or legally auth California Water tooses, two acre-fe Act (SGMA) exclu- in critically overdra I declare that I ection 67.446 stat ormit was issued p of the above, I c	ime: apacity (if available ests (if available): S EXTRACTOR S norized representativ Code, Division 6, et or less per yea unde an applicant fo afteo groundwater understand that es, "a permit may ursuant to this ch	Measure e):, declare f ve) , Part 2.74, Chapter r". I further understa or a new water well v r basins and SGMA- San Diego County C v be revoked or susp apter has obtained t	hat I understand th 2, Section 10721(and that the Water who would be a de mandated basins. code of Regulatory ended by the Direct he same by fraud o	Estima e definition of e), to mean "a Code and the minimis extrac Ordinances, T ctor if he/she o r misrepresen	a de minimis extractor, as a person who extracts, for Sustainable Groundwater ator from the requirements Fitle 6, Division 7, Chapter determines that the person
c M f f l z t t	Pum Annu Spec Resu DECLARATIO I, Chris Hu (Name of defined in the domestic purp Management for new wells for new wells	ping Rate: ral Extraction Volu- tific Production Ca filts of Pumping Te ON OF DE MINIMI Imphries owner or legally auth California Water tooses, two acre-fe Act (SGMA) exclu- in critically overdra I declare that I ection 67.446 stat ormit was issued p of the above, I c	Ime: Ipacity (if available): ests (if available): S EXTRACTOR S norized representative Code, Division 6, et or less per year ide an applicant for afted groundwater understand that es, "a permit may ursuant to this chi- leclare that the pr	Measure e):, declare f ve) , Part 2.74, Chapter r". I further understa or a new water well v r basins and SGMA- San Diego County C v be revoked or susp apter has obtained t	hat I understand th 2, Section 10721(and that the Water who would be a de mandated basins. code of Regulatory ended by the Direct he same by fraud o	Estima e definition of e), to mean "a Code and the minimis extrac Ordinances, T ctor if he/she o r misrepresen	a de minimis extractor, as a person who extracts, for Sustainable Groundwater ator from the requirements Fitle 6, Division 7, Chapter determines that the person station".
t t	Pum Annu Spec Resu DECLARATIC I, <u>Chris Hu</u> (Name of defined in the domestic purp Management for new wells i Furthermore, 4, Article 5, So to who any pe In recognition acre-feet of w Signature: <u>C</u>	ping Rate: al Extraction Volu- ific Production Ca ults of Pumping Te DN OF DE MINIMI Imphries powner or legally auth California Water poses, two acre-fe Act (SGMA) exclu- in critically overdra I declare that I ection 67.446 state print was issued p of the above, I c ater per year.	Ime: pacity (if available): ests (if available): S EXTRACTOR S norized representation Code, Division 6, et or less per year ide an applicant for afted groundwater understand that years understand that years understand that years understand that years beclare that the pre- hries Determine and years Determine and years	Measure e):, declare (STATUS , declare (ve) , Part 2.74, Chapter r". I further understa or a new water well of r basins and SGMA- San Diego County C v be revoked or susp apter has obtained t oposed water well is	hat I understand th 2, Section 10721(and that the Water who would be a de mandated basins. code of Regulatory ended by the Direc he same by fraud o for domestic purpo	Estima e definition of e), to mean "a Code and the minimis extrac Ordinances, T ctor if he/she of r misrepresent oses and I will	a de minimis extractor, as a person who extracts, for Sustainable Groundwater ator from the requirements Fitle 6, Division 7, Chapter determines that the person station".

Surf Cup Property Well Information

Surf Cup #1						
Use	Irregation					
Depth (ft bgs)	60?					
Diameter (in)	10					
Screen interval (ft bgs)	NA					
Pumping rate (gpm)	120					
Annual Extraction Volume (Estimated acre-ft)	NA Not metered					
Measured (acre-ft)	NA					
Estimated (acre-ft)	NA					
Specific Production Capacity (if available)	NA					
Results of Pump Test (if available)	NA					

Surf Cup #2	
Use	Irregation
Depth (ft bgs)	110
Diameter (in)	10
Screen interval (ft bgs)	50-110
Pumping rate (gpm)	120
Annual Extraction Volume (Estimated acre-ft)	NA Not metered
Measured (acre-ft)	NA
Estimated (acre-ft)	NA
Specific Production Capacity (if available)	~6 (calculated from DWR log)
Results of Pump Test (if available)	NA

RSF Club Polo No. 1_Abandoned	
Use	Irregation (Abandond)
Depth (ft bgs)	57.2
Diameter (in)	12
Screen interval (ft bgs)	NA
Pumping rate (gpm)	NA
Annual Extraction Volume (acre-ft)	NA
Measured (acre-ft)	NA
Estimated (acre-ft)	NA
Specific Production Capacity (if available)	NA
Results of Pump Test (if available)	NA

RSF Club Polo No. 2_Abandoned	
Use	Irregation (Abandond)
Depth (ft bgs)	98
Diameter (in)	10
Screen interval (ft bgs)	NA
Pumping rate (gpm)	NA
Annual Extraction Volume (acre-ft)	NA
Measured (acre-ft)	NA
Estimated (acre-ft)	NA
Specific Production Capacity (if available)	NA
Results of Pump Test (if available)	NA



County of San Diego

Department of Environmental Health Land and Water Quality Division 5500 Overland Ave, Suite 210, San Diego, CA 92123 (858) 565-5173 www.sdcdeh.org

STORMWATER & DISCHARGE MANAGEMENT PLAN FOR WATER WELLS

	Well Permit Number:	Assessor's Parcel Number: 760-146-07-00
--	---------------------	--

GPS Coordinates: (map datum: WGS84, units: HDD) N: _____32.98507222 W: _-117.21284167

Section 1: Required Information from the Well Driller:

- Are there any watercourses or water bodies within 50 feet of the limits of soil disturbance? YES NO X
 Does the plat show the project boundaries? (a "detail inset" is acceptable for a large parcel)
- Does the plat show the project boundaries? (a "detail inset" is acceptable for a large parcel)
 Does the plat show footprints of any existing structures and facilities within 100 feet of the YES X NO
 Wellhead position?
- 4. Does the plat show locations where run-off may enter storm drains, drainage courses and/or YES NO
 5. Is grading required to access site or install well?
 YES NO X
- 6. Does the project conform to the local grading ordinance?
- 7. Will drilling additives be used to drill the well?
- 8. Are the Best Management Practices attached to this permit application?

Section 2: Best Management Practices

The goal of stormwater and discharge control management planning while drilling and installing wells is to reduce pollution to the maximum extent practicable using Best Management Practices (BMPs). Construction related materials, sediments, chemical residues such as drilling foam, wastes, and spills must be retained within the property boundaries to eliminate transport from the site to nearby streets, drainage courses, receiving waters and adjacent properties. It is the responsibility of the property owner and the contractor to determine which BMPs will be used in order to ensure that all contaminants are retained on-site.

Examples of Best Management Practices to contain well installation run-off include, but are not limited to, installation of a sediment basin to contain run-off, using geotextile fabric to contain sediments and drilling mud, or eliminating the use of drilling foam. (Website information is available at <u>www.projectcleanwater.org</u>)

Section 3: Certification- I have read and understand the following: (Please check each box after concurrence.)

- Selected BMP's will be implemented so that water quality is not negatively impacted by well construction activities.
- I am aware the selected BMP's must be installed, maintained, monitored and revised as necessary so they are effective.
- I understand that non-compliance with the San Diego County Watershed Protection Ordinance may result in enforcement actions by the County. These may include fines, citations, stop-work orders, or other actions.
- DEH inspectors and personnel from other regulatory agencies are authorized to enter my property at any time for purposes associated with this well permit until such time the well is completed to the satisfaction of DEH.
- Should DEH determine during the field review that the well installation procedures contradict this Discharge Management Plan or the well permit application, the well drilling permit may be suspended or revoked. Further activity will require a new permit fee and amendment to the existing permit.

Signatures:	$\mathcal{O}_{\mathcal{A}}$
Contractor:	
Property Owner:	Parle
Reviewed by DEH:	Jenna. Poetras

Date	3/1/19	,	
Date	2/27	19	
Date	3/29/19	·····	

YES NO

YES 🗴 NO

YES X NO

Olivenhain Well Best Management Practices (BMPs) Guidelines

General

Jensen Drilling Company (JDC) will employ Best Management Practices (BMPs) for Test Well construction activities. Drilling activities shall be conducted in such a way as to prevent the introduction of pollutants to the ground surface or off-site drainages or public rights-of-way during construction. Accordingly, any equipment and/or materials brought to the project area must be managed in accordance with the following procedures:

- Plastic sheeting that is bermed or drip pans will be used to catch leaks and residual material in hoses and spigots under all stationary equipment. The plastic sheeting or drip pans will be checked daily and emptied or replaced as needed by reusing the substance or proper disposal.
- Spilled hazardous materials will be contained immediately using sand, dirt, and/or absorbent materials. Such spills will be cleaned up promptly along with the contaminant material and will be disposed of properly.
- Outdoor storage of all fuels, oils, solvents, cleaners and other liquid materials shall be within secondary containment at either the drilling site or materials storage and staging area. When not immediately in use, materials shall be properly stored and protected at the designated materials storage and staging area, and covered, as necessary, to prevent storm water accumulation in the containment.
- Bentonite, cement, and any other powdered product shall be stored on pallets and away from any drainage path. The storage area should be covered and protected, if necessary, to prevent pollution runoff by wind or storm water.
- Chemicals, bagged material, or drums shall be stored on pallets within secondary containment.

Waste products generated during the drilling/construction work must be managed in accordance with the following procedures and shall not be allowed to mobilize beyond the confines of the work area:

- Containerized waste will not be allowed to overflow. Any waste that requires storage in containers shall be removed from the project areas on a regular basis and disposed of at an approved facility.
- Waste material (i.e., drill cuttings) shall be stored within watertight and covered containers, protected and maintained to prevent runoff of materials to nearby work areas, storm drains, or pubic right-of-way. This may include lining and/or covering of cuttings piles/containers with plastic sheeting to prevent transportation by the forces of wind or water.
- Cleaning of the drilling rigs, tremie pipe and any other equipment shall be conducted only at the designated materials storage and staging area.
- Waste drilling additives or cement must be removed from the project areas prior to completion of the Work.

The use and maintenance of drilling rigs and support vehicles shall be in accordance with the following procedures:

- No fueling of vehicles or equipment that can be moved to a commercial fueling station and filled there is allowed.
- If the vehicles or equipment cannot be filled at a commercial fueling station, fueling will be performed on site at designated areas. During fueling operations, drip pans or bermed plastic sheeting will be used to catch leaks. "Topping off" of fuel tanks is not allowed.
- Maintenance of vehicles will be performed within designated areas. Drip pans will be used during maintenance activities to catch any leaks.
- Daily inspections of drilling rigs and support vehicles and equipment will be made to check for leaks. Any leaks detected shall be reported and fixed immediately.
- All Contractor employees and subcontractors shall be educated in the proper handling and storage of construction materials used during the project.
- All spills shall be soaked up using absorbent materials and disposed of properly at the Contractor's expense. Washing down or burial of spills is not allowed. Any spill, no matter how small, is to be reported.
- If required, steam cleaning of the drilling rigs and support equipment must be carried out within the designated materials storage and staging area. The cleaning area shall be contained to prevent runoff to storm drains. All wastewater generated from cleaning equipment must be containerized and disposed of at the Contractor's expense. Any soap used during cleaning must be phosphate-free and biodegradable.

Disposal of all wastewater and drill cuttings shall be by such manner and to such locations that nuisance or damage to environment, structures, roads, or utilities or interference with other construction projects will be prevented.

Sediment Control

Sediment control is not anticipated to be a significant impact within the project area as the site is in an area covered with asphalt. However, the project will incorporate minimum temporary sediment control requirements and other measures selected by the JDC. Sediment control BMPs consisting of temporary fiber rolls and gravel bag berm will be installed at all appropriate locations along the site perimeter and at all operational internal inlets to the storm drain system. Temporary sediment control materials will be maintained onsite throughout the duration of the project for implementation in the event of predicted rain, rapid response to failures or emergencies, in conformance with other requirements. Should sediment become mobilized to paved area beyond the immediate work area, JDC will employ street sweeping to prevent further mobilization of sediment. Additionally, street sweeping will be employed during soil hauling to keep streets clear of tracked material and debris. Washing of sediment tracked onto streets into storm drains will not occur.

Non-Stormwater Management Pollution Control

Construction site management shall consist of controlling potential sources of water pollution before they come in contact with water systems or watercourses. JDC shall control material pollution and manage waste and non-storm water existing at the construction site by implementing effective handling, storage, use, and disposal practices. Non-Stormwater discharges into drainage systems or waterways, which are not authorized and shall be prohibited.

Several types of vehicles and equipment will be used onsite throughout the project, including drill rigs, trucks and trailers, forklifts, generators, and compressors. Vehicle and Equipment Fueling, and Vehicle and Equipment Maintenance BMPs will be utilized to prevent discharges of fuel and other vehicle fluids. Vehicle cleaning will not be performed onsite.

Aside from the drilling, compressors, and forklifts all wheeled vehicles shall be fueled offsite or at the temporary staging area. Fuel trucks, each equipped with absorbent spill clean-up materials, shall be used for all onsite fueling, whether at the temporary fueling area or for mobile fueling elsewhere. Drip pans shall be used during all mobile fueling. Drip pans or absorbent pads shall be used during all vehicle and equipment maintenance activities that involve grease, oil, solvents, or other vehicle fluids.

Materials Storage and Handling

In general, BMPs shall be implemented to help prevent discharges of construction materials during delivery, storage, and use. The material storage and temporary staging area shall be located within the project site boundary. Watertight containers shall be used to store hand tools, small parts, and most construction materials that can be carried by hand, such as paint cans, solvents and grease.

Stockpile Management shall be implemented to reduce or eliminate pollution of stormwater from stockpiles of soil cuttings. Stockpiles shall be surrounded with sediment controls (i.e., temporary fiber rolls and gravel bag berms) and plastic covers in advance of rainy precipitation.

Sanitary Facilities

Jensen Drilling Company shall implement Sanitary and Septic Waste Management BMPs consisting of portable toilets located and maintained at the drilling site for the duration of the project. Weekly maintenance shall be provided by a professional waste management service and shall be disposed offsite.





State Water Resources Control Board

AUG 27 2018

Ms. Kimberly Thorner Olivenhain Municipal Water District 1966 Olivenhain Road Encinitas, CA 92024

AMENDED NOTICE OF APPLICABILITY INCORPORATING GROUNDWATER TEST PROJECT; OLIVENHAIN MUNICIPAL WATER DISTRICT; STATEWIDE GENERAL PERMIT FOR DRINKING WATER SYSTEM DISCHARGES TO WATERS OF THE UNITED STATES

Dear Ms. Thorner:

Thank you for submitting the May 22, 2018 information requesting an amendment to your July 1, 2016 approved coverage under the Statewide Drinking Water Systems Discharge Permit,¹ adopted by the State Water Resources Control Board (State Water Board) in November 2014. The Statewide Drinking Water Systems Discharge Permit provides Clean Water Act regulatory coverage for: (1) discharges resulting from essential operations and maintenance activities of drinking water systems undertaken to comply with the federal Safe Drinking Water Act, California Health and Safety Code, and State Water Board's Division of Drinking Water permitting requirements; and (2) emergency discharges.

Amended Notice of Applicability

The information submitted in the initial August 4, 2015 application package, and the May 22, 2018 amendment information, satisfies the requirements for application of an amended Notice of Applicability. This Amended Notice of Applicability continues to implement regulatory coverage under the Statewide Drinking Water Systems Discharge Permit for the water system described below, effective as of July 1, 2016. This amended Notice of Applicability (NOA) ads discharges from a pilot groundwater test. The original waste discharge identification number of 4DW0412 identifies this amended coverage.

Discharge Description

The Olivenhain Municipal Water District (District) Water System is a community drinking water system with 21,890 connections that serves a population of approximately 82,351 in Carlsbad, Encinitas, San Diego, San Marcos, Solana Beach, and neighboring communities in San Diego County. The source of water for the system is treated surface water and purchased treated water from the San Diego County Water Authority.

¹ Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Drinking Water System Discharges to Waters of the United States; State Water Board Order 2014-0194-DWQ (see http://www.waterboards.ca.gov/water issues/programs/npdes/docs/drinkingwater/final statewide wgo2014 0194 dwg.pdf)

FELICIA MARCUS, CHAIR | EILEEN SOBECK, EXECUTIVE DIRECTOR

¹⁰⁰¹ I Street, Sacramento, CA 95814 | Mailing Address: P.O. Box 100. Sacramento, CA 95812-0100 | www.waterboards.ca.gov

The District plans to conduct a pilot groundwater test project to assess groundwater quality as a future drinking water supply source. The pilot groundwater test project is the second phase of the San Dieguito Valley Brackish Groundwater Desalination Study. The pilot project includes exploratory well boring(s), testing the well construction, conducting a long-term pump test, and piloting the manganese pretreatment system. The pump test will be operated at up to 600 gallons per minute for up to a 10-month duration. During dry-weather months, the majority of the water from the pump test will be provided to large irrigation customers in the adjacent vicinity, such as the Surf Cup Soccer Fields. During wet weather months when irrigation demands are minimal, pump test water may be discharged to a drainage swale that is tributary to the San Dieguito River. Other waterbodies that the District's system discharges into include Encinitas Creek, Escondido Creek, Lusardi Creek, San Elijo Lagoon, and San Marcos Creek. Solids from testing procedures will be disposed of at the local water reclamation facility.

Some of the receiving waterbodies are tributary to the Pacific Ocean Shoreline within the San Dieguito Hydrologic Unit. There are applicable total maximum daily loads for the bacteria indicators of E. coli, enterococci, and fecal coliforms in the Pacific Ocean Shoreline of the San Dieguito HU. The supplemental monitoring data submitted with the Application Package demonstrates that discharges from the system do not contribute to the impairment of the Pacific Ocean Shoreline in the San Dieguito Hydrologic Unit.

General Requirements

To comply with the Statewide Drinking Water Systems Discharge Permit, the District shall:

- a. Establish and implement appropriate best management practices.
- b. Ensure that all planned discharges comply with the terms and requirements of the Statewide Drinking Water Systems Discharge Permit including applicable effluent limitations for chlorine residual and turbidity.
- c. Take all necessary steps to review and update the effectiveness and adequacy of the control measures and best management practices.
- d. Keep control measures and best management practices plan updated and available onsite for all system operators.
- e. Conduct monitoring and reporting in compliance with the provisions and requirements in the Monitoring and Reporting Program, Attachment E of the Statewide Drinking Water Systems Discharge Permit.
- f. Maintain self-monitoring reports including compliant and non-compliant discharge monitoring information at the system's main office and make them available upon request of State Water Board and San Diego Regional Water Quality Control Board (San Diego Water Board) staff.

g. Submit an annual report and all reporting information required by the Monitoring and Reporting Program to the following address:

State Water Resources Control Board Division of Water Quality NPDES Wastewater Unit 1001 I Street, 15th Floor Sacramento, CA 95814

Include the following certification in the annual monitoring report:

"I certify under penalty of law that this document and all enclosures were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If you prefer to submit an electronic copy of the report, you can do so by sending it to the following e-mail: <u>DMR@waterboards.ca.gov</u> and title the e-mail "DWS No. 3710029 Annual Report."

h. Notify the San Diego Water Board per notification requirements in the Statewide Drinking Water Systems Discharge Permit's Monitoring and Reporting Program. The staff contact at the San Diego Water Board is Mr. Ben Neill who may be contacted at (619) 521-3376 or Ben.Neill@waterboards.ca.gov.

Previous Permitting Coverage

Based on your application package and staff review of the California Integrated Water Quality System database, the District's Water System no longer has previous regulatory coverage for its discharges under any San Diego Water Board order.

If you have any questions regarding this Notice of Applicability or the Statewide Drinking Water Systems Discharge Permit, please contact Mr. Renan Jauregui in the NPDES Wastewater Unit of the Division of Water Quality at (916) 341-5505 or <u>renan.jauregui@waterboards.ca.gov</u>.

Sincerely,

Karen Mogus, Deputy Director Division of Water Quality

cc: Next Page

cc: [via email]

Pascal Mues NPDES Permits Office U.S. EPA Region 9, WTR-5 75 Hawthorne Street San Francisco, CA 94105 <u>Mues.pascal@epa.gov</u>

Brandi Outwin-Beals, Senior Water Resource Control Engineer San Diego Regional Water Quality Control Board 2375 Northside Drive, #100 San Diego, CA 92108 Brandi.Outwin-Beals@waterboards.ca.gov

Ben Neill, Water Resource Control Engineer San Diego Regional Water Quality Control Board 2375 Northside Drive, #100 San Diego, CA 92108 Ben.Neill@waterboards.ca.gov Board of Directors Lawrence A. Watt, President Christy Guerin, Vice President Edmund K. Sprague, Treasurer Gerald E. Varty, Secretary Robert F. Topolovac, Director



General Manager Kimberly A. Thorner, Esq. General Counsel Alfred Smith, Esq.

May 22, 2018

Mr. Renan Jauregui State Water Resources Control Board Division of Water Quality NPDES Unit, 15th Floor P.O. Box 100 Sacramento, CA 95812-0100

VIA EMAIL: renan.jauregui@waterboards.ca.gov

Subject: NOI Amendment under Statewide NPDES Permit for Drinking Water System Discharges Order 2014-0194-DWQ – Olivenhain Municipal Water District

Dear Mr. Jauregui,

Pursuant to our discussion on April 18, 2018, Olivenhain Municipal Water District (OMWD) is seeking coverage under the Statewide NPDES Permit for Drinking Water System Discharge Order 2014-0194-DWQ to be amended to include the pilot groundwater test project.

The pilot groundwater test project is the second phase of the San Dieguito Valley Brackish Groundwater Desalination Study. OMWD recently completed the Feasibility Study in December 2017 in partnership with California Department of Water Resources (DWR) funding to analyze extracting 1.2 million gallons per day (mgd) of brackish groundwater in the San Dieguito Valley groundwater basin. The next phase of the study, also in partnership with DWR funding, is to pilot the well with exploratory boring(s), test well construction, a long-term pump test, and pilot the manganese pretreatment system. Solids from the pre-treatment system testing will be collected and disposed of at the local water reclamation facility. The pump test is proposed at 600 gallons per minute (gpm) for up to a 10-month duration.

The vast majority of discharge flows from the test well will be used beneficially by large irrigation customers in the adjacent vicinity. OMWD has been working with Surf Cup Soccer Fields in preparation for this project. Demands for Surf Cup Soccer Fields peak at 1,200 gpm in dry-weather months and they have committed to irrigating as much as possible to minimize discharges outside their property. However, during the wet weather seasonality when irrigation demands are minimal, the well test flows may need to be discharged. See Attachment 1 for potential irrigation demand seasonality and likelihood of discharge. Analysis estimates up to 61 acre-feet (AF) could be discharged in a wet-weather month based on 2017 historic precipitation and local evapotranspiration values. 72% of flows will be used for beneficial irrigation. Any discharge will need to comply with chlorine and turbidity levels as well as manage erosion.



1966 Olivenhain Road • Encinitas, CA 92024 • Phone 760-753-6466 • www.olivenhain.com

OMWD has developed a comprehensive approach to ensure compliance year round for this test well project:

- a. Expected duration of discharge: In wet-weather months (October-March), up to 61 AF/month for peak month. 72% of flows will be used for beneficial irrigation. During dry-weather months, zero discharge will be expected to occur.
- b. Monitoring and sampling frequency: OMWD will complete weekly sampling at the discharge to verify chlorine levels less than 0.019 mg/L and turbidity less than 100 NTU. Compliance point shall be at end of pipe as shown in Attachment 2. Water quality will also be sampled daily at the wellhead as part of the test pilot work. Flow volume will be monitored at wellhead, at turnout to beneficial use(s), and at discharge to compliance point. As part of weekly sampling, discharge flowrate to creek will be visually estimated, if any, and documented. In the event sampling indicates exceedance of allowed limits, the well can be shut down and retested until compliance is confirmed. Attachment 3 provides a summary of sampled groundwater quality in the San Dieguito Valley Basin.
- c. Amount of discharge that would go to beneficial reuse: See Attachment 1 for chart showing seasonal demand. Estimate 72% of flows to beneficial irrigation uses.
- d. Circumstance when it would go directly to the creek via drainage system: In a wet weather event when there is zero irrigation demand possible, flows would be discharged to the drainage swale. Assuming drainage swale is flowing at full capacity, discharge from the well would reach the creek after traveling through the 1,200-foot long drainage swale.
- e. Appropriate BMPs:

1) Well development will take 4 days with a total of 5.8 AF produced over the 4 day development period. This flow, that may be high in turbidity, will not be discharged to the creek. All flows during well development will be utilized for beneficial use. This will be accomplished by scheduling well development during peak dry-weather months and working with the local irrigation users to make sure they can accommodate all flows during well development.

2) If flows are discharged in a wet-weather event, flows will enter the onsite drainage swale. Chlorine and turbidity will still be sampled at the pipe end (compliance point).

(a) If turbidity exceeds 100 NTU at the monitoring compliance point and the drainage swale is submerged, the well will be shut off until compliance is confirmed.

(b) If turbidity exceeds 100 NTU at the monitoring compliance point and the drainage swale is not submerged, the well will continue to operate and sampling increased to daily being taken at swale discharge to the creek to verify turbidity levels less than 100 NTU. If no flows are leaving the drainage swale, no additional sampling is required.

- f. Map or schematic of the location of the project and discharge: See Attachment 2.
- g. Location map in reference to the entire water system boundaries: See Attachment 4.

We appreciate your consideration of this amendment request and look forward to discussing the project further with you. Please contact Joey Randall, OMWD Assistant General Manager, at 760-753-6466 with any questions or for additional information.

Sincerely,

Astronal Kimberly A. Thorner

General Manager

Attachments:

- -- Notice of Intent
- 1. Planned beneficial use of well supply vs discharge
- 2. Map of proposed project and compliance point for sampling
- 3. Groundwater quality table
- 4. Location map with OMWD boundaries



Development Services Department Engineering Division 1222 First Avenue, 5th Floor San Diego, CA 92101-4101 Tel (619) 446-5152

NOISE PERMIT APPLICATION

Counter Service Hours: 8:00 AM - 3:00 PM Monday through Thursday. 10:00 AM - 3:00 PM Friday For Your Appointment Call: (619) 446-5152

JOB LOCATION: 14989 Via de la Valle, Sa	an Diego, CA 92014
Address	Zip Code
START DATE: May 13, 2019	END DATE: May 17, 2019
FROM: 7:00 A M TO: 6:59	<u>A M</u>
DESCRIPTION OF CONSTRUCTION TYPE: well during constant rate pump test over a 24-ho run to power the test well pump. Noise levels will NOISE SOURCE (Construction equipment, jac	ur period. During one (1) night, generator will be I be limited to 65-dBA at 23-feet.
Generator, crew trucks	<u>.</u>
Applicant's Name (Please print): Joey Randall, As	ssistant General Manager
Name of Company or Organization: Olivenhain	Municipal Water District
Applicant Address: 1966 Olivenhain Road Encini	itas, CA 92024
	City, State and Zip Code
Daytime Phone: (760) 230-2572	Evening Contact: (760) 632-4648
Email Address: _JRandall@olivenhain.com	

Applicant Signature

Today's Date

Please mail this application or drop it off at our office located at 1222 First Avenue, 5^{th} Floor, San Diego, CA 92101. We will notify you when the permit is ready for pick-up. The fee is $\frac{149.001}{62.36}$. Make Checks payable to the City Treasurer.

Complete this portion of the application if your construction job site is in a residential area and will affect others. For construction between 7:00 PM and 7:00 AM, all residents within 500 feet of the job site are to sign the application below and indicate if they AGREE or DISAGREE with the issuance of a Noise Permit for the specified job. Please include a color map marking the 500 foot radius. Attach additional page(s) if necessary.

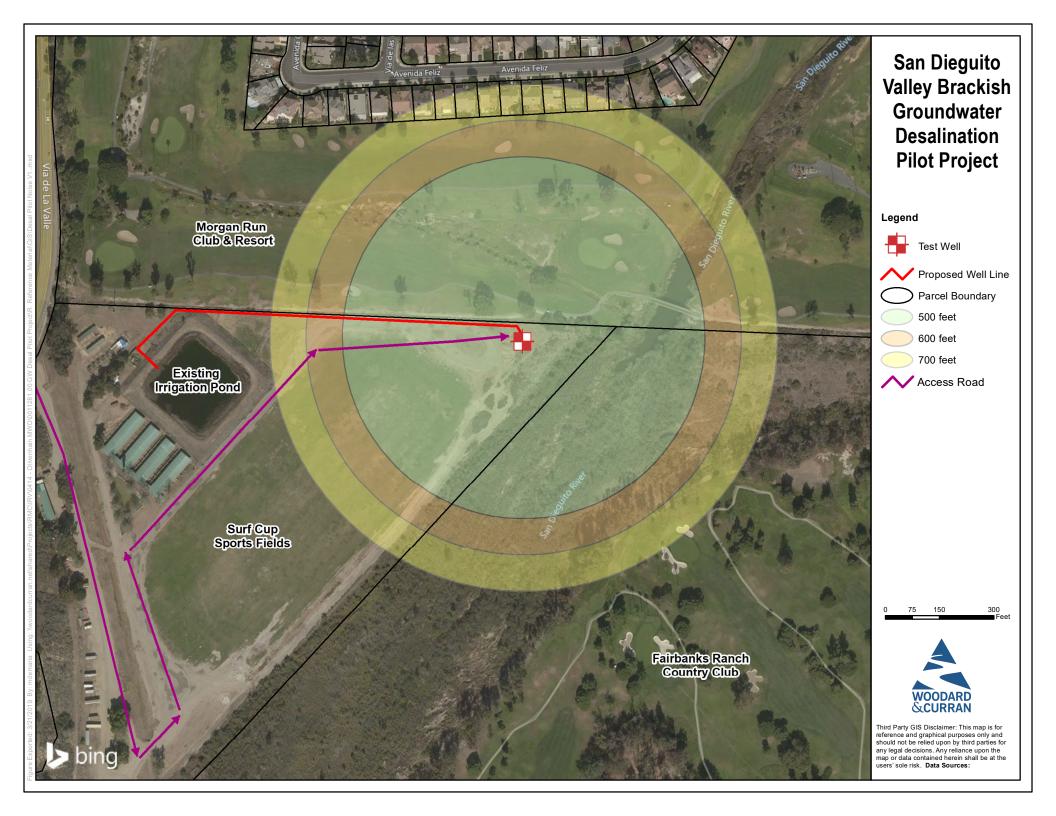
pilot well operation	5/13/19	5/17/19	7:00	<u>AM</u>	<u>6:59</u> A M
Event Description	Start Date	End Date	From	То	

The following residents are within 700 feet of the job site; see map attached.

Name	Address	Phone	Agree or Disagree
	3797 Avenida Feliz		notified
	3805 Avenida Feliz		notified
	3811 Avenida Feliz		notified
	3817 Avenida Feliz		notified
	3823 Avenida Feliz		notified
	3829 Avenida Feliz	-	notified
	3835 Avenida Feliz		notified
	3841 Avenida Feliz		notified
	3847 Avenida Feliz		notified
	3853 Avenida Feliz		notified
	3859 Avenida Feliz	_	notified
	3865 Avenida Feliz		notified

I certify that the above signatures are valid and that they represent all affected properties within a 500 foot radius of the construction site.

Signature of Applicant



APPENDIX C

Desalter Test Well

Chronology of Construction and Testing & Long-Term Pumping Test



Olivenhain Municipal Water District Report of Design Pilot Testing for the San Dieguito Valley Brackish Groundwater Desalination Project

Desalter Test Well Construction and Long-Term Pumping Test Chronology

Date(s)	Desalter Test Well Construction Phases and Long-Term Pumping Test Events
September 6 through September 12, 2018	Exploratory Borehole (EX-1) Drilling and Backfilling (Lithology used to create Desalter Test Well Design)
April 1 to April 17, 2019	Set up, Conductor Install & Pilot Borehole Drilling to 165 ft bgs
April 18, 2019	Pilot Borehole Geophysical Logs
April 19, 2019	Installation of 18-inch Well Screen, Well Casing, and Filter Pack
April 22, 2019	Installation of Sanitary Seal
April 23 through April 29, 2019	Initial Development by Swabbing and Airlifting
May 1, 2019	Installation of Test Pump
May 2 through May 17, 2019	Well Development
May 20, 2019	Transducer Installation
May 20, 2019	Step-Drawdown Pumping Test
May 21 through May 22, 2019	1-Day Constant Rate Pumping Test and 4-Hour Recovery Test
May 22, 2019	Desalter Test Well Water Quality Sampling
May 23, 2019	Desalter Test Well Video Survey & Gyroscopic Survey
September 10, 2019	Reinstallation of Desalter Test Well Transducer
September 10, 2019	First Round of Monitoring Network Transducer Installations
November 19, 2019	Second Round of Monitoring Network Transducer Installations
December 4, 2019	Start of Long-Term Pumping Test
April 21, 2020	First Quarterly Water Quality Sampling Event
May 5, 2020	Desalter Test Well Flow Tests
May 6, 2020	Desalter Test Well Pump Off due to Installtion of Secondary 6-inch flowmeter
May 13 through May 18, 2020	Desalter Test Well Pump Off due to Leaky Discharge Pipe
June 1 through June 5, 2020	Manganese Pre-Treatment System Test
September 16, 2020	Second Quarterly Water Quality Sampling Event
October 27, 2020	Desalter Test Well Pump Off due to Cleaning of Iron and Manganese fouling from Flowmeter 2
December 1, 2020	Third Quarterly Water Quality Sampling Event
December 2, 2020	End of Long-Term Pumping Test
March 9, 2021	Permanent Pump Installation and Test

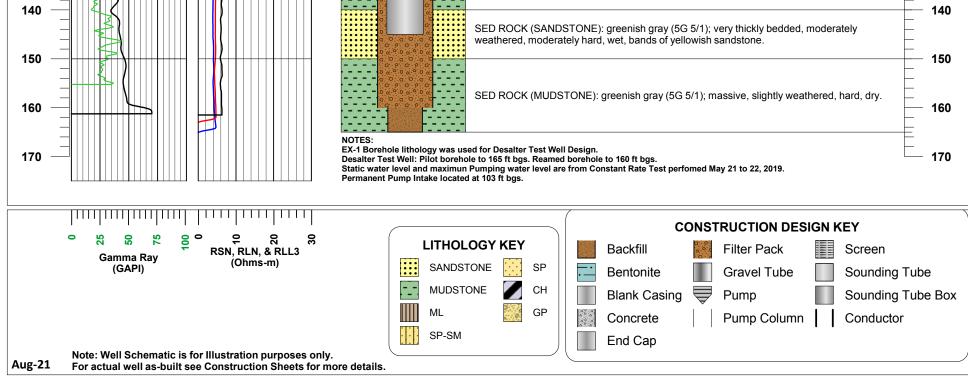
APPENDIX D

Desalter Test Well

Borehole Lithologic and Well Construction Log



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 ANDY SILT (ML): Stark (2.5Y 2.5/1): 45% fine grained sand; 5% silt; trace clay; contains quartz, feldspar, and mica micaceous. ANDY SILT (ML): Stark (2.5Y 2.5/1): 45% fine grained sand; 5% silt; trace clay; contains quartz, feldspar, and mica micaceous. AND (SP): black (2.5Y 2.5/1): 45% fine grained sand; trace silt; contains quartz, feldspar, and mica micaceous. ANDY SILT (ML): black (2.5Y 2.5/1): 45% fine grained sand; trace silt; contains quartz, feldspar, and mica; micaceous. ANDY SILT (ML): black (2.5Y 2.5/1): 45% fine grained sand; trace silt; contains quartz, feldspar, and mica; micaceous. ANDY SILT (ML): black (2.5Y 2.5/1): 45% fine grained sand; trace silt; contains quartz, feldspar, and mica; micaceous. ANDY SILT (ML): black (2.5Y 2.5/1): 45% fine grained sand; trace silt; contains quartz, feldspar, and mica; micaceous. ANDY SILT (ML): black (2.5Y 2.5/1): 45% fine grained sand; 10% silt; trace clay. ANDY SILT (ML): black (2.5Y 2.5/1): 90% four to medium grained sand; 10% silt; trace clay. ANDY SILT (ML): black (2.5Y 2.5/1): 90% fine-coarse, subangular-subrounded sand; and mica; micaceous, shell fragments. SAND WITH SILT (SP-SM): black (2.5Y 2.5/1): 90% fine-coarse, subangular-subrounded sand; quartz, feldspar, and mica; micaceous, shell fragments, trace clay. SAND (SP): very dark grayish brown (2.5Y 32); 90% fine-coarse, subangular-subrounded sand; gray contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay. SAND (SP): very dark grayish brown (2.5Y 32); 90% fine-coarse, subangular-subrounded sand; gray contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay. SAND (SP): very dark grayish brown (2.Y 32); 90% fine-coarse, subangular-subrounded sand; first end gray. SAND (SP): very dark grayish brown (2.Y 32); 90% fine-coarse, subangular-subrounded sand; first end gray.<td></td>	
 RSN RSN	10
20 Imicaceous. 30 SAND (SP): black (2.5Y 2.5/1); 95% fine grained sand; 5% silt; trace clay: contains quartz, feldspar, and mica; micaceous. 30 SAND (SP): black (2.5Y 2.5/1); 100% fine grained sand; trace silt; contains quartz, feldspar, and mica; micaceous. 30 SAND (SP): black (2.5Y 2.5/1); 100% fine grained sand; trace silt; contains quartz, feldspar, and mica; micaceous. 30 SANDY SILT (ML): black (2.5Y 2.5/1); 45% non to low plasticity silt; 55% fine grained sand; trace silt; contains quartz, feldspar, and mica; micaceous, shell fragments at ~45 ft bgs. 30 F7.4 Dosp FAT CLAY (CL): black (2.5Y 2.5/1); 45% non to low plasticity all; 75% fine grained sand; trace silt; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 30 SAND WITH SiLT (SP-SM); black (2.5Y 2.5/1); 90% fine-medium grained sand; 10% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 30 SAND WITH SiLT (SP-SM); black (2.5Y 2.5/1); 90% fine-coarse, subangular-subrounded sand; 90% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 30 SAND WITH SiLT (SP-SM); black (2.5Y 2.5/1); 90% fine-coarse, subangular-subrounded gravel up to 47mm; thace clay; contains quartz, feldspar, and mica, micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica, micaceous, shell fragments, trace clay balls. 30 SAND WITH SiLT (SP-SM); black (2.5Y 2.5/1); 90% fine-coarse, subangular-subrounded gravel up to 47mm; thace clay; contains qu	
SAND (SP): black (2.5Y 2.51); 95% fine grained sand; 5% silt; trace clay. contains quartz, feldspar, and trace mica; micaceous. SAND (SP): black (2.5Y 2.51); 10% fine grained sand; trace silt; contains quartz, feldspar, mica; micaceous. SAND (SP): black (2.5Y 2.51); 10% fine grained sand; trace silt; contains quartz, feldspar, mica; micaceous. SAND (SP): black (2.5Y 2.51); 10% fine grained sand; trace silt; contains quartz, feldspar, mica; micaceous. SAND (SP): black (2.5Y 2.51); 10% fine grained sand; trace silt; contains quartz, feldspar, mica; micaceous, shell fragments, at ~45 ft bgs. FAT CLAY (CL): black (2.5Y 2.51); 10% fine-medium grained sand; 10% silt; tra clay: contains quartz, feldspar, and mica; micaceous, shell fragments. SAND WITH SILT (SP-SM): black (2.5Y 2.51); 10% fine-medium grained sand; 10% silt; tra clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: balax graves up to a first feldspar, and mica; micaceous, shell fragments, trace clay: balax shangular-subrounded sand; 5% fine grained, subangular-subrounded graves up to a first feldspar, and mica; micaceous, shell fragments, trace clay: balax shangular-subrounded sand; 5% fine grained, subangular-subrounded graves up to a first first first ec clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: balax shangular-subrounded sand; 5% fine grained, subangular-subrounded graves up to a first first first ec clay; contains quartz, feldspar, and mica; micaceous,	
 RSN RSN REN REN	20
 An D (SP): black (2.5Y 2.5/1); 100% fine grained sand; trace silt; contains quartz, feldspar, micazeous. SAND (SP): black (2.5Y 2.5/1); 45% non to low plasticity silt; 55% fine grained sand; trace day, contains quartz, feldspar, and mica; micazeous, shell fragments at -45 ft bgs. FAT CLAY (CL): black (2.5Y 2.5/1); 90% low to medium plasticity clay; 10% fine grained sand; trace silt; contains quartz, feldspar, and mica; micazeous, shell fragments. FAT CLAY (CL): black (2.5Y 2.5/1); 90% low to medium plasticity clay; 10% fine grained sand; trace silt; contains quartz, feldspar, and mica; micazeous, shell fragments. SAND WITH SIQ LT (SP-SM); black (2.5Y 2.5/1); 90% fine-coarse, subangular-subrounded sand; 10% silt; trace silt; contains quartz, feldspar, and mica; micazeous, shell fragments. SAND (SP): very dark grayish brown (2.5Y 32); 95% fine-coarse, subangular-subrounded sand; 5% silt; trace fine-coarse, subangular-subrounded gravel up 64 Thm. trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; micazeous, shell fragments, trace clay; contains quartz, feldspar, and mica; fiese shell fragments, trace clay; co	
A0 GR SP KuN KUN S0 GR SP RUN RUN FUL3 FAT CLAY (CL): black (2.5Y 2.5/1); 100% fine grained sand; trace slit; contains quartz, feldspar, and mica; micaceous, shell fragments tat -45 ft bgs. FAT CLAY (CL): black (2.5Y 2.5/1); 90% low to medium plasticity slit; 55% fine grained sand; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments tat -45 ft bgs. FAT CLAY (CL): black (2.5Y 2.5/1); 90% low to medium plasticity clay, 10% fine grained sand; trace slit; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded sand; 5% slit; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded sand; 5% slit; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded gravel up to 47mm; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay to antip gravel up to 45mm; trace slit; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay contains quartz, feldspar, and mica; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; trace cla	
40 FR FR FR FR 50 FR FR FR FR SANDY SILT (ML): black (2.5Y 2.5/1): 45% non to low plasticity silt; 55% fine grained sant; trace day; contains quartz, feldspar, and mica; micaceous, shell fragments at ~45 ft bgs. 60 FAT CLAY (CL): black (2.5Y 2.5/1): 90% low to medium plasticity clay; 10% fine grained sant; trace silt; contains quartz, feldspar, and mica; micaceous, shell fragments. 70 FAT CLAY (CL): black (2.5Y 2.5/1): 90% fine-medium grained sant; 10% silt; trace clay contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 70 SAND WITH SILT (SP-SM): black (2.5Y 2.5/1): 90% fine-coarse, subangular-subrounded sand; 10% silt; trace clay contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 80 GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded gravel up to 47mm; trace clay balls. 90 GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 47mm; trace clay balls. 90 GRAVEL (SP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 48mm; trace clay balls. 90 SAND WITH GRAVEL (SP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 48mm; trace clay contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay contains quartz, feldspar, and mica; micaceous shell fragments, trace clay balls. </td <td>- 30</td>	- 30
40 GR SP FLI3 50 FLI3 Fumping SANDY SILT (ML): black (2.5Y 2.5/1): 45% non to low plasticity silt; 55% fine grained sand; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments at ~45 ft bgs. 60 FAT CLAY (CL): black (2.5Y 2.5/1): 90% low to medium plasticity clay; 10% fine grained sand; trace silt; contains quartz, feldspar, and mica; micaceous, shell fragments. 70 SAND WITH SILT (SP-SM): black (2.5Y 2.5/1): 90% fine-medium grained sand; 10% silt; trac clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 70 SAND WITH SILT (SP): very dark grayish brown (2.5Y 3/2): 95% fine-coarse, subangular-subrounded s 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 90 GRAVEL (GP): very dark grayish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded send; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and m	nd—
SADDY SILT (ML): black (2.5Y 2.5/1); 45% non to low plasticity silt; 55% fine grained sant; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, at ~45 ft bgs. FAT CLAY (CL): black (2.5Y 2.5/1); 90% low to medium plasticity clay: 10% fine grained sant trace silt; contains quartz, feldspar, and mica; micaceous, shell fragments. FAT CLAY (CL): black (2.5Y 2.5/1); 90% fine-medium grained sant; 10% silt; trace silt; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. FAT CLAY (CL): black (2.5Y 2.5/1); 90% fine-coarse, subangular-subrounded sant; 10% silt; trace silt; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% fine-coarse, subangular-subrounded sant; 10% silt; trace silt; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded gravel up to 47mm; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 47mm; trace clay ball SAND (SP): olive gray (SY 4/2); 90% fine-coarse, subangular-subrounded gravel up to 47mm; trace site; trace clay contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball SAND (SP): olive gray (SY 4/2); 90% fine-coarse, subangular-subrounded gravel up to 47mm; trace site; trace clay; contains quartz, feldspar, and mica; micaceous, firship brown (2.5Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 47mm; trace site; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay is ontains quartz, feldspar, and mica; micaceous, shell fragments, trace clay is ontains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; mic	F
50 Pumping Water Level 60 Particle State 60 SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% low to medium plasticity clay; 10% fine grained sant race silt; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 60 SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% low to medium plasticity clay; 10% fine grained sant; 10% silt; trace intervention is quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 70 SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% fine-coarse, subangular-subrounded sant; 10% silt; trace intervention is quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 80 SAND (SP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded sant; 50% fine-coarse, subangular-subrounded sant; 50% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 90 GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded sant; 50% fine-coarse, subangular-subrounded sant; 50% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 90 GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded sant; 50% fine-coarse, subangular-subrounded sant; 50% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceou	40
50 Pumping 60 FAT CLAY (CL): black (2.5Y 2.5/1); 90% low to medium plasticity clay; 10% fine grained sant trace sitt, contains quartz, feldspar, and mica, micaceous, shell fragments. 60 SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% fine-coarse, subangular-subrounded sand; 10% sitt; trace clay balls. 70 SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% fine-coarse, subangular-subrounded sand; 10% sitt; trace clay balls. 80 SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded sand; 5% sitt; trace clay. contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 80 GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded sand; 5% sitt; trace clay. contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball 90 GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 4:mm; trace clay. contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball 90 GRAVEL (SP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 4:mm; trace sitt, trace clay. contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball 90 GRAVEL (SP): very dark grayish brown (2.5Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 4:mm; trace sitt, trace clay. contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball 90 GRAVEL (SP): very dark grayish brown (2.5Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 4	_
 FAT CLAY (CL): black (2.5Y 2.5/1); 90% low to medium plasticity clay; 10% fine grained sant race silt; contains quartz, feldspar, and mica; micaceous, shell fragments. SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% fine-medium grained sant; 10% silt; trac clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded s 5% silt; trace fine-coarse, subangular-subrounded s 5% silt; trace fine-coarse, subangular-subrounded s 5% silt; trace fine-coarse, subangular-subrounded sant; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded s 5% silt; trace fine-coarse, subangular-subrounded sant; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, feldspar, and mic	F
 PAT CLP. Diack (2:57:2:5/1); 90% to the dum plasticity day, 10% time grained sant trace silt; contains quartz, feldspar, and mica; micaceous, shell fragments. SAND WITH SILT (SP-SM); black (2:57:2:5/1); 90% fine-medium grained sand; 10% silt; trac day; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. SAND (SP): very dark grayish brown (2:57:3/2); 95% fine-coarse, subangular-subrounded sattir trace filt; trace file: coarses, subangular-subrounded sattir squartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. GRAVEL (GP): very dark grayish brown (2:57:3/2); 90% fine-coarse, subangular-subrounded gravel up to 6-inches; 5% fine-coarse, subangular-subrounded gravel up to 4 firme; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay be distributed of gravel up to 4 firme; trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: be distributed of gravel up to 4 firme; trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, freshell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, freshell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, freshell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, freshell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, freshell fragments, trace clay: contains quartz, feldspar, and mica; micaceous, freshell fragments, trace silt; trace clay: contains quartz, feldspar, and mica; micaceous, freshell fragments, trace silt; trace clay: contains quartz, feldspar, and mica	- 50
60 57.59 70 G2.64	;
70 SAND WITH SILT (SP-SM): black (2.5Y 2.5/1); 90% fine-medium grained sand; 10% silt; trac lay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 80 SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded signarel up to 47mm; trace clay, contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 90 GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 6-inches; 5% fine-coarse, subangular-subrounded sand; 5% silt; trace clay balls. 90 SAND WITH GRAVEL (SP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 6-inches; 5% fine-coarse, subangular-subrounded gravel up to 6-inches; 16(dspar, and mica; trace shell fragments, trace clay ball 90 SAND WITH GRAVEL (SP): very dark grayish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 6-inches; 00% fine-coarse, subangular-subrounded gravel up to 6-inches; 00% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 7mm; trace clay ball 90 SAND (SP): olive gray (5Y 4/2); 00% fine-coarse, subangular-subrounded gravel up to 6-inches; 10% fine-coarse, subangular-subrounded gravel up to 7mm; 5% silt; trace clay contains quartz, feldspar, and mic	F.
 SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded sand; 76% silt; trace clay balls. SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 4-inches; 5% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 6-inches; 5% fine-coarse, subangular-subrounded gravel up to 4-inches; 5% fine-coarse, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, freship broken cobiles. GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 4-inches; fieldspar, and mica; micaceous, freship broken cobiles. SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly wrathered in the saturated and for the saturated	60
70 SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded sinds, 5% silt; trace fine-coarse, subangular-subrounded gravel up to 47mm; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 80 GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. 90 GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball 90 SAND WITH GRAVEL (SP): very dark grayish brown (2. Y 3/2); 70% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball 90 SAND WITH GRAVEL (SP): very dark grayish brown (2. Y 3/2); 70% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded sand; 5% fine grained, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 47mm; 5% silt; trace clay; contains quartz, feldspar, and mica. 20 GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica. 20 GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. 20 SED ROCK (SANDSTON	e 📙
SAND (SP): very dark grayish brown (2.5Y 3/2); 95% fine-coarse, subangular-subrounded si 5% silt; trace fine-coarse, subangular-subrounded gravel up to 47mm; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 6-inches; 5% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball SAND WITH GRAVEL (SP): very dark grayish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball SAND WITH GRAVEL (SP): very dark grayish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay SAND (SP): olive gray (SY 4/2); 90% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. GRAVEL WITH SAND (GP): olive gray (SY 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worthered	<u>⊢</u>
 5% silt; trace fine-coarse, subangular-subrounded gravel up to 47mm; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay balls. GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 6-inches; 5% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay ball SAND WITH GRAVEL (SP): very dark grayish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded sand; 30% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica. GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. 	
30 GRAVEL (GP): very dark gravish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay bal 90 90-92 SAND WITH GRAVEL (SP): very dark gravish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay 90 90-92 SAND WITH GRAVEL (SP): very dark gravish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay 90 90-92 SAND (SP): olive gray (5Y 4/2); 90% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. 106 06 GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica. 20 GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. 20 SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly	
GRAVEL (GP): very dark grayish brown (2.5Y 3/2); 90% fine-coarse, subangular-subrounded gravel up to 6-inches; 5% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay bal SAND WITH GRAVEL (SP): very dark grayish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay; contains quartz, feldspar, and mica. GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 90% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worthered	
 gravel up to 6-inches; 5% fine-coarse, subangular-subrounded sand; 5% silt; trace clay; contains quartz, feldspar, and mica; micaceous, shell fragments, trace clay bal SAND WITH GRAVEL (SP): very dark grayish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay SAND (SP): olive gray (5Y 4/2); 90% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly up to the composed. 	80
20 90-92 SAND WITH GRAVEL (SP): very dark grayish brown (2. Y 3/2); 70% fine-coarse, subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay 20 10 106-108 SAND (SP): olive gray (5Y 4/2); 90% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. 20 106-108 GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. 20 GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica. 20 SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worthered	
SAND WITH GRAVEL (SP): very dark grayish brown (2.Y 3/2); 70% fine-coarse, subangular-subrounded sand; 30% fine-coarse, subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay SAND (SP): olive gray (5Y 4/2); 90% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worthered	
00 usbangular-subrounded sand; 30% fine-coarse, subangular-subrounded gravel up to 46mm; trace silt; trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay 10 usbangular-subrounded gravel up to 46mm; feldspar, and mica; trace shell fragments, trace clay; contains quartz, feldspar, and mica; trace shell fragments, trace clay; contains quartz, feldspar, and mica; trace clay; contains quartz, feldspar, and mica. 10 usbangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. 20 usbangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. 20 SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly	90
00 SAND (SP): olive gray (5Y 4/2); 90% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. 10 GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. 20 SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worthered	F
10 10 106-108 SAND (SP): olive gray (5Y 4/2); 90% fine-coarse, subangular-subrounded sand; 5% fine grained, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. 20 GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. 20 SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worthered	+
10 106-108 grained, subangular-subrounded gravel up to 17mm; 5% silt; trace clay; contains quartz, feldspar, and mica. 20 Image: Contrained state of the st	10
10 GRAVEL WITH SAND (GP): olive gray (5Y 4/2); 60% fine-coarse, subangular-subrounded gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. 20 SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worken red	E
20 - Contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worthered	⊢ .
20 gravel up to 48mm; 40% fine-coarse, subangular-subrounded sand; trace silt; trace clay; contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worther red	<u> </u>
20 contains quartz, feldspar, and mica; micaceous, freshly broken cobbles. SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly worther red	E
SED ROCK (SANDSTONE): greenish gray (5GY 5/1); medium grained sand, moderately bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly weathered	F.
bedded, decomposed, very soft, saturated, bands of more yellowish sandstone; highly	12
	Ŧ
	F
	13
- SED ROCK (MUDSTONE): greenish gray (5G 5/1); thickly bedded, slightly weathered, very	\vdash
hard, moist, red and yellow laminations of clay.	



APPENDIX E

Desalter Test Well

Geophysical Borehole Logs, Caliper Log, Gyroscopic Survey, and Video Survey DVDs



	C I F I C R V E Y S		ELECTF LATER GAMM	OLOG	3		the accuracy or correctness of any loss, costs, damages, or These interpretations are also		
Job No. 25439	Company J	ENSEN DRILLI	NG COMPAI	NY			and we cannot and do not guarantee the accu our part, be liable or responsible for any loss, of our officers, agents or employees. These in in our current Price Schedule.		
	, ,	MWD SAN DIE					d do not guarantee or responsible for al nts or employees. ¹ Schedule.		
	Well C	JIVIVVD SAN DIE	GOLLO DES	ALIER	IESI VVELL		guar Isibl Iplo		
	Field D	DEL MAR					not ç spon or em		
File No.	County S	SAN DIEGO	State	CA			do i r res ts o Sche		
	County C		Sidle				and ole or agen rice (
Location:				Other Servi	ices:		not liab rs, a it Pr		
NEAR 14955 VI. GPS: 32.9853				LL3/GR			we cannot anc oart, be liable c ir officers, agei r current Price		
Sec.	Twp.	Rge.		SNC/VDL			and w our pa of our in our		
Sec. Permanent Datu		Rye.	Elevation		Elevation	_	on o on o ut in		t
Log Measured Fi		0'	above perm. da	atum			ements ence on by any set out	S	
Drilling Measured		0			K.B. D.F. G.L.			Comments	Calibration Denort
Date		04/18/2019					her measul Ilful neglige ation made conditions	L E	, i
Run Number		ONE					ier m Iful r tion cond	ပိ	
Depth Driller		165'					or othe or will pretat and c		
Depth Logger		165'					or or rrpr		C
Bottom Logged I		165'					es from electrical the case of gross ting from any inter our general terms		
Top Log Interval		30'					ectri f gr ny i te		
Casing Driller		36" @ 50'					ele era		
Casing Logger		50'					from e case g fron r gen		
Bit Size		17.5"					s fr ng ur (
Type Fluid in Ho		EASY MUD					in the sulti sulti o		
Density / Viscosi	ity	8.75 / 36					inferences xcept in the ine resultin Ibject to ou		
oH / Fluid Loss		8.5 / 13				_	on infere except yone res subject		
Source of Sampl		PIT					on ot, e inyc su		
Rm @ Meas. Te		3.60 @ 58.4 F					sed I nc y a		
Rmf @ Meas. Te		3.33 @ 58.4 F					ba: shal ed t		
Rmc @ Meas. T		N/A				_	ons ve s ainé		
Source of Rmf /	Rmc	MEASURE				_	oinic id v ust;		
Rm @ BHT	Otenarad	N/A					All interpretations are opinions based on infe any interpretation, and we shall not, exce expenses incurred or sustained by anyone subje		
Time Circulation		8:42 PM				12	ar∈ ion, ∋d c		
Fime Logger on		12:15 AM				Here	ons etati urre		
Max. Recorded		N/A				<u> </u> ±	atic		
Equipment Numl	per	PS-10				Fold	oret ntei es		
Location		LA					terç ii yr ens		
Recorded By		E. AFOH				¥ V	ar ar xpe		
Witnessed By		E. HERNANDEZ					- σ		

ELOG Calibration Report

Serial: Model:	PS_10 DTQ	
Shop Calibration Performed:	Fri May 04 13:28:36 2018	
Before Survey Verification Performed:	Fri May 04 13:30:37 2018	
After Survey Verification Performed:	Fri May 04 13:31:06 2018	

Shop (Calibration
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	Readings		Readings References				Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	0.689	51.211		0.500	50.000	Ohm-m	0.980	-0.176
Long	2.520	205.133		2.000	200.000	Ohm-m	0.977	-0.463
IEE	32.360	7355.900	counts	0.035	8.050	А		
VSN	94.540	8338.720	counts	1.803	159.051	V		
VLN	10.280	2095.160	counts	0.196	39.963	V		

Before Survey Verification

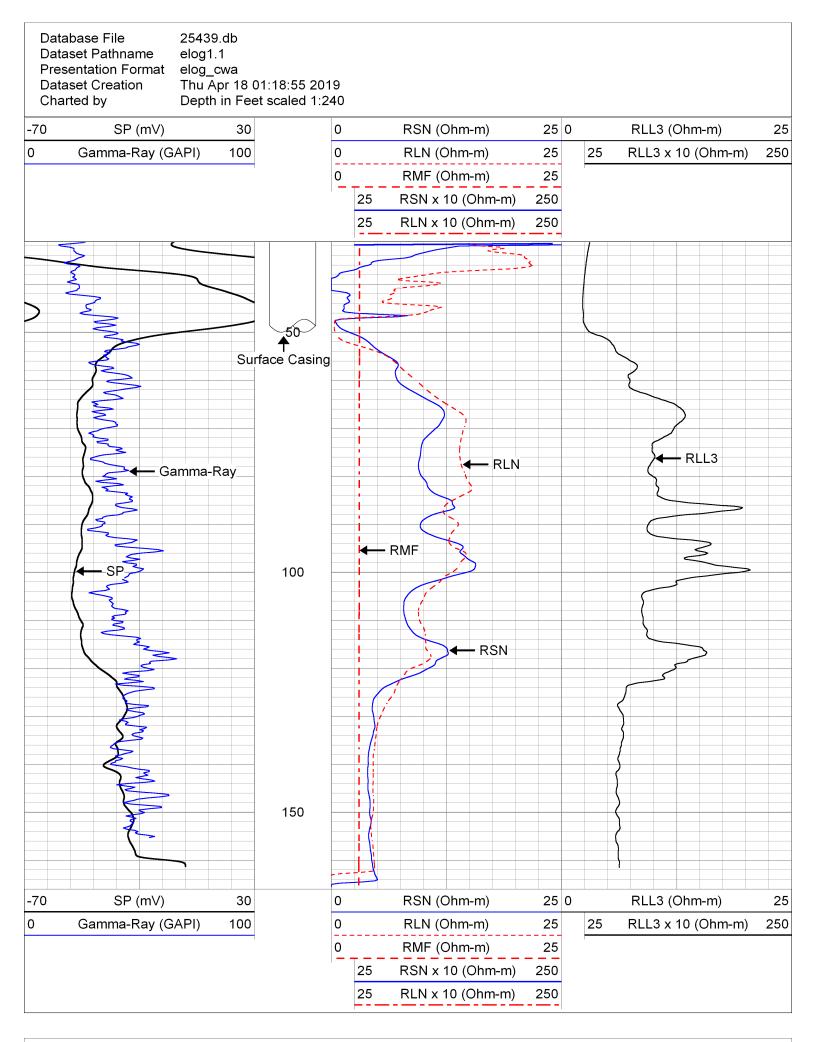
Read	ings		Refere	nces		Resu	ılts
Zero	Cal		Zero	Cal		Gain	Offset
278.454	100.945		260.034	100.899	Ohm-m	0.896	10.403
149.317	101.496		113.102	101.406	Ohm-m	0.245	76.582
31.140	7360.440	counts	0.034	8.055	А		
97.420	8347.680	counts	1.858	159.222	V		
13.060	2098.300	counts	0.249	40.023	V		
	Zero 278.454 149.317 31.140 97.420	278.454 100.945 149.317 101.496 31.140 7360.440 97.420 8347.680	Zero Cal 278.454 100.945 149.317 101.496 31.140 7360.440 counts 97.420 8347.680 counts	Zero Cal Zero 278.454 100.945 260.034 149.317 101.496 113.102 31.140 7360.440 counts 0.034 97.420 8347.680 counts 1.858	ZeroCalZeroCal278.454100.945260.034100.899149.317101.496113.102101.40631.1407360.440counts0.0348.05597.4208347.680counts1.858159.222	Zero Cal Zero Cal 278.454 100.945 260.034 100.899 Ohm-m 149.317 101.496 113.102 101.406 Ohm-m 31.140 7360.440 counts 0.034 8.055 A 97.420 8347.680 counts 1.858 159.222 V	Zero Cal Zero Cal Gain 278.454 100.945 260.034 100.899 Ohm-m 0.896 149.317 101.496 113.102 101.406 Ohm-m 0.245 31.140 7360.440 counts 0.034 8.055 A 97.420 8347.680 counts 1.858 159.222 V

After Survey Verification

Read	ings		Refere	nces		Resu	ults
Zero	Cal		Zero	Cal		Gain	Offset
279.744	100.952		278.454	100.945	Ohm-m	0.993	0.717
167.157	101.542		149.317	101.496	Ohm-m	0.729	27.490
31.480	7364.160	counts	0.034	8.059	А		
98.940	8352.460	counts	1.887	159.313	V		
14.780	2100.320	counts	0.282	40.061	V		
	Zero 279.744 167.157 31.480 98.940	279.744 100.952 167.157 101.542 31.480 7364.160 98.940 8352.460	Zero Cal 279.744 100.952 167.157 101.542 31.480 7364.160 counts 98.940 8352.460 counts	Zero Cal Zero 279.744 100.952 278.454 167.157 101.542 149.317 31.480 7364.160 counts 0.034 98.940 8352.460 counts 1.887	ZeroCalZeroCal279.744100.952278.454100.945167.157101.542149.317101.49631.4807364.160counts0.0348.05998.9408352.460counts1.887159.313	Zero Cal Zero Cal 279.744 100.952 278.454 100.945 Ohm-m 167.157 101.542 149.317 101.496 Ohm-m 31.480 7364.160 counts 0.034 8.059 A 98.940 8352.460 counts 1.887 159.313 V	Zero Cal Zero Cal Gain 279.744 100.952 278.454 100.945 Ohm-m 0.993 167.157 101.542 149.317 101.496 Ohm-m 0.729 31.480 7364.160 counts 0.034 8.059 A 98.940 8352.460 counts 1.887 159.313 V

After Survey Verification compared to Before Survey Calibration

	Zer	0		Ca	I		
	Before	After		Before	After		
Short	260.034	278.454	Ohm-m	100.899	100.945	Ohm-m	
Long	113.102	149.317	Ohm-m	101.406	101.496	Ohm-m	
			Gamn	na Ray Calibra	tion Report		
ç	Serial Number:		D4				
-	Tool Model:		EL	OG			
F	Performed:			n Nov 06 17:1	7:41 2017		
(Calibrator Valu	٥.	16'	2.0	GAPI		
,		6.	102	2.0	GALL		
E	Background Re	ading:	10 ⁻	1.7	cps		
(Calibrator Read	ding:	320	6.7	cps		
c	Sensitivity:		0.7	200	GAPI/cps		



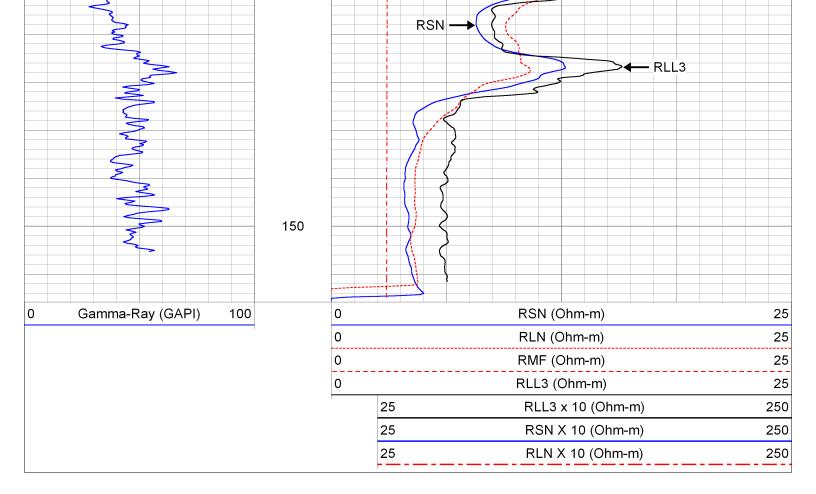
Log \/orightarian DatabaseC:\ProgramData\Warrior\Data\25439.db

		1	Top - Bot	ttom		
BOREID in	BOTTEMP degF	CASEOD in	CASETHCK in	PERFS	RM_MEAS_R Ohm-m	RM_MEAS_T degF
17.5	65.68	0	0	0	3.6	58.4
RMF	RSH	SPSHIFT	SRFTEMP	TDEPTH	TempGrad	
Ohm-m	Ohm-m	mV	degF	ft	DegF/ft	
3.33	20	0	63.65	165	0.01235	

v / Jumb Br S. Teled T. T. S. Teled T. T. Lind Status S. Teled T. T. S. Teled T.																																								
essed B	orded By	ition	pment N	Record) Logger) Circula	@ BHT	ce of R	@ Mea	@ Meas	@ Meas	ce of Sa	Fluid Lo	sity / Vis	Fluid in	ize	ng Logg	ng Drille	Log Inte	om Logg	h Logge	h Driller	Number		ng Meas	Veasure	Ianent D		\R 1495 3: 32.985	ation:		File No.			25439				S	P
Y			umber	ed Tem	on Bott	tion Stol		mf / Rm	s. Temp	3. Temp	3. Temp	mple	SS	cosity	Hole		er		rval	ed Inter	ſ				ured Fro	d From	milte		5 VIA DE 53 -117		С С	Ţ		٤	ç					ACIFIC
				perature	om	pped		c	•											val					m			Ļ	E LA VA 7.2128		County	Field		Well	Company					Ξ
				C.																					G.L.	G	ה -	Twp.	ĹĹĒ			_							S	0
E. HE	E. AFOH	Ā	PS-10	N/A	12:15 AM	8:42 PM	N/A	MEASURE	N/A	3.33 @	3.60 ©	PIT	8.5 / 13	8.75 / 36	EASY MUD	17.5"	50'	36" @	30'	165'	165'	165'	ONE	04/18/2019		Ō					SAN DIEGO	DEL MAR			ENSE					
HERNANDEZ	£				AM	Ň		URE		3.33 @ 58.4 F	3.60 @ 58.4 F		13	36	MUD			50'						2019							DIEGC	I AR		D SAN	N DF					
EZ			Rge.																																					
			Rge.															GUIT				പ	Z																	
			OMWD SAN DIEGUITO DESALTER TEST WELL State C State CA NIC Elevation above perm. datum 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9/7 9															JENSEN DRILLING COMPANY			AMN																			
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	any	/ in	terp	oret	atio	on, a	anc	l we	ə sl	hall	no	t, e	хсе	ept i	n th	ес	ase	e of	gro	ss	or	will	ful ı	neg	gligei	nce	on	our	l we car part, be	e liabl	e or i	espo	nsil	ole fo	or any	loss,	costs	, dai	nage	s, or
e	the	1156	5 1	ncu	ne		su	sia	ine		ya											d c	onc	ditio	ons s	set o			ur office ur curre					oyee	25. 111	ese m	leipi			
																							Co	mr	nen	ts														
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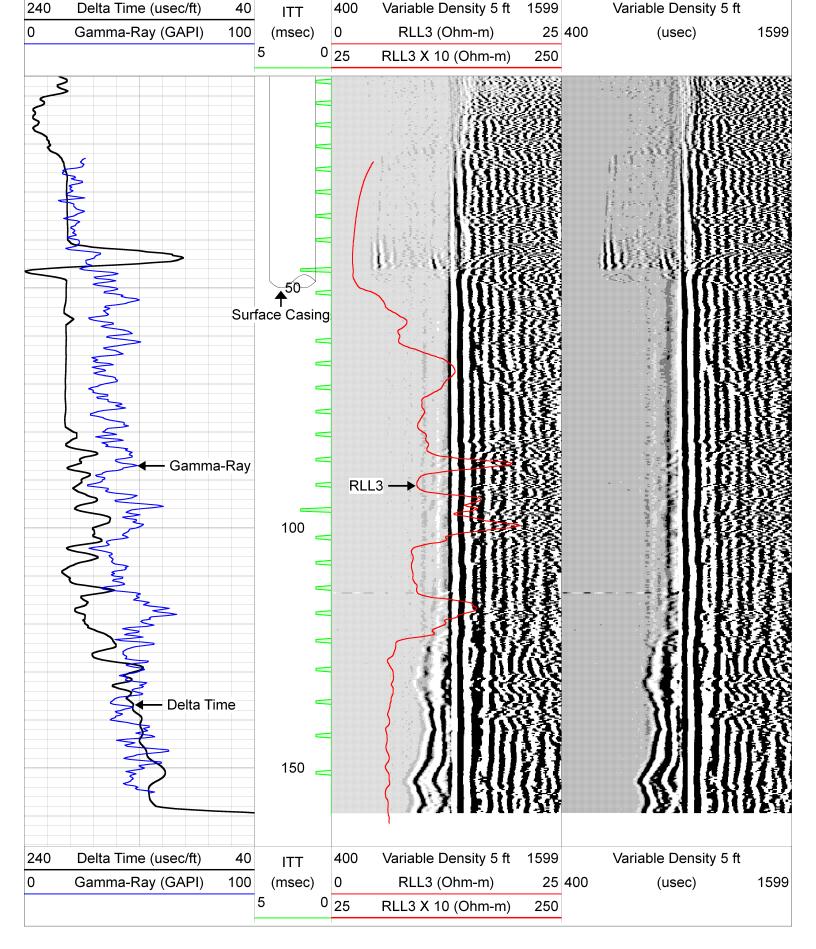
Database File	25439.db
Dataset Pathname	3
Dataset Creation	Thu Apr 18 00:41:28 2019

•	Serial Number: Tool Model: Performed:	12 GROH Tue Sep 08 16:4	8:35 2015			
	Calibrator Value:	162.0	GAPI			
	Background Reading: Calibrator Reading:	54.1 193.3				
	Sensitivity:	1.1641	GAPI/			
-	RLL3 (Res	istivity Laterolog 3)	Calibration F	Report:		
	Serial Nun Tool Mode Performed	l:	883 M&W Mon Nov 13	3 11:43:06 2017	7	
	System	n Reading		Calibration Re	ference	
	0.013 0.022 0.212 1.063 2.139			2.500 5.000 50.000 250.000 500.000	Ohm-m	
	Database File25439.dbDataset PathnameII3Presentation FormatguardDataset CreationThu Apr 18 00:41:28 20Charted byDepth in Feet scaled 1					
	0 Gamma-Ray (GAPI) 100	0		RSN (Ohm-m)		25
		0		RLN (Ohm-m)		25
		0 0		RMF (Ohm-m)		25 25
		25		RLL3 (Ohm-m) RLL3 x 10 (Of	nm-m)	250
		25		RSN X 10 (Of		250
		25		RLN X 10 (Of		250
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		3				
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					- RLN	
			K			
		RM	1F		>	
	Gamma-Ray		1			
					2	
	100				5	



og Varia			ramData\Warrio ll/run1/elog1.1/		b	
			Top - Bo	ttom		
BOREID in 17.5	BOTTEMP degF 65.68	CASEOD in 0	CASETHCK in 0	PERFS 0	RM_MEAS_R Ohm-m 3.6	RM_MEAS_T degF 58.4
RMF Ohm-m 3.33	RSH Ohm-m 20	SPSHIFT mV 0	SRFTEMP degF 63.65	TDEPTH ft 165	TempGrad DegF/ft 0.01235	

	d Bv			ature	Time Logger on Bottom 1	Time Circulation Stopped 8	Rm @ BHT N	Source of Rmf / Rmc N	Rmc @ Meas. Temp N		qr	Source of Sample P			uid in Hole		-		Top Log Interval 0'	d Interval	Depth Logger 1	Depth Driller 1	Run Number C	Date 0		Log Measured From G.L. 0	G.L.	Twp	NEAR 14955 VIA DE LA VALLE GPS: 32.9853 -117.2128	Location:	County SA		Field DF	Well		Company	Job No				SURVEYS	PACIFIC
E. HERNANDEZ	E. AFOH	LA	PS-10	N/A	12:15 AM	8:42 PM	N/A	MEASURE	N/A	3.33 @ 58.4 F	3.60 @ 58.4 F	PIT	8.5 / 13	8.75 / 36	EASY MUD	17.5"	50'	36" @ 50'		165'	165'	165'	ONE	04/18/2019	-	above perm. datum		Rge.	ELOG LL3/GR	Other S	SAN DIEGO State CA	I	DEI MAR	UMWD SAN DIEGUITO DESALTER TEST WELL		JENSEN DRILLING COMPANY						
		< Fc	old	Her	e >	>>																			ĞL	D.F.B.	Elevation	1	~	Other Services:	A			R IESI WELL							CITY	
All i ir	nte nter	erpr rpre	reta etat	itior ion	ns a , ar	are Id w	/e s	shal	l nc	ot, e	exce	ept i	in th	ne c om :	ase any	of inte	gro ərpi	ss eta	or v atio	villf n m	ul r ade	neg e by litio	lige / ar ns :	nce ny c set	e on of οι	i ou ur o in c	r pa ffice our	art, b ərs, a	ve cann e liable agents o ent Price	or res r emp	pons loyee	ible es. T	for	any	los	s, co	sts,	dam	ages	ore	expe	nses
 	Da Pre Da	ata es ata	en	t F tat t C	Pat ioi Cre	hn ո F	an ^T or	ma	at	s s T	254 snc slt Thu Dep	i A I	.pr	18																												



Log Varia			mData\Warrior\E run1/snc/_vars_	0ata\25439.db			
			Top - Botton	ı			
BOREID	BOTTEMP degF	CASEOD	CASETHCK	COMPACT	FloatGate	PERFS	

17.5	65.68	0	0	1	0	0	
RM_MEAS_R Ohm-m 5.9	RM_MEAS_T degF 58.4	RMF Ohm-m 5.65	RSH Ohm-m 20	SPSHIFT mV 0	SRFTEMP degF 63.65	SVFLUID usec/ft 189	-
SVMATRIX usec/ft 47.6	TDEPTH ft 165	TempGrad DegF/ft 0.01235				r	1

Production String Production String	Production String	Production String	Surface String			CNE		-		Mitposed By	Depended Dec		Fruinment Number	Time Leager on Det	Time Well Deady	Max. Recorded Temp	Density / Viscosity	Type Fluid in Hole	Type Caliper	Top Log Interval	Bottom Logged Interval	Depth Logger	Depth Driller	Run Number	Date	Drilling Measured From	Log Measured From	Permanent Datum	Sec.)	NEAR 14955 VIA DE LA VALLE GPS: 32.9853 -117.2128	Location:		File No.	<		Job No.			C		>
		18	36'			07			Rorehole Rec					+ 5 5 5		np.					rval					rom			wp.	4)e la valle 7.2128		County	Field	Well	Company				1	< - - - - - - - - - - - - -	п -
															JENS						,																					
	JENSEN DRILL OMVVD SAN DI DEL MAR SAN DIEGO G.L. G.L. G.L. G.L. G.L. G.L. G.L. G.																	_																								
	ENSEN DRILLING COMP/ MWD SAN DIEGUITO DE PL MAR AN DIEGO IL ON/ 164.9 16																	BOREHOLE VOLUMES)) 																							
	JENSEN DRILLING COMPANY OMVVD SAN DIEGUTTO DESALT SAN DIEGO State Ofthe SAN DIEGO State Ofthe G.L. Class G.L. Elevation G.L. Class OM OM ON G.L. Elevation G.L. Class Flat ARM ARM STIO AM Flat Gravel Feed/T Type Type Type Type N/A Size Type Sign Type O O																																									
	VD SAN DIEGUITO - MAR A DIEGO 0' - Rge. - Rge. - Rge. - Elevation 0' - Baove pr - Size - 160' - 160' - 160' - 160' - 29 - 160' - 29 - 10 -																	VOLU	、 「 こ こ こ	ר כ																						
		145'	50'		- D4	40			hodulo																		Ξηίας	Elevation				<u>S</u>			EST WEL				MES			
				re >>	·>				ns	ha			n ir		ren		fro	m		-tri	cal	or	otl		me	2251		men	ts :	and	Pacific	Sun		anno				ante	e the :		racy o	
	col	rred	ctnes	s of a	any	int	ter	pre Irre	etat ed o	ion or s	, ai sust	nd tai	we ned	sh I by	all / ar	not iyoi	, ex ne i	cep esi	ot ir ultir	ו th ומי	ne o froi	cas m a	se c any al te	of g int erm	ros terp ns a	ss o oret and	r wi atio cor	llful n m nditio	ne ade	glig e by	ence o any of t out in	n our f our	part, office	be lia rs, ag	ible oi ents c	respo or empl	nsible	e for	any lo	oss, (costs,	
																								Co	m	me	nts	<u>.</u>														

Database File25453.dbCalibration ReportDataset PathnamecalDataset CreationFri Apr 19 05:09:33 2019

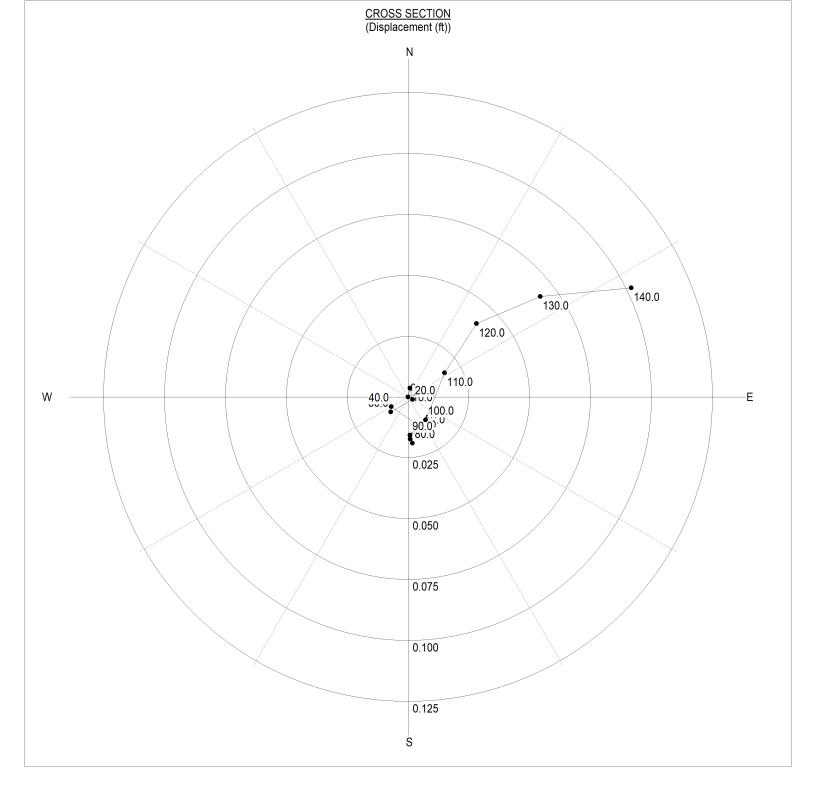
XY Caliper Calibration Report

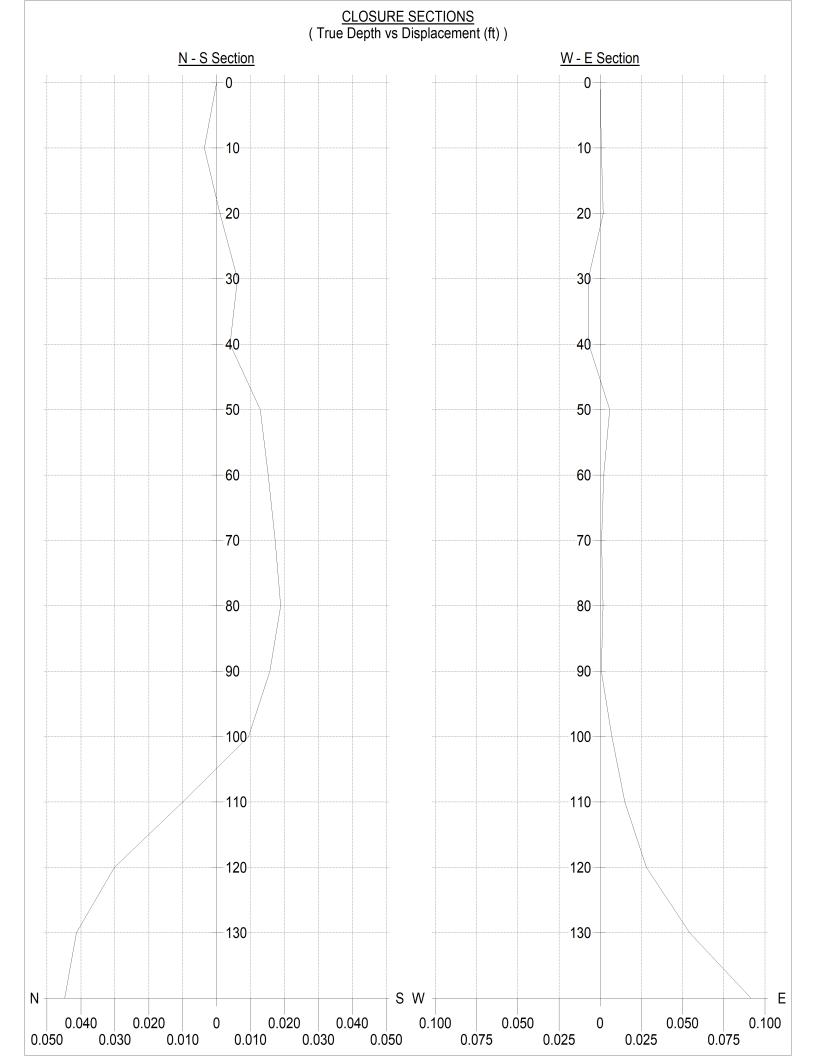
Serial Number/Mo Performed:	odel:	Cal-4 Long-0 Tue Feb 26	Comp 09:30	robe :09 2019			
Ring		X Cali	per		Y Caliper		
1: 14 ii 2: 20 ii 3: 26 ii 4: 32 ii 5: 38 ii 6: 44 ii 7: ii 8: ii 9: ii 10: ii	า า า า า า	808.49 1078.5 1327.7 1576.9 1837.7 2116.8	5 73 95 79 87	cps cps cps cps cps cps cps cps cps cps	808.492 1078.5 1327.73 1576.95 1837.79 2116.87	cps cps cps cps cps cps cps cps cps cps	
	inal 05:09:33 20 eet scaled 1						
CSG SCHEDULE	AVTX	20			Caliper (in)	40
Pipe(s) proportional to Hole Size	(ft3)	20			Bit Size (in)	40
	1	40		Ca	aliper back-u	p (in)	60
		TBHV ft ³		Caliper			Annular ft^3
		(ft3)		(in)			(ft3)
	E 0	872.8		- 35.33 -			589.1
Gravel	Surface Cas	801.4 733.5		35.29 -			-539.5 -492.4
		665.6		35.25			445.4
		597.9		35.20 -			398.4
	50	535.9		- 28.77 -	5		356.6
So ►	unding Tube	9			5		
Sounding		492.1	TBHV ft^3	28.11 -	2		- 332.5
		442.9	- ft^3	37.94 -	2		301.9
		393.2		29.10	\geq		271.0
		- 343.7	Ca	29.43 -	ww		240.1
$\left \left\{ \left \right. \right\} \right \left\{ \left \left\{ \left. \left \right. \right\} \right \right\} \right\}$	100	294.5	Caliper (in)	→30.32 -		Annular ft^3	→209.6
		245.6		29.30			179.4

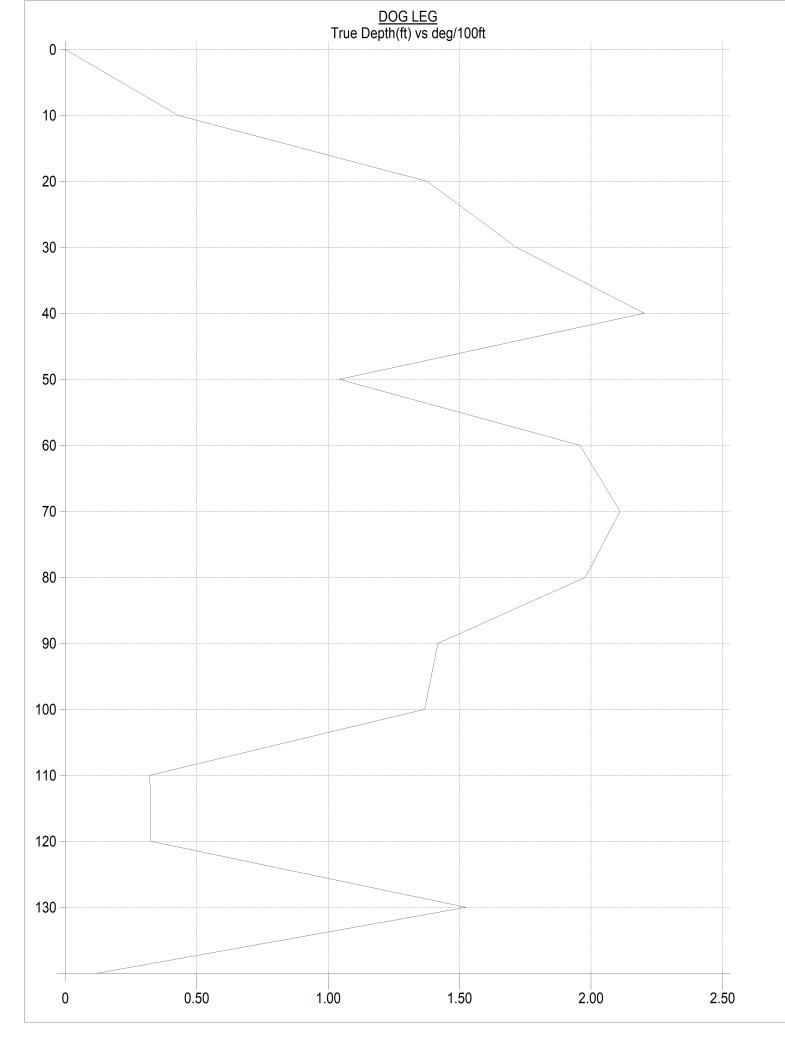
		197.5	29.27	5	149.9						
		Ann 152.9	Bit Size	← Caliper	124.0						
		f 100 − 108.7 − − − − − − − − − − − − − − − − − − −	28.29		98.4						
		డ — 65.6 —	28.30		65.6						
		22.4	28.32		22.4						
CSG SCHEDULE	AVTX	20	C	Caliper (in)	40						
Pipe(s) proportional to Hole Size	(ft3)	20	20 Bit Size (in)								
		40	Calip	er back-up (in)	60						
		TBHV ft ³	Caliper		Annular ft^3						
		(ft3)	(in)		(ft3)						

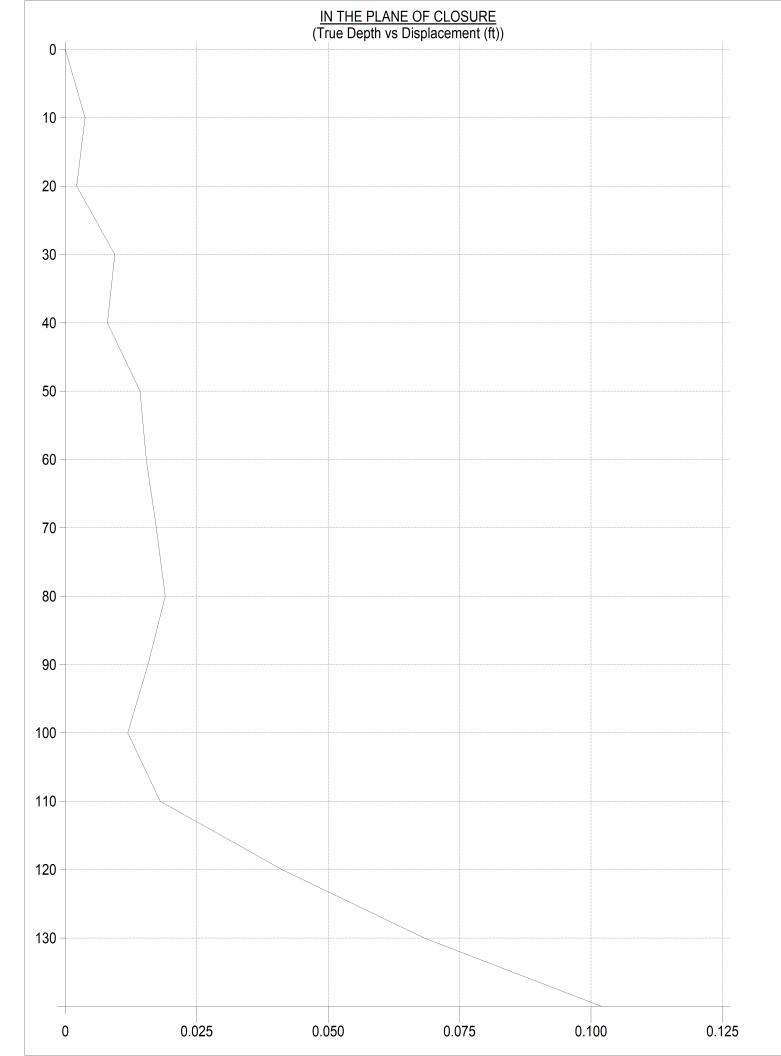
g Varia	ables Data	abaseC:\Progra aset field/well/	amData\Warrior\Da /run1/cal/_vars_	ata\25453.db		
			Top - 40.00 ft			
BOREID in	BOTTEMP degF	CASEOD in	CASETHCK in	PERFS	SRFTEMP degF	TDEPTH ft
28	65.6	19.5192	0	0	63.65	160
			40.00 ft - 54.00 f	t		
BOREID in	BOTTEMP degF	CASEOD in	CASETHCK in	PERFS	SRFTEMP degF	TDEPTH ft
28	65.6	19.2029	0	0	63.65	160
			54.00 ft - 58.00 f	t		
BOREID in	BOTTEMP degF	CASEOD in	CASETHCK in	PERFS	SRFTEMP degF	TDEPTH ft
28	65.6	19.0394	0	0	63.65	160
			58.00 ft - 145.00	ft		
BOREID in	BOTTEMP degF	CASEOD in	CASETHCK in	PERFS	SRFTEMP degF	TDEPTH ft
28	65.6	18.5	0	0	63.65	160
			145.00 ft - Botto	m		
BOREID	BOTTEMP degF	CASEOD in	CASETHCK	PERFS	SRFTEMP degF	TDEPTH ft
28	65.6	0	0	0	63.65	160

Froduction String Liner	Surface String	Casing Record		ONE	_		Recorded By	Location	Equipment Number	Time I onner on Br	Pump Rate (GPM)	Max. Recorded Te	Density / Viscosity	Time Pumping Prior to	Dumn Sat	Ton I on Interval	Depth Logger	Depth Driller	Run Number	Date	Log Measured From Drilling Measured From	Permanent Datum	Sec.	NEAR 14955 VIA DE LA VALLE GPS: 32.9853 -117.2128	Location:	0		~	Job No. 25655				ΡΑC
18" ID	36" OD	Size		28" (hole Re					ottom		mp.		or to Survey		ervar					n rom		Twp.	ia de la valle -117.2128		County	Field	Well	Company			VEY	IFIC
						E. HERNANDEZ	E. AFOH	F	PS-9	0.00 AM	N/A	N/A	N/A	N/A	N/A	0 ⁻	144.7	145'	ONE	05/23/2019	G.L. O					SAN DIEGO	DEL MAR	OMWD S	JENSEN				
0.250" WALL	0.375" WALL	Wgt/Ft				ANDEZ														9			Rge.			GO	J	AN DIEG	DRILLIN		DE		
			4" SOUNDING	3" GRAVEL	N/P																above perm. datum	Elevation				State		UITO DES	JENSEN DRILLING COMPANY		VIATIO		
0	0	op		VEL 0'	ng Rec																			VIDEO SURVEY	Other Services:	CA		SALTER T	ŃY		DEVIATION SURVEY		
145'	50'	Bottom		40'	_																	Elevation		VEY	es:			OMWD SAN DIEGUITO DESALTER TEST WELL			VEY		
All inter correct	<<< Fold Here >>> All interpretations are opinions based on inferences from electrical or other measurements and Pacific Surveys cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Pacific Surveys' general terms and conditions set out in our current Price Schedule.																																
																		(Со	mr	nents												









	TVD Report (Minimum Curvature Method)
Database File Dataset Pathname	25655.db ./././_tvd_/1
Dataset Creation	Thu May 23 10:20:51 2019

Meas. Depth	Incline	Azimuth	TVD	North	East	Degleg	Closuro Die	Closure Dir	Vert. Sec.				
						Dog Leg							
(ft)	(deg)	(deg)	(ft)	(ft)	(ft)	(deg/100ft)	(ft)	(deg)	(ft)				
	Vertical Section Direction 0.00												
0.0	0.00	12.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
10.0	0.04	13.05	10.00	0.00	0.00	0.43	0.00	13.05	0.00				
20.0	0.10	178.46	20.00	-0.00	0.00	1.38	0.00	-61.17	-0.00				
30.0	0.11	289.16	30.00	-0.01	-0.01	1.72	0.01	49.14	-0.01				
40.0	0.11	96.32	40.00	-0.00	-0.01	2.20	0.01	60.11	-0.00				
50.0	0.10	156.34	50.00	-0.01	0.01	1.04	0.01	-24.73	-0.01				
60.0	0.10	307.87	60.00	-0.02	0.00	1.96	0.02	-8.47	-0.02				
70.0	0.11	142.87	70.00	-0.02	0.00	2.11	0.02	-2.99	-0.02				
80.0	0.09	321.08	80.00	-0.02	0.00	1.98	0.02	-5.48	-0.02				
90.0	0.05	126.10	90.00	-0.02	0.00	1.42	0.02	-2.91	-0.02				
100.0	0.11	16.23	100.00	-0.01	0.01	1.37	0.01	-37.65	-0.01				
110.0	0.13	26.41	110.00	0.01	0.02	0.32	0.02	56.42	0.01				
120.0	0.14	38.99	120.00	0.03	0.03	0.33	0.04	43.02	0.03				
130.0	0.21	85.57	130.00	0.04	0.05	1.53	0.07	52.72	0.04				
140.0	0.22	83.81	140.00	0.04	0.09	0.12	0.10	63.94	0.04				

APPENDIX F

Desalter Test Well

Video Survey Report



Pacific Surveys

a full service geophysical well logging company

Video Survey Report

Company:		Date:	23-May-	19		
Well:	OMWD San Dieguito Desalter Test Well	Run No.	One		Truck	PS-9
Field:	Del Mar	Job Ticket:	25655		-	
State:	California	Total Depth:	144.7 ft			
Location:		Water Level:			SWL	
		Oil on Water:			Amount:	N/A
GPS:		Operator:	Afoh			
Zero Datum					Dead Space	2.50 ft
Reason for S		Guides Set @	16.5 incl	nes	Dedu Opace	2.50 10
Depth	Observations			W	ell Details	
0.0 ft	Begin survey from ground level.		Perforation		As-Built	
11.0 ft	SWL: water is cloudy. Visibility is poor.		Ful-Flo Lou	lvers	60.0 ft to 3	l25.0 ft
44.0 ft	Water column begins to clear.					
48.0 ft	Water column becomes clear. Visibility is good.					
55.9 ft 61.5 ft	Top of sounding tube. Bottom is at 57.9 ft. Top of perfs: open with some gravel pack visible behind the casing wall.					
127.0 ft	Bottom of perfs: entire interval is open with some gravel pack visible behind the casin	ng wall				
143.1 ft	Top of soft fill.					
144.7 ft	Hard fill encountered, end survey.					
			Casing Si	ze (in):	As-Built	
			0.D.	I.D.		
			18.500	18.00	0 ft to 3	145.0 ft
			Casing M	aterial	SST	
			Screen M	aterial	SST	
				11-2		ê.
T		-1-				
-	0055.9 F 0057.9 F	0061.5 F			0070.4 F	
-			=		-	
-					2.0	
	0072.5 F 0075.5 F	0093. 0. F			0102.5 F	
					6	

0106.4 F

0110.8 F

0140.6 F

APPENDIX G

Desalter Test Well

DWR Well Completion Report



State of California Well Completion Report Form DWR 188 Submitted 6/26/2019 WCR2019-008761

Owner's V	Vell Numb	er OMWD Desal Test Well	Date Work Beg	gan 04/09/2019	Date Work Ended 05/21/2019
Local Per	mit Agency	y County of San Diego DEH/LWQD I	and Water and Qua	ality Division, Land Use	e Program
Secondar	y Permit A	gency	Permit Num	ber LWELL-002249	9 Permit Date 03/08/2019
Well C	Owner (must remain confidential p	ursuant to Wa	ater Code 13752	2) Planned Use and Activity
		AIN MUNICIPAL WATER DISTRICT,			Activity New Well
Mailing A	ddress	1966 Olivenhain Road			Planned Use Water Supply Public
					_
City En	ncinitas		State CA	Zip 92024	_][
			Well Le	ocation	
Address	14989	Via DE La Valle			APN 760-146-07-00
City D	Del Mar	Zip 92024	County S	an Diego	Township 14 S
Latitude	32	59 6.2638 N Longitu	ude -117 12	2 46.2297 W	Range 03 W
	Deg.	Min. Sec.	Deg. Mi	n. Sec.	Section 05 Baseline Meridian San Bernardino
Dec. Lat.	32.9850	0733 Dec. L	ong117.2128416	6	Ground Surface Elevation 25
Vertical D	Datum N	IAVD88 Horizontal	Datum WGS84		Elevation Accuracy 1 Ft
Location	Accuracy	10 Ft Location Determ	ination Method G	SPS	Elevation Determination Method GPS
		Borehole Information		Water I	evel and Yield of Completed Well
Orientatio	on Vertio		Specify	Depth to first wate	•
			entonite	Depth to Static	
Drilling M		irculation	entonite	Water Level	11 (Feet) Date Measured 05/21/2019
				Estimated Yield*	200 (GPM) Test Type Pump
	oth of Borir		eet	Test Length	24 (Hours) Total Drawdown 45 (feet) sentative of a well's long term yield.
Total Dep	oth of Com	pleted Well 145 F	eet		
			Geologic Log	g - Free Form	
Depth Surf				Description	
Feet to				Description	
0	6	POORLY GRADED SAND WITH GRA	VEL		
6	13	POORLY GRADED SAND			
13	18	SILTY SAND			
18	21	SILT WITH SAND			
21	23	SILTY SAND			
23	25	POORLY GRADED SAND WITH SILT			
25	27	POORLY GRADED SAND			
27	30	SILTY SAND			
30	40	POORLY GRADED SAND			
40	43	LEAN CLAY			
43	47	SILTY SAND			
47	48	SILT WITH SAND			
48	51	SILTY SAND			
51	52	POORLY GRADED SAND			

52	56	SILT WITH SAND							
56	57	T CLAY							
57	61	POORLY GRADED SAND							
61	63	SILTY SAND							
63	69	POORLY GRADED SAND WITH SILT							
69	75	POORLY GRADED SAND							
75	77	SILT WITH SAND							
77	87	POORLY GRADED SAND WITH SILT							
87	105	POORLY GRADED SAND WITH GRAVEL							
105	115	POORLY GRADED SAND WITH SILT							
115	122	POORLY GRADED SAND WITH GRAVEL							
122	124	SANDSTONE							
124	128	MUDSTONE							
128	141	SANDSTONE							
141	165	MUDSTONE							

						Casing	s						
Casing #		m Surface to Feet	Casing T	уре	Material	Casings Specificatons	Wall Thickne (inches		Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description	
1	0	50	Conduct Fill Pipe	ductor or Low Carbon Pipe Steel		Grade: ASTM A53	0.37	5	36				
2	0	60	Blank	k Spiral Weld Stainless Steel		Nominal Size: 18 in. Thickness: 1/4 in. OD: 18-5/8 in.	0.25		18.625				
2	60	125	Screen		Spiral Weld Stainless Steel	Nominal Size: 18 in. Thickness: 1/4 in. OD: 18-5/8 in.	/4 in.		18.625	Louver	0.05		
2	125	145	Blank		Spiral Weld Stainless Steel	Nominal Size: 18 in. Thickness: 1/4 in. OD: 18-5/8 in.	0.25		18.625				
						Annular Ma	terial						
Śur	n from face to Feet	Fill			Fill T	ype Details		Filter Pack Size			Description		
0	50	Ceme	ent 10	.3 Sac	ck Mix						Conductor	r Seal	
0	25	Ceme	ent 10	.3 Sac	ck Mix						Anulus be	tween 18inch and conductor	
25	30	Bento	nite Hi	gh Soli	ids								
30	165	Filter F	Pack Of	her Gr	ravel Pack			1/4	X 40		Tacna Sar	nd	
Other	r Observ	ations:											

	E	Borehole Specifications	Certification Statement							
Depth Surf Feet to		Borehole Diameter (inches)	I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief Name JENSEN DRILLING COMPANY							
0 50	50 165	48 28	Person, Firm or Corporation 1775 HENDERSON AVENUE EUGENE OR 974 Address City State Zip							
			Signed electronic signature received 06/26/2019 340115 C-57 Licensed Water Well Contractor Date Signed C-57 License N							
		Attachments	DWR Use Only							
(1).pdf -		D_Construction_Drawings_Sheets 1-8_11x17 struction Diagram n Map	CSG #	State We	g/Min/Sec	N	Longitude		ell Number W n/Sec	

APPENDIX H

Desalter Test Well

Aquifer Pump Testing Data



Olivenhain Municipal Water District Report of Design Pilot Testing for the San Dieguito Valley Brackish Groundwater Desalination Project

GEOSCIENCE

GEOSCIENCE Support Services, Inc. P.O. Box 220, Claremont, CA 91711 Tel: (909) 451-6650 Fax: (909) 451-6638 www.gssiwater.com

PUMPING TEST DATA

www	.gssiwater.com							
Test Date:	May 20,	2019						
	-		Desalter Te	est Well				
Circle Well	Type:	\sim	Pumping	>	Observatio	n (r = _ft)		
Circle Test	Type:	Ste	ep Drawdow	n	Constant R	ate	Recovery	Development
Static Wate	er Level D	epth: 10.	47 ft bgs		Reference l	Point Elevation:	4.0 ft ags	
Time	Time	Time	Depth to	Draw-	Pumping	Sand	Totalizer	
of	Step	Total	Water	down	Rate	Content		Remarks and Other Data
Day	[min]	[min]	[ft brp]	[ft]	[gpm]	[ppm]	[galx100]	
9:20	0	0	14.47	0.00	0	-	8,854.00	Pump on to ~160 gpm
9:22	2	2	31.91	17.44	200	-	8,858.00	
9:24	4	4	37.62	23.15	175	-	8,861.50	
9:26	6	6	40.04	25.57	175	5.28	8,865.00	0-5 min sand = 5.28 ppm
9:28	8	8	41.26	26.79	175	trace	8,868.50	
9:30	10	10	41.32	26.85	175	trace	8,872.00	5-10 min sand = Trace
9:35	15	15	41.55	27.08	160	0.00	8,880.00	
9:40	20	20	41.94	27.47	160	0.00	8,888.00	15-20 min sand = 0 mL
9:45	25	25	42.21	27.74	150	0.00	8,895.50	
9:50	30	30	42.48	28.01	160	0.00	8,903.50	
10:00	40	40	42.84	28.37	160	0.00	8,919.50	
10:10	50	50	43.11	28.64	160	0.00	8,935.50	
10:20	60	60	43.34	28.87	160	0.00	8,951.50	$Q_1 Avg = 162.5 \text{ gpm/SC}_1 = 5.63 \text{ gpm/ft}$
10:22	2	62	51.32	36.85	225	0.00	8,956.00	Q↑ = 240 gpm
10:24	4	64	57.06	42.59	250	0.00	8,961.00	<u> </u>
10:26	6	66	59.40	44.93	250	0.00	8,966.00	0-5 min sand = 0 mL
10:28	8	68	60.51	46.04	250	0.00	8,971.00	
10:30	10	70	61.19	46.72	225	0.00	8,975.50	5-10 min sand = 0 mL
10:35	15	75	62.02	47.55	240	0.00	8,987.50	
10:40	20	80	62.39	47.92	240	0.00	8,999.50	15-20 min sand = 0 mL
10:45	25	85	62.71	48.24	240	0.00	9,011.50	
10:50	30	90	62.94	48.47	240	0.00	9,023.50	
11:00	40	100	63.38	48.91	235	0.00	9,047.00	
11:10	50	110	63.74	49.27	240	0.00	9,071.00	
11:20	60	120	63.97	49.50	235	0.00	9,094.50	
11:35	75	135	64.31	49.84	237	0.00	9,130.00	
11:50	90	150	64.53	50.06	237	0.00	9,165.50	
12:05	105	165	64.70	50.23	237	0.00	9,201.00	
12:20	120	180	64.93	50.46	237	0.00	9,236.50	$Q_2 Avg = 237.5 \text{ gpm/SC}_2 = 4.71 \text{ gpm/ft}$
12:22	2	182	70.73	56.26	275	0.00	9,242.00	Q↑ = 280 gpm
12:24	4	184	73.69	59.22	275	0.00	9,247.50	<u> </u>
12:26	6	186	75.14	60.67	275	0.00	9,253.00	0-5 min sand = 0 mL
12:28	8	188	77.13	62.66	300	0.00	9,259.00	
12:30	10	190	78.47	64.00	275	0.00	9,264.50	5-10 min sand = 0 mL
12:35	15	195	79.65	65.18	290	0.00	9,279.00	
12:40	20	200	79.98	65.51	290	0.00	9,293.50	15-20 min sand = 0 mL
12:45	25	205	80.23	65.76	280	0.00	9,307.50	
12:50	30	210	80.44	65.97	290	0.00	9,322.00	
13:00	40	220	80.60	66.13	280	0.00	9,350.00	
13:10	50	230	80.83	66.36	285	0.00	9,378.50	
13:20	60	240	81.11	66.64	285	0.00	9,407.00	
13:35	75	255	81.41	66.94	283	0.00	9,449.50	

GEOSCIENCE

GEOSCIENCE Support Services, Inc. P.O. Box 220, Claremont, CA 91711 Tel: (909) 451-6650 Fax: (909) 451-6638 www.gssiwater.com

Test Date: May 20, 2019

Well Name/Number: OMWD Desalter Test Well Circle Well Type: C Pumping Observation (r = ft) Circle Test Type: Step Drawdown <**Constant Rate** Recovery Development Static Water Level Depth: 10.47 ft bgs Reference Point Elevation: 4.0 ft ags Time Time Time Depth to Pumping Sand Totalizer Draw-**Remarks and Other Data** of Step Total Water down Rate Content [min] [ft brp] [ft] Day [min] [gpm] [ppm] [galx100] 13:50 90 270 81.62 67.15 0.00 9,492.00 283 105 14:05 285 81.87 67.40 280 0.00 9,534.00 9,576.50 14:20 120 300 82.10 67.63 283 0.00 283 14:35 135 315 82.32 67.85 0.00 9,619.00 14:50 0.00 150 82.50 68.03 280 9,661.00 330 15:05 165 345 82.58 68.11 280 0.00 9,703.00 15:20 180 360 82.59 68.12 283 0.00 9,745.50 $Q_3 Avg = 282.8 gpm/SC_3 = 4.15 gpm/ft$ Pump Off

Olivenhain Municipal Water District Report of Design Pilot Testing for the San Dieguito Valley Brackish Groundwater Desalination Project

GEOSCIENCE

GEOSCIENCE Support Services, Inc. P.O. Box 220, Claremont, CA 91711 Tel: (909) 451-6650 Fax: (909) 451-6638 www.gssiwater.com

www	.gssiwater.com							
Test Date:								
Well Name	e/Number	r: OMWE	Desalter Te	st Well				
Circle Well	Type:	<	Pumping	>	Observation	(r = ft)		
Circle Test	Type:	Ste	ep Drawdowi	ı <	Constant Rat	ie 🔿	Recovery	Development
Static Wat	er Level D	epth: 11	.02 ft bgs		Reference Po	oint Elevatio	on: 4.0 ft ags	
Time	Time	Time	Depth to	Draw-	Pumping	Sand	Totalizer	
of	Step	Total	Water	down	Rate	Content		Remarks and Other Data
Day	[min]	[min]	[ft brp]	[ft]	[gpm]	[ppm]	[galx100]	
7:40	0	0	15.02	0.00	0	-	9,749.00	Pump on
7:42	2	2	36.07	21.05	200	trace	9,753.00	
7:44	4	4	42.65	27.63	200	trace	9,757.00	
7:46	6	6	45.58	30.56	200	0.00	9,761.00	0-5 min sand = 0 mL
7:48	8	8	47.03	32.01	200	0.00	9,765.00	
7:50	10	10	49.45	34.43	200	0.00	9,769.00	5-10 min sand = 0 mL
7:55	15	15	52.27	37.25	200	0.00	9,779.00	
8:00	20	20	53.38	38.36	200	0.00	9,789.00	15-20 min sand = 0 mL
8:05	25	25	54.00	38.98	200	0.00	9,799.00	
8:10	30	30	54.49	39.47	200	0.00	9,809.00	
8:20	40	40	55.07	40.05	200	0.00	9,829.00	
8:30	50	50	55.50	40.48	200	0.00	9,849.00	
8:40	60	60	55.79	40.77	200	0.00	9,869.00	
8:55	75	75	56.12	41.10	200	0.00	9,899.00	
8:30	90	90	56.40	41.38	200	0.00	9,929.00	
9:25	105	105	56.56	41.54	200	0.00	9,959.00	
9:40	120	120	56.71	41.69	200	0.00	9,989.00	
10:10	150	150	57.21	42.19	200	0.00	10,051.00	
10:40	180	180	57.43	42.41	190	0.00	10,108.00	
11:10	210	210	57.85	42.83	200	0.00	10,168.00	
11:40	240	240	57.84	42.82	200	0.00	10,228.00	
12:10	270	270	57.98	42.96	197	0.00	10,228.00	
12:40	300	300	58.10	43.08	200	0.00	10,287.00	
12:40	330	330	58.27	43.08	197	0.00	10,347.00	
13:40	360	360	58.37	43.35	197	0.00	10,408.00	
13:40	300	390	58.50	43.48	197	0.00	10,403.00	
14:10	420	420		43.61	197		-	
14:40	420	420	58.63 58.73	43.61	200	0.00	10,583.00 10,643.00	
15:10	450	450	58.73	43.71	197	0.00	10,843.00	
15:40	480 510	480 510	58.91	43.79	197	0.00	10,761.00	
16:10	510	510	59.03	43.89	197	0.00	10,761.00	
16:40	540 570	540 570	59.03	44.01	197	0.00		
					197		10,879.00	
17:40	600	600	59.21	44.19		0.00	10,938.00	+
18:10	630	630	59.27	44.25	197	0.00	10,997.00	
18:40	660	660	59.37	44.35	197	0.00	11,056.00	
19:10	690	690	59.41	44.39	197	0.00	11,115.00	
19:40	720	720	59.51	44.49	197	0.00	11,174.00	
20:10	750	750	59.55	44.53	193	0.00	11,232.00	
20:40	780	780	59.64	44.62	197	0.00	11,291.00	
21:10	810	810	59.74	44.72	197	0.00	11,350.00	
21:40	840	840	59.77	44.75	197	0.00	11,409.00	
22:10	870	870	59.84	44.82	197	0.00	11,468.00	

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www	.gssiwater.com							
Test Date:	-							
		r: OMWE	Desalter Tes					
Circle Well		<	Pumping		Observation			
Circle Test			ep Drawdown		Constant Rat		Recovery	Development
Static Wat	er Level D	epth: 11	.02 ft bgs		Reference Po	oint Elevatio	on: 4.0 ft ags	
Time	Time	Time	Depth to	Draw-	Pumping	Sand	Totalizer	
of	Step	Total	Water	down	Rate	Content		Remarks and Other Data
Day	[min]	[min]	[ft brp]	[ft]	[gpm]	[ppm]	[galx100]	
22:40	900	900	59.92	44.90	193	0.00	11,526.00	
23:10	930	930	59.98	44.96	197	0.00	11,585.00	
23:40	960	960	60.04	45.02	193	0.00	11,643.00	
0:10	990	990	60.07	45.05	197	0.00	11,702.00	
0:40	1,020	1,020	60.11	45.09	197	0.00	11,761.00	
1:10	1,050	1,050	60.16	45.14	197	0.00	11,820.00	
1:40	1,080	1,080	60.23	45.21	193	0.00	11,878.00	
2:10	1,110	1,110	60.25	45.23	197	0.00	11,937.00	
2:40	1,140	1,140	60.28	45.26	193	0.00	11,995.00	
3:10	1,170	1,170	60.34	45.32	197	0.00	12,054.00	
3:40	1,200	1,200	60.50	45.48	197	0.00	12,113.00	
4:10	1,230	1,230	60.53	45.51	193	0.00	12,171.00	
4:40	1,260	1,260	60.51	45.49	197	0.00	12,230.00	
5:10	1,290	1,290	60.63	45.61	193	0.00	12,288.00	
5:40	1,320	1,320	60.70	45.68	197	0.00	12,347.00	
6:10	1,350	1,350	60.70	45.68	193	0.00	12,405.00	
6:40	1,380	1,380	60.77	45.75	197	0.00	12,464.00	
7:10	1,410	1,410	60.80	45.78	197	0.00	12,523.00	
7:40	1,440	1,440	60.83	45.81	193	0.00	12,581.00	Q _{avg} = 196.7 gpm/SC = 4.3 gpm/ft
								Pump Off

GEOSCIENCE

GEOSCIENCE Support Services, Inc. P.O. Box 220, Claremont, CA 91711 Tel: (909) 451-6650 Fax: (909) 451-6638 www.gssiwater.com

22 2010 . . -

Test Date:	May 22,	2019						
Well Name	/Numbe	r: OMWD	Desalter Tes	st Well				
Circle Well	Type:	<	Pumping	>	Observation	(r = ft)		
Circle Test	Type:		Step Drawdo	own	Constant Rat	:e <	Recovery	Development
Static Wate	er Level D	epth: 11.	02 ft bgs		Reference Po	oint Elevatio	on: 4.00 ft ags	
Time	Time	Time	Depth to	Draw-	Pumping	Sand	Totalizer	
of	Step	Total	Water	down	Rate	Content		Remarks and Other Data
Day	[min]	[min]	[ft]	[ft]	[gpm]	[ppm]	[galx100]	
7:40	0	1,440	60.83	45.81	-	-	12,581.00	Pump off
7:42	2	1,442	38.58	23.56	-	-	-	
7:44	4	1,444	28.18	13.16	-	-	-	
7:46	6	1,446	23.64	8.62	-	-	-	
7:48	8	1,448	21.73	6.71	-	-	-	
7:50	10	1,450	20.80	5.78	-	-	-	
7:55	15	1,455	19.81	4.79	-	-	-	
8:00	20	1,460	19.29	4.27	-	-	-	
8:05	25	1,465	18.94	3.92	-	-	-	
8:10	30	1,470	18.65	3.63	-	-	-	
8:20	40	1,480	18.28	3.26	-	-	-	
8:30	50	1,490	18.05	3.03	-	-	-	
8:40	60	1,500	17.89	2.87	-	-	-	
8:50	70	1,510	17.77	2.75	-	-	-	
9:00	80	1,520	17.67	2.65	-	-	-	
9:10	90	1,530	17.57	2.55	-	-	-	
9:20	100	1,540	17.50	2.48	-	-	-	
9:35	115	1,555	17.40	2.38	-	-	-	
9:50	130	1,570	17.31	2.29	-	-	-	
10:05	145	1,585	17.23	2.21	-	-	-	
10:20	160	1,600	17.19	2.17	-	-	-	
10:35	175	1,615	17.09	2.07	-	-	-	
10:50	190	1,630	17.04	2.02	-	-	-	
11:05	205	1,645	16.98	1.96	-	-	-	
11:20	220	1,660	16.90	1.88	-	-	-	
11:40	240	1,680	16.86	1.84	-	-	-	End Test

APPENDIX I

Desalter Test Well Completed Well & Desalter Test Well & Select Monitoring Wells Long-Term Testing Water Chemistry Laboratory Reports





750 Royal Oaks Drive, Suite 100 Monrovia, California 91016-3629 Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)





AT-1807

Laboratory Report

for

David C. McCollum Water Treatment Plant 1966 Olivenhain Rd. Encinitas, CA 92024 Attention: Tom Arellano Fax: 760-740-1702

REPORT REVISED, replaces the original report.

Report:806101

Project:SPECIAL Group:desal pilot



Utah ELCP CA00006



YOM: Yolanda.O.Martin

Project Manager

* Accredited in accordance with TNI 2016 and ISO/IEC 17025:2017.

* Laboratory certifies that the test results meet all TNI 2016 and ISO/IEC 17025:2017 requirements unless noted under the individual analysis.

* Following the cover page are State Certification List, ISO/IEC 17025:2017 Accredited Method List, Acknowledgement of Samples Received, Comments,

Hits Report, Data Report, QC Summary, QC Report and Regulatory Forms, as applicable.

* Test results relate only to the sample(s) tested.

* Test results apply to the sample(s) as received, unless EEA-M collected and analyzed the sample(s) as noted in the COC and final report.

* This report shall not be reproduced except in full, without the written approval of the laboratory.

* This report includes ISO/IEC 17025:2017 and non-ISO/IEC 17025:2017 accredited methods.



STATE CERTIFICATION LIST

State	Certification Number	State	Certification Number
Alabama	41060	Montana	Cert 0035
Arizona	AZ0778	Nebraska	Certified
Arkansas	Certified	Nevada	CA000062018
California	2813	New Hampshire *	2959
Colorado	Certified	New Jersey *	CA 008
Connecticut	PH-0107	New Mexico	Certified
Delaware	CA 006	New York *	11320
Florida *	E871024	North Carolina	06701
Georgia	947	North Dakota	R-009
Guam	18-005R	Oregon *	CA200003-005
Hawaii	Certified	Pennsylvania *	68-565
Idaho	Certified	Puerto Rico	Certified
Illinois *	200033	Rhode Island	LAO00326
Indiana	C-CA-01	South Carolina	87016
Iowa - Asbestos	413	South Dakota	Certified
Kansas *	E-10268	Tennessee	TN02839
Kentucky	90107	Texas *	T104704230-18-15
Louisiana *	LA180000	Utah (Primary AB) *	CA00006
Maine	CA0006	Vermont	VT0114
Maryland	224	Virginia *	460260
Commonwealth of Northern Marianas Is.	MP0004	Washington	C838
Massachusetts	M-CA006	EPA Region 5	Certified
Michigan	9906	Los Angeles County Sanitation Districts	10264
Mississippi	Certified		

* NELAP/TNI Recognized Accreditation Bodies

Eurofins Eaton Analytical, LLC

750 Royal Oaks Drive, Suite 100 Monrovia, CA 91016-3629 T | 626-386-1100 F | 866-988-3757 www.EurofinsUS.com/Eaton

ISO/IEC 17025 Accredited Method List

The tests listed below are accredited and meet the requirements of ISO/IEC 17025 as verified by the ANSI-ASQ National Accreditation Board/ANAB. Refer to Certificate and scope of accreditation (AT 1807) found at: https://www.eurofinsus.com/Eaton

SPECIFIC TESTS	METHOD OR TECHNIQUE USED	Environ- mental (Drinking Water)	Environ- mental (Waste Water)	Water as a Component of Food and Bev/Bev/ Bottled Water	SPECIFIC TESTS	METHOD OR TECHNIQUE USED	Environ- mental (Drinking Water)	Environ- mental (Waste Water)	Water as a Component of Foo and Bev/Bev/ Bottled Water
1,2,3-TCP (5 PPT & 0.5	CA SRL 524M-TCP	x	(valci)	X	Hexavalent Chromium	EPA 218.7	x	(vater)	X
PPT)									
1,4-Dioxane 2,3,7,8-TCDD	EPA 522 Modified EPA 1613B	x		x x	Hexavalent Chromium Hormones	SM 3500-Cr B EPA 539	x	x	x
Acrylamide	In House Method (2440)	x		x	Hydroxide as OH Calc.	SM 2330B	x		x
Algal Toxins/Microcystin	In House Method (3570)	~		~	Kjeldahl Nitrogen	EPA 351.2	~	x	~
Alkalinity	SM 2320B	x	x	x	Legionella	Legiolert	x		x
Ammonia	EPA 350.1		х	x	Mercury	EPA 245.1	х	х	x
Ammonia	SM 4500-NH3 H		х	х	Metals	EPA 200.7 / 200.8	х	х	х
Anions and DBPs by IC	EPA 300.0	х	х	x	Microcystin LR	ELISA (2360)	х		х
Anions and DBPs by IC	EPA 300.1	x		х	Microcystin, Total	EPA 546	х		x
Asbestos	EPA 100.2	x	x		NDMA	EPA 521 In house method (2425)	x		x
BOD / CBOD	SM 5210B		х	х	Nitrate/Nitrite Nitrogen	EPA 353.2	х	х	x
Bromate	In House Method (2447)	х		х	OCL, Pesticides/PCB	EPA 505	х		х
Carbamates	EPA 531.2	x		x	Ortho Phosphate	EPA 365.1	х	х	x
Carbonate as CO3	SM 2330B	x	х	x	Ortho Phosphorous	SM 4500P E	х		x
Carbonyls	EPA 556	x		x	Oxyhalides Disinfection Byproducts	EPA 317.0	x		x
COD	EPA 410.4 / SM 5220D		х		Perchlorate	EPA 331.0	х		x
Chloramines	SM 4500-CL G	х	х	x	Perchlorate (low and high)	EPA 314.0	х		х
Chlorinated Acids	EPA 515.4	х		x	Perfluorinated Alkyl Acids	EPA 537	х		х
Chlorinated Acids	EPA 555	x		x	Perfluorinated Polutant	In house Method (2434)	х		х
Chlorine Dioxide	SM 4500-CLO2 D Palin Test	×		x	рН	EPA 150.1	x		
Chlorine -Total/Free/ Combined Residual	SM 4500-Cl G	x	x	x	рН	SM 4500-H+B	x	x	x
Conductivity	EPA 120.1		x		Phenylurea Pesticides/ Herbicides	In House Method, based on EPA 532 (2448)	x		x
Conductivity	SM 2510B	х	х	x	Pseudomonas	IDEXX Pseudalert (2461)	х		x
Corrosivity (Langelier Index)	SM 2330B	x		x	Radium-226	GA Institute of Tech	x		x
Cyanide, Amenable	SM 4500-CN G	x	x		Radium-228	GA Institute of Tech	x		x
Cyanide, Free	SM 4500CN F	x	х	x	Radon-222	SM 7500RN	х		x
Cyanide, Total	EPA 335.4	х	х	х	Residue, Filterable	SM 2540C	х	х	x
Cyanogen Chloride (screen)	In House Method (2470)	x		x	Residue, Non-filterable	SM 2540D		х	
Diquat and Paraquat	EPA 549.2	х		x	Residue, Total	SM 2540B		х	x
DBP/HAA	SM 6251B	x		х	Residue, Volatile	EPA 160.4		х	
Dissolved Oxygen	SM 4500-O G		х	x	Semi-VOC	EPA 525.2	х		x
DOC	SM 5310C	х		x	Silica	SM 4500-Si D	х	х	
E. Coli	(MTF/EC+MUG)	х		x	Silica	SM 4500-SiO2 C	х	х	
E. Coli	CFR 141.21(f)(6)(i)	х		x	Sulfide	SM 4500-S ⁼ D		х	
E. Coli	SM 9223		х		Sulfite	SM 4500-SO3B	х	х	x
E. Coli (Enumeration)	SM 9221B.1/ SM 9221F	x		x	Surfactants	SM 1000 DO D SM 5540C	x	x	x
E. Coli (Enumeration)	SM 9221B.17 SM 9221F SM 9223B	x		x	Taste and Odor Analytes	SM 5340C SM 6040E	x	X	x
EDB/DCBP	EPA 504.1	x			Total Coliform (P/A)	SM 9221 A, B	x		x
					Total Coliform				
EDB/DBCP and DBP	EPA 551.1	x		x	(Enumeration)	SM 9221 A, B, C	x		x
EDTA and NTA	In House Method (2454)	х		x	Total Coliform / E. coli	Colisure SM 9223	х		х
Endothall	EPA 548.1	x		x	Total Coliform Total Coliform with Chlorine	SM 9221B		x	
Endothall	In-house Method (2445)	x		x	Present	SM 9221B		x	
Enterococci	SM 9230B	x	х		Total Coliform / E.coli (P/A and Enumeration)	SM 9223	x		×
Fecal Coliform	SM 9221 E (MTF/EC)	х		↓]	TOC	SM 5310C	x	x	х
Fecal Coliform	SM 9221C, E (MTF/EC)	-	х	<u> </u>	TOX	SM 5320B		х	
Fecal Coliform (Enumeration)	SM 9221E (MTF/EC)	x		x	Total Phenols	EPA 420.1		x	
Fecal Coliform with Chlorine Present	SM 9221E		×		Total Phenols	EPA 420.4	x	x	×
Fecal Streptococci	SM 9230B	x	x		Total Phosphorous Triazine Pesticides &	SM 4500 P E		х	
Fluoride	SM 4500-F C	x	x	x	Degradates	In House (3617)	x		x
Glyphosate	EPA 547	х		x	Turbidity	EPA 180.1	х	х	х
Glyphosate + AMPA	In House Method (3618)	x		x	Turbidity	SM 2130B	х	х	
Gross Alpha/Beta	EPA 900.0	x	x	x	Uranium by ICP/MS	EPA 200.8	x		x
Gross Alpha Coprecipitation	SM 7110 C SM 2340B	x	×	x	UV 254 VOC	SM 5910B	×		~
Hardness Heterotrophic Bacteria	In House Method (2439)	x	x	x	VOC	EPA 524.2 In House Method (2411)	x		x
Heterotrophic Bacteria	SM 9215 B	x		x	Yeast and Mold	SM 9610	x		x

750 Royal Oaks Dr., Ste 100, Monrovia, CA 91016 Tel (626) 386-1100 Fax (866) 988-3757 https://www.eurofinsus.com/Eaton Version 003 Issued: 09/20/2018

Attn: Tom Arellano

Phone: 760-740-1385 x183

Acknowledgement of Samples Received

Addr: David C. McCollum Water Treatment Plant

1966 Olivenhain Rd. Encinitas, CA 92024 Client ID: OLIVENHAIN Folder #: 806101 Project: SPECIAL Sample Group: desal pilot

Project Manager: Yolanda.O.Martin Phone: (626)-386-1104

The following samples were received from you on **May 22, 2019** at **1433**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical, LLC.

Sample #	Sample ID		Sample Date
201905200220	Test Well		05/22/2019 0515
	@ANIONS28	@ICP	@ICPMS
	Agressiveness Index-Calculated	Alkalinity in CaCO3 units	Anion Sum - Calculated
	Bicarb.Alkalinity as HCO3,calc	Carbon Dioxide,Free(25C)-Calc.	Carbonate as CO3, Calculated
	Cation Sum - Calculated	Carbon Dioxide, Free(25C)-Carc.	Fluoride
	1		
	Hydroxide as OH, Calculated	Langelier Index - 25 degree	Langlier Index at 60 degrees C
	Mercury	PH (H3=past HT not compliant)	pH of CaCO3 saturation(25C)
	pH of CaCO3 saturation(60C)	Specific Conductance	Surfactants
	Total Dissolved Solid (TDS)	Total Hardness as CaCO3 by ICP	Apparent Color
	Odor at 60 C (TON)	Turbidity	@ICPMS
	Uranium by ICPMS as pCi/L	@525PLUS	@537
	@BETA	@CLO4-MS	@DIQUAT
	@DIQUAT-LOW	@EDB-DBC	@ML505
	@ML515.4	@ML531.2	@RN
	@TCP-524	@VOASDWA	Asbestos (Subbed)_CA cert
	Boron Total ICAP	Cyanide by manual distillation	2,3,7,8-TCDD
	Endothal_LOW	Endothall	Glyphosate
	Glyphosate by LCMS	Gross Alpha by Co-precipitation	Hexavalent Chromium by 218.6
	Mercury by ICAP/MS	Nitrate as Nitrogen by IC	Nitrate as NO3 (calc)
	Nitrite Nitrogen by RFA	Silica	Vanadium Total ICAP/MS
201905200221	Travel Blank - HOLD		05/22/2019 0515
	@EDB-DBC TB	@TCP-524 TB	@VOASDWA TB
201905230398	Field Blank (201905200221)		05/22/2019 0515
	@537 FB		

Test Description

@ANIONS28 -- Chloride, Sulfate by EPA 300.0

@ICP -- ICP Metals

@ICPMS -- ICPMS Metals

@ICPMS -- ICPMS Metals

@525PLUS -- Semivolatiles by GCMS

@537 -- Perfluorinated Alkyl Acids EPA 537 rev 1.1

@537 FB -- Perfluorinated Alkyl Acids EPA 537 rev 1.1

750 Royal Oaks Drive, Suite 100, Monrovia, CA 91016 Tel (626) 386-1100 Fax (866) 988-3757 www.EurofinsUS.com/Eaton

Attn: Tom Arellano

Phone: 760-740-1385 x183

Acknowledgement of Samples Received

Addr: David C. McCollum Water Treatment Plant

1966 Olivenhain Rd. Encinitas, CA 92024 Client ID: OLIVENHAIN Folder #: 806101 Project: SPECIAL Sample Group: desal pilot

Project Manager: Yolanda.O.Martin Phone: (626)-386-1104

The following samples were received from you on **May 22**, **2019** at **1433**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical, LLC.

Sample #	Sample ID	Sample Date
	@BETA Gross Alpha/Beta Radiation	
	@CLO4-MS Perchlorate by LCMS	
	@DIQUAT Diquat and Paraquat	
	@DIQUAT-LOW DIQUAT-LOW 0.1ppb	
	@EDB-DBC EPA Method 504.1	
	@EDB-DBC TB EPA Method 504.1	
	@ML505 Organochlorine Pesticides/PCBs	
	@ML515.4 Chlorophenoxy Herbicides	
	@ML531.2 Aldicarbs	
	@RN Radon 222	
	@TCP-524 1,2,3-Trichloropropane (SIM)	
	@TCP-524 TB 1,2,3-Trichloropropane (SIM)	
	@VOASDWA Volatile Organics by GCMS	
	@VOASDWA TB Volatile Organics by GCMS	

Page 2 of 2

🐝 eurofins	CHAIN C	CHAIN OF CUSTODY RECORD	XI I.
Eaton Analytical	EUROFINS EATON ANALYTICAL USE ONLY:		10/000
750 Roval Oaks Drive, Suite 100	LOGIN COMMENTS:	SAMPLES CHECKED AGAINST COC BY:	ST COC BY:
Monrovia, CA 91016-3629		SAMPLES LOGGED IN BY:	SGED IN BY:
Phone: 626 386 1100 Fax: 626 386 1101	SAMPLE TEMP RECEIVED AT:		oLLECTION? (check for yes)
800 566 LABS (800 566 5227)	Monrovia IR Gun ID = 6	(Observation= <u>5 0</u> °C) (Corr.Factor <u>01</u> °C) (Final =	nal = <u>2.1</u> °C)
Website: www.EatonAnalytical.com	TYPE OF ICE: Real X Synthetic Ordenisty: 4 ± 2 °	A ± 2.°C) (Microbiology: < 10°C.) No Ice CONDITION OF ICE: Frozen X Partially Frozen	Thawed N/A
	PMENT: Pick-Up /	walkyn / FedEx / UPS / DHL / Area Fast / Top Line / Other:	
TO BE COMPLETED BY SAMPLER:)	(check for yes)	(check for yes)
MU nicipal Water District	PROJECT CODE:	COMPLIANCE SAMPLES NON-COMPLIANCE SAMP - Requires state forms REGULATION INVOLVED:	NON-COMPLIANCE SAMPLES
	Special	NE SPECIAL	ON (eg. SDWA, NPDES, etc.)
Coc ID: Olivenhain/CA 3410029-008	SAMPLE GROUP: Desal pilot	SEE ATTACHED KIT ORDER FOR ANALYSES X (check for yes), OR List ALL ANALYSES REQUIRED (enter number of bottles sent for each test for each sample)	$\left \sum \right $ (check for yes), <u>OR</u> ant for each test for each sample)
TAT requested: rush by adv notice only	STD X 1 wk 3 day 2 day 1 day		
SAMPLE DATE DATE SAMPLE TIME SAMPLE D	CLIENT LAB ID MATRIX *		SAMPLER COMMENTS
Stall OFIS Desal Pilot/	\vdash		Please cc results to Terry Watkins
Test Well		TUAL	
			Water Quality Parameters:
		2110	pH: 7.26
		2 150	Temp (c): 19.8
			Turbe (NTV): 0.81
			SC (NS): 5410
			TDS (49m): 4237
			Prates 196 open
* MATRIX TYPES: RSW = Raw Surface Water	 CFW = Chlor(am)inated Finished Water FW = Other Finished Water 	SEAW = Sea Water BW = Bottled Water SO = Soil WW = Waste Water SW = Storm Water SL = Sludge	0 = Other - Please Identify
SIGNATURE	PRINT NAME	COMPANY/TITLE	DATE TIME
SAMPLED BY: My all Mitte	-		5/22/19 05:15
KELINGUISHED BY MUROLO, Mitte	Alexander Arita	BEOSCIENCE/Staff Geolydhologist	
RECEIVED BY:	Chuch Breek	Y EEP	5.22-19 1433
RECEIVED BY:			
QA FO 0029.2 (Version 2) (08/28/2014)	-	-	PAGE OF

	Analytical
	Eaton
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Kit Order for Olivenhain Municipal Water District

Yolanda.O.Martin is your Eurofins Eaton Analytical, LLC Service Manager

750 Royal Oaks Drive, Suite 100 Monrovia, California 91016-3629 (626) 386-1100 FAX (866) 988-3757

Kit #: 234571

Created By: Irene Trang - [WBN6] Deliver By: 05/21/2019 STG: Bottle Orders Pre Registered

Note: Sampler Please return this paper with your samples client ID: OLIVENHAIN/CA3710029-008

Project Code: SPECIAL Bottle Orders Group Name: desal pilot PO#/JOB#:

Description: No Schedule

Water Treatment	35 x183	UN DOT #																			UN1789	UN1789	UN1789	UN1789			
Billing Address David C. McCollum Water Treatment Plant 1966 Olivenhain Rd. Encinitas, CA 92024	Attn: Tom Arellano Phone: 760-740-1385 x183 Fax: 760-740-1702	Total	-	-	t	٢	2	2	t	1	1	1	t	÷	4	2	+	۲	2	4	2	4	ę	2	З	2	2
Send Report to David C. McCollum Water Treatment Plant 1966 Olivenhain Rd. Encinitas, CA 92024	Attn: Tom Arellano Phone: 760-740-1385 x183 Fax: 760-740-1702	Bottle Qty - Type [preservative information]	1 - 125ml amber glass [no preservative]	1 - 125ml poly [1.25 ml NH4SO4/NH4OH buffer]	1 - 125ml poly [no preservative]	1 - 125ml poly [no preservative]	- 1L amber glass [1 ml Thio 8%]	2 - 1L amber glass [2 ml of 6N HCL]	1 - 1L amber glass [no preservative]	1 - 1L amber poly [no preservative]	- 1L poly sonicated [no preservative]	 - 250 ml poly [2 ml NaOH (30%)+6 scoops AA] 	- 250 ml poly [no preservative]	- 250ml amber glass [no preservative]	1 - 250ml poly [no preservative]	2 - 275 ml polypro w polypro cap [1.4 g Trisma]	1 - 275 ml polypro w polypro cap [1.4g Trisma + H2O]	1 - 275 ml polypro w polypro cap [no preservative]	2 - 40ml amber glass vial [0.37g KH2Citrate+6mg ThioSO4]	4 - 40ml amber glass vial [1 drop Thio (8%)]	- 40ml amber glass vial [4 drops 1:1 HCL + H2O]	4 - 40ml amber glass vial [4 drops of 1:1 HCL]	- 40ml amber glass vial [4drops 6N HCL (36%)]	2 - 40ml amber glass vial [4drops of 1:1 HCL + H2O]	3 - 40ml amber glass vial [no preservative]	2 - 40ml amber glass vial [no preservative]	2 - 40ml amber glass vial [no preservative + H20]
Ship Sample Kits to Olivenhain Municipal Water District 19090 Via Ambiente Rd. Escondido, CA 92029	Attri: Evan DeWindt Phone: 760-740-1385 Fax: 760-740-1702	Bott	1 - 1		(P) 1-1	1 - 1	2 - 1	2-1	00	1 - 1	3 (B 1-1	1 - 2	1 - 2	1 - 2	Alkalinity in CaCO3 units, PH (H3=past HT not compliant), Specific 1 - 2 Conductance	2-2	1 - 2	1 - 2	2 - 4	4 - 4	2 - 4	4 - 4	3 - 4	2 - 4	3 - 4	2 - 4	2 - 4
		# of Sample Tests	Glyphosate	Hexavalent Chromium by 218.6	@ANIONS28, @ANIONS48	Perchlorate by LCMS	@2378-TCDD_Dioxin	@525PLUS	Apparent Color, Odor at 60 C (TON), Turbidity	@DIQUAT	Asbestos by TEM - >10 microns	Cyanide	Fluoride	Endothall	Alkalinity in CaCO3 units, PH (H3 Conductance	@537	@537 TB EMPTY	@537 FB	@ML531.2	@ML505	@TCP-524 TB	@TCP-524	@VOASDWA	@VOASDWA TB	@EDB-DBC	(@RN) (&	@EDB-DBC TB
		# of Sam	7	Ī	-	5	1	-	1	7	-	ī	ī	ī	7	01	1	E	ī	7	ī	Ē	j	Į	of 1	- 100	1 pag

	Eaton Analytical
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Kit Order for Olivenhain Municipal Water District

Yolanda.O.Martin is your Eurofins Eaton Analytical, LLC Service Manager

Note: Sampler Please return this paper with your samples

Client ID: OLIVENHAIN Project Code: SPECIAL Bottle Orders Group Name: desal pilot PO#/JOB#:

Kit #: 234571

750 Royal Oaks Drive, Suite 100 Monrovia, California 91016-3629 (626) 386-1100 FAX (866) 988-3757

	n Water Treatment 1. 24	85 x183	UN DOT #	UN2031	UN2031							
	Billing Address David C. McCollum Water Treatment Plant 1966 Olivenhain Rd. Encinitas, CA 92024	Attn: Tom Arellano Phone: 760-740-1385 x183 Fax: 760-740-1702	Total	~	2	t	Ţ	4	-	Sum Bottles: 53		
Project code: OF ECARL BOUND CLUERS Group Name: desal pilot PO#JOB#: Description: No Schedule	Send Report to David C. McCollum Water Treatment Plant 1966 Olivenhain Rd. Encinitas, CA 92024	Attn: Tom Arellano Phone: 760-740-1385 x183 Fax: 760-740-1702	e Qty - Type [preservative information]	1 - 500ml acid poly [2ml HNO3 (18%)]	2 - 500ml poly [2ml 18%HNO3+125ml poly/no pres]	1 - 500ml poly [no preservative]	00ml poly [no preservative]	4 - 60ml amber glass [3 mg NaSulfite]	1 - sterile 125mL poly [Sterile filter + syringe and instructions]	Sum		
Created By: Irene Trang - [WBN6] Deliver By: 05/21/2019 STG: Bottle Orders Ice Type: W Pre Registered	Ship Sample Kits to Olivenhain Municipal Water District 19090 Via Ambiente Rd. Escondido, CA 92029	Attri: Evan DeWindt Phone: 760-740-1385 Fax: 760-740-1702	# of Sample Tests Bottle	③ICPMS, Mercury, Boron Total ICAP, Mercury by S, Silica, Vanadium Total ICAP/MS	1 @RAD 2-50	ants) C(S	-1 Total Dissolved Solid (TDS) 1 - 50	- 1 @ML515.4 4-60	- 1 @CL04-MS 1 - ste	Sum Tests: 31	Comments	Include any available sampling instructions

Prepared By

of Coolers

Tracking #

Constituent	Units	Minimum Reporting Level
General Physical Properties		
Color	Color unit	3
Odor	Odor unit	1
Turbidity	NTU ¹	0.2
MBAS	mg/L ²	0.05
General Minerals		
Total Hardness	mg/L	3
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Total Alkalinity, as CaCO ₃	mg/L	3
Hydroxide	mg/L	3
Carbonate	mg/L	3
Bicarbonate	mg/L	3
Sulfate	mg/L	0.5
Chloride	mg/L	1
рН	pH unit	1
Iron	μg/L	20.0
Zinc	μg/L	10.0
Manganese	μg/L	10.0
Copper	μg/L	10.0
Specific Conductance	umhos/cm ³	1
Total Dissolved Solids (TDS)	mg/L	20
Aggressive Index	-	-
Langlier Index	-	and the second second second
Inorganic Chemicals	AND A DE STREET	
Aluminum	μg/L ⁴	50.0
Antimony	μg/L	6.0
Arsenic	μg/L	2.0
Barium	μg/L	100.0
Beryllium	μg/L	1.0
Cadmium	μg/L	1.0
Chromium (Total)	μg/L	1.0
Chromium, hexavalent (CrVI)	μg/L	1.0
Cyanide	mg/L	0.1
Fluoride	mg/L	0.1
Lead	μg/L	5.0
Mercury	μg/L	1.0
Nickel	μg/L	10.0
Nitrate, as NO ₃	mg/L	1.0
Nitrate, as N	mg/L	0.2
Nitrite, as N	mg/L	0.1
Perchlorate (EPA 332.0)	μg/L	0.1

Completed Well Required Water Quality Analyses

Constituent	Units	Minimum Reporting Level
Selenium	μg/L	5.0
Silver	μg/L	10.0
Thallium	μg/L	1.0
EPA Organic Methods		A STATE OF THE STATE OF
Volatiles (EPA 524.2) - includes MTBE	μg/L	various
EDB and DBCP (EPA 504.1)	μg/L	various
Nitrogen & Phosphorus Pesticides (EPA 507)	μg/L	various
Chlorinated Pesticides & PCB's as DCP (EPA 508)	μg/L	various
Chlorinated Acid Herbicides (EPA 515.3)	μg/L	various
DEHP, DEHA, Benzo(a)Pyrene (EPA 525.2)	μg/L	various
Carbamates (EPA 531.1)	μg/L	various
Glyphosate (EPA 547)	μg/L	25.0
Endothall (EPA 548.1)	μg/L	45.0
Diquat (EPA 549.1)	μg/L	4.0
Dioxin (2,3,7,8 TCDD) (EPA 1613)	μg/L	0.000005
Additional Analysis		
1,2,3-Trichloropropane (1,2,3-TCP)	μg/L	0.005
Boron	μg/L	100.0
Vanadium	μg/L	3.0
Radioactivity (Gross Alpha and Gross Beta)	pCi/L ⁵	3
Radon	pCi/L	10
Silica (Total)	mg/L	1.0
Asbestos	MFL ⁶	0.2
UCMR4 Analyses		Section States
UCMR4 Metals (EPA 200.8)	μg/L	various
UCMR4 Pesticides (EPA 525.3)	μg/L	various
UCMR4 Semivolatiles (EPA 530)	μg/L	various
UCMR4 Alcohols (EPA 541)	μg/L	various
UCMR4 Microcystins & Nodularin (EPA 544)	μg/L	various
UCMR4 Anatoxin & Cylindrospermopsin (EPA 545)	μg/L	various
UCMR4 Total Microsystin [ELISA] (EPA 546)	μg/L	0.3
UCMR4 Haloacetic Acids [HAA9] (EPA 552.3)	μg/L	various
Total Organic Carbon (SM 5310B)	mg/L	0.1
Bromide (EPA 300.1)	μg/L	10

Completed Well Required Water Quality Analyses

¹ nephelometric turbidity units

² milligrams per liter

³ micromhos per centimeter

⁴ micrograms per liter

⁵ picocuries per liter

⁶ million fibers per liter



Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Folder Comments

Results for Asbestos are submitted by Eurofins CEI in Gary SC

Analytical results for 2378-TCDD by 1613 are submitted Eurofins Lancaster Laboratories, Lancaster PA CAELAP 2792 exp 1-31-2020

Report revised to report Asbestos down to <0.2 MFL. Y.Martin 7/24/19

Flags Legend:

B4 - Target analyte detected in blank at or above method acceptance criteria. ND data is reportable and valid for compliance.

Result Comments

Odor at 60 C (TON) 201905200220: SULFUR



Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Laboratory Hits

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024 Samples Received on: 05/22/2019 1433

Analyzed	Analyte Sample ID	Result	Federal MCL	Units	MRL
	201905200220 <u>Test Well</u>				
05/24/2019 16:31	Agressiveness Index-Calculated	14		None	0.10
05/23/2019 03:51	Alkalinity in CaCO3 units	380		mg/L	20
05/29/2019 22:33	Anion Sum - Calculated	60		meq/L	0.0010
05/23/2019 18:10	Apparent Color	10	15	ACU	3.0
05/24/2019 12:38	Arsenic Total ICAP/MS	5.7	10	ug/L	1.0
05/24/2019 12:38	Barium Total ICAP/MS	130	2000	ug/L	2.0
06/11/2019 18:00	Beta, Gross	35		pCi/L	3.0
05/24/2019 16:31	Bicarb.Alkalinity as HCO3calc	460		mg/L	2.0
05/23/2019 14:57	Boron Total ICAP	0.81		mg/L	0.050
05/23/2019 14:57	Calcium Total ICAP	400		mg/L	1.0
05/24/2019 16:31	Carbon Dioxide, Free (25C)-Calc.	12		mg/L	2.0
05/23/2019 17:23	Cation Sum - Calculated	57		meq/L	0.0010
05/24/2019 23:56	Chloride	1300	250	mg/L	25
05/22/2019 23:36	Fluoride	0.27	4	mg/L	0.050
06/20/2019 17:50	Gross Alpha + adjusted error	11		pCi/L	3.0
06/20/2019 17:50	Gross Alpha by Coprecipitation	11	15	pCi/L	3.0
05/23/2019 14:57	Iron Total ICAP	0.63	0.3	mg/L	0.020
05/24/2019 16:31	Langelier Index - 25 degree	1.6		None	-14
05/24/2019 16:31	Langelier Index at 60 degrees C	2.0		None	-14
05/23/2019 14:57	Magnesium Total ICAP	100		mg/L	0.10
05/24/2019 12:38	Manganese Total ICAP/MS	1100	50	ug/L	2.0
05/22/2019 17:59	Odor at 60 C (TON)	8.0	3	TON	1.0
06/07/2019 2:30	Perfluorohexanesulfonic acid	0.0062		ug/L	0.0020
06/07/2019 2:30	Perfluorooctanesulfonic acid	0.010		ug/L	0.0020
06/07/2019 2:30	Perfluorooctanoic acid	0.0032		ug/L	0.0020
05/23/2019 03:51	PH (H3=past HT not compliant)	7.8		Units	0.10
05/24/2019 22:34	pH of CaCO3 saturation(25C)	6.2		Units	0.10
05/23/2019 17:22	pH of CaCO3 saturation(60C)	5.7		Units	0.10
05/23/2019 14:57	Potassium Total ICAP	39		mg/L	1.0
05/23/2019 03:44	Radon 222	240		pCi/L	50
05/23/2019 14:57	Silica	31		mg/L	0.50
05/23/2019 14:57	Sodium Total ICAP	620		mg/L	1.0
05/23/2019 03:51	Specific Conductance, 25 C	5500		umho/cm	10
05/22/2019 21:37	Sulfate	730	250	mg/L	5.0
05/23/2019 08:03	Surfactants	0.19	0.5	mg/L	0.10
05/28/2019 21:09	Total Dissolved Solids (TDS)	3200	500	mg/L	10



Laboratory Hits

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024 Samples Received on: 05/22/2019 1433

Analyzed	Analyte	Sample ID	Result	Federal MCL	Units	MRL
05/23/2019 17:23	Total Hardness as CaCO	3 by ICP (calc)	1400		mg/L	3.0
05/23/2019 13:46	Turbidity		5.4	5	NTU	0.10
06/27/2019 12:31	Uranium by ICPMS as pC	Si/L	14		pCi/L	0.70
06/27/2019 11:06	Uranium ICAP/MS		21	30	ug/L	1.0

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Laboratory Data

Samples Received on:

05/22/2019 1433

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
Test We	ell (20190520	0220)				Sam	pled on 05/22	/2019 051	5
		EPA 200.8	- ICPMS Metals						
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Aluminum Total ICAP/MS	ND	ug/L	20	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Antimony Total ICAP/MS	ND	ug/L	1.0	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Arsenic Total ICAP/MS	5.7	ug/L	1.0	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Barium Total ICAP/MS	130	ug/L	2.0	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Beryllium Total ICAP/MS	ND	ug/L	1.0	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Cadmium Total ICAP/MS	ND	ug/L	0.50	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Chromium Total ICAP/MS	ND	ug/L	1.0	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Copper Total ICAP/MS	ND	ug/L	2.0	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Lead Total ICAP/MS	ND	ug/L	0.50	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Manganese Total ICAP/MS	1100	ug/L	2.0	1
05/23/19	06/04/19 19:06	1173450	1176125	(EPA 200.8)	Mercury Total ICAP/MS	ND	ug/L	0.20	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Nickel Total ICAP/MS	ND	ug/L	5.0	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Selenium Total ICAP/MS	ND	ug/L	5.0	1
05/23/19	06/04/19 15:56	1173450	1175821	(EPA 200.8)	Silver Total ICAP/MS	ND	ug/L	0.50	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Thallium Total ICAP/MS	ND	ug/L	1.0	1
05/23/19	06/27/19 11:06	1173450	1180365	(EPA 200.8)	Uranium ICAP/MS	21	ug/L	1.0	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Vanadium Total ICAP/MS	ND	ug/L	3.0	1
05/23/19	05/24/19 12:38	1173450	1173831	(EPA 200.8)	Zinc Total ICAP/MS	ND	ug/L	20	1
		EPA 200.7	- ICP Metals						
05/23/19	05/23/19 14:57	1173450	1173798	(EPA 200.7)	Boron Total ICAP	0.81	mg/L	0.050	1
05/23/19	05/23/19 14:57	1173450	1173798	(EPA 200.7)	Calcium Total ICAP	400	mg/L	1.0	1
05/23/19	05/23/19 14:57	1173450	1173798	(EPA 200.7)	Iron Total ICAP	0.63	mg/L	0.020	1
05/23/19	05/23/19 14:57	1173450	1173798	(EPA 200.7)	Magnesium Total ICAP	100	mg/L	0.10	1
05/23/19	05/23/19 14:57	1173450	1173798	(EPA 200.7)	Potassium Total ICAP	39	mg/L	1.0	1
05/23/19	05/23/19 14:57	1173450	1173798	(EPA 200.7)	Silica	31	mg/L	0.50	1
05/23/19	05/23/19 14:57	1173450	1173798	(EPA 200.7)	Sodium Total ICAP	620	mg/L	1.0	1
		EPA 245.1	- Mercury Total						
05/31/19	05/31/19 16:26	1175223	1175326	(EPA 245.1)	Mercury	ND	ug/L	0.20	1
		SM2330B -	Hydroxide as O	H, Calculated					
	05/24/19 16:31			(SM2330B)	Hydroxide as OH Calculated	ND (c)	mg/L	2.0	1
		SM 2330B	- pH of CaCO3 s	•	,				
	05/23/19 17:22			(SM 2330B)	pH of CaCO3 saturation(60C)	5.7 (c)	Units	0.10	1
		EPA 200.8	- Uranium by IC	•					
	06/27/19 12:31			(EPA 200.8)	Uranium by ICPMS as pCi/L	14 (c)	pCi/L	0.70	1
		SM4500-C0	D2-D - Carbon D	ioxide,Free(25	5C)-Calc.				
Rounding on	totals after summation	1.							

Rounding on totals after summation.

Tel: (626) 386-1100

Eaton Analytical

Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Laboratory Data

Samples Received on:

05/22/2019 1433

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped Analyzed Prep Batch Analytical Batch Method Analyte Result Units MRL Dilution (SM4500-CO2-D) Carbon Dioxide, Free (25C)-Calc. 2.0 1 05/24/19 16:31 12 (c) mg/L SM 2330B - Langelier Index - 25 degree 05/24/19 16:31 Langelier Index - 25 degree -14 (SM 2330B) 1.6 (c) None 1 SM2330B - Carbonate as CO3, Calculated 05/24/19 22:34 Carbonate as CO3, Calculated ND (c) (SM2330B) mg/L 20 1 SM 2340B - Total Hardness as CaCO3 by ICP 05/23/19 17:23 Total Hardness as CaCO3 by ICP 1400 (c) 3.0 (SM 2340B) mg/L 1 (calc) SM 1030E - Anion Sum - Calculated 05/29/19 22:33 (SM 1030E) Anion Sum - Calculated 60 (c) meq/L 0.0010 1 SM 1030E - Cation Sum - Calculated 05/23/19 17:23 Cation Sum - Calculated 0.0010 (SM 1030E) 57 (c) meg/L 1 SM 2330B - pH of CaCO3 saturation(25C) 05/24/19 22:34 pH of CaCO3 saturation(25C) Units 0.10 (SM 2330B) 6.2 (c) 1 SM2330B - Bicarb.Alkalinity as HCO3,calc 05/24/19 16:31 (SM2330B) Bicarb.Alkalinity as HCO3calc 460 (c) ma/L 20 1 SM 2330 - Agressiveness Index-Calculated 05/24/19 16:31 Agressiveness Index-Calculated (SM 2330) 14 (c) None 0.10 1 SM 2330B - Langlier Index at 60 degrees C 05/24/19 16:31 (SM 2330B) Langelier Index at 60 degrees C 2.0 (c) None -14 1 SM 1030E - Cation/Anion Difference 05/30/19 22:33 (SM 1030E) Cation/Anion Difference 2.7 (c) % 1 EPA 505 - Organochlorine Pesticides/PCBs 05/29/19 22:08 1174471 1175303 ND 0.10 05/29/19 (EPA 505) Alachlor (Alanex) ug/L 1 05/29/19 05/29/19 22:08 1174471 1175303 Aldrin ND ug/L 0.010 1 (EPA 505) 1175303 05/29/19 05/29/19 22:08 1174471 Chlordane ND ug/L 0.10 1 (EPA 505) 05/29/19 05/29/19 22:08 1174471 1175303 (EPA 505) Dieldrin ND ug/L 0.0100 1 05/29/19 05/29/19 22:08 1174471 1175303 (EPA 505) Endrin ND ug/L 0.010 1 1175303 Heptachlor ND 0.010 05/29/19 05/29/19 22:08 1174471 (EPA 505) ug/L 1 05/29/19 05/29/19 22:08 1175303 Heptachlor Epoxide ND 0.010 1174471 ug/L 1 (EPA 505) 05/29/19 05/29/19 22:08 1174471 1175303 Lindane (gamma-BHC) ND 0.010 ug/L 1 (EPA 505) 05/29/19 05/29/19 22:08 1174471 1175303 (EPA 505) Methoxychlor ND ug/L 0.050 1 05/29/19 05/29/19 22:08 1174471 1175303 PCB 1016 Aroclor ND 0.080 (EPA 505) ug/L 1 05/29/19 05/29/19 22:08 1174471 1175303 (EPA 505) PCB 1221 Aroclor ND ug/L 0.10 1 05/29/19 05/29/19 22:08 1174471 1175303 PCB 1232 Aroclor ND 0.10 (EPA 505) ug/L 1 1175303 ND ug/L 05/29/19 05/29/19 22:08 1174471 PCB 1242 Aroclor 0.10 (EPA 505) 1 05/29/19 05/29/19 22:08 1174471 1175303 PCB 1248 Aroclor ND ug/L 0.10 1 (EPA 505) 05/29/19 05/29/19 22:08 1174471 PCB 1254 Aroclor ND 1175303 (EPA 505) ug/L 0.10 1

Rounding on totals after summation.

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David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
05/29/19	05/29/19 22:08	1174471	1175303	(EPA 505)	PCB 1260 Aroclor	ND	ug/L	0.10	1
05/29/19	05/29/19 22:08	1174471	1175303	(EPA 505)	Total PCBs	ND	ug/L	0.10	1
05/29/19	05/29/19 22:08	1174471	1175303	(EPA 505)	Toxaphene	ND	ug/L	0.50	1
05/29/19	05/29/19 22:08	1174471	1175303	(EPA 505)	Tetrachlorometaxylene	83	%		1
		EPA 515.4	- Chloropheno	y Herbicides					
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	2,4,5-T	ND	ug/L	0.20	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	2,4,5-TP (Silvex)	ND	ug/L	0.20	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	2,4-D	ND	ug/L	0.10	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	2,4-DB	ND	ug/L	2.0	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	3,5-Dichlorobenzoic acid	ND	ug/L	0.50	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	Acifluorfen	ND	ug/L	0.20	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	Bentazon	ND	ug/L	0.50	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	Dalapon	ND	ug/L	1.0	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	Dicamba	ND	ug/L	0.10	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	Dichlorprop	ND	ug/L	0.50	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	Dinoseb	ND	ug/L	0.20	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	Pentachlorophenol	ND	ug/L	0.040	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	Picloram	ND	ug/L	0.10	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	Tot DCPA Mono&Diacid Degradate	ND	ug/L	0.10	1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	2,4-Dichlorophenyl acetic acid	114	%		1
06/05/19	06/07/19 15:24	1175936	1176585	(EPA 515.4)	4,4-Dibromooctafluorobiphenyl	102	%		1
		EPA 504.1	- EPA Method 5	504.1					
06/04/19	06/04/19 19:04	1175496	1175953	(EPA 504.1)	Dibromochloropropane (DBCP)	ND	ug/L	0.010	1
06/04/19	06/04/19 19:04	1175496	1175953	(EPA 504.1)	Ethylene Dibromide (EDB)	ND	ug/L	0.010	1
06/04/19	06/04/19 19:04	1175496	1175953	(EPA 504.1)	1,2-Dibromopropane	97	%		1
		EPA 525.2	- Semivolatiles	by GCMS					
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	2,4-DDD	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	2,4-DDE	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	2,4-DDT	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	2,4-Dinitrotoluene	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	2,6-Dinitrotoluene	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	4,4-DDD	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	4,4-DDE	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	4,4-DDT	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Acenaphthene	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Acenaphthylene	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Acetochlor	ND	ug/L	0.10	1

Rounding on totals after summation.



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05/22/2019 1433

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Alachlor	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Aldrin	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Alpha-BHC	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	alpha-Chlordane	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Anthracene	ND	ug/L	0.020	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Atrazine	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Benz(a)Anthracene	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Benzo(a)pyrene	ND	ug/L	0.020	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Benzo(b)Fluoranthene	ND	ug/L	0.020	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Benzo(g,h,i)Perylene	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Benzo(k)Fluoranthene	ND	ug/L	0.020	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Beta-BHC	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Bromacil	ND	ug/L	0.20	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Butachlor	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Butylbenzylphthalate	ND	ug/L	0.50	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Caffeine by method 525mod	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Chlorobenzilate	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Chloroneb	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Chlorothalonil(Draconil,Bravo)	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Chlorpyrifos (Dursban)	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Chrysene	ND	ug/L	0.020	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Delta-BHC	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Di-(2-Ethylhexyl)adipate	ND	ug/L	0.60	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Di(2-Ethylhexyl)phthalate	ND	ug/L	0.60	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Diazinon (Qualitative)	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Dibenz(a,h)Anthracene	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Dichlorvos (DDVP)	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Dieldrin	ND	ug/L	0.20	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Diethylphthalate	ND	ug/L	0.50	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Dimethoate	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Dimethylphthalate	ND	ug/L	0.50	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Di-n-Butylphthalate	ND	ug/L	1.0	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Di-N-octylphthalate	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Endosulfan I (Alpha)	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Endosulfan II (Beta)	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Endosulfan Sulfate	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Endrin	ND	ug/L	0.20	1

Rounding on totals after summation.



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Samples Received on:

05/22/2019 1433

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Endrin Aldehyde	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	EPTC	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Fluoranthene	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Fluorene	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	gamma-Chlordane	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Heptachlor	ND	ug/L	0.040	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Heptachlor Epoxide (isomer B)	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Hexachlorobenzene	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Hexachlorocyclopentadiene	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Indeno(1,2,3,c,d)Pyrene	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Isophorone	ND	ug/L	0.50	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Lindane	ND	ug/L	0.040	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Malathion	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Methoxychlor	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Metolachlor	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Metribuzin	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Molinate	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Naphthalene	ND	ug/L	0.30	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Parathion	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Pendimethalin	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Permethrin (mixed isomers)	ND	ug/L	0.20	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Phenanthrene	ND	ug/L	0.040	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Propachlor	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Pyrene	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Simazine	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Terbacil	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Terbuthylazine	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Thiobencarb (ELAP)	ND	ug/L	0.20	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	trans-Nonachlor	ND	ug/L	0.050	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Trifluralin	ND	ug/L	0.10	1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	1,3-Dimethyl-2-nitrobenzene	97	%		1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Acenaphthene-d10	92	%		1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Chrysene-d12	96	%		1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Perylene-d12	92	%		1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Phenanthrene-d10	99	%		1
06/05/19	06/12/19 12:20	1176017	1177380	(EPA 525.2)	Triphenylphosphate	108	%		1
			Endothall						

EPA 548.1 - Endothall

Rounding on totals after summation.

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

Samples Received on:

05/22/2019 1433

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
05/28/19	05/31/19 8:18	1174382	1174900	(EPA 548.1)	Endothall	ND	ug/L	40	8
		EPA 547 - 0	Glyphosate						
	05/29/19 0:52		1174458	(EPA 547)	Glyphosate	ND	ug/L	6.0	1
		EPA 531.2	- Aldicarbs						
	06/04/19 04:12		1175661	(EPA 531.2)	3-Hydroxycarbofuran	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	Aldicarb (Temik)	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	Aldicarb sulfone	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	Aldicarb sulfoxide	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	Baygon	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	Carbaryl	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	Carbofuran (Furadan)	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	Methiocarb	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	Methomyl	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	Oxamyl (Vydate)	ND	ug/L	0.50	1
	06/04/19 04:12		1175661	(EPA 531.2)	4-Bromo-3,5-dimethylphenyl-N-methylc arbamate	104	%		1
		EPA 549.2	- Diquat and Pa	raquat					
05/28/19	05/29/19 18:49	1174432	1174443	(EPA 549.2)	Diquat	ND	ug/L	0.40	1
05/28/19	05/29/19 18:49	1174432	1174443	(EPA 549.2)	Paraquat	ND	ug/L	2.0	1
		EPA 300.0	- Nitrate, Nitrite	by EPA 300.0					
	05/22/19 21:37		1173588	(EPA 300.0)	Nitrate as Nitrogen by IC	ND	mg/L	0.12	10
	05/22/19 21:37		1173588	(EPA 300.0)	Nitrate as NO3 (calc)	ND	mg/L	0.55	10
		EPA 300.0	- Chloride, Sulf	ate by EPA 30	0.0				
	05/24/19 23:56		1174171	(EPA 300.0)	Chloride	1300	mg/L	25	50
	05/22/19 21:37		1173590	(EPA 300.0)	Sulfate	730	mg/L	5.0	10
		EPA 218.6	- Hexavalent Cl	nromium by 21	8.6				
	05/30/19 00:18		1174776	(EPA 218.6)	Hexavalent Chromium by 218.6	ND	ug/L	0.020	1
		EPA 331.0	- Perchlorate by	y LCMS					
	05/28/19 17:39		1174578	(EPA 331.0)	Perchlorate	ND	ng/L	50	1
	05/28/19 17:39		1174578	(EPA 331.0)	Oxygen Enriched Perchlorate	127	%		1
		EPA 537 - I	Perfluorinated A	Alkyl Acids EP	A 537 rev 1.1				
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	N-ethyl Perfluorooctanesulfonamidoacetic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	N-methyl Perfluorooctanesulfonamidoacetic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorobutanesulfonic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorodecanoic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorododecanoic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluoroheptanoic acid	ND	ug/L	0.0020	1

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Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorohexanesulfonic acid	0.0062	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorohexanoic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorononanoic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorooctanesulfonic acid	0.010	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorooctanoic acid	0.0032	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorotetradecanoic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluorotridecanoic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	Perfluoroundecanoic acid	ND	ug/L	0.0020	1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	13C-PFDA	79	%		1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	13C-PFHxA	87	%		1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	13C-PFOA	115	%		1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	13C-PFOS	97	%		1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	d3-NMeFOSAA	89	%		1
06/03/19	06/07/19 2:30	1175545	1177011	(EPA 537)	d5-NEtFOSAA	97	%		1
		SM 7500RM	N - Radon 222						
	05/23/19 03:44		1173888	(SM 7500RN)	Radon 222	240	pCi/L	50	1
	05/23/19 03:44		1173888	(SM 7500RN)	Radon 222, Two Sigma Error	12	pCi/L		1
		EPA 900.0	- Gross Alpha/	Beta Radiation	l i i i i i i i i i i i i i i i i i i i				
05/29/19	06/11/19 18:00	1174743	1177411	(EPA 900.0)	Beta, Gross	35	pCi/L	3.0	1
05/29/19	06/11/19 18:00	1174743	1177411	(EPA 900.0)	Beta, Min Detectable Activity	8	pCi/L		1
05/29/19	06/11/19 18:00	1174743	1177411	(EPA 900.0)	Beta, Two Sigma Error	2.8	pCi/L		1
		SM 7110C	- Gross Alpha	by Co-precipita	ation				
06/07/19	06/20/19 17:50	1176539	1180088	(SM 7110C)	Alpha, Min Detectable Activity	0.2	pCi/L		1
06/07/19	06/20/19 17:50	1176539	1180088	(SM 7110C)	Alpha, Two Sigma Error	0.46	pCi/L		1
06/07/19	06/20/19 17:50	1176539	1180088	(SM 7110C)	Gross Alpha + adjusted error	11	pCi/L	3.0	1
06/07/19	06/20/19 17:50	1176539	1180088	(SM 7110C)	Gross Alpha by Coprecipitation	11	pCi/L	3.0	1
		EPA 353.2	- Nitrite Nitrog	en by RFA					
	05/23/19 09:24		1173653	(EPA 353.2)	Nitrite Nitrogen by RFA	ND	mg/L	0.010	1
			 Cyanide by m 	nanual distillati	on				
06/05/19	06/05/19 12:09	1175983	1175985	(EPA 335.4)	Cyanide by manual distillation	ND (B4)	mg/L	0.0050	1
		EPA 1613B	8 - 2,3,7,8-TCDE)					
06/06/19	06/07/19 08:36			(EPA 1613B)	2,3,7,8-TCDD	ND (ND)	pg/L	3.9	1
		EPA 100.2	- Asbestos						
	06/04/19 00:00			(EPA 100.2)	Asbestos	<0.20	MFL	0.2	1
0.5.000111			- Volatile Orga	•				a	
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1,1,2-Tetrachloroethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1,1-Trichloroethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1,2,2-Tetrachloroethane	ND	ug/L	0.50	1
	1-1-1 ft								

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Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1,2-Trichloroethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1-Dichloroethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1-Dichloroethylene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1-Dichloropropene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2,3-Trichlorobenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2,3-Trichloropropane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2,4-Trichlorobenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2,4-Trimethylbenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2-Dichloroethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2-Dichloropropane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,3,5-Trimethylbenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,3-Dichloropropane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	2,2-Dichloropropane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	2-Butanone (MEK)	ND	ug/L	5.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	4-Methyl-2-Pentanone (MIBK)	ND	ug/L	5.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Benzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromobenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromochloromethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromodichloromethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromoethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromoform	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromomethane (Methyl Bromide)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Carbon disulfide	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Carbon Tetrachloride	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chlorobenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chlorodibromomethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chloroethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chloroform (Trichloromethane)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chloromethane(Methyl Chloride)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	cis-1,2-Dichloroethylene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	cis-1,3-Dichloropropene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Dibromomethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Dichlorodifluoromethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Dichloromethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Di-isopropyl ether	ND	ug/L	3.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Ethyl benzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Hexachlorobutadiene	ND	ug/L	0.50	1

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Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Isopropylbenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	m,p-Xylenes	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	m-Dichlorobenzene (1,3-DCB)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Methyl Tert-butyl ether (MTBE)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Naphthalene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	n-Butylbenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	n-Propylbenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	o-Chlorotoluene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	o-Dichlorobenzene (1,2-DCB)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	o-Xylene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	p-Chlorotoluene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	p-Dichlorobenzene (1,4-DCB)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	p-Isopropyltoluene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	sec-Butylbenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Styrene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	tert-amyl Methyl Ether	ND	ug/L	3.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	tert-Butyl Ethyl Ether	ND	ug/L	3.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	tert-Butylbenzene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Tetrachloroethylene (PCE)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Toluene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Total 1,3-Dichloropropene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Total THM	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Total xylenes	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	trans-1,2-Dichloroethylene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	trans-1,3-Dichloropropene	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Trichloroethylene (TCE)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Trichlorofluoromethane	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Trichlorotrifluoroethane(Freon 113)	ND	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Vinyl chloride (VC)	ND	ug/L	0.30	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2-Dichloroethane-d4	99	%		1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	4-Bromofluorobenzene	97	%		1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Toluene-d8	96	%		1
		CASRL 524	4M-TCP - 1,2,3	-Trichloropropar	ne (SIM)				
05/23/19	05/23/19 15:44	1173899	1173900	(CASRL 524M-TCP)	1,2,3-Trichloropropane	ND	ug/L	0.00500	1
05/23/19	05/23/19 15:44	1173899	1173900	(CASRL 524M-TCP)	Toluene-d8	94	%		1
		SM 2150B ·	- Odor at 60 C	(TON)					
	05/22/19 17:59		1173647	(SM 2150B)	Odor at 60 C (TON)	8.0	TON	1.0	1

Rounding on totals after summation.



Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Samples Received on: 05/22/2019 1433

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
		SM 4500F-	C - Fluoride						
	05/22/19 23:36		1173613	(SM 4500F-C)	Fluoride	0.27	mg/L	0.050	1
		SM 2320B	 Alkalinity in C 	aCO3 units					
	05/23/19 03:51		1173608	(SM 2320B)	Alkalinity in CaCO3 units	380	mg/L	20	1
				issolved Solids	()				
05/28/19	05/28/19 21:09	1174137		(E160.1/SM2540C)		3200	mg/L	10	1
		SM4500-HI	• •	t HT not compli					
	05/23/19 03:51		1173609	(SM4500-HB)	PH (H3=past HT not compliant)	7.8	Units	0.10	1
	05/23/19 08:03	SM 5540C/	EPA 425.1 - Su 1173939	rfactants (SM 5540C/EPA 425.1)	Surfactants	0.19	mg/L	0.10	1
		EPA 180.1	- Turbidity	,					
	05/23/19 13:46		1173754	(EPA 180.1)	Turbidity	5.4	NTU	0.10	1
		SM2510B -	Specific Cond	uctance					
	05/23/19 03:51		1173610	(SM2510B)	Specific Conductance, 25 C	5500	umho/cm	10	1
		SM 2120B	- Apparent Cold	or					
	05/23/19 18:10		1173910	(SM 2120B)	Apparent Color	10	ACU	3.0	1
Travel I	Blank - HOLD	(20190520	<u>0221)</u>			Sam	pled on 05/22/2	019 051	5
		EPA 504.1	- EPA Method {	504.1					
06/03/19	06/03/19 20:20	1175497	1175671	(EPA 504.1)	Dibromochloropropane (DBCP)	ND	ug/L	0.010	1
06/03/19	06/03/19 20:20	1175497	1175671	(EPA 504.1)	Ethylene Dibromide (EDB)	ND	ug/L	0.010	1
06/03/19	06/03/19 20:20	1175497	1175671	(EPA 504.1)	1,2-Dibromopropane	97	%		1
		EPA 524.2	- Volatile Organ	nics by GCMS					
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1,1,2-Tetrachloroethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1,1-Trichloroethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1,2,2-Tetrachloroethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1,2-Trichloroethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1-Dichloroethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1-Dichloroethylene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,1-Dichloropropene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2,3-Trichlorobenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2,3-Trichloropropane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2,4-Trichlorobenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2,4-Trimethylbenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2-Dichloroethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2-Dichloropropane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,3,5-Trimethylbenzene	NA	ug/L	0.50	1

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05/22/2019 1433

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,3-Dichloropropane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	2,2-Dichloropropane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	2-Butanone (MEK)	NA	ug/L	5.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	4-Methyl-2-Pentanone (MIBK)	NA	ug/L	5.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Benzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromobenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromochloromethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromodichloromethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromoethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromoform	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Bromomethane (Methyl Bromide)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Carbon disulfide	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Carbon Tetrachloride	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chlorobenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chlorodibromomethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chloroethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chloroform (Trichloromethane)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Chloromethane(Methyl Chloride)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	cis-1,2-Dichloroethylene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	cis-1,3-Dichloropropene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Dibromomethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Dichlorodifluoromethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Dichloromethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Di-isopropyl ether	NA	ug/L	3.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Ethyl benzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Hexachlorobutadiene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Isopropylbenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	m,p-Xylenes	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	m-Dichlorobenzene (1,3-DCB)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Methyl Tert-butyl ether (MTBE)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Naphthalene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	n-Butylbenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	n-Propylbenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	o-Chlorotoluene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	o-Dichlorobenzene (1,2-DCB)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	o-Xylene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	p-Chlorotoluene	NA	ug/L	0.50	1

Rounding on totals after summation.



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David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	n Method	Analyte	Result	Units	MRL	Dilution
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	p-Dichlorobenzene (1,4-DCB)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	p-Isopropyltoluene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	sec-Butylbenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Styrene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	tert-amyl Methyl Ether	NA	ug/L	3.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	tert-Butyl Ethyl Ether	NA	ug/L	3.0	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	tert-Butylbenzene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Tetrachloroethylene (PCE)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Toluene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Total 1,3-Dichloropropene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Total THM	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Total xylenes	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	trans-1,2-Dichloroethylene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	trans-1,3-Dichloropropene	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Trichloroethylene (TCE)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Trichlorofluoromethane	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Trichlorotrifluoroethane(Freon 113)	NA	ug/L	0.50	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Vinyl chloride (VC)	NA	ug/L	0.30	1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	1,2-Dichloroethane-d4	NA	%		1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	4-Bromofluorobenzene	NA	%		1
05/28/19	05/28/19 23:22	1174664	1174669	(EPA 524.2)	Toluene-d8	NA	%		1
				3-Trichloropropar					
05/23/19		1173899	1173900		1,2,3-Trichloropropane	NA	ug/L	0.00500	
05/23/19	05/23/19 15:44	1173899	1173900	(CASRL 524M-TCP)	Toluene-d8	NA	%		1
Field B	lank (2019052	<u>:00221) (201</u>	<u>1905230398)</u>			Sam	pled on 05/22/	2019 0515	
		EPA 537 - I	Perfluorinated	d Alkyl Acids EPA	537 rev 1.1				
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	N-ethyl Perfluorooctanesulfonamidoacetic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	N-methyl Perfluorooctanesulfonamidoacetic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorobutanesulfonic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorodecanoic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorododecanoic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluoroheptanoic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorohexanesulfonic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorohexanoic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorononanoic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorooctanesulfonic acid	ND	ug/L	0.0020	1

Rounding on totals after summation.



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David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorooctanoic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorotetradecanoic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluorotridecanoic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	Perfluoroundecanoic acid	ND	ug/L	0.0020	1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	13C-PFDA	100	%		1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	13C-PFHxA	114	%		1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	13C-PFOA	115	%		1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	13C-PFOS	106	%		1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	d3-NMeFOSAA	104	%		1
06/04/19	06/07/19 22:01	1175640	1177054	(EPA 537)	d5-NEtFOSAA	100	%		1

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Laboratory QC Summary

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

Nitrate, Nitrite by EPA 300.0		
Analytical Batch: 1173588		Analysis Date: 05/22/2019
201905200220	Test Well	Analyzed by: TR7W
Chloride, Sulfate by EPA 300.0		
Analytical Batch: 1173590		Analysis Date: 05/22/2019
201905200220	Test Well	Analyzed by: TR7W
Alkalinity in CaCO3 units		
Analytical Batch: 1173608		Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: BM2O
PH (H3=past HT not compliant)		
Analytical Batch: 1173609		Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: BM2O
Specific Conductance		
Analytical Batch: 1173610		Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: BM2O
Fluoride		
Analytical Batch: 1173613		Analysis Date: 05/22/2019
201905200220	Test Well	Analyzed by: BM2O
Odor at 60 C (TON)		
Analytical Batch: 1173647		Analysis Date: 05/22/2019
201905200220	Test Well	Analyzed by: AP6M
Nitrite Nitrogen by RFA		
Analytical Batch: 1173653		Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: H5VG
Turbidity		
Analytical Batch: 1173754		Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: T4ZB
ICP Metals		
Prep Batch: 1173450 Ana	lytical Batch: 1173798	Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: 6Q4
ICPMS Metals		
Prep Batch: 1173450 Ana	lytical Batch: 1173831	Analysis Date: 05/24/2019
201905200220	Test Well	Analyzed by: LUPE
Radon 222		
Analytical Batch: 1173888		Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: EAE5
1,2,3-Trichloropropane (SIM)		
Prep Batch: 1173899 Ana	lytical Batch: 1173900	Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: TG9W



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David C. McCollum Water Treatment Plant

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David O. Meeoliani We		
201905200221	Travel Blank - HOLD	Analyzed by: TG9W
Apparent Color		
Analytical Batch: 1173	910	Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: AP6M
Surfactants		
Analytical Batch: 1173	939	Analysis Date: 05/23/2019
201905200220	Test Well	Analyzed by: K4TY
Chloride, Sulfate by EPA 30	00.0	
Analytical Batch: 1174	171	Analysis Date: 05/24/2019
201905200220	Test Well	Analyzed by: TR7W
Diquat and Paraquat		
Prep Batch: 1174432	Analytical Batch: 1174443	Analysis Date: 05/29/2019
201905200220	Test Well	Analyzed by: XWO
Glyphosate		
Analytical Batch: 1174	458	Analysis Date: 05/29/2019
201905200220	Test Well	Analyzed by: DYM
Total Dissolved Solids (TD	S)	
Prep Batch: 1174137	Analytical Batch: 1174483	Analysis Date: 05/28/2019
201905200220	Test Well	Analyzed by: TJ52
Perchlorate by LCMS		
Analytical Batch: 1174	578	Analysis Date: 05/28/2019
201905200220	Test Well	Analyzed by: PHK
Volatile Organics by GCMS	;	
Prep Batch: 1174664	Analytical Batch: 1174669	Analysis Date: 05/28/2019
201905200220	Test Well	Analyzed by: TG9W
201905200221	Travel Blank - HOLD	Analyzed by: TG9W
Hexavalent Chromium by 2		
Analytical Batch: 1174		Analysis Date: 05/30/2019
201905200220	Test Well	Analyzed by: TLH
Glyphosphate by LCMS		
Analytical Batch: 1174	843	Analysis Date: 05/30/2019
201905200220	Test Well	Analyzed by: SZZ
DIQUAT-LOW 0.1ppb		
Prep Batch: 1173964	Analytical Batch: 1174886	Analysis Date: 05/29/2019
201905200220	Test Well	Analyzed by: XWO
Endothal_LOW-LCMS		
Analytical Batch: 1174	892	Analysis Date: 05/29/2019
201905200220	Test Well	Analyzed by: SZZ

David C. McCollum Water Treatment Plant

Endothall

Prep Batch: 1174382 Analytical Batch: 1174900 201905200220 Test Well **Organochlorine Pesticides/PCBs** Prep Batch: 1174471 Analytical Batch: 1175303 201905200220 Test Well Mercury Total Prep Batch: 1175223 Analytical Batch: 1175326 201905200220 Test Well Aldicarbs Analytical Batch: 1175661 201905200220 Test Well EPA Method 504.1 Prep Batch: 1175497 Analytical Batch: 1175671 201905200221 Travel Blank - HOLD **ICPMS Metals** Prep Batch: 1173450 Analytical Batch: 1175821 201905200220 Test Well EPA Method 504.1 Prep Batch: 1175496 Analytical Batch: 1175953 201905200220 Test Well Cyanide by manual distillation Prep Batch: 1175983 Analytical Batch: 1175985 201905200220 Test Well **ICPMS Metals** Prep Batch: 1173450 Analytical Batch: 1176125 201905200220 Test Well **Chlorophenoxy Herbicides** Prep Batch: 1175936 Analytical Batch: 1176585 201905200220 Test Well Perfluorinated Alkyl Acids EPA 537 rev 1.1 Prep Batch: 1175545 Analytical Batch: 1177011 201905200220 Test Well Perfluorinated Alkyl Acids EPA 537 rev 1.1 Prep Batch: 1175640 Analytical Batch: 1177054 201905230398 Field Blank (201905200221) Semivolatiles by GCMS Prep Batch: 1176017 Analytical Batch: 1177380 201905200220 Test Well

Report: 806101 Project: SPECIAL Group: desal pilot

> Analysis Date: 05/31/2019 Analyzed by: X8AA

Analysis Date: 05/29/2019 Analyzed by: LRL

Analysis Date: 05/31/2019 Analyzed by: AZS

Analysis Date: 06/04/2019 Analyzed by: XWO

Analysis Date: 06/03/2019 Analyzed by: DYM

Analysis Date: 06/04/2019 Analyzed by: NINA

Analysis Date: 06/04/2019 Analyzed by: DYM

Analysis Date: 06/05/2019 Analyzed by: H5VG

Analysis Date: 06/04/2019 Analyzed by: AZS

Analysis Date: 06/07/2019 Analyzed by: A4H

Analysis Date: 06/07/2019 Analyzed by: KAM

Analysis Date: 06/07/2019 Analyzed by: KAM

Analysis Date: 06/12/2019 Analyzed by: KDT



David C. McCollum Water Treatment Plant

Gross Alpha/Beta Radiation

Prep Batch: 1174743Analytical Batch: 1177411201905200220Test WellGross Alpha by Co-precipitation
Prep Batch: 1176539Analytical Batch: 1180088201905200220Test WellICPMS MetalsICPMS Metals

Prep Batch: 1173450 Analytical Batch: 1180365

201905200220

Test Well

Laboratory QC Summary

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> Analysis Date: 06/11/2019 Analyzed by: EAE5

Analysis Date: 06/20/2019 Analyzed by: EAE5

Analysis Date: 06/27/2019 Analyzed by: LUPE



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David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
Nitrate, Nitrite by E	EPA 300.0 by EPA 300.0								
Analytical Ba	atch: 1173588					An	alysis Date:	05/22/2019	
LCS1	Nitrate as Nitrogen by IC		2.5	2.63	mg/L	105	(90-110)		
LCS2	Nitrate as Nitrogen by IC		2.5	2.63	mg/L	105	(90-110)	20	0.0
MBLK	Nitrate as Nitrogen by IC			<0.05	mg/L				
MRL_CHK	Nitrate as Nitrogen by IC		0.05	0.0517	mg/L	103	(50-150)		
MRLLW	Nitrate as Nitrogen by IC		0.013	0.0133	mg/L	106	(50-150)		
MS_201812290130	Nitrate as Nitrogen by IC	0.92	13	14.2	mg/L	106	(80-120)		
MS_201905200220	Nitrate as Nitrogen by IC	ND	13	13.4	mg/L	107	(80-120)		
MSD_201812290130	Nitrate as Nitrogen by IC	0.92	13	14.1	mg/L	106	(80-120)	20	0.75
MSD_201905200220	Nitrate as Nitrogen by IC	ND	13	13.5	mg/L	108	(80-120)	20	0.91
Chloride, Sulfate b	oy EPA 300.0 by EPA 300.0								
Analytical Ba	atch: 1173590					An	alysis Date:	05/22/2019	
LCS1	Chloride		25	26.1	mg/L	104	(90-110)		
LCS2	Chloride		25	26.2	mg/L	105	(90-110)	20	0.38
MBLK	Chloride			<0.25	mg/L				
MRL_CHK	Chloride		0.5	0.450	mg/L	90	(50-150)		
MS_201905200220	Chloride		13	ND	mg/L	<u>55</u>	(80-120)		
MS_201812290130	Chloride	210	130	349	mg/L	108	(80-120)		
MSD_201812290130	Chloride	210	130	346	mg/L	105	(80-120)	20	0.89
MSD_201905200220	Chloride		13	ND	mg/L	<u>60</u>	(80-120)	20	0.73
LCS1	Sulfate		50	52.3	mg/L	105	(90-110)		
LCS2	Sulfate		50	52.4	mg/L	105	(90-110)	20	0.19
MBLK	Sulfate			<0.125	mg/L				
MRL_CHK	Sulfate		1	0.994	mg/L	99	(50-150)		
MRLLW	Sulfate		0.25	0.269	mg/L	108	(50-150)		
MS_201905200220	Sulfate	730	250	977	mg/L	100	(80-120)		
MS_201812290130	Sulfate	370	250	635	mg/L	108	(80-120)		
MSD_201812290130	Sulfate	370	250	630	mg/L	105	(80-120)	20	0.81
MSD_201905200220	Sulfate	730	250	983	mg/L	102	(80-120)	20	0.65
Alkalinity in CaCO	3 units by SM 2320B								
Analytical Ba	atch: 1173608					An	alysis Date:	05/23/2019	
LCS1	Alkalinity in CaCO3 units		100	98.8	mg/L	99	(90-110)		
LCS2	Alkalinity in CaCO3 units		100	98.6	mg/L	99	(90-110)	20	0.20
MBLK	Alkalinity in CaCO3 units			<1	mg/L				
MRLHI	Alkalinity in CaCO3 units		20	20.1	mg/L	101	(50-150)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MS_201905220100	Alkalinity in CaCO3 units	270	100	349	mg/L	81	(80-120)		
MS_201904101009	Alkalinity in CaCO3 units	270	100	356	mg/L	83	(80-120)		
MSD_201905220100	Alkalinity in CaCO3 units	270	100	347	mg/L	<u>79</u>	(80-120)	20	0.67
MSD_201904101009	Alkalinity in CaCO3 units	270	100	352	mg/L	80	(80-120)	20	1.0
PH (H3=past HT no	ot compliant) by SM4500-HB								
Analytical Ba	atch: 1173609					An	alysis Date	: 05/23/2019	
DUP_201905220100	PH (H3=past HT not compliant)	8.1		8.07	Units		(0-20)	20	0.12
DUP_201904101009	PH (H3=past HT not compliant)	7.6		7.64	Units		(0-20)	20	0.13
LCS1	PH (H3=past HT not compliant)		6	5.97	Units	100	(98-102)		
LCS2	PH (H3=past HT not compliant)		6	5.97	Units	100	(98-102)	20	0.0
Specific Conducta	nce by SM2510B								
Analytical Ba	atch: 1173610					An	alysis Date	: 05/23/2019	
DUP1_201904101009	Specific Conductance	1600		1580	umho/cm		(0-20)	20	0.68
DUP1_201905240347	Specific Conductance	660		665	umho/cm		(0-20)	20	0.26
LCS1	Specific Conductance		1000	990	umho/cm	99	(95-105)		
LCS2	Specific Conductance		1000	984	umho/cm	99	(95-105)	20	0.51
MBLK	Specific Conductance			<1	umho/cm				
MRL_CHK	Specific Conductance		1.8	2.00	umho/cm	112	(50-150)		
MRLHI	Specific Conductance		10	10.4	umho/cm	104	(50-150)		
Fluoride by SM 45	00F-C								
Analytical Ba	atch: 1173613					An	alysis Date	: 05/22/2019	
LCS1	Fluoride		1	0.994	mg/L	100	(90-110)		
LCS2	Fluoride		1	0.981	mg/L	98	(90-110)	20	1.4
MBLK	Fluoride			<0.025	mg/L				
MRL_CHK	Fluoride		0.05	0.0488	mg/L	98	(50-150)		
MS_201905210695	Fluoride	0.32	1	1.31	mg/L	99	(80-120)		
MSD_201905210695	Fluoride	0.32	1	1.31	mg/L	99	(80-120)	20	0.37
Odor at 60 C (TON) by SM 2150B								
Analytical Ba	atch: 1173647					An	alysis Date	: 05/22/2019	
DUP1_201905220800	Odor at 60 C (TON)	ND		ND	TON		(0-20)		
MBLK	Odor at 60 C (TON)			<1	TON				
Nitrite Nitrogen by	RFA by EPA 353.2								
	atch: 1173653					An	alysis Date	: 05/23/2019	
LCS1	Nitrite Nitrogen by RFA		0.1	0.0914	mg/L	91	(90-110)		
LCS2	Nitrite Nitrogen by RFA		0.1	0.0936	mg/L	94	(90-110)	20	2.4
Spiko rocovoru je alroadu correc	stad for notive requilte								

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	Nitrite Nitrogen by RFA			<0.0049	mg/L				
MRL_CHK	Nitrite Nitrogen by RFA		0.01	0.00800	mg/L	80	(50-150)		
MS_201905200220	Nitrite Nitrogen by RFA	ND	0.1	0.0935	mg/L	94	(90-110)		
MSD_201905200220	Nitrite Nitrogen by RFA	ND	0.1	0.0931	mg/L	93	(90-110)	20	0.43
Turbidity by EPA 1	80.1								
Analytical Ba	atch: 1173754					An	alysis Date:	05/23/2019	
DUP1_201905220022	Turbidity	ND		0.0500	NTU		(0-20)	20	4.1
DUP2_201905200220	Turbidity	5.4		5.63	NTU		(0-20)	20	4.0
LCS1	Turbidity		20	20.1	NTU	101	(90-110)		
LCS2	Turbidity		20	20.7	NTU	103	(90-110)	20	2.9
MBLK	Turbidity			<0.10	NTU				
MRLHI	Turbidity		0.1	0.0730	NTU	73	(50-150)		
ICP Metals by EPA	200.7								
Analytical Ba	atch: 1173798					An	alysis Date:	05/23/2019	
LCS1	Boron Total ICAP		0.5	0.490	mg/L	98	(85-115)		
LCS2	Boron Total ICAP		0.5	0.488	mg/L	98	(85-115)	20	0.41
MBLK	Boron Total ICAP			<0.025	mg/L				
MRL_CHK	Boron Total ICAP		0.05	0.0494	mg/L	99	(50-150)		
MS_201905220423	Boron Total ICAP	0.08	0.5	0.561	mg/L	96	(70-130)		
MS2_201905220561	Boron Total ICAP	0.070	0.5	0.579	mg/L	102	(70-130)		
MSD_201905220423	Boron Total ICAP	0.08	0.5	0.575	mg/L	99	(70-130)	20	2.4
MSD2_201905220561	Boron Total ICAP	0.070	0.5	0.574	mg/L	101	(70-130)	20	0.95
LCS1	Calcium Total ICAP		50	49.8	mg/L	100	(85-115)		
LCS2	Calcium Total ICAP		50	49.8	mg/L	100	(85-115)	20	0.0
MBLK	Calcium Total ICAP			<0.5	mg/L				
MRL_CHK	Calcium Total ICAP		1	1.01	mg/L	101	(50-150)		
MS_201905220423	Calcium Total ICAP	47	50	94.9	mg/L	96	(70-130)		
MS2_201905220561	Calcium Total ICAP	56	50	101	mg/L	90	(70-130)		
MSD_201905220423	Calcium Total ICAP	47	50	95.5	mg/L	97	(70-130)	20	0.67
MSD2_201905220561	Calcium Total ICAP	56	50	100	mg/L	89	(70-130)	20	0.89
LCS1	Iron Total ICAP		5	5.00	mg/L	100	(85-115)		
LCS2	Iron Total ICAP		5	5.00	mg/L	100	(85-115)	20	0.0
MBLK	Iron Total ICAP			<0.01	mg/L				
MRL_CHK	Iron Total ICAP		0.02	0.0209	mg/L	104	(50-150)		
MS_201905220423	Iron Total ICAP	ND	5	4.95	mg/L	99	(70-130)		
MS2_201905220561	Iron Total ICAP	ND	5	5.22	mg/L	104	(70-130)		
MSD_201905220423	Iron Total ICAP	ND	5	5.09	mg/L	102	(70-130)	20	2.8

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD2_201905220561	Iron Total ICAP	ND	5	5.19	mg/L	104	(70-130)	20	0.53
LCS1	Magnesium Total ICAP		20	19.6	mg/L	98	(85-115)		
LCS2	Magnesium Total ICAP		20	19.6	mg/L	98	(85-115)	20	0.0
MBLK	Magnesium Total ICAP			<0.05	mg/L				
MRL_CHK	Magnesium Total ICAP		0.1	0.0984	mg/L	98	(50-150)		
MS_201905220423	Magnesium Total ICAP	9.8	20	29.0	mg/L	96	(70-130)		
MS2_201905220561	Magnesium Total ICAP	7.6	20	27.9	mg/L	102	(70-130)		
MSD_201905220423	Magnesium Total ICAP	9.8	20	29.4	mg/L	98	(70-130)	20	1.2
MSD2_201905220561	Magnesium Total ICAP	7.6	20	27.8	mg/L	101	(70-130)	20	0.30
LCS1	Potassium Total ICAP		20	19.8	mg/L	99	(85-115)		
LCS2	Potassium Total ICAP		20	19.8	mg/L	99	(85-115)	20	0.0
MBLK	Potassium Total ICAP			<0.5	mg/L				
MRL_CHK	Potassium Total ICAP		1	0.706	mg/L	71	(50-150)		
MS_201905220423	Potassium Total ICAP	1.8	20	22.5	mg/L	104	(70-130)		
MS2_201905220561	Potassium Total ICAP	2.4	20	23.8	mg/L	107	(70-130)		
MSD_201905220423	Potassium Total ICAP	1.8	20	23.0	mg/L	106	(70-130)	20	2.1
MSD2_201905220561	Potassium Total ICAP	2.4	20	23.9	mg/L	107	(70-130)	20	0.27
LCS1	Silica		21	20.2	mg/L	94	(85-115)		
LCS2	Silica		21	20.2	mg/L	95	(85-115)	20	0.0
MBLK	Silica			<0.25	mg/L				
MRL_CHK	Silica		0.43	0.420	mg/L	98	(50-150)		
MS_201905220423	Silica	24	21	44.2	mg/L	94	(70-130)		
MS2_201905220561	Silica	11	21	31.0	mg/L	94	(70-130)		
MSD_201905220423	Silica	24	21	44.2	mg/L	94	(70-130)	20	0.068
MSD2_201905220561	Silica	11	21	31.2	mg/L	95	(70-130)	20	0.61
LCS1	Sodium Total ICAP		50	49.3	mg/L	99	(85-115)		
LCS2	Sodium Total ICAP		50	48.9	mg/L	98	(85-115)	20	0.82
MBLK	Sodium Total ICAP			<0.5	mg/L				
MRL_CHK	Sodium Total ICAP		1	0.947	mg/L	95	(50-150)		
MS_201905220423	Sodium Total ICAP	47	50	93.5	mg/L	94	(70-130)		
MS2_201905220561	Sodium Total ICAP	30	50	79.6	mg/L	98	(70-130)		
MSD_201905220423	Sodium Total ICAP	47	50	94.1	mg/L	95	(70-130)	20	0.59
MSD2_201905220561	Sodium Total ICAP	30	50	79.7	mg/L	98	(70-130)	20	0.068
ICPMS Metals by E	PA 200.8								
Analytical Ba	atch: 1173831					An	alysis Date:	05/24/2019	
LCS1	Aluminum Total ICAP/MS		100	103	ug/L	103	(85-115)		
LCS2	Aluminum Total ICAP/MS		100	102	ug/L	103	(85-115)	20	0.0
MBLK	Aluminum Total ICAP/MS			<10	ug/L		(/)		
					ug,∟				

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Aluminum Total ICAP/MS		20	20.3	ug/L	102	(50-150)		
MS_201905220061	Aluminum Total ICAP/MS	ND	100	116	ug/L	105	(70-130)		
MS2_201905220275	Aluminum Total ICAP/MS	ND	100	114	ug/L	114	(70-130)		
MSD_201905220061	Aluminum Total ICAP/MS	ND	100	119	ug/L	108	(70-130)	20	2.5
LCS1	Antimony Total ICAP/MS		50	46.7	ug/L	93	(85-115)		
LCS2	Antimony Total ICAP/MS		50	46.0	ug/L	92	(85-115)	20	1.5
MBLK	Antimony Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Antimony Total ICAP/MS		1	0.982	ug/L	98	(50-150)		
MS_201905220061	Antimony Total ICAP/MS	1.3	50	50.0	ug/L	97	(70-130)		
MS2_201905220275	Antimony Total ICAP/MS	ND	50	51.2	ug/L	102	(70-130)		
MSD_201905220061	Antimony Total ICAP/MS	1.3	50	52.4	ug/L	102	(70-130)	20	4.7
LCS1	Arsenic Total ICAP/MS		50	52.1	ug/L	104	(85-115)		
LCS2	Arsenic Total ICAP/MS		50	51.9	ug/L	104	(85-115)	20	0.39
MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1	1.13	ug/L	113	(50-150)		
MS_201905220061	Arsenic Total ICAP/MS	2.4	50	59.3	ug/L	114	(70-130)		
MS2_201905220275	Arsenic Total ICAP/MS	1.8	50	60.7	ug/L	118	(70-130)		
MSD_201905220061	Arsenic Total ICAP/MS	2.4	50	60.7	ug/L	117	(70-130)	20	2.3
LCS1	Barium Total ICAP/MS		50	49.5	ug/L	99	(85-115)		
LCS2	Barium Total ICAP/MS		50	49.7	ug/L	99	(85-115)	20	0.40
MBLK	Barium Total ICAP/MS			<1	ug/L				
MRL_CHK	Barium Total ICAP/MS		2	1.99	ug/L	100	(50-150)		
MS_201905220061	Barium Total ICAP/MS	9.3	50	61.0	ug/L	103	(70-130)		
MS2_201905220275	Barium Total ICAP/MS	49	50	103	ug/L	108	(70-130)		
MSD_201905220061	Barium Total ICAP/MS	9.3	50	63.0	ug/L	107	(70-130)	20	3.2
LCS1	Beryllium Total ICAP/MS		25	24.6	ug/L	99	(85-115)		
LCS2	Beryllium Total ICAP/MS		25	24.7	ug/L	99	(85-115)	20	0.41
MBLK	Beryllium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Beryllium Total ICAP/MS		1	1.02	ug/L	102	(50-150)		
MS_201905220061	Beryllium Total ICAP/MS	ND	25	26.8	ug/L	107	(70-130)		
MS2_201905220275	Beryllium Total ICAP/MS	ND	25	27.1	ug/L	108	(70-130)		
MSD_201905220061	Beryllium Total ICAP/MS	ND	25	27.8	ug/L	111	(70-130)	20	4.1
MSD2_201905220275	Beryllium Total ICAP/MS	ND	25	26.0	ug/L	104	(70-130)	20	4.2
LCS1	Cadmium Total ICAP/MS		25	24.8	ug/L	99	(85-115)		
LCS2	Cadmium Total ICAP/MS		25	24.9	ug/L	99	(85-115)	20	0.40
MBLK	Cadmium Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Cadmium Total ICAP/MS		0.5	0.533	ug/L	107	(50-150)		
MS_201905220061	Cadmium Total ICAP/MS	ND	25	25.6	ug/L	102	(70-130)		

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MS2_201905220275	Cadmium Total ICAP/MS	ND	25	25.9	ug/L	104	(70-130)		
MSD_201905220061	Cadmium Total ICAP/MS	ND	25	26.7	ug/L	107	(70-130)	20	4.4
LCS1	Chromium Total ICAP/MS		50	50.9	ug/L	102	(85-115)		
LCS2	Chromium Total ICAP/MS		50	50.8	ug/L	102	(85-115)	20	0.20
MBLK	Chromium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Chromium Total ICAP/MS		1	1.04	ug/L	104	(50-150)		
MS_201905220061	Chromium Total ICAP/MS	ND	50	51.6	ug/L	103	(70-130)		
MS2_201905220275	Chromium Total ICAP/MS	ND	50	56.6	ug/L	113	(70-130)		
MSD_201905220061	Chromium Total ICAP/MS	ND	50	54.4	ug/L	109	(70-130)	20	5.2
LCS1	Copper Total ICAP/MS		50	50.5	ug/L	101	(85-115)		
LCS2	Copper Total ICAP/MS		50	50.2	ug/L	100	(85-115)	20	0.60
MBLK	Copper Total ICAP/MS			<1	ug/L				
MRL_CHK	Copper Total ICAP/MS		2	2.09	ug/L	104	(50-150)		
MS_201905220061	Copper Total ICAP/MS	200	50	258	ug/L	107	(70-130)		
MS2_201905220275	Copper Total ICAP/MS	2.9	50	53.3	ug/L	101	(70-130)		
MSD_201905220061	Copper Total ICAP/MS	200	50	258	ug/L	108	(70-130)	20	0.30
LCS1	Lead Total ICAP/MS		50	50.6	ug/L	101	(85-115)		
LCS2	Lead Total ICAP/MS		50	50.4	ug/L	101	(85-115)	20	0.40
MBLK	Lead Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Lead Total ICAP/MS		0.5	0.527	ug/L	105	(50-150)		
MS_201905220061	Lead Total ICAP/MS	0.81	50	51.4	ug/L	101	(70-130)		
MS2_201905220275	Lead Total ICAP/MS	ND	50	51.8	ug/L	103	(70-130)		
MSD_201905220061	Lead Total ICAP/MS	0.81	50	52.8	ug/L	104	(70-130)	20	2.6
LCS1	Manganese Total ICAP/MS		100	102	ug/L	102	(85-115)		
LCS2	Manganese Total ICAP/MS		100	101	ug/L	101	(85-115)	20	0.99
MBLK	Manganese Total ICAP/MS			<1	ug/L				
MRL_CHK	Manganese Total ICAP/MS		2	2.04	ug/L	102	(50-150)		
MS_201905220061	Manganese Total ICAP/MS	ND	100	103	ug/L	102	(70-130)		
MS2_201905220275	Manganese Total ICAP/MS	ND	100	109	ug/L	109	(70-130)		
MSD_201905220061	Manganese Total ICAP/MS	ND	100	106	ug/L	105	(70-130)	20	2.9
LCS1	Nickel Total ICAP/MS		50	51.2	ug/L	102	(85-115)		
LCS2	Nickel Total ICAP/MS		50	50.6	ug/L	101	(85-115)	20	1.2
MBLK	Nickel Total ICAP/MS			<2.5	ug/L				
MRL_CHK	Nickel Total ICAP/MS		5	5.13	ug/L	103	(50-150)		
MS_201905220061	Nickel Total ICAP/MS	ND	50	51.2	ug/L	101	(70-130)		
MS2_201905220275	Nickel Total ICAP/MS	ND	50	51.9	ug/L	102	(70-130)		
MSD_201905220061	Nickel Total ICAP/MS	ND	50	52.3	ug/L	103	(70-130)	20	2.1
LCS1	Selenium Total ICAP/MS		50	50.8	ug/L	102	(85-115)		

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	Selenium Total ICAP/MS		50	50.7	ug/L	101	(85-115)	20	0.20
MBLK	Selenium Total ICAP/MS			<2.5	ug/L				
MRL_CHK	Selenium Total ICAP/MS		5	5.23	ug/L	105	(50-150)		
MS_201905220061	Selenium Total ICAP/MS	ND	50	57.9	ug/L	115	(70-130)		
MS2_201905220275	Selenium Total ICAP/MS	35	50	94.0	ug/L	117	(70-130)		
MSD_201905220061	Selenium Total ICAP/MS	ND	50	59.0	ug/L	118	(70-130)	20	2.0
LCS1	Silver Total ICAP/MS		25	24.5	ug/L	98	(85-115)		
LCS2	Silver Total ICAP/MS		25	24.2	ug/L	97	(85-115)	20	1.2
MBLK	Silver Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Silver Total ICAP/MS		0.5	0.436	ug/L	87	(50-150)		
MS_201905220061	Silver Total ICAP/MS	ND	25	24.0	ug/L	95	(70-130)		
MS2_201905220275	Silver Total ICAP/MS	ND	25	24.8	ug/L	99	(70-130)		
MSD_201905220061	Silver Total ICAP/MS	ND	25	25.4	ug/L	100	(70-130)	20	5.8
LCS1	Thallium Total ICAP/MS		50	51.0	ug/L	102	(85-115)		
LCS2	Thallium Total ICAP/MS		50	50.8	ug/L	102	(85-115)	20	0.39
MBLK	Thallium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Thallium Total ICAP/MS		1	1.03	ug/L	103	(50-150)		
MS_201905220061	Thallium Total ICAP/MS	ND	50	52.4	ug/L	105	(70-130)		
MS2_201905220275	Thallium Total ICAP/MS	ND	50	54.0	ug/L	108	(70-130)		
MSD_201905220061	Thallium Total ICAP/MS	ND	50	54.0	ug/L	108	(70-130)	20	2.9
LCS1	Uranium ICAP/MS		50	51.4	ug/L	103	(85-115)		
LCS2	Uranium ICAP/MS		50	52.2	ug/L	104	(85-115)	20	1.4
MBLK	Uranium ICAP/MS			<0.5	ug/L				
MRL_CHK	Uranium ICAP/MS		1	1.01	ug/L	101	(50-150)		
MS_201905220061	Uranium ICAP/MS	3.8	50	59.5	ug/L	111	(70-130)		
MS2_201905220275	Uranium ICAP/MS	3.9	50	64.3	ug/L	121	(70-130)		
MSD_201905220061	Uranium ICAP/MS	3.8	50	61.0	ug/L	114	(70-130)	20	2.5
MSD2_201905220275	Uranium ICAP/MS	3.9	50	60.8	ug/L	114	(70-130)	20	5.7
LCS1	Vanadium Total ICAP/MS		50	51.0	ug/L	102	(85-115)		
LCS2	Vanadium Total ICAP/MS		50	50.8	ug/L	102	(85-115)	20	0.39
MBLK	Vanadium Total ICAP/MS			<1.5	ug/L				
MRL_CHK	Vanadium Total ICAP/MS		3	3.01	ug/L	100	(50-150)		
MS_201905220061	Vanadium Total ICAP/MS	ND	50	54.7	ug/L	109	(70-130)		
MS2_201905220275	Vanadium Total ICAP/MS	ND	50	59.9	ug/L	119	(70-130)		
MSD_201905220061	Vanadium Total ICAP/MS	ND	50	56.7	ug/L	113	(70-130)	20	3.5
1.004									
LCS1	Zinc Total ICAP/MS		50	51.3	ug/L	103	(85-115)		
LCS1 LCS2	Zinc Total ICAP/MS Zinc Total ICAP/MS		50 50	51.3 50.2	ug/L ug/L	103 100	(85-115) (85-115)	20	2.2

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Zinc Total ICAP/MS		20	20.3	ug/L	101	(50-150)		
MS_201905220061	Zinc Total ICAP/MS	ND	50	62.5	ug/L	106	(70-130)		
MS2_201905220275	Zinc Total ICAP/MS	ND	50	60.3	ug/L	103	(70-130)		
MSD_201905220061	Zinc Total ICAP/MS	ND	50	64.2	ug/L	110	(70-130)	20	2.6
Radon 222 by SM 7	7500RN								
Analytical Ba	atch: 1173888					An	alysis Date:	05/22/2019	
DUP_201905220264	Radon 222	ND		22.8	pCi/L		(0-10)	10	<u>78</u>
LCS1	Radon 222		200	228	pCi/L	114	(80-120)		
LCS2	Radon 222		208	231	pCi/L	111	(80-120)	10	1.3
MBLK	Radon 222			<50	pCi/L				
1,2,3-Trichloroprop	pane (SIM) by CASRL 524M-TCP								
Analytical Ba	atch: 1173900					An	alysis Date:	05/23/2019	
DUP_201905220100	1,2,3-Trichloropropane	ND		ND	ug/L		(0-20)		
LCS1	1,2,3-Trichloropropane		0.01	0.00903	ug/L	90	(80-120)		
LCS2	1,2,3-Trichloropropane		0.01	0.00892	ug/L	89	(80-120)	20	1.2
MBLK	1,2,3-Trichloropropane			<0.005	ug/L				
MRL_CHK	1,2,3-Trichloropropane		0.005	0.00459	ug/L	92	(80-120)		
DUP_201905220100	Toluene-d8 (S)		2000	104	%	104	(70-130)		
LCS1	Toluene-d8 (S)		2000	92.6	%	93	(70-130)		
LCS2	Toluene-d8 (S)		2000	89.6	%	90	(70-130)		
MBLK	Toluene-d8 (S)			89.9	%	90	(70-130)		
MRL_CHK	Toluene-d8 (S)		2000	92.8	%	93	(70-130)		
Apparent Color by	SM 2120B								
Analytical Ba	atch: 1173910					An	alysis Date:	05/23/2019	
DUP1_201905220587	Apparent Color	ND		ND	ACU		(0-20)		
DUP2_201905220753	Apparent Color	ND		ND	ACU		(0-20)		
MBLK	Apparent Color			<0.5	ACU				
Surfactants by SM	5540C/EPA 425.1								
Analytical Ba	atch: 1173939					An	alysis Date:	05/23/2019	
LCS1	Surfactants		0.2	0.214	mg/L	107	(90-110)		
LCS2	Surfactants		0.2	0.210	mg/L	105	(90-110)	20	1.9
MBLK	Surfactants			<0.05	mg/L				
MRL_CHK	Surfactants		0.1	0.101	mg/L	101	(75-125)		
	Curfo stants	ND	0.2	0.216	mg/L	102	(80-120)		
MS_201905220426	Surfactants	ND	0.2	0.210	mg/L	102	(00 120)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
Chloride, Sulfate b	oy EPA 300.0 by EPA 300.0								
Analytical B	atch: 1174171					An	alysis Date:	05/24/2019	
LCS1	Chloride		25	26.0	mg/L	104	(90-110)		
LCS2	Chloride		25	25.9	mg/L	103	(90-110)	20	0.39
MBLK	Chloride			<0.25	mg/L				
MRL_CHK	Chloride		0.5	0.464	mg/L	93	(50-150)		
MS_201905240487	Chloride	23	26	50.8	mg/L	111	(80-120)		
MSD_201905240487	Chloride	23	26	50.7	mg/L	111	(80-120)	20	0.26
LCS1	Sulfate		50	51.8	mg/L	104	(90-110)		
LCS2	Sulfate		50	51.7	mg/L	103	(90-110)	20	0.19
MBLK	Sulfate			<0.125	mg/L				
MRL_CHK	Sulfate		1	0.990	mg/L	99	(50-150)		
MRLLW	Sulfate		0.25	0.253	mg/L	101	(50-150)		
MS_201905240487	Sulfate	78	50	132	mg/L	107	(80-120)		
MSD_201905240487	Sulfate	78	50	131	mg/L	107	(80-120)	20	0.43
Diquat and Paraqu	uat by EPA 549.2								
Analytical B	atch: 1174443					An	alysis Date:	05/29/2019	
СССН	Diquat		10	10.0	ug/L	100	(80-120)		
CCCL	Diquat		0.4	0.385	ug/L	96	(50-150)		
CCCM	Diquat		4	3.99	ug/L	100	(80-120)		
LCS1	Diquat		5	3.98	ug/L	80	(73-96)		
MBLK	Diquat			<0.4	ug/L				
MRLLW	Diquat		0.4	0.370	ug/L	93	(50-150)		
MS_201905220011	Diquat	ND	5	4.05	ug/L	81	(70-130)		
MS2_201905230013	Diquat	ND	5	3.97	ug/L	79	(70-130)		
MSD_201905220011	Diquat	ND	5	4.00	ug/L	80	(70-130)	20	1.3
CCCH	Paraquat		10	10.2	ug/L	102	(80-120)		
CCCL	Paraquat		2	2.20	ug/L	110	(50-150)		
CCCM	Paraquat		4	3.90	ug/L	98	(80-120)		
LCS1	Paraquat		5	3.95	ug/L	79	(71-104)		
MBLK	Paraquat			<2	ug/L				
MRL_CHK	Paraquat		2	1.63	ug/L	82	(50-150)		
MS_201905220011	Paraquat	ND	5	3.99	ug/L	80	(70-130)		
MS2_201905230013	Paraquat	ND	5	4.17	ug/L	83	(70-130)		
MSD_201905220011	Paraquat	ND	5	4.03	ug/L	81	(70-130)	20	1.1

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
			opilieu		01110				
Glyphosate by EP	A 547 atch: 1174458					Δn	alvsis Dato	05/28/2019	
Analytical D								05/20/2015	
CCCH	Glyphosate		25	20.7	ug/L	83	(80-120)		
CCCM	Glyphosate		10	8.06	ug/L	81	(80-120)		
LCS1	Glyphosate		10	9.88	ug/L	99	(80-120)		
MBLK	Glyphosate			<3	ug/L				
MRL_CHK	Glyphosate		6	5.16	ug/L	86	(50-150)		
MS_201905210014	Glyphosate	ND	10	9.47	ug/L	95	(70-130)		
MS2_201905220010	Glyphosate	ND	10	9.79	ug/L	98	(70-130)		
MSD_201905210014	Glyphosate	ND	10	9.46	ug/L	95	(70-130)	20	0.15
Total Dissolved So	olids (TDS) by E160.1/SM2540C								
Analytical B	atch: 1174483					An	alysis Date:	05/28/2019	
DUP_201905240038	Total Dissolved Solid (TDS)	520		516	mg/L		(0-20)	10	0.39
DUP_201905230100	Total Dissolved Solid (TDS)	220		230	mg/L		(0-20)	10	2.6
LCS1	Total Dissolved Solid (TDS)		175	178	mg/L	102	(80-114)		
LCS2	Total Dissolved Solid (TDS)		700	688	mg/L	98	(80-114)		
MBLK	Total Dissolved Solid (TDS)			<5	mg/L				
MRL_CHK	Total Dissolved Solid (TDS)		10	9.00	mg/L	90	(50-150)		
Perchlorate by LC	MS by EPA 331.0								
-	atch: 1174578					An	alysis Date:	05/28/2019	
СССН	Oxygen Enriched Perchlorate (S)			129	%	129	(70-130)		
CCCL	Oxygen Enriched Perchlorate (S)			101	%	101	(70-130)		
CCCM	Oxygen Enriched Perchlorate (S)			99.9	%	100	(70-130)		
ICCS	Oxygen Enriched Perchlorate (S)			98.8	%	99	(70-130)		
LCS1	Oxygen Enriched Perchlorate (S)			96.3	%	96	(70-130)		
LCS2	Oxygen Enriched Perchlorate (S)			94.3	%	94	(70-130)		
MBLK	Oxygen Enriched Perchlorate (S)			103	%	103	(70-130)		
MRL_CHK	Oxygen Enriched Perchlorate (S)			101	%	101	(70-130)		
MS_201905230128	Oxygen Enriched Perchlorate (S)			88.1	%	88	(70-130)		
MSD_201905230128	Oxygen Enriched Perchlorate (S)			113	%	113	(70-130)		
СССН	Perchlorate		5000	5080	ng/l	102	(80-120)		
CCCL	Perchlorate		50	62.2	ng/l	124	(50-150)		
CCCM	Perchlorate		1000	990	ng/l	99	(80-120)		
ICCS	Perchlorate		1000	1000	ng/l	100	(80-120)		
LCS1	Perchlorate		1000	1070	ng/L	107	(80-120)		
LCS2	Perchlorate		1000	1110	ng/L	111	(80-120)	20	3.7
					-				

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	Perchlorate			<16.67	ng/L				
MRL_CHK	Perchlorate		50	62.2	ng/L	124	(50-150)		
MS_201905230128	Perchlorate	ND	100	119	ng/L	119	(50-150)		
MSD_201905230128	Perchlorate	ND	100	85.8	ng/L	86	(50-150)	50	32
Volatile Organics	by GCMS by EPA 524.2								
-	atch: 1174669					An	alysis Date	: 05/28/2019	
LCS1	1,1,1,2-Tetrachloroethane		5	4.62	ug/L	92	(70-130)		
LCS2	1,1,1,2-Tetrachloroethane		5	4.67	ug/L	93	(70-130)	20	1.1
MBLK	1,1,1,2-Tetrachloroethane			<0.5	ug/L				
MRL_CHK	1,1,1,2-Tetrachloroethane		0.5	0.430	ug/L	86	(50-150)		
LCS1	1,1,1-Trichloroethane		5	4.90	ug/L	98	(70-130)		
LCS2	1,1,1-Trichloroethane		5	4.82	ug/L	96	(70-130)	20	1.6
MBLK	1,1,1-Trichloroethane			<0.5	ug/L				
MRL_CHK	1,1,1-Trichloroethane		0.5	0.470	ug/L	94	(50-150)		
LCS1	1,1,2,2-Tetrachloroethane		5	4.91	ug/L	98	(70-130)		
LCS2	1,1,2,2-Tetrachloroethane		5	5.05	ug/L	101	(70-130)	20	2.8
MBLK	1,1,2,2-Tetrachloroethane			<0.5	ug/L				
MRL_CHK	1,1,2,2-Tetrachloroethane		0.5	0.510	ug/L	102	(50-150)		
LCS1	1,1,2-Trichloroethane		5	5.04	ug/L	101	(70-130)		
LCS2	1,1,2-Trichloroethane		5	4.84	ug/L	97	(70-130)	20	4.0
MBLK	1,1,2-Trichloroethane			<0.5	ug/L				
MRL_CHK	1,1,2-Trichloroethane		0.5	0.520	ug/L	104	(50-150)		
LCS1	1,1-Dichloroethane		5	4.75	ug/L	95	(70-130)		
LCS2	1,1-Dichloroethane		5	4.90	ug/L	98	(70-130)	20	3.1
MBLK	1,1-Dichloroethane			<0.5	ug/L				
MRL_CHK	1,1-Dichloroethane		0.5	0.500	ug/L	100	(50-150)		
LCS1	1,1-Dichloroethylene		5	4.73	ug/L	95	(70-130)		
LCS2	1,1-Dichloroethylene		5	4.59	ug/L	92	(70-130)	20	3.0
MBLK	1,1-Dichloroethylene			<0.5	ug/L				
MRL_CHK	1,1-Dichloroethylene		0.5	0.450	ug/L	90	(50-150)		
LCS1	1,1-Dichloropropene		5	4.89	ug/L	98	(70-130)		
LCS2	1,1-Dichloropropene		5	4.66	ug/L	93	(70-130)	20	4.8
MBLK	1,1-Dichloropropene			<0.5	ug/L				
MRL_CHK	1,1-Dichloropropene		0.5	0.500	ug/L	100	(50-150)		
LCS1	1,2,3-Trichlorobenzene		5	4.93	ug/L	99	(70-130)		
LCS2	1,2,3-Trichlorobenzene		5	4.78	ug/L	96	(70-130)	20	3.1
MBLK	1,2,3-Trichlorobenzene			<0.5	ug/L				
MRL_CHK	1,2,3-Trichlorobenzene		0.5	0.440	ug/L	88	(50-150)		
MBLK MRL_CHK	1,2,3-Trichlorobenzene			<0.5	ug/L			20	

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

LESI 1.2.3-Trichloropropane 5 5.05 upL 102 (70-130) LCS2 1.2.3-Trichloropropane 5 5.05 upL 101 (70-130) 20 0.79 MELK 1.2.3-Trichloropropane 0.5 0.50 upL 110 (50-150) 110 (70-130) 20 0.79 MELCHK 1.2.4-Trichlorobenzene 5 4.96 upL 99 (70-130) 20 3.5 MELK 1.2.4-Trichlorobenzene 5.0 4.96 upL 92 (50-150) 1.5 1.5 LCS1 1.2.4-Trinchlorobenzene 5 5.06 upL 101 (70-130) 20 0.79 MELCHK 1.2.4-Trinchlybenzene 5 5.06 upL 101 (70-130) 20 0.79 MELCHK 1.2.4-Trinchlybenzene 5 5.06 upL 101 (70-130) 20 2.1 LCS1 1.2.4-Trinchlybenzene 5 4.82 upL 94 (50-150) 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 </th <th>QC Type</th> <th>Analyte</th> <th>Native</th> <th>Spiked</th> <th>Recovered</th> <th>Units</th> <th>Yield (%)</th> <th>Limits (%)</th> <th>RPDLimit (%)</th> <th>RPD%</th>	QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK13.3°1richiorographeo0.500.500.90.0.100.70130JMR_CMK12.4°1richiorobanzano54.9009.007.1302.03.50MBLK12.4°1richiorobanzano54.9009.007.1302.03.50MBLCMK12.4°1richiorobanzano50.40009.007.1302.03.50MBLCMK12.4°1rinehylbenzeno50.40009.007.0302.00.70LGS212.4°1rinehylbenzeno50.40009.007.0302.00.70MBLK12.4°1rinehylbenzeno50.47009.007.00.700.700.70LGS112.4°1rinehylbenzeno50.47009.007.00.700.700.700.70LGS112.0°1orioethane50.47009.007.00.700.700.700.700.70LGS112.0°1orioethane50.48009.007.00.700.700.700.700.70LGS112.0°1orioethane50.4900.700.700.700.700.700.700.70LGS112.0°1orioethane60.4900.700.700.700.700.700.700.70LGS112.0°1orioethane60.70 <td>LCS1</td> <td>1,2,3-Trichloropropane</td> <td></td> <td>5</td> <td>5.09</td> <td>ug/L</td> <td>102</td> <td>(70-130)</td> <td></td> <td></td>	LCS1	1,2,3-Trichloropropane		5	5.09	ug/L	102	(70-130)		
NRL_CHK1.2.3.Trichloropropane0.50.5500.9L11.0(69.15)LCS11.2.4.Trichlorobenzene54.790ugL90(70.130)203.5LGS21.2.4.Trichlorobenzene5.04.790ugL12.4(70.130)203.5MEL, CHK1.2.4.Trichlorobenzene0.50.400ugL10.0(70.130)200.79LGS11.2.4.Trinethylbenzene0.50.400ugL10.0(70.130)200.79MBLK1.2.4.Trinethylbenzene0.50.400ugL94.0(70.130)200.79MBLK1.2.4.Trinethylbenzene0.54.82ugL94.0(70.130)202.1LGS11.2.Dichloroethane0.54.82ugL94.0(70.130)202.1MEL, CHK1.2.Dichloroethane54.82ugL94.0(70.130)2.12.1MEL, CHK1.2.Dichloroethane50.400ugL94.0(70.130)2.12.1MEL, CHK1.2.Dichloroethane50.400ugL94.0(70.130)2.11.1MEL, CHK1.2.Dichloroethane50.400ugL94.0(70.130)2.11.1LGS11.2.Dichloroethane50.400ugL94.0(70.130)2.11.1LGS11.2.Dichloroethane50.400ugL94.0(70.130)1.11.1LGS11.2.Dichloroethane61.	LCS2	1,2,3-Trichloropropane		5	5.05	ug/L	101	(70-130)	20	0.79
LGS11,2.4.Ticklorobenzene54,96upL99(70-13).LGS21,2.4.Ticklorobenzene54,70upL0(70-13)23.5MRL1,2.4.Ticklorobenzene50,50upL92(50-15)1.5LGS11,2.4.Tinchtybenzene55.20upL101(70-13)	MBLK	1,2,3-Trichloropropane			<0.5	ug/L				
LGS21.2.4.Trichlorobenzene54.7.9ugl.96(70.13)203.5MBLK1.2.4.Trichlorobenzene0.50.3Cugl <t< td=""><td>MRL_CHK</td><td>1,2,3-Trichloropropane</td><td></td><td>0.5</td><td>0.550</td><td>ug/L</td><td>110</td><td>(50-150)</td><td></td><td></td></t<>	MRL_CHK	1,2,3-Trichloropropane		0.5	0.550	ug/L	110	(50-150)		
MBLK1,2,4-Trichlorobenzene-0.50,460ug1,9.2(60-150)LGS11,2,4-Trinethybenzene5.55.02ug1,100(70-130)0.7LGS21,2,4-Trinethybenzene5.55.02ug1,100(70-130)0.7MBLK1,2,4-Trinethybenzene0.50,470ug1,94(50-150)1.7MRL_CHK1,2,4-Trinethybenzene0.50,470ug1,94(70-130)2.02.1LGS11,2,4-Trinethybenzene0.50,470ug1,94(70-130)2.11.1LGS11,2,1-Cinhoroethane0.50,470ug1,94(70-130)2.11.1LGS11,2-Dichloroethane0.50,480ug1,98(70-130)2.11.1LGS11,2-Dichloroethane-d4 (S)59.78%99(70-130)1.11.2LGS11,2-Dichloroethane-d4 (S)59.68%99(70-130)1.11.2LGS11,2-Dichloroethane-d4 (S)59.68%9.0(70-130)1.11.2LGS11,2-Dichloroethane-d4 (S)51021.2	LCS1	1,2,4-Trichlorobenzene		5	4.96	ug/L	99	(70-130)		
NRL_CHK1.2.4-Tindehybenzene0.50.460ugl92(50-150)LCS11.2.4-Tindehybenzene55.02ugl100(70-130)2.00.79LGS21.2.4-Tindehybenzene5.06ugl100(70-130)2.00.79MRL_CHK1.2.4-Tindehybenzene0.50.470ugl94(50-150)1.01.0LCS11.2.0.1chioredhane5.04.82ugl96(70-130)2.02.1LGS11.2.0.1chioredhane5.00.470ugl98(50-150)1.01.0LGS11.2.0.1chioredhane0.50.490ugl98(50-150)1.01.0LGS11.2.0.1chioredhane0.50.490ugl98(70-130)1.01.0LGS11.2.0.1chioredhane-44(S)5.00.490ugl98(70-130)1.01.0LGS11.2.0.1chioredhane-44(S)5.09.6%.09.0(70-130)1.01.0LGS11.2.0.1chioredhane-44(S)5.09.6%.09.0(70-130)1.01.0MRL_CHK1.2.0.1chioredhane-44(S)5.09.6%.09.0(70-130)1.01.0LGS11.2.0.1chioredhane-44(S)5.09.6%.09.0(70-130)2.00.3MRL_CHK1.2.0.1chioredhane-44(S)5.09.6%.01.0(70-130)2.00.3LGS11.2	LCS2	1,2,4-Trichlorobenzene		5	4.79	ug/L	96	(70-130)	20	3.5
LCS11,2,4-Trimethylbenzene55,0ugl.10,0(70-130)2,00,79MBLK1,2,4-Trimethylbenzene-0.50,70ugl.4.6(70-130)2,00,79MBL_CHK1,2,4-Trimethylbenzene5.00,500,42ugl.60-10)2,02,1LCS11,2,0-chloroethane5.04,82ugl.9,4(70-130)2,02,1MBLK1,2,0-chloroethane5.04,72ugl.9,4(70-130)2,02,1MBLK1,2,0-chloroethane-44(S)5.00,209,2(70-130)1,0MRL_CHK1,2,0-chloroethane-44(S)5.09,209,2(70-130)1,0MRL_CHK1,2,0-chloroethane-44(S)5.09,209,20(70-130) <td< td=""><td>MBLK</td><td>1,2,4-Trichlorobenzene</td><td></td><td></td><td><0.5</td><td>ug/L</td><td></td><td></td><td></td><td></td></td<>	MBLK	1,2,4-Trichlorobenzene			<0.5	ug/L				
LCS21,2,4-Trimethylbenzene55.06ugL(70-130)2.00.79MELK1,2,4-Trimethylbenzene0.50.470ugL94(50-15)1LCS11,2-Dichloroethane54.82ugL94(70-130)202.1MELK1,2-Dichloroethane54.82ugL94(70-130)202.1MELK1,2-Dichloroethane0.50.490ugL98(50-15)12MELK1,2-Dichloroethane5.50.490ugL98(50-15)11LCS11,2-Dichloroethane-44(5)5.00.490100(70-130)11LCS21,2-Dichloroethane-44(5)5.09.6%98(70-130)11LCS11,2-Dichloroethane-44(5)5.09.6%91(70-130)111MELK1,2-Dichloroethane-44(5)5.09.6%91(70-130)11	MRL_CHK	1,2,4-Trichlorobenzene		0.5	0.460	ug/L	92	(50-150)		
MBLK1.2.4-Trimethylbenzene-0.5ugl.ugl.Var.<	LCS1	1,2,4-Trimethylbenzene		5	5.02	ug/L	100	(70-130)		
NRL_CHK1,2.4.Trimethylbenzene0,50.470ugl.94.(50-15)LCS11.2.Dichloroethane54.82ugl.96.(70-130)202.1LCS21.2.Dichloroethane54.72ugl.96.(50-15)2.1MBLK1.2.Dichloroethane0.50.400ugl.88.(50-15)5102%1.102.(70-130)5102.102.(70-130)5102. <td>LCS2</td> <td>1,2,4-Trimethylbenzene</td> <td></td> <td>5</td> <td>5.06</td> <td>ug/L</td> <td>101</td> <td>(70-130)</td> <td>20</td> <td>0.79</td>	LCS2	1,2,4-Trimethylbenzene		5	5.06	ug/L	101	(70-130)	20	0.79
LCS11,2-Dichlorophane54.82ugl.96(70-130)202.1LCS21,2-Dichlorophane54.72ugl.94(70-130)202.1MBLK1,2-Dichlorophane0.50.400ugl.98(50-150)1LCS11,2-Dichlorophane-44(S)50.20%102(70-130)1LCS21,2-Dichlorophane-44(S)50.78%99(70-130)11LCS11,2-Dichlorophane-44(S)597.8%99(70-130)11MBLK1,2-Dichlorophane-44(S)597.8%100(70-130)11MRL_CHK1,2-Dichlorophane-44(S)598.6%99(70-130)11MRLCHK1,2-Dichlorophane-44(S)598.6%100(70-130)11LCS11,2-Dichlorophane-44(S)598.6%100(70-130)11LCS11,2-Dichlorophane-44(S)58.6wgl.98(70-130)200.43MRLCHK1,2-Dichlorophane58.6wgl.102(70-130)200.43LCS11,2-Dichlorophane58.6wgl.102(70-130)200.39MBLK1,3-Dichlorophane58.6wgl.102(70-130)200.39LCS11,3-Dichlorophane59.6wgl. <td>MBLK</td> <td>1,2,4-Trimethylbenzene</td> <td></td> <td></td> <td><0.5</td> <td>ug/L</td> <td></td> <td></td> <td></td> <td></td>	MBLK	1,2,4-Trimethylbenzene			<0.5	ug/L				
LCS2 1.2-Dichloroethane 5 4.72 ugL 94 97.1 mm 20 2.1 MBLK 1.2-Dichloroethane -0.5 ugL -	MRL_CHK	1,2,4-Trimethylbenzene		0.5	0.470	ug/L	94	(50-150)		
MBLK1.2.Dichloroethane4<	LCS1	1,2-Dichloroethane		5	4.82	ug/L	96	(70-130)		
NRL_CHK1.2.Dichloroethane-d4 (S)0.50.490vg/L98(50-150)LCS11.2.Dichloroethane-d4 (S)5102%102(70-130)LCS21.2.Dichloroethane-d4 (S)98.6%98(70-130)MRL_CHK1.2.Dichloroethane-d4 (S)598.6%102(70-130)MRL_CHK1.2.Dichloroethane-d4 (S)598.6102(70-130)MRL_CHK1.2.Dichloroethane-d4 (S)596.6103(70-130)LCS11.2.Dichloroethane-d4 (S)596.6103(70-130)LCS11.2.Dichloroppane54.66ug/L93(70-130)LCS21.2.Dichloroppane54.68ug/L93(70-130)LCS11.2.Dichloroppane54.68ug/L93(70-130)200.43MRL_CHK1.2.Dichloroppane55.08ug/L102(70-130)200.43LCS21.3.5.Trimethylbenzene55.08ug/L102(70-130)200.53LCS11.3.5.Trimethylbenzene55.09ug/L102(70-130)205.2LCS21.3.Dichloroppane55.09ug/L102(70-130)205.2LCS11.3.Dichloroppane55.09ug/L102(70-130)205.2LCS21.3.Dichloroppane55.09ug/L102(70-130)205.2LCS21.3.Dichloroppane <td< td=""><td>LCS2</td><td>1,2-Dichloroethane</td><td></td><td>5</td><td>4.72</td><td>ug/L</td><td>94</td><td>(70-130)</td><td>20</td><td>2.1</td></td<>	LCS2	1,2-Dichloroethane		5	4.72	ug/L	94	(70-130)	20	2.1
L 1	MBLK	1,2-Dichloroethane			<0.5	ug/L				
LS22 1,2-Dichloropthane-d4 (S) 5 97.8 % 98 70-130 MBLK 1,2-Dichloropthane-d4 (S) 5 98.6 % 99 (70-130) MRL_CHK 1,2-Dichloropthane-d4 (S) 5 102 % 102 (70-130) MRLW 1,2-Dichloropthane-d4 (S) 5 99.6 % 100 (70-130) LCS1 1,2-Dichloropthane-d4 (S) 5 99.6 % 100 (70-130) 20 0.43 LCS1 1,2-Dichloropthane-d4 (S) 5 99.6 wgl 03 (70-130) 20 0.43 LCS1 1,2-Dichloropthane 5 4.64 ugl 93 (50-150) 10 10 10 10 0.4 0.4 0.5 0.4 0.5 10 10 10 0.5 0.3 0.5 1.5	MRL_CHK	1,2-Dichloroethane		0.5	0.490	ug/L	98	(50-150)		
MBLK 1.2-Dichloroethane-34 (S) 98.6 % 90 70-130 MRL_CHK 1.2-Dichloroethane-34 (S) 5 102 % 102 (70-130) MRLLW 1.2-Dichloroethane-34 (S) 5 99.6 % 100 (70-130) LCS1 1.2-Dichloropropane 5 4.64 ug/L 93 (70-130) 20 0.43 MBLK 1.2-Dichloropropane 5 4.64 ug/L 93 (70-130) 20 0.43 MBLK 1.2-Dichloropropane 5 4.66 ug/L 93 (70-130) 20 0.43 MBLK 1.2-Dichloropropane 0.5 0.490 ug/L 98 (50-150) 12 12 12 0.39 LCS1 1.3.5-Trimethylbenzene 5 5.09 ug/L 102 (70-130) 20 0.39 LCS1 1.3.5-Trimethylbenzene 5 0.470 ug/L 102 (70-130) 20 5.2 MRLCHK 1.3.5-Dichloropropan	LCS1	1,2-Dichloroethane-d4 (S)		5	102	%	102	(70-130)		
NRL_CHK1,2-Dichloroethane-d4 (S)5102%10270.1 allMRLLW1,2-Dichloropthane-d4 (S)59.6%100(70.130).LCS11,2-Dichloropthane-d4 (S)54.64ug/L93(70.130)200.43LCS21,2-Dichloropthane-d454.64ug/L93(70.130)200.43MBLK1,2-Dichloropthane54.64ug/L93(70.130)200.43MBLK1,2-Dichloropthane50.490ug/L98(50.150)LCS11,3-Dichloropthane55.08ug/L102(70.130)200.39LCS21,3-Dichloropthane55.08ug/L102(70.130)200.39MBLK1,3-Dichloropthane55.08ug/L102(70.130)200.39LCS21,3-Dichloropthane55.08ug/L102(70.130)205.28LCS11,3-Dichloropthane55.08ug/L14(50.150)LCS11,3-Dichloropthane55.08ug/L1605.150LCS21,3-Dichloropthane55.08ug/L161LCS11,3-Dichloropthane55.08ug/L19.110.1LCS21,3-Dichloropthane55.08ug/L19.110.1.	LCS2	1,2-Dichloroethane-d4 (S)		5	97.8	%	98	(70-130)		
Luk 1,2-Dichloroethane-d (S) 5 9.6 % 100 (70-130) LCS1 1,2-Dichloropropane 5 4.64 ug/L 93 (70-130) LCS2 1,2-Dichloropropane 5 4.66 ug/L 93 (70-130) 0.433 MBLK 1,2-Dichloropropane 5 4.66 ug/L 93 (50-150) 0.433 MBLK 1,2-Dichloropropane 0.5 0.490 ug/L 98 (50-150) 0.433 MBLK 1,2-Dichloropropane 0.5 0.490 ug/L 98 (50-150) 0.433 LCS1 1,3-5-Trimethylbenzene 5 5.08 ug/L 102 (70-130) 20 0.39 MBLK 1,3-5-Trimethylbenzene 5 5.09 ug/L 102 (70-130) 20 5.2 LCS2 1,3-5-Trimethylbenzene 5 5.09 ug/L 102 (70-130) 20 5.2 LCS2 1,3-5-Dichloropropane 5 5.99 ug/L 102 (70-130) 20 5.2 LCS2 1,3-Dichlo	MBLK	1,2-Dichloroethane-d4 (S)			98.6	%	99	(70-130)		
LCS11,2-Dichloropropane54.64ug/L93(7-130)200.43LCS21,2-Dichloropropane<	MRL_CHK	1,2-Dichloroethane-d4 (S)		5	102	%	102	(70-130)		
LCS2 1,2-Dichloropropane 5 4.66 ug/L 93 70-130 20 0.43 MBLK 1,2-Dichloropropane <0.5	MRLLW	1,2-Dichloroethane-d4 (S)		5	99.6	%	100	(70-130)		
MBLK1,2-Dichloropropane <th< td=""><td>LCS1</td><td>1,2-Dichloropropane</td><td></td><td>5</td><td>4.64</td><td>ug/L</td><td>93</td><td>(70-130)</td><td></td><td></td></th<>	LCS1	1,2-Dichloropropane		5	4.64	ug/L	93	(70-130)		
NRL_CHK1,2-Dichloropropane0.50.490ug/L98(50-150)LCS11,3,5-Timethylbenzene55.08ug/L102(70-130)200.39MBLK1,3,5-Timethylbenzene55.10ug/L102(70-130)200.39MBLK1,3,5-Timethylbenzene0.50.470ug/L94(50-150)1.21.2LCS11,3-Dichloropropane55.09ug/L102(70-130)205.2LCS21,3-Dichloropropane55.09ug/L102(70-130)205.2MBLK1,3-Dichloropropane54.83ug/L97(70-130)205.2MBLK1,3-Dichloropropane50.530ug/L104(50-150)1.21.2LCS22,2-Dichloropropane54.96ug/L99(70-130)200.81LCS12,2-Dichloropropane54.92ug/L910.130)1.81.8LCS22,2-Dichloropropane54.96ug/L910.130)0.811.8LCS22,2-Dichloropropane54.92ug/L910.13000.811.8MBLK2,2-Dichloropropane54.92ug/L14(50-150)1.81.8MBLK2,2-Dichloropropane55.5ug/L14(50-150)1.81.8MBLK2,2-Dichloropropane55.5ug/L14(50-150)1.8 </td <td>LCS2</td> <td>1,2-Dichloropropane</td> <td></td> <td>5</td> <td>4.66</td> <td>ug/L</td> <td>93</td> <td>(70-130)</td> <td>20</td> <td>0.43</td>	LCS2	1,2-Dichloropropane		5	4.66	ug/L	93	(70-130)	20	0.43
LCS1 1,3,5-Trimethylbenzene 5 5.08 ug/L 102 (70-130) 20 0.39 LCS2 1,3,5-Trimethylbenzene 5 5.10 ug/L 102 (70-130) 20 0.39 MBLK 1,3,5-Trimethylbenzene 5 5.10 ug/L 102 (70-130) 20 0.39 MRL_CHK 1,3,5-Trimethylbenzene 0.5 0.470 ug/L 94 (50-150) 20 0.39 LCS1 1,3-Dichloropropane 5 0.97 ug/L 94 (50-150) 20 5.2 LCS2 1,3-Dichloropropane 5 0.97 ug/L 102 (70-130) 20 5.2 MBLK 1,3-Dichloropropane 5 9.9 ug/L 106 (50-150) 5.2 MRL_CHK 1,3-Dichloropropane 5.3 0.530 ug/L 99 (70-130) 20 0.81 LCS1 2,2-Dichloropropane 5 4.92 ug/L 98 (70-130) 20 0.81 LCS2 2,2-Dichloropropane 5 0.570 ug/L	MBLK	1,2-Dichloropropane			<0.5	ug/L				
LCS2 1,3,5-Trimethylbenzene 5 5.10 ug/L 102 (70-130) 20 0.39 MBLK 1,3,5-Trimethylbenzene <.5.0	MRL_CHK	1,2-Dichloropropane		0.5	0.490	ug/L	98	(50-150)		
MBLK 1,3,5-Trimethylbenzene <0.5 ug/L MRL_CHK 1,3,5-Trimethylbenzene 0.5 0.470 ug/L 94 (50-150) LCS1 1,3-Dichloropropane 5 5.09 ug/L 102 (70-130) 20 5.2 LCS2 1,3-Dichloropropane 5 4.83 ug/L 97 (70-130) 20 5.2 MBLK 1,3-Dichloropropane 5 0.530 ug/L 106 (50-150) 5.2 MBLK 1,3-Dichloropropane 0.5 0.530 ug/L 106 (50-150) 5.2 MRL_CHK 1,3-Dichloropropane 0.5 0.530 ug/L 106 (50-150) 5.2 LCS1 2,2-Dichloropropane 5 4.96 ug/L 99 (70-130) 20 0.81 LCS2 2,2-Dichloropropane 5 4.92 ug/L 98 (70-130) 20 0.81 MBLK 2,2-Dichloropropane 5.5 ug/L ug/L 114 (50-150) MBLK 2,2-Dichloropropane 0.5 0.570 ug/L	LCS1	1,3,5-Trimethylbenzene		5	5.08	ug/L	102	(70-130)		
MRL_CHK 1,3,5-Trimethylbenzene 0.5 0.470 ug/L 94 (50-150) LCS1 1,3-Dichloropropane 5 5.09 ug/L 102 (70-130) 20 5.2 LCS2 1,3-Dichloropropane 5 4.83 ug/L 97 (70-130) 20 5.2 MBLK 1,3-Dichloropropane 0.5 0.530 ug/L 106 (50-150) 5.2 MRL_CHK 1,3-Dichloropropane 0.5 0.530 ug/L 106 (50-150) 5.2 LCS1 2,2-Dichloropropane 5 4.96 ug/L 99 (70-130) 20 0.81 LCS2 2,2-Dichloropropane 5 4.96 ug/L 98 (70-130) 20 0.81 MBLK 2,2-Dichloropropane 5 4.92 ug/L 98 (70-130) 20 0.81 MBLK 2,2-Dichloropropane 5 5.5 ug/L 114 (50-150) MBLK 2,2-Dichloropropane 0.5 0.570 ug/L 114 (50-150) 11	LCS2	1,3,5-Trimethylbenzene		5	5.10	ug/L	102	(70-130)	20	0.39
LCS11,3-Dichloropropane55.09ug/L102(70-130)205.2LCS21,3-Dichloropropane54.83ug/L97(70-130)205.2MBLK1,3-Dichloropropane-0.5ug/Lug/LMRL_CHK1,3-Dichloropropane0.50.530ug/L106(50-150)LCS12,2-Dichloropropane54.92ug/L99(70-130)200.81LCS22,2-Dichloropropane54.92ug/L98(70-130)200.81MBLK2,2-Dichloropropane5.5ug/LNBLK2,2-Dichloropropane0.50.570ug/L114(50-150)	MBLK	1,3,5-Trimethylbenzene			<0.5	ug/L				
LCS2 1,3-Dichloropropane 5 4.83 ug/L 97 (70-130) 20 5.2 MBLK 1,3-Dichloropropane <0.5	MRL_CHK	1,3,5-Trimethylbenzene		0.5	0.470	ug/L	94	(50-150)		
MBLK 1,3-Dichloropropane <0.5	LCS1	1,3-Dichloropropane		5	5.09	ug/L	102	(70-130)		
MRL_CHK 1,3-Dichloropropane 0.5 0.530 ug/L 106 (50-150) LCS1 2,2-Dichloropropane 5 4.96 ug/L 99 (70-130) LCS2 2,2-Dichloropropane 5 4.92 ug/L 98 (70-130) 20 0.81 MBLK 2,2-Dichloropropane <	LCS2	1,3-Dichloropropane		5	4.83	ug/L	97	(70-130)	20	5.2
LCS1 2,2-Dichloropropane 5 4.96 ug/L 99 (70-130) 20 0.81 LCS2 2,2-Dichloropropane 5 4.92 ug/L 98 (70-130) 20 0.81 MBLK 2,2-Dichloropropane <	MBLK	1,3-Dichloropropane			<0.5	ug/L				
LCS2 2,2-Dichloropropane 5 4.92 ug/L 98 (70-130) 20 0.81 MBLK 2,2-Dichloropropane <0.5	MRL_CHK	1,3-Dichloropropane		0.5	0.530	ug/L	106	(50-150)		
MBLK 2,2-Dichloropropane <0.5 ug/L MRL_CHK 2,2-Dichloropropane 0.5 0.570 ug/L 114 (50-150)	LCS1	2,2-Dichloropropane		5	4.96	ug/L	99	(70-130)		
MRL_CHK 2,2-Dichloropropane 0.5 0.570 ug/L 114 (50-150)	LCS2	2,2-Dichloropropane		5	4.92	ug/L	98	(70-130)	20	0.81
	MBLK	2,2-Dichloropropane			<0.5	ug/L				
LCS1 2-Butanone (MEK) 50 49.8 ug/L 100 (70-130)	MRL_CHK	2,2-Dichloropropane		0.5	0.570	ug/L	114	(50-150)		
	LCS1	2-Butanone (MEK)		50	49.8	ug/L	100	(70-130)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	2-Butanone (MEK)		50	48.8	ug/L	98	(70-130)	20	2.0
MBLK	2-Butanone (MEK)			<5.0	ug/L				
MRL_CHK	2-Butanone (MEK)		5	4.99	ug/L	100	(50-150)		
LCS1	4-Bromofluorobenzene (S)		5	103	%	103	(70-130)		
LCS2	4-Bromofluorobenzene (S)		5	103	%	103	(70-130)		
MBLK	4-Bromofluorobenzene (S)			95.6	%	96	(70-130)		
MRL_CHK	4-Bromofluorobenzene (S)		5	99.4	%	99	(70-130)		
MRLLW	4-Bromofluorobenzene (S)		5	97.8	%	98	(70-130)		
LCS1	4-Methyl-2-Pentanone (MIBK)		50	52.0	ug/L	104	(70-130)		
LCS2	4-Methyl-2-Pentanone (MIBK)		50	50.7	ug/L	101	(70-130)	20	2.5
MBLK	4-Methyl-2-Pentanone (MIBK)			<5.0	ug/L				
MRL_CHK	4-Methyl-2-Pentanone (MIBK)		5	4.97	ug/L	99	(50-150)		
LCS1	Benzene		5	5.01	ug/L	100	(70-130)		
LCS2	Benzene		5	4.87	ug/L	97	(70-130)	20	2.8
MBLK	Benzene			<0.5	ug/L				
MRL_CHK	Benzene		0.5	0.500	ug/L	100	(50-150)		
LCS1	Bromobenzene		5	5.10	ug/L	102	(70-130)		
LCS2	Bromobenzene		5	5.01	ug/L	100	(70-130)	20	1.8
MBLK	Bromobenzene			<0.5	ug/L				
MRL_CHK	Bromobenzene		0.5	0.430	ug/L	86	(50-150)		
LCS1	Bromochloromethane		5	5.30	ug/L	106	(70-130)		
LCS2	Bromochloromethane		5	5.21	ug/L	104	(70-130)	20	1.7
MBLK	Bromochloromethane			<0.5	ug/L				
MRL_CHK	Bromochloromethane		0.5	0.500	ug/L	100	(50-150)		
LCS1	Bromodichloromethane		5	4.91	ug/L	98	(70-130)		
LCS2	Bromodichloromethane		5	4.68	ug/L	94	(70-130)	20	4.8
MBLK	Bromodichloromethane			<0.5	ug/L				
MRL_CHK	Bromodichloromethane		0.5	0.430	ug/L	86	(50-150)		
LCS1	Bromoethane		5	4.75	ug/L	95	(70-130)		
LCS2	Bromoethane		5	4.78	ug/L	96	(70-130)	20	0.63
MBLK	Bromoethane			<0.5	ug/L				
MRL_CHK	Bromoethane		0.5	0.490	ug/L	98	(50-150)		
LCS1	Bromoform		5	4.80	ug/L	96	(70-130)		
LCS2	Bromoform		5	4.98	ug/L	100	(70-130)	20	3.7
MBLK	Bromoform			<0.5	ug/L				
MRL_CHK	Bromoform		0.5	0.670	ug/L	134	(50-150)		
LCS1	Bromomethane (Methyl Bromide)		5	5.55	ug/L	111	(70-130)		
LCS2	Bromomethane (Methyl Bromide)		5	5.23	ug/L	105	(70-130)	20	5.9

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	Bromomethane (Methyl Bromide)			<0.5	ug/L				
MRL_CHK	Bromomethane (Methyl Bromide)		0.5	0.740	ug/L	148	(50-150)		
LCS1	Carbon disulfide		5	4.77	ug/L	95	(70-130)		
LCS2	Carbon disulfide		5	4.79	ug/L	96	(70-130)	20	0.42
MBLK	Carbon disulfide			<0.5	ug/L				
MRL_CHK	Carbon disulfide		0.5	0.460	ug/L	92	(50-150)		
LCS1	Carbon Tetrachloride		5	4.65	ug/L	93	(70-130)		
LCS2	Carbon Tetrachloride		5	4.33	ug/L	87	(70-130)	20	7.1
MBLK	Carbon Tetrachloride			<0.5	ug/L				
MRL_CHK	Carbon Tetrachloride		0.5	0.390	ug/L	78	(50-150)		
LCS1	Chlorobenzene		5	5.02	ug/L	100	(70-130)		
LCS2	Chlorobenzene		5	4.99	ug/L	100	(70-130)	20	0.60
MBLK	Chlorobenzene			<0.5	ug/L				
MRL_CHK	Chlorobenzene		0.5	0.500	ug/L	100	(50-150)		
LCS1	Chlorodibromomethane		5	5.03	ug/L	101	(70-130)		
LCS2	Chlorodibromomethane		5	5.04	ug/L	101	(70-130)	20	0.20
MBLK	Chlorodibromomethane			<0.5	ug/L				
MRL_CHK	Chlorodibromomethane		0.5	0.600	ug/L	120	(50-150)		
LCS1	Chloroethane		5	5.06	ug/L	101	(70-130)		
LCS2	Chloroethane		5	4.50	ug/L	90	(70-130)	20	12
MBLK	Chloroethane			<0.5	ug/L				
MRL_CHK	Chloroethane		0.5	0.540	ug/L	108	(50-150)		
LCS1	Chloroform (Trichloromethane)		5	4.81	ug/L	96	(70-130)		
LCS2	Chloroform (Trichloromethane)		5	4.75	ug/L	95	(70-130)	20	1.3
MBLK	Chloroform (Trichloromethane)			<0.5	ug/L				
MRL_CHK	Chloroform (Trichloromethane)		0.5	0.510	ug/L	102	(50-150)		
LCS1	Chloromethane(Methyl Chloride)		5	4.45	ug/L	89	(70-130)		
LCS2	Chloromethane(Methyl Chloride)		5	4.82	ug/L	96	(70-130)	20	8.0
MBLK	Chloromethane(Methyl Chloride)			<0.5	ug/L				
MRL_CHK	Chloromethane(Methyl Chloride)		0.5	0.540	ug/L	108	(50-150)		
LCS1	cis-1,2-Dichloroethylene		5	4.64	ug/L	93	(70-130)		
LCS2	cis-1,2-Dichloroethylene		5	4.80	ug/L	96	(70-130)	20	3.4
MBLK	cis-1,2-Dichloroethylene			<0.5	ug/L				
MRL_CHK	cis-1,2-Dichloroethylene		0.5	0.480	ug/L	96	(50-150)		
LCS1	cis-1,3-Dichloropropene		5	4.93	ug/L	99	(70-130)		
LCS2	cis-1,3-Dichloropropene		5	4.83	ug/L	97	(70-130)	20	2.0
MBLK	cis-1,3-Dichloropropene			<0.5	ug/L				
MRL_CHK	cis-1,3-Dichloropropene		0.5	0.440	ug/L	88	(50-150)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	Dibromomethane		5	4.94	ug/L	99	(70-130)		
LCS2	Dibromomethane		5	4.79	ug/L	96	(70-130)	20	3.1
MBLK	Dibromomethane			<0.5	ug/L				
MRL_CHK	Dibromomethane		0.5	0.490	ug/L	98	(50-150)		
LCS1	Dichlorodifluoromethane		5	4.48	ug/L	90	(70-130)		
LCS2	Dichlorodifluoromethane		5	4.49	ug/L	90	(70-130)	20	0.22
MBLK	Dichlorodifluoromethane			<0.5	ug/L				
MRL_CHK	Dichlorodifluoromethane		0.5	0.440	ug/L	88	(50-150)		
LCS1	Dichloromethane		5	4.52	ug/L	90	(70-130)		
LCS2	Dichloromethane		5	4.54	ug/L	91	(70-130)	20	0.44
MBLK	Dichloromethane			<0.5	ug/L				
MRL_CHK	Dichloromethane		0.5	0.470	ug/L	94	(50-150)		
LCS1	Di-isopropyl ether		5	4.93	ug/L	99	(70-130)		
LCS2	Di-isopropyl ether		5	4.87	ug/L	97	(70-130)	20	1.2
MBLK	Di-isopropyl ether			<3.0	ug/L				
MRL_CHK	Di-isopropyl ether		0.5	0.500	ug/L	100	(50-150)		
LCS1	Ethyl benzene		5	5.19	ug/L	104	(70-130)		
LCS2	Ethyl benzene		5	4.95	ug/L	99	(70-130)	20	4.7
MBLK	Ethyl benzene			<0.5	ug/L				
MRL_CHK	Ethyl benzene		0.5	0.500	ug/L	100	(50-150)		
LCS1	Hexachlorobutadiene		5	5.04	ug/L	101	(70-130)		
LCS2	Hexachlorobutadiene		5	4.73	ug/L	95	(70-130)	20	6.3
MBLK	Hexachlorobutadiene			<0.5	ug/L				
MRL_CHK	Hexachlorobutadiene		0.5	0.480	ug/L	96	(50-150)		
LCS1	Isopropylbenzene		5	5.04	ug/L	101	(70-130)		
LCS2	Isopropylbenzene		5	4.97	ug/L	99	(70-130)	20	1.4
MBLK	Isopropylbenzene			<0.5	ug/L				
MRL_CHK	Isopropylbenzene		0.5	0.470	ug/L	94	(50-150)		
LCS1	m,p-Xylenes		10	10.5	ug/L	105	(70-130)		
LCS2	m,p-Xylenes		10	10.0	ug/L	100	(70-130)	20	4.9
MBLK	m,p-Xylenes			<0.5	ug/L				
MRL_CHK	m,p-Xylenes		1	1.03	ug/L	103	(50-150)		
MRLLW	m,p-Xylenes		0.5	0.520	ug/L	104	(50-150)		
LCS1	m-Dichlorobenzene (1,3-DCB)		5	4.98	ug/L	100	(70-130)		
LCS2	m-Dichlorobenzene (1,3-DCB)		5	5.07	ug/L	101	(70-130)	20	1.8
MBLK	m-Dichlorobenzene (1,3-DCB)			<0.5	ug/L				
MRL_CHK	m-Dichlorobenzene (1,3-DCB)		0.5	0.510	ug/L	102	(50-150)		
LCS1	Methyl Tert-butyl ether (MTBE)		5	4.73	ug/L	95	(70-130)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	Methyl Tert-butyl ether (MTBE)		5	4.68	ug/L	94	(70-130)	20	1.1
MBLK	Methyl Tert-butyl ether (MTBE)			<0.5	ug/L				
MRL_CHK	Methyl Tert-butyl ether (MTBE)		0.5	0.470	ug/L	94	(50-150)		
LCS1	Naphthalene		5	5.16	ug/L	103	(70-130)		
LCS2	Naphthalene		5	4.85	ug/L	97	(70-130)	20	6.2
MBLK	Naphthalene			<0.5	ug/L				
MRL_CHK	Naphthalene		0.5	0.460	ug/L	92	(50-150)		
LCS1	n-Butylbenzene		5	5.20	ug/L	104	(70-130)		
LCS2	n-Butylbenzene		5	4.89	ug/L	98	(70-130)	20	6.1
MBLK	n-Butylbenzene			<0.5	ug/L				
MRL_CHK	n-Butylbenzene		0.5	0.480	ug/L	96	(50-150)		
LCS1	n-Propylbenzene		5	5.14	ug/L	103	(70-130)		
LCS2	n-Propylbenzene		5	5.13	ug/L	103	(70-130)	20	0.20
MBLK	n-Propylbenzene			<0.5	ug/L				
MRL_CHK	n-Propylbenzene		0.5	0.460	ug/L	92	(50-150)		
LCS1	o-Chlorotoluene		5	5.07	ug/L	101	(70-130)		
LCS2	o-Chlorotoluene		5	5.07	ug/L	101	(70-130)	20	0.0
MBLK	o-Chlorotoluene			<0.5	ug/L				
MRL_CHK	o-Chlorotoluene		0.5	0.510	ug/L	102	(50-150)		
LCS1	o-Dichlorobenzene (1,2-DCB)		5	5.22	ug/L	104	(70-130)		
LCS2	o-Dichlorobenzene (1,2-DCB)		5	4.89	ug/L	98	(70-130)	20	6.5
MBLK	o-Dichlorobenzene (1,2-DCB)			<0.5	ug/L				
MRL_CHK	o-Dichlorobenzene (1,2-DCB)		0.5	0.500	ug/L	100	(50-150)		
LCS1	o-Xylene		5	5.35	ug/L	107	(70-130)		
LCS2	o-Xylene		5	5.29	ug/L	106	(70-130)	20	1.1
MBLK	o-Xylene			<0.5	ug/L				
MRL_CHK	o-Xylene		0.5	0.480	ug/L	96	(50-150)		
LCS1	p-Chlorotoluene		5	5.09	ug/L	102	(70-130)		
LCS2	p-Chlorotoluene		5	5.14	ug/L	103	(70-130)	20	0.98
MBLK	p-Chlorotoluene			<0.5	ug/L				
MRL_CHK	p-Chlorotoluene		0.5	0.510	ug/L	102	(50-150)		
LCS1	p-Dichlorobenzene (1,4-DCB)		5	4.96	ug/L	99	(70-130)		
LCS2	p-Dichlorobenzene (1,4-DCB)		5	4.95	ug/L	99	(70-130)	20	0.20
MBLK	p-Dichlorobenzene (1,4-DCB)			<0.5	ug/L				
MRL_CHK	p-Dichlorobenzene (1,4-DCB)		0.5	0.510	ug/L	102	(50-150)		
LCS1	p-Isopropyltoluene		5	5.02	ug/L	100	(70-130)		
LCS2	p-Isopropyltoluene		5	5.14	ug/L	103	(70-130)	20	2.4
MBLK	p-Isopropyltoluene			<0.5	ug/L				

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	p-Isopropyltoluene		0.5	0.480	ug/L	96	(50-150)		
LCS1	sec-Butylbenzene		5	5.03	ug/L	101	(70-130)		
LCS2	sec-Butylbenzene		5	5.05	ug/L	101	(70-130)	20	0.40
MBLK	sec-Butylbenzene			<0.5	ug/L				
MRL_CHK	sec-Butylbenzene		0.5	0.470	ug/L	94	(50-150)		
LCS1	Styrene		5	5.31	ug/L	106	(70-130)		
_CS2	Styrene		5	5.14	ug/L	103	(70-130)	20	3.3
MBLK	Styrene			<0.5	ug/L				
MRL_CHK	Styrene		0.5	0.490	ug/L	98	(50-150)		
LCS1	tert-amyl Methyl Ether		5	5.11	ug/L	102	(70-130)		
LCS2	tert-amyl Methyl Ether		5	5.02	ug/L	100	(70-130)	20	1.8
MBLK	tert-amyl Methyl Ether			<3.0	ug/L				
MRL_CHK	tert-amyl Methyl Ether		0.5	0.530	ug/L	106	(50-150)		
LCS1	tert-Butyl Ethyl Ether		5	5.02	ug/L	100	(70-130)		
LCS2	tert-Butyl Ethyl Ether		5	4.95	ug/L	99	(70-130)	20	1.4
MBLK	tert-Butyl Ethyl Ether			<3.0	ug/L				
MRL_CHK	tert-Butyl Ethyl Ether		0.5	0.470	ug/L	94	(50-150)		
_CS1	tert-Butylbenzene		5	5.04	ug/L	101	(70-130)		
_CS2	tert-Butylbenzene		5	4.97	ug/L	99	(70-130)	20	1.4
MBLK	tert-Butylbenzene			<0.5	ug/L				
MRL_CHK	tert-Butylbenzene		0.5	0.440	ug/L	88	(50-150)		
CS1	Tetrachloroethylene (PCE)		5	5.00	ug/L	100	(70-130)		
_CS2	Tetrachloroethylene (PCE)		5	4.63	ug/L	93	(70-130)	20	7.7
//BLK	Tetrachloroethylene (PCE)			<0.5	ug/L				
MRL_CHK	Tetrachloroethylene (PCE)		0.5	0.460	ug/L	92	(50-150)		
CS1	Toluene		5	5.09	ug/L	102	(70-130)		
CS2	Toluene		5	4.97	ug/L	99	(70-130)	20	2.4
MBLK	Toluene			<0.5	ug/L				
MRL_CHK	Toluene		0.5	0.550	ug/L	110	(50-150)		
_CS1	Toluene-d8 (S)		5	103	%	103	(70-130)		
_CS2	Toluene-d8 (S)		5	99.8	%	100	(70-130)		
//BLK	Toluene-d8 (S)			100	%	100	(70-130)		
MRL_CHK	Toluene-d8 (S)		5	99.4	%	99	(70-130)		
MRLLW	Toluene-d8 (S)		5	101	%	101	(70-130)		
LCS1	trans-1,2-Dichloroethylene		5	4.75	ug/L	95	(70-130)		
_CS2	trans-1,2-Dichloroethylene		5	4.61	ug/L	92	(70-130)	20	3.0
MBLK	trans-1,2-Dichloroethylene			<0.5	ug/L				
MRL_CHK	trans-1,2-Dichloroethylene		0.5	0.440	ug/L	88	(50-150)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	trans-1,3-Dichloropropene		5	5.23	ug/L	105	(70-130)		
LCS2	trans-1,3-Dichloropropene		5	5.04	ug/L	101	(70-130)	20	3.7
MBLK	trans-1,3-Dichloropropene			<0.5	ug/L				
MRL_CHK	trans-1,3-Dichloropropene		0.5	0.660	ug/L	132	(50-150)		
LCS1	Trichloroethylene (TCE)		5	4.99	ug/L	100	(70-130)		
LCS2	Trichloroethylene (TCE)		5	4.79	ug/L	96	(70-130)	20	4.1
MBLK	Trichloroethylene (TCE)			<0.5	ug/L				
MRL_CHK	Trichloroethylene (TCE)		0.5	0.500	ug/L	100	(50-150)		
LCS1	Trichlorofluoromethane		5	4.78	ug/L	96	(70-130)		
LCS2	Trichlorofluoromethane		5	4.66	ug/L	93	(70-130)	20	2.5
MBLK	Trichlorofluoromethane			<0.5	ug/L				
MRL_CHK	Trichlorofluoromethane		0.5	0.480	ug/L	96	(50-150)		
LCS1	Trichlorotrifluoroethane(Freon		5	4.82	ug/L	96	(70-130)		
LCS2	Trichlorotrifluoroethane(Freon		5	4.64	ug/L	93	(70-130)	20	3.8
MBLK	Trichlorotrifluoroethane(Freon			<0.5	ug/L				
MRL_CHK	Trichlorotrifluoroethane(Freon		0.5	0.340	ug/L	68	(50-150)		
LCS1	Vinyl chloride (VC)		5	4.66	ug/L	93	(70-130)		
LCS2	Vinyl chloride (VC)		5	4.50	ug/L	90	(70-130)	20	3.5
MBLK	Vinyl chloride (VC)			<0.3	ug/L				
MRL_CHK	Vinyl chloride (VC)		0.5	0.480	ug/L	96	(50-150)		
MRLLW	Vinyl chloride (VC)		0.25	0.230	ug/L	92	(50-150)		
Hexavalent Chrom	ium by 218.6 by EPA 218.6								
Analytical Ba	tch: 1174776					An	alysis Date:	05/29/2019	
LCS1	Hexavalent Chromium by 218.6		2	1.94	ug/L	97	(90-110)		
LCS2	Hexavalent Chromium by 218.6		2	1.93	ug/L	97	(90-110)	10	0.52
MBLK	Hexavalent Chromium by 218.6			<0.01	ug/L				
MRL_CHK	Hexavalent Chromium by 218.6		0.02	0.0203	ug/L	101	(50-150)		
MS_201905280765	Hexavalent Chromium by 218.6	15	2	17.4	ug/L	100	(90-110)		
MS_201905210146	Hexavalent Chromium by 218.6	2.0	2	4.00	ug/L	100	(90-110)		
MSD_201905210146	Hexavalent Chromium by 218.6	2.0	2	4.03	ug/L	102	(90-110)	15	0.68
MSD_201905280765	Hexavalent Chromium by 218.6	15	2	17.4	ug/L	99	(90-110)	15	0.18
Endothall by EPA	548.1								
Prep Batch:	1174382 Analytical Batch: 1174900					An	alysis Date:	05/31/2019	
LCS1	Endothall		25	18.3	ug/L	73	(66-117)		
LCS2	Endothall		25	21.5	ug/L	86	(66-117)	30	16
MBLK	Endothall			<5	ug/L				
MRL_CHK	Endothall		5	6.09	ug/L	122	(50-150)		

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MS_201905220600	Endothall	ND	25	15.2	ug/L	<u>61</u>	(66-117)		
MS_2ND_20190522002	7 Endothall	ND	25	22.6	ug/L	90	(66-117)		
MSD_201905220600	Endothall	ND	25	16.2	ug/L	<u>65</u>	(66-117)	30	5.9
Organochlorine Pe	esticides/PCBs by EPA 505								
Analytical Ba	atch: 1175303					An	alysis Date:	05/29/2019	
СССН	Alachlor (Alanex)		1	1.06	ug/L	106	(70-130)		
СССН	Alachlor (Alanex)		1	1.05	ug/L	105	(70-130)		
СССН	Alachlor (Alanex)		1	1.05	ug/L	105	(70-130)		
СССН	Alachlor (Alanex)		1	1.02	ug/L	102	(70-130)		
MBLK	Alachlor (Alanex)			<0.1	ug/L				
MRL_CHK	Alachlor (Alanex)		0.1	0.104	ug/L	104	(50-150)		
MS1_201905220010	Alachlor (Alanex)	ND	0.2	0.231	ug/L	116	(65-135)		
MS2_201906070515	Alachlor (Alanex)	ND	1	1.06	ug/L	106	(65-135)		
СССН	Aldrin		0.1	0.0960	ug/L	96	(70-130)		
СССН	Aldrin		0.1	0.0930	ug/L	93	(70-130)		
СССН	Aldrin		0.1	0.0977	ug/L	98	(70-130)		
СССН	Aldrin		0.1	0.0954	ug/L	95	(70-130)		
MBLK	Aldrin			<0.01	ug/L				
MRL_CHK	Aldrin		0.01	0.0105	ug/L	105	(50-150)		
MS1_201905220010	Aldrin	ND	0.02	0.0208	ug/L	104	(65-135)		
MS2_201906070515	Aldrin	ND	0.1	0.103	ug/L	103	(65-135)		
MBLK	Chlordane			<0.1	ug/L				
CCCH	Dieldrin		0.1	0.0988	ug/L	99	(70-130)		
CCCH	Dieldrin		0.1	0.0983	ug/L	98	(70-130)		
СССН	Dieldrin		0.1	0.0995	ug/L	100	(70-130)		
CCCH	Dieldrin		0.1	0.0953	ug/L	95	(70-130)		
MBLK	Dieldrin			<0.01	ug/L				
MRL_CHK	Dieldrin		0.01	0.0116	ug/L	116	(50-150)		
MS1_201905220010	Dieldrin	ND	0.02	0.0215	ug/L	108	(65-135)		
MS2_201906070515	Dieldrin	ND	0.1	0.102	ug/L	102	(65-135)		
СССН	Endrin		0.1	0.0987	ug/L	99	(70-130)		
СССН	Endrin		0.1	0.0944	ug/L	94	(70-130)		
СССН	Endrin		0.1	0.0989	ug/L	99	(70-130)		
СССН	Endrin		0.1	0.0974	ug/L	97	(70-130)		
MBLK	Endrin			<0.01	ug/L				
MRL_CHK	Endrin		0.01	0.0114	ug/L	114	(50-150)		
MS1_201905220010	Endrin	ND	0.02	0.0205	ug/L	102	(65-135)		
MS2_201906070515	Endrin	ND	0.1	0.101	ug/L	101	(65-135)		

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
СССН	Heptachlor		0.1	0.0994	ug/L	99	(70-130)		
CCCH	Heptachlor		0.1	0.0950	ug/L	95	(70-130)		
CCCH	Heptachlor		0.1	0.0956	ug/L	96	(70-130)		
CCCH	Heptachlor		0.1	0.0970	ug/L	97	(70-130)		
MBLK	Heptachlor			<0.01	ug/L				
MRL_CHK	Heptachlor		0.01	0.0104	ug/L	104	(50-150)		
MS1_201905220010	Heptachlor	ND	0.02	0.0206	ug/L	103	(65-135)		
MS2_201906070515	Heptachlor	ND	0.1	0.100	ug/L	100	(65-135)		
CCCH	Heptachlor Epoxide		0.1	0.0977	ug/L	98	(70-130)		
СССН	Heptachlor Epoxide		0.1	0.100	ug/L	100	(70-130)		
CCCH	Heptachlor Epoxide		0.1	0.0988	ug/L	99	(70-130)		
СССН	Heptachlor Epoxide		0.1	0.0994	ug/L	99	(70-130)		
MBLK	Heptachlor Epoxide			<0.01	ug/L				
MRL_CHK	Heptachlor Epoxide		0.01	0.00960	ug/L	96	(50-150)		
MS1_201905220010	Heptachlor Epoxide	ND	0.02	0.0206	ug/L	103	(65-135)		
MS2_201906070515	Heptachlor Epoxide	ND	0.1	0.103	ug/L	103	(65-135)		
СССН	Lindane (gamma-BHC)		0.1	0.0984	ug/L	98	(70-130)		
CCCH	Lindane (gamma-BHC)		0.1	0.103	ug/L	103	(70-130)		
СССН	Lindane (gamma-BHC)		0.1	0.0980	ug/L	98	(70-130)		
СССН	Lindane (gamma-BHC)		0.1	0.101	ug/L	101	(70-130)		
MBLK	Lindane (gamma-BHC)			<0.01	ug/L				
MRL_CHK	Lindane (gamma-BHC)		0.01	0.0125	ug/L	125	(50-150)		
MS1_201905220010	Lindane (gamma-BHC)	ND	0.02	0.0216	ug/L	108	(65-135)		
MS2_201906070515	Lindane (gamma-BHC)	ND	0.1	0.102	ug/L	102	(65-135)		
CCCH	Methoxychlor		0.5	0.399	ug/L	80	(70-130)		
CCCH	Methoxychlor		0.5	0.491	ug/L	98	(70-130)		
СССН	Methoxychlor		0.5	0.445	ug/L	89	(70-130)		
СССН	Methoxychlor		0.5	0.462	ug/L	93	(70-130)		
MBLK	Methoxychlor			<0.05	ug/L				
MRL_CHK	Methoxychlor		0.05	0.0518	ug/L	104	(50-150)		
MS1_201905220010	Methoxychlor	ND	0.1	0.113	ug/L	113	(65-135)		
MS2_201906070515	Methoxychlor	ND	0.5	0.466	ug/L	93	(65-135)		
MBLK	PCB 1016 Aroclor			<0.08	ug/L				
MBLK	PCB 1221 Aroclor			<0.1	ug/L				
MBLK	PCB 1232 Aroclor			<0.1	ug/L				
MBLK	PCB 1242 Aroclor			<0.1	ug/L				
MBLK	PCB 1248 Aroclor			<0.1	ug/L				
MBLK	PCB 1254 Aroclor			<0.1	ug/L				

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).

(S) - Indicates surrogate compound.
 (I) - Indicates internal standard compound.

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	PCB 1260 Aroclor			<0.1	ug/L				
CCCH	Tetrachlorometaxylene (S)			89.5	%	89	(70-130)		
CCCH	Tetrachlorometaxylene (S)			102	%	102	(70-130)		
СССН	Tetrachlorometaxylene (S)			103	%	103	(70-130)		
CCCH	Tetrachlorometaxylene (S)			91.1	%	91	(70-130)		
MBLK	Tetrachlorometaxylene (S)			103	%	103	(70-130)		
MRL_CHK	Tetrachlorometaxylene (S)			101	%	101	(70-130)		
MS1_201905220010	Tetrachlorometaxylene (S)			94.5	%	94	(70-130)		
MS2_201906070515	Tetrachlorometaxylene (S)			90.7	%	91	(70-130)		
СССН	Toxaphene		2.5	2.50	ug/L	100	(70-130)		
СССН	Toxaphene		2.5	2.35	ug/L	94	(70-130)		
MBLK	Toxaphene			<0.5	ug/L				
MRL_CHK	Toxaphene		0.5	0.562	ug/L	112	(50-150)		
MS1_201905220010	Toxaphene	ND	2.5	2.50	ug/L	100	(65-135)		
MS2_201906070515	Toxaphene	ND	2.5	2.50	ug/L	100	(65-135)		
Mercury Total by E	PA 245.1								
	atch: 1175326					An	alysis Date:	05/31/2019	
LCS1	Mercury		1.5	1.60	ug/L	107	(90-110)		
LCS2	Mercury		1.5	1.59	ug/L	106	(90-110)	20	0.63
MBLK	Mercury			<0.1	ug/L				
MRL_CHK	Mercury		0.2	0.189	ug/L	95	(50-150)		
MS_201905220010	Mercury	ND	1.5	1.64	ug/L	108	(70-130)		
MS2_201905220663	Mercury	ND	1.5	1.56	ug/L	104	(70-130)		
MSD_201905220010	Mercury	ND	1.5	1.86	ug/L	123	(70-130)	20	13
MSD2_201905220663	Mercury	ND	1.5	1.59	ug/L	106	(70-130)	20	1.6
Aldicarbs by EPA	531.2								
Analytical Ba						An	alysis Date:	06/03/2019	
СССН	3-Hydroxycarbofuran		25	24.7	ug/L	99	(70-130)		
CCCM	3-Hydroxycarbofuran		10	9.99	ug/L	100	(70-130)		
LCS	3-Hydroxycarbofuran		5	5.48	ug/L	110	(70-130)		
MBLK	3-Hydroxycarbofuran			<0.167	ug/L		. ,		
MRL_CHK	3-Hydroxycarbofuran		0.5	0.535	ug/L	107	(50-150)		
_ MS1_201905300029	3-Hydroxycarbofuran	ND	5	5.76	ug/L	115	(70-130)		
	3-Hydroxycarbofuran	ND	5	5.73	ug/L	115	(70-130)	20	0.50
СССН	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate	(99.0	%	99	(70-130)		
CCCM	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate	-		98.7	%	99	(70-130)		
LCS	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate	(;		109	%	109	(70-130)		
		-							

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate	(107	%	107	(70-130)		
MRL_CHK	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate	(:	100	103	%	103	(70-130)		
MS1_201905300029	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate	(:		99.1	%	99	(70-130)		
MSD1_201905300029	4-Bromo-3,5-dimethylphenyl-N-methylcarbamate	(:		96.9	%	97	(70-130)		
CCCH	Aldicarb (Temik)		25	22.2	ug/L	89	(70-130)		
CCCM	Aldicarb (Temik)		10	8.85	ug/L	89	(70-130)		
LCS	Aldicarb (Temik)		5	4.73	ug/L	95	(70-130)		
MBLK	Aldicarb (Temik)			<0.167	ug/L				
MRL_CHK	Aldicarb (Temik)		0.5	0.443	ug/L	89	(50-150)		
MS1_201905300029	Aldicarb (Temik)	ND	5	5.59	ug/L	112	(70-130)		
MSD1_201905300029	Aldicarb (Temik)	ND	5	5.43	ug/L	109	(70-130)	20	3.0
CCCH	Aldicarb sulfone		25	24.7	ug/L	99	(70-130)		
CCCM	Aldicarb sulfone		10	10.1	ug/L	101	(70-130)		
LCS	Aldicarb sulfone		5	5.39	ug/L	108	(70-130)		
MBLK	Aldicarb sulfone			<0.167	ug/L				
MRL_CHK	Aldicarb sulfone		0.5	0.524	ug/L	105	(50-150)		
MS1_201905300029	Aldicarb sulfone	ND	5	5.77	ug/L	115	(70-130)		
MSD1_201905300029	Aldicarb sulfone	ND	5	5.83	ug/L	117	(70-130)	20	1.0
CCCH	Aldicarb sulfoxide		25	23.8	ug/L	95	(70-130)		
CCCM	Aldicarb sulfoxide		10	9.58	ug/L	96	(70-130)		
LCS	Aldicarb sulfoxide		5	4.63	ug/L	93	(70-130)		
MBLK	Aldicarb sulfoxide			<0.167	ug/L				
MRL_CHK	Aldicarb sulfoxide		0.5	0.462	ug/L	92	(50-150)		
MS1_201905300029	Aldicarb sulfoxide	ND	5	5.74	ug/L	115	(70-130)		
MSD1_201905300029	Aldicarb sulfoxide	ND	5	5.85	ug/L	117	(70-130)	20	1.8
СССН	Baygon		25	24.5	ug/L	98	(70-130)		
CCCM	Baygon		10	10.1	ug/L	101	(70-130)		
LCS	Baygon		5	4.90	ug/L	98	(70-130)		
MBLK	Baygon			<0.167	ug/L				
MRL_CHK	Baygon		0.5	0.451	ug/L	90	(50-150)		
MS1_201905300029	Baygon	ND	5	5.68	ug/L	114	(70-130)		
MSD1_201905300029	Baygon	ND	5	5.67	ug/L	113	(70-130)	20	0.23
СССН	Carbaryl		25	24.8	ug/L	99	(70-130)		
CCCM	Carbaryl		10	9.83	ug/L	98	(70-130)		
LCS	Carbaryl		5	5.26	ug/L	105	(70-130)		
MBLK	Carbaryl			<0.167	ug/L				
MBLK MRL_CHK	Carbaryl Carbaryl		0.5	<0.167 0.493	ug/L ug/L	99	(50-150)		

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

MED1_20190530029 Cartholyan (Furadan) ND 5 5.51 ugl. 110 (70-130) 20 0.81 CCCH Cartholuran (Furadan) 25 24.7 ugl. 103 (70-130) (70-130) LCS Cartholuran (Furadan) 10 10.3 ugl. 97 (70-130) MEL_CHK Cartholuran (Furadan) 0.5 0.516 ugl. 103 (60-150) MEL_CHK Cartholuran (Furadan) ND 5 5.53 ugl. 113 (70-130) 20 0.73 MSD1201905300229 Cartholuran (Furadan) ND 5 5.53 ugl. 100 (70-130) 20 0.73 CCCH Methiocarb 25 2.49 ugl. 100 (70-130) 0 </th <th>QC Туре</th> <th>Analyte</th> <th>Native</th> <th>Spiked</th> <th>Recovered</th> <th>Units</th> <th>Yield (%)</th> <th>Limits (%)</th> <th>RPDLimit (%)</th> <th>RPD%</th>	QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
CCMGebotran (Fundam)InI	MSD1_201905300029	Carbaryl	ND	5	5.51	ug/L	110	(70-130)	20	0.61
LGSGaloiran (undami)5SS999	CCCH	Carbofuran (Furadan)		25	24.7	ug/L	99	(70-130)		
MBLK MRL_CHKCathofuran (Furadam) <td>CCCM</td> <td>Carbofuran (Furadan)</td> <td></td> <td>10</td> <td>10.3</td> <td>ug/L</td> <td>103</td> <td>(70-130)</td> <td></td> <td></td>	CCCM	Carbofuran (Furadan)		10	10.3	ug/L	103	(70-130)		
NRL_CHKCatoduran (Furadam)ND50.510upl13(50.15)MSD 20100530020Catoduran (Furadam)ND56.50upl13(70.13)MSD 20100530020Catoduran (Furadam)ND56.50upl10(70.13)	LCS	Carbofuran (Furadan)		5	4.85	ug/L	97	(70-130)		
MSI 20190330029Canoduran (Furadam)ND5633ugL13(70-130).MSD 20190330029Canoduran (Furadam)ND55.90ugL100(70-130)	MBLK	Carbofuran (Furadan)			<0.167	ug/L				
ND1 2019030000Carolina (Fundam)NDSSS9597 </td <td>MRL_CHK</td> <td>Carbofuran (Furadan)</td> <td></td> <td>0.5</td> <td>0.516</td> <td>ug/L</td> <td>103</td> <td>(50-150)</td> <td></td> <td></td>	MRL_CHK	Carbofuran (Furadan)		0.5	0.516	ug/L	103	(50-150)		
CCA CCA MethicarbMethicarb2524.9ugl10(70-130)	MS1_201905300029	Carbofuran (Furadan)	ND	5	5.63	ug/L	113	(70-130)		
CCCMMethicarb109.7	MSD1_201905300029	Carbofuran (Furadan)	ND	5	5.59	ug/L	112	(70-130)	20	0.73
LSAMethoanh55.70.7 <th< td=""><td>СССН</td><td>Methiocarb</td><td></td><td>25</td><td>24.9</td><td>ug/L</td><td>100</td><td>(70-130)</td><td></td><td></td></th<>	СССН	Methiocarb		25	24.9	ug/L	100	(70-130)		
MRL MRL_GNRMethoandN6.1679.179.189.1619.149.161 <td>CCCM</td> <td>Methiocarb</td> <td></td> <td>10</td> <td>9.87</td> <td>ug/L</td> <td>99</td> <td>(70-130)</td> <td></td> <td></td>	CCCM	Methiocarb		10	9.87	ug/L	99	(70-130)		
MRL_CHKMethiocarb0,50,618vit 0,5124(50-150)MS1_20190530029MethiocarbND55,42ugL108(70-130)22.0MSD_20190530029MethiocarbND55,31ugL0(70-130)22.0CCCHMethomyI1088,61ugL86(70-130)LCSMethomyI108,61ugL91(70-130)MRL_CHKMethomyI050,568ugL91(70-130)MS1_20190530029MethomyIND50,568ugL111(70-130)22.7MS1_20190530029MethomyIND55,53ugL111(70-130)22.7CCCHWamyI (Vydate)ND55,63ugL111(70-130)22.7CCHWamyI (Vydate)109,640ugL10(70-130)MSL_10190530029MethomyI (Vydate)109,640ugL11(70-130)20,631MSL_10190530029NamyI (Vydate)ND55,74ugL13(50-150)MSL_10190530029NamyI (Vydate)ND55,74ugL13(50-150)MSL_10190530029NamyI (Vydate)ND55,74ugL13(50-150)MSL_10190530029 <td>LCS</td> <td>Methiocarb</td> <td></td> <td>5</td> <td>5.37</td> <td>ug/L</td> <td>107</td> <td>(70-130)</td> <td></td> <td></td>	LCS	Methiocarb		5	5.37	ug/L	107	(70-130)		
Main Mathematic M	MBLK	Methiocarb			<0.167	ug/L				
NDQ101905300029MethicarabND55.31ugiL106(70.130)202.0CCCHMethomyI252.07ugiL83(70.130) <td>MRL_CHK</td> <td>Methiocarb</td> <td></td> <td>0.5</td> <td>0.618</td> <td>ug/L</td> <td>124</td> <td>(50-150)</td> <td></td> <td></td>	MRL_CHK	Methiocarb		0.5	0.618	ug/L	124	(50-150)		
CCCHMethomyI252.07ugl83(70-130)CCCMMethomyI108.61ugl86(70-130)LCSMethomyI54.56ugl91(70-130)MRLMethomyI0.55.68ugl71(50-150)MRL_CHKMethomyIND55.80ugl114(70-130)202.7MSD1_20190530029MethomyIND55.80ugl111(70-130)202.7CCCHOxamy (Vydate)ND55.81ugl92(70-130)22.7CCMOxamy (Vydate)109.46ugl95(70-130)22.7MRL_CHKOxamy (Vydate)109.46ugl95(70-130)22.7MRL_CHKOxamy (Vydate)109.43ugl87(50-150)11MS1_201905300029Oxamy (Vydate)ND55.84ugl87(50-150)11.45MRL_CHKOxamy (Vydate)ND55.84ugl117(70-130)20.45MS1_201905300029Oxamy (Vydate)ND55.84ugl117(70-130)20.45MS1_201905300029Oxamy (Vydate)ND55.84ugl117(70-130)20.45MS1_201905300029Oxamy (Vydate)ND55.84ugl117(70-130)20.45D12_019052010912_010	MS1_201905300029	Methiocarb	ND	5	5.42	ug/L	108	(70-130)		
CCCMMethonyl108.61ug/L86(70-130)LCSMethomyl54.56ug/L91(70-130)	MSD1_201905300029	Methiocarb	ND	5	5.31	ug/L	106	(70-130)	20	2.0
LCSMethonyl54.56vg/L91(70.13)MELKMethonyl<	CCCH	Methomyl		25	20.7	ug/L	83	(70-130)		
MBLK Methomyl < <0.167 ug/L 71 (50-150) MRL_CHK Methomyl ND 5.0 3.56 ug/L 71 (50-150) MS1_201905300029 Methomyl ND 5 5.68 ug/L 114 (70-130) 20 2.7 CCCH Oxamyl (Vydate) ND 5 5.53 ug/L 92 (70-130) 2.7 CCCM Oxamyl (Vydate) 10 9.46 ug/L 92 (70-130) 2.7 LCS Oxamyl (Vydate) 10 9.46 ug/L 92 (70-130) 2.7 MELK Oxamyl (Vydate) 5 5.00 ug/L 100 (70-130) 2.7 MSL Oxamyl (Vydate) 5 6.01 ug/L 102 (70-130) 2.0 .7 MSL Oxamyl (Vydate) ND 5 8.74 ug/L 117 (70-130) 2.0 .45 MSL20190530029 Oxamyl (Vydate) ND 5 8.74 ug/L 117 (70-130) 2.0 .45 <	CCCM	Methomyl		10	8.61	ug/L	86	(70-130)		
MR_CHK Methomy 0.5 0.356 ug/L 71 (50-150) MS1_20190530029 Methomyl ND 5 5.68 ug/L 114 (70-130) 20 2.7 MSD1_20190530029 Methomyl ND 5 5.53 ug/L 111 (70-130) 20 2.7 CCCH Oxamyl (Vydate) 25 2.9 ug/L 92 (70-130) 2 7 LCS Oxamyl (Vydate) 5 5.00 ug/L 100 (70-130) 2 9 MSL_CHK Oxamyl (Vydate) 5 5.00 ug/L 101 (70-130) 2 9 MSL_CHK Oxamyl (Vydate) 05 0.434 ug/L 17 (70-130) 20 0.45 MSL_20190530029 Oxamyl (Vydate) ND 5 5.84 ug/L 17 (70-130) 20 0.45 MSL_20190530029 Oxamyl (Vydate) ND 5 5.84 ug/L 17 (70-130) 0.45 CCCH 12-Dibron-3-chloropropane 0.55 0.505 ug/L	LCS	Methomyl		5	4.56	ug/L	91	(70-130)		
NT OP ND 5 6.88 up 114 (70-130) 20 2.7 MSD1_20190530029 Methomyl ND 5 5.53 up/L 111 (70-130) 20 2.7 CCCH Oxamyl (Vydate) 25 22.9 up/L 92 (70-130) -	MBLK	Methomyl			<0.167	ug/L				
MSD1_20190530002Methom/MD5.55.53ug/L111(70-130)202.7CCCHOxamy(Vydap()22.9ug/L92(70-130)CCMOxamy(Vydap()55.00ug/L92(70-130)MBLKOxamy(Vydap()55.01ug/L87(50-150)MS1_20190530029Oxamy(Vydap()ND5.03.87ug/L117(70-130)MS1_20190530029Oxamy(Vydap()ND5.05.87ug/L117(70-130)200.45MS1_20190530029Oxamy(Vydap()ND5.05.87ug/L117(70-130)200.45MS1_20190530029Oxamy(Vydap()ND5.05.87ug/L107(70-130)200.45MS1_20190530029Oxamy(Vydap()ND5.05.87ug/L107(70-130)200.45CCCH1.2-Dirom-3-chloropropaneND5.00.507ug/L101(70-130)CCCH1.2-Dirom-3-chloropropaneNDND0.0507ug/L102(70-130) <td>MRL_CHK</td> <td>Methomyl</td> <td></td> <td>0.5</td> <td>0.356</td> <td>ug/L</td> <td>71</td> <td>(50-150)</td> <td></td> <td></td>	MRL_CHK	Methomyl		0.5	0.356	ug/L	71	(50-150)		
CCCM Oxamyl (Vydate) 25 22.9 ug/L 92 (70-130) CCCM Oxamyl (Vydate) 10 9.46 ug/L 95 (70-130) LCS Oxamyl (Vydate) 5 5.00 ug/L 100 (70-130) MBLK Oxamyl (Vydate) 5 5.00 ug/L 100 (70-130) MBLK Oxamyl (Vydate) 0.5 0.434 ug/L 87 (50-150) MS1_201905300029 Oxamyl (Vydate) ND 5 5.87 ug/L 117 (70-130) 20 0.45 MSD1_201905300029 Oxamyl (Vydate) ND 5 5.84 ug/L 117 (70-130) 20 0.45 EPA Method 504.1 Analytical British for Set 175671 CCCH 1,2-Dibrono-3-chloropropane 0.25 0.254 ug/L 101 (70-130) 20 0.45 CCCL 1,2-Dibrono-3-chloropropane ND 0.0507 ug/L 101 (70-130) 20 1.45 DUP_201905240130 1,2-Dibrono-3-chloropropane ND <td>MS1_201905300029</td> <td>Methomyl</td> <td>ND</td> <td>5</td> <td>5.68</td> <td>ug/L</td> <td>114</td> <td>(70-130)</td> <td></td> <td></td>	MS1_201905300029	Methomyl	ND	5	5.68	ug/L	114	(70-130)		
CCCM Oxamyl (Vydate) 10 9.46 ug/L 95 (70-130) LCS Oxamyl (Vydate) 5 5.00 ug/L 100 (70-130) MBLK Oxamyl (Vydate) MR_CHK Oxamyl (Vydate) 0.5 0.434 ug/L 87 (50-150) MS1_20190530029 Oxamyl (Vydate) ND 5 5.87 ug/L 117 (70-130) 0.45 MS1_20190530029 Oxamyl (Vydate) ND 5 5.84 ug/L 117 (70-130) 0.45 MS1_20190530029 Oxamyl (Vydate) ND 5 5.84 ug/L 117 (70-130) 0.45 MS1_20190530029 Oxamyl (Vydate) ND 5 5.84 ug/L 117 (70-130) 0.45 Amalytical Expensional Structures St	MSD1_201905300029	Methomyl	ND	5	5.53	ug/L	111	(70-130)	20	2.7
LCS Oxamy (Vydate) 5 5.00 ug/L 100 (70-130) MBLK Oxamy (Vydate) 0.5 0.434 ug/L 87 (50-150) MR1_CHK Oxamy (Vydate) ND 5 5.87 ug/L 117 (70-130) 20 0.45 MS1_201905300029 Oxamy (Vydate) ND 5 5.87 ug/L 117 (70-130) 20 0.45 EPA Method 504.1 EPA 504.1 Analytical B=:	СССН	Oxamyl (Vydate)		25	22.9	ug/L	92	(70-130)		
MBLK Oxamyl (Vydate) <0.167 ug/L MRL_CHK Oxamyl (Vydate) 0.5 0.434 ug/L 87 (50-150) MS1_201905300029 Oxamyl (Vydate) ND 5 5.87 ug/L 117 (70-130) MSD1_201905300029 Oxamyl (Vydate) ND 5 5.84 ug/L 117 (70-130) 20 0.45 EPA Method 504.1 EPA 504.1 Analytical For T CCCH 1,2-Dibrono-3-chloropropane 0.25 0.254 ug/L 102 (70-130) 20 0.45 CCCM2 1,2-Dibrono-3-chloropropane 0.25 0.254 ug/L 101 (70-130) 20 117 DUP_201905240130 1,2-Dibrono-3-chloropropane 0.05 0.0507 ug/L 101 (70-130) 117 1010 117 1010 117 1111<	CCCM	Oxamyl (Vydate)		10	9.46	ug/L	95	(70-130)		
MRL_CHK Oxamyl (Vydate) 0.5 0.434 ug/L 87 (50-150) MS1_201905300029 Oxamyl (Vydate) ND 5 5.87 ug/L 117 (70-130) 20 0.45 MSD1_201905300029 Oxamyl (Vydate) ND 5 5.87 ug/L 117 (70-130) 20 0.45 EPA Method 504.1 JEPA 504.1 Analytical Batter 1175671 Statter US/O3/2019 CCCH 1,2-Dibromo-3-chloropropane 0.25 0.254 ug/L 102 (70-130) 2 0.45 CCCM2 1,2-Dibromo-3-chloropropane 0.25 0.254 ug/L 101 (70-130) 2 1 DUP_201905240130 1,2-Dibromo-3-chloropropane ND ND ND ug/L 101 (70-130) 1 1 1 LCS2 1,2-Dibromo-3-chloropropane ND ND 0.21 0.216 ug/L 108 (70-130) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1<	LCS	Oxamyl (Vydate)		5	5.00	ug/L	100	(70-130)		
MS1_201905300029 Oxamyl (Vydate) ND 5 5.87 ug/L 117 (70-130) MSD1_201905300029 Oxamyl (Vydate) ND 5 5.84 ug/L 117 (70-130) 20 0.45 EPA Method 504.1 FPA 504.1 Analytical Batter: 1175671 CCCH 1,2-Dibromo-3-chloropropane 0.25 0.254 ug/L 102 (70-130) 20 0.45 CCCM2 1,2-Dibromo-3-chloropropane 0.25 0.254 ug/L 102 (70-130) 20 0.45 DUP_201905240130 1,2-Dibromo-3-chloropropane 0.25 0.254 ug/L 101 (70-130) 20 0.45 LCS2 1,2-Dibromo-3-chloropropane ND 0.50 0.507 ug/L 101 (70-130) 20 117 LCS2 1,2-Dibromo-3-chloropropane ND ND ug/L Ug/L 108 (70-130) 117 117 117 117 117 117 117 117 117 117 117 117 117 117 117 117 117 117	MBLK	Oxamyl (Vydate)			<0.167	ug/L				
MSD1_201905300029 Oxamyl (Vydate) ND 5 5.84 ug/L 117 (70-130) 20 0.45 EPA Method 504.1 by EPA 504.1 Analytical Bath: 1175671 CCCH 1,2-Dibromo-3-chloropropane 0.25 0.254 ug/L 102 (70-130) 20 0.45 CCCM2 1,2-Dibromo-3-chloropropane 0.25 0.254 ug/L 102 (70-130) 20 0.45 DUP_201905240130 1,2-Dibromo-3-chloropropane ND 0.55 0.254 ug/L 101 (70-130) 20 117 LCS2 1,2-Dibromo-3-chloropropane ND ND ug/L 101 (70-130) 20 20 MBLK 1,2-Dibromo-3-chloropropane ND ND ug/L 108 (70-130) 20 21 MBLK 1,2-Dibromo-3-chloropropane 0.21 0.216 ug/L 108 (70-130) 21 21 MBLK 1,2-Dibromo-3-chloropropane 0.31 0.0180 ug/L 89 (60-140) 21 21	MRL_CHK	Oxamyl (Vydate)		0.5	0.434	ug/L	87	(50-150)		
BPA Method 504.1 JrstersAnlytical B-1:	MS1_201905300029	Oxamyl (Vydate)	ND	5	5.87	ug/L	117	(70-130)		
Analytical Bark: 1175671Analytical Bark: 1175671CCCH1,2-Dibromo-3-chloropropane0.250.254ug/L102(70-130)CCCM21,2-Dibromo-3-chloropropaneND0.507ug/L101(70-130)DUP_2019052401301,2-Dibromo-3-chloropropaneNDNDug/L(0-20)LCS21,2-Dibromo-3-chloropropane0.20.216ug/L108(70-130)MBLK1,2-Dibromo-3-chloropropane0.10.0180ug/L	MSD1_201905300029	Oxamyl (Vydate)	ND	5	5.84	ug/L	117	(70-130)	20	0.45
CCCH 1,2-Dibromo-3-chloropropane 0.25 0.254 ug/L 102 (70-130) CCCM2 1,2-Dibromo-3-chloropropane 0.05 0.0507 ug/L 101 (70-130) DUP_201905240130 1,2-Dibromo-3-chloropropane ND ND ug/L (0-20) LCS2 1,2-Dibromo-3-chloropropane 0.2 0.216 ug/L 108 (70-130) MBLK 1,2-Dibromo-3-chloropropane 0.2 0.216 ug/L 108 (70-130) MRL_CHK 1,2-Dibromo-3-chloropropane 0.2 0.216 ug/L 108 (70-130)	EPA Method 504.1	by EPA 504.1								
CCCM2 1,2-Dibromo-3-chloropropane 0.05 0.0507 ug/L 101 (70-130) DUP_201905240130 1,2-Dibromo-3-chloropropane ND ND ug/L (0-20) LCS2 1,2-Dibromo-3-chloropropane 0.2 0.216 ug/L 108 (70-130) MBLK 1,2-Dibromo-3-chloropropane 0.2 0.216 ug/L 108 (70-130) MRL_CHK 1,2-Dibromo-3-chloropropane 0.1 0.01890 ug/L 59.0 (60-140)	Analytical Ba	tch: 1175671					An	alysis Date:	06/03/2019	
DUP_201905240130 1,2-Dibromo-3-chloropropane ND ug/L (0-20) LCS2 1,2-Dibromo-3-chloropropane 0.2 0.216 ug/L 108 (70-130) MBLK 1,2-Dibromo-3-chloropropane <0.01	СССН	1,2-Dibromo-3-chloropropane		0.25	0.254	ug/L	102	(70-130)		
LCS2 1,2-Dibromo-3-chloropropane 0.2 0.216 ug/L 108 (70-130) MBLK 1,2-Dibromo-3-chloropropane <0.01	CCCM2	1,2-Dibromo-3-chloropropane		0.05	0.0507	ug/L	101	(70-130)		
MBLK 1,2-Dibromo-3-chloropropane <0.01 ug/L MRL_CHK 1,2-Dibromo-3-chloropropane 0.01 0.00890 ug/L 89 (60-140)	DUP_201905240130	1,2-Dibromo-3-chloropropane	ND		ND	ug/L		(0-20)		
MRL_CHK 1,2-Dibromo-3-chloropropane 0.01 0.00890 ug/L 89 (60-140)	LCS2	1,2-Dibromo-3-chloropropane		0.2	0.216		108			
MRL_CHK 1,2-Dibromo-3-chloropropane 0.01 0.00890 ug/L 89 (60-140)	MBLK	1,2-Dibromo-3-chloropropane			<0.01	ug/L				
	MRL_CHK	1,2-Dibromo-3-chloropropane		0.01	0.00890		89	(60-140)		
MRLLW 1,2-Dibromo-3-chloropropane 0.008 0.00840 ug/L 105 (60-140)		1,2-Dibromo-3-chloropropane		0.008	0.00840	ug/L		(60-140)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MS_201905240128	1,2-Dibromo-3-chloropropane	ND	0.25	0.279	ug/L	112	(65-135)		
СССН	1,2-Dibromoethane		0.25	0.254	ug/L	102	(70-130)		
CCCM2	1,2-Dibromoethane		0.05	0.0548	ug/L	110	(70-130)		
DUP_201905240130	1,2-Dibromoethane	ND		ND	ug/L		(0-20)		
LCS2	1,2-Dibromoethane		0.2	0.210	ug/L	105	(70-130)		
MBLK	1,2-Dibromoethane			<0.01	ug/L				
MRL_CHK	1,2-Dibromoethane		0.01	0.0117	ug/L	117	(60-140)		
MS_201905240128	1,2-Dibromoethane	ND	0.25	0.272	ug/L	109	(65-135)		
CCCH	1,2-Dibromopropane (S)		100	110	%	110	(60-140)		
CCCM2	1,2-Dibromopropane (S)		100	102	%	102	(60-140)		
DUP_201905240130	1,2-Dibromopropane (S)		100	96.2	%	96	(60-140)		
LCS2	1,2-Dibromopropane (S)		100	106	%	106	(60-140)		
MBLK	1,2-Dibromopropane (S)			98.1	%	98	(60-140)		
MRL_CHK	1,2-Dibromopropane (S)		100	99.0	%	99	(60-140)		
MRLLW	1,2-Dibromopropane (S)		100	110	%	110	(60-140)		
MS_201905240128	1,2-Dibromopropane (S)		100	112	%	113	(60-140)		
ICPMS Metals by E	PA 200.8								
Analytical Ba	atch: 1175821					An	alysis Date	: 06/04/2019	
LCS1	Silver Total ICAP/MS		25	25.1	ug/L	100	(85-115)		
LCS2	Silver Total ICAP/MS		25	24.7	ug/L	99	(85-115)	20	1.6
MBLK	Silver Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Silver Total ICAP/MS		0.5	0.542	ug/L	108	(50-150)		
MS_201905200099	Silver Total ICAP/MS	ND	25	25.2	ug/L	101	(70-130)		
MS2_201905220009	Silver Total ICAP/MS	ND	25	25.5	ug/L	102	(70-130)		
MSD_201905200099	Silver Total ICAP/MS	ND	25	25.6	ug/L	102	(70-130)	20	1.7
MSD2_201905220009	Silver Total ICAP/MS	ND	25	25.8	ug/L	103	(70-130)	20	1.3
EPA Method 504.1	by EPA 504.1								
Analytical Ba	atch: 1175953					An	alysis Date	: 06/04/2019	
СССН	1,2-Dibromo-3-chloropropane		0.25	0.248	ug/L	99	(70-130)		
CCCM2	1,2-Dibromo-3-chloropropane		0.05	0.0463	ug/L	93	(70-130)		
DUP_201905300522	1,2-Dibromo-3-chloropropane	ND		ND	ug/L		(0-20)		
LCS2	1,2-Dibromo-3-chloropropane		0.2	0.207	ug/L	104	(70-130)		
MBLK	1,2-Dibromo-3-chloropropane			<0.01	ug/L				
MRL_CHK	1,2-Dibromo-3-chloropropane		0.01	0.00980	ug/L	98	(60-140)		
MS_201905290135	1,2-Dibromo-3-chloropropane	ND	0.25	0.262	ug/L	105	(65-135)		
СССН	1,2-Dibromoethane		0.25	0.249	ug/L	100	(70-130)		
CCCM2	1,2-Dibromoethane		0.05	0.0510	ug/L	102	(70-130)		
Spiles receiver in already correct	tod for pativo regulto								

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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David C. McCollum Water Treatment Plant

DUP_201905300522 1.2-Dibromoethane ND ND ug/L (020) LCS2 1.2-Dibromoethane 0.2 0.199 ug/L 100 (70-130) MRL 1.2-Dibromoethane 0.01 0.00760 ug/L 76 (60-140) MR_L_CHK 1.2-Dibromoethane ND 0.25 0.249 ug/L 99 (65-135) CCCH 1.2-Dibromopropane (\$) 100 104 % 104 (60-140) DUP_201905300522 1.2-Dibromopropane (\$) 100 104 % 104 (60-140) DUP_201905300522 1.2-Dibromopropane (\$) 100 104 % 104 (60-140) MRL_CHK 1.2-Dibromopropane (\$) 100 104 % 104 (60-140) MRLLW 1.2-Dibromopropane (\$) 100 104 % 106 (60-140) MRLLW 1.2-Dibromopropane (\$) 100 102 % 102 (60-140) MRLLW 1.2-Dibromopropane (\$) 100 106	RPD%
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Analytical Bath: 1175985 Analytical Bath: 1175985 LCS1 ©yanide by manual distillation 0.1 0.100 mg/L 100 (90-110) LCS2 ©yanide by manual distillation 0.1 0.103 mg/L 103 (90-10) 20 MBLK ©yanide by manual distillation 0.0 0.00730 mg/L 146 (50-150) MR_CHK Qiande by manual distillation ND 0.10 0.108 mg/L 105 (90-110) MS_201905090622 Qiande by manual distillation ND 0.10 0.108 mg/L 105 (90-10) 20 MS_201905090622 Qiande by manual distillation ND 0.10 0.108 mg/L 105 (90-10) 20 MS_201905090622 Qiande by manual distillation ND 0.11 0.108 mg/L 102 (90-10) 20 MS_201905090622 Qiande by manual distillation ND 0.11 0.108 mg/L 102 (90-10) 20 LCS1 Aluminum Total ICAP/MS 100 102 ug/L 102 (85-115) 20 <td></td>	
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Analytical Back: 1176125 Analytical Back: 504/2019 LCS1 Aluminum Total ICAP/MS 100 100 101 100 102	2.7
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MSD_201905230013 Aluminum Total ICAP/MS 100 108 ug/L 108 (70-130) 20	
LCS1 Antimony Total ICAP/MS 50 49.3 ug/L 99 (85-115)	2.7
LCS2 Antimony Total ICAP/MS 50 49.2 ug/L 98 (85-115) 20	0.20
MBLK Antimony Total ICAP/MS <0.5 ug/L	
MRL_CHK Antimony Total ICAP/MS 1 1.10 ug/L 110 (50-150)	
MS_201905230013 Antimony Total ICAP/MS 50 54.6 ug/L 109 (70-130)	
MSD_201905230013 Antimony Total ICAP/MS 50 55.3 ug/L 111 (70-130) 20	1.2
LCS1 Arsenic Total ICAP/MS 50 50.4 ug/L 101 (85-115)	
LCS2 Arsenic Total ICAP/MS 50 50.6 ug/L 101 (85-115) 20	0.40

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1	0.759	ug/L	76	(50-150)		
MS_201905230013	Arsenic Total ICAP/MS		50	58.5	ug/L	117	(70-130)		
MSD_201905230013	Arsenic Total ICAP/MS		50	58.7	ug/L	117	(70-130)	20	0.34
LCS1	Barium Total ICAP/MS		50	49.4	ug/L	99	(85-115)		
LCS2	Barium Total ICAP/MS		50	49.4	ug/L	99	(85-115)	20	0.0
MBLK	Barium Total ICAP/MS			<1	ug/L				
MRL_CHK	Barium Total ICAP/MS		2	1.92	ug/L	96	(50-150)		
LCS1	Beryllium Total ICAP/MS		25	24.7	ug/L	99	(85-115)		
LCS2	Beryllium Total ICAP/MS		25	24.8	ug/L	99	(85-115)	20	0.40
MBLK	Beryllium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Beryllium Total ICAP/MS		1	0.991	ug/L	99	(50-150)		
MS_201905230013	Beryllium Total ICAP/MS		25	29.7	ug/L	119	(70-130)		
MSD_201905230013	Beryllium Total ICAP/MS		25	29.2	ug/L	117	(70-130)	20	1.6
LCS1	Cadmium Total ICAP/MS		25	24.6	ug/L	99	(85-115)		
LCS2	Cadmium Total ICAP/MS		25	24.4	ug/L	98	(85-115)	20	0.82
MBLK	Cadmium Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Cadmium Total ICAP/MS		0.5	0.484	ug/L	97	(50-150)		
MS_201905230013	Cadmium Total ICAP/MS		25	27.6	ug/L	110	(70-130)		
MSD_201905230013	Cadmium Total ICAP/MS		25	27.3	ug/L	109	(70-130)	20	0.94
LCS1	Chromium Total ICAP/MS		50	49.0	ug/L	98	(85-115)		
LCS2	Chromium Total ICAP/MS		50	49.1	ug/L	98	(85-115)	20	0.20
MBLK	Chromium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Chromium Total ICAP/MS		1	0.959	ug/L	96	(50-150)		
MS_201905230013	Chromium Total ICAP/MS		50	55.0	ug/L	110	(70-130)		
MSD_201905230013	Chromium Total ICAP/MS		50	53.9	ug/L	108	(70-130)	20	2.0
LCS1	Copper Total ICAP/MS		50	49.9	ug/L	100	(85-115)		
LCS2	Copper Total ICAP/MS		50	50.1	ug/L	100	(85-115)	20	0.40
MBLK	Copper Total ICAP/MS			<1	ug/L				
MRL_CHK	Copper Total ICAP/MS		2	1.86	ug/L	93	(50-150)		
MS_201905230013	Copper Total ICAP/MS		50	53.5	ug/L	107	(70-130)		
MSD_201905230013	Copper Total ICAP/MS		50	52.8	ug/L	106	(70-130)	20	1.3
LCS1	Lead Total ICAP/MS		50	48.2	ug/L	97	(85-115)		
LCS2	Lead Total ICAP/MS		50	48.6	ug/L	97	(85-115)	20	0.83
MBLK	Lead Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Lead Total ICAP/MS		0.5	0.490	ug/L	98	(50-150)		
MS_201905230013	Lead Total ICAP/MS		50	51.7	ug/L	103	(70-130)		
MSD_201905230013	Lead Total ICAP/MS		50	51.3	ug/L	103	(70-130)	20	0.81

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	Manganese Total ICAP/MS		100	99.0	ug/L	99	(85-115)		
LCS2	Manganese Total ICAP/MS		100	99.6	ug/L	100	(85-115)	20	0.60
MBLK	Manganese Total ICAP/MS			<1	ug/L				
MRL_CHK	Manganese Total ICAP/MS		2	1.95	ug/L	97	(50-150)		
MS_201905230013	Manganese Total ICAP/MS		100	107	ug/L	107	(70-130)		
MSD_201905230013	Manganese Total ICAP/MS		100	106	ug/L	106	(70-130)	20	0.97
LCS1	Mercury Total ICAP/MS		0.75	0.748	ug/L	100	(85-115)		
LCS2	Mercury Total ICAP/MS		0.75	0.699	ug/L	93	(85-115)	20	6.8
MBLK	Mercury Total ICAP/MS			<0.1	ug/L				
MRL_CHK	Mercury Total ICAP/MS		0.2	0.188	ug/L	94	(50-150)		
MS_201905230013	Mercury Total ICAP/MS	ND	1.5	1.50	ug/L	99	(70-130)		
MSD_201905230013	Mercury Total ICAP/MS	ND	1.5	1.28	ug/L	85	(70-130)	20	16
LCS1	Nickel Total ICAP/MS		50	49.5	ug/L	99	(85-115)		
LCS2	Nickel Total ICAP/MS		50	49.6	ug/L	99	(85-115)	20	0.20
MBLK	Nickel Total ICAP/MS			<2.5	ug/L				
MRL_CHK	Nickel Total ICAP/MS		5	4.87	ug/L	97	(50-150)		
MS_201905230013	Nickel Total ICAP/MS		50	52.1	ug/L	104	(70-130)		
MSD_201905230013	Nickel Total ICAP/MS		50	51.4	ug/L	103	(70-130)	20	1.3
LCS1	Selenium Total ICAP/MS		50	48.6	ug/L	97	(85-115)		
LCS2	Selenium Total ICAP/MS		50	49.7	ug/L	100	(85-115)	20	2.2
MBLK	Selenium Total ICAP/MS			<2.5	ug/L				
MRL_CHK	Selenium Total ICAP/MS		5	4.95	ug/L	99	(50-150)		
MS_201905230013	Selenium Total ICAP/MS		50	58.0	ug/L	116	(70-130)		
MSD_201905230013	Selenium Total ICAP/MS		50	58.9	ug/L	118	(70-130)	20	1.6
LCS1	Silver Total ICAP/MS		25	25.7	ug/L	103	(85-115)		
LCS2	Silver Total ICAP/MS		25	25.7	ug/L	103	(85-115)	20	0.0
MBLK	Silver Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Silver Total ICAP/MS		0.5	0.508	ug/L	102	(50-150)		
MS_201905230013	Silver Total ICAP/MS		25	27.8	ug/L	111	(70-130)		
MSD_201905230013	Silver Total ICAP/MS		25	27.8	ug/L	111	(70-130)	20	0.18
LCS1	Thallium Total ICAP/MS		50	47.6	ug/L	95	(85-115)		
LCS2	Thallium Total ICAP/MS		50	47.9	ug/L	96	(85-115)	20	0.63
MBLK	Thallium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Thallium Total ICAP/MS		1	0.941	ug/L	94	(50-150)		
MS_201905230013	Thallium Total ICAP/MS		50	51.2	ug/L	102	(70-130)		
MSD_201905230013	Thallium Total ICAP/MS		50	50.8	ug/L	102	(70-130)	20	0.78
LCS1	Uranium ICAP/MS		50	47.8	ug/L	96	(85-115)		
				47.8				20	0.0

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	Uranium ICAP/MS			<0.5	ug/L				
MRL_CHK	Uranium ICAP/MS		1	0.928	ug/L	93	(50-150)		
MS_201905230013	Uranium ICAP/MS		50	53.9	ug/L	108	(70-130)		
MSD_201905230013	Uranium ICAP/MS		50	53.4	ug/L	107	(70-130)	20	0.94
LCS1	Vanadium Total ICAP/MS		50	48.7	ug/L	97	(85-115)		
LCS2	Vanadium Total ICAP/MS		50	48.7	ug/L	97	(85-115)	20	0.0
MBLK	Vanadium Total ICAP/MS			<1.5	ug/L				
MRL_CHK	Vanadium Total ICAP/MS		3	3.00	ug/L	100	(50-150)		
MS_201905230013	Vanadium Total ICAP/MS	13	50	66.1	ug/L	107	(70-130)		
MSD_201905230013	Vanadium Total ICAP/MS	13	50	65.5	ug/L	106	(70-130)	20	0.94
LCS1	Zinc Total ICAP/MS		50	48.7	ug/L	97	(85-115)		
LCS2	Zinc Total ICAP/MS		50	49.2	ug/L	98	(85-115)	20	1.0
MBLK	Zinc Total ICAP/MS			<10	ug/L				
MRL_CHK	Zinc Total ICAP/MS		20	19.1	ug/L	95	(50-150)		
MS_201905230013	Zinc Total ICAP/MS		50	54.6	ug/L	109	(70-130)		
MSD_201905230013	Zinc Total ICAP/MS		50	54.0	ug/L	108	(70-130)	20	0.84
Chlorophenoxy He	rbicides by EPA 515.4								
	1175936 Analytical Batch: 1176585					An	alysis Date:	06/07/2019	
6662	2457		4	4.02		100	(70.120)		
CCC3	2,4,5-T		4	4.02	ug/L	100	(70-130)		
CCCH	2,4,5-T		4	3.96	ug/L	99	(70-130)		
CCCM	2,4,5-T		1	1.10	ug/L	110	(70-130)		
MBLK	2,4,5-T			< 0.066	ug/L	100	(50.450)		
MRL_CHK	2,4,5-T		0.2	0.247	ug/L	123	(50-150)		
MS1_201905230303	2,4,5-T	ND	3	3.05	ug/L	102	(70-130)		
MSD1_201905230303	2,4,5-T	ND	3	3.07	ug/L	102	(70-130)	30	0.59
CCC3	2,4,5-TP (Silvex)		4	3.97	ug/L	99	(70-130)		
СССН	2,4,5-TP (Silvex)		4	3.92	ug/L	98	(70-130)		
CCCM	2,4,5-TP (Silvex)		1	1.05	ug/L	105	(70-130)		
MBLK	2,4,5-TP (Silvex)			<0.066	ug/L				
MRL_CHK	2,4,5-TP (Silvex)		0.2	0.178	ug/L	89	(50-150)		
MS1_201905230303	2,4,5-TP (Silvex)	ND	3	3.08	ug/L	103	(70-130)		
MSD1_201905230303	2,4,5-TP (Silvex)	ND	3	2.96	ug/L	99	(70-130)	30	3.9
CCC3	2,4-D		2	1.96	ug/L	98	(70-130)		
CCCH	2,4-D		2	1.97	ug/L	99	(70-130)		
CCCM	2,4-D		0.5	0.541	ug/L	108	(70-130)		
MBLK	2,4-D			<0.033	ug/L				
MRL_CHK	2,4-D		0.1	0.123	ug/L	123	(50-150)		
MS1_201905230303	2,4-D	ND	1.5	1.73	ug/L	115	(70-130)		
Snike recovery is already correct	ted for native results								

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD1_201905230303	2,4-D	ND	1.5	1.71	ug/L	114	(70-130)	30	1.2
CCC3	2,4-DB		40	38.6	ug/L	97	(70-130)		
СССН	2,4-DB		40	39.2	ug/L	98	(70-130)		
CCCM	2,4-DB		10	11.2	ug/L	112	(70-130)		
MBLK	2,4-DB			<0.666	ug/L				
MRL_CHK	2,4-DB		2	2.15	ug/L	108	(50-150)		
MRLLW	2,4-DB		1	0.971	ug/L	97	(50-150)		
MS1_201905230303	2,4-DB	ND	30	30.4	ug/L	101	(70-130)		
MSD1_201905230303	2,4-DB	ND	30	30.2	ug/L	101	(70-130)	30	0.73
CCC3	2,4-Dichlorophenyl acetic acid (S)		100	94.6	%	95	(70-130)		
СССН	2,4-Dichlorophenyl acetic acid (S)		10	96.0	%	96	(70-130)		
CCCM	2,4-Dichlorophenyl acetic acid (S)		2.5	99.5	%	100	(70-130)		
MBLK	2,4-Dichlorophenyl acetic acid (S)			92.1	%	92	(70-130)		
MRL_CHK	2,4-Dichlorophenyl acetic acid (S)			100	%	100	(70-130)		
MRLLW	2,4-Dichlorophenyl acetic acid (S)		0.1	95.9	%	96	(70-130)		
MS1_201905230303	2,4-Dichlorophenyl acetic acid (S)			100	%	100	(70-130)		
MSD1_201905230303	2,4-Dichlorophenyl acetic acid (S)			97.1	%	97	(70-130)		
CCC3	3,5-Dichlorobenzoic acid		10	9.80	ug/L	98	(70-130)		
СССН	3,5-Dichlorobenzoic acid		10	9.92	ug/L	99	(70-130)		
CCCM	3,5-Dichlorobenzoic acid		2.5	2.48	ug/L	99	(70-130)		
MBLK	3,5-Dichlorobenzoic acid			<0.166	ug/L				
MRL_CHK	3,5-Dichlorobenzoic acid		0.5	0.401	ug/L	80	(50-150)		
MS1_201905230303	3,5-Dichlorobenzoic acid	ND	7.5	7.85	ug/L	105	(70-130)		
MSD1_201905230303	3,5-Dichlorobenzoic acid	ND	7.5	7.72	ug/L	103	(70-130)	30	1.7
CCC3	4,4-Dibromooctafluorobiphenyl (I)		100	102	%	102	(50-150)		
СССН	4,4-Dibromooctafluorobiphenyl (I)			102	%	102	(50-150)		
CCCM	4,4-Dibromooctafluorobiphenyl (I)			102	%	102	(50-150)		
MBLK	4,4-Dibromooctafluorobiphenyl (I)			109	%	109	(50-150)		
MRL_CHK	4,4-Dibromooctafluorobiphenyl (I)		100	102	%	102	(50-150)		
MRLLW	4,4-Dibromooctafluorobiphenyl (I)			105	%	105	(50-150)		
MS1_201905230303	4,4-Dibromooctafluorobiphenyl (I)		100	94.8	%	95	(50-150)		
MSD1_201905230303	4,4-Dibromooctafluorobiphenyl (I)			98.2	%	98	(50-150)		
CCC3	Acifluorfen		4	4.16	ug/L	104	(70-130)		
СССН	Acifluorfen		4	3.86	ug/L	97	(70-130)		
CCCM	Acifluorfen		1	1.14	ug/L	114	(70-130)		
MBLK	Acifluorfen			<0.066	ug/L				
MRL_CHK	Acifluorfen		0.2	0.232	ug/L	116	(50-150)		
MS1_201905230303	Acifluorfen	ND	3	3.22	ug/L	107	(70-130)		

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD1_201905230303	Acifluorfen	ND	3	3.13	ug/L	104	(70-130)	30	2.9
CCC3	Bentazon		10	10.5	ug/L	105	(70-130)		
СССН	Bentazon		10	10.7	ug/L	107	(70-130)		
CCCM	Bentazon		2.5	2.92	ug/L	117	(70-130)		
MBLK	Bentazon			<0.166	ug/L				
MRL_CHK	Bentazon		0.5	0.509	ug/L	102	(50-150)		
MS1_201905230303	Bentazon	ND	7.5	8.04	ug/L	107	(70-130)		
MSD1_201905230303	Bentazon	ND	7.5	8.27	ug/L	110	(70-130)	30	2.8
CCC3	Dalapon		20	23.6	ug/L	118	(70-130)		
СССН	Dalapon		20	23.7	ug/L	119	(70-130)		
CCCM	Dalapon		5	5.85	ug/L	117	(70-130)		
MBLK	Dalapon			<0.333	ug/L				
MRL_CHK	Dalapon		1	1.03	ug/L	103	(50-150)		
MS1_201905230303	Dalapon	ND	15	15.7	ug/L	105	(70-130)		
MSD1_201905230303	Dalapon	ND	15	17.2	ug/L	115	(70-130)	30	8.9
CCC3	Dicamba		2	2.24	ug/L	112	(70-130)		
СССН	Dicamba		2	2.13	ug/L	106	(70-130)		
CCCM	Dicamba		0.5	0.548	ug/L	110	(70-130)		
MBLK	Dicamba			<0.033	ug/L				
MRL_CHK	Dicamba		0.1	0.0615	ug/L	62	(50-150)		
MS1_201905230303	Dicamba	ND	1.5	1.53	ug/L	102	(70-130)		
MSD1_201905230303	Dicamba	ND	1.5	1.62	ug/L	108	(70-130)	30	5.5
CCC3	Dichlorprop		10	9.97	ug/L	100	(70-130)		
СССН	Dichlorprop		10	9.96	ug/L	100	(70-130)		
CCCM	Dichlorprop		2.5	2.72	ug/L	109	(70-130)		
MBLK	Dichlorprop			<0.166	ug/L				
MRL_CHK	Dichlorprop		0.5	0.356	ug/L	71	(50-150)		
MS1_201905230303	Dichlorprop	ND	7.5	7.68	ug/L	102	(70-130)		
MSD1_201905230303	Dichlorprop	ND	7.5	7.62	ug/L	102	(70-130)	30	0.83
CCC3	Dinoseb		4	3.90	ug/L	98	(70-130)		
СССН	Dinoseb		4	3.89	ug/L	97	(70-130)		
CCCM	Dinoseb		1	1.08	ug/L	108	(70-130)		
MBLK	Dinoseb			<0.066	ug/L				
MRL_CHK	Dinoseb		0.2	0.214	ug/L	107	(50-150)		
MS1_201905230303	Dinoseb	ND	3	3.01	ug/L	100	(70-130)		
MSD1_201905230303	Dinoseb	ND	3	2.89	ug/L	97	(70-130)	30	4.0
CCC3	Pentachlorophenol		0.8	0.887	ug/L	111	(70-130)		
СССН	Pentachlorophenol		0.8	0.846	ug/L	106	(70-130)		

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
CCCM	Pentachlorophenol		0.2	0.240	ug/L	120	(70-130)		
MBLK	Pentachlorophenol			<0.013	ug/L				
MRL_CHK	Pentachlorophenol		0.04	0.0414	ug/L	103	(50-150)		
MS1_201905230303	Pentachlorophenol	ND	0.6	0.646	ug/L	108	(70-130)		
MSD1_201905230303	Pentachlorophenol	ND	0.6	0.712	ug/L	119	(70-130)	30	9.9
CCC3	Picloram		2	1.75	ug/L	88	(70-130)		
СССН	Picloram		2	1.92	ug/L	96	(70-130)		
CCCM	Picloram		0.5	0.478	ug/L	96	(70-130)		
MBLK	Picloram			<0.033	ug/L				
MRL_CHK	Picloram		0.1	0.109	ug/L	109	(50-150)		
MS1_201905230303	Picloram	ND	1.5	1.68	ug/L	110	(70-130)		
MSD1_201905230303	Picloram	ND	1.5	1.85	ug/L	122	(70-130)	30	9.9
CCC3	Tot DCPA Mono&Diacid Degradate		2	2.17	ug/L	109	(70-130)		
СССН	Tot DCPA Mono&Diacid Degradate		2	2.10	ug/L	105	(70-130)		
CCCM	Tot DCPA Mono&Diacid Degradate		0.5	0.509	ug/L	102	(70-130)		
MBLK	Tot DCPA Mono&Diacid Degradate			<0.033	ug/L				
MRL_CHK	Tot DCPA Mono&Diacid Degradate		0.1	0.146	ug/L	146	(50-150)		
MS1_201905230303	Tot DCPA Mono&Diacid Degradate	ND	1.5	1.55	ug/L	103	(70-130)		
MSD1_201905230303	Tot DCPA Mono&Diacid Degradate	ND	1.5	1.68	ug/L	112	(70-130)	30	8.2
Perfluorinated Alk	yl Acids EPA 537 rev 1.1 by EPA 537								
	1175545 Analytical Batch: 1177011					An	alysis Date:	06/06/2019	
DUP_201905290302	13C-PFDA (S)			91.2	%	91	(70-130)		
MBLK	13C-PFDA (S)			107	%	107	(70-130)		
MRL_CHK	13C-PFDA (S)		100	107	%	107	(70-130)		
MS1_201906030075	13C-PFDA (S)		100	88.1	%	88	(70-130)		
DUP_201905290302	13C-PFHxA (S)			99.2	%	99	(70-130)		
MBLK	13C-PFHxA (S)			111	%	111	(70-130)		
MRL_CHK	13C-PFHxA (S)		100	104	%	104	(70-130)		
MS1_201906030075	13C-PFHxA (S)		100	97.9	%	98	(70-130)		
DUP_201905290302	13C-PFOA (I)			105	%	105	(50-150)		
MBLK	13C-PFOA (I)			96.8	%	97	(50-150)		
MRL_CHK	13C-PFOA (I)		100	94.8	%	95	(50-150)		
MS1_201906030075	13C-PFOA (I)		100	102	%	103	(50-150)		
DUP_201905290302	13C-PFOS (I)			95.2	%	95	(50-150)		
MBLK	13C-PFOS (I)			89.6	%	90	(50-150)		
MRL_CHK	13C-PFOS (I)		100	91.2	%	91	(50-150)		
	13C-PFOS (I)		100	93.3	%	93	(50-150)		
_ DUP 201905290302	d3-NMeFOSAA (I)			92.8	%	93	(50-150)		

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	d3-NMeFOSAA (I)			96.0	%	96	(50-150)		
MRL_CHK	d3-NMeFOSAA (I)		100	91.8	%	92	(50-150)		
MS1_201906030075	d3-NMeFOSAA (I)		100	88.5	%	89	(50-150)		
DUP_201905290302	d5-NEtFOSAA (S)			104	%	105	(70-130)		
MBLK	d5-NEtFOSAA (S)			101	%	101	(70-130)		
MRL_CHK	d5-NEtFOSAA (S)		100	97.5	%	98	(70-130)		
MS1_201906030075	d5-NEtFOSAA (S)		100	101	%	101	(70-130)		
DUP_201905290302	N-ethyl Perfluorooctanesulfonamidoacetic acid			0.000106	ug/L		(0-30)		
MBLK	N-ethyl Perfluorooctanesulfonamidoacetic acid			<0.000667	ug/L				
MRL_CHK	N-ethyl Perfluorooctanesulfonamidoacetic acid		0.002	0.00194	ug/L	97	(50-150)		
MS1_201906030075	N-ethyl Perfluorooctanesulfonamidoacetic acid	ND	0.025	0.0249	ug/L	99	(70-130)		
DUP_201905290302	N-methyl Perfluorooctanesulfonamidoacetic acid			0.0000210	ug/L		(0-30)		
MBLK	N-methyl Perfluorooctanesulfonamidoacetic acid			<0.000667	ug/L				
MRL_CHK	N-methyl Perfluorooctanesulfonamidoacetic acid		0.002	0.00170	ug/L	85	(50-150)		
MS1_201906030075	N-methyl Perfluorooctanesulfonamidoacetic acid	ND	0.025	0.0237	ug/L	95	(70-130)		
DUP_201905290302	Perfluorobutanesulfonic acid	0.013		0.0136	ng/L		(0-30)	30	2.7
MBLK	Perfluorobutanesulfonic acid			<0.00059	ug/L				
MRL_CHK	Perfluorobutanesulfonic acid		0.0018	0.00192	ug/L	108	(50-150)		
MS1_201906030075	Perfluorobutanesulfonic acid	ND	0.022	0.0237	ug/L	107	(70-130)		
DUP_201905290302	Perfluorodecanoic acid			0.000309	ng/L		(0-30)		
MBLK	Perfluorodecanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluorodecanoic acid		0.002	0.00246	ug/L	123	(50-150)		
MS1_201906030075	Perfluorodecanoic acid	ND	0.025	0.0230	ug/L	92	(70-130)		
DUP_201905290302	Perfluorododecanoic acid			0.000111	ug/L		(0-30)		
MBLK	Perfluorododecanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluorododecanoic acid		0.002	0.00191	ug/L	95	(50-150)		
MS1_201906030075	Perfluorododecanoic acid	ND	0.025	0.0216	ug/L	87	(70-130)		
DUP_201905290302	Perfluoroheptanoic acid	0.011		0.0115	ug/L		(0-30)	30	0.79
MBLK	Perfluoroheptanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluoroheptanoic acid		0.002	0.00150	ug/L	75	(50-150)		
MS1_201906030075	Perfluoroheptanoic acid	ND	0.025	0.0235	ug/L	93	(70-130)		
DUP_201905290302	Perfluorohexanesulfonic acid	0.066		0.0620	ug/L		(0-30)	30	5.8
MBLK	Perfluorohexanesulfonic acid			<0.000608	ug/L				
MRL_CHK	Perfluorohexanesulfonic acid		0.0018	0.00180	ug/L	99	(50-150)		
MS1_201906030075	Perfluorohexanesulfonic acid	ND	0.023	0.0248	ug/L	109	(70-130)		
DUP_201905290302	Perfluorohexanoic acid			0.0444	ug/L		(0-30)		
MBLK	Perfluorohexanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluorohexanoic acid		0.002	0.00224	ug/L	112	(50-150)		

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MS1_201906030075	Perfluorohexanoic acid	ND	0.025	0.0252	ug/L	101	(70-130)		
DUP_201905290302	Perfluorononanoic acid	0.0031		0.00280	ug/L		(0-30)	30	9.4
MBLK	Perfluorononanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluorononanoic acid		0.002	0.00248	ug/L	124	(50-150)		
MS1_201906030075	Perfluorononanoic acid	ND	0.025	0.0268	ug/L	107	(70-130)		
DUP_201905290302	Perfluorooctanesulfonic acid	0.094		0.114	ug/L		(0-30)	30	3.8
MBLK	Perfluorooctanesulfonic acid			<0.000617	ug/L				
MRL_CHK	Perfluorooctanesulfonic acid		0.0019	0.00191	ug/L	103	(50-150)		
MS1_201906030075	Perfluorooctanesulfonic acid	ND	0.023	0.0251	ug/L	109	(70-130)		
DUP_201905290302	Perfluorooctanoic acid	0.013		0.0134	ug/L		(0-30)	30	1.0
MBLK	Perfluorooctanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluorooctanoic acid		0.002	0.00289	ug/L	145	(50-150)		
MS1_201906030075	Perfluorooctanoic acid	ND	0.025	0.0256	ug/L	101	(70-130)		
DUP_201905290302	Perfluorotetradecanoic acid			0.000281	ug/L		(0-30)		
MBLK	Perfluorotetradecanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluorotetradecanoic acid		0.002	0.00183	ug/L	92	(50-150)		
MS1_201906030075	Perfluorotetradecanoic acid	ND	0.025	0.0208	ug/L	83	(70-130)		
DUP_201905290302	Perfluorotridecanoic acid			0.000186	ug/L		(0-30)		
MBLK	Perfluorotridecanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluorotridecanoic acid		0.002	0.00271	ug/L	136	(50-150)		
MS1_201906030075	Perfluorotridecanoic acid	ND	0.025	0.0210	ug/L	84	(70-130)		
DUP_201905290302	Perfluoroundecanoic acid			ND	ug/L		(0-30)		
MBLK	Perfluoroundecanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluoroundecanoic acid		0.002	0.00239	ug/L	120	(50-150)		
MS1_201906030075	Perfluoroundecanoic acid	ND	0.025	0.0202	ug/L	81	(70-130)		
Perfluorinated Alk	yl Acids EPA 537 rev 1.1 by EPA 537								
Prep Batch:	1175545 Analytical Batch: 1177020					An	alysis Date:	: 06/07/2019	
LCS1	13C-PFDA (S)		100	108	%	108	(70-130)		
LCS2	13C-PFDA (S)		100	105	%	105	(70-130)		
LCS1	13C-PFHxA (S)		100	108	%	108	(70-130)		
LCS2	13C-PFHxA (S)		100	103	%	103	(70-130)		
LCS1	13C-PFOA (I)		100	101	%	101	(50-150)		
LCS2	13C-PFOA (I)		100	104	%	104	(50-150)		
LCS1	13C-PFOS (I)		100	109	%	109	(50-150)		
LCS2	13C-PFOS (I)		100	102	%	102	(50-150)		
LCS1	d3-NMeFOSAA (I)		100	103	%	103	(50-150)		
LCS2	d3-NMeFOSAA (I)		100	103	%	103	(50-150)		
LCS1	d5-NEtFOSAA (S)		100	99.0	%	99	(70-130)		
Spike recovery is already correct	cted for native results.								

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	d5-NEtFOSAA (S)		100	96.7	%	97	(70-130)		
LCS1	N-ethyl Perfluorooctanesulfonamidoacetic acid		0.025	0.0256	ug/L	102	(70-130)		
LCS2	N-ethyl Perfluorooctanesulfonamidoacetic acid		0.025	0.0240	ug/L	96	(70-130)	30	6.0
LCS1	N-methyl Perfluorooctanesulfonamidoacetic acid		0.025	0.0256	ug/L	103	(70-130)		
LCS2	N-methyl Perfluorooctanesulfonamidoacetic acid		0.025	0.0251	ug/L	101	(70-130)	30	2.4
LCS1	Perfluorobutanesulfonic acid		0.022	0.0212	ug/L	96	(70-130)		
LCS2	Perfluorobutanesulfonic acid		0.022	0.0218	ug/L	99	(70-130)	30	2.8
LCS1	Perfluorodecanoic acid		0.025	0.0260	ug/L	104	(70-130)		
LCS2	Perfluorodecanoic acid		0.025	0.0258	ug/L	103	(70-130)	30	0.77
LCS1	Perfluorododecanoic acid		0.025	0.0272	ug/L	109	(70-130)		
LCS2	Perfluorododecanoic acid		0.025	0.0263	ug/L	105	(70-130)	30	3.4
LCS1	Perfluoroheptanoic acid		0.025	0.0190	ug/L	76	(70-130)		
LCS2	Perfluoroheptanoic acid		0.025	0.0179	ug/L	72	(70-130)	30	6.0
LCS1	Perfluorohexanesulfonic acid		0.023	0.0224	ug/L	98	(70-130)		
LCS2	Perfluorohexanesulfonic acid		0.023	0.0241	ug/L	106	(70-130)	30	7.3
LCS1	Perfluorohexanoic acid		0.025	0.0257	ug/L	103	(70-130)		
LCS2	Perfluorohexanoic acid		0.025	0.0257	ug/L	103	(70-130)	30	0.0
LCS1	Perfluorononanoic acid		0.025	0.0272	ug/L	109	(70-130)		
LCS2	Perfluorononanoic acid		0.025	0.0281	ug/L	112	(70-130)	30	2.9
LCS1	Perfluorooctanesulfonic acid		0.023	0.0216	ug/L	94	(70-130)		
LCS2	Perfluorooctanesulfonic acid		0.023	0.0236	ug/L	102	(70-130)	30	8.4
LCS1	Perfluorooctanoic acid		0.025	0.0258	ug/L	103	(70-130)		
LCS2	Perfluorooctanoic acid		0.025	0.0250	ug/L	100	(70-130)	30	3.1
LCS1	Perfluorotetradecanoic acid		0.025	0.0248	ug/L	99	(70-130)		
LCS2	Perfluorotetradecanoic acid		0.025	0.0251	ug/L	100	(70-130)	30	1.2
LCS1	Perfluorotridecanoic acid		0.025	0.0252	ug/L	101	(70-130)		
LCS2	Perfluorotridecanoic acid		0.025	0.0240	ug/L	96	(70-130)	30	4.9
LCS1	Perfluoroundecanoic acid		0.025	0.0280	ug/L	112	(70-130)		
LCS2	Perfluoroundecanoic acid		0.025	0.0241	ug/L	96	(70-130)	30	15
Perfluorinated Alk	yl Acids EPA 537 rev 1.1 by EPA 537								
Prep Batch:	1175640 Analytical Batch: 1177054					An	alysis Date:	06/07/2019	
LCS2	13C-PFDA (S)		100	111	%	111	(70-130)		
MBLK	13C-PFDA (S)			108	%	108	(70-130)		
MRL_CHK	13C-PFDA (S)		100	108	%	109	(70-130)		
MS_201905310387	13C-PFDA (S)		100	112	%	112	(70-130)		
	13C-PFDA (S)		100	106	%	106	(70-130)		
LCS2	13C-PFHxA (S)		100	108	%	108	(70-130)		

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLK	13C-PFHxA (S)			111	%	111	(70-130)		
MRL_CHK	13C-PFHxA (S)		100	108	%	108	(70-130)		
MS_201905310387	13C-PFHxA (S)		100	108	%	108	(70-130)		
MSD_201905310387	13C-PFHxA (S)		100	109	%	109	(70-130)		
LCS2	13C-PFOA (I)		100	110	%	110	(50-150)		
MBLK	13C-PFOA (I)			114	%	114	(50-150)		
MRL_CHK	13C-PFOA (I)		100	111	%	111	(50-150)		
MS_201905310387	13C-PFOA (I)		100	113	%	113	(50-150)		
MSD_201905310387	13C-PFOA (I)		100	110	%	110	(50-150)		
LCS2	13C-PFOS (I)		100	106	%	106	(50-150)		
MBLK	13C-PFOS (I)			100	%	100	(50-150)		
MRL_CHK	13C-PFOS (I)		100	99.7	%	100	(50-150)		
MS_201905310387	13C-PFOS (I)		100	101	%	101	(50-150)		
MSD_201905310387	13C-PFOS (I)		100	107	%	107	(50-150)		
LCS2	d3-NMeFOSAA (I)		100	97.4	%	97	(50-150)		
MBLK	d3-NMeFOSAA (I)			99.5	%	100	(50-150)		
MRL_CHK	d3-NMeFOSAA (I)		100	94.6	%	95	(50-150)		
MS_201905310387	d3-NMeFOSAA (I)		100	97.8	%	98	(50-150)		
MSD_201905310387	d3-NMeFOSAA (I)		100	99.6	%	100	(50-150)		
LCS2	d5-NEtFOSAA (S)		100	114	%	114	(70-130)		
MBLK	d5-NEtFOSAA (S)			123	%	123	(70-130)		
MRL_CHK	d5-NEtFOSAA (S)		100	122	%	122	(70-130)		
MS_201905310387	d5-NEtFOSAA (S)		100	121	%	121	(70-130)		
MSD_201905310387	d5-NEtFOSAA (S)		100	106	%	106	(70-130)		
LCS2	N-ethyl Perfluorooctanesulfonamidoacetic acid		0.025	0.0287	ug/L	115	(70-130)	30	5.4
MBLK	N-ethyl Perfluorooctanesulfonamidoacetic acid			<0.000667	ug/L				
MRL_CHK	N-ethyl Perfluorooctanesulfonamidoacetic acid		0.002	0.00248	ug/L	124	(50-150)		
MS_201905310387	N-ethyl Perfluorooctanesulfonamidoacetic acid	ND	0.002	0.00205	ug/L	101	(50-150)		
MSD_201905310387	N-ethyl Perfluorooctanesulfonamidoacetic acid	ND	0.002	0.00191	ug/L	95	(50-150)	50	7.0
LCS2	N-methyl Perfluorooctanesulfonamidoacetic acid		0.025	0.0259	ug/L	104	(70-130)	30	1.1
MBLK	N-methyl Perfluorooctanesulfonamidoacetic acid			<0.000667	ug/L				
MRL_CHK	N-methyl Perfluorooctanesulfonamidoacetic acid		0.002	0.00226	ug/L	113	(50-150)		
MS_201905310387	N-methyl Perfluorooctanesulfonamidoacetic acid	ND	0.002	0.00209	ug/L	102	(50-150)		
MSD_201905310387	N-methyl Perfluorooctanesulfonamidoacetic acid	ND	0.002	0.00222	ug/L	108	(50-150)	50	6.0
LCS2	Perfluorobutanesulfonic acid		0.022	0.0233	ug/L	105	(70-130)	30	4.2
MBLK	Perfluorobutanesulfonic acid			<0.00059	ug/L				
MRL_CHK	Perfluorobutanesulfonic acid		0.0018	0.00201	ug/L	114	(50-150)		
MS_201905310387	Perfluorobutanesulfonic acid	ND	0.0018	0.00202	ug/L	114	(50-150)		

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

MSD_201905310387 Perflucondecancic acid ND 0.0018 0.0019 upl. 107 (50-150) 50 6.3 LGS2 Perflucondecancic acid 0.025 0.0245 upl. 18 (70-130) 30 6.3 MEL Perflucondecancic acid 0.0023 0.00234 upl. 118 (50-150) 50 4.4 MSD_201905510387 Perflucondecancic acid ND 0.002 0.00244 upl. 105 (50-150) 50 4.4 LCS2 Perflucondecancic acid ND 0.002 0.00244 upl. 102 (70-130) 30 4.6 MBLK Perflucondeceancic acid 0.002 0.0223 upl. 112 (50-150) 7.3 LCS2 Perflucondeceancic acid ND 0.002 0.00244 upl. 71 (70-130) 30 3.4 MSL_201905310387 Perflucondeplanoic acid ND 0.002 0.00154 upl. 77 (50-150) 7.3	QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MBLKPerflucrodecanoic acid0.0020.0023ug/LUUU <td>MSD_201905310387</td> <td>Perfluorobutanesulfonic acid</td> <td>ND</td> <td>0.0018</td> <td>0.00190</td> <td>ug/L</td> <td>107</td> <td>(50-150)</td> <td>50</td> <td>6.3</td>	MSD_201905310387	Perfluorobutanesulfonic acid	ND	0.0018	0.00190	ug/L	107	(50-150)	50	6.3
MRL_CHKPerthurodecanoic acidND0.020.00236ugl.118(50-15)MS_20190531037Perthurodecanoic acidND0.020.0021ugl.100(50-15)LGS2Perthurodecanoic acid0.020.0250.02102(70-13)3.04.8MRL_CHKPerthurodedecanoic acid0.020.0021ugl.122(50-15)-MS_20190531037Perthurodedecanoic acidND0.020.0021ugl.102(50-15)-MS_201905310387Perthurodedecanoic acidND0.020.0121ugl.101(70-13)3.03.1MS_201905310387Perthurodedecanoic acidND0.020.0124ugl.102(50-15)MS_201905310387Perthuroheptanoic acidND0.020.0154ugl.7.3(50-15)MS_201905310387Perthuroheptanoic acidND0.020.0164ugl.12(50-15)MS_201905310387Perthuroheptanoic acidND0.020.0164ugl.12(50-15)MS_201905310387Perthuroheptanoic acidND0.020.0164ugl.12(50-15)MS_201905310387Perthurohexanesuffonic acidND0.020.021ugl.12(50-15)MS_201905310387Perthurohexanesuffonic acidND0.020.022ugl.12(50-15)<	LCS2	Perfluorodecanoic acid		0.025	0.0245	ug/L	98	(70-130)	30	6.3
MS_20190310387Perfluoredecanoic acidNDND0.020.021ugl.100(50-150)4.4MSD_20190510387Perfluoredecanoic acid0.020.0214ugl.102(70-130)3.04.8MELCPerfluoredecanoic acid0.020.0224ugl.112(50-150)5.05.0MSL_201905310387Perfluoredecanoic acidND0.0020.00214ugl.102(50-150)5.05.0MS_201905310387Perfluoredecanoic acidND0.0020.0014ugl.102(50-150)5.05.0MSL_201905310387Perfluoredecanoic acidND0.0020.0118ugl.7.1(70-130)3.03.4MSL_201905310387Perfluoredecanoic acidND0.020.0118ugl.7.5(50-150)5.06.7MSL_201905310387Perfluoredecanoic acidND0.020.0118ugl.7.5(50-150)5.06.7MSL_201905310387Perfluoredecanoic acidND0.020.0164ugl.10.2(50-150)5.06.7MSL_201905310387Perfluoredecanoic acidND0.020.0214ugl.112(50-150)5.06.7MSL_201905310387Perfluoredecanoic acidND0.020.0214ugl.112(50-150)5.06.7MSL_201905310387Perfluoredecanoic acidND0.020.0214ugl.112(50-150)5.05.0MSL_201905310387	MBLK	Perfluorodecanoic acid			<0.000667	ug/L				
MBD_201908310387Perfluorodoceannoic acidND0.020.0221ugl.102(50-150)504.4LCS2Perfluorododecannoic acid0.020.0223ugl.102(71-30)304.6MBLPerfluorododecannoic acid0.0020.00224ugl.102(50-150)MS_201905310387Perfluorododecannoic acidND0.0020.0021ugl.102(50-150)MSD_201905310387Perfluorododecannoic acidND0.0020.00124ugl.103(50-150)MSD_201905310387Perfluoroheptanoic acidND0.0020.0164ugl.77(50-150)MSD_201905310387Perfluoroheptanoic acidND0.0020.00163ugl.73(50-150)MSD_201905310387Perfluoroheptanoic acidND0.0020.00163ugl.112(70-130)300.39MSLPerfluorohexanesuffonic acidND0.0020.00163ugl.112(50-150)MSL_201905310387Perfluorohexanesuffonic acidND0.0180.019ugl.102(50-150)MSL_201905310387Perfluorohexanesuffonic acidND0.0180.019ugl.1030.013.03.5MSL_201905310387Perfluorohexanesuffonic acidND0.0280.022ugl.105105MSL_201905310387Perfluorohexanesid<	MRL_CHK	Perfluorodecanoic acid		0.002	0.00236	ug/L	118	(50-150)		
LCS2Perfluorodoscanoi acid0.0250.0254ugl.1.02(70-130)3.04.6MBLKPerfluorodoscanoi acid0.0020.00223ugl.112(60-15)100100(50-15)100100(50-15)100100(50-15)100100100(50-15)100100100(50-15)100100100(50-15)100100100100(50-15)100 <t< td=""><td>MS_201905310387</td><td>Perfluorodecanoic acid</td><td>ND</td><td>0.002</td><td>0.00204</td><td>ug/L</td><td>100</td><td>(50-150)</td><td></td><td></td></t<>	MS_201905310387	Perfluorodecanoic acid	ND	0.002	0.00204	ug/L	100	(50-150)		
MBLKPerfluorododecanoic acid0.0020.00223ugil.112(50-15)112(50-15)MR_CHKPerfluorododecanoic acidND0.0020.0024ugil.102(50-150)507.3MSD_201090310387Perfluorododecanoic acidND0.0020.0024ugil.102(50-150)507.3LCS2Perfluoroheptanoic acidND0.0250.0178ugil.7.1(70-130)303.4MBLKPerfluoroheptanoic acidND0.0220.0154ugil.7.1(50-150)506.7MS_201905310387Perfluoroheptanoic acidND0.0020.0154ugil.7.3(50-150)506.7MSL_CHKPerfluoroheptanoic acidND0.0020.0154ugil.7.3(50-150)506.7MSL_201905310387Perfluorohexanesuffonic acidND0.0020.0254ugil.102(50-150)506.7MSL_CHKPerfluorohexanesuffonic acidND0.0030.0254ugil.112(50-150)506.7MSL_201905310387Perfluorohexanesuffonic acidND0.0020.0214ugil.102(50-150)506.7MSL_CHKPerfluorohexanesuffonic acidND0.0020.0214ugil.103(50-150)506.7MSL_CHKPerfluorohexanesuffonic acidND0.0020.0214ugil.103(50-150)506.2MSL_CHKPerfluorohe	MSD_201905310387	Perfluorodecanoic acid	ND	0.002	0.00213	ug/L	105	(50-150)	50	4.4
NRL_CHKPerfluorododecanoic acidND0.020.0223ugl112(50-150).MS_201905310387Perfluorododecanoic acidND0.0020.00219ugl109(50-150)507.3MSD_201905310387Perfluoroheptanoic acidND0.0020.00174ugl109(50-150)507.3MELKPerfluoroheptanoic acid.0.0020.00154ugl77(50-150)MS_201905310387Perfluoroheptanoic acidND0.0020.00154ugl75(50-150)MS_070905310387Perfluoroheptanoic acidND0.0230.0254ugl112(70-130)300.39MSLKPerfluoroheptanoic acidND0.0230.0254ugl112(50-150)MS_201905310387Perfluorohexanesulfonic acidND0.0180.012ugl100(50-150)MSL_CHKPerfluorohexanesulfonic acidND0.0280.0182ugl101(70-130)30.39.MSL_201905310387Perfluorohexanesulfonic acidND0.0280.0182ugl102(50-150)MS_201905310387Perfluorohexanesulfonic acidND0.0280.021ugl101(70-130)30.5.MSL_201905310387Perfluorohexanei acidND0.020.02140ugl102(50-150)MSL_201905	LCS2	Perfluorododecanoic acid		0.025	0.0254	ug/L	102	(70-130)	30	4.6
MS_201905310387Perfluorododecanoic acidNDND0.0020.0021ugl.102(50-150).MSD_201905310387Perfluorododecanoic acidND0.0220.0178ugl.10(50-150)507.3LCS2Perfluoroheplanoic acid0.0250.0178ugl.77(50-150)MRL_CHKPerfluoroheplanoic acidND0.0020.00153ugl.77(50-150)MS_201905310387Perfluoroheplanoic acidND0.0020.00164ugl.76(50-150)MSD_201905310387Perfluoroheplanoic acidND0.0020.00164ugl.102(50-150)MSL_CHKPerfluoroheplanoic acidND0.0020.00164ugl.112(50-150)MSL_01905310387Perfluorohexanesulfonic acidND0.0010.0020ugl.102(50-150)MSL_01905310387Perfluorohexanesulfonic acidND0.0010.0010ugl.101(70-130)303.5MSL_01Worehxanosi.acidND0.0020.0220ugl.102(50-150)MSL_01Worehxanosi.acidND0.0020.0210ugl.101(70-130)303.5MSL_01Worehxanosi.acidND0.0020.0210ugl.102(50-150)MSL_01Worehxanosi.acidND0.0020.0220ugl.	MBLK	Perfluorododecanoic acid			<0.000667	ug/L				
MSD_201906310387Perfluorohoptanoic acidND0.0020.00219ug/L109(50-150)507.3LCS2Perfluorohoptanoic acid0.0250.0178ug/L71(70-130)303.4MBLKPerfluorohoptanoic acid0.0020.00154ug/L77(60-150)506.7MS_201905310387Perfluorohoptanoic acidND0.0020.00153ug/L75(60-150)506.7MS_201905310387Perfluorohoptanoic acidND0.0020.00164ug/L80(60-150)506.7LCS2Perfluorohoptanoic acidND0.0020.0164ug/L80(60-150)506.7MRL_CHKPerfluorohoptanoic acidND0.0020.0264ug/L102(50-150)506.7MRL_CHKPerfluorohoxanesulfonic acidND0.0025ug/L102(50-150)509.1LCS2Perfluorohoxanoic acidND0.0180.0182ug/L109(50-150)509.1LCS2Perfluorohoxanoic acidND0.0220.0210ug/L109(50-150)509.1LCS2Perfluorohoxanoic acidND0.0220.0210ug/L105(50-150)506.2MRL_CHKPerfluorohoxanoic acidND0.0220.0221ug/L105106.2MS2.0190531037Perfluorohoxanoic acidND0.0220.0223ug/L101(50-150)	MRL_CHK	Perfluorododecanoic acid		0.002	0.00223	ug/L	112	(50-150)		
LCS2 Perfluoroheptanoic acid 0.025 0.0178 ug/L 71 (70.130) 30 3.4 MBLK Perfluoroheptanoic acid -0.00667 ug/L 77 (50.150) - MRC1HK Perfluoroheptanoic acid ND 0.002 0.00154 ug/L 76 (50.150) MS_021905310387 Perfluoroheptanoic acid ND 0.002 0.00164 ug/L 76 (50.150) MS_021905310387 Perfluorohexanesulfonic acid ND 0.023 0.024 ug/L 112 (70.130) 30 0.39 MBLK Perfluorohexanesulfonic acid ND 0.018 0.0124 ug/L 112 (50.150) 50 9.1 MS_201905310387 Perfluorohexanesulfonic acid ND 0.018 0.0124 ug/L 101 (70.130) 30 3.5 MS_201905310387 Perfluorohexanoscifonic acid ND 0.025 ug/L 101 (70.130) 30 6.2 MS_201905310387 Perfluorohexanoic acid N	MS_201905310387	Perfluorododecanoic acid	ND	0.002	0.00204	ug/L	102	(50-150)		
MBLKPerfluoroheptanoic acid-0.00067ug/LMRL_CHKPerfluoroheptanoic acidND0.0020.00154ug/L77(50-150)MS_D10905310387Perfluoroheptanoic acidND0.0020.00164ug/L75(50-150)506.7MSD_D10905310387Perfluoroheptanoic acidND0.0220.0254ug/L112(70-130)300.39MBLKPerfluorohexanesulfonic acid0.0230.0256ug/L112(50-150)506.7MS_D10905310387Perfluorohexanesulfonic acidND0.0180.0192ug/L100(50-150)509.1MS_D21905310387Perfluorohexanesulfonic acidND0.0180.0192ug/L101(70-130)303.5MSLKPerfluorohexanesulfonic acidND0.0200.0210ug/L105(50-150)509.1LCS2Perfluorohexanoic acidND0.0200.0210ug/L105(50-150)506.2MSL_CHKPerfluorohexanoic acidND0.0200.0210ug/L105(50-150)506.2LCS2Perfluorohexanoic acidND0.022ug/L105(70-130)308.8MSL_CHKPerfluorohexanoic acidND0.022ug/L105(70-130)306.2LCS2Perfluorohexanoic acidND0.022ug/L105(50-150)506.2LCS2Perfluorohexanoic acid <td>MSD_201905310387</td> <td>Perfluorododecanoic acid</td> <td>ND</td> <td>0.002</td> <td>0.00219</td> <td>ug/L</td> <td>109</td> <td>(50-150)</td> <td>50</td> <td>7.3</td>	MSD_201905310387	Perfluorododecanoic acid	ND	0.002	0.00219	ug/L	109	(50-150)	50	7.3
MRL_CHK Perfluoroheptanoic acid 0.002 0.0154 ugl. 77 (50-150) MS_201905310387 Perfluoroheptanoic acid ND 0.002 0.00153 ugl. 75 (50-150) MS_201905310387 Perfluoroheptanoic acid ND 0.002 0.01644 ugl. 80 (50-150) 50 6.7 LCS2 Perfluorohexanesulfonic acid ND 0.023 0.024 ugl. 112 (50-150) 50 6.7 MRL_CHK Perfluorohexanesulfonic acid ND 0.025 ugl. 112 (50-150) 50 9.1 MRL_CHK Perfluorohexanesulfonic acid ND 0.018 0.019 ugl. 100 (50-150) 50 9.1 LCS2 Perfluorohexanoic acid ND 0.018 0.019 ugl. 101 (70-130) 30 3.5 MSL_CHK Perfluorohexanoic acid ND 0.022 0.026 ugl. 105 (50-150) 50 6.2 LCS2 Perfluorohexa	LCS2	Perfluoroheptanoic acid		0.025	0.0178	ug/L	71	(70-130)	30	3.4
MS_201905310387 Perfluoroheptanoic acid ND 0.002 0.00153 ug/L 75 (50-150) MSD_201905310387 Perfluorohexanesulfonic acid ND 0.002 0.0164 ug/L 80 (50-150) 50 6.7 LCS2 Perfluorohexanesulfonic acid 0.023 0.0244 ug/L 112 (70-130) 30 0.39 MBL Perfluorohexanesulfonic acid 0.023 0.0254 ug/L 112 (50-150) 50 9.1 MS_201905310387 Perfluorohexanesulfonic acid ND 0.0018 0.00190 ug/L 100 (50-150) 50 9.1 LCS2 Perfluorohexanesulfonic acid ND 0.018 0.0199 ug/L 101 (70-130) 30 3.5 MSL_CHK Perfluorohexanoic acid ND 0.002 0.00267 ug/L 101 (70-130) 30 8.8 MSL_CHK Perfluorohexanoic acid ND 0.002 0.00267 ug/L 103 (50-150) 50 6.2 <td>MBLK</td> <td>Perfluoroheptanoic acid</td> <td></td> <td></td> <td><0.000667</td> <td>ug/L</td> <td></td> <td></td> <td></td> <td></td>	MBLK	Perfluoroheptanoic acid			<0.000667	ug/L				
MSD_201905310387 Perfluoroheptanoic acid ND 0.002 0.0014 ug/L 80 (50-150) 50 6.7 LCS2 Perfluorohexanesulfonic acid 0.023 0.0254 ug/L 112 (70-130) 30 0.39 MBLK Perfluorohexanesulfonic acid 0.018 0.0255 ug/L 112 (50-150) - - MR_CHK Perfluorohexanesulfonic acid ND 0.018 0.0018 ug/L 100 (50-150) - - MS_201905310387 Perfluorohexanosulfonic acid ND 0.018 0.0190 ug/L 100 (50-150) - - MS_201905310387 Perfluorohexanoic acid ND 0.022 0.0210 ug/L 103 (50-150) -	MRL_CHK	Perfluoroheptanoic acid		0.002	0.00154	ug/L	77	(50-150)		
LCS Perfluorohexanesulfonic acid 0.023 0.0254 ug/L 112 (70-130) 30 0.39 MBLK Perfluorohexanesulfonic acid 0.0018 0.0205 ug/L 112 (50-150)	MS_201905310387	Perfluoroheptanoic acid	ND	0.002	0.00153	ug/L	75	(50-150)		
MBLK Perfluorohexanesulfonic acid -0.00608 ugl. MRL_CHK Perfluorohexanesulfonic acid 0.0018 0.0025 ugl. 112 (50-150) MS_201905310387 Perfluorohexanesulfonic acid ND 0.0018 0.00182 ugl. 100 (50-150) MSD_201905310387 Perfluorohexanoic acid ND 0.0018 0.00182 ugl. 100 (50-150) 50 9.1 LCS2 Perfluorohexanoic acid 0.02 0.0252 ugl. 101 (70-130) 30 3.5 MBLK Perfluorohexanoic acid 0.02 0.00210 ugl. 105 (50-150) - MS_201905310387 Perfluorohexanoic acid ND 0.002 0.00210 ugl. 105 (50-150) - MSD_201905310387 Perfluoronnanoic acid ND 0.002 0.00260 ugl. 105 (50-150) - 6.2 MSD_201905310387 Perfluoronnanoic acid ND 0.002 0.0027 ugl. 126 (50-150)	MSD_201905310387	Perfluoroheptanoic acid	ND	0.002	0.00164	ug/L	80	(50-150)	50	6.7
MRL_CHK Perfluorohexanesulfonic acid 0.0018 0.00205 ug/L 112 (50.150) MS_201905310387 Perfluorohexanesulfonic acid ND 0.0018 0.00182 ug/L 100 (50.150) 50 9.1 MSD_201905310387 Perfluorohexanoic acid ND 0.0182 0.0199 ug/L 109 (50.150) 50 9.1 LCS2 Perfluorohexanoic acid ND 0.025 0.0252 ug/L 101 (70.130) 30 3.5 MBLK Perfluorohexanoic acid ND 0.022 0.0210 ug/L 105 (50.150) - - MS_201905310387 Perfluorohexanoic acid ND 0.002 0.0206 ug/L 100 (50.150) 50 6.2 LCS2 Perfluoronnanoic acid ND 0.002 0.0262 ug/L 100 (50.150) 50 6.2 LCS2 Perfluoronnanoic acid ND 0.022 0.0262 ug/L 112 (50.150) 50 13	LCS2	Perfluorohexanesulfonic acid		0.023	0.0254	ug/L	112	(70-130)	30	0.39
M2 Perfluorohexanesulfonic acid ND 0.0018 0.00182 ug/L 100 (60-150) MSD_201905310387 Perfluorohexanesulfonic acid ND 0.0018 0.00180 ug/L 109 (50-150) 50 9.1 LCS2 Perfluorohexanoic acid 0.025 0.0252 ug/L 101 (70-130) 30 3.5 MBLK Perfluorohexanoic acid 0.02 0.0021 ug/L 105 (50-150) 50 9.1 MS_201905310387 Perfluorohexanoic acid ND 0.002 0.0024 0.026 ug/L 94 (50-150) 50 6.2 MS_201905310387 Perfluoronexnoic acid ND 0.022 0.0266 ug/L 100 (50-150) 50 6.2 LCS2 Perfluoronenancic acid ND 0.022 0.0263 ug/L 127 (50-150) 50 6.2 MSL_CHK Perfluoronanoic acid ND 0.020 0.0028 ug/L 127 (50-150) 50 13	MBLK	Perfluorohexanesulfonic acid			<0.000608	ug/L				
MSD_201905310387 Perfluorohexanesulfonic acid ND 0.0018 0.00199 u/L 109 (50-150) 50 9.1 LCS2 Perfluorohexanoic acid 0.025 0.0252 u/L 101 (70-130) 30 3.5 MBLK Perfluorohexanoic acid 0.002 0.00210 u/L 105 (50-150) - - MS_201905310387 Perfluorohexanoic acid ND 0.002 0.00260 u/L 94 (50-150) -<	MRL_CHK	Perfluorohexanesulfonic acid		0.0018	0.00205	ug/L	112	(50-150)		
LC2 Perfluorohexanoic acid 0.025 0.0252 0.026<	MS_201905310387	Perfluorohexanesulfonic acid	ND	0.0018	0.00182	ug/L	100	(50-150)		
MBLK Perfluorohexanoic acid < < MRL_CHK Perfluorohexanoic acid 0.002 0.00210 ug/L 105 (50-150) MS_201905310387 Perfluorohexanoic acid ND 0.002 0.00194 ug/L 94 (50-150) 6.2 MSD_201905310387 Perfluorohexanoic acid ND 0.002 0.0026 ug/L 100 (50-150) 50 6.2 LCS2 Perfluoronanoic acid ND 0.022 0.0262 ug/L 100 (50-150) 50 6.2 MSLK Perfluoronanoic acid ND 0.022 0.0263 ug/L 127 (50-150) 13 MSL_CHK Perfluoronanoic acid ND 0.02 0.0027 ug/L 129 (50-150) 13 MSL_SO1905310387 Perfluoronanoic acid ND 0.02 0.0027 ug/L 136 0.41 13 LCS2 Perfluoroctanesulfonic acid ND<	MSD_201905310387	Perfluorohexanesulfonic acid	ND	0.0018	0.00199	ug/L	109	(50-150)	50	9.1
MRL_CHK Perfluorohexanoic acid 0.002 0.00210 ug/L 105 (50-150) MS_201905310387 Perfluorohexanoic acid ND 0.002 0.00194 ug/L 94 (50-150) MSD_201905310387 Perfluorohexanoic acid ND 0.002 0.00260 ug/L 100 (50-150) 50 6.2 LCS2 Perfluorononanoic acid ND 0.022 0.00260 ug/L 100 (50-150) 50 6.2 MBLK Perfluorononanoic acid ND 0.022 0.00260 ug/L 127 (50-150) 50 8.8 MSL_CHK Perfluorononanoic acid ND 0.002 0.00253 ug/L 127 (50-150) 50 13 MSL_201905310387 Perfluoronanoic acid ND 0.002 0.0027 ug/L 113 (50-150) 50 13 LCS2 Perfluoroctanesulfonic acid ND 0.028 0.0246 ug/L 106 (70-130) 30 0.41 MSL_CHK	LCS2	Perfluorohexanoic acid		0.025	0.0252	ug/L	101	(70-130)	30	3.5
MS_201905310387 Perfluorohexanoic acid ND 0.002 0.00194 ug/L 94 (50-150) MSD_201905310387 Perfluorohexanoic acid ND 0.002 0.00206 ug/L 100 (50-150) 50 6.2 LCS2 Perfluoronanoic acid 0.025 0.0262 ug/L 105 (70-130) 30 8.8 MBLK Perfluoronanoic acid 0.002 0.00253 ug/L 127 (50-150) - - MS_201905310387 Perfluoronanoic acid ND 0.002 0.00259 ug/L 127 (50-150) - - MS_201905310387 Perfluoronanoic acid ND 0.002 0.00227 ug/L 129 (50-150) - - MSD_201905310387 Perfluoroctanesulfonic acid ND 0.023 0.0246 ug/L 106 (70-130) 30 0.41 MSLCS2 Perfluoroctanesulfonic acid 0.0019 0.0182 ug/L 104 (50-150) - - MSLCS	MBLK	Perfluorohexanoic acid			<0.000667	ug/L				
MSD_201905310387 Perfluorohexanoic acid ND 0.002 0.00206 ug/L 100 (50-150) 50 6.2 LCS2 Perfluorononanoic acid 0.025 0.0262 ug/L 105 (70-130) 30 8.8 MBLK Perfluorononanoic acid <0.0026	MRL_CHK	Perfluorohexanoic acid		0.002	0.00210	ug/L	105	(50-150)		
LCS2 Perfluorononanoic acid 0.025 0.0262 ug/L 105 (70-130) 30 8.8 MBLK Perfluorononanoic acid < < 0.025 0.0267 ug/L 105 (70-130) 30 8.8 MBLK Perfluorononanoic acid < < 0.002 0.0253 ug/L 127 (50-150) MS_201905310387 Perfluorononanoic acid ND 0.002 0.00253 ug/L 129 (50-150) 50 13 LCS2 Perfluorononanoic acid ND 0.002 0.0024 0.024 ug/L 113 (50-150) 50 13 LCS2 Perfluorooctanesulfonic acid ND 0.002 0.0246 ug/L 106 (70-130) 30 0.41 MBLK Perfluorooctanesulfonic acid ND 0.0019 0.0246 ug/L ug/L 106 (70-130) 30 0.41 MRL_CHK Perfluorooctanesulfonic acid ND 0.0019 0.00182	MS_201905310387	Perfluorohexanoic acid	ND	0.002	0.00194	ug/L	94	(50-150)		
MBLK Perfluorononanoic acid < < MRL_CHK Perfluorononanoic acid 0.002 0.00253 ug/L 127 (50-150) MS_201905310387 Perfluorononanoic acid ND 0.002 0.00253 ug/L 129 (50-150) 13 MSD_201905310387 Perfluorononanoic acid ND 0.002 0.00227 ug/L 113 (50-150) 50 13 LCS2 Perfluoroctanesulfonic acid ND 0.023 0.0246 ug/L 106 (70-130) 30 0.41 MBLK Perfluoroctanesulfonic acid -0.00617 ug/L 106 (70-130) 30 0.41 MRL_CHK Perfluoroctanesulfonic acid -0.0017 ug/L 104 (50-150) - - - - 0.0182 ug/L 104 (50-150) - - - - - - - - - - - - - - </td <td>MSD_201905310387</td> <td>Perfluorohexanoic acid</td> <td>ND</td> <td>0.002</td> <td>0.00206</td> <td>ug/L</td> <td>100</td> <td>(50-150)</td> <td>50</td> <td>6.2</td>	MSD_201905310387	Perfluorohexanoic acid	ND	0.002	0.00206	ug/L	100	(50-150)	50	6.2
MRL_CHK Perfluorononanoic acid 0.002 0.00253 ug/L 127 (50-150) MS_201905310387 Perfluorononanoic acid ND 0.002 0.00259 ug/L 129 (50-150) MSD_201905310387 Perfluorononanoic acid ND 0.002 0.00227 ug/L 113 (50-150) 50 13 LCS2 Perfluoroctanesulfonic acid ND 0.023 0.0246 ug/L 106 (70-130) 30 0.41 MBLK Perfluoroctanesulfonic acid Implue to the second t	LCS2	Perfluorononanoic acid		0.025	0.0262	ug/L	105	(70-130)	30	8.8
MS_201905310387 Perfluorononanoic acid ND 0.002 0.00259 ug/L 129 (50-150) MSD_201905310387 Perfluorononanoic acid ND 0.002 0.00227 ug/L 113 (50-150) 50 13 LCS2 Perfluorooctanesulfonic acid ND 0.023 0.0246 ug/L 106 (70-130) 30 0.41 MBLK Perfluorooctanesulfonic acid 0.0019 ug/L ug/L 106 (70-130) 30 0.41 MBLK Perfluorooctanesulfonic acid 0.0019 ug/L 106 (50-150) 0.41 MRL_CHK Perfluorooctanesulfonic acid 0.0019 ug/L ug/L 99 (50-150) ND 0.0019 ug/L 104 (50-150) 20 MSD_201905310387 Perfluorooctanesulfonic acid ND 0.019 0.0158 ug/L 85 <td< td=""><td>MBLK</td><td>Perfluorononanoic acid</td><td></td><td></td><td><0.000667</td><td>ug/L</td><td></td><td></td><td></td><td></td></td<>	MBLK	Perfluorononanoic acid			<0.000667	ug/L				
MSD_201905310387 Perfluorononanoic acid ND 0.002 0.00227 ug/L 113 (50-150) 50 13 LCS2 Perfluorooctanesulfonic acid 0.023 0.0246 ug/L 106 (70-130) 30 0.41 MBLK Perfluorooctanesulfonic acid <0.0017	MRL_CHK	Perfluorononanoic acid		0.002	0.00253	ug/L	127	(50-150)		
LCS2 Perfluorooctanesulfonic acid 0.023 0.0246 ug/L 106 (70-130) 30 0.41 MBLK Perfluorooctanesulfonic acid < <0.0019 0.00182 ug/L 99 (50-150) MRL_CHK Perfluorooctanesulfonic acid ND 0.0019 0.00192 ug/L 104 (50-150) MS_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00192 ug/L 104 (50-150) MSD_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00198 ug/L 85 (50-150) 50 20 LCS2 Perfluorooctanoic acid ND 0.025 0.0256 ug/L 103 (70-130) 30 0.39	MS_201905310387	Perfluorononanoic acid	ND	0.002	0.00259	ug/L	129	(50-150)		
MBLK Perfluorooctanesulfonic acid <0.000617 ug/L MRL_CHK Perfluorooctanesulfonic acid 0.0019 0.00182 ug/L 99 (50-150) MS_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00192 ug/L 104 (50-150) MSD_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00158 ug/L 50 20 MSD_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00158 ug/L 104 (50-150) 50 20 LCS2 Perfluorooctanoic acid ND 0.025 0.0256 ug/L 103 (70-130) 30 0.39	MSD_201905310387	Perfluorononanoic acid	ND	0.002	0.00227	ug/L	113	(50-150)	50	13
MRL_CHK Perfluorooctanesulfonic acid 0.0019 0.00182 ug/L 99 (50-150) MS_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00192 ug/L 104 (50-150) MSD_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00192 ug/L 104 (50-150) MSD_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00158 ug/L 85 (50-150) 50 20 LCS2 Perfluorooctanoic acid 0.025 0.0256 ug/L 103 (70-130) 30 0.39	LCS2	Perfluorooctanesulfonic acid		0.023	0.0246	ug/L	106	(70-130)	30	0.41
MS_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00192 ug/L 104 (50-150) MSD_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00158 ug/L 85 (50-150) 50 20 LCS2 Perfluorooctanoic acid 0.025 0.0256 ug/L 103 (70-130) 30 0.39	MBLK	Perfluorooctanesulfonic acid			<0.000617	ug/L				
MSD_201905310387 Perfluorooctanesulfonic acid ND 0.0019 0.00158 ug/L 85 (50-150) 50 20 LCS2 Perfluorooctanoic acid 0.025 0.0256 ug/L 103 (70-130) 30 0.39	MRL_CHK	Perfluorooctanesulfonic acid		0.0019	0.00182	ug/L	99	(50-150)		
LCS2 Perfluorooctanoic acid 0.025 0.0256 ug/L 103 (70-130) 30 0.39	MS_201905310387	Perfluorooctanesulfonic acid	ND	0.0019	0.00192	ug/L	104	(50-150)		
	MSD_201905310387	Perfluorooctanesulfonic acid	ND	0.0019	0.00158	ug/L	85	(50-150)	50	20
MBLK Perfluorooctanoic acid <0.000667 ug/L	LCS2	Perfluorooctanoic acid		0.025	0.0256	ug/L	103	(70-130)	30	0.39
	MBLK	Perfluorooctanoic acid			<0.000667	ug/L				

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Perfluorooctanoic acid		0.002	0.00220	ug/L	110	(50-150)		
MS_201905310387	Perfluorooctanoic acid	ND	0.002	0.00228	ug/L	109	(50-150)		
MSD_201905310387	Perfluorooctanoic acid	ND	0.002	0.00214	ug/L	102	(50-150)	50	6.1
LCS2	Perfluorotetradecanoic acid		0.025	0.0238	ug/L	95	(70-130)	30	0.84
MBLK	Perfluorotetradecanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluorotetradecanoic acid		0.002	0.00219	ug/L	109	(50-150)		
MS_201905310387	Perfluorotetradecanoic acid	ND	0.002	0.00202	ug/L	96	(50-150)		
MSD_201905310387	Perfluorotetradecanoic acid	ND	0.002	0.00216	ug/L	104	(50-150)	50	7.2
LCS2	Perfluorotridecanoic acid		0.025	0.0248	ug/L	99	(70-130)	30	4.5
MBLK	Perfluorotridecanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluorotridecanoic acid		0.002	0.00268	ug/L	134	(50-150)		
MS_201905310387	Perfluorotridecanoic acid	ND	0.002	0.00241	ug/L	118	(50-150)		
MSD_201905310387	Perfluorotridecanoic acid	ND	0.002	0.00253	ug/L	124	(50-150)	50	4.9
LCS2	Perfluoroundecanoic acid		0.025	0.0228	ug/L	91	(70-130)	30	9.6
MBLK	Perfluoroundecanoic acid			<0.000667	ug/L				
MRL_CHK	Perfluoroundecanoic acid		0.002	0.00248	ug/L	124	(50-150)		
MS_201905310387	Perfluoroundecanoic acid	ND	0.002	0.00255	ug/L	122	(50-150)		
MSD_201905310387	Perfluoroundecanoic acid	ND	0.002	0.00143	ug/L	66	(50-150)	50	<u>56</u>
Perfluorinated Alk	yl Acids EPA 537 rev 1.1 by EPA 537								
Prep Batch:	1175640 Analytical Batch: 1177087					An	alysis Date:	06/08/2019	
LCS1	13C-PFDA (S)		100	108	%	108	(70-130)		
LCS1	13C-PFHxA (S)		100	112	%	112	(70-130)		
LCS1	13C-PFOA (I)		100	105	%	105	(50-150)		
LCS1	13C-PFOS (I)		100	106	%	106	(50-150)		
LCS1	d3-NMeFOSAA (I)		100	104	%	104	(50-150)		
LCS1	d5-NEtFOSAA (S)		100	104	%	104	(70-130)		
LCS1	N-ethyl Perfluorooctanesulfonamidoacetic acid		0.025	0.0258	ug/L	103	(70-130)		
LCS1	N-methyl Perfluorooctanesulfonamidoacetic acid		0.025	0.0250	ug/L	100	(70-130)		
LCS1	Perfluorobutanesulfonic acid		0.022	0.0232	ug/L	105	(70-130)		
LCS1	Perfluorodecanoic acid		0.025	0.0274	ug/L	109	(70-130)		
LCS1	Perfluorododecanoic acid		0.025	0.0260	ug/L	104	(70-130)		
LCS1	Perfluoroheptanoic acid		0.025	0.0190	ug/L	76	(70-130)		
LCS1	Perfluorohexanesulfonic acid		0.023	0.0242	ug/L	106	(70-130)		
LCS1	Perfluorohexanoic acid		0.025	0.0284	ug/L	113	(70-130)		
LCS1	Perfluorononanoic acid		0.025	0.0277	ug/L	111	(70-130)		
LCS1	Perfluorooctanesulfonic acid		0.023	0.0243	ug/L	105	(70-130)		
LCS1	Perfluorooctanoic acid		0.025	0.0290	ug/L	116	(70-130)		
LCS1	Perfluorotetradecanoic acid		0.025	0.0277	ug/L	111	(70-130)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).

Laboratory QC

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Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	Perfluorotridecanoic acid		0.025	0.0261	ug/L	104	(70-130)		
LCS1	Perfluoroundecanoic acid		0.025	0.0258	ug/L	103	(70-130)		
Semivolatiles by G	CMS by EPA 525.2								
	1176017 Analytical Batch: 1177380					An	alysis Date:	06/12/2019	
LCS1	1,3-Dimethyl-2-nitrobenzene (S)		5	96.4	%	96	(70-130)		
LCS2	1,3-Dimethyl-2-nitrobenzene (S)		5	96.1	%	96	(70-130)		
MBLK	1,3-Dimethyl-2-nitrobenzene (S)			94.0	%	94	(70-130)		
MRL_CHK	1,3-Dimethyl-2-nitrobenzene (S)		5	95.6	%	96	(70-130)		
MS_201905240012	1,3-Dimethyl-2-nitrobenzene (S)		5	93.7	%	94	(70-130)		
MSD_201905240012	1,3-Dimethyl-2-nitrobenzene (S)		5	89.5	%	90	(70-130)		
LCS1	2,4-DDD		2	2.11	ug/L	106	(70-130)		
LCS2	2,4-DDD		2	2.11	ug/L	106	(70-130)	20	0.0
MBLK	2,4-DDD			<0.1	ug/L				
MRL_CHK	2,4-DDD		0.1	0.125	ug/L	125	(50-150)		
MS_201905240012	2,4-DDD		2	2.09	ug/L	105	(70-130)		
MSD_201905240012	2,4-DDD		2	2.24	ug/L	112	(70-130)	20	6.7
LCS1	2,4-DDE		2	2.00	ug/L	100	(70-130)		
LCS2	2,4-DDE		2	2.00	ug/L	100	(70-130)	20	0.0
MBLK	2,4-DDE			<0.1	ug/L				
MRL_CHK	2,4-DDE		0.1	0.106	ug/L	106	(50-150)		
MS_201905240012	2,4-DDE		2	1.97	ug/L	98	(70-130)		
MSD_201905240012	2,4-DDE		2	2.13	ug/L	107	(70-130)	20	8.0
LCS1	2,4-DDT		2	2.10	ug/L	105	(70-130)		
LCS2	2,4-DDT		2	2.14	ug/L	107	(70-130)	20	1.9
MBLK	2,4-DDT			<0.1	ug/L				
MRL_CHK	2,4-DDT		0.1	0.101	ug/L	101	(50-150)		
MS_201905240012	2,4-DDT		2	2.10	ug/L	105	(70-130)		
MSD_201905240012	2,4-DDT		2	2.29	ug/L	115	(70-130)	20	8.7
LCS1	2,4-Dinitrotoluene		2	2.41	ug/L	121	(70-130)		
LCS2	2,4-Dinitrotoluene		2	2.26	ug/L	113	(70-130)	20	6.4
MBLK	2,4-Dinitrotoluene			<0.1	ug/L				
MRL_CHK	2,4-Dinitrotoluene		0.1	0.100	ug/L	100	(50-150)		
MS_201905240012	2,4-Dinitrotoluene	ND	2	2.41	ug/L	120	(70-130)		
MSD_201905240012	2,4-Dinitrotoluene	ND	2	2.28	ug/L	114	(70-130)	20	5.4
LCS1	2,6-Dinitrotoluene		2	2.13	ug/L	106	(70-130)		
LCS2	2,6-Dinitrotoluene		2	1.99	ug/L	100	(70-130)	20	6.8
	2,6-Dinitrotoluene			<0.1	ug/L				

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte		Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	2,6-Dinitrotoluene			0.1	0.116	ug/L	116	(50-150)		
MS_201905240012	2,6-Dinitrotoluene		ND	2	2.01	ug/L	100	(70-130)		
MSD_201905240012	2,6-Dinitrotoluene		ND	2	2.07	ug/L	104	(70-130)	20	3.0
LCS1	4,4-DDD			2	2.10	ug/L	105	(70-130)		
LCS2	4,4-DDD			2	2.11	ug/L	106	(70-130)	20	0.0
MBLK	4,4-DDD				<0.1	ug/L				
MRL_CHK	4,4-DDD			0.1	0.0910	ug/L	91	(50-150)		
MS_201905240012	4,4-DDD		ND	2	2.12	ug/L	106	(70-130)		
MSD_201905240012	4,4-DDD		ND	2	2.25	ug/L	112	(70-130)	20	6.2
LCS1	4,4-DDE			2	1.94	ug/L	97	(70-130)		
LCS2	4,4-DDE			2	2.00	ug/L	100	(70-130)	20	3.0
MBLK	4,4-DDE				<0.1	ug/L				
MRL_CHK	4,4-DDE			0.1	0.0990	ug/L	99	(50-150)		
MS_201905240012	4,4-DDE		ND	2	1.96	ug/L	98	(70-130)		
MSD_201905240012	4,4-DDE		ND	2	2.18	ug/L	109	(70-130)	20	11
LCS1	4,4-DDT			2	2.11	ug/L	106	(70-130)		
LCS2	4,4-DDT			2	2.10	ug/L	105	(70-130)	20	0.48
MBLK	4,4-DDT				<0.1	ug/L				
MRL_CHK	4,4-DDT			0.1	0.0960	ug/L	96	(50-150)		
MS_201905240012	4,4-DDT		ND	2	2.10	ug/L	105	(70-130)		
MSD_201905240012	4,4-DDT		ND	2	2.30	ug/L	115	(70-130)	20	9.0
LCS1	Acenaphthene			2	1.97	ug/L	99	(70-130)		
LCS2	Acenaphthene			2	2.00	ug/L	100	(70-130)	20	1.5
MBLK	Acenaphthene				<0.1	ug/L				
MRL_CHK	Acenaphthene			0.1	0.0860	ug/L	86	(50-150)		
MS_201905240012	Acenaphthene		ND	2	1.97	ug/L	99	(70-130)		
MSD_201905240012	Acenaphthene		ND	2	1.97	ug/L	99	(70-130)	20	0.051
LCS1	Acenaphthene-d10	(I)		5	97.5	%	98	(50-150)		
LCS2	Acenaphthene-d10	(I)		5	84.3	%	84	(50-150)		
MBLK	Acenaphthene-d10	(I)			87.5	%	88	(50-150)		
MRL_CHK	Acenaphthene-d10	(I)		5	84.5	%	85	(50-150)		
MS_201905240012	Acenaphthene-d10	(I)		5	78.6	%	79	(50-150)		
	Acenaphthene-d10	(I)		5	81.6	%	82	(50-150)		
LCS1	Acenaphthylene			2	1.74	ug/L	87	(70-130)		
LCS2	Acenaphthylene			2	1.74	ug/L	87	(70-130)	20	0.0
MBLK	Acenaphthylene				<0.1	ug/L		. ,		
MRL_CHK	Acenaphthylene			0.1	0.0700	ug/L	70	(50-150)		
MS_201905240012	Acenaphthylene		ND	2	1.81	ug/L	91	(70-130)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD_201905240012	Acenaphthylene	ND	2	1.66	ug/L	83	(70-130)	20	8.6
LCS1	Acetochlor		2	2.06	ug/L	103	(70-130)		
LCS2	Acetochlor		2	2.12	ug/L	106	(70-130)	20	2.9
MBLK	Acetochlor			<0.1	ug/L				
MRL_CHK	Acetochlor		0.05	0.0500	ug/L	100	(50-150)		
MS_201905240012	Acetochlor	ND	2	2.10	ug/L	105	(70-130)		
MSD_201905240012	Acetochlor	ND	2	2.24	ug/L	112	(70-130)	20	6.6
LCS1	Alachlor		2	2.02	ug/L	101	(70-130)		
LCS2	Alachlor		2	2.08	ug/L	104	(70-130)	20	2.9
MBLK	Alachlor			<0.05	ug/L				
MRL_CHK	Alachlor		0.05	0.0500	ug/L	100	(50-150)		
MS_201905240012	Alachlor	ND	2	2.02	ug/L	101	(70-130)		
MSD_201905240012	Alachlor	ND	2	2.16	ug/L	108	(70-130)	20	6.8
LCS1	Aldrin		2	1.46	ug/L	73	(70-130)		
LCS2	Aldrin		2	1.51	ug/L	76	(70-130)	20	3.4
MBLK	Aldrin			<0.05	ug/L				
MRL_CHK	Aldrin		0.05	0.0450	ug/L	90	(50-150)		
MS_201905240012	Aldrin	ND	2	1.49	ug/L	75	(70-130)		
MSD_201905240012	Aldrin	ND	2	1.60	ug/L	80	(70-130)	20	7.0
LCS1	Alpha-BHC		2	2.07	ug/L	103	(70-130)		
LCS2	Alpha-BHC		2	2.05	ug/L	102	(70-130)	20	0.97
MBLK	Alpha-BHC			<0.1	ug/L				
MRL_CHK	Alpha-BHC		0.1	0.101	ug/L	101	(50-150)		
MS_201905240012	Alpha-BHC	ND	2	2.04	ug/L	102	(70-130)		
MSD_201905240012	Alpha-BHC	ND	2	2.09	ug/L	104	(70-130)	20	2.4
LCS1	alpha-Chlordane		2	1.98	ug/L	99	(70-130)		
LCS2	alpha-Chlordane		2	2.07	ug/L	103	(70-130)	20	4.4
MBLK	alpha-Chlordane			<0.05	ug/L				
MRL_CHK	alpha-Chlordane		0.05	0.0540	ug/L	108	(50-150)		
MS_201905240012	alpha-Chlordane	ND	2	1.99	ug/L	100	(70-130)		
MSD_201905240012	alpha-Chlordane	ND	2	2.16	ug/L	108	(70-130)	20	8.0
LCS1	Anthracene		2	1.94	ug/L	97	(70-130)		
LCS2	Anthracene		2	1.93	ug/L	96	(70-130)	20	0.52
MBLK	Anthracene			<0.02	ug/L				
MRL_CHK	Anthracene		0.02	0.0220	ug/L	110	(50-150)		
MS_201905240012	Anthracene	ND	2	1.90	ug/L	95	(70-130)		
MSD_201905240012	Anthracene	ND	2	1.91	ug/L	96	(70-130)	20	0.58
LCS1	Atrazine		2	2.32	ug/L	116	(70-130)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	Atrazine		2	2.30	ug/L	115	(70-130)	20	0.87
MBLK	Atrazine			<0.05	ug/L				
MRL_CHK	Atrazine		0.05	0.0510	ug/L	102	(50-150)		
MS_201905240012	Atrazine	ND	2	2.26	ug/L	113	(70-130)		
MSD_201905240012	Atrazine	ND	2	2.38	ug/L	119	(70-130)	20	5.3
LCS1	Benz(a)Anthracene		2	2.03	ug/L	102	(70-130)		
LCS2	Benz(a)Anthracene		2	1.97	ug/L	99	(70-130)	20	3.0
MBLK	Benz(a)Anthracene			<0.05	ug/L				
MRL_CHK	Benz(a)Anthracene		0.05	0.0540	ug/L	108	(50-150)		
MS_201905240012	Benz(a)Anthracene	ND	2	2.03	ug/L	102	(70-130)		
MSD_201905240012	Benz(a)Anthracene	ND	2	2.04	ug/L	102	(70-130)	20	0.39
LCS1	Benzo(a)pyrene		2	1.94	ug/L	97	(70-130)		
LCS2	Benzo(a)pyrene		2	1.86	ug/L	93	(70-130)	20	4.2
MBLK	Benzo(a)pyrene			<0.02	ug/L				
MRL_CHK	Benzo(a)pyrene		0.02	0.0180	ug/L	90	(50-150)		
MS_201905240012	Benzo(a)pyrene	ND	2	1.94	ug/L	97	(70-130)		
MSD_201905240012	Benzo(a)pyrene	ND	2	1.84	ug/L	92	(70-130)	20	5.1
LCS1	Benzo(b)Fluoranthene		2	2.08	ug/L	104	(70-130)		
LCS2	Benzo(b)Fluoranthene		2	1.98	ug/L	99	(70-130)	20	4.9
MBLK	Benzo(b)Fluoranthene			<0.02	ug/L				
MRL_CHK	Benzo(b)Fluoranthene		0.02	0.0220	ug/L	110	(50-150)		
MS_201905240012	Benzo(b)Fluoranthene	ND	2	2.02	ug/L	101	(70-130)		
MSD_201905240012	Benzo(b)Fluoranthene	ND	2	2.02	ug/L	101	(70-130)	20	0.099
LCS1	Benzo(g,h,i)Perylene		2	2.17	ug/L	109	(70-130)		
LCS2	Benzo(g,h,i)Perylene		2	2.09	ug/L	105	(70-130)	20	3.8
MBLK	Benzo(g,h,i)Perylene			<0.05	ug/L				
MRL_CHK	Benzo(g,h,i)Perylene		0.05	0.0400	ug/L	80	(50-150)		
MS_201905240012	Benzo(g,h,i)Perylene	ND	2	2.09	ug/L	105	(70-130)		
MSD_201905240012	Benzo(g,h,i)Perylene	ND	2	2.09	ug/L	105	(70-130)	20	0.0
LCS1	Benzo(k)Fluoranthene		2	2.11	ug/L	105	(70-130)		
LCS2	Benzo(k)Fluoranthene		2	2.10	ug/L	105	(70-130)	20	0.48
MBLK	Benzo(k)Fluoranthene			<0.02	ug/L				
MRL_CHK	Benzo(k)Fluoranthene		0.02	0.0190	ug/L	95	(50-150)		
MS_201905240012	Benzo(k)Fluoranthene	ND	2	2.12	ug/L	106	(70-130)		
MSD_201905240012	Benzo(k)Fluoranthene	ND	2	2.06	ug/L	103	(70-130)	20	2.6
LCS1	Beta-BHC		2	2.27	ug/L	114	(70-130)		
LCS2	Beta-BHC		2	2.21	ug/L	111	(70-130)	20	2.7

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Beta-BHC		0.1	0.114	ug/L	114	(50-150)		
MS_201905240012	Beta-BHC	ND	2	2.34	ug/L	117	(70-130)		
MSD_201905240012	Beta-BHC	ND	2	2.34	ug/L	117	(70-130)	20	0.60
LCS1	Bromacil		2	2.31	ug/L	116	(70-130)		
LCS2	Bromacil		2	2.29	ug/L	115	(70-130)	20	0.87
MBLK	Bromacil			<0.2	ug/L				
MRL_CHK	Bromacil		0.1	0.117	ug/L	117	(50-150)		
MS_201905240012	Bromacil	ND	2	2.42	ug/L	121	(70-130)		
MSD_201905240012	Bromacil	ND	2	2.33	ug/L	117	(70-130)	20	3.7
LCS1	Butachlor		2	2.24	ug/L	112	(70-130)		
LCS2	Butachlor		2	2.22	ug/L	111	(70-130)	20	0.90
MBLK	Butachlor			<0.05	ug/L				
MRL_CHK	Butachlor		0.05	0.0550	ug/L	110	(50-150)		
MS_201905240012	Butachlor	ND	2	2.24	ug/L	112	(70-130)		
MSD_201905240012	Butachlor	ND	2	2.41	ug/L	120	(70-130)	20	7.4
LCS1	Butylbenzylphthalate		2	2.24	ug/L	112	(70-130)		
LCS2	Butylbenzylphthalate		2	2.16	ug/L	108	(70-130)	20	3.6
MBLK	Butylbenzylphthalate			<0.5	ug/L				
MRL_CHK	Butylbenzylphthalate		0.15	0.157	ug/L	105	(50-150)		
MS_201905240012	Butylbenzylphthalate	ND	2	2.22	ug/L	111	(70-130)		
MSD_201905240012	Butylbenzylphthalate	ND	2	2.31	ug/L	115	(70-130)	20	3.8
LCS1	Caffeine by method 525mod		2	1.76	ug/L	88	(45-137)		
LCS2	Caffeine by method 525mod		2	1.79	ug/L	90	(45-137)	20	1.7
MBLK	Caffeine by method 525mod			<0.05	ug/L				
MRL_CHK	Caffeine by method 525mod		0.05	0.0490	ug/L	98	(50-150)		
MS_201905240012	Caffeine by method 525mod		2	1.84	ug/L	92	(46-144)		
MSD_201905240012	Caffeine by method 525mod		2	1.80	ug/L	90	(46-144)	20	2.3
_CS1	Chlorobenzilate		2	2.35	ug/L	117	(70-130)		
_CS2	Chlorobenzilate		2	2.31	ug/L	116	(70-130)	20	1.7
MBLK	Chlorobenzilate			<0.1	ug/L				
MRL_CHK	Chlorobenzilate		0.1	0.106	ug/L	106	(50-150)		
MS_201905240012	Chlorobenzilate	ND	2	2.30	ug/L	115	(70-130)		
MSD_201905240012	Chlorobenzilate	ND	2	2.44	ug/L	122	(70-130)	20	6.1
LCS1	Chloroneb		2	2.12	ug/L	106	(70-130)		
LCS2	Chloroneb		2	2.13	ug/L	107	(70-130)	20	0.47
MBLK	Chloroneb			<0.1	ug/L				
MRL_CHK	Chloroneb		0.1	0.107	ug/L	107	(50-150)		
MS 201905240012	Chloroneb	ND	2	2.07	ug/L	104	(70-130)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD_201905240012	Chloroneb	ND	2	2.13	ug/L	107	(70-130)	20	2.7
LCS1	Chlorothalonil(Draconil,Bravo)		2	2.14	ug/L	107	(70-130)		
LCS2	Chlorothalonil(Draconil,Bravo)		2	2.14	ug/L	107	(70-130)	20	0.0
MBLK	Chlorothalonil(Draconil,Bravo)			<0.1	ug/L				
MRL_CHK	Chlorothalonil(Draconil,Bravo)		0.05	0.0500	ug/L	100	(50-150)		
MS_201905240012	Chlorothalonil(Draconil,Bravo)	ND	2	2.16	ug/L	108	(70-130)		
MSD_201905240012	Chlorothalonil(Draconil,Bravo)	ND	2	2.24	ug/L	112	(70-130)	20	4.2
LCS1	Chlorpyrifos (Dursban)		2	2.04	ug/L	102	(70-130)		
LCS2	Chlorpyrifos (Dursban)		2	1.98	ug/L	99	(70-130)	20	3.0
MBLK	Chlorpyrifos (Dursban)			<0.05	ug/L				
MRL_CHK	Chlorpyrifos (Dursban)		0.05	0.0580	ug/L	116	(50-150)		
MS_201905240012	Chlorpyrifos (Dursban)	ND	2	2.06	ug/L	103	(70-130)		
MSD_201905240012	Chlorpyrifos (Dursban)	ND	2	2.12	ug/L	106	(70-130)	20	3.1
LCS1	Chrysene		2	1.98	ug/L	99	(70-130)		
LCS2	Chrysene		2	1.94	ug/L	97	(70-130)	20	2.0
MBLK	Chrysene			<0.02	ug/L				
MRL_CHK	Chrysene		0.02	0.0190	ug/L	95	(50-150)		
MS_201905240012	Chrysene	ND	2	1.99	ug/L	100	(70-130)		
MSD_201905240012	Chrysene	ND	2	1.95	ug/L	98	(70-130)	20	2.1
LCS1	Chrysene-d12 (I)		5	110	%	110	(50-150)		
LCS2	Chrysene-d12 (I)		5	95.1	%	95	(50-150)		
MBLK	Chrysene-d12 (I)			98.3	%	98	(50-150)		
MRL_CHK	Chrysene-d12 (I)		5	94.4	%	94	(50-150)		
MS_201905240012	Chrysene-d12 (I)		5	90.7	%	91	(50-150)		
MSD_201905240012	Chrysene-d12 (I)		5	95.1	%	95	(50-150)		
LCS1	Delta-BHC		2	2.04	ug/L	102	(70-130)		
LCS2	Delta-BHC		2	2.06	ug/L	103	(70-130)	20	0.98
MBLK	Delta-BHC			<0.1	ug/L				
MRL_CHK	Delta-BHC		0.1	0.106	ug/L	106	(50-150)		
MS_201905240012	Delta-BHC	ND	2	2.04	ug/L	102	(70-130)		
MSD_201905240012	Delta-BHC	ND	2	2.12	ug/L	106	(70-130)	20	4.1
_CS1	Di-(2-Ethylhexyl)adipate		2	2.30	ug/L	115	(70-130)		
_CS2	Di-(2-Ethylhexyl)adipate		2	2.31	ug/L	116	(70-130)	20	0.43
MBLK	Di-(2-Ethylhexyl)adipate			<0.6	ug/L				
MRL_CHK	Di-(2-Ethylhexyl)adipate		0.3	0.325	ug/L	108	(50-150)		
	Di-(2-Ethylhexyl)adipate	ND	2	2.30	ug/L	115	(70-130)		
MSD_201905240012	Di-(2-Ethylhexyl)adipate	ND	2	2.45	ug/L	122	(70-130)	20	6.5
LCS1	Di(2-Ethylhexyl)phthalate		2	1.84	ug/L	92	(70-130)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	Di(2-Ethylhexyl)phthalate		2	1.89	ug/L	95	(70-130)	20	2.7
MBLK	Di(2-Ethylhexyl)phthalate			<0.6	ug/L				
MRL_CHK	Di(2-Ethylhexyl)phthalate		0.6	0.604	ug/L	101	(50-150)		
MS_201905240012	Di(2-Ethylhexyl)phthalate	ND	2	1.90	ug/L	95	(70-130)		
MSD_201905240012	Di(2-Ethylhexyl)phthalate	ND	2	1.96	ug/L	98	(70-130)	20	2.9
LCS1	Diazinon (Qualitative)		2	1.84	ug/L	92	(15-132)		
LCS2	Diazinon (Qualitative)		2	1.85	ug/L	92	(15-132)	20	0.0
MBLK	Diazinon (Qualitative)			<0.10	ug/L				
MRL_CHK	Diazinon (Qualitative)		0.1	0.0990	ug/L	99	(15-132)		
MS_201905240012	Diazinon (Qualitative)	ND	2	2.03	ug/L	101	(15-132)		
MSD_201905240012	Diazinon (Qualitative)	ND	2	2.08	ug/L	104	(15-132)	20	2.5
LCS1	Dibenz(a,h)Anthracene		2	2.24	ug/L	112	(70-130)		
LCS2	Dibenz(a,h)Anthracene		2	2.20	ug/L	110	(70-130)	20	1.8
MBLK	Dibenz(a,h)Anthracene			<0.05	ug/L				
MRL_CHK	Dibenz(a,h)Anthracene		0.05	0.0440	ug/L	88	(50-150)		
MS_201905240012	Dibenz(a,h)Anthracene	ND	2	2.27	ug/L	114	(70-130)		
MSD_201905240012	Dibenz(a,h)Anthracene	ND	2	2.27	ug/L	113	(70-130)	20	0.044
LCS1	Dichlorvos (DDVP)		2	2.07	ug/L	104	(70-130)		
LCS2	Dichlorvos (DDVP)		2	1.99	ug/L	100	(70-130)	20	3.9
MBLK	Dichlorvos (DDVP)			<0.05	ug/L				
MRL_CHK	Dichlorvos (DDVP)		0.05	0.0500	ug/L	100	(50-150)		
MS_201905240012	Dichlorvos (DDVP)	ND	2	2.03	ug/L	101	(70-130)		
MSD_201905240012	Dichlorvos (DDVP)	ND	2	2.02	ug/L	101	(70-130)	20	0.40
LCS1	Dieldrin		2	1.92	ug/L	96	(70-130)		
LCS2	Dieldrin		2	1.91	ug/L	96	(70-130)	20	0.52
MBLK	Dieldrin			<0.2	ug/L				
MRL_CHK	Dieldrin		0.1	0.111	ug/L	111	(50-150)		
MS_201905240012	Dieldrin	ND	2	2.00	ug/L	100	(70-130)		
MSD_201905240012	Dieldrin	ND	2	2.08	ug/L	104	(70-130)	20	3.9
LCS1	Diethylphthalate		2	2.22	ug/L	111	(70-130)		
LCS2	Diethylphthalate		2	2.21	ug/L	111	(70-130)	20	0.45
MBLK	Diethylphthalate			<0.5	ug/L				
MRL_CHK	Diethylphthalate		0.15	0.171	ug/L	114	(50-150)		
MS_201905240012	Diethylphthalate	ND	2	2.17	ug/L	108	(70-130)		
MSD_201905240012	Diethylphthalate	ND	2	2.21	ug/L	111	(70-130)	20	1.9
LCS1	Dimethoate		2	1.72	ug/L	86	(35-100)		
LCS2	Dimethoate		2	1.77	ug/L	89	(35-100)	20	2.3
MBLK	Dimethoate			<0.1	ug/L				

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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David C. McCollum Water Treatment Plant

NRL_CHK Dimethodate ND 2 1.84 ugL 90 (35-100) MS_201965240012 Dimethodate ND 2 1.84 ugL 90 (34-111) K MS_201962240012 Dimethyliphthalate 2 2.16 ugL 108 (70-130) 20 0.93 LGS1 Dimethyliphthalate 0.5 ugL 98 (50-150) (70-130) 20 0.93 MSL_CHK Dimethyliphthalate ND 2 2.18 ugL 108 (70-130) 20 3.0 MSL_201905240012 Dimethyliphthalate ND 2 2.12 ugL 108 (70-130) 20 0.69 MSL Di-n-Bulylphthalate 4 4.35 ugL 108 (70-130) 20 0.69 MSL Di-n-Bulylphthalate 0.3 0.323 ugL 108 (70-130) 20 5.8 LCS1 Di-n-Bulylphthalate ND 4 4.33 ugL (70-130)	QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
NBQ_201905240012DimethodeND21.80upL90(34.11)201.80LCS1Dimethylphthalte22.16upL107(70-130)200.93MBLDimethylphthalte <td< td=""><td>MRL_CHK</td><td>Dimethoate</td><td></td><td>0.1</td><td>0.0900</td><td>ug/L</td><td>90</td><td>(35-100)</td><td></td><td></td></td<>	MRL_CHK	Dimethoate		0.1	0.0900	ug/L	90	(35-100)		
LGS1Dimethylphalate22.16ugl.0.8(70.10)2.00.93LGS2Dimethylphalate0.910.910.91MR_CHKDimethylphalateND22.12ugl.0.910.70.10 <td>MS_201905240012</td> <td>Dimethoate</td> <td>ND</td> <td>2</td> <td>1.84</td> <td>ug/L</td> <td>92</td> <td>(34-111)</td> <td></td> <td></td>	MS_201905240012	Dimethoate	ND	2	1.84	ug/L	92	(34-111)		
LGS2Dimethylphhalate22,14upl0,17(70-13)2,00,33MBLKDimethylphhalate0,30upl9(0-13)MB_20190524012DimethylphhalateND22.18upl16(70-13)23,0MS201905240212DimethylphhalateND22.12upl16(70-13)23,0LGS1DimethylphhalateND44,35upl16(70-13)20,60MS20190524012Dimethylphhalate44,35upl16(70-13)20,60MSLDim-ButylphhalateND44,33upl16(70-13)20,60MSL20190524012Dim-ButylphhalateND44,34upl16(70-13)25MSL20190524012Dim-ButylphhalateND44,39upl16(70-13)25MSL20190524012Dim-ButylphhalateND44,39upl15(70-13)25MSL20190524012Dim-ButylphhalateND22,70upl16(70-13)25MSL20190524012Dim-ButylphhalateND22,70upl16(70-13)25MSL20190524012Dim-ButylphhalateND22,70upl16(70-13)215MSL20190524012Dim-ButylphhalateND22,80upl16(70	MSD_201905240012	Dimethoate	ND	2	1.80	ug/L	90	(34-111)	20	1.6
MBLCInnerhyphthalate-0.5ugL9.49.40.5.50.5.7<	LCS1	Dimethylphthalate		2	2.16	ug/L	108	(70-130)		
NRL_CHKInvertigation0.30.2930.2130.210.60(60-15)MS_20190524012DimetrylophtalateND22.120.210.60(70-130)2.03.0MSD_20190524012DimetrylophtalateA4.20.210.60(70-130)2.00.69LCS1Din-ButylophtalateA4.20.210.61(70-130)2.00.69MRL_CHKDin-ButylophtalateA4.330.210.61(70-130)2.05.63MS2.0190524012Din-ButylophtalateND4.04.330.210.61(70-130)2.05.63MS2.0190524012Din-ButylophtalateND4.04.330.210.61(70-130)2.05.63MS2.0190524012Din-ButylophtalateND4.04.000.10(70-130)2.05.63MS2.0190524012Din-NoctylophtalateND2.02.610.10(70-130)2.05.63MS2.0190524012Di-NoctylophtalateND2.02.610.10(70-13)2.05.63MS2.0190524012Di-NoctylophtalateND2.02.620.101.14(70-130)2.05.63MS2.0190524012Di-NoctylophtalateND2.02.180.10(70-13)2.05.63MS2.0190524012Di-NoctylophtalateND2.02.190.10(70-13)2.05.63MS2.0190524012Di-NoctylophtalateND2.00	LCS2	Dimethylphthalate		2	2.14	ug/L	107	(70-130)	20	0.93
MS201905240012ImmetyiphthalateND22.18upl.19(70-130)23.10MSD_201905240012IndentyiphthalateND22.12upl.108(70-130)23.0LGS1Din-Butyiphthalate-4.32upl.108(70-130)20.68MBLKDin-Butyiphthalate-3.30.23upl.108(70-130)MS2.01905240012Din-ButyiphthalateND44.59upl.116(70-130)25.8MS2.01905240012Din-ButyiphthalateND44.59upl.116(70-130)25.8LGS1Din-ButyiphthalateND49.020.7(70-130)2.05.8LGS1Din-ButyiphthalateND49.020.1(70-130)2.05.8LGS1Di-N-octyiphthalateND22.08upl.114(70-130)2.05.8LGS1Di-N-octyiphthalateND22.8upl.114(70-130)2.01.8MS2.0190524012Di-N-octyiphthalateND22.8upl.114(70-130)2.01.5MS2.0190524012Endosuffan (Alpha)10.02114(70-130)2.01.5MS2.0190524012Endosuffan (Alpha)10.02114(70-130)2.01.5MS2.0190524012Endosuffan (Alpha)ND22.0 <td>MBLK</td> <td>Dimethylphthalate</td> <td></td> <td></td> <td><0.5</td> <td>ug/L</td> <td></td> <td></td> <td></td> <td></td>	MBLK	Dimethylphthalate			<0.5	ug/L				
MSD_201905240012DimethylphthalateND22.12ugl.106(70-130)2.03.0LCS1In-Bulylphthalate44.32ugl.108(70-130)2.00.69LGS2Din-Bulylphthalate44.32ugl.108(50-150)MRL_CHKDin-BulylphthalateND44.33ugl.108(50-150)MS_20190524012Din-BulylphthalateND44.33ugl.108(70-130)MS_20190524012Din-BulylphthalateND44.33ugl.103(70-130)MS_20190524012Din-SulylphthalateND44.33ugl.103(70-130)MS_20190524012Din-SulylphthalateND22.07ugl.103(70-130)MS_20190524012Din-SchylphthalateND22.07ugl.114(70-130)MS_20190524012Din-SchylphthalateND22.08ugl.114(70-130)MS_20190524012Din-SchylphthalateND22.88ugl.114(70-130)MS_20190524012Din-SchylphthalateND2128ugl.114(70-130)	MRL_CHK	Dimethylphthalate		0.3	0.293	ug/L	98	(50-150)		
LCS1Din-Bulyphthalate44.22ugl108(70-130)200.69LCS2Din-Bulyphthalate-1ugl109(70-130)200.69MBLKDin-Bulyphthalate-1ugl(60-16)MS_201905240012Din-BulyphthalateND44.33ugl108(70-130)205.8MSD_201905240012Din-BulyphthalateND44.59ugl115(70-130)205.8LCS1Di-N-oclyphthalate22.08ugl103(70-130)200.48MBLKDi-N-oclyphthalate0.10.900ugl103(70-130)200.48MS201905240012Di-N-oclyphthalate0.10.900ugl104(70-130)200.48MS20190524012Di-N-oclyphthalate0.10.900ugl104(70-130)200.48MS20190524012Di-N-oclyphthalate0.10.900ugl104(70-130)209.6MS20190524012Di-N-oclyphthalate0.10.870ugl104(70-130)209.6MS20190524012Endosulfan (Alpha)021.8ugl104(70-130)209.6MS20190524012Endosulfan (Alpha)01.9ugl104(70-130)209.6MS20190524012Endosulfan (Alpha)ND22.8ugl101(70-130)209.6MS201905240012	MS_201905240012	Dimethylphthalate	ND	2	2.18	ug/L	109	(70-130)		
LCS2Din-Butylphthalate44.35ug/L109(70.130)200.091MBLKDin-Butylphthalate1ug/L<	MSD_201905240012	Dimethylphthalate	ND	2	2.12	ug/L	106	(70-130)	20	3.0
MELK Din-Butylphthalate <1 ugL MRL_CHK Din-Butylphthalate 0.3 0.323 ugL 108 (50-150) MS2_201905240012 Din-Butylphthalate ND 4 4.33 ugL 108 (70-130) 20 5.8 MSD_201905240012 Din-Butylphthalate ND 4.4 4.33 ugL 108 (70-130) 20 5.8 LCS1 Din-butylphthalate 2 2.07 ugL 103 (70-130) 20 0.48 MELK Din-botylphthalate 2 2.07 ugL 103 (70-130) 20 0.48 MELCHK Din-botylphthalate 2.1 0.900 ugL 103 (70-130) 20 0.48 MS_201905240012 Din-botylphthalate 0.1 0.900 ugL 110 (70-130) 20 1.5 LCS1 Endosulfan I (Alpha) 2 2.8 ugL 140 (70-130) 20 1.5 LCS2 Endosulfan I (Alpha) ND 2 2.18 ugL 100 (70-130) 20 <td>LCS1</td> <td>Di-n-Butylphthalate</td> <td></td> <td>4</td> <td>4.32</td> <td>ug/L</td> <td>108</td> <td>(70-130)</td> <td></td> <td></td>	LCS1	Di-n-Butylphthalate		4	4.32	ug/L	108	(70-130)		
NRL_CHKDin-Butyphthalate0.30.323ug/L108(50-150)MS_201905240012Din-ButyphthalateND44.33ug/L108(70-130)205.83MSD_201905240012Din-ButyphthalateND44.59ug/L115(70-130)205.83LGS1Di-N-octyphthalate22.07ug/L103(70-130)200.48MBLKDi-N-octyphthalate22.07ug/L103(70-130)200.48MSL_OHS02012Di-N-octyphthalateND22.28ug/L112(70-130)21.5MS_20190524012Di-N-octyphthalateND22.28ug/L114(70-130)21.5MSD_20190524012Di-N-octyphthalateND22.28ug/L114(70-130)21.5LGS1Endosulfan (Alpha)21.99ug/L100(70-130)29.6MSL_CHKEndosulfan (Alpha)22.18ug/L109(70-130)29.6MSL_OHS06240012Endosulfan (Alpha)ND22.03ug/L101(70-130)27.9MSL_OHS06240012Endosulfan (Alpha)ND22.03ug/L101(70-130)27.9MSL_OHS06240012Endosulfan (Idpha)ND22.04ug/L101(70-130)27.9LGS1Endosulfan (Idpha)ND22.04ug/L101 <t< td=""><td>LCS2</td><td>Di-n-Butylphthalate</td><td></td><td>4</td><td>4.35</td><td>ug/L</td><td>109</td><td>(70-130)</td><td>20</td><td>0.69</td></t<>	LCS2	Di-n-Butylphthalate		4	4.35	ug/L	109	(70-130)	20	0.69
MS_201905240012Din-ButylphthalateND44.33ugL108(70-130)2.05.8MSD_201905240012Din-ButylphthalateND44.59ugL115(70-130)2.05.8LCS1Din-Acctylphthalate22.08ugL104(70-130)2.05.8LCS2Din-Acctylphthalate0.12.08ugL104(70-130)2.00.48MBLKDi-Acctylphthalate0.10.090ugL10.0(50-150)MS_201905240012Di-AcctylphthalateND22.28ugL112(70-130)2.01.5LCS1Di-AcctylphthalateND22.28ugL104(70-130)2.01.5LCS1Endosulfan I (Alpha)ND22.88ugL104(70-130)2.01.5LCS1Endosulfan I (Alpha)ND22.88ugL10.0(70-130)2.01.5LCS1Endosulfan I (Alpha)ND22.03ugL10.0(70-130)2.07.9LCS1Endosulfan I (Alpha)ND22.03ugL10.0(70-130)2.07.9LCS1Endosulfan I (Alpha)ND22.03ugL10.0(70-130)2.07.9LCS1Endosulfan I (Beta)ND22.03ugL10.0(70-130)2.07.9LCS1Endosulfan II (Beta)ND22.03ugL<	MBLK	Di-n-Butylphthalate			<1	ug/L				
MSD_201905240012Din-BulyIphthalateND44.59ug/L115(70-130)205.8LCS1DiN-octyIphthalate22.08ug/L104(70-130)200.48LCS2DiN-octyIphthalate22.07ug/L103(70-130)200.48MBLKDiN-octyIphthalate0.10.900ug/L103(70-130)200.48MS_201905240012DiN-octyIphthalateND22.25ug/L112(70-130)201.5MSD_201905240012DiN-octyIphthalateND22.28ug/L100(70-130)201.5LCS1Endosulfan I (Alpha)21.99ug/L100(70-130)209.6MBLKEndosulfan I (Alpha)21.0ug/L100(70-130)209.6MS_201905240012Endosulfan I (Alpha)22.03ug/L100(70-130)209.6MSL_CHKEndosulfan I (Alpha)ND22.03ug/L102(70-130)207.9LCS1Endosulfan I (Alpha)ND22.03ug/L102(70-130)207.9LCS1Endosulfan I (Alpha)ND22.03ug/L102(70-130)207.9LCS1Endosulfan I (Alpha)ND22.03ug/L101(70-130)207.9LCS1Endosulfan I (Bela)ND22.03ug/L103(70-	MRL_CHK	Di-n-Butylphthalate		0.3	0.323	ug/L	108	(50-150)		
L.S. Di-Nockylphhalate 2 2.08 ug/L 104 (70-130) 20 0.48 LCS2 Di-Nockylphhalate 2 2.07 ug/L 103 (70-130) 20 0.48 MBLK Di-Nockylphhalate 0.1 0.0900 ug/L 90 (50-150)	MS_201905240012	Di-n-Butylphthalate	ND	4	4.33	ug/L	108	(70-130)		
LCS2Di-No-dylphthalate22.07ugl.103(70-130)2.00.48MBLKDi-No-dylphthalate0.10.0900ugl.90(50-150)	MSD_201905240012	Di-n-Butylphthalate	ND	4	4.59	ug/L	115	(70-130)	20	5.8
MBLK Di-N-octylphthalate -0.1 0.070 ug/L 90 (50-150) MRL_CHK Di-N-octylphthalate ND 2 2.25 ug/L 112 (70-130) 20 1.5 MSD_201905240012 Di-N-octylphthalate ND 2 2.28 ug/L 114 (70-130) 20 1.5 LCS1 Endosulfan I (Alpha) 2 2.18 ug/L 100 (70-130) 20 9.6 MSLK Endosulfan I (Alpha) 2 2.18 ug/L 100 (70-130) 20 9.6 MSLK Endosulfan I (Alpha) 2 2.18 ug/L 102 (70-130) 20 9.6 MSLY Endosulfan I (Alpha) 01 0.6870 ug/L 102 (70-130) 20 7.9 MS_201905240012 Endosulfan I (Alpha) ND 2 2.06 ug/L 103 (70-130) 20 4.5 MS_201905240012 Endosulfan I (Bela) ND 2 2.06 ug/L	LCS1	Di-N-octylphthalate		2	2.08	ug/L	104	(70-130)		
MR_CHK Di-Noctylphthalate 0.1 0.9000 ugl 90 (50.150) MS_201905240012 Di-Noctylphthalate ND 2 2.25 ugl 112 (70.130) 20 1.5 MSD_201905240012 Di-Noctylphthalate ND 2 2.28 ugl 114 (70.130) 20 1.5 LCS1 Endosulfan I (Alpha) 2 1.99 ugl 100 (70.130) 20 9.6 MBLK Endosulfan I (Alpha) 2 1.99 ugl 100 (70.130) 20 9.6 MSLCHK Endosulfan I (Alpha) 2 2.18 ugl 102 (70.130) 20 9.6 MSL_201905240012 Endosulfan I (Alpha) ND 2 2.03 ugl 102 (70.130) 20 7.9 LCS1 Endosulfan I (Beta) 2 2.06 ugl 103 (70.130) 20 4.5 MSL Endosulfan I (Beta) 0.1 1.91 ugl 103	LCS2	Di-N-octylphthalate		2	2.07	ug/L	103	(70-130)	20	0.48
MS_201905240012 Di-No-otylphthalate ND 2 2.25 ug/L 112 (70-130) MSD_201905240012 Di-No-otylphthalate ND 2 2.28 ug/L 114 (70-130) 20 1.5 LCS1 Endosulfan I (Alpha) 2 1.99 ug/L 100 (70-130) 20 9.6 MSL Endosulfan I (Alpha) 2 2.18 ug/L 109 (70-130) 20 9.6 MSL Endosulfan I (Alpha) 2 2.18 ug/L 109 (70-130) 20 9.6 MSL Endosulfan I (Alpha) 0.1 0.0870 ug/L 87 (50-150) 112 112 112 112 112 112 112 112 112 113 112 113	MBLK	Di-N-octylphthalate			<0.1	ug/L				
NSD_201905240012Di-N-octylpthalateND22.28.9L114(70-130)201.5LCS1Endosulfan (Alpha)21.99.9L100(70-130)209.6LCS2Endosulfan (Alpha)22.18.9L.9L.09L.01.00.09.6MBLKEndosulfan (Alpha)01.9L.9L.01.00.0.09.6MS_201905240012Endosulfan (Alpha)01.0870.9L.87.05.150)MS_201905240012Endosulfan (Alpha)ND22.03.9L.10.07.130).0.7.9LCS1Endosulfan (Alpha)ND2.2.03.9L.10.07.130).0.7.9LCS1Endosulfan (Alpha)ND2.2.03.9L.10LCS1Endosulfan (Beta)LCS2Endosulfan I (Beta)MS_201905240012Endosulfan I (Beta)<	MRL_CHK	Di-N-octylphthalate		0.1	0.0900	ug/L	90	(50-150)		
LCS1Endosifian (Alpha)21.99ug/L1.00(70-130)209.6LCS2Endosifian (Alpha)22.18ug/L109(70-130)209.6MBLKEndosifian (Alpha)0.10.870ug/L87(50-150)1MR_CHKEndosifian (Alpha)ND22.03ug/L102(70-130)207.9MS_201905240012Endosifian (Alpha)ND22.02ug/L110(70-130)207.9LCS1Endosifian (Beta)ND22.06ug/L103(70-130)204.5MSLCHKEndosifian I (Beta)22.06ug/L133(50-150)11.5MSL201905240012Endosifian I (Beta)ND22.08ug/L113(50-150)1MSL_CHKEndosifian I (Beta)ND22.07ug/L104(70-130)20.43MS_201905240012Endosifian I (Beta)ND22.07ug/L104(70-130)20.43MS_201905240012Endosifian I (Beta)ND22.07ug/L103(70-130)20.43LCS1Endosifian I (Beta)ND22.07ug/L104(70-130)20.43LCS1Endosifian I (Beta)ND22.07ug/L104(70-130)21.43LCS1Endosifian I (Beta)ND22.07ug/L104(70-130)	MS_201905240012	Di-N-octylphthalate	ND	2	2.25	ug/L	112	(70-130)		
LCS2Endosuffan (Alpha)22.18ug/L109(70.130)209.6MBLKEndosuffan (Alpha)0.1ug/Lug/L101101.0MR_CHKEndosuffan (Alpha)ND20.870ug/L102(70.130)MS_201905240012Endosuffan (Alpha)ND22.03ug/L101(70.130)207.9LCS1Endosuffan (Beta)ND22.04ug/L103(70.130)207.9LCS2Endosuffan (Beta)29.6ug/L103(70.130)204.5MBLKEndosuffan (Beta)22.06ug/L1030.0130204.5MS_201905240012Endosuffan (Beta)ND22.06ug/L103(70.130)204.5MS_201905240012Endosuffan (Beta)ND22.06ug/L103(70.130)204.5MS_201905240012Endosuffan (Beta)ND22.06ug/L113(50.150)MS_201905240012Endosuffan (Beta)ND22.07ug/L104(70.130)200.43-LCS1Endosuffan (Beta)ND22.07ug/L104(70.130)LCS1Endosuffan (Beta)ND22.07ug/L104(70.130)201.4LCS2En	MSD_201905240012	Di-N-octylphthalate	ND	2	2.28	ug/L	114	(70-130)	20	1.5
MBLK Endosulfan I (Alpha) <0.1 ug/L 87 (50-150) MRL_CHK Endosulfan I (Alpha) 0.1 0.0870 ug/L 87 (50-150) MS_201905240012 Endosulfan I (Alpha) ND 2 2.03 ug/L 102 (70-130) 20 7.9 MSD_201905240012 Endosulfan I (Alpha) ND 2 2.03 ug/L 102 (70-130) 20 7.9 LCS1 Endosulfan I (Beta) ND 2 2.06 ug/L 103 (70-130) 20 4.5 MBLK Endosulfan II (Beta) 2 2.06 ug/L 113 (50-150) 4.5 MBLK Endosulfan II (Beta) 1 0.113 ug/L 113 (50-150) 4.5 MS_201905240012 Endosulfan II (Beta) ND 2 2.08 ug/L 104 (70-130) 20 0.43 MS_201905240012 Endosulfan II (Beta) ND 2 2.07 ug/L 103 (70-130) 20<	LCS1	Endosulfan I (Alpha)		2	1.99	ug/L	100	(70-130)		
MRL_CHK Endosulfan I (Alpha) 0.1 0.0870 ug/L 87 (50-150) MS_201905240012 Endosulfan I (Alpha) ND 2 2.03 ug/L 102 (70-130) 20 7.9 MSD_201905240012 Endosulfan I (Alpha) ND 2 2.20 ug/L 110 (70-130) 20 7.9 LCS1 Endosulfan II (Beta) 2 2.06 ug/L 99 (70-130) 20 4.5 MSL_CHK Endosulfan II (Beta) 2 2.06 ug/L 103 (70-130) 20 4.5 MSL_CHK Endosulfan II (Beta) 2 2.06 ug/L 103 (70-130) 20 4.5 MSL_CHK Endosulfan II (Beta) 2 2.06 ug/L 103 (70-130) 20 4.5 MS_201905240012 Endosulfan II (Beta) ND 2 2.08 ug/L 104 (70-130) 20 0.43 LCS1 Endosulfan Sulfate 2 2.07 ug/L 103 (70-130) 20 0.43 LCS1 Endosulfan Sulfate <td>LCS2</td> <td>Endosulfan I (Alpha)</td> <td></td> <td>2</td> <td>2.18</td> <td>ug/L</td> <td>109</td> <td>(70-130)</td> <td>20</td> <td>9.6</td>	LCS2	Endosulfan I (Alpha)		2	2.18	ug/L	109	(70-130)	20	9.6
MS_201905240012Endosulfan I (Alpha)ND22.03ug/L102(70-130)207.9MSD_201905240012Endosulfan I (Alpha)ND22.20ug/L110(70-130)207.9LCS1Endosulfan I (Beta)21.97ug/L99(70-130)204.5LCS2Endosulfan I (Beta)22.06ug/L103(70-130)204.5MBLKEndosulfan I (Beta)MS_201905240012Endosulfan I (Beta)0.10.113ug/L113(50-150)MS_201905240012Endosulfan I (Beta)ND22.07ug/L104(70-130)MS_201905240012Endosulfan I (Beta)ND22.07ug/L104(70-130)200.43LCS1Endosulfan I (Beta)ND22.07ug/L103(70-130)200.43LCS1Endosulfan SulfateEndosulfan Sulfate22.07ug/L103(70-130)200.43LCS2Endosulfan SulfateEndosulfan SulfateEndosulfan Sulfate22.17ug/L109(70-130)201.4MBLKEndosulfan SulfateEndosulfan Sulfate <td< td=""><td>MBLK</td><td>Endosulfan I (Alpha)</td><td></td><td></td><td><0.1</td><td>ug/L</td><td></td><td></td><td></td><td></td></td<>	MBLK	Endosulfan I (Alpha)			<0.1	ug/L				
MSD_201905240012 Endosulfan I (Alpha) ND 2 2.20 ug/L 110 (70-130) 20 7.9 LCS1 Endosulfan II (Beta) 2 1.97 ug/L 99 (70-130) 20 4.5 LCS2 Endosulfan II (Beta) 2 2.06 ug/L 103 (70-130) 20 4.5 MBLK Endosulfan II (Beta) 2 2.06 ug/L 113 (50-150) 20 4.5 MS_201905240012 Endosulfan II (Beta) ND 2 2.08 ug/L 113 (50-150) 20 0.43 MS_201905240012 Endosulfan II (Beta) ND 2 2.08 ug/L 104 (70-130) 20 0.43 LCS1 Endosulfan II (Beta) ND 2 2.07 ug/L 103 (70-130) 20 0.43 LCS1 Endosulfan Sulfate 2 2.07 ug/L 103 (70-130) 20 0.43 LCS1 Endosulfan Sulfate 2 2.07 ug/L 103 (70-130) 20 1.4 MB	MRL_CHK	Endosulfan I (Alpha)		0.1	0.0870	ug/L	87	(50-150)		
LCS1 Endosulfan II (Beta) 2 1.97 ug/L 99 (70-130) LCS2 Endosulfan II (Beta) 2 2.06 ug/L 103 (70-130) 20 4.5 MBLK Endosulfan II (Beta) 2 2.06 ug/L 103 (70-130) 20 4.5 MBLK Endosulfan II (Beta) 2 2.06 ug/L 113 (50-150) 20 4.5 MS_201905240012 Endosulfan II (Beta) ND 2 2.08 ug/L 104 (70-130) 20 0.43 MSD_201905240012 Endosulfan II (Beta) ND 2 2.07 ug/L 103 (70-130) 20 0.43 LCS1 Endosulfan Sulfate 2 2.07 ug/L 103 (70-130) 20 0.43 LCS2 Endosulfan Sulfate 2 2.17 ug/L 109 (70-130) 20 1.4 MBLK Endosulfan Sulfate - - - 0.1 ug/L 110 (50-150) - - MBLCH Endosulfan Sulfate 0.11	MS_201905240012	Endosulfan I (Alpha)	ND	2	2.03	ug/L	102	(70-130)		
LCS2Endosulfan II (Beta)22.06ug/L103(70-130)204.5MBLKEndosulfan II (Beta)0.1ug/L </td <td>MSD_201905240012</td> <td>Endosulfan I (Alpha)</td> <td>ND</td> <td>2</td> <td>2.20</td> <td>ug/L</td> <td>110</td> <td>(70-130)</td> <td>20</td> <td>7.9</td>	MSD_201905240012	Endosulfan I (Alpha)	ND	2	2.20	ug/L	110	(70-130)	20	7.9
MBLK Endosulfan II (Beta) <0.1 ug/L MRL_CHK Endosulfan II (Beta) 0.1 0.113 ug/L 113 (50-150) MS_201905240012 Endosulfan II (Beta) ND 2 2.08 ug/L 104 (70-130) MSD_201905240012 Endosulfan II (Beta) ND 2 2.07 ug/L 103 (70-130) 20 0.43 LCS1 Endosulfan Sulfate 2 2.07 ug/L 100 (70-130) 20 0.43 LCS2 Endosulfan Sulfate 2 2.07 ug/L 109 (70-130) 20 0.43 MBLK Endosulfan Sulfate 2 2.07 ug/L 100 (70-130) 20 0.43 LCS2 Endosulfan Sulfate 2 2.01 ug/L 109 (70-130) 20 1.4 MBLK Endosulfan Sulfate - - - 0.1 ug/L - - - MBLK Endosulfan Sulfate - - - - - - - - - -	LCS1	Endosulfan II (Beta)		2	1.97	ug/L	99	(70-130)		
MRL_CHK Endosulfan II (Beta) 0.1 0.113 ug/L 113 (50-150) MS_201905240012 Endosulfan II (Beta) ND 2 2.08 ug/L 104 (70-130) MSD_201905240012 Endosulfan II (Beta) ND 2 2.07 ug/L 103 (70-130) 20 0.43 LCS1 Endosulfan Sulfate 2 2.07 ug/L 109 (70-130) 20 0.43 LCS2 Endosulfan Sulfate 2 2.17 ug/L 109 (70-130) 20 1.4 MBLK Endosulfan Sulfate - - 6.1 ug/L 110 (50-150) 1.4 MRL_CHK Endosulfan Sulfate - - 1.13 ug/L - - 1.4	LCS2	Endosulfan II (Beta)		2	2.06	ug/L	103	(70-130)	20	4.5
MS_201905240012 Endosulfan II (Beta) ND 2 2.08 ug/L 104 (70-130) MSD_201905240012 Endosulfan II (Beta) ND 2 2.07 ug/L 103 (70-130) 20 0.43 LCS1 Endosulfan Sulfate 2 2.20 ug/L 110 (70-130) 20 1.4 LCS2 Endosulfan Sulfate 2 2.17 ug/L 109 (70-130) 20 1.4 MBLK Endosulfan Sulfate - - - 0.1 ug/L 110 (50-150) - - MRL_CHK Endosulfan Sulfate 0.1 0.110 ug/L 110 (50-150) - -	MBLK	Endosulfan II (Beta)			<0.1	ug/L				
MSD_201905240012 Endosulfan II (Beta) ND 2 2.07 ug/L 103 (70-130) 20 0.43 LCS1 Endosulfan Sulfate 2 2.20 ug/L 110 (70-130) 20 0.43 LCS2 Endosulfan Sulfate 2 2.17 ug/L 109 (70-130) 20 1.4 MBLK Endosulfan Sulfate - - 0.1 ug/L 110 (50-150) - 1.4 MRL_CHK Endosulfan Sulfate 0.1 0.110 ug/L 110 (50-150) - -	MRL_CHK	Endosulfan II (Beta)		0.1	0.113	ug/L	113	(50-150)		
LCS1 Endosulfan Sulfate 2 2.20 ug/L 110 (70-130) 1.4 LCS2 Endosulfan Sulfate 2 2.17 ug/L 109 (70-130) 20 1.4 MBLK Endosulfan Sulfate - - 0.1 ug/L - - 1.4 MRL_CHK Endosulfan Sulfate 0.1 0.110 ug/L 110 (50-150) - -	MS_201905240012	Endosulfan II (Beta)	ND	2	2.08	ug/L	104	(70-130)		
LCS2 Endosulfan Sulfate 2 2.17 ug/L 109 (70-130) 20 1.4 MBLK Endosulfan Sulfate <0.1 ug/L ug/L 100 (70-130) 20 1.4 MRL_CHK Endosulfan Sulfate 0.1 0.110 ug/L 110 (50-150) L	MSD_201905240012	Endosulfan II (Beta)	ND	2	2.07	ug/L	103	(70-130)	20	0.43
MBLK Endosulfan Sulfate <0.1 ug/L MRL_CHK Endosulfan Sulfate 0.1 0.110 ug/L 110 (50-150)	LCS1	Endosulfan Sulfate		2	2.20	ug/L	110	(70-130)		
MRL_CHK Endosulfan Sulfate 0.1 0.110 ug/L 110 (50-150)	LCS2	Endosulfan Sulfate		2	2.17	ug/L	109	(70-130)	20	1.4
	MBLK	Endosulfan Sulfate			<0.1	ug/L				
MS_201905240012 Endosulfan Sulfate ND 2 2.30 ug/L 115 (70-130)	MRL_CHK	Endosulfan Sulfate		0.1	0.110	ug/L	110	(50-150)		
	MS_201905240012	Endosulfan Sulfate	ND	2	2.30	ug/L	115	(70-130)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD_201905240012	Endosulfan Sulfate	ND	2	2.25	ug/L	112	(70-130)	20	2.4
LCS1	Endrin		2	1.97	ug/L	99	(70-130)		
LCS2	Endrin		2	2.03	ug/L	101	(70-130)	20	3.0
MBLK	Endrin			<0.1	ug/L				
MRL_CHK	Endrin		0.1	0.138	ug/L	138	(50-150)		
MS_201905240012	Endrin	ND	2	2.00	ug/L	100	(70-130)		
MSD_201905240012	Endrin	ND	2	2.12	ug/L	106	(70-130)	20	5.8
LCS1	Endrin Aldehyde		2	1.88	ug/L	94	(70-130)		
LCS2	Endrin Aldehyde		2	1.88	ug/L	94	(70-130)	20	0.0
MBLK	Endrin Aldehyde			<0.1	ug/L				
MRL_CHK	Endrin Aldehyde		0.1	0.0730	ug/L	73	(50-150)		
MS_201905240012	Endrin Aldehyde	ND	2	1.82	ug/L	91	(70-130)		
MSD_201905240012	Endrin Aldehyde	ND	2	1.96	ug/L	98	(70-130)	20	8.2
LCS1	EPTC		2	1.82	ug/L	91	(70-130)		
LCS2	EPTC		2	1.79	ug/L	90	(70-130)	20	1.7
MBLK	EPTC			<0.1	ug/L				
MRL_CHK	EPTC		0.1	0.0860	ug/L	86	(50-150)		
MS_201905240012	EPTC	ND	2	1.79	ug/L	90	(70-130)		
MSD_201905240012	EPTC	ND	2	1.71	ug/L	86	(70-130)	20	4.5
LCS1	Fluoranthene		2	2.09	ug/L	105	(70-130)		
LCS2	Fluoranthene		2	2.08	ug/L	104	(70-130)	20	0.48
MBLK	Fluoranthene			<0.1	ug/L				
MRL_CHK	Fluoranthene		0.05	0.0510	ug/L	102	(50-150)		
MS_201905240012	Fluoranthene	ND	2	2.09	ug/L	105	(70-130)		
MSD_201905240012	Fluoranthene	ND	2	2.16	ug/L	108	(70-130)	20	3.3
LCS1	Fluorene		2	2.15	ug/L	108	(70-130)		
LCS2	Fluorene		2	2.12	ug/L	106	(70-130)	20	0.94
MBLK	Fluorene			<0.05	ug/L				
MRL_CHK	Fluorene		0.05	0.0510	ug/L	102	(50-150)		
MS_201905240012	Fluorene	ND	2	2.16	ug/L	108	(70-130)		
MSD_201905240012	Fluorene	ND	2	2.14	ug/L	107	(70-130)	20	0.70
LCS1	gamma-Chlordane		2	1.95	ug/L	98	(70-130)		
LCS2	gamma-Chlordane		2	1.96	ug/L	98	(70-130)	20	0.51
MBLK	gamma-Chlordane			<0.05	ug/L				
MRL_CHK	gamma-Chlordane		0.05	0.0490	ug/L	98	(50-150)		
MS_201905240012	gamma-Chlordane	ND	2	1.98	ug/L	99	(70-130)		
MSD_201905240012	gamma-Chlordane	ND	2	2.08	ug/L	104	(70-130)	20	5.1
LCS1	Heptachlor		2	1.97	ug/L	99	(70-130)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	Heptachlor		2	2.03	ug/L	102	(70-130)	20	3.0
MBLK	Heptachlor			<0.04	ug/L				
MRL_CHK	Heptachlor		0.04	0.0370	ug/L	93	(50-150)		
MS_201905240012	Heptachlor	ND	2	1.93	ug/L	96	(70-130)		
MSD_201905240012	Heptachlor	ND	2	2.10	ug/L	105	(70-130)	20	8.6
LCS1	Heptachlor Epoxide (isomer B)		2	2.03	ug/L	101	(70-130)		
LCS2	Heptachlor Epoxide (isomer B)		2	2.04	ug/L	102	(70-130)	20	0.49
MBLK	Heptachlor Epoxide (isomer B)			<0.05	ug/L				
MRL_CHK	Heptachlor Epoxide (isomer B)		0.05	0.0490	ug/L	98	(50-150)		
MS_201905240012	Heptachlor Epoxide (isomer B)	ND	2	2.06	ug/L	103	(70-130)		
MSD_201905240012	Heptachlor Epoxide (isomer B)	ND	2	2.10	ug/L	105	(70-130)	20	2.1
LCS1	Hexachlorobenzene		2	2.04	ug/L	102	(70-130)		
LCS2	Hexachlorobenzene		2	2.05	ug/L	102	(70-130)	20	0.49
MBLK	Hexachlorobenzene			<0.05	ug/L				
MRL_CHK	Hexachlorobenzene		0.05	0.0520	ug/L	104	(50-150)		
MS_201905240012	Hexachlorobenzene	ND	2	2.01	ug/L	101	(70-130)		
MSD_201905240012	Hexachlorobenzene	ND	2	2.08	ug/L	104	(70-130)	20	3.4
LCS1	Hexachlorocyclopentadiene		2	2.02	ug/L	101	(70-130)		
LCS2	Hexachlorocyclopentadiene		2	2.00	ug/L	100	(70-130)	20	1
MBLK	Hexachlorocyclopentadiene			<0.05	ug/L				
MRL_CHK	Hexachlorocyclopentadiene		0.05	0.0440	ug/L	88	(50-150)		
MS_201905240012	Hexachlorocyclopentadiene	ND	2	1.97	ug/L	99	(70-130)		
MSD_201905240012	Hexachlorocyclopentadiene	ND	2	1.86	ug/L	93	(70-130)	20	5.7
LCS1	Indeno(1,2,3,c,d)Pyrene		2	2.17	ug/L	109	(70-130)		
LCS2	Indeno(1,2,3,c,d)Pyrene		2	2.16	ug/L	108	(70-130)	20	0.46
MBLK	Indeno(1,2,3,c,d)Pyrene			<0.05	ug/L				
MRL_CHK	Indeno(1,2,3,c,d)Pyrene		0.05	0.0430	ug/L	86	(50-150)		
MS_201905240012	Indeno(1,2,3,c,d)Pyrene	ND	2	2.27	ug/L	114	(70-130)		
MSD_201905240012	Indeno(1,2,3,c,d)Pyrene	ND	2	2.16	ug/L	108	(70-130)	20	5.0
LCS1	Isophorone		2	1.92	ug/L	96	(70-130)		
LCS2	Isophorone		2	1.84	ug/L	92	(70-130)	20	4.3
MBLK	Isophorone			<0.5	ug/L				
MRL_CHK	Isophorone		0.1	0.0820	ug/L	82	(50-150)		
MS_201905240012	Isophorone	ND	2	1.89	ug/L	94	(70-130)		
MSD_201905240012	Isophorone	ND	2	1.81	ug/L	90	(70-130)	20	4.2
LCS1	Lindane		2	2.17	ug/L	108	(70-130)		
LCS2	Lindane		2	2.18	ug/L	109	(70-130)	20	0.46
				<0.04	ug/L				

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Lindane		0.04	0.0530	ug/L	133	(50-150)		
MS_201905240012	Lindane	ND	2	2.10	ug/L	105	(70-130)		
MSD_201905240012	Lindane	ND	2	2.22	ug/L	111	(70-130)	20	5.4
LCS1	Malathion		2	2.31	ug/L	115	(70-130)		
LCS2	Malathion		2	2.29	ug/L	114	(70-130)	20	0.87
MBLK	Malathion			<0.1	ug/L				
MRL_CHK	Malathion		0.1	0.119	ug/L	119	(50-150)		
MS_201905240012	Malathion	ND	2	2.33	ug/L	116	(70-130)		
MSD_201905240012	Malathion	ND	2	2.44	ug/L	122	(70-130)	20	4.8
LCS1	Methoxychlor		2	2.36	ug/L	118	(70-130)		
LCS2	Methoxychlor		2	2.31	ug/L	116	(70-130)	20	2.1
MBLK	Methoxychlor			<0.1	ug/L				
MRL_CHK	Methoxychlor		0.1	0.0980	ug/L	98	(50-150)		
MS_201905240012	Methoxychlor	ND	2	2.28	ug/L	114	(70-130)		
MSD_201905240012	Methoxychlor	ND	2	2.37	ug/L	118	(70-130)	20	4.1
LCS1	Metolachlor		2	2.14	ug/L	107	(70-130)		
LCS2	Metolachlor		2	2.17	ug/L	109	(70-130)	20	1.4
MBLK	Metolachlor			<0.05	ug/L				
MRL_CHK	Metolachlor		0.05	0.0480	ug/L	96	(50-150)		
MS_201905240012	Metolachlor	ND	2	2.14	ug/L	107	(70-130)		
MSD_201905240012	Metolachlor	ND	2	2.28	ug/L	114	(70-130)	20	6.2
LCS1	Metribuzin		2	2.01	ug/L	100	(70-130)		
LCS2	Metribuzin		2	1.94	ug/L	97	(70-130)	20	3.5
MBLK	Metribuzin			<0.05	ug/L				
MRL_CHK	Metribuzin		0.05	0.0450	ug/L	90	(50-150)		
MS_201905240012	Metribuzin	ND	2	1.95	ug/L	98	(70-130)		
MSD_201905240012	Metribuzin	ND	2	1.92	ug/L	96	(70-130)	20	1.5
LCS1	Molinate		2	1.96	ug/L	98	(70-130)		
LCS2	Molinate		2	1.84	ug/L	92	(70-130)	20	6.3
MBLK	Molinate			<0.1	ug/L				
MRL_CHK	Molinate		0.1	0.0910	ug/L	91	(50-150)		
MS_201905240012	Molinate	ND	2	1.98	ug/L	99	(70-130)		
MSD_201905240012	Molinate	ND	2	1.83	ug/L	92	(70-130)	20	8.1
LCS1	Naphthalene		2	1.94	ug/L	97	(70-130)		
LCS2	Naphthalene		2	1.90	ug/L	95	(70-130)	20	2.1
MBLK	Naphthalene			<0.3	ug/L				
MRL_CHK	Naphthalene		0.1	0.0980	ug/L	98	(50-150)		
MS_201905240012	Naphthalene	ND	2	1.90	ug/L	95	(70-130)		

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD_201905240012	Naphthalene	ND	2	1.79	ug/L	90	(70-130)	20	6.1
LCS1	Parathion		2	2.52	ug/L	126	(70-130)		
LCS2	Parathion		2	2.39	ug/L	119	(70-130)	20	5.3
MBLK	Parathion			<0.1	ug/L				
MRL_CHK	Parathion		0.1	0.0940	ug/L	94	(50-150)		
MS_201905240012	Parathion	ND	2	2.39	ug/L	119	(70-130)		
MSD_201905240012	Parathion	ND	2	2.48	ug/L	124	(70-130)	20	3.8
LCS1	Pendimethalin		2	2.48	ug/L	124	(70-130)		
LCS2	Pendimethalin		2	2.51	ug/L	126	(70-130)	20	1.2
MBLK	Pendimethalin			<0.1	ug/L				
MRL_CHK	Pendimethalin		0.1	0.0940	ug/L	94	(50-150)		
MS_201905240012	Pendimethalin	ND	2	2.40	ug/L	120	(70-130)		
MSD_201905240012	Pendimethalin	ND	2	2.56	ug/L	128	(70-130)	20	6.2
LCS1	Permethrin (mixed isomers)		4	4.38	ug/L	110	(70-130)		
LCS2	Permethrin (mixed isomers)		4	4.27	ug/L	107	(70-130)	20	2.5
MBLK	Permethrin (mixed isomers)			<0.2	ug/L				
MRL_CHK	Permethrin (mixed isomers)		0.2	0.184	ug/L	92	(50-150)		
MS_201905240012	Permethrin (mixed isomers)	ND	4	4.37	ug/L	109	(70-130)		
MSD_201905240012	Permethrin (mixed isomers)	ND	4	4.51	ug/L	113	(70-130)	20	3.1
LCS1	Perylene-d12 (S)		5	98.2	%	98	(70-130)		
LCS2	Perylene-d12 (S)		5	97.5	%	97	(70-130)		
MBLK	Perylene-d12 (S)			82.0	%	82	(70-130)		
MRL_CHK	Perylene-d12 (S)		5	82.6	%	83	(70-130)		
MS_201905240012	Perylene-d12 (S)		5	100	%	100	(70-130)		
MSD_201905240012	Perylene-d12 (S)		5	96.4	%	96	(70-130)		
LCS1	Phenanthrene		2	1.99	ug/L	100	(70-130)		
LCS2	Phenanthrene		2	1.99	ug/L	100	(70-130)	20	0.0
MBLK	Phenanthrene			<0.04	ug/L				
MRL_CHK	Phenanthrene		0.02	0.0220	ug/L	110	(50-150)		
MS_201905240012	Phenanthrene	ND	2	2.00	ug/L	100	(70-130)		
MSD_201905240012	Phenanthrene	ND	2	2.01	ug/L	101	(70-130)	20	0.65
LCS1	Phenanthrene-d10 (I)		5	107	%	107	(50-150)		
LCS2	Phenanthrene-d10 (I)		5	92.4	%	92	(50-150)		
MBLK	Phenanthrene-d10 (I)			94.7	%	95	(50-150)		
MRL_CHK	Phenanthrene-d10 (I)		5	92.7	%	93	(50-150)		
MS_201905240012	Phenanthrene-d10 (I)		5	86.1	%	86	(50-150)		
MSD_201905240012	Phenanthrene-d10 (I)		5	89.1	%	89	(50-150)		
LCS1	Propachlor		2	2.12	ug/L	106	(70-130)		

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RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



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David C. McCollum Water Treatment Plant

LGS2 Propablic 2 2.08 upL 104 (70-130) 20 1.9 MBLK Propablicr 0.05 ugL -<	QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
NRL_CHK NS_20190524001PropachiorND0.0650.0600upL132(9.6-10)NSD_20190524001PopachiorND22.62upL111(70-13)2.0ALGS1Pyrene22.12upL108(70-13)2.0A.7MRL_CHKPyrene0.050.480upL160(70-13)2.0A.7MRL_CHKPyrene0.050.480upL160(70-13)2.0A.7MS_20190524012PyreneND22.10upL110(70-13)2.0A.7MS_2019052402PyreneND22.20upL110(70-13)2.0A.3MS_20190524012SimazineND22.00upL110(70-13)2.0A.3MRL_CHKSimazineND22.19upL110(70-13)2.0A.3MS_20190524012SimazineND22.19upL110(70-13)2.0A.3MS_20190524012SimazineND22.19upL110(70-13)2.0A.3MS_20190524012SimazineND22.19upL110(70-13)2.0A.3MS_20190524012SimazineND22.24upL110(70-13)2.0A.3MS_20190524012TerbaciND22.24upL112(70-13)2.0A.3MS_20190524012Terbaci<	LCS2	Propachlor		2	2.08	ug/L	104	(70-130)	20	1.9
MS_201905240012PropachlorNDND22.62ugl.60.3(70.130)ZMSMSD_201905240012PropachlorND22.12ugl.101(70.130)2.00.47LCS1PyreneZ2.12ugl.105(70.130)2.00.47MRL,CHKPyreneND2.00.470ugl.105(70.130)2.00.47MS_20190524012PyreneND2.02.12ugl.105(70.130)Z5.0MS_20190524021PyreneND2.22.12ugl.110(70.130)2.02.33MSL_CHKSimarineND2.22.12ugl.110(70.130)2.02.33MSL_CHKSimarineND2.02.12ugl.110(70.130)2.02.33MSL_OHSSimarineND2.02.12ugl.100(70.130)2.02.33MSL_OHSSimarineND2.02.12ugl.100(70.130)2.02.33MSL_OHSSimarineND2.02.12ugl.100(70.130)2.03.0MSL_OHSSimarineND2.02.12ugl.100(70.130)2.03.0MSL_OHSSimarineND2.02.12ugl.112(70.130)2.03.0MSL_OHSSimarineND2.02.12ugl.113(70.130)2.03.0 <td>MBLK</td> <td>Propachlor</td> <td></td> <td></td> <td><0.05</td> <td>ug/L</td> <td></td> <td></td> <td></td> <td></td>	MBLK	Propachlor			<0.05	ug/L				
MBD BD DP000000000000000000000000000000000000	MRL_CHK	Propachlor		0.05	0.0660	ug/L	132	(50-150)		
LCS1Pyrene22.12uglL108(70.130)Z0.47LCS2Pyrene22.10uglL105(70.130)2.00.47MBLPyreneND0.050.480uglL60.150MS_201905240012PyreneND22.10uglL105(70.130)Z5.0MS2_0190524012PyreneND22.25uglL111(70.130)Z2.35LCS1SimazineND22.25uglL113(70.130)Z2.35MRL_CHKSimazineND22.25uglL110(70.130)Z2.35MS2_0190524012SimazineND22.10uglL100(70.130)Z2.36MS2_0190524012SimazineND22.18uglL101(70.130)Z0.60LCS1SimazineND22.18uglL101(70.130)Z0.60LCS1SimazineND22.18uglL102(70.130)Z0.60LCS1SimazineND22.14uglL103(70.130)Z0.60LCS1TerbailND22.14uglL114(70.130)Z0.61MS2_0190524012TerbailND22.32uglL113(70.130)Z0.61LCS1TerbailND22.32uglL114(70	MS_201905240012	Propachlor	ND	2	2.06	ug/L	103	(70-130)		
LCS2Pyrene22.11uğ.l1.05(70.130)2.00.4.7MRLPyrene-0.55ug.l	MSD_201905240012	Propachlor	ND	2	2.22	ug/L	111	(70-130)	20	8.1
MBLKPyrene-0.050.0480ug/L-6.060-15.0-MR_CHKPyreneND22.100.10105(70-130)25.3MSD_201905240012PyreneND22.20ug/L113(70-130)2.02.3LCS1Simazine22.25ug/L113(70-130)2.02.3LCS4Simazine22.20ug/L110(70-130)2.02.3MBLKSimazine0.550.600ug/L(50-150)MS_201905240012SimazineND22.19ug/L110(70-130)2.00.53MS_201905240012SimazineND22.18ug/L110(70-130)2.00.51MS_201905240012SimazineND22.18ug/L110(70-130)2.03.9MSLCTerbaci22.19ug/L112(70-130)2.03.9MSLTerbaci22.14ug/L114(70-130)2.03.9MSL201905240012Terbaci10.11.1(70-130)2.03.9MSL201905240012TerbaciND22.38ug/L113(70-130)2.03.9MSL201905240012TerbaciND22.14ug/L114(70-130)2.00.5MSL201905240012TerbaciND22.38ug/L113(70-130)2.0 <td< td=""><td>LCS1</td><td>Pyrene</td><td></td><td>2</td><td>2.12</td><td>ug/L</td><td>106</td><td>(70-130)</td><td></td><td></td></td<>	LCS1	Pyrene		2	2.12	ug/L	106	(70-130)		
NRL_CHKPyrene0.050.480ugl.96(50-150)MS_201905240012PyreneND22.10ugl.105(70-130)25MSD_201905240012PyreneND22.22ugl.111(70-130)2.05.3LGS1Simazine22.20ugl.110(70-130)2.02.3LGS4Simazine0.05ugl.110(70-130)2.02.3MBLSimazine0.050.0620ugl.124(50-15)MS2_01905240012SimazineND22.18ugl.124(70-130)2.00.60LCS1SimazineND22.18ugl.116(70-130)2.00.60LCS1Terbacil-22.33ugl.116(70-130)2.00.60LCS1Terbacil-2.02.14ugl.116(70-130)2.00.60LCS1Terbacil-2.14ugl.116(70-130)2.00.61MSL_201905240012FebacilND22.27ugl.113(70-130)2.00.61MSL_20190524012FebacilND22.28ugl.119(70-130)2.00.61MSL_201905240012FebacilND22.38ugl.119(70-130)2.00.61MSL_201905240012Febultylazine-1.14ugl.1	LCS2	Pyrene		2	2.11	ug/L	105	(70-130)	20	0.47
NSOpponeND22.10ug/L105(70-130)MSD201906240012PyreneND22.22ug/L111(70-130)2.05.3LCS1Simazine22.25ug/L113(70-130)2.05.3MSLSimazine22.20ug/L113(70-130)2.02.3MBLKSimazine0.050.0620ug/L124(50-150)MS_20190524012SimazineND22.13ug/L116(70-130)2.00.60LCS1Terbaci22.33ug/L116(70-130)2.00.60LCS1Terbaci2.02.34ug/L116(70-130)2.00.60MSLTerbaci2.02.33ug/L116(70-130)2.00.61MSLTerbaci0.10.14.3ug/L113(70-130)2.00.61MSL201905240012Terbaci0.10.14.3ug/L113(70-130)0.00.1MSL201905240012Terbaci1.10.14.3Ug/L113(70-130)0.00.11.1MSL201905240012Terbaci1.10.14.3Ug/L113(70-130)0.11.11.1MSL201905240012Terbaci2.22.14Ug/L113(70-130)0.11.11.11.11.1<	MBLK	Pyrene			<0.05	ug/L				
MSD_201905240012PyreeND22.22ugl.111(70.130205.3LCS1Simazine22.25ugl.113(70.130)202.3LCS2Simazine22.00ugl.110(70.130)202.3MRLSimazine0.050.0620ugl.124(50.150)MS_201905240012SimazineND22.18ugl.109(70.130)MS_201905240012SimazineND22.18ugl.112(70.130)MS_201905240012SimazineND22.33ugl.112(70.130)203.9LCS1Terbacil-22.34ugl.112(70.130)203.9MSL/CHKTerbacilND22.73ugl.113(70.130)MS_20190524012TerbacilND22.74ugl.114(70.130)200.57LCS1TerbacilND22.38ugl.113(70.130)200.57LCS1Terbalylazine-10.100ugl.119(70.130)200.57LCS1Terbuthylazine-23.84ugl.119(70.130)200.51LCS1Terbuthylazine-10.100ugl.119(70.130)200.51LCS1Terbuthylazine-23.94	MRL_CHK	Pyrene		0.05	0.0480	ug/L	96	(50-150)		
LC31Simaine22.22.213(70-130)22.3LG52Simaine22.0ugL10(70-130)2.02.3MBL <m< td="">Simaine50.050ugL555MS_20105240012SimaineMD22.18ugL10.0(70-130)2.00.60LG51SimaineND22.18ugL11.6(70-130)2.00.60LG51Terbaci-2.22.33ugL11.6(70-130)2.03.9MBLKTerbaci-0.14ugL11.2(70-130)2.03.9MBLTerbaci-0.11.43ugL11.4(70-130)2.03.9MS_20190524012Terbaci-0.11.43ugL11.4(70-130)2.03.9MS_20190524012TerbaciND22.2ugL11.4(70-130)2.00.57LC51Terbuthylazine-0.14ugL11.4(70-130)2.00.57LC51Terbuthylazine-2.3ugL11.9(70-130)2.00.57MSL_20190524012Terbuthylazine-2.3ugL11.9(70-130)2.00.57MSL_20190524012Terbuthylazine-2.3ugL11.9(70-130)2.00.1MSL_20190524012Terbuthylazine-2.3ugL11.9(70-130)2.00.1<</m<>	MS_201905240012	Pyrene	ND	2	2.10	ug/L	105	(70-130)		
LCS2Simaine22.20ugl.1.01(70.130)2.02.3MBLKSimazine0.050.050ugl.124(50.10)12410.1010.10MS_20190524012SimazineND22.180ugl.10.0(70.130)2.00.00LCS1GinazineND22.13ugl.11.0(70.130)2.00.00LCS2TerbaciTerbaci22.33ugl.11.2(70.130)2.00.00MRL_CKTerbaci22.34ugl.11.2(70.130)2.00.00MS_20190524012Terbaci10.43ugl.11.2(70.130)2.00.00MS_20190524012TerbaciND22.24ugl.11.4(70.130)2.00.05MS_20190524012TerbaciND22.27ugl.11.4(70.130)2.00.57LCS1TerbuthylazineND22.26ugl.11.9(70.130)2.00.57LCS1TerbuthylazineI0.10ugl.10.1(70.130)2.00.57MS_20190524012TerbuthylazineI0.10ugl.10.1(70.130)2.00.1MSL_CKKTerbuthylazineND22.3ugl.11.5(70.130)2.00.0MSL_CHKTerbuthylazineND22.4ugl.10.1(70.130)2.00.0MSL_20190524012 <td< td=""><td>MSD_201905240012</td><td>Pyrene</td><td>ND</td><td>2</td><td>2.22</td><td>ug/L</td><td>111</td><td>(70-130)</td><td>20</td><td>5.3</td></td<>	MSD_201905240012	Pyrene	ND	2	2.22	ug/L	111	(70-130)	20	5.3
MBLKSimazine-0.05ug/Lview<	LCS1	Simazine		2	2.25	ug/L	113	(70-130)		
NRL_CHKSimazine0.050.0620ug/L124(50-150)MS_201905240012SimazineND22.19ug/L110(70-130)200.60MSD_201905240012SimazineND22.18ug/L109(70-130)200.60LCS1Terbacil22.24ug/L116(70-130)203.9MBLKTerbacil0.14ug/L143(50-150)MSL_201905240012TerbacilND22.27ug/L114(70-130)MS_201905240012TerbacilND22.26ug/L113(70-130)200.42.MS_201905240012TerbachlyazineND22.38ug/L119(70-130)LCS2Terbuthylazine	LCS2	Simazine		2	2.20	ug/L	110	(70-130)	20	2.3
N. 201905240012 Simazine ND 2 2.19 ug/L 100 (70-13) 20 0.60 MSD 201905240012 Simazine ND 2 2.18 ug/L 109 (70-130) 20 0.60 LCS1 Terbacil 2 2.33 ug/L 116 (70-130) 20 3.9 LCS2 Terbacil 2 2.44 ug/L 112 (70-130) 20 3.9 MBLK Terbacil 2 2.24 ug/L 143 (50-150) 5 MS_201905240012 Terbacil ND 2 2.27 ug/L 113 (70-130) 20 0.57 MS_201905240012 Terbacil ND 2 2.28 ug/L 119 (70-130) 20 0.57 LCS1 Terbuthylazine 2 3.8 ug/L 119 (70-130) 20 0.42 MS_201905240012 Terbuthylazine ND 2 2.38 ug/L 101 <t< td=""><td>MBLK</td><td>Simazine</td><td></td><td></td><td><0.05</td><td>ug/L</td><td></td><td></td><td></td><td></td></t<>	MBLK	Simazine			<0.05	ug/L				
ND 201905240012 Simazine ND 2 2.18 ug/L 109 (70-130) 20 0.60 LCS1 Terbacil 2 2.33 ug/L 116 (70-130) 20 3.9 LCS2 Terbacil 2 2.24 ug/L 112 (70-130) 20 3.9 MBLK Terbacil - - 0.1 0.143 ug/L 143 (50-150) - - - - - 0.1 0.143 Ug/L 143 (70-130) 20 0.50 - - - - - 0.1 0.143 Ug/L 114 (70-130) 20 0.50 - - 0.5 0.57 - - 0.5 0.57 - - 0.5 0.57 - 0.5 0.57 - - 0.5 0.57 - - 0.5 0.5 - - 0.5 0.5 - - 0.5 0.5	MRL_CHK	Simazine		0.05	0.0620	ug/L	124	(50-150)		
L Terbacil Terbacil 2 2.33 ug/L 116 (70.13) 2 3.9 LCS2 Terbacil 2 2.24 ug/L 112 (70.13) 20 3.9 MBLK Terbacil 2 2.24 ug/L 143 (50-150) 5 MR_CHK Terbacil ND 2 2.27 ug/L 144 (70.130) 20 0.57 MS_201905240012 Terbacil ND 2 2.39 ug/L 113 (70.130) 20 0.57 LCS1 Terbuthylazine 2 2.39 ug/L 119 (70.130) 20 0.42 MBLK Terbuthylazine 2 2.39 ug/L 119 (70.130) 20 0.42 MS_201905240012 Terbuthylazine 2 3.9 ug/L 100 (50-150) 1 MS_201905240012 Terbuthylazine ND 2 2.30 ug/L 107 0.130 20 6.1 <td>MS_201905240012</td> <td>Simazine</td> <td>ND</td> <td>2</td> <td>2.19</td> <td>ug/L</td> <td>110</td> <td>(70-130)</td> <td></td> <td></td>	MS_201905240012	Simazine	ND	2	2.19	ug/L	110	(70-130)		
LCS2Tenden224ugL112(70-130)203.9MBLKTenbaiTenbai <td>MSD_201905240012</td> <td>Simazine</td> <td>ND</td> <td>2</td> <td>2.18</td> <td>ug/L</td> <td>109</td> <td>(70-130)</td> <td>20</td> <td>0.60</td>	MSD_201905240012	Simazine	ND	2	2.18	ug/L	109	(70-130)	20	0.60
MBLKTerbacia	LCS1	Terbacil		2	2.33	ug/L	116	(70-130)		
MRL_CHK Terbacil 0.1 0.143 ug/L 143 (50-150) MS_201905240012 Terbacil ND 2 2.27 ug/L 114 (70-130) 20 0.57 MSD_201905240012 Terbacil ND 2 2.62 ug/L 113 (70-130) 20 0.57 LCS1 Terbuthylazine 2 2.39 ug/L 119 (70-130) 20 0.42 MBLK Terbuthylazine 2 2.38 ug/L 119 (70-130) 20 0.42 MS_201905240012 Terbuthylazine 0.1 0.100 ug/L 100 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 143 (50-150) 145 (50-150) 145 (50-150) 145 (50-150) 145 <td>LCS2</td> <td>Terbacil</td> <td></td> <td>2</td> <td>2.24</td> <td>ug/L</td> <td>112</td> <td>(70-130)</td> <td>20</td> <td>3.9</td>	LCS2	Terbacil		2	2.24	ug/L	112	(70-130)	20	3.9
M2 OP 2.27 Ug/L 114 (70-130) 20 0.57 MSD_201905240012 Febacil ND 2 2.26 ug/L 113 (70-130) 20 0.57 LCS1 Terbuthylazine 2 2.39 ug/L 119 (70-130) 20 0.42 LCS2 Terbuthylazine 2 2.38 ug/L 119 (70-130) 20 0.42 MBLK Terbuthylazine 2 2.38 ug/L 100 (50-150) 0.42 MS_201905240012 Terbuthylazine 0.10 0.100 ug/L 100 (50-150) 0.42 MS_201905240012 Terbuthylazine ND 2 2.30 ug/L 115 (70-130) 20 6.1 MS_201905240012 Terbuthylazine ND 2 2.45 ug/L 107 (70-130) 20 6.1 LCS1 Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MSLCHK Thiobencarb 1 0.100 ug/L 100 (50	MBLK	Terbacil			<0.1	ug/L				
ND P	MRL_CHK	Terbacil		0.1	0.143	ug/L	143	(50-150)		
LCS1Terbuthylazine22.39ug/L119(70-130)200.42LCS2Terbuthylazine22.38ug/L119(70-130)200.42MBLKTerbuthylazine0.10.100ug/L100(50-150)10010	MS_201905240012	Terbacil	ND	2	2.27	ug/L	114	(70-130)		
LCS2 Terbuthylazine 2 2.38 ug/L 119 (70-130) 20 0.42 MBLK Terbuthylazine <0.1 0.100 ug/L 100 (50-150) MR_CHK Terbuthylazine 0.1 0.100 ug/L 100 (50-150) MS_201905240012 Terbuthylazine ND 2 2.30 ug/L 115 (70-130) 20 6.1 MSD_201905240012 Terbuthylazine ND 2 2.30 ug/L 115 (70-130) 20 6.1 MSD_201905240012 Terbuthylazine ND 2 2.45 ug/L 107 (70-130) 20 6.1 LCS1 Thiobencarb 2 2.15 ug/L 107 (70-130) 20 0.0 MBLK Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MS_201905240012 Thiobencarb 0 1 0.100 ug/L 104 (70-130) 20 3.8 MS_201905240012 Thiob	MSD_201905240012	Terbacil	ND	2	2.26	ug/L	113	(70-130)	20	0.57
MBLK Terbuthylazine <0.1 ug/L MRL_CHK Terbuthylazine 0.1 0.100 ug/L 100 (50-150) MS_201905240012 Terbuthylazine ND 2 2.30 ug/L 115 (70-130) MSD_201905240012 Terbuthylazine ND 2 2.45 ug/L 107 (70-130) 20 6.1 LCS1 Thiobencarb 2 2.15 ug/L 107 (70-130) 20 0.0 MSLK Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MSLK Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MSLK Thiobencarb 0.1 0.100 ug/L 107 (70-130) 20 0.0 MSL201905240012 Thiobencarb 0.1 0.100 ug/L 104 (70-130) 20 3.8 LCS1 Tans-Nonachlor 2 1.99 ug/L 100	LCS1	Terbuthylazine		2	2.39	ug/L	119	(70-130)		
MRL_CHK Terbuthylazine 0.1 0.100 ug/L 100 (50-150) MS_201905240012 Terbuthylazine ND 2 2.30 ug/L 115 (70-130) 20 6.1 MSD_201905240012 Terbuthylazine ND 2 2.45 ug/L 122 (70-130) 20 6.1 LCS1 Thiobencarb 2 2.15 ug/L 107 (70-130) 20 0.0 MBLK Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MRL_CHK Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MRL_CHK Thiobencarb 2 2.14 ug/L 100 (50-150) 100	LCS2	Terbuthylazine		2	2.38	ug/L	119	(70-130)	20	0.42
MS_201905240012 Terbuthylazine ND 2 2.30 ug/L 115 (70-130) MSD_201905240012 Terbuthylazine ND 2 2.45 ug/L 122 (70-130) 20 6.1 LCS1 Thiobencarb 2 2.15 ug/L 107 (70-130) 20 6.1 LCS2 Thiobencarb 2 2.15 ug/L 107 (70-130) 20 0.0 MSL Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MSL Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MRL_CHK Thiobencarb 2 2.0 ug/L 100 (50-150) 2 100 100 100 100 100 100 100 3.8 MSD_201905240012 Thiobencarb ND 2 2.09 ug/L 100 (70-130) 20 3.8 LCS1 trans-Nonachlor 2 2.0 1.99 ug/L 100 (70-130) 20 0.0	MBLK	Terbuthylazine			<0.1	ug/L				
MSD_201905240012 Terbuthylazine ND 2 2.45 ug/L 122 (70-130) 20 6.1 LCS1 Thiobencarb 2 2.15 ug/L 107 (70-130) 20 0.0 LCS2 Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MBLK Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MRL_CHK Thiobencarb 1 0.10 0.100 ug/L 100 (50-150) 20 0.0 MS_201905240012 Thiobencarb ND 2 2.09 ug/L 104 (70-130) 20 3.8 MSD_201905240012 Thiobencarb ND 2 2.17 ug/L 109 (70-130) 20 3.8 LCS1 trans-Nonachlor 2 2 1.99 ug/L 100 (70-130) 20 0.0 LCS2 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0	MRL_CHK	Terbuthylazine		0.1	0.100	ug/L	100	(50-150)		
LCS1 Thiobencarb 2 2.15 ug/L 107 (70-130) 20 0.0 LCS2 Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MBLK Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MRL_CHK Thiobencarb 5 0.1 0.100 ug/L 100 (50-150) 5 5 MS_201905240012 Thiobencarb ND 2 2.09 ug/L 104 (70-130) 20 3.8 LCS1 trans-Nonachlor ND 2 1.99 ug/L 100 (70-130) 20 3.8 LCS2 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 3.8 LCS2 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0	MS_201905240012	Terbuthylazine	ND	2	2.30	ug/L	115	(70-130)		
LCS2 Thiobencarb 2 2.14 ug/L 107 (70-130) 20 0.0 MBLK Thiobencarb 50.2 ug/L ug/L 107 (70-130) 20 0.0 MRL_CHK Thiobencarb 0.1 0.100 ug/L 100 (50-150) 100 100 MS_201905240012 Thiobencarb ND 2 2.09 ug/L 104 (70-130) 20 3.8 MSD_201905240012 Thiobencarb ND 2 2.17 ug/L 100 (70-130) 20 3.8 LCS1 trans-Nonachlor 2 2 1.99 ug/L 100 (70-130) 20 0.0 LCS2 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0	MSD_201905240012	Terbuthylazine	ND	2	2.45	ug/L	122	(70-130)	20	6.1
MBLK Thiobencarb <0.2 ug/L MRL_CHK Thiobencarb 0.1 0.100 ug/L 100 (50-150) MS_201905240012 Thiobencarb ND 2 2.09 ug/L 104 (70-130) MSD_201905240012 Thiobencarb ND 2 2.17 ug/L 109 (70-130) 20 3.8 LCS1 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0	LCS1	Thiobencarb		2	2.15	ug/L	107	(70-130)		
MRL_CHK Thiobencarb 0.1 0.100 ug/L 100 (50-150) MS_201905240012 Thiobencarb ND 2 2.09 ug/L 104 (70-130) MSD_201905240012 Thiobencarb ND 2 2.17 ug/L 109 (70-130) 20 3.8 LCS1 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0 LCS2 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0	LCS2	Thiobencarb		2	2.14	ug/L	107	(70-130)	20	0.0
MS_201905240012 Thiobencarb ND 2 2.09 ug/L 104 (70-130) MSD_201905240012 Thiobencarb ND 2 2.17 ug/L 109 (70-130) 20 3.8 LCS1 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0 LCS2 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0	MBLK	Thiobencarb			<0.2	ug/L				
MSD_201905240012 Thiobencarb ND 2 2.17 ug/L 109 (70-130) 20 3.8 LCS1 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 3.8 LCS2 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0	MRL_CHK	Thiobencarb		0.1	0.100	ug/L	100	(50-150)		
LCS1 trans-Nonachlor 2 1.99 ug/L 100 (70-130) LCS2 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0	MS_201905240012	Thiobencarb	ND	2	2.09	ug/L	104	(70-130)		
LCS2 trans-Nonachlor 2 1.99 ug/L 100 (70-130) 20 0.0	MSD_201905240012	Thiobencarb	ND	2	2.17	ug/L	109	(70-130)	20	3.8
	LCS1	trans-Nonachlor		2	1.99	ug/L	100	(70-130)		
MBLK trans-Nonachlor <0.05 ug/L	LCS2	trans-Nonachlor		2	1.99	ug/L	100	(70-130)	20	0.0
	MBLK	trans-Nonachlor			<0.05	ug/L				

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	trans-Nonachlor		0.05	0.0540	ug/L	108	(50-150)		
MS_201905240012	trans-Nonachlor	ND	2	2.05	ug/L	102	(70-130)		
MSD_201905240012	trans-Nonachlor	ND	2	2.25	ug/L	113	(70-130)	20	9.3
LCS1	Trifluralin		2	2.29	ug/L	114	(70-130)		
LCS2	Trifluralin		2	2.29	ug/L	114	(70-130)	20	0.0
MBLK	Trifluralin			<0.1	ug/L				
MRL_CHK	Trifluralin		0.1	0.104	ug/L	104	(50-150)		
MS_201905240012	Trifluralin	ND	2	2.28	ug/L	114	(70-130)		
MSD_201905240012	Trifluralin	ND	2	2.37	ug/L	118	(70-130)	20	4.0
LCS1	Triphenylphosphate (S)		5	112	%	112	(70-130)		
LCS2	Triphenylphosphate (S)		5	111	%	111	(70-130)		
MBLK	Triphenylphosphate (S)			112	%	112	(70-130)		
MRL_CHK	Triphenylphosphate (S)		5	109	%	109	(70-130)		
MS_201905240012	Triphenylphosphate (S)		5	115	%	115	(70-130)		
MSD_201905240012	Triphenylphosphate (S)		5	115	%	115	(70-130)		
Gross Alpha/Beta	Radiation by EPA 900.0								
Analytical Ba	atch: 1177411					An	alysis Date:	06/07/2019	
DUP1_201905230668	Beta, Gross	4.1		4.35	pCi/L		(0-20)		
	Beta, Gross	5.2		ND	pCi/L		(0-20)		
LCS1	Beta, Gross		31	28.6	pCi/L	91	(80-120)		
LCS2	Beta, Gross		31	30.3	pCi/L	97	(80-120)	20	5.8
MBLK	Beta, Gross			<3	pCi/L				
MS_201905230665	Beta, Gross	3.4	31	33.6	pCi/L	96	(70-130)		
Gross Alpha by Co	p-precipitation by SM 7110C								
	atch: 1180088					An	alysis Date:	06/19/2019	
LCS1	Gross Alpha by Coprecipitation		31	27.4	pCi/L	88	(80-120)		
LCS2	Gross Alpha by Coprecipitation		31	28.4	pCi/L	91	(80-120)	20	3.6
MBLK	Gross Alpha by Coprecipitation			<3	pCi/L				
MS_201905280036	Gross Alpha by Coprecipitation	25	31	82.6	pCi/L	92	(70-130)		
ICPMS Metals by E	PA 200.8								
	atch: 1180365					An	alysis Date:	06/27/2019	
LCS1	Aluminum Total ICAP/MS		100	106	ug/L	106	(85-115)		
LCS2	Aluminum Total ICAP/MS		100	108	ug/L	108	(85-115)	20	1.9
MBLK	Aluminum Total ICAP/MS			<10	ug/L				
MRL_CHK	Aluminum Total ICAP/MS		20	20.6	ug/L	103	(50-150)		
	Aluminum Total ICAP/MS	38	100	150	ug/L	111	(70-130)		
					-		-		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

MB2_07906230507 Auminum Total ICAPMIS ND 100 128 upL 118 (70-130) 20 0.97 MSD_2010623028 Aluminum Total ICAPMIS ND 100 120 ugL 114 (70-130) 20 0.97 MSD_2010623026 Aluminum Total ICAPMIS ND 100 120 ugL 114 (70-130) 20 0.8 LCS1 Antimony Total ICAPMIS 50 47.7 ugL 95 (85-115) 20 0.0 MBL/ Antimony Total ICAPMIS ND 50 53.2 ugL 96 (50-150) MS2_20190628026 Antimony Total ICAPMIS ND 50 52.9 ugL 106 (70-130) 20 0.7.3 MSD_20190628026 Antimony Total ICAPMIS ND 50 52.4 ugL 105 (70-130) 20 0.7.3 MSD_20190628027 Arsenic Total ICAPMIS ND 50 52.7 ugL 105 (515) 1.1 1.1 1.10 (QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD2_20190523057Aluminum Total ICAP/MSND100100101101110(70-130)203.8LCS1Antimory Total ICAP/MS5047.7ugL95(85-115)200.0MBLAntimory Total ICAP/MS10.85ugL96(60-15)1100MS2_0100220027Antimory Total ICAP/MSND505.22ugL106(70-130)200.73MS2_0100220057Antimory Total ICAP/MSND505.26ugL107(70-130)200.73MS2_0100220207Antimory Total ICAP/MSND505.28ugL106(70-130)200.73MS2_0100220207Antimory Total ICAP/MSND505.28ugL108(80-15)200.19LCS1Asenic Total ICAP/MSND505.27ugL108(80-15)200.19MS2_0100220220Asenic Total ICAP/MSND505.29ugL110(60-15)100.22LCS2Asenic Total ICAP/MSND505.23ugL110(60-16)10.200.22MS2_0100220202Asenic Total ICAP/MSND505.3ugL110(60-16)100.22MS2_0100220205Asenic Total ICAP/MSND505.3ugL110(60-16)100.22MS2_0100220205Asenic Total ICAP/MSND505.3ugL110	MS2_201905230507	Aluminum Total ICAP/MS	ND	100	125	ug/L	118	(70-130)		
LGRAntimony Total ICAPMS5047.7ugl96(85-15)200.0LGS2Antimony Total ICAPMS5.5ugl98(50-15)MRLAntimony Total ICAPMSND5052.9ugl16(70-130)MS2.20190523020Antimony Total ICAPMSND5052.9ugl166(70-130)MS2.20190523027Antimony Total ICAPMSND5052.8ugl165(70-130)200.73MS2.20190523027Antimony Total ICAPMSND5052.8ugl165(85-15)-0MS2.20190523037Antimony Total ICAPMSND5052.8ugl165(85-15)00.19LGS1Assenic Total ICAPMSND5052.8ugl165(85-15)00.19MS2.0190523037Assenic Total ICAPMSND5052.8ugl119(70-130)200.22MS2.0190523057Assenic Total ICAPMSND5062.9ugl119(70-130)200.22MS2.0190523057Assenic Total ICAPMSND5062.9ugl119(70-130)200.22MS2.0190523057Assenic Total ICAPMSND5062.9ugl119(70-130)200.22MS2.0190523057Assenic Total ICAPMSND5062.9ugl119(70-130)200.22MS2.0190523057 <td>MSD_201906260226</td> <td>Aluminum Total ICAP/MS</td> <td>38</td> <td>100</td> <td>151</td> <td>ug/L</td> <td>112</td> <td>(70-130)</td> <td>20</td> <td>0.97</td>	MSD_201906260226	Aluminum Total ICAP/MS	38	100	151	ug/L	112	(70-130)	20	0.97
LGS2Antimony Total ICAPMS6047.7ugl.95.(85-11)200.0MRL, CHAntimony Total ICAPMS100.8190.1	MSD2_201905230507	Aluminum Total ICAP/MS	ND	100	120	ug/L	114	(70-130)	20	3.8
MBLK Antimony Total ICAPIMS i 0.56 ugl. 99 60-150 MRL_CHK Antimony Total ICAPIMS 1 0.865 ugl. 99 (70-130) 1 MS2_201905280236 Antimony Total ICAPIMS ND 50 52.9 ugl. 106 (70-130) 20 0.73 MSD_201905280236 Antimony Total ICAPIMS ND 50 52.8 ugl. 107 (70-130) 20 0.73 MSD_201905280236 Antimony Total ICAPIMS ND 50 52.8 ugl. 105 (70-130) 20 0.19 MSD_201905280257 Ansenic Total ICAPIMS ND 50 52.7 ugl. 105 (85-15) 20 0.19 MELK Assenic Total ICAPIMS ND 50 52.7 ugl. 124 (70-130) 20 0.19 MSL_20190520026 Assenic Total ICAPIMS ND 50 52.5 ugl. 124 (70-130) 20 0.24 MSL_20190520027 Assenic Total ICAPIMS ND 50 53.3 ugl. 131 0.10 0.	LCS1	Antimony Total ICAP/MS		50	47.7	ug/L	96	(85-115)		
NRL_CHKAntimony Total ICAPIMS10.985ugL99(60-150)MS_20190628028Antimony Total ICAPIMSND505.2.2ugL106(70-130)MSD_20190628027Antimony Total ICAPIMSND505.2.3ugL105(70-130)200.7.3MSD_20190628027Antimony Total ICAPIMSND505.2.3ugL105(70-130)201.1LCS1Arsenic Total ICAPIMSND505.2.3ugL105(85-115)200.1LCS2Arsenic Total ICAPIMSND505.2.3ugL106(85-115)200.1MSL_20190628027Arsenic Total ICAPIMSND505.2.3ugL110(85-115)200.1MSL_20190628028Arsenic Total ICAPIMSND505.2.3ugL110(61-15)11MSL_20190628027Arsenic Total ICAPIMSND505.5.3ugL119(70-130)200.22MSL_20190528057Arsenic Total ICAPIMSND505.3.3ugL119(70-130)200.24MSL_20190528057Arsenic Total ICAPIMSND505.3.3ugL119(70-130)202.4MSL_20190528057Arsenic Total ICAPIMSND505.4.5ugL110(85-115)202.4MSL_20190528057Barium Total ICAPIMSI505.4.5ugL110(70-130)202.4 <td< td=""><td>LCS2</td><td>Antimony Total ICAP/MS</td><td></td><td>50</td><td>47.7</td><td>ug/L</td><td>95</td><td>(85-115)</td><td>20</td><td>0.0</td></td<>	LCS2	Antimony Total ICAP/MS		50	47.7	ug/L	95	(85-115)	20	0.0
MS_201906280228Antimony Total ICAPIMSND5053.2ugit.106(70-130).MS2_01905230577Antimony Total ICAPIMSND5052.9ugit.106(70-130)200.73MSD2_0190523057Antimony Total ICAPIMSND5052.8ugit.107(70-130)200.11LCS1Arsenic Total ICAPIMSND5052.8ugit.108(85-115)200.11LCS2Arsenic Total ICAPIMSND5052.8ugit.108(85-115)200.12MRLArsenic Total ICAPIMSND5062.8ugit.108(60-150)11MS_201906280261Arsenic Total ICAPIMSND5062.8ugit.109(70-130)200.22MSD_201906280262Arsenic Total ICAPIMSND5062.8ugit.119(70-130)200.22MSD_201905230507Arsenic Total ICAPIMSND5063.3ugit.119(70-130)200.22MSD_201905230507Arsenic Total ICAPIMSND5063.3ugit.119(70-130)200.32LCS1Barium Total ICAPIMSND5063.3ugit.119(70-130)200.32MSD_20190523057Barium Total ICAPIMSND5051.5ugit.101(60-15)202.0MS2_0190523057Barium Total ICAPIMSND5055.4ugit.109 <t< td=""><td>MBLK</td><td>Antimony Total ICAP/MS</td><td></td><td></td><td><0.5</td><td>ug/L</td><td></td><td></td><td></td><td></td></t<>	MBLK	Antimony Total ICAP/MS			<0.5	ug/L				
MS2_201905230507 Antimony Total ICAP/MS ND 50 52,9 ugl 106 (70-130) 20 0.73 MSD_201906280226 Antimony Total ICAP/MS ND 50 52.8 ugl 105 (70-130) 20 0.73 MSD_20190628057 Antimony Total ICAP/MS 50 52.8 ugl 105 (85-115) 20 0.19 LCS1 Arsenic Total ICAP/MS 50 52.7 ugl 105 (85-115) 20 0.19 MBL Arsenic Total ICAP/MS 1 1.00 ugl 10 (50-15) 2 1 1.00 ugl 10 (50-15) 2 1 1.00 101 (50-15) 2 1 1.00 101 (50-15) 1 1.00	MRL_CHK	Antimony Total ICAP/MS		1	0.985	ug/L	99	(50-150)		
MSD_20190829022Antimony Total ICAP/MSNDSDS3.8ugl107(70-130)200.73MSD_20190823050Antimony Total ICAP/MSNDS0S2.8ugl105(70-130)201.1LGS1Arsenic Total ICAP/MSS0S2.8ugl105(85-115)MSL_20190823057Arsenic Total ICAP/MS11.0ugl100(50-150) <td< td=""><td>MS_201906260226</td><td>Antimony Total ICAP/MS</td><td>ND</td><td>50</td><td>53.2</td><td>ug/L</td><td>106</td><td>(70-130)</td><td></td><td></td></td<>	MS_201906260226	Antimony Total ICAP/MS	ND	50	53.2	ug/L	106	(70-130)		
MND 201905230507 Antimony Total ICAP/MS ND 50 52.3 ug/L 105 (70.130) 20 1.1 LCS1 Arsenic Total ICAP/MS 50 52.8 ug/L 106 (86.115) 20 0.19 LCS2 Arsenic Total ICAP/MS 50 52.7 ug/L 100 (85.115) 20 0.19 MRL_CHK Arsenic Total ICAP/MS 1 1 100 ug/L 124 (70.130) 20 0.22 MSL_201905230507 Arsenic Total ICAP/MS ND 50 62.8 ug/L 19 (70.130) 20 0.22 MSD_201905230507 Arsenic Total ICAP/MS ND 50 62.9 ug/L 19 (70.130) 20 0.22 MSD_201905230507 Arsenic Total ICAP/MS ND 50 63.3 ug/L 19 (70.130) 20 2.4 MSD_20190526026 Barium Total ICAP/MS 2 1.4 ug/L 19 (70.130) 20 2.4	MS2_201905230507	Antimony Total ICAP/MS	ND	50	52.9	ug/L	106	(70-130)		
LCS1 Arsenic Total ICAP/MS 50 52.8 ug/L 106 (85-115) 20 0.19 LCS2 Arsenic Total ICAP/MS 50 52.7 ug/L 105 (85-115) 20 0.19 MBL<	MSD_201906260226	Antimony Total ICAP/MS	ND	50	53.6	ug/L	107	(70-130)	20	0.73
LCS2Arsenic Total ICAP/MS5052.7ugl.10(85.115)200.19MBLKArsenic Total ICAP/MS	MSD2_201905230507	Antimony Total ICAP/MS	ND	50	52.3	ug/L	105	(70-130)	20	1.1
MELKArsenic Total ICAP/MS<	LCS1	Arsenic Total ICAP/MS		50	52.8	ug/L	106	(85-115)		
MRL_CHKArsenic Total ICAP/MS11.0ug/L10(50-15)MS_20190620226Arsenic Total ICAP/MSND5062.8ug/L124(70-130)MS2_20190523050Arsenic Total ICAP/MSND5059.5ug/L119(70-130)200.22MSD_20190620226Arsenic Total ICAP/MSND5059.3ug/L101(85-115)200.22MSD_20190523050Arsenic Total ICAP/MS5050.3ug/L101(85-115)202.4LCS1Barium Total ICAP/MS5051.5ug/L103(85-115)202.4MSL_CHKBarium Total ICAP/MS21.94ug/L97(51-15)2.4MS2_20190520507Barium Total ICAP/MS121.94ug/L112(70-130)2.02.9MS2_20190520507Barium Total ICAP/MS121.84ug/L112(70-130)2.02.9MS2_20190520507Barium Total ICAP/MSND5057.4ug/L114(70-130)2.02.9LCS1Barium Total ICAP/MSND5055.4ug/L102(61-15)2.92.9LCS1Barium Total ICAP/MSND5055.4ug/L112(70-130)2.02.9LCS1Barium Total ICAP/MSND5055.4ug/L112(70-130)2.92.9LCS1Barium Total ICAP/MSND5052.4ug/L112(LCS2	Arsenic Total ICAP/MS		50	52.7	ug/L	105	(85-115)	20	0.19
M2 Olymotical ICAP/MS ND 50 62.8 ug/L 124 (70-130) MS2_201905230507 Arsenic Total ICAP/MS ND 50 59.5 ug/L 119 (70-130) 20 0.22 MSD_20190628026 Arsenic Total ICAP/MS ND 50 59.3 ug/L 119 (70-130) 20 0.22 MSD_20190628026 Arsenic Total ICAP/MS ND 50 50.3 ug/L 119 (70-130) 20 0.22 MSD_20190628026 Barium Total ICAP/MS ND 50 50.3 ug/L 119 (70-130) 20 2.4 MRL Barium Total ICAP/MS 50 51.3 ug/L 101 (85-115) 20 2.4 MRL Barium Total ICAP/MS 2 1.94 ug/L 109 (70-130) 20 2.4 MS2_201905230507 Barium Total ICAP/MS 116 ug/L 112 (70-130) 20 2.0 MS2_201905230507 Barium Total ICAP/MS ND	MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MS2_20190523050Arsenic Total ICAP/MSND5059.5ug/L19(70-130)200.22MSD_20190626023Arsenic Total ICAP/MSND5059.3ug/L119(70-130)200.34LCS1Barium Total ICAP/MSND5050.3ug/L110(85-115)202.4LCS2Barium Total ICAP/MS10ug/L101(85-115)202.4MRL_CHKBarium Total ICAP/MS10ug/L103(85-115)202.4MS_20190626026Barium Total ICAP/MS1001(85-115)202.4MS_20190626026Barium Total ICAP/MS11101102(70-130)202.4MS_20190626026Barium Total ICAP/MS10114101(70-130)202.0MS2_0190626026Barium Total ICAP/MSND5055.4ug/L114(70-130)202.9LCS1Barium Total ICAP/MSND2525.2ug/L101(85-115)201.6MS2_0190626026Barium Total ICAP/MSI10.964ug/L102(85-115)202.9LCS1Baryllim Total ICAP/MSI10.964ug/L114(70-130)202.9LCS1Baryllim Total ICAP/MSI10.964ug/L116(70-130)1.6MS_20190626026Baryllim Total ICAP/MSND25 <td< td=""><td>MRL_CHK</td><td>Arsenic Total ICAP/MS</td><td></td><td>1</td><td>1.10</td><td>ug/L</td><td>110</td><td>(50-150)</td><td></td><td></td></td<>	MRL_CHK	Arsenic Total ICAP/MS		1	1.10	ug/L	110	(50-150)		
NSD_201906260261Arsenic Total ICAP/MSND5062.9ug/L125(70.130)200.22MSD2_20190523057Arsenic Total ICAP/MSND5053.3ug/L119(70.130)200.34LCS1Barium Total ICAP/MS505.33ug/L101(85-115)202.4LCS2Barium Total ICAP/MS505.15ug/L103(85-115)202.4MRLBarium Total ICAP/MS71(97-130)202.4MS_201906260226Barium Total ICAP/MS21.94ug/L101(85-115)202.4MS_201906260226Barium Total ICAP/MS10501.64ug/L101(70-130)202.0MS_20190626026Barium Total ICAP/MSND5055.4ug/L104(70-130)202.0MSD_201906260276Barium Total ICAP/MS12525.6ug/L101(85-115)202.0LCS1Beryllium Total ICAP/MS12525.6ug/L101(85-115)201.6MSL_20190626026Beryllium Total ICAP/MS19.64ug/L161(70-130)202.9LCS1Beryllium Total ICAP/MS19.64ug/L162(85-115)1.6MSL_20190626026Beryllium Total ICAP/MS19.64ug/L161(70-130)1.6MSL_20190626026Beryllium Total ICAP/MS1252.83ug/L </td <td>MS_201906260226</td> <td>Arsenic Total ICAP/MS</td> <td>ND</td> <td>50</td> <td>62.8</td> <td>ug/L</td> <td>124</td> <td>(70-130)</td> <td></td> <td></td>	MS_201906260226	Arsenic Total ICAP/MS	ND	50	62.8	ug/L	124	(70-130)		
NDD_201905230507 Arsenic Total ICAP/MS ND 50 59.3 ug/L 119 (70.130) 20 0.34 LCS1 Barium Total ICAP/MS 50 50.3 ug/L 101 (85.115) 20 2.4 LCS2 Barium Total ICAP/MS 50 51.5 ug/L 103 (85.115) 20 2.4 MBLK Barium Total ICAP/MS 2 1.94 ug/L 97 (50-150) 50 50 50.5 1.16 ug/L 109 (70.130) 20 2.4 MSL_201906260226 Barium Total ICAP/MS 61 50 116 ug/L 109 (70.130) 20 2.0 MS2_20190523057 Barium Total ICAP/MS 61 50 51.5 ug/L 112 (70.130) 20 2.0 MS2_20190523057 Barium Total ICAP/MS ND 50 55.4 ug/L 109 (70.130) 20 2.0 LCS1 Beryllium Total ICAP/MS ND 50 55.4 ug/L 102 (85.115) 20 1.6 MSL_20190523057 Ber	MS2_201905230507	Arsenic Total ICAP/MS	ND	50	59.5	ug/L	119	(70-130)		
L Barium Total ICAP/MS 50 50.3 u/L 101 (86-11) LCS2 Barium Total ICAP/MS 50 51.5 u/L 103 (85-115) 20 2.4 MBLK Barium Total ICAP/MS	MSD_201906260226	Arsenic Total ICAP/MS	ND	50	62.9	ug/L	125	(70-130)	20	0.22
LCS2 Baium Total ICAP/MS 50 51.5 ug/L 103 (85-15) 20 2.4 MBLK Baium Total ICAP/MS -1 ug/L 97 (50-150) -1 -1 MR_CHK Baium Total ICAP/MS 2 1.94 ug/L 97 (50-150) -1	MSD2_201905230507	Arsenic Total ICAP/MS	ND	50	59.3	ug/L	119	(70-130)	20	0.34
MBLK Barium Total ICAP/MS < 1 ug/L 97 (50-150) MRL_CHK Barium Total ICAP/MS 2 1.94 ug/L 97 (50-150) MS_201906260226 Barium Total ICAP/MS 61 50 116 ug/L 199 (70-130) MS2_20190523057 Barium Total ICAP/MS ND 50 57.0 ug/L 114 (70-130) 20 2.0 MSD_20190523057 Barium Total ICAP/MS 61 50 118 ug/L 109 (70-130) 20 2.0 MSD_20190523057 Barium Total ICAP/MS 61 50 18 ug/L 109 (70-130) 20 2.0 MSD_201905230507 Barium Total ICAP/MS ND 50 55.4 ug/L 102 (85-115) 20 1.6 MSLK Beryllium Total ICAP/MS 25 25.6 ug/L 113 (70-130) 20 1.6 MSL Beryllium Total ICAP/MS ND 25 28.1 ug/L 113 <	LCS1	Barium Total ICAP/MS		50	50.3	ug/L	101	(85-115)		
NRL_CHKBaiun Total ICAP/MS21.94ug/L97(50.150)MS_2019052026Baiun Total ICAP/MS6150116ug/L109(70.130)202.0MSD_20190520507Baiun Total ICAP/MS615057.0ug/L114(70.130)202.0MSD_20190520507Baiun Total ICAP/MS615054.4ug/L109(70.130)202.0LCS1Baiun Total ICAP/MSND5054.4ug/L102(85.115)2.02.0LCS2Baiun Total ICAP/MS.2525.2ug/L102(85.115).1.6MSL_CHKBaiun Total ICAP/MS3.6ug/L113(70.130)2.01.6MSL_CHKBaiun Total ICAP/MS1.00.964ug/L96(50.150)MS_2019052050Baiun Total ICAP/MSND2528.3ug/L114(70.130)2.0MS_20190520505Baiun Total ICAP/MSND2528.6ug/L114(70.130)2.0MSD_20190520505Baiun Total ICAP/MSND2528.6ug/L114(70.130)2.0MSD_20190520505Baiun Total ICAP/MSND2528.1ug/L114(70.130)2.0MSD_20190520505Baiun Total ICAP/MSND2528.1ug/L114(70.130)	LCS2	Barium Total ICAP/MS		50	51.5	ug/L	103	(85-115)	20	2.4
NS_201906260226Barium Total ICAP/MS6150116ug/L109(70-130)MS2_201905230507Barium Total ICAP/MSND5057.0ug/L112(70-130)202.0MSD_201906260226Barium Total ICAP/MSND5055.4ug/L109(70-130)202.9LCS1Berylium Total ICAP/MSND5055.4ug/L102(85-115)LCS2Berylium Total ICAP/MS.2525.2ug/L101(85-115)MRL_CHKBerylium Total ICAP/MS	MBLK	Barium Total ICAP/MS			<1	ug/L				
MS2_201905230507 Barium Total ICAP/MS ND 50 57.0 ug/L 112 (70-130) MSD_201906260226 Barium Total ICAP/MS 61 50 118 ug/L 114 (70-130) 20 2.0 MSD_201905230507 Barium Total ICAP/MS ND 50 55.4 ug/L 109 (70-130) 20 2.9 LCS1 Beryllium Total ICAP/MS Z5 25.6 ug/L 102 (85-115) 20 1.6 MSLK Beryllium Total ICAP/MS Z5 25.2 ug/L 101 (85-115) 20 1.6 MSL Beryllium Total ICAP/MS Z5 25.2 ug/L 101 (85-115) 20 1.6 MSL Beryllium Total ICAP/MS Z5 25.2 ug/L 101 (85-115) 20 1.6 MS_20190520507 Beryllium Total ICAP/MS I 0.964 ug/L 113 (70-130) 20 0.91 MS_201905230507 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91	MRL_CHK	Barium Total ICAP/MS		2	1.94	ug/L	97	(50-150)		
MSD_201906260226 Barium Total ICAP/MS 61 50 118 ug/L 114 (70-130) 20 2.0 MSD2_201905230507 Barium Total ICAP/MS ND 50 55.4 ug/L 109 (70-130) 20 2.9 LCS1 Beryllium Total ICAP/MS 25 25.6 ug/L 102 (85-115) 20 1.6 LCS2 Beryllium Total ICAP/MS 25 25.2 ug/L 101 (85-115) 20 1.6 MBLK Beryllium Total ICAP/MS 25 25.2 ug/L 101 (50-150) 1.6 MS_201906260226 Beryllium Total ICAP/MS 1 0.964 ug/L 96 (50-150) 1.4 MS_201906260226 Beryllium Total ICAP/MS ND 25 28.3 ug/L 113 (70-130) 20 0.91 MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20	MS_201906260226	Barium Total ICAP/MS	61	50	116	ug/L	109	(70-130)		
MSD2_201905230507 Barium Total ICAP/MS ND 50 55.4 ug/L 109 (70-130) 20 2.9 LCS1 Beryllium Total ICAP/MS 25 25.6 ug/L 102 (85-115) 20 1.6 LCS2 Beryllium Total ICAP/MS 25 25.2 ug/L 101 (85-115) 20 1.6 MBLK Beryllium Total ICAP/MS 1 0.964 ug/L 96 (50-150) 20 .5 MS_201906260226 Beryllium Total ICAP/MS ND 25 28.3 ug/L 113 (70-130) 20 0.91 MS_201906260226 Beryllium Total ICAP/MS ND 25 28.3 ug/L 113 (70-130) 20 0.91 MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD2_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD2_201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L	MS2_201905230507	Barium Total ICAP/MS	ND	50	57.0	ug/L	112	(70-130)		
LCS1 Beryllium Total ICAP/MS 25 25.6 ug/L 102 (85-115) 20 1.6 LCS2 Beryllium Total ICAP/MS 25 25.2 ug/L 101 (85-115) 20 1.6 MBLK Beryllium Total ICAP/MS 25.2 ug/L 101 (85-115) 20 1.6 MBLK Beryllium Total ICAP/MS 1 0.964 ug/L 96 (50-150) 20 1.6 MS_201906260226 Beryllium Total ICAP/MS ND 25 28.3 ug/L 113 (70-130) 20 0.91 MS2_201905230507 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.16 ug/L 112 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 25.7 ug/L 103 (85-115)	MSD_201906260226	Barium Total ICAP/MS	61	50	118	ug/L	114	(70-130)	20	2.0
LCS2 Beryllium Total ICAP/MS 25 25.2 ug/L 101 (85-115) 20 1.6 MBLK Beryllium Total ICAP/MS <0.5 ug/L <0.5 ug/L <0.5 1.6 MRL_CHK Beryllium Total ICAP/MS 1 0.964 ug/L 96 (50-150) <0.5 <0.5 MS_201906260226 Beryllium Total ICAP/MS ND 25 28.3 ug/L 113 (70-130) <0.5 <0.5 MS2_201905230507 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 25.7 ug/L 103 (85-115) 20 3.1 LCS1 Cadmium Total ICAP/MS 25 25.5 ug/L 102 (85-115) <td>MSD2_201905230507</td> <td>Barium Total ICAP/MS</td> <td>ND</td> <td>50</td> <td>55.4</td> <td>ug/L</td> <td>109</td> <td>(70-130)</td> <td>20</td> <td>2.9</td>	MSD2_201905230507	Barium Total ICAP/MS	ND	50	55.4	ug/L	109	(70-130)	20	2.9
MBLK Beryllium Total ICAP/MS <0.5 ug/L MRL_CHK Beryllium Total ICAP/MS 1 0.964 ug/L 96 (50-150) MS_201906260226 Beryllium Total ICAP/MS ND 25 28.3 ug/L 113 (70-130) MS2_201905230507 Beryllium Total ICAP/MS ND 25 29.0 ug/L 116 (70-130) 20 0.91 MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 0.91 MSD_2.201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 3.1 LCS1 Cadmium Total ICAP/MS 25 25.7 ug/L 103 (85-115) 20 0.78	LCS1	Beryllium Total ICAP/MS		25	25.6	ug/L	102	(85-115)		
MRL_CHK Beryllium Total ICAP/MS 1 0.964 ug/L 96 (50-150) MS_201906260226 Beryllium Total ICAP/MS ND 25 28.3 ug/L 113 (70-130) MS2_201905230507 Beryllium Total ICAP/MS ND 25 29.0 ug/L 116 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 25.7 ug/L 103 (85-115) - - - LCS1 Cadmium Total ICAP/MS 25 25.5 ug/L 102 (85-115) 20 0.78	LCS2	Beryllium Total ICAP/MS		25	25.2	ug/L	101	(85-115)	20	1.6
MS_201906260226 Beryllium Total ICAP/MS ND 25 28.3 ug/L 113 (70-130) MS2_201905230507 Beryllium Total ICAP/MS ND 25 29.0 ug/L 116 (70-130) 20 0.91 MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 3.1 LCS1 Cadmium Total ICAP/MS 25 25.7 ug/L 103 (85-115) 20 0.78 LCS2 Cadmium Total ICAP/MS 25 25.5 ug/L 102 (85-115) 20 0.78	MBLK	Beryllium Total ICAP/MS			<0.5	ug/L				
MS2_201905230507 Beryllium Total ICAP/MS ND 25 29.0 ug/L 116 (70-130) MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 3.1 LCS1 Cadmium Total ICAP/MS 25 25.7 ug/L 103 (85-115) 20 0.78 LCS2 Cadmium Total ICAP/MS 25 25.5 ug/L 102 (85-115) 20 0.78	MRL_CHK	Beryllium Total ICAP/MS		1	0.964	ug/L	96	(50-150)		
MSD_201906260226 Beryllium Total ICAP/MS ND 25 28.6 ug/L 114 (70-130) 20 0.91 MSD_201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 3.1 LCS1 Cadmium Total ICAP/MS 25 25.7 ug/L 103 (85-115) - LCS2 Cadmium Total ICAP/MS 25 25.5 ug/L 102 (85-115) 20 0.78	MS_201906260226	Beryllium Total ICAP/MS	ND	25	28.3	ug/L	113	(70-130)		
MSD2_201905230507 Beryllium Total ICAP/MS ND 25 28.1 ug/L 112 (70-130) 20 3.1 LCS1 Cadmium Total ICAP/MS 25 25.7 ug/L 103 (85-115) 20 0.78 LCS2 Cadmium Total ICAP/MS 25 25.5 ug/L 102 (85-115) 20 0.78	MS2_201905230507	Beryllium Total ICAP/MS	ND	25	29.0	ug/L	116	(70-130)		
LCS1 Cadmium Total ICAP/MS 25 25.7 ug/L 103 (85-115) LCS2 Cadmium Total ICAP/MS 25 25.5 ug/L 102 (85-115) 20 0.78	MSD_201906260226	Beryllium Total ICAP/MS	ND	25	28.6	ug/L	114	(70-130)	20	0.91
LCS2 Cadmium Total ICAP/MS 25 25.5 ug/L 102 (85-115) 20 0.78	MSD2_201905230507	Beryllium Total ICAP/MS	ND	25	28.1	ug/L	112	(70-130)	20	3.1
	LCS1	Cadmium Total ICAP/MS		25	25.7	ug/L	103	(85-115)		
MBLK Cadmium Total ICAP/MS <0.25 ug/L	LCS2	Cadmium Total ICAP/MS		25	25.5	ug/L	102	(85-115)	20	0.78
	MBLK	Cadmium Total ICAP/MS			<0.25	ug/L				

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Tel: (626) 386-1100

Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Cadmium Total ICAP/MS		0.5	0.464	ug/L	93	(50-150)		
MS_201906260226	Cadmium Total ICAP/MS	ND	25	27.0	ug/L	108	(70-130)		
MS2_201905230507	Cadmium Total ICAP/MS	ND	25	28.7	ug/L	115	(70-130)		
MSD_201906260226	Cadmium Total ICAP/MS	ND	25	27.3	ug/L	109	(70-130)	20	1.0
MSD2_201905230507	Cadmium Total ICAP/MS	ND	25	28.5	ug/L	114	(70-130)	20	0.86
LCS1	Chromium Total ICAP/MS		50	52.4	ug/L	105	(85-115)		
LCS2	Chromium Total ICAP/MS		50	52.7	ug/L	105	(85-115)	20	0.57
MBLK	Chromium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Chromium Total ICAP/MS		1	1.00	ug/L	100	(50-150)		
MS_201906260226	Chromium Total ICAP/MS	ND	50	55.4	ug/L	111	(70-130)		
MS2_201905230507	Chromium Total ICAP/MS	ND	50	56.6	ug/L	113	(70-130)		
MSD_201906260226	Chromium Total ICAP/MS	ND	50	55.6	ug/L	111	(70-130)	20	0.30
MSD2_201905230507	Chromium Total ICAP/MS	ND	50	55.7	ug/L	111	(70-130)	20	1.6
LCS1	Copper Total ICAP/MS		50	51.9	ug/L	104	(85-115)		
LCS2	Copper Total ICAP/MS		50	52.4	ug/L	105	(85-115)	20	0.96
MBLK	Copper Total ICAP/MS			<1	ug/L				
MRL_CHK	Copper Total ICAP/MS		2	2.05	ug/L	103	(50-150)		
MS_201906260226	Copper Total ICAP/MS	ND	50	54.2	ug/L	107	(70-130)		
MS2_201905230507	Copper Total ICAP/MS	ND	50	56.2	ug/L	112	(70-130)		
MSD_201906260226	Copper Total ICAP/MS	ND	50	54.2	ug/L	107	(70-130)	20	0.026
MSD2_201905230507	Copper Total ICAP/MS	ND	50	55.8	ug/L	111	(70-130)	20	0.77
LCS1	Lead Total ICAP/MS		50	52.4	ug/L	105	(85-115)		
LCS2	Lead Total ICAP/MS		50	52.1	ug/L	104	(85-115)	20	0.57
MBLK	Lead Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Lead Total ICAP/MS		0.5	0.519	ug/L	104	(50-150)		
MS_201906260226	Lead Total ICAP/MS	ND	50	55.1	ug/L	110	(70-130)		
MS2_201905230507	Lead Total ICAP/MS	ND	50	57.1	ug/L	114	(70-130)		
MSD_201906260226	Lead Total ICAP/MS	ND	50	55.2	ug/L	110	(70-130)	20	0.15
MSD2_201905230507	Lead Total ICAP/MS	ND	50	56.4	ug/L	113	(70-130)	20	1.3
LCS1	Manganese Total ICAP/MS		100	108	ug/L	108	(85-115)		
LCS2	Manganese Total ICAP/MS		100	108	ug/L	108	(85-115)	20	0.0
MBLK	Manganese Total ICAP/MS			<1	ug/L				
MRL_CHK	Manganese Total ICAP/MS		2	2.14	ug/L	107	(50-150)		
MS_201906260226	Manganese Total ICAP/MS	ND	100	113	ug/L	113	(70-130)		
MS2_201905230507	Manganese Total ICAP/MS	ND	100	116	ug/L	116	(70-130)		
MSD_201906260226	Manganese Total ICAP/MS	ND	100	115	ug/L	115	(70-130)	20	1.6
MSD2_201905230507	Manganese Total ICAP/MS	ND	100	113	ug/L	113	(70-130)	20	2.5
LCS1	Nickel Total ICAP/MS		50	52.0	ug/L	104	(85-115)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	Nickel Total ICAP/MS		50	52.9	ug/L	106	(85-115)	20	1.7
MBLK	Nickel Total ICAP/MS			<2.5	ug/L				
MRL_CHK	Nickel Total ICAP/MS		5	5.12	ug/L	102	(50-150)		
MS_201906260226	Nickel Total ICAP/MS	ND	50	54.8	ug/L	107	(70-130)		
MS2_201905230507	Nickel Total ICAP/MS	ND	50	56.0	ug/L	111	(70-130)		
MSD_201906260226	Nickel Total ICAP/MS	ND	50	54.7	ug/L	106	(70-130)	20	0.21
MSD2_201905230507	Nickel Total ICAP/MS	ND	50	54.9	ug/L	109	(70-130)	20	1.9
LCS1	Selenium Total ICAP/MS		50	52.7	ug/L	105	(85-115)		
LCS2	Selenium Total ICAP/MS		50	52.4	ug/L	105	(85-115)	20	0.57
MBLK	Selenium Total ICAP/MS			<2.5	ug/L				
MRL_CHK	Selenium Total ICAP/MS		5	5.25	ug/L	105	(50-150)		
MS2_201905230507	Selenium Total ICAP/MS	ND	50	64.8	ug/L	130	(70-130)		
MSD2_201905230507	Selenium Total ICAP/MS	ND	50	65.3	ug/L	<u>131</u>	(70-130)	20	0.77
LCS1	Silver Total ICAP/MS		25	24.0	ug/L	96	(85-115)		
LCS2	Silver Total ICAP/MS		25	24.1	ug/L	96	(85-115)	20	0.0
MBLK	Silver Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Silver Total ICAP/MS		0.5	0.471	ug/L	94	(50-150)		
MS_201906260226	Silver Total ICAP/MS	ND	25	24.9	ug/L	99	(70-130)		
MS2_201905230507	Silver Total ICAP/MS	ND	25	25.6	ug/L	102	(70-130)		
MSD_201906260226	Silver Total ICAP/MS	ND	25	25.0	ug/L	100	(70-130)	20	0.40
MSD2_201905230507	Silver Total ICAP/MS	ND	25	25.5	ug/L	102	(70-130)	20	0.57
LCS1	Thallium Total ICAP/MS		50	52.4	ug/L	105	(85-115)		
LCS2	Thallium Total ICAP/MS		50	52.5	ug/L	105	(85-115)	20	0.19
MBLK	Thallium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Thallium Total ICAP/MS		1	1.04	ug/L	105	(50-150)		
MS_201906260226	Thallium Total ICAP/MS	ND	50	55.8	ug/L	112	(70-130)		
MS2_201905230507	Thallium Total ICAP/MS	ND	50	56.8	ug/L	114	(70-130)		
MSD_201906260226	Thallium Total ICAP/MS	ND	50	56.0	ug/L	112	(70-130)	20	0.28
MSD2_201905230507	Thallium Total ICAP/MS	ND	50	56.4	ug/L	113	(70-130)	20	0.63
LCS1	Uranium ICAP/MS		50	51.9	ug/L	104	(85-115)		
LCS2	Uranium ICAP/MS		50	53.6	ug/L	107	(85-115)	20	3.2
MBLK	Uranium ICAP/MS			<0.5	ug/L				
MRL_CHK	Uranium ICAP/MS		1	1.01	ug/L	101	(50-150)		
MS_201906260226	Uranium ICAP/MS	1.9	50	62.3	ug/L	121	(70-130)		
MS2_201905230507	Uranium ICAP/MS	ND	50	59.3	ug/L	119	(70-130)		
MSD_201906260226	Uranium ICAP/MS	1.9	50	62.6	ug/L	122	(70-130)	20	0.54
MSD2_201905230507	Uranium ICAP/MS	ND	50	59.3	ug/L	119	(70-130)	20	0.029
LCS1	Vanadium Total ICAP/MS		50	52.3	ug/L	105	(85-115)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

Report: 806101 Project: SPECIAL Group: desal pilot

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
_CS2	Vanadium Total ICAP/MS		50	52.6	ug/L	105	(85-115)	20	0.57
MBLK	Vanadium Total ICAP/MS			<1.5	ug/L				
MRL_CHK	Vanadium Total ICAP/MS		3	3.09	ug/L	103	(50-150)		
MS_201906260226	Vanadium Total ICAP/MS	ND	50	60.7	ug/L	117	(70-130)		
MS2_201905230507	Vanadium Total ICAP/MS	ND	50	58.9	ug/L	117	(70-130)		
MSD_201906260226	Vanadium Total ICAP/MS	ND	50	60.4	ug/L	116	(70-130)	20	0.53
MSD2_201905230507	Vanadium Total ICAP/MS	ND	50	57.8	ug/L	115	(70-130)	20	2.0
_CS1	Zinc Total ICAP/MS		50	52.9	ug/L	106	(85-115)		
_CS2	Zinc Total ICAP/MS		50	52.6	ug/L	105	(85-115)	20	0.57
MBLK	Zinc Total ICAP/MS			<10	ug/L				
MRL_CHK	Zinc Total ICAP/MS		20	20.4	ug/L	102	(50-150)		
MS_201906260226	Zinc Total ICAP/MS	ND	50	55.5	ug/L	109	(70-130)		
MS2_201905230507	Zinc Total ICAP/MS	ND	50	59.2	ug/L	117	(70-130)		
MSD_201906260226	Zinc Total ICAP/MS	ND	50	55.2	ug/L	109	(70-130)	20	0.31
MSD2_201905230507	Zinc Total ICAP/MS	ND	50	58.9	ug/L	116	(70-130)	20	0.56

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



July 3, 2019

Eurofins Eaton Analytical- MON 750 Royal Oaks Dr. STE 100 Monrovia, CA 91016

 CLIENT PROJECT:
 Folder # 806101, Job # 1000014, Sub COC # 99-66761

 LAB CODE:
 R190139

CEI

Dear Customer:

Enclosed are asbestos analysis results for TEM drinking water samples received at our laboratory on May 29, 2019. The samples were analyzed for asbestos using transmission electron microscopy (TEM) per the US EPA 100.2 Method.

The current EPA regulatory limit for asbestos in drinking water is 7 million fibers per liter (> 10 um in length). The analytical sensitivity for the EPA 100.2 method is 0.2 MFL.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,

Tunsas Di

Tianbao Bai, Ph.D., CIH Laboratory Director



AMENDED

CEI

ASBESTOS ANALYTICAL REPORT By: Transmission Electron Microscopy

Prepared for

Eurofins Eaton Analytical- MON

CLIENT PROJECT: Folder # 806101, Job # 1000014, Sub COC # 99-66761

LAB CODE: R190139

TEST METHOD: EPA 100.2

REPORT DATE: 06/11/19

🛟 eurofins

ASBESTOS IN DRINKING WATER ANALYSIS

By: TRANSMISSION ELECTRON MICROSCOPY

CEI

AMENDED

Client:	Eurofins Eaton Analytical- MON			Lab Code:	R190139
	750 Royal Oaks Dr. STE 100	Time Collected:	5:15 AM	Date Collected:	05-22-19
		Time Received:	9:40 AM	Date Received:	05-29-19
IV	Monrovia, CA 91016	Time Filtered:	2:30 PM	Date Filtered:	05-29-19
		Time Analyzed:		Date Analyzed:	06-04-19
		Avg Grid Opening Size:	0.01 mm ²	Date Reported:	06-11-19

Project: Folder # 806101, Job # 1000014, Sub COC # 99-66761

TEM DRINI		ATER (E	PA 100.2	2)							
Client ID Lab ID	Sample Volume Filtered	Dilution Factor	Effective Filter Area (mm ²)	# Of Grid Openings Analyzed	Total Area of Filter Examined	Analytical Sensitivity (MFL)	Asbestos Type	Cα >10 μm	oncentrati (MFL)		nce Limit Upper
20190520 0220 R00542	100	10	1064.1	54	0.54	0.197	None Detected	0	<.2	0.0	<0.73



LEGEND: MFL = million fibers per liter , > 10 um in length NSD = no asbestos structures detected ml = milliliter

CEI

CHRY = chrysotile um = micrometer

CROC = crocidolite mm = millimeter

METHOD: EPA 100.2

ANALYTICAL SENSITIVITY: 0.2 MFL

MAXIMUM CONTAMINANT LEVEL: 7 MFL

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Information provided by customer includes customer sample ID, location, volume and area as well as date and time of sampling.

For the current states of certification please refer to the website: www.EurofinsUS.com/CEI

APPROVED BY: ANALYST: mühen. Lunner Tianbao Bai, Ph.D., CIH

Laboratory Director

AMENDED due to Client Wishes to Change Specifications for Analysis - Report down to 0.2 MFL

To: Jaclyn Contreras **Subject:** 806101 - needs a <0.2 RL **Importance:** High

Jackie – this sample requires an RL of <0.2MFL, please ask the sub-lab to issue a revised report.

Thank you,

Yolanda Martin Analytical Services Manager

In observance of the Independence Day Holiday, we will be closed on Thursday, July 4, 2019. The last day to ship samples will be Tuesday, July 2nd.

Eurofins Eaton Analytical, LLC 750 Royal Oaks Drive, Suite 100 Monrovia, CA 91016 Phone: +1 626-386-1104 Mobil: +1 626-483-7376

Email: <u>YolandaMartin@EurofinsUS.com</u> Website: <u>www.EurofinsUS.com/Eaton</u>



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						REVORISA	
	🛟 eurofins	Eaton Analytical	ytical	*REPORTING REQ Report & Invoice mu	Su UIRMENTS: Do Not Combine R ist have the Folder# 806101 Joh	Submittal Form Date *REPORTING REQUIRMENTS: Do Not Combine Reports with any other samples submitted under different Folder Numbers! Report & Invoice must have the Folder # 806101 Job # 1000014	ー・ー Date: 5/28/2019 nder different Folder Numbers!
	Chin To:		1000 million and 1000 million a	Report all quality co Results must have	ntrol data according to Method. In Complete data & QC with App	Report all quality control data according to Method. Include dates analyzed. Date extracted (if extracted) and Method reference on the report. Results must have Complete data & QC with Approval Signature.	cted) and Method reference on the report.
	/0 E	CEI, Inc. aynard Road 27511		Euro	Reports: Jackie Contrera EMAIL TO: us20_su ins Eaton Analytical, LLC 750 Phone (626) 386-	Reports: Jackie Contreras Sub-Contracting Administrator EMAIL TO: us20_subcontract@eurofinsus.com Eurofins Eaton Analytical, LLC 750 Royal Oaks Drive, Suite 100, Monrovia, CA 91016 Phone (626) 386-1165 Fax (626) 386-1122	Provide in each Report the Specified State Certification # & Exp Date for requested tests + matrix. Samples from: CALIFORNIA
					Invoices to: Euro	Involces to: Eurofins Eaton Analytical, LLC	
	Phone: 919-481-1413	31-1413 Fax:					
- w	Folder #: 806101	Report Due: 06/12/2019	Sub COC#: 99-66761				
_	JLS	Use Lab Order # for ID	Client Sample ID for reference only	for reference only	Analysis Requested	Sample Date & Time Matrix PW	PWS Systemcode PWSID
I		201905200220	Tast Mall			05/22/10 0515 DW	
L		JUZZU Sam	o lest well Sample type:	Sample Event:	Facility ID:	<	Static ID: 2.5°C Are SI29
-	2.00	(Subbed)_CA cert					
	Relinquished by:	aculta	Sample Control		Time	NOTIFICATION REQUIRED IF RECEIVED OUTSIDE OF 0-6 CELSIUS	VED OUTSIDE OF 0-6 CELSIUS
	Received by:		JW.		Date 5-241 Time 9740		An Acknowledgement of Receipt is requested to attn: Jackie Contreras
	Relinquished by:	Sê	Sample Control		Date Time		
	Received by:				Date Time	1	
) pages		750 Roya	al Oaks Drive, Sui	750 Royal Oaks Drive, Suite 100, Monrovia, CA 91	Page 1 of 1 A 91016 Tel (626) 386-1100	Page 1 of 1 016 Tel (626) 386-1100 Fax (866) 988-3757 www.EurofinsUS.com/Eaton	om/Eaton



Lancaster Laboratories Environmental

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv



ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 Eurofins Eaton Analytical, Inc Suite 100 750 Royal Oaks Drive Monrovia CA 91016

Report Date: June 10, 2019 15:07

Project: 806101

Account #: 14482 Group Number: 2046310 PO Number: NA State of Sample Origin: CA

Electronic Copy To Eurofins Eaton Analytical, Inc

Attn: EEAI Reports

Respectfully Submitted,

Deur L Catt

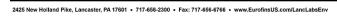
Hannah L. Cottman Project Manager

(717) 556-7383

To view our laboratory's current scopes of accreditation please go to <u>https://www.eurofinsus.com/environment-</u> testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratoriesenvironmental/. Historical copies may be requested through your project manager.



Lancaster Laboratories Environmental





SAMPLE INFORMATION

Client Sample Description	Sample Collection	ELLE#
	Date/Time	
201905200220 Potable Water	05/22/2019 05:15	1068713

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Page 2 of 9



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Project Name: 806101 ELLE Group #: 2046310

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

No additional comments are necessary.



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Sample Description:		220 Potable Water 6101 Sub PO# 99-66	3754 Job# 1000014	Ļ	Eurofins Eaton Ar ELLE Sample #: ELLE Group #:	nalytical, Inc PW 1068713 2046310
Project Name:	806101				Matrix: Potable W	
Submittal Date/Time: Collection Date/Time:	05/30/2019 05/22/2019					
CAT No. Analysis Name		CAS Number	Result	EDL*	MRL	Dilution Factor
Dioxins/Furans 12935 2378-TCDD	EPA 16	13B October 1994 1746-01-6	pg/l N.D.	pg/l 0.125	pg/l 3.92	1
Labeled Compounds 13C12-2378-TCDD	%Rec 121	Windows 25 - 164				
U Undetected J Estimated co	Method Blank	tween Estimated Detec	tion Limit and Minimur	n Reporting Leve		
	0	acondor CC column				

C Confirmed quantitation on secondary GC column

Q EMPC - Estimated Maximum Possible Concentration

F Interference is present

S Saturation of detection signal

CA ELAP Lab Certification No. 2792

=

Sample Comments

Laboratory Sample Analysis Record

			-				
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
12935	2378-TCDD in Potable Water	EPA 1613B October 1994	1	19157005	06/07/2019 08:36	Joel A Denlinger	1
10914	Dioxins/Furans in Water - SepF	EPA 1613B October 1994	1	19157005	06/06/2019 08:47	Alex L Barton	1



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Quality Control Summary

Client Name: Eurofins Eaton Analytical, Inc Reported: 06/10/2019 15:07 Group Number: 2046310

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	EDL**	MRL
	pg/l	pg/l	pg/l
Batch number: 19157005	Sample numb	per(s): 1068713	
2378-TCDD	0.123 J	0.108	4.00

OPR/OPRD

Analysis Name	OPR Spike Added pg/l	OPR Conc pg/l	OPRD Spike Added pg/l	OPRD Conc pg/l	OPR %REC	OPRD %REC	OPR/OPRD Limits	RPD	RPD Max
Batch number: 19157005 2378-TCDD	Sample number(2.00	s): 1068713 2.30			115		67-158		

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 2378-TCDD in Potable Water Batch number: 19157005 13C12-2378-TCDD 1068713 121 Blank 131 Limits: 25-164 0PR 130 Limits: 20-175

*- Outside of specification

- **-This limit was used in the evaluation of the final result for the blank
- (1) The result for one or both determinations was less than five times the MRL.
- (2) The unspiked result was more than four times the spike added.

512901 0129h=2 28hh1	*REPORTING REQUIRME *Report & Invoice must hav Report all quality control ds Results must have Comp	aster Laboratories Ind Pike 17601	Phone: 717-656-2300 Fax: J flag	Cli		Ied by Concersion Date ZS-Trime O by NoTIFICATION REQUIRED IF RECEIVED OUTSIDE OF 0-6 CELSIUS by Date Time Date Time An Acknowledgement of Receipt Is requested to attr. Jackie Confreras by Date Time Date Time An Acknowledgement of Receipt Is requested to attr. Jackie Confreras by Date Time Date Time Date
	eurofins	Snip 1o: `Eurofins Lanc Environmental 2425 New Holla Lancaster, PA	Phone: 717-656 Folder #: F		2 EPA 1613B 2,	Relinquished by: Received by: Received by: Received by:

Page 97 of 100 pages

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Lancaster Laboratories

Sample Administration Receipt Documentation Log

Doc Log ID: 250228

Group Number(s): 2046310

Client: Eaton Analytical

Delivery Method: <u>Fe</u>	ed Ex	Arrival Timestamp:	<u>05/30/2019 1</u>	<u>0:20</u>		
Number of Packages: <u>1</u>		Number of Projects:	<u>2</u>			
State/Province of Origin: <u>C</u>	4					
	Arrival C	ondition Summary				
Shipping Container Sealed:	Yes	Sample IDs on COC m	natch Containers:	Yes		
Custody Seal Present:	No	Sample Date/Times m	atch COC:	Yes		
Samples Chilled:	Yes	VOA Vial Headspace ≥ 6mm: N/A				
Paperwork Enclosed:	Yes	; Total Trip Blank Qty:		0		
Samples Intact:	Yes	Air Quality Samples Pr	resent:	No		
Missing Samples:	No					
Extra Samples:	No					
Discrepancy in Container Qty on	COC: No					
Unpacked by Simon Nies (2511)	2) at 13:21 on 05	5/30/2019		<u>,</u> ,		
	Sampl	es Chilled Details				

<u>Cooler #</u>	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?	
1	32170023	2.3	IR	Wet	Y	Bagged	Ν	

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IU	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		be equivalent to milli	kilogram (mg/kg) or one gram per million grams. For igrams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated

V Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.

- W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
- Z Laboratory Defined see analysis report

Lancaster Laboratories

Environmental

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

EnviroMatrix

Analytical, Inc.

11 June 2020

Geoscience Support Services, Inc. Attn: Nathan Reynolds PO Box 220 Claremont, CA 91711 EMA Log #: 20D0672

Project: GMGP Water Quality 2020

Enclosed are the results of analyses for samples received by the laboratory on 04/21/20 15:55. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that this data is in compliance both technically and for completeness.

Kland S. Que

Leland S. Pitt Laboratory Director

CA ELAP Certification #: 2564

4340 Viewridge Avenue, Suite A - San Diego, California 92123 - (858) 560-7717 - Fax (858) 560-7763 Analytical Chemistry Laboratory

EMA Log #: 20D0672

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
P2	20D0672-01	Grnd-Water	04/21/20 09:36	04/21/20 15:55
P11 B	20D0672-02	Grnd-Water	04/21/20 10:55	04/21/20 15:55
P11 D	20D0672-03	Grnd-Water	04/21/20 11:30	04/21/20 15:55
Gun R	20D0672-04	Grnd-Water	04/21/20 12:45	04/21/20 15:55
TEST	20D0672-05	Grnd-Water	04/21/20 14:30	04/21/20 15:55



EMA Log #: 20D0672

Total Metals by EPA 200 Series Methods

		10-	Reporting					Sample Prepared		
Analyte	Result	MDL	Limit	Units	Dilution	Analyst	Batch	Sample Analyzed	Method	Notes
P11 B (20D0672-02) Grnd-Water	Sampled: 04/21	/20 10:55	Received: 04	/21/20 15	5:55					
Boron	0.54	0.25	0.50	mg/l	1	ICP	0052751	05/27/20 11:47 05/28/20 14:51	EPA 200.7	
Barium	0.185	0.0002	0.010	"	"	MG	0051171	05/11/20 15:50 05/12/20 12:45	EPA 200.8	
Calcium	68.0	0.10	0.50	"	"	ICP	0052751	05/27/20 11:47 05/28/20 14:51	EPA 200.7	
Chromium	0.0009	0.0002	0.005	"	"	MG	0051171	05/11/20 15:50 05/12/20 12:45	EPA 200.8	J
Copper	0.002	0.0002	0.010	"	"	MG	"	05/11/20 15:50 05/12/20 12:45	"	J
Iron	0.490	0.002	0.050	"	"	MG	"	05/11/20 15:50 05/12/20 12:45	"	
Potassium	41.1	1.00	1.00	"	"	ICP	0052751	05/27/20 11:47 05/28/20 14:51	EPA 200.7	
Magnesium	57.3	0.100	0.500	"	"	ICP	"	05/27/20 11:47 05/28/20 14:51	"	
Manganese	0.095	0.0001	0.005	"	"	MG	0051171	05/11/20 15:50 05/12/20 12:45	EPA 200.8	
Sodium	321	0.20	2.50	"	5	ICP	0052751	05/27/20 11:47 06/02/20 13:36	EPA 200.7	
Zinc	0.010	0.0003	0.020	"	1	MG	0051171	05/11/20 15:50 05/12/20 12:45	EPA 200.8	J
P11 D (20D0672-03) Grnd-Water	Sampled: 04/2	1/20 11:30	Received: 04	/21/20 15	5:55					
Boron	0.47	0.25	0.50	mg/l	1	ICP	0052751	05/27/20 11:47 05/28/20 14:56	EPA 200.7	J
Barium	0.348	0.0002	0.010	"	"	MG	0051171	05/11/20 15:50 05/12/20 12:47	EPA 200.8	
Calcium	145	0.10	0.50	"	"	ICP	0052751	05/27/20 11:47 05/28/20 14:55	EPA 200.7	
Chromium	0.0006	0.0002	0.005	"	"	MG	0051171	05/11/20 15:50 05/12/20 12:47	EPA 200.8	J
Copper	0.003	0.0002	0.010	"	"	MG	"	05/11/20 15:50 05/12/20 12:47	"	J
Iron	0.820	0.002	0.050	"	"	MG	"	05/11/20 15:50 05/12/20 12:47	"	
Potassium	27.4	1.00	1.00	"	"	ICP	0052751	05/27/20 11:47 05/28/20 14:55	EPA 200.7	
Magnesium	106	0.100	0.500	"	"	ICP	"	05/27/20 11:47 05/28/20 14:55	"	



EMA Log #: 20D0672

Total Metals by EPA 200 Series Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P11 D (20D0672-03) Grnd-Water	Sampled: 04/21	1/20 11:30	Received: 04	/21/20 15	5:55					
Manganese	0.464	0.0001	0.005	mg/l	1	MG	0051171	05/11/20 15:50 05/12/20 12:47	EPA 200.8	
Sodium	504	0.20	2.50	"	5	ICP	0052751	05/27/20 11:47 06/02/20 13:41	EPA 200.7	
Zinc	0.004	0.0003	0.020	"	1	MG	0051171	05/11/20 15:50 05/12/20 12:47	EPA 200.8	J
Gun R (20D0672-04) Grnd-Water	Sampled: 04/2	1/20 12:45	Received: 04	4/21/20 1	5:55					
Boron	0.36	0.25	0.50	mg/l	1	ICP	0052751	05/27/20 11:47 05/28/20 15:01	EPA 200.7	J
Barium	0.099	0.0002	0.010	"	"	MG	0051171	05/11/20 15:50 05/12/20 12:49	EPA 200.8	
Calcium	403	0.50	2.50	"	5	ICP	0052751	05/27/20 11:47 05/28/20 15:01	EPA 200.7	
Chromium	0.0004	0.0002	0.005	"	1	MG	0051171	05/11/20 15:50 05/12/20 12:49	EPA 200.8	J
Copper	0.010	0.0002	0.010	"	"	MG	"	05/11/20 15:50 05/12/20 12:49	"	
Iron	0.262	0.002	0.050	"	"	MG	"	05/11/20 15:50 05/12/20 12:49	"	
Potassium	11.5	1.00	1.00	"	"	ICP	0052751	05/27/20 11:47 05/28/20 15:01	EPA 200.7	
Magnesium	197	0.500	2.50	"	5	ICP	"	05/27/20 11:47 05/28/20 15:01	"	
Manganese	2.29	0.001	0.050	"	10	MG	0051171	05/11/20 15:50 05/12/20 13:36	EPA 200.8	
Sodium	688	0.20	2.50	"	5	ICP	0052751	05/27/20 11:47 06/02/20 13:55	EPA 200.7	
Zinc	0.009	0.0003	0.020	"	1	MG	0051171	05/11/20 15:50 05/12/20 12:49	EPA 200.8	J
TEST (20D0672-05) Grnd-Water	Sampled: 04/21	1/20 14:30	Received: 04	/21/20 15	5:55					
Boron	0.95	0.25	0.50	mg/l	1	ICP	0052751	05/27/20 11:47 05/28/20 15:06	EPA 200.7	
Barium	0.132	0.0002	0.010	"	"	MG	0051171	05/11/20 15:50 05/12/20 12:51	EPA 200.8	
Calcium	452	0.50	2.50	"	5	ICP	0052751	05/27/20 11:47 05/28/20 15:06	EPA 200.7	
Chromium	0.0003	0.0002	0.005	"	1	MG	0051171	05/11/20 15:50 05/12/20 12:51	EPA 200.8	J



EMA Log #: 20D0672

Total Metals by EPA 200 Series Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
TEST (20D0672-05) Grnd-Water	Sampled: 04/21	/20 14:30	Received: 04	/21/20 15	5:55					
Copper	0.002	0.0002	0.010	mg/l	1	MG	0051171	05/11/20 15:50 05/12/20 12:51	EPA 200.8	J
Iron	0.858	0.002	0.050	"	"	MG	"	05/11/20 15:50 05/12/20 12:51	"	
Potassium	31.5	1.00	1.00	"	"	ICP	0052751	05/27/20 11:47 05/28/20 15:06	EPA 200.7	
Magnesium	107	0.100	0.500	"	"	ICP	"	05/27/20 11:47 05/28/20 15:06	"	
Manganese	1.07	0.0001	0.005	"	"	MG	0051171	05/11/20 15:50 05/12/20 12:51	EPA 200.8	
Sodium	820	0.20	2.50	"	5	ICP	0052751	05/27/20 11:47 06/02/20 14:00	EPA 200.7	
Zinc	0.039	0.0003	0.020	"	1	MG	0051171	05/11/20 15:50 05/12/20 12:51	EPA 200.8	



EMA Log #: 20D0672

Metals (Dissolved) by EPA 200 Series Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P2 (20D0672-01) Grnd-Water	Sampled: 04/21/20) 09:36 Re	ceived: 04/21/	/20 15:55	;					
Boron	0.46	0.25	0.50	mg/l	1	ICP	0060145	06/01/20 08:05 06/02/20 12:43	EPA 200.7	J
Barium	0.064	0.0002	0.010	"	"	MG	0051181	05/11/20 16:20 05/12/20 11:47	EPA 200.8	
Calcium	546	0.50	2.50	"	5	ICP	0060145	06/01/20 08:05 06/02/20 12:42	EPA 200.7	
Chromium	0.0003	0.0002	0.005	"	1	MG	0051181	05/11/20 16:20 05/12/20 11:47	EPA 200.8	J
Copper	0.002	0.001	0.010	"	"	MG	"	05/11/20 16:20 05/12/20 11:47	"	J
Iron	0.035	0.002	0.050	"	"	MG	"	05/11/20 16:20 05/12/20 11:47	"	J
Potassium	17.0	1.00	1.00	"	"	ICP	0060145	06/01/20 08:05 06/02/20 12:42	EPA 200.7	
Magnesium	355	2.50	5.00	"	5	ICP	"	06/01/20 08:05 06/02/20 12:42	"	
Manganese	4.86	0.001	0.050	"	10	MG	0051181	05/11/20 16:20 05/12/20 13:09	EPA 200.8	
Sodium	954	1.00	12.5	"	25	ICP	0060145	06/01/20 08:05 06/02/20 12:42	EPA 200.7	
Zinc	0.003	0.0003	0.020	"	1	MG	0051181	05/11/20 16:20 05/12/20 11:47	EPA 200.8	J



Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P2 (20D0672-01) Grnd-Water	Sampled: 04/21/20) 09:36 I	Received: 04/21	1/20 15:55						
Bicarbonate Alkalinity	404	5	5	mg CaCO3/ L	1	LBH	0042356	04/23/20 09:22 04/23/20 09:22	SM2320B	
Carbonate Alkalinity	ND	5	5	"	"	LBH	"	04/23/20 09:22 04/23/20 09:22	"	
Hydroxide Alkalinity	ND	5	5	"	"	LBH	"	04/23/20 09:22 04/23/20 09:22	"	
Total Alkalinity	404	5	5	"	"	LBH	"	04/23/20 09:22 04/23/20 09:22	"	
Ammonia as N	0.35	0.02	0.10	mg/l	"	UM	0050447	05/05/20 12:10 05/05/20 14:26	EPA 350.1	
Chloride	2200	0.05	0.05	"	"	NLF	0042414	04/24/20 15:15 04/24/20 15:15	SM4500 Cl B	
Specific Conductance (EC)	8330	1.00	1.00	umhos/c m	"	LBH	0042237	04/22/20 12:50 04/22/20 12:50	SM2510 B	
Fluoride	0.277	0.031	0.100	mg/l	"	LBH	0042937	04/29/20 13:53 04/29/20 13:53	SM4500 F C	
Hardness (Dissolved)	2830	10	10	mg CaCO3/ L	"	ICP	0060145	06/01/20 08:05 06/02/20 12:42	EPA 200.7	
Nitrate as N	1.41	0.09	0.50	mg/l	10	UM	0050738	05/07/20 16:00 05/07/20 19:55	EPA 353.2	W-02
Nitrite as N	0.13	0.007	0.05	"	1	UM	0042415	04/22/20 12:50 04/22/20 12:50	SM4500 NO2 B	
pH at 25 deg C	7.03	0.01	0.10	pH Units	"	NLF	0042234	04/21/20 16:54 04/21/20 16:54	SM4500-H+ B	HT-15
Orthophosphate as P	3.72	0.04	0.25	mg/l	5	LBH	0042330	04/22/20 08:30 04/22/20 08:30	SM4500 P E	
Phosphorus, Total	2.08	0.20	0.50	"	10	UM	0042230	04/22/20 12:00 04/23/20 14:25	EPA 365.1	
Total Dissolved Solids	5460	1.0	20.0	"	1	NLF	0042758	04/27/20 09:00 04/29/20 09:00	SM2540 C	
Sulfate as SO4	1240	50.0	250	"	50	LBH	0051246	05/12/20 11:45 05/12/20 11:45	SM4500 SO4 E	
Turbidity	50.0	0.05	0.05	NTU	1	NLF	0042231	04/22/20 10:00 04/22/20 10:00	SM2130 B	
P11 B (20D0672-02) Grnd-Wat	er Sampled: 04/2	1/20 10:55	5 Received: 04	4/21/20 15	:55					
Bicarbonate Alkalinity	260	5	5	mg CaCO3/	1	LBH	0042356	04/23/20 09:22 04/23/20 09:22	SM2320B	



Conventional Chemistry Parameters by Standard/EPA Methods

			Papartina					Sample Prepared		
Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Analyzed	Method	Notes
P11 B (20D0672-02) Grnd-Water	Sampled: 04/21	1/20 10:55	Received: 04	4/21/20 15	:55					
Carbonate Alkalinity	ND	5	5	mg CaCO3/ L	1	LBH	0042356	04/23/20 09:22 04/23/20 09:22	SM2320B	
Hydroxide Alkalinity	ND	5	5	"	"	LBH	"	04/23/20 09:22 04/23/20 09:22	"	
Total Alkalinity	260	5	5	"	"	LBH	"	04/23/20 09:22 04/23/20 09:22	"	
Ammonia as N	4.52	0.11	0.50	mg/l	5	UM	0050447	05/05/20 12:10 05/05/20 14:26	EPA 350.1	
Chloride	380	0.05	0.05	"	1	NLF	0042414	04/24/20 15:15 04/24/20 15:15	SM4500 Cl B	
Specific Conductance (EC)	1950	1.00	1.00	umhos/c m	"	LBH	0042237	04/22/20 12:50 04/22/20 12:50	SM2510 B	
Fluoride	0.405	0.031	0.100	mg/l	"	LBH	0042937	04/29/20 13:53 04/29/20 13:53	SM4500 F C	
Hardness (Total)	406	10	10	mg CaCO3/ L	"	ICP	0052751	05/27/20 11:47 05/28/20 14:51	EPA 200.7	
Nitrate as N	0.03	0.009	0.05	mg/l	"	UM	0050738	05/07/20 16:00 05/07/20 19:55	EPA 353.2	W-02, J
Nitrite as N	ND	0.007	0.05	"	"	UM	0042415	04/22/20 12:50 04/22/20 12:50	SM4500 NO2 B	
pH at 25 deg C	7.54	0.01	0.10	pH Units	"	NLF	0042234	04/21/20 16:56 04/21/20 16:56	SM4500-H+ B	HT-15
Orthophosphate as P	1.88	0.04	0.25	mg/l	5	LBH	0042330	04/22/20 08:30 04/22/20 08:30	SM4500 P E	
Phosphorus, Total	1.76	0.20	0.50	"	10	UM	0042230	04/22/20 12:00 04/23/20 14:25	EPA 365.1	
Total Dissolved Solids	1080	1.0	20.0	"	1	NLF	0042758	04/27/20 09:00 04/29/20 09:00	SM2540 C	
Sulfate as SO4	183	5.0	25.0	"	5	LBH	0051246	05/12/20 11:45 05/12/20 11:45	SM4500 SO4 E	
Turbidity	1.30	0.05	0.05	NTU	1	NLF	0042231	04/22/20 10:00 04/22/20 10:00	SM2130 B	
P11 D (20D0672-03) Grnd-Water	Sampled: 04/2	1/20 11:30	Received: 04	4/21/20 15	:55					
Bicarbonate Alkalinity	380	5	5	mg CaCO3/ L	1	LBH	0042356	04/23/20 09:22 04/23/20 09:22	SM2320B	
Carbonate Alkalinity	ND	5	5	"	"	LBH	"	04/23/20 09:22 04/23/20 09:22	"	



Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P11 D (20D0672-03) Grnd-Water	-			4/21/20 15	:55					
Hydroxide Alkalinity	ND	5	5	mg CaCO3/ L	1	LBH	0042356	04/23/20 09:22 04/23/20 09:22	SM2320B	
Total Alkalinity	380	5	5	"	"	LBH	"	04/23/20 09:22 04/23/20 09:22	"	
Ammonia as N	2.05	0.04	0.20	mg/l	2	UM	0050447	05/05/20 12:10 05/05/20 14:26	EPA 350.1	
Chloride	630	0.05	0.05	"	1	NLF	0042414	04/24/20 15:15 04/24/20 15:15	SM4500 Cl B	
Specific Conductance (EC)	3150	1.00	1.00	umhos/c m	"	LBH	0042237	04/22/20 12:50 04/22/20 12:50	SM2510 B	
Fluoride	0.298	0.031	0.100	mg/l	"	LBH	0042937	04/29/20 13:53 04/29/20 13:53	SM4500 F C	
Hardness (Total)	800	10	10	mg CaCO3/ L	"	ICP	0052751	05/27/20 11:47 05/28/20 14:55	EPA 200.7	
Nitrate as N	0.04	0.009	0.05	mg/l	"	UM	0050738	05/07/20 16:00 05/07/20 19:55	EPA 353.2	W-02, J
Nitrite as N	ND	0.007	0.05	"	"	UM	0042415	04/22/20 12:50 04/22/20 12:50	SM4500 NO2 B	
pH at 25 deg C	7.37	0.01	0.10	pH Units	"	NLF	0042234	04/21/20 16:58 04/21/20 16:58	SM4500-H+ B	HT-15
Orthophosphate as P	0.68	0.007	0.05	mg/l	"	LBH	0042330	04/22/20 08:30 04/22/20 08:30	SM4500 P E	
Phosphorus, Total	0.66	0.02	0.05	"	"	UM	0042230	04/22/20 12:00 04/23/20 14:25	EPA 365.1	
Fotal Dissolved Solids	1890	1.0	20.0	"	"	NLF	0042758	04/27/20 09:00 04/29/20 09:00	SM2540 C	
Sulfate as SO4	346	25.0	125	"	25	LBH	0051246	05/12/20 11:45 05/12/20 11:45	SM4500 SO4 E	
Furbidity	4.10	0.05	0.05	NTU	1	NLF	0042231	04/22/20 10:00 04/22/20 10:00	SM2130 B	
Gun R (20D0672-04) Grnd-Water	Sampled: 04/2	1/20 12:45	Received: (<u>4/21/20</u> 1:	5:55					
Bicarbonate Alkalinity	346	5	5	mg CaCO3/	1	LBH	0042356	04/23/20 09:22 04/23/20 09:22	SM2320B	
Carbonate Alkalinity	ND	5	5	L "	"	LBH	"	04/23/20 09:22 04/23/20 09:22	"	
Hydroxide Alkalinity	ND	5	5	"		LBH	"	04/23/20 09:22	"	



Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
Gun R (20D0672-04) Grnd-Water	Sampled: 04/2	21/20 12:45	Received: 0	4/21/20 1	5:55					
Total Alkalinity	346	5	5	mg CaCO3/ L	1	LBH	0042356	04/23/20 09:22 04/23/20 09:22	SM2320B	
Ammonia as N	0.08	0.02	0.10	mg/l	"	UM	0050447	05/05/20 12:10 05/05/20 14:26	EPA 350.1	J
Chloride	1110	0.05	0.05	"	"	NLF	0042414	04/24/20 15:15 04/24/20 15:15	SM4500 Cl B	
Specific Conductance (EC)	5190	1.00	1.00	umhos/c m	"	LBH	0042237	04/22/20 12:50 04/22/20 12:50	SM2510 B	
Fluoride	0.271	0.031	0.100	mg/l	"	LBH	0042937	04/29/20 13:53 04/29/20 13:53	SM4500 F C	
Hardness (Total)	1820	10	10	mg CaCO3/ L	"	ICP	0052751	05/27/20 11:47 05/28/20 15:01	EPA 200.7	
Nitrate as N	0.70	0.02	0.10	mg/l	2	UM	0050738	05/07/20 16:00 05/07/20 19:55	EPA 353.2	W-02
Nitrite as N	0.009	0.007	0.05	"	1	UM	0042415	04/22/20 12:50 04/22/20 12:50	SM4500 NO2 B	J
pH at 25 deg C	7.19	0.01	0.10	pH Units	"	NLF	0042234	04/21/20 17:00 04/21/20 17:00	SM4500-H+ B	HT-15
Orthophosphate as P	0.11	0.007	0.05	mg/l	"	LBH	0042330	04/22/20 08:30 04/22/20 08:30	SM4500 P E	
Phosphorus, Total	0.10	0.02	0.05	"	"	UM	0042230	04/22/20 12:00 04/23/20 14:25	EPA 365.1	
Total Dissolved Solids	3320	1.0	20.0	"	"	NLF	0042758	04/27/20 09:00 04/29/20 09:00	SM2540 C	
Sulfate as SO4	853	25.0	125	"	25	LBH	0051246	05/12/20 11:45 05/12/20 11:45	SM4500 SO4 E	
Turbidity	1.60	0.05	0.05	NTU	1	NLF	0042231	04/22/20 10:00 04/22/20 10:00	SM2130 B	
TEST (20D0672-05) Grnd-Water	Sampled: 04/2	1/20 14:30	Received: 04	4/21/20 15	:55					
Bicarbonate Alkalinity	384	5	5	mg CaCO3/	1	LBH	0042356	04/23/20 09:22 04/23/20 09:22	SM2320B	
Carbonate Alkalinity	ND	5	5	L "	"	LBH		04/23/20 09:22 04/23/20 09:22	"	
Hydroxide Alkalinity	ND	5	5	"	"	LBH	"	04/23/20 16:51 04/23/20 16:51	"	
Total Alkalinity	384	5	5	"	"	LBH	"	04/23/20 16:51 04/23/20 16:51	"	



EMA Log #: 20D0672

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
/ maryte	Kesun	MDL	Liiiit	Onits	Dilution	Analyst	Batch	Sample Analyzed	Method	Notes
TEST (20D0672-05) Grnd-Water	Sampled: 04/2	1/20 14:30	Received: 04	4/21/20 15	:55					
Ammonia as N	0.99	0.02	0.10	mg/l	1	UM	0050447	05/05/20 12:10 05/05/20 14:26	EPA 350.1	
Chloride	1290	0.05	0.05	"	"	NLF	0042414	04/24/20 15:15 04/24/20 15:15	SM4500 Cl B	
Specific Conductance (EC)	5440	1.00	1.00	umhos/c m	"	LBH	0042237	04/22/20 12:50 04/22/20 12:50	SM2510 B	
Fluoride	0.275	0.031	0.100	mg/l	"	LBH	0042937	04/29/20 13:53 04/29/20 13:53	SM4500 F C	
Hardness (Total)	1570	10	10	mg CaCO3/ L	"	ICP	0052751	05/27/20 11:47 05/28/20 15:06	EPA 200.7	
Nitrate as N	0.05	0.009	0.05	mg/l	"	UM	0050738	05/07/20 16:00 05/07/20 19:55	EPA 353.2	W-02
Nitrite as N	ND	0.007	0.05	"	"	UM	0042415	04/22/20 12:50 04/22/20 12:50	SM4500 NO2 B	
pH at 25 deg C	7.04	0.01	0.10	pH Units	"	NLF	0042234	04/21/20 17:05 04/21/20 17:05	SM4500-H+ B	HT-15
Orthophosphate as P	0.33	0.007	0.05	mg/l	"	LBH	0042330	04/22/20 08:30 04/22/20 08:30	SM4500 P E	
Phosphorus, Total	0.32	0.02	0.05	"	"	UM	0042230	04/22/20 12:00 04/23/20 14:25	EPA 365.1	
Total Dissolved Solids	3500	1.0	20.0	"	"	NLF	0042758	04/27/20 09:00 04/29/20 09:00	SM2540 C	
Sulfate as SO4	802	25.0	125	"	25	LBH	0051246	05/12/20 11:45 05/12/20 11:45	SM4500 SO4 E	
Turbidity	6.50	0.05	0.05	NTU	1	NLF	0042231	04/22/20 10:00 04/22/20 10:00	SM2130 B	



Miscellaneous Physical/Conventional Chemistry Parameters

			Reporting					Sample Prepared		
Analyte	Result	MDL	Limit	Units	Dilution	Analyst	Batch	Sample Analyzed	Method	Notes
P2 (20D0672-01) Grnd-Water Sa	mpled: 04/21/20	09:36 Re	eceived: 04/21	/20 15:55	5					
Aggressive Index	12.8	1.00	1.00	N/A	1	MAR	0060459	06/04/20 15:15 06/05/20 07:54	Calculation	
adj-Sodium Adsorption Ratio	9.78	0.100	0.100	Ratio	"	MAR	0051855	05/18/20 08:33 05/18/20 08:43	Suarez-1981	
Langelier Index at 20 deg C	0.77	-3.00	-3.00	N/A	"	MAR	0061171	06/11/20 17:54 06/11/20 17:54	Calculation	
P11 B (20D0672-02) Grnd-Water	Sampled: 04/21	/20 10:55	Received: 04	/21/20 15	5:55					
Aggressive Index	12.2	1.00	1.00	N/A	1	MAR	0060459	06/04/20 15:15 06/05/20 07:54	Calculation	
adj-Sodium Adsorption Ratio	7.67	0.100	0.100	Ratio	"	MAR	0051855	05/18/20 08:33 05/18/20 08:43	Suarez-1981	
Langelier Index at 20 deg C	0.18	-3.00	-3.00	N/A	"	MAR	0061171	06/11/20 17:54 06/11/20 17:54	Calculation	
P11 D (20D0672-03) Grnd-Water	Sampled: 04/21	/20 11:30	Received: 04	/21/20 15	5:55					
Aggressive Index	12.5	1.00	1.00	N/A	1	MAR	0060459	06/04/20 15:15 06/05/20 07:54	Calculation	
adj-Sodium Adsorption Ratio	9.12	0.100	0.100	Ratio	"	MAR	0051855	05/18/20 08:33 05/18/20 08:43	Suarez-1981	
Langelier Index at 20 deg C	0.51	-3.00	-3.00	N/A	"	MAR	0061171	06/11/20 17:54 06/11/20 17:54	Calculation	
Gun R (20D0672-04) Grnd-Water	Sampled: 04/2	1/20 12:45	Received: 0	4/21/20 1	5:55					
Aggressive Index	12.7	1.00	1.00	N/A	1	MAR	0060459	06/04/20 15:15 06/05/20 07:54	Calculation	
adj-Sodium Adsorption Ratio	9.03	0.100	0.100	Ratio	"	MAR	0051855	05/18/20 08:33 05/18/20 08:43	Suarez-1981	
Langelier Index at 20 deg C	0.73	-3.00	-3.00	N/A	"	MAR	0061171	06/11/20 17:54 06/11/20 17:54	Calculation	
TEST (20D0672-05) Grnd-Water	Sampled: 04/21	/20 14:30	Received: 04	/21/20 15	5:55					
Aggressive Index	12.7	1.00	1.00	N/A	1	MAR	0060459	06/04/20 15:15 06/05/20 07:54	Calculation	
adj-Sodium Adsorption Ratio	13.2	0.100	0.100	Ratio	"	MAR	0051855	05/18/20 08:33 05/18/20 08:43	Suarez-1981	
Langelier Index at 20 deg C	0.68	-3.00	-3.00	N/A	"	MAR	0061171	06/11/20 17:54 06/11/20 17:54	Calculation	



Analyte	D l'	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Result	MDL	Liiiit	Units		Level	Kesuit	70KEC	Lillins	KFD	Liiiit	Notes
Batch 0051171												
Blank (0051171-BLK1)					Prepared:	05/11/20	Analyzed: (5/12/20				
Barium	ND	0.0002	0.010	mg/l	MG							
Chromium	ND	0.0002	0.005	"	MG							
Copper	ND	0.0002	0.010	"	MG							
Iron	ND	0.002	0.050	"	MG							
Manganese	ND	0.0001	0.005	"	MG							
Zinc	ND	0.0003	0.020	"	MG							
LCS (0051171-BS1)					Prepared:	05/11/20	Analyzed: (5/12/20				
Barium	0.104	0.0002	0.010	mg/l	MG	0.100		104	85-115			
Chromium	0.100	0.0002	0.005	"	MG	0.100		100	85-115			
Copper	0.102	0.0002	0.010	"	MG	0.100		102	85-115			
Manganese	0.107	0.0001	0.005	"	MG	0.100		107	85-115			
Zinc	0.105	0.0003	0.020	"	MG	0.100		105	85-115			
Iron	0.102	0.002	0.050	"	MG	0.100		102	85-115			
LCS Dup (0051171-BSD1)					Prepared:	05/11/20	Analyzed: (5/12/20				
Barium	0.103	0.0002	0.010	mg/l	MG	0.100		103	85-115	0.5	20	
Iron	0.105	0.002	0.050	"	MG	0.100		105	85-115	3	20	
Manganese	0.107	0.0001	0.005	"	MG	0.100		107	85-115	0.3	20	
Copper	0.103	0.0002	0.010	"	MG	0.100		103	85-115	0.8	20	
Chromium	0.101	0.0002	0.005	"	MG	0.100		101	85-115	0.8	20	
Zinc	0.106	0.0003	0.020	"	MG	0.100		106	85-115	0.8	20	
Duplicate (0051171-DUP1)		Source: 20	D0527-06		Prepared:	05/11/20	Analyzed: (5/12/20				
Barium	0.146	0.0002	0.010	mg/l	MG		0.151			3	20	
Zinc	0.077	0.0003	0.020	"	MG		0.033			81	20	QR-06
Chromium	0.0008	0.0002	0.005	"	MG		0.0007			23	20	QR-04, J
Copper	0.002	0.0002	0.010	"	MG		0.002			21	20	QR-04, J
Manganese	0.146	0.0001	0.005	"	MG		0.119			20	20	
Iron	1.82	0.017	0.500	"	MG		1.88			3	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0051171												
Matrix Spike (0051171-MS1)	5	Source: 20	D0527-06		Prepared:	05/11/20	Analyzed: (05/12/20				
Barium	0.246	0.0002	0.010	mg/l	MG	0.100	0.151	94	70-130			
Chromium	0.104	0.0002	0.005	"	MG	0.100	0.0007	103	70-130			
Copper	0.106	0.0002	0.010	"	MG	0.100	0.002	104	70-130			
Manganese	0.233	0.0001	0.005	"	MG	0.100	0.119	114	70-130			
Zinc	0.146	0.0003	0.020	"	MG	0.100	0.033	113	70-130			
Iron	2.00	0.017	0.500	"	MG	0.100	1.88	116	70-130			
Matrix Spike (0051171-MS2)	S	Source: 20	D0226-02		Prepared:	05/11/20	Analyzed: (05/12/20				
Barium	0.116	0.0002	0.010	mg/l	MG	0.100	0.009	107	70-130			
Manganese	0.118	0.0001	0.005	"	MG	0.100	0.006	112	70-130			
Chromium	0.106	0.0002	0.005	"	MG	0.100	0.0008	105	70-130			
Iron	0.312	0.002	0.050	"	MG	0.100	0.187	125	70-130			
Copper	0.141	0.0002	0.010	"	MG	0.100	0.029	112	70-130			
Zinc	0.248	0.0003	0.020	"	MG	0.100	0.134	114	70-130			
Matrix Spike Dup (0051171-MSD1)	5	Source: 20	D0527-06		Prepared:	05/11/20	Analyzed: (05/12/20				
Barium	0.254	0.0002	0.010	mg/l	MG	0.100	0.151	103	70-130	4	20	
Chromium	0.102	0.0002	0.005	"	MG	0.100	0.0007	102	70-130	1	20	
Iron	1.88	0.017	0.500	"	MG	0.100	1.88	NR	70-130	6	20	QM-4X
Copper	0.106	0.0002	0.010	"	MG	0.100	0.002	104	70-130	0.1	20	
Manganese	0.215	0.0001	0.005	"	MG	0.100	0.119	96	70-130	8	20	
Zinc	0.125	0.0003	0.020	"	MG	0.100	0.033	92	70-130	15	20	
Batch 0052751												
Blank (0052751-BLK1)					Prepared:	05/27/20	Analyzed:	05/28/20				
Boron	ND	0.25	0.50	mg/l	ICP							
Magnesium	ND	0.100	0.500	"	ICP							
Sodium	ND	0.04	0.50	"	ICP							
Potassium	ND	1.00	1.00	"	ICP							

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ND

0.10

Calcium

0.50

.,

ICP



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0052751												
LCS (0052751-BS1)					Prenared.	05/27/20	Analyzed: (15/28/20				
Magnesium	1.08	0.100	0.500	mg/l	ICP	1.00	Thatyzea.	108	85-115			
Boron	1.09	0.25	0.50	"	ICP	1.00		109	85-115			
Calcium	1.13	0.10	0.50	"	ICP	1.00		113	85-115			
Sodium	ND	0.04	0.50	"	MEG	1.00			85-115			
Potassium	10.9	1.00	1.00	"	ICP	10.0		109	85-115			
LCS (0052751-BS2)					Prepared:	05/27/20	Analyzed: ()5/28/20				
Potassium	5.36	1.00	1.00	mg/l	ICP	5.00		107	85-115			
Boron	ND	0.25	0.50	"	ICP				85-115			
Sodium	5.34	0.04	0.50	"	ICP	5.00		107	85-115			
Magnesium	5.68	0.100	0.500	"	ICP	5.00		114	85-115			
Calcium	5.11	0.10	0.50	"	ICP	5.00		102	85-115			
LCS Dup (0052751-BSD1)					Prepared:	05/27/20	Analyzed: (05/28/20				
Potassium	10.8	1.00	1.00	mg/l	ICP	10.0		108	85-115	0.5	20	
Magnesium	1.07	0.100	0.500	"	ICP	1.00		107	85-115	0.2	20	
Calcium	1.13	0.10	0.50	"	ICP	1.00		113	85-115	0.09	20	
Boron	1.12	0.25	0.50	"	ICP	1.00		112	85-115	3	20	
Sodium	ND	0.04	0.50	"	MEG	1.00			85-115		20	
LCS Dup (0052751-BSD2)					Prepared:	05/27/20	Analyzed: ()5/28/20				
Potassium	5.14	1.00	1.00	mg/l	ICP	5.00		103	85-115	4	20	
Calcium	5.08	0.10	0.50	"	ICP	5.00		102	85-115	0.6	20	
Magnesium	5.77	0.100	0.500	"	ICP	5.00		115	85-115	2	20	
Boron	ND	0.25	0.50	"	ICP				85-115		20	
Sodium	5.39	0.04	0.50	"	ICP	5.00		108	85-115	1	20	
Duplicate (0052751-DUP1)	S	ource: 20	DD0880-02		Prepared:	05/27/20	Analyzed: (05/28/20				
Boron	ND	0.25	0.50	mg/l	ICP		ND				20	
Magnesium	99.4	0.100	0.500	"	ICP		110			10	20	
Potassium	ND	1.00	1.00	"	ICP		ND				20	
Sodium	99.6	0.04	0.50	"	ICP		104			5	20	
Calcium	206	0.50	2.50	"	ICP		212			3	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0052751												
Matrix Spike (0052751-MS1)	S	ource: 20	0D0880-02		Prepared:	05/27/20	Analyzed: ()5/28/20				
Potassium	11.0	1.00	1.00	mg/l	ICP	10.0	ND	110	75-125			
Boron	1.16	0.25	0.50	"	ICP	1.00	ND	116	75-125			
Magnesium	99.0	0.100	0.500	"	ICP	1.00	110	NR	75-125			QM-4X
Calcium	211	0.50	2.50	"	ICP	1.00	212	NR	75-125			QM-4X
Sodium	103	0.04	0.50	"	ICP	1.00	104	NR	75-125			QM-4X
Matrix Spike (0052751-MS2)	S	ource: 20	0D0856-01		Prepared:	05/27/20	Analyzed: (05/28/20				
Boron	1.54	0.25	0.50	mg/l	ICP	1.00	0.51	103	75-125			
Potassium	26.0	1.00	1.00	"	ICP	10.0	15.5	105	75-125			
Magnesium	38.4	0.100	0.500	"	ICP	1.00	33.9	451	75-125			QM-4X
Sodium	160	0.04	0.50	"	ICP	1.00	154	600	75-125			QM-4X
Calcium	74.6	0.10	0.50	"	ICP	1.00	76.4	NR	75-125			QM-4X
Matrix Spike Dup (0052751-MSD1)	s	ource: 20	0D0880-02		Prepared:	05/27/20	Analyzed: (05/28/20				
Boron	1.15	0.25	0.50	mg/l	ICP	1.00	ND	115	75-125	1	20	
Potassium	11.3	1.00	1.00	"	ICP	10.0	ND	113	75-125	2	20	
Calcium	215	0.50	2.50	"	ICP	1.00	212	340	75-125	2	20	QM-4X
Magnesium	103	0.100	0.500	"	ICP	1.00	110	NR	75-125	4	20	QM-4X
Sodium	99.1	0.04	0.50	"	ICP	1.00	104	NR	75-125	4	20	QM-4X



Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
	result										-	
Batch 0051181												
Blank (0051181-BLK1)					Prepared:	05/11/20	Analyzed: 0	5/12/20				
Barium	ND	0.0002	0.010	mg/l	MG							
Chromium	ND	0.0002	0.005	"	MG							
Manganese	ND	0.0001	0.005	"	MG							
Copper	ND	0.001	0.010	"	MG							
Iron	ND	0.002	0.050	"	MG							
Zinc	ND	0.0003	0.020	"	MG							
LCS (0051181-BS1)					Prepared:	05/11/20	Analyzed: 0	5/12/20				
Chromium	0.099	0.0002	0.005	mg/l	MG	0.100		99	75-125			
Barium	0.101	0.0002	0.010	"	MG	0.100		101	85-115			
Manganese	0.105	0.0001	0.005	"	MG	0.100		105	85-115			
Iron	0.102	0.002	0.050	"	MG	0.100		102	85-115			
Zinc	0.101	0.0003	0.020	"	MG	0.100		101	85-115			
Copper	0.100	0.001	0.010	"	MG	0.100		100	85-115			
LCS Dup (0051181-BSD1)					Prepared:	05/11/20	Analyzed: 0	5/12/20				
Manganese	0.103	0.0001	0.005	mg/l	MG	0.100		103	85-115	2	20	
Chromium	0.097	0.0002	0.005	"	MG	0.100		97	75-125	1	20	
Barium	0.095	0.0002	0.010	"	MG	0.100		95	85-115	7	20	
Iron	0.101	0.002	0.050	"	MG	0.100		101	85-115	1	20	
Zinc	0.100	0.0003	0.020	"	MG	0.100		100	85-115	1	20	
Copper	0.099	0.001	0.010	"	MG	0.100		99	85-115	1	20	
Duplicate (0051181-DUP1)	S	Source: 20	D0226-02		Prepared:	05/11/20	Analyzed: 0	5/12/20				
Manganese	0.002	0.0001	0.005	mg/l	MG		0.002			1	20	J
Chromium	0.0004	0.0002	0.005	"	MG		0.0004			7	20	J
Barium	0.006	0.0002	0.010	"	MG		0.005			11	20	J
Zinc	0.109	0.0003	0.020	"	MG		0.108			0.8	20	
Iron	0.008	0.002	0.050	"	MG		0.008			0.5	20	J
Copper	0.022	0.001	0.010	"	MG		0.021			1	20	



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Metals (Dissolved) by EPA 200 Series Methods - Quality Control

			Reporting			Spike	Source		%REC		RPD	
Analyte	Result	MDL	Limit	Units	Analyst	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 0051181												
Matrix Spike (0051181-MS1)	S	Source: 20	D0226-02		Prepared:	05/11/20	Analyzed: (05/12/20				
Manganese	0.105	0.0001	0.005	mg/l	MG	0.100	0.002	103	70-130			
Chromium	0.097	0.0002	0.005	"	MG	0.100	0.0004	96	75-125			
Barium	0.100	0.0002	0.010		MG	0.100	0.005	95	70-130			
Copper	0.120	0.001	0.010	"	MG	0.100	0.021	98	70-130			
Iron	0.109	0.002	0.050		MG	0.100	0.008	101	70-130			
Zinc	0.206	0.0003	0.020	"	MG	0.100	0.108	98	70-130			
Matrix Spike Dup (0051181-MSD1)	5	Source: 20	D0226-02		Prepared:	05/11/20	Analyzed: (05/12/20				
Barium	0.102	0.0002	0.010	mg/l	MG	0.100	0.005	97	70-130	2	20	
Manganese	0.105	0.0001	0.005		MG	0.100	0.002	102	70-130	0.6	20	
Chromium	0.096	0.0002	0.005		MG	0.100	0.0004	95	75-125	0.9	20	
Iron	0.107	0.002	0.050	"	MG	0.100	0.008	99	70-130	2	20	
Zinc	0.205	0.0003	0.020		MG	0.100	0.108	98	70-130	0.2	20	
Copper	0.118	0.001	0.010	"	MG	0.100	0.021	97	70-130	1	20	
Batch 0060145												
Blank (0060145-BLK1)					Prepared:	06/01/20	Analyzed: (06/02/20				
Magnesium	ND	0.50	1.00	mg/l	ICP							
Boron	ND	0.25	0.50		ICP							
Potassium	ND	1.00	1.00		ICP							
Calcium	ND	0.10	0.50	"	ICP							
Sodium	ND	0.04	0.50	"	ICP							
LCS (0060145-BS1)					Prepared:	06/01/20	Analyzed: (06/11/20				
Calcium	2.75	0.10	0.50	mg/l	ICP	1.00		275	85-115			
Sodium	4.00	0.04	0.50	"	ICP	1.00		400	85-115			
Magnesium	1.10	0.50	1.00	"	ICP	1.00		110	85-115			
Potassium	11.0	1.00	1.00	"	ICP	10.0		110	85-115			
Boron	1.13	0.25	0.50		ICP	1.00		113	85-115			



Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Prepared: 06/01/20 Analyzed: 06/11/20 Boron ND 0.25 0.50 mg/l ICP Sodium 5.41 0.04 0.50 " ICP 5.00 108 Calcium 5.38 0.10 0.50 " ICP 5.00 108 Magnesium 6.32 0.50 1.00 " ICP 5.00 126 Potassium 5.50 1.00 1.00 " ICP 5.00 100 LCS Dup (0060145-BSD1) Prepared: 06/01/20 Analyzed: 06/11/20 Calcium 2.77 0.10 0.50 mg/l ICP 1.00 277 Sodium 3.98 0.04 0.50 " ICP 1.00 114 Boron 1.12 0.25 0.50 " ICP 1.00 110 LCS Dup (0060145-BSD2) Prepared: 06/01/20 Analyzed: 06/11/20 Analyzed: 06/11/20 Calcium 5.34 0.10 0.50 mg/l ICP 5.00 <td< th=""><th>%REC Limits</th><th>RPD</th><th>RPD Limit</th><th>Notes</th></td<>	%REC Limits	RPD	RPD Limit	Notes
Boron ND 0.25 0.50 mg/l ICP Sodium 5.41 0.04 0.50 " ICP 5.00 108 Calcium 5.38 0.10 0.50 " ICP 5.00 108 Magnesium 6.32 0.50 1.00 " ICP 5.00 126 Potassium 5.50 1.00 1.00 " ICP 5.00 110 LCS Dup (0060145-BSD1) Prepared: 06/01/20 Analyzed: 06/11/20 Analyzed: 06/11/20 Calcium 2.77 0.10 0.50 mg/l ICP 1.00 277 Sodium 3.98 0.04 0.50 "ICP 1.00 114 Boron 1.14 0.50 1.00 "ICP 1.00 112 Potassium 11.0 1.00 1.00 "ICP 1.00 110 LCS Dup (0060145-BSD2) Prepared: 06/01/20 Analyzed: 06/11/20 Analyzed: 06/11/20 Calcium 5.3				
Solium 5.41 0.04 0.50 " ICP 5.00 108 Calcium 5.38 0.10 0.50 " ICP 5.00 108 Magnesium 6.32 0.50 1.00 " ICP 5.00 126 Potassium 5.50 1.00 1.00 " ICP 5.00 126 Potassium 5.50 1.00 1.00 " ICP 5.00 100 Calcium 2.77 0.10 0.50 mg/l ICP 1.00 277 Softum 3.98 0.04 0.50 " ICP 1.00 398 Magnesium 1.14 0.50 1.00 " ICP 1.00 114 Boron 1.12 0.25 0.50 " ICP 1.00 110 Calcium 5.34 0.10 0.50 mg/l ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 107 Potassium 5.40 1.00				
Calcium 5.38 0.10 0.50 " ICP 5.00 108 Magnesium 6.32 0.50 1.00 " ICP 5.00 126 Potassium 5.50 1.00 1.00 " ICP 5.00 110 LCS Dup (0060145-BSD1) Prepared: 06/01/20 Analyzed: 06/11/20 Calcium 2.77 0.10 0.50 mg/l ICP 1.00 277 Sodium 3.98 0.04 0.50 " ICP 1.00 398 Magnesium 1.14 0.50 1.00 " ICP 1.00 114 Boron 1.12 0.25 0.50 " ICP 1.00 112 Potassium 1.0 1.00 1.00 " ICP 1.00 112 Potassium 5.34 0.10 0.50 mg/l ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 <	85-115			
Magnesium 6.32 0.50 1.00 " ICP 5.00 126 Potassium 5.50 1.00 1.00 " ICP 5.00 110 Prepared: 06/01/20 Analyzed: 06/11/20 Calcium 2.77 0.10 0.50 mg/l ICP 1.00 277 Sodium 3.98 0.04 0.50 " ICP 1.00 114 Boron 1.12 0.25 0.50 " ICP 1.00 112 Potassium 1.10 1.00 1.00 " ICP 1.00 112 Potassium 1.10 1.00 1.00 " ICP 1.00 112 Otassium 5.34 0.10 0.50 mg/l ICP 5.00 107 Calcium 5.34 0.10 1.00 " ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 <	85-115			
Magnesiun 6.32 0.30 1.00 1.00 1.00 1.00 1.00 1.20 Potassium 5.50 1.00 1.00 " ICP 5.00 110 LCS Dup (0060145-BSD1) Prepared: 06/01/20 Analyzed: 06/11/20 Analyzed: 06/11/20 Analyzed: 06/11/20 Calcium 2.77 0.10 0.50 mg/l ICP 1.00 277 Sodium 3.98 0.04 0.50 " ICP 1.00 398 Magnesium 1.14 0.50 1.00 " ICP 1.00 114 Boron 1.12 0.25 0.50 " ICP 1.00 112 Potassium 1.0 1.00 1.00 " ICP 1.00 112 Potassium 5.40 1.00 1.00 " ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 125 Sodium <t< td=""><td>85-115</td><td></td><td></td><td></td></t<>	85-115			
Ideasition 5.50 1.00 2.77 Softum 3.98 0.04 0.50 mg/l ICP 1.00 3.98 Magnesium 3.98 0.04 0.50 mg/l ICP 1.00 3.98 Magnesium 1.14 0.50 1.00 " ICP 1.00 1.14 0.50 mg/l ICP 1.00 1.14 0.50 mg/l ICP 1.00 1.12 0.25 0.50 " ICP 1.00 1.10 1.00 1.00 1.00 1.00 ICP 5.00 1.01 1.00 1.02 ICP 5.00 1.01 1.02 ICP 5.00 1.02 ICP 5.00 1.02 ICP 5.00 1.02 ICP 5.00 1.06 ICP <	85-115			
Calcium 2.77 0.10 0.50 mg/l ICP 1.00 277 Sodium 3.98 0.04 0.50 " ICP 1.00 398 Magnesium 1.14 0.50 " ICP 1.00 114 Boron 1.12 0.25 0.50 " ICP 1.00 112 Potassium 11.0 1.00 1.00 " ICP 1.00 112 Potassium 11.0 1.00 1.00 " ICP 1.00 110 LCS Dup (0060145-BSD2) Prepared: $06/01/20$ Analyzed: $06/11/20$ Calcium 5.34 0.10 0.50 mg/l ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 125 Sodium 6.26 0.50 1.00 " <td>85-115</td> <td></td> <td></td> <td></td>	85-115			
Solium 3.98 0.00 0.50 " ICP 1.00 398 Magnesium 1.14 0.50 1.00 " ICP 1.00 114 Boron 1.12 0.25 0.50 " ICP 1.00 112 Potassium 11.0 1.00 1.00 " ICP 1.00 112 Potassium 11.0 1.00 1.00 " ICP 1.00 110 LCS Dup (0060145-BSD2) Prepared: 06/01/20 Analyzed: 06/11/20 Analyzed: 06/11/20 Analyzed: 06/11/20 Calcium 5.34 0.10 0.50 mg/l ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 125 Sodium 5.29 0.04 0.50 " ICP 5.00 125 Sodium 944 1.00 12.5 mg/l ICP 954 17.0 Potassium 16.5 1.0				
Sodian 3.58 0.04 0.50 1CP 1.00 5.66 Magnesium 1.14 0.50 1.00 " ICP 1.00 114 Boron 1.12 0.25 0.50 " ICP 1.00 112 Potassium 11.0 1.00 1.00 " ICP 1.00 112 Potassium 11.0 1.00 1.00 " ICP 1.00 110 Prepared: 06/01/20 Analyzed: 06/11/20 Calcium 5.34 0.10 0.50 mg/1 ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 125 Sodium 5.29 0.04 0.50 " ICP 5.00 106 Duplicate (0060145-DUP1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Sodium	85-115	0.9	20	
Magnesium 1.14 0.50 1.00 1CP 1.00 114 Boron 1.12 0.25 0.50 " ICP 1.00 112 Potassium 11.0 1.00 1.00 " ICP 1.00 112 Potassium 11.0 1.00 1.00 " ICP 10.0 110 LCS Dup (0060145-BSD2) Prepared: 06/01/20 Analyzed: 06/11/20 Calcium 5.34 0.10 0.50 mg/l ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 125 Sodium 5.29 0.04 0.50 " ICP 5.00 106 Duplicate (0060145-DUP1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Sodium Sodium 944 1.00 12.5 mg/l ICP 0.46	85-115	0.4	20	
Boron 1.12 0.25 0.50 " ICP 1.00 112 Potassium 11.0 1.00 1.00 1.00 " ICP 1.00 112 Potassium 11.0 1.00 1.00 1.00 " ICP 1.00 110 LCS Dup (0060145-BSD2) Prepared: 06/01/20 Analyzed: 06/11/20 Calcium 5.34 0.10 0.50 mg/l ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 125 Sodium 6.26 0.50 1.00 " ICP 5.00 125 Sodium 9.44 1.00 12.5 mg/l ICP 5.00 106 Duplicate (0060145-DUP1) Source: 20D/672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Sodium 944 1.00 12.5 mg/l ICP 9.54 100 100 100 <	85-115	3	20	
Potassium 11.0 1.00 1.00 " ICP 10.0 110 LCS Dup (0060145-BSD2) Prepared: 06/01/20 Analyzed: 06/11/20 Calcium 5.34 0.10 0.50 mg/l ICP 5.00 107 Calcium 5.40 1.00 1.00 " ICP 5.00 107 Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP 5.00 125 Sodium 6.26 0.50 1.00 " ICP 5.00 125 Sodium 5.29 0.04 0.50 " ICP 5.00 106 Duplicate (0060145-DUP1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Sodium 944 1.00 12.5 mg/l ICP 954 Potassium 16.5 1.00 1.00 " ICP 0.46 Boron 0.47 0.25 0.50 " ICP 355 Calcium	85-115	0.2	20	
Calcium 5.34 0.10 0.50 mg/l ICP 5.00 107 Potassium 5.40 1.00 1.00 "ICP 5.00 108 Boron ND 0.25 0.50 "ICP 5.00 108 Boron ND 0.25 0.50 "ICP 5.00 125 Sodium 6.26 0.50 1.00 "ICP 5.00 125 Sodium 5.29 0.04 0.50 "ICP 5.00 106 Duplicate (0060145-DUP1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Sodium 944 1.00 12.5 mg/l ICP 954 Potassium 16.5 1.00 1.00 "ICP 17.0 0.46 Magnesium 352 2.50 5.00 "ICP 355 Calcium 538 0.50 2.50 "ICP 546 Matrix Spike (0060145-MS1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20	85-115	0.09	20	
Potassium 5.40 1.00 1.00 " ICP 5.00 108 Boron ND 0.25 0.50 " ICP				
No.astan 3.40 1.00	85-115	0.8	20	
Join IAD 0.23 0.00 ICP Magnesium 6.26 0.50 1.00 " ICP 5.00 125 Sodium 5.29 0.04 0.50 " ICP 5.00 106 Duplicate (0060145-DUP1) Source: 20D/0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Sodium 944 1.00 12.5 mg/l ICP 954 Potassium 16.5 1.00 1.00 " ICP 954 Potassium 16.5 1.00 1.00 " ICP 0.46 Magnesium 352 2.50 5.00 " ICP 355 Calcium 538 0.50 2.50 " ICP 546 Matrix Spike (0060145-MS1) Source: 20D/0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Magnesium 317 2.50 5.00 mg/l ICP 1.00 355 NR	85-115	2	20	
Magnesium 0.20 0.50 1.00 1CP 5.00 125 Sodium 5.29 0.04 0.50 " ICP 5.00 106 Duplicate (0060145-DUP1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Sodium 944 1.00 12.5 mg/l ICP 954 Potassium 16.5 1.00 1.00 " ICP 954 Boron 0.47 0.25 0.50 " ICP 0.46 Magnesium 352 2.50 5.00 " ICP 355 Calcium 538 0.50 2.50 " ICP 546 Matrix Spike (0060145-MS1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Magnesium 317 2.50 5.00 mg/l ICP 1.00 355 NR	85-115		20	
Duplicate (0060145-DUP1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Sodium 944 1.00 12.5 mg/l ICP 954 Potassium 16.5 1.00 1.00 " ICP 954 Boron 0.47 0.25 0.50 " ICP 0.46 Magnesium 352 2.50 5.00 " ICP 355 Calcium 538 0.50 2.50 " ICP 546 Matrix Spike (0060145-MS1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Magnesium 317 2.50 5.00 mg/l ICP 1.00 355	85-115	0.8	20	
Sodium 944 1.00 12.5 mg/l ICP 954 Potassium 16.5 1.00 1.00 " ICP 17.0 Boron 0.47 0.25 0.50 " ICP 0.46 Magnesium 352 2.50 5.00 " ICP 355 Calcium 538 0.50 2.50 " ICP 546 Matrix Spike (0060145-MS1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Magnesium 317 2.50 5.00 mg/l ICP 1.00 355 NR	85-115	2	20	
Potassium 16.5 1.00 1.00 " ICP 17.0 Boron 0.47 0.25 0.50 " ICP 0.46 Magnesium 352 2.50 5.00 " ICP 355 Calcium 538 0.50 2.50 " ICP 546 Matrix Spike (0060145-MS1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Magnesium 317 2.50 5.00 mg/l ICP 1.00 355 NR				
Nonstant 10.5 1.00 100 100 100 17.0 Boron 0.47 0.25 0.50 " ICP 0.46 Magnesium 352 2.50 5.00 " ICP 355 Calcium 538 0.50 2.50 " ICP 546 Matrix Spike (0060145-MS1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Magnesium 317 2.50 5.00 mg/l ICP 1.00 355 NR		1	20	
Magnesium 352 2.50 5.00 " ICP 3.40 Magnesium 352 2.50 5.00 " ICP 355 Calcium 538 0.50 2.50 " ICP 546 Matrix Spike (0060145-MS1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Magnesium 317 2.50 5.00 mg/l ICP 1.00 355 NR		3	20	
Magnesium 532 2.50 5.00 ICP 533 Calcium 538 0.50 2.50 " ICP 546 Matrix Spike (0060145-MS1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Magnesium 317 2.50 5.00 mg/l ICP 1.00 355 NR		0.7	20	J
Matrix Spike (0060145-MS1) Source: 20D0672-01 Prepared: 06/01/20 Analyzed: 06/02/20 Magnesium 317 2.50 5.00 mg/l ICP 1.00 355 NR		0.8	20	
Magnesium 317 2.50 5.00 mg/l ICP 1.00 355 NR		2	20	
	75-125			QM-4X
Calcium 516 0.50 2.50 " ICP 1.00 546 NR	75-125			QM-4X
Boron 1.41 0.25 0.50 " ICP 1.00 0.46 95	75-125			
Sodium 867 0.20 2.50 " ICP 1.00 954 NR	75-125			QM-4X
Potassium 26.4 1.00 1.00 " ICP 10.0 17.0 94	75-125			



Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte Batch 0060145	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (0060145-MSD1)	s	ource: 2	0D0672-01		Prepared:	06/01/20	Analyzed: (6/02/20				
Boron	1.37	0.25	0.50	mg/l	ICP	1.00	0.46	90	75-125	3	20	
Calcium	496	0.50	2.50		ICP	1.00	546	NR	75-125	4	20	QM-4X
Magnesium	306	2.50	5.00		ICP	1.00	355	NR	75-125	4	20	QM-4X
Potassium	26.8	1.00	1.00		ICP	10.0	17.0	98	75-125	2	20	
Sodium	828	0.20	2.50		ICP	1.00	954	NR	75-125	5	20	QM-4X



			Reporting		A., 1 ·	Spike	Source		%REC		RPD	
Analyte	Result	MDL	Limit	Units	Analyst	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 0042230												
Blank (0042230-BLK1)					Prepared:	04/22/20	Analyzed:	04/23/20				
Phosphorus, Total	ND	0.02	0.05	mg/l	UM							
LCS (0042230-BS1)					Prepared:	04/22/20	Analyzed:	04/23/20				
Phosphorus, Total	0.49	0.02	0.05	mg/l	UM	0.500		98	90-110			
LCS Dup (0042230-BSD1)					Prepared:	04/22/20	Analyzed:	04/23/20				
Phosphorus, Total	0.49	0.02	0.05	mg/l	UM	0.500		99	90-110	0.6	20	
Duplicate (0042230-DUP1)	s	ource: 2	0D0225-01		Prepared:	04/22/20	Analyzed:	04/23/20				
Phosphorus, Total	0.08	0.02	0.05	mg/l	UM		0.07			11	20	
Matrix Spike (0042230-MS1)	S	ource: 2	0D0225-01	_	Prepared:	04/22/20	Analyzed:	04/23/20		_	_	
Phosphorus, Total	1.05	0.04	0.10	mg/l	UM	1.00	0.07	98	90-110			
Matrix Spike Dup (0042230-MSD1)	s	ource: 2	0D0225-01		Prepared:	04/22/20	Analyzed:	04/23/20				
Phosphorus, Total	1.07	0.04	0.10	mg/l	UM	1.00	0.07	100	90-110	2	20	
Batch 0042231												
Duplicate (0042231-DUP1)	s	ource: 2	0D0614-01		Prepared &	& Analyze	ed: 04/21/20)				
Turbidity	0.10	0.05	0.05	NTU	NLF	<u>.</u>	0.10			0	20	
Reference (0042231-SRM1)					Prepared &	& Analyze	ed: 04/21/20)				
Turbidity	4.20	0.05	0.05	NTU	NLF	4.50		93	84.7-131			
Batch 0042234												
Duplicate (0042234-DUP1)	s	ource: 2	0D0672-01		Prepared &	& Analyze	ed: 04/21/20)				
pH at 25 deg C	7.04	0.01	0.10	pH Units	-		7.03			0.3	20	



			Reporting			Spike	Source		%REC		RPD	
Analyte	Result	MDL	Limit	Units	Analyst	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 0042234												
Reference (0042234-SRM1)					Prepared	& Analyze	d: 04/21/20					
pH at 25 deg C	6.50	0.01	0.10	pH Units	NLF	6.39		102	96.87-103.12			
Batch 0042237												
Duplicate (0042237-DUP1)	S	ource: 2	DD0607-01		Prepared	& Analyze	ed: 04/22/20					
Specific Conductance (EC)	5740	1.00	1.00	umhos/c m	LBH		5770			0.5	20	
Reference (0042237-SRM1)					Prepared	& Analyze	d: 04/22/20					
Specific Conductance (EC)	445	1.00	1.00	umhos/c m	LBH	444		100	90.09-110.13			
Batch 0042330												
Blank (0042330-BLK1)					Prepared	& Analyze	d: 04/22/20					
Orthophosphate as P	ND	0.007	0.05	mg/l	LBH							
LCS (0042330-BS1)					Prepared	& Analyze	d: 04/22/20					
Orthophosphate as P	0.49	0.007	0.05	mg/l	LBH	0.500		99	80-120			
LCS Dup (0042330-BSD1)					Prepared	& Analyze	d: 04/22/20					
Orthophosphate as P	0.49	0.007	0.05	mg/l	LBH	0.500		98	80-120	0.6	20	
Duplicate (0042330-DUP1)	S	ource: 2	0D0615-05		Prepared	& Analyze	d: 04/22/20					
Orthophosphate as P	0.31	0.007	0.05	mg/l	LBH		0.32			1	20	
Matrix Spike (0042330-MS1)	S	ource: 2	DD0615-05		Prepared	& Analyze	d: 04/22/20					
Orthophosphate as P	0.81	0.007	0.05	mg/l	LBH	0.500	0.32	98	80-120			



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0042330												
Matrix Spike Dup (0042330-MSD1)		auree. 7)D0615-05		Prepared	& Analyza	ed: 04/22/20					
Orthophosphate as P	0.80	0.007	0.05	mg/l	LBH	0.500	0.32	97	80-120	0.5	20	
Batch 0042356												
Duplicate (0042356-DUP1)	s	ource: 20	D0683-03		Prepared a	& Analyze	ed: 04/23/20					
Hydroxide Alkalinity	ND	5	5	mg CaCO3/ L	LBH		ND				20	
Carbonate Alkalinity	ND	5	5	"	LBH		ND				20	
Bicarbonate Alkalinity	ND	5	5	"	LBH		ND				20	
Total Alkalinity	300	5	5	"	LBH		280			7	20	
Reference (0042356-SRM1)					Prepared a	& Analyze	ed: 04/23/20					
Hydroxide Alkalinity	ND	5	5	mg CaCO3/ L	LBH	0.00			0-0			
Carbonate Alkalinity	ND	5	5	"	LBH	0.00			0-0			
Bicarbonate Alkalinity	32	5	5	"	LBH	138		23	55.03-145.69			
Total Alkalinity	32	5	5	"	LBH	138		23	55.03-145.69			
Batch 0042414												
Blank (0042414-BLK1)					Prepared a	& Analyze	ed: 04/24/20					
Chloride	ND	0.05	0.05	mg/l	NLF							
LCS (0042414-BS1)					Prepared a	& Analyze	ed: 04/24/20					
Chloride	180	0.05	0.05	mg/l	NLF	200		90	80-120			
LCS Dup (0042414-BSD1)					Prepared a	& Analyze	ed: 04/24/20					
Chloride	190	0.05	0.05	mg/l	NLF	200		95	80-120	5	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0042414												
Duplicate (0042414-DUP1)	S	ource: 20	0D0702-01		Prepared	& Analyze	ed: 04/24/20					
Chloride	1820	0.05	0.05	mg/l	NLF		1820			0	20	
Matrix Spike (0042414-MS1)	s	ource: 20	0D0702-01		Prepared	& Analyze	ed: 04/24/20					
Chloride	2050	0.06	0.06	mg/l	NLF	200	1820	115	80-120			
Matrix Spike Dup (0042414-MSD1)	S	ource: 20	0D0702-01		Prepared	& Analyze	ed: 04/24/20					
Chloride	2040	0.06	0.06	mg/l	NLF	200	1820	109	80-120	0.6	20	
Reference (0042414-SRM1)					Prepared	& Analyze	ed: 04/24/20					
Chloride	48.0	0.05	0.05	mg/l	NLF	47.7		101	86.58-113.83			
Reference (0042414-SRM2)					Prepared	& Analyze	ed: 04/24/20					
Chloride	49.0	0.05	0.05	mg/l	NLF	47.7		103	86.58-113.83			
Batch 0042415												
Blank (0042415-BLK1)					Prepared	& Analyze	ed: 04/22/20					
Nitrite as N	ND	0.007	0.05	mg/l	UM							
LCS (0042415-BS1)					Prepared	& Analyze	ed: 04/22/20					
Nitrite as N	0.10	0.007	0.05	mg/l	UM	0.100		102	80-120			
LCS Dup (0042415-BSD1)					Prepared	& Analyze	ed: 04/22/20					
Nitrite as N	0.10	0.007	0.05	mg/l	UM	0.100		102	80-120	0	20	
Duplicate (0042415-DUP1)	s	ource: 20	0D0635-01		Prepared	& Analyze	ed: 04/22/20					
Nitrite as N	ND	0.007	0.05	mg/l	UM		ND				20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0042415												
Matrix Spike (0042415-MS1)	S	ource: 20	D0635-01		Prepared a	& Analyze	ed: 04/22/20					
Nitrite as N	0.10	0.007	0.05	mg/l	UM	0.100	ND	98	80-120			
Matrix Spike Dup (0042415-MSD1)	s	ource: 20	D0635-01		Prepared a	& Analyze	ed: 04/22/20					
Nitrite as N	0.10	0.007	0.05	mg/l	UM	0.100	ND	99	80-120	1	20	
Batch 0042758												
Blank (0042758-BLK1)					Prepared:	04/27/20	Analyzed: ()4/29/20				
Total Dissolved Solids	ND	1.0	20.0	mg/l	NLF							
Duplicate (0042758-DUP1)	s	ource: 20	D0673-02		Prepared:	04/27/20	Analyzed: ()4/29/20				
Total Dissolved Solids	598	1.0	20.0	mg/l	NLF		603			0.8	20	
Reference (0042758-SRM1)					Prepared:	04/27/20	Analyzed: ()4/29/20				
Total Dissolved Solids	342	1.0	20.0	mg/l	NLF	328		104	86.28-113.72			
Batch 0042937												
Blank (0042937-BLK1)					Prepared a	& Analyze	ed: 04/29/20	1				
Fluoride	ND	0.031	0.100	mg/l	LBH							
LCS (0042937-BS1)					Prepared a	& Analyze	ed: 04/29/20					
Fluoride	0.980	0.031	0.100	mg/l	LBH	1.00		98	80-120			
LCS Dup (0042937-BSD1)					Prepared a	& Analyze	ed: 04/29/20					
Fluoride	0.980	0.031	0.100	mg/l	LBH	1.00		98	80-120	0	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0042937												
Duplicate (0042937-DUP1)	s	ource: 20	D0856-01		Prepared	& Analyze	d: 04/29/20					
Fluoride	0.606	0.031	0.100	mg/l	LBH		0.610			0.7	20	
Matrix Spike (0042937-MS1)	s	ource: 20	D0856-01		Prepared	& Analyze	d: 04/29/20					
Fluoride	1.60	0.062	0.200	mg/l	LBH	1.00	0.610	99	80-120			
Matrix Spike Dup (0042937-MSD1)	s	ource: 20)D0856-01		Prepared	& Analyze	d: 04/29/20					
Fluoride	1.60	0.062	0.200	mg/l	LBH	1.00	0.610	99	80-120	0	20	
Batch 0050447												
Blank (0050447-BLK1)					Prepared	& Analyze	ed: 05/05/20					
Ammonia as N	ND	0.02	0.10	mg/l	UM							
LCS (0050447-BS1)					Prepared	& Analyze	d: 05/05/20					
Ammonia as N	0.96	0.02	0.10	mg/l	UM	1.00		96	90-110			
LCS Dup (0050447-BSD1)					Prepared	& Analyze	d: 05/05/20					
Ammonia as N	0.97	0.02	0.10	mg/l	UM	1.00		97	90-110	1	20	
Duplicate (0050447-DUP1)	S	ource: 20	D0865-03		Prepared	& Analyze	d: 05/05/20					
Ammonia as N	0.06	0.02	0.10	mg/l	UM		0.06			2	20	J
Matrix Spike (0050447-MS1)	s	ource: 20	D0865-03		Prepared	& Analyze	d: 05/05/20					
Ammonia as N	2.01	0.04	0.20	mg/l	UM	2.00	0.06	98	90-110			
Matrix Spike Dup (0050447-MSD1)	s	ource: 20	D0865-03		Prepared	& Analyze	d: 05/05/20					
Ammonia as N	2.00	0.04	0.20	mg/l	UM	2.00	0.06	97	90-110	0.6	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0050738												
Blank (0050738-BLK1)					Prepared	& Analyze	ed: 05/07/20					
Nitrate as N	ND	0.009	0.05	mg/l	UM							
LCS (0050738-BS1)					Prepared	& Analyze	ed: 05/07/20					
Nitrate as N	0.49	0.009	0.05	mg/l	UM	0.500		99	90-110			
LCS Dup (0050738-BSD1)					Prepared	& Analyze	ed: 05/07/20					
Nitrate as N	0.50	0.009	0.05	mg/l	UM	0.500		99	90-110	0.4	20	
Duplicate (0050738-DUP1)	s	ource: 2	0D0730-01		Prepared	& Analyze	ed: 05/07/20					
Nitrate as N	0.02	0.009	0.05	mg/l	UM		0.02			5	20	J
Matrix Spike (0050738-MS1)	s	ource: 2	0D0730-01		Prepared	& Analyze	ed: 05/07/20					
Nitrate as N	1.00	0.02	0.10	mg/l	UM	1.00	0.02	98	90-110			
Matrix Spike Dup (0050738-MSD1)	s	ource: 2	0D0730-01		Prepared	& Analyze	ed: 05/07/20					
Nitrate as N	1.02	0.02	0.10	mg/l	UM	1.00	0.02	100	90-110	1	20	
Batch 0051246												
Blank (0051246-BLK1)					Prepared	& Analyze	ed: 05/12/20					
Sulfate as SO4	2.0	1.0	5.0	mg/l	LBH							J
LCS (0051246-BS1)					Prepared	& Analyze	ed: 05/12/20					
Sulfate as SO4	9.4	1.0	5.0	mg/l	LBH	10.0		94	80-120			
LCS Dup (0051246-BSD1)					Prepared	& Analyze	ed: 05/12/20					
Sulfate as SO4	9.3	1.0	5.0	mg/l	LBH	10.0		93	80-120	0.3	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
	Result	MDL			-							
Batch 0051246												
Duplicate (0051246-DUP1)	S	ource: 2	0D0672-03		Prepared a	& Analyze	d: 05/12/20	1				
Sulfate as SO4	351	25.0	125	mg/l	LBH		346			1	20	
Matrix Spike (0051246-MS1)	S	ource: 2	0D0672-03		Prepared a	& Analyze	d: 05/12/20)				
Sulfate as SO4	607	25.0	125	mg/l	LBH	250	346	104	80-120			
Matrix Spike Dup (0051246-MSD1)	s	ource: 2	0D0672-03		Prepared a	& Analyze	d: 05/12/20)				
Sulfate as SO4	612	25.0	125	mg/l	LBH	250	346	106	80-120	0.7	20	
Batch 0052751												
Blank (0052751-BLK1)					Prepared:	05/27/20	Analyzed:	05/28/20				
Hardness (Total)	ND	10	10	mg CaCO3/ L	ICP							
Duplicate (0052751-DUP1)	s	ource: 2	DD0880-02		Prepared:	05/27/20	Analyzed: (05/28/20				
Hardness (Total)	925	10	10	mg CaCO3/ L	ICP		983			6	20	
Batch 0060145												
Blank (0060145-BLK1)					Prepared:	06/01/20	Analyzed: (06/02/20				
Hardness (Dissolved)	ND	10	10	mg CaCO3/ L	ICP							
Duplicate (0060145-DUP1)	s	ource: 2	DD0672-01		Prepared:	06/01/20	Analyzed: (06/02/20				
Hardness (Dissolved)	2790	10	10	mg CaCO3/ L	ICP		2830			1	20	



Notes and Definitions

W-02	The sample for nitrate analysis was preserved with H2SO4 after the nitrite portion of the analysis was completed to extend the holding time for the sample. Nitrate results are corrected for the nitrite contribution per the method.
QR-06	The RPD value was exceeded due to the sample concentration being less than 10 times the reporting limit. The QC batch was accepted based on the LCS or QCS results.
QR-04	The RPD between the sample and sample duplicate is not valid since both results are below the reporting limit for this analyte.
QM-4X	The spike recovery was outside of the QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
J	Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag).
HT-15	This sample was received outside of the EPA's recommended 15 minute holding time for this analysis. However, the sample was analyzed immediately upon receipt.
ND	Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
NR	Not Reported
dry	Sample results reported on a dry weight basis (if indicated in units column)
RPD	Relative Percent Difference

MDL Method detection limit (indicated per client's request)



CHAIN-OF-CUSTODY RECORD	0	0	0	T C	– EnviroMatrix	iroN	latr	ix.	(A	nal	Analytical, Inc.	al,	Ine			1		Page	-	of
EMA LOG #:	Π)	4340 Vi	4340 Viewridge Ave., Ste. A - San Diego, CA 92123 - Phone (858) 560-7717 - Fax (858) 560-7763	Ave., S	te. A -	San D	iego, C	A 921	23 - PI	one (8	58) 56	0-771	7 - Fao	: (858)	560-5	1763			
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10 Matrix Codes: A = Air, DW = Drinking Water, GW = Groundwater SW = Storm Water	SW = Storm	Water								-	╋	i			┝╌┝				\mathbb{H}	H	\Box	Π
$WW \approx Wastewater, S = Soil, SED = Sediment, SD = Solid, T = Tissue, O = Oil, L = Liquid$, un Juuin le, O = Oil, L	= Liquid			Signature				R				DATE/TIME	ų			f	RECE	RECEIVED BY	ЗҮ		
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Project/Sample Comments: Nathan Reynol	leyri	A	ÿ	M.G	0		ANYYNOLDSQ GOOSE REACHMEN	۲×	0/0	200	0	sol	3 S	ie	Ş	Ž	Ť	S	رە ب	٤		
¹ Additional costs may apply. Please note there is a \$35 minimum charge for all clients ² EMA reserves the right to return one complex that the start of a set of the set of t	arge for all cli	ents.																				٦
Lots the rest we regul to return any samples that do not match our waste profile. Note: Even relations amples that do not match our waste profile. Note: Even elimpting samples to the services requested on this COC form and any additional analyses performed on this project. Payment for services is due within 30 days from date of invoice. Samples will be discoved of 3	waste protile. for the service	s requested	on this CO	C form and ar	y additions	l analyses	perform	ed on thi	is projec	rt. Payn	tent for	services	is due v	áthin 3() davs f	rom dat	e of inv	oice S	amoles	be d	snosed	cf 7

work is subject to EMA's terms and conditions.

EnviroMatrix

Analytical Services Quotation

Analytical, Inc.

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41 1250 J- P

GMGP Water Quality 2020 Geoscience Support Services, Inc. Nathan Reynolds

Bid Date: **Bid Expires:** Prices Expire:

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04/17/2020 04/17/2021 04/17/2021

	(THE INCOMENTATION OF A CONTRACT			TAT	L'Initia	Extended
Matrix	Parameters	Method	14 11	(days)	Price	Price
Water	Aggressive Index (calc)(LAB)		5	7	\$5.00	\$25.00
Water	Alkalinity (All Forms)	lvaries	5	7	\$25.00	\$125.00
Water	Hexavalent Chromium	EPA 218.6		7	\$105.00	\$525.00
Water	Langelier Index (Calc)		CD	7	\$5.00 	\$25.00
Water	Barium (Total)	EPA 200.8	5	7	\$10.00	\$50.00
Water	Boron (Total)	EPA 200.7	5		\$10.00	\$50.00
Water	Calcium (Total)	EPA 200.7	5	7	\$10.00	\$50.00
Water	Chromium (Total)	EPA 200.8	5	And a second	\$10.00	\$50.00
Water	Copper (Total)	EPA 200.8	5	free and the second	\$10.00	\$50.00
Waler	fron (Total)	EPA 200.8	Ċ.	171	\$10.00	\$50.00
Water	Magnesium (Total)	EPA 200.7	5	7	\$10.00	\$50.00
Nater	Manganese (Total)	EPA 200.8		*	\$10.00	\$50.00
Nater	Potassium (Total)	EPA 200.7	ся С.Я		\$10.00	\$50.00
Nater	Silicon (Total)	EPA 200.7	5	7	\$35.00	\$175.00
Nater	Sodium (Totai)	EPA 200.7	5		\$10.00	\$50.00
Vater	Strontium (Total)	EPA 200.7	5	7	\$45.00	\$225.00
Vater	Zinc (Total)	EPA 200.8	40	1	\$10.00	\$50.00
Vater	Ammonia as N	EPA 360.1	6	7	\$25.00ll	\$125.00
Vater	Chloride	SM4500 CI C	a and a second sec	7	\$15.00	\$75.00
Vater	Fluoride	SM4500 F C	5	7	\$20.00	\$100.00
Vater	Hardness	EPA 200.7	5	7	\$15.00	\$75.00
Vater	Nitrate as N	EPA 365.1	5	7	\$25.00 	\$125.00
Vater	Nitrite as N	SM4600 NO2 B	6	7	\$25.00	\$125.00
Vater	Orthophosphate as P	SM4500 P E	- B-	7	\$15.00	\$75.00
Vater	pH in water	SM4500-H+ B	5	7	\$10.00	\$50.00
Vater	Specific Conductance (EC)	SM2510 B	5	7	\$15.00	\$75.00
/ater	Sulfate	SM4500 SO4 E	5	7	\$15.00	\$75.00
Valer	Total Dissolved Solids	SM2540 C	6		\$15.00	\$75.00
Vater	Total phosphate as P	EPA 365.1	5		\$20.00	\$100.00

Mark Allen Rein

 Project Magagelewridge Avenue, Suite A • San Diego, California 92123 • (858) 560-7717 • Pax (858) 560-7763

 EnviroMatrix Analytical, Inc.
 Analytical Chemistry Laboratory
 Pag

Page 1 of 2

EnviroMatrix



Analytical, Inc.

23 October 2020

Geoscience Support Services, Inc. Attn: Nathan Reynolds PO Box 220 Claremont, CA 91711 EMA Log #: 2010485

Project: GMGP Water Quality 2020

Enclosed are the results of analyses for samples received by the laboratory on 09/16/20 14:35. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that this data is in compliance both technically and for completeness.

Kland S. Que

Leland S. Pitt Laboratory Director

CA ELAP Certification #: 2564

4340 Viewridge Avenue, Suite A - San Diego, California 92123 - (858) 560-7717 - Fax (858) 560-7763 Analytical Chemistry Laboratory

EMA Log #: 2010485

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
P2	2010485-01	Grnd-Water	09/16/20 09:40	09/16/20 14:35
P11B	2010485-02	Grnd-Water	09/16/20 10:45	09/16/20 14:35
P11D	2010485-03	Grnd-Water	09/16/20 11:15	09/16/20 14:35
GUNR	2010485-04	Grnd-Water	09/16/20 12:20	09/16/20 14:35
DS	2010485-05	Grnd-Water	09/16/20 13:55	09/16/20 14:35



EMA Log #: 2010485

Total Metals by EPA 200 Series Methods

			Donarting					Sampla Proported		
Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P2 (2010485-01) Grnd-Water S	Sampled: 09/16/20	09:40 Re	ceived: 09/16/2	20 14:35						
Boron	0.76	0.25	0.50	mg/l	1	ICP	0092440	09/24/20 15:36 09/28/20 16:08	EPA 200.7	
Barium	0.070	0.0002	0.010	"	"	MG	0092945	09/29/20 15:09 09/30/20 16:14	EPA 200.8	
Calcium	ND	1.00	5.00	"	10	ICP	0092440	09/24/20 15:36 09/30/20 13:24	EPA 200.7	
Chromium	0.0002	0.0002	0.005	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:14	EPA 200.8	J
Copper	0.004	0.0002	0.010	"	"	MG	"	09/29/20 15:09 09/30/20 16:14	"	J
Iron	0.453	0.002	0.050	"	"	MG	"	09/29/20 15:09 09/30/20 16:14	"	
Potassium	5.22	1.00	1.00	"	"	ICP	0092440	09/24/20 15:36 09/28/20 16:08	EPA 200.7	
Magnesium	ND	1.00	5.00	"	10	ICP	"	09/24/20 15:36 09/30/20 13:24	"	
Manganese	3.36	0.001	0.050	"	"	MG	0092945	09/29/20 15:09 09/30/20 17:06	EPA 200.8	
Sodium	2.78	0.40	5.00	"	"	ICP	0092440	09/24/20 15:36 09/30/20 13:24	EPA 200.7	J
Zinc	0.004	0.0003	0.020	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:14	EPA 200.8	J
P11B (2010485-02) Grnd-Water	Sampled: 09/16/2	20 10:45	Received: 09/1	6/20 14:	35					
Boron	0.73	0.25	0.50	mg/l	1	ICP	0092440	09/24/20 15:36 09/28/20 16:32	EPA 200.7	
Barium	0.348	0.0002	0.010	"	"	MG	0092945	09/29/20 15:09 09/30/20 16:25	EPA 200.8	
Calcium	107	1.00	5.00	"	10	ICP	0092440	09/24/20 15:36 09/30/20 13:27	EPA 200.7	
Chromium	0.0002	0.0002	0.005	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:25	EPA 200.8	J
Copper	0.0008	0.0002	0.010	"	"	MG	"	09/29/20 15:09 09/30/20 16:25	"	J
Iron	0.305	0.002	0.050	"	"	MG	"	09/29/20 15:09 09/30/20 16:25	"	
Potassium	70.0	1.00	1.00	"	"	ICP	0092440	09/24/20 15:36 09/28/20 16:31	EPA 200.7	
Magnesium	143	1.00	5.00	"	10	ICP	"	09/24/20 15:36 09/30/20 13:27	"	



EMA Log #: 2010485

Total Metals by EPA 200 Series Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P11B (2010485-02) Grnd-Water	Sampled: 09/16/	20 10:45	Received: 09/1	16/20 14:	35					
Manganese	0.127	0.0001	0.005	mg/l	1	MG	0092945	09/29/20 15:09 09/30/20 16:25	EPA 200.8	
Sodium	576	0.40	5.00	"	10	ICP	0092440	09/24/20 15:36 09/30/20 13:27	EPA 200.7	
Zinc	0.002	0.0003	0.020	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:25	EPA 200.8	J
P11D (20I0485-03) Grnd-Water	Sampled: 09/16/	20 11:15	Received: 09/1	6/20 14:	35					
Boron	0.53	0.25	0.50	mg/l	1	ICP	0092440	09/24/20 15:36 09/28/20 16:38	EPA 200.7	
Barium	0.357	0.0002	0.010	"	"	MG	0092945	09/29/20 15:09 09/30/20 16:27	EPA 200.8	
Calcium	142	1.00	5.00	"	10	ICP	0092440	09/24/20 15:36 09/30/20 13:29	EPA 200.7	
Chromium	ND	0.0002	0.005	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:27	EPA 200.8	
Copper	0.0008	0.0002	0.010	"	"	MG	"	09/29/20 15:09 09/30/20 16:27	"	J
Iron	1.15	0.002	0.050	"	"	MG	"	09/29/20 15:09 09/30/20 16:27	"	
Potassium	30.5	1.00	1.00	"	"	ICP	0092440	09/24/20 15:36 09/28/20 16:37	EPA 200.7	
Magnesium	123	1.00	5.00	"	10	ICP	"	09/24/20 15:36 09/30/20 13:30	"	
Manganese	0.476	0.0001	0.005	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:27	EPA 200.8	
Sodium	514	0.40	5.00	"	10	ICP	0092440	09/24/20 15:36 09/30/20 13:29	EPA 200.7	
Zinc	0.001	0.0003	0.020	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:27	EPA 200.8	J
GUNR (2010485-04) Grnd-Wate	r Sampled: 09/1	6/20 12:20	Received: 09	0/16/20 1	4:35					
Boron	0.38	0.25	0.50	mg/l	1	ICP	0092440	09/24/20 15:36 09/28/20 16:43	EPA 200.7	J
Barium	0.093	0.0002	0.010	"	"	MG	0092945	09/29/20 15:09 09/30/20 16:28	EPA 200.8	
Calcium	369	1.00	5.00	"	10	ICP	0092440	09/24/20 15:36 09/30/20 13:32	EPA 200.7	
Chromium	ND	0.0002	0.005	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:28	EPA 200.8	



EMA Log #: 2010485

Total Metals by EPA 200 Series Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
GUNR (2010485-04) Grnd-Water	Sampled: 09/1	6/20 12:20	Received: 09	/16/20 1	4:35					
Copper	0.002	0.0002	0.010	mg/l	1	MG	0092945	09/29/20 15:09 09/30/20 16:28	EPA 200.8	J
Iron	0.195	0.002	0.050	"	"	MG	"	09/29/20 15:09 09/30/20 16:28	"	
Potassium	13.0	1.00	1.00	"	"	ICP	0092440	09/24/20 15:36 09/28/20 16:42	EPA 200.7	
Magnesium	224	1.00	5.00	"	10	ICP	"	09/24/20 15:36 09/30/20 13:32	"	
Manganese	1.99	0.001	0.050	"	"	MG	0092945	09/29/20 15:09 09/30/20 17:08	EPA 200.8	
Sodium	682	0.40	5.00	"	"	ICP	0092440	09/24/20 15:36 09/30/20 13:32	EPA 200.7	
Zinc	0.003	0.0003	0.020	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:28	EPA 200.8	J
DS (2010485-05) Grnd-Water San	npled: 09/16/20	13:55 Re	ceived: 09/16/	20 14:35	i					
Boron	0.96	0.25	0.50	mg/l	1	ICP	0092440	09/24/20 15:36 09/28/20 16:47	EPA 200.7	
Barium	0.132	0.0002	0.010	"	"	MG	0092945	09/29/20 15:09 09/30/20 16:30	EPA 200.8	
Calcium	457	1.00	5.00	"	10	ICP	0092440	09/24/20 15:36 09/30/20 14:12	EPA 200.7	
Chromium	ND	0.0002	0.005	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:30	EPA 200.8	
Copper	0.001	0.0002	0.010	"	"	MG		09/29/20 15:09 09/30/20 16:30	"	J
Iron	0.700	0.002	0.050	"	"	MG	"	09/29/20 15:09 09/30/20 16:30	"	
Potassium	34.0	1.00	1.00	"	"	ICP	0092440	09/24/20 15:36 09/28/20 16:47	EPA 200.7	
Magnesium	139	1.00	5.00	"	10	ICP	"	09/24/20 15:36 09/30/20 14:12	"	
Manganese	1.00	0.0001	0.005	"	1	MG	0092945	09/29/20 15:09 09/30/20 16:30	EPA 200.8	
Sodium	900	0.40	5.00	"	10	ICP	0092440	09/24/20 15:36 09/30/20 14:12	EPA 200.7	



Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P2 (2010485-01) Grnd-Water	Sampled: 09/16/20	09:40 R	eceived: 09/16/	/20 14:35						
Bicarbonate Alkalinity	556	5	5	mg CaCO3/	1	JB	0092234	09/21/20 13:00 09/21/20 13:00	SM2320B	
Carbonate Alkalinity	ND	5	5	L "	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	
Hydroxide Alkalinity	ND	5	5	"	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	
Total Alkalinity	556	5	5	"	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	
Ammonia as N	0.08	0.02	0.10	mg/l	"	UM	0091123	10/05/20 11:30 10/05/20 17:23	EPA 350.1	J
Chloride	2480	0.05	0.05	"	"	SF	0091821	09/17/20 10:00 09/17/20 10:00	SM4500 Cl B	
Specific Conductance (EC)	8060	1.00	1.00	umhos/c m	"	SF	0092236	09/22/20 09:00 09/22/20 09:00	SM2510 B	
Fluoride	0.408	0.031	0.100	mg/l	"	SF	0092349	09/22/20 12:00 09/23/20 11:03	SM4500 F C	
Hardness (Total)	ND	10	10	mg CaCO3/ L	"	NLF	0092440	09/24/20 15:36 09/30/20 17:01	EPA 200.7	
Nitrate as N	4.25	0.18	1.00	mg/l	20	UM	0092422	09/29/20 17:00 09/29/20 17:10	EPA 353.2	W-02
Nitrite as N	0.45	0.01	0.10	"	2	SF	0092167	09/18/20 09:00 09/18/20 09:00	SM4500 NO2 B	
pH at 25 deg C	7.07	0.01	0.10	pH Units	1	JB	0091742	09/16/20 15:35 09/16/20 15:35	SM4500-H+ B	HT-15
Orthophosphate as P	0.62	0.007	0.05	mg/l	"	UM	0092027	09/16/20 17:45 09/16/20 17:45	SM4500 P E	
Phosphorus, Total	0.58	0.04	0.10	"	2	UM	0092257	09/22/20 11:00 09/23/20 20:49	EPA 365.1	
Total Dissolved Solids	5990	1.0	20.0	"	1	NP	0092179	09/21/20 19:18 09/23/20 20:21	SM2540 C	
Sulfate as SO4	1400	100	500	"	100	JB	0091814	09/17/20 10:00 09/17/20 10:00	SM4500 SO4 E	
Turbidity	5.00	0.05	0.05	NTU	1	JB	0091834	09/18/20 09:00 09/18/20 09:00	SM2130 B	
P11B (2010485-02) Grnd-Wate	er Sampled: 09/16/	20 10:45	Received: 09/	16/20 14:3	35					
Bicarbonate Alkalinity	452	5	5	mg CaCO3/	1	JB	0092234	09/21/20 13:00 09/21/20 13:00	SM2320B	

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P11B (20I0485-02) Grnd-Water	Sampled: 09/16/2	20 10:45	Received: 09/	16/20 14:3	35					
Carbonate Alkalinity	ND	5	5	mg CaCO3/ L	1	JB	0092234	09/21/20 13:00 09/21/20 13:00	SM2320B	
Hydroxide Alkalinity	ND	5	5	"	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	
Total Alkalinity	452	5	5	"	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	
Ammonia as N	6.26	0.11	0.50	mg/l	5	UM	0091123	10/05/20 11:30 10/05/20 17:23	EPA 350.1	
Chloride	690	0.05	0.05	"	1	SF	0091821	09/17/20 10:00 09/17/20 10:00	SM4500 Cl B	
Specific Conductance (EC)	2920	1.00	1.00	umhos/c m	"	SF	0092236	09/22/20 09:00 09/22/20 09:00	SM2510 B	
Fluoride	0.616	0.031	0.100	mg/l	"	SF	0092349	09/22/20 12:00 09/23/20 11:03	SM4500 F C	
Hardness (Total)	858	10	10	mg CaCO3/ L	"	NLF	0092440	09/24/20 15:36 09/30/20 17:01	EPA 200.7	
Nitrate as N	0.02	0.009	0.05	mg/l	"	UM	0092422	09/29/20 17:00 09/29/20 17:10	EPA 353.2	W-02, J
Nitrite as N	ND	0.007	0.05	"	"	SF	0092167	09/18/20 09:00 09/18/20 09:00	SM4500 NO2 B	
pH at 25 deg C	7.49	0.01	0.10	pH Units	"	JB	0091742	09/16/20 15:37 09/16/20 15:37	SM4500-H+ B	HT-15
Orthophosphate as P	0.74	0.007	0.05	mg/l	"	UM	0092027	09/16/20 17:45 09/16/20 17:45	SM4500 P E	
Phosphorus, Total	0.69	0.04	0.10	"	2	UM	0092257	09/22/20 11:00 09/23/20 20:49	EPA 365.1	
Total Dissolved Solids	1780	1.0	20.0	"	1	NP	0092179	09/21/20 19:18 09/23/20 20:21	SM2540 C	
Sulfate as SO4	337	20.0	100	"	20	JB	0091814	09/18/20 09:00 09/18/20 09:00	SM4500 SO4 E	
Turbidity	1.30	0.05	0.05	NTU	1	JB	0091834	09/18/20 09:00 09/18/20 09:00	SM2130 B	
P11D (2010485-03) Grnd-Water	Sampled: 09/16/	20 11:15	Received: 09/	16/20 14:3	35					
Bicarbonate Alkalinity	408	5	5	mg CaCO3/	1	JB	0092234	09/21/20 13:00 09/21/20 13:00	SM2320B	
Carbonate Alkalinity	ND	5	5	L "	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	



Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P11D (2010485-03) Grnd-Water	Sampled: 09/16/	20 11:15	Received: 09/	16/20 14:3	35					
Hydroxide Alkalinity	ND	5	5	mg CaCO3/	1	JB	0092234	09/21/20 13:00 09/21/20 13:00	SM2320B	
Total Alkalinity	408	5	5	L "	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	
Ammonia as N	2.16	0.04	0.20	mg/l	2	UM	0091123	10/05/20 11:30 10/05/20 17:23	EPA 350.1	
Chloride	600	0.05	0.05	"	1	SF	0091821	09/17/20 10:00 09/17/20 10:00	SM4500 Cl B	
Specific Conductance (EC)	2850	1.00	1.00	umhos/c m	"	SF	0092236	09/22/20 09:00 09/22/20 09:00	SM2510 B	
Fluoride	0.303	0.031	0.100	mg/l	"	SF	0092349	09/22/20 12:00 09/23/20 11:03	SM4500 F C	
Hardness (Total)	860	10	10	mg CaCO3/ L	"	NLF	0092440	09/24/20 15:36 09/30/20 17:01	EPA 200.7	
Nitrate as N	0.02	0.009	0.05	mg/l	"	UM	0092422	09/29/20 17:00 09/29/20 17:10	EPA 353.2	W-02, J
Nitrite as N	ND	0.007	0.05	"	"	SF	0092167	09/18/20 09:00 09/18/20 09:00	SM4500 NO2 B	
pH at 25 deg C	7.30	0.01	0.10	pH Units	"	JB	0091742	09/16/20 15:39 09/16/20 15:39	SM4500-H+ B	HT-15
Orthophosphate as P	0.44	0.007	0.05	mg/l	"	UM	0092027	09/16/20 17:45 09/16/20 17:45	SM4500 P E	
Phosphorus, Total	0.46	0.04	0.10	"	2	UM	0092257	09/22/20 11:00 09/23/20 20:49	EPA 365.1	
Total Dissolved Solids	1870	1.0	20.0	"	1	NP	0092179	09/21/20 19:18 09/23/20 20:21	SM2540 C	
Sulfate as SO4	359	25.0	125	"	25	JB	0091814	09/18/20 09:00 09/18/20 09:00	SM4500 SO4 E	
Turbidity	10.0	0.05	0.05	NTU	1	JB	0091834	09/18/20 09:00 09/18/20 09:00	SM2130 B	
GUNR (2010485-04) Grnd-Wate	r Sampled: 09/1	6/20 12:20	Received: 0	9/16/20 14	:35					
Bicarbonate Alkalinity	340	5	5	mg CaCO3/ L	1	JB	0092234	09/21/20 13:00 09/21/20 13:00	SM2320B	
Carbonate Alkalinity	ND	5	5	"	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	
Hydroxide Alkalinity	ND	5	5	"	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	



Conventional Chemistry Parameters by Standard/EPA Methods

			Reporting					Sample Prepared		
Analyte	Result	MDL	Limit	Units	Dilution	Analyst	Batch	Sample Analyzed	Method	Notes
GUNR (2010485-04) Grnd-Water	Sampled: 09/1	6/20 12:20	Received: 0	9/16/20 14	:35					
Total Alkalinity	340	5	5	mg CaCO3/ L	1	JB	0092234	09/21/20 13:00 09/21/20 13:00	SM2320B	
Ammonia as N	0.23	0.02	0.10	mg/l	"	UM	0091123	10/05/20 11:30 10/05/20 17:23	EPA 350.1	
Chloride	1230	0.05	0.05	"	"	SF	0091821	09/17/20 10:00 09/17/20 10:00	SM4500 Cl B	
Specific Conductance (EC)	4150	1.00	1.00	umhos/c m	"	SF	0092236	09/22/20 09:00 09/22/20 09:00	SM2510 B	
Fluoride	0.292	0.031	0.100	mg/l	"	SF	0092349	09/22/20 12:00 09/23/20 11:03	SM4500 F C	
Hardness (Total)	1840	10	10	mg CaCO3/ L	"	NLF	0092440	09/24/20 15:36 09/30/20 17:01	EPA 200.7	
Nitrate as N	1.84	0.04	0.25	mg/l	5	UM	0092422	09/29/20 17:00 09/29/20 17:10	EPA 353.2	W-02
Nitrite as N	0.02	0.007	0.05	"	1	SF	0092167	09/18/20 09:00 09/18/20 09:00	SM4500 NO2 B	J
pH at 25 deg C	6.83	0.01	0.10	pH Units	"	JB	0091742	09/16/20 15:41 09/16/20 15:41	SM4500-H+ B	HT-15
Orthophosphate as P	0.11	0.007	0.05	mg/l	"	UM	0092027	09/16/20 17:45 09/16/20 17:45	SM4500 P E	
Phosphorus, Total	0.11	0.02	0.05	"	"	UM	0092257	09/22/20 11:00 09/23/20 20:49	EPA 365.1	
Total Dissolved Solids	3210	1.0	20.0	"	"	NP	0092179	09/21/20 19:18 09/23/20 20:21	SM2540 C	
Sulfate as SO4	657	50.0	250	"	50	JB	0091814	09/18/20 09:00 09/18/20 09:00	SM4500 SO4 E	
Turbidity	1.40	0.05	0.05	NTU	1	JB	0091834	09/18/20 09:00 09/18/20 09:00	SM2130 B	
DS (20I0485-05) Grnd-Water Sa	mpled: 09/16/20	13:55 Re	ceived: 09/16	/20 14:35						
Bicarbonate Alkalinity	408	5	5	mg CaCO3/	1	JB	0092234	09/21/20 13:00 09/21/20 13:00	SM2320B	
Carbonate Alkalinity	ND	5	5	L "	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	
Hydroxide Alkalinity	ND	5	5	"	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	
Total Alkalinity	408	5	5	"	"	JB	"	09/21/20 13:00 09/21/20 13:00	"	



EMA Log #: 2010485

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
DS (2010485-05) Grnd-Water	Sampled: 09/16/20	13:55 Re	ceived: 09/16	/20 14:35						
Ammonia as N	0.95	0.02	0.10	mg/l	1	UM	0091123	10/05/20 11:30 10/05/20 17:23	EPA 350.1	
Chloride	1330	0.05	0.05	"	"	SF	0091821	09/17/20 10:00 09/17/20 10:00	SM4500 Cl B	
Specific Conductance (EC)	4930	1.00	1.00	umhos/c m	"	SF	0092236	09/22/20 09:00 09/22/20 09:00	SM2510 B	
Fluoride	0.253	0.031	0.100	mg/l	"	SF	0092349	09/22/20 12:00 09/23/20 11:03	SM4500 F C	
Hardness (Total)	1710	10	10	mg CaCO3/ L	"	NLF	0092440	09/24/20 15:36 09/30/20 17:01	EPA 200.7	
Nitrate as N	0.02	0.009	0.05	mg/l	"	UM	0092422	09/29/20 17:00 09/29/20 17:10	EPA 353.2	W-02, J
Nitrite as N	ND	0.007	0.05	"	"	SF	0092167	09/18/20 09:00 09/18/20 09:00	SM4500 NO2 B	
pH at 25 deg C	6.96	0.01	0.10	pH Units	"	JB	0091742	09/16/20 15:43 09/16/20 15:43	SM4500-H+ B	HT-15
Orthophosphate as P	0.31	0.007	0.05	mg/l	"	UM	0092027	09/16/20 17:45 09/16/20 17:45	SM4500 P E	
Phosphorus, Total	0.33	0.02	0.05	"	"	UM	0092257	09/22/20 11:00 09/23/20 20:49	EPA 365.1	
Total Dissolved Solids	3590	1.0	20.0	"	"	NP	0092179	09/21/20 19:18 09/23/20 20:21	SM2540 C	
Sulfate as SO4	748	50.0	250	"	50	JB	0091814	09/18/20 09:00 09/18/20 09:00	SM4500 SO4 E	
Turbidity	6.40	0.05	0.05	NTU	1	JB	0091834	09/18/20 09:00 09/18/20 09:00	SM2130 B	



EMA Log #: 2010485

Miscellaneous Physical/Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P2 (2010485-01) Grnd-Water S	ampled: 09/16/20 ()9:40 Ree	ceived: 09/16/	20 14:35						
Aggressive Index	10.1	1.00	1.00	N/A	1	MAR	0102329	10/23/20 11:54 10/23/20 12:02	Calculation	
adj-Sodium Adsorption Ratio	0.310	0.100	0.100	Ratio	"	MAR	0102331	10/23/20 12:16 10/23/20 12:16	Suarez-1981	
Langelier Index at 20 deg C	-2.03	-3.00	-3.00	N/A	"	MAR	0102332	10/23/20 12:56 10/23/20 13:11	Calculation	
P11B (20I0485-02) Grnd-Water	Sampled: 09/16/2	0 10:45	Received: 09/1	6/20 14:	35					
Aggressive Index	12.6	1.00	1.00	N/A	1	MAR	0102329	10/23/20 11:54 10/23/20 12:02	Calculation	
adj-Sodium Adsorption Ratio	9.62	0.100	0.100	Ratio	"	MAR	0102331	10/23/20 12:16 10/23/20 12:16	Suarez-1981	
Langelier Index at 20 deg C	0.57	-3.00	-3.00	N/A	"	MAR	0102332	10/23/20 12:56 10/23/20 13:11	Calculation	
P11D (2010485-03) Grnd-Water	Sampled: 09/16/2	20 11:15 1	Received: 09/1	6/20 14:	35					
Aggressive Index	12.5	1.00	1.00	N/A	1	MAR	0102329	10/23/20 11:54 10/23/20 12:02	Calculation	
adj-Sodium Adsorption Ratio	8.95	0.100	0.100	Ratio	"	MAR	0102331	10/23/20 12:16 10/23/20 12:16	Suarez-1981	
Langelier Index at 20 deg C	0.46	-3.00	-3.00	N/A	"	MAR	0102332	10/23/20 12:56 10/23/20 13:11	Calculation	
GUNR (2010485-04) Grnd-Water	r Sampled: 09/16	/20 12:20	Received: 09)/16/20 14	4:35					
Aggressive Index	12.3	1.00	1.00	N/A	1	MAR	0102329	10/23/20 11:54 10/23/20 12:02	Calculation	
adj-Sodium Adsorption Ratio	8.59	0.100	0.100	Ratio		MAR	0102331	10/23/20 12:16 10/23/20 12:16	Suarez-1981	
Langelier Index at 20 deg C	0.33	-3.00	-3.00	N/A	"	MAR	0102332	10/23/20 12:56 10/23/20 13:11	Calculation	
DS (2010485-05) Grnd-Water S	Sampled: 09/16/20	13:55 Re	ceived: 09/16/	20 14:35						
Aggressive Index	12.6	1.00	1.00	N/A	1	MAR	0102329	10/23/20 11:54 10/23/20 12:02	Calculation	
adj-Sodium Adsorption Ratio	13.4	0.100	0.100	Ratio	"	MAR	0102331	10/23/20 12:16 10/23/20 12:16	Suarez-1981	
Langelier Index at 20 deg C	0.63	-3.00	-3.00	N/A	"	MAR	0102332	10/23/20 12:56 10/23/20 13:11	Calculation	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0092440												
Blank (0092440-BLK1)					Prepared:	09/24/20	Analyzed: (09/30/20				
Calcium	ND	0.10	0.50	mg/l	ICP							
Sodium	ND	0.04	0.50	"	ICP							
Boron	ND	0.25	0.50	"	ICP							
Magnesium	ND	0.100	0.500	"	ICP							
Potassium	ND	1.00	1.00	"	ICP							
LCS (0092440-BS1)					Prepared:	09/24/20	Analyzed:	10/06/20				
Sodium	10.2	0.04	0.50	mg/l	ICP	1.00		NR	85-115			
Boron	1.07	0.25	0.50		ICP	1.00		107	85-115			
Magnesium	10.2	0.100	0.500		ICP	1.00		NR	85-115			
Calcium	10.2	0.10	0.50	"	ICP	1.00		NR	85-115			
LCS (0092440-BS2)					Prepared:	09/24/20	Analyzed: (09/28/20				
Potassium	5.20	1.00	1.00	mg/l	ICP	5.00		104	85-115			
Magnesium	5.23	0.100	0.500	"	ICP	5.00		105	85-115			
Calcium	4.65	0.10	0.50	"	ICP	5.00		93	85-115			
Sodium	4.41	0.04	0.50	"	ICP	5.00		88	85-115			
LCS Dup (0092440-BSD1)					Prepared:	09/24/20	Analyzed:	10/06/20				
Sodium	9.18	0.04	0.50	mg/l	ICP	1.00		918	85-115	10	20	
Boron	1.11	0.25	0.50	"	ICP	1.00		111	85-115	4	20	
Magnesium	9.30	0.100	0.500	"	ICP	1.00		930	85-115	9	20	
Calcium	9.24	0.10	0.50	"	ICP	1.00		924	85-115	10	20	
LCS Dup (0092440-BSD2)					Prepared:	09/24/20	Analyzed: (09/28/20				
Potassium	5.05	1.00	1.00	mg/l	ICP	5.00		101	85-115	3	20	
Magnesium	5.23	0.100	0.500	"	ICP	5.00		105	85-115	0	20	
Calcium	4.55	0.10	0.50	"	ICP	5.00		91	85-115	2	20	
Sodium	4.39	0.04	0.50	"	ICP	5.00		88	85-115	0.3	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0092440												
Duplicate (0092440-DUP1)	S	Source: 20	H0575-01		Prepared:	09/24/20	Analyzed: (09/30/20				
Sodium	3090	1.00	12.5	mg/l	ICP		3020			2	20	
Magnesium	13.1	0.100	0.500	"	ICP		11.8			11	20	
Potassium	176	1.00	1.00	"	ICP		168			5	20	
Calcium	203	0.50	2.50	"	ICP		169			18	20	
Boron	0.26	0.25	0.50	"	ICP		ND				20	J
Duplicate (0092440-DUP2)	S	Source: 20	H0575-02		Prepared:	09/24/20	Analyzed: (09/30/20				
Magnesium	3.86	0.100	0.500	mg/l	ICP		3.71			4	20	
Calcium	38.2	0.10	0.50	"	ICP		36.6			4	20	
Sodium	1960	1.00	12.5	"	ICP		1920			2	20	
Boron	ND	0.25	0.50	"	ICP		ND				20	
Potassium	76.0	1.00	1.00	"	ICP		71.4			6	20	
Matrix Spike (0092440-MS1)	S	Source: 20	H0575-01		Prepared:	09/24/20	Analyzed: (09/30/20				
Magnesium	14.0	0.100	0.500	mg/l	ICP	1.00	11.8	220	75-125			QM-4X
Potassium	223	5.00	5.00	"	ICP	10.0	168	556	75-125			QM-4X
Calcium	207	0.50	2.50	"	ICP	1.00	169	NR	75-125			QM-4X
Sodium	3080	1.00	12.5	"	ICP	1.00	3020	NR	75-125			QM-4X
Boron	1.31	0.25	0.50	"	ICP	1.00	ND	131	75-125			QM-05
Matrix Spike (0092440-MS2)	S	Source: 20	H0575-02		Prepared:	09/24/20	Analyzed: (09/30/20				
Calcium	41.6	0.10	0.50	mg/l	ICP	1.00	36.6	500	75-125			QM-4X
Magnesium	5.28	0.100	0.500	"	ICP	1.00	3.71	157	75-125			QM-4X
Boron	1.30	0.25	0.50	"	ICP	1.00	ND	130	75-125			QM-05
Sodium	1980	1.00	12.5	"	ICP	1.00	1920	NR	75-125			QM-4X
Potassium	82.2	1.00	1.00	"	ICP	10.0	71.4	108	75-125			
Matrix Spike Dup (0092440-MSD1)		Source: 20	H0575-01		Prepared:	09/24/20	Analyzed: (09/30/20				
Sodium	3140	1.00	12.5	mg/l	ICP	1.00	3020	NR	75-125	2	20	QM-4X
Calcium	207	0.50	2.50	"	ICP	1.00	169	NR	75-125	0	20	QM-4X
Potassium	258	5.00	5.00	"	ICP	10.0	168	897	75-125	14	20	QM-4X
Boron	1.32	0.25	0.50	"	ICP	1.00	ND	132	75-125	0.6	20	QM-05
Magnesium	14.0	0.100	0.500	"	ICP	1.00	11.8	223	75-125	0.2	20	OM-4X



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0092440												
Matrix Spike Dup (0092440-MSD2)	5	Source: 20)H0575-02		Prepared:	09/24/20	Analyzed:	09/28/20				
Potassium	84.7	1.00	1.00	mg/l	ICP	10.0	71.4	133	75-125	3	20	QM-4X
Boron	1.33	0.25	0.50	"	ICP	1.00	ND	133	75-125	2	20	QM-05
Calcium	43.9	0.10	0.50	"	ICP	1.00	36.6	738	75-125	6	20	QM-4X
Sodium	2110	1.00	12.5	"	ICP	1.00	1920	NR	75-125	6	20	QM-4X
Magnesium	5.60	0.100	0.500	"	ICP	1.00	3.71	189	75-125	6	20	QM-4X
Batch 0092945												
Blank (0092945-BLK1)					Prepared:	09/29/20	Analyzed:	09/30/20				
Barium	ND	0.0002	0.010	mg/l	MG							
Chromium	ND	0.0002	0.005	"	MG							
Manganese	ND	0.0001	0.005	"	MG							
Iron	ND	0.002	0.050	"	MG							
Copper	ND	0.0002	0.010	"	MG							
Zinc	ND	0.0003	0.020	"	MG							
LCS (0092945-BS1)					Prepared:	09/29/20	Analyzed:	09/30/20				
Barium	0.100	0.0002	0.010	mg/l	MG	0.100		100	85-115			
Iron	0.108	0.002	0.050	"	MG	0.100		108	85-115			
Copper	0.107	0.0002	0.010	"	MG	0.100		107	85-115			
Manganese	0.105	0.0001	0.005	"	MG	0.100		105	85-115			
Zinc	0.109	0.0003	0.020	"	MG	0.100		109	85-115			
Chromium	0.103	0.0002	0.005	"	MG	0.100		103	85-115			
LCS Dup (0092945-BSD1)					Prepared:	09/29/20	Analyzed:	09/30/20				
Barium	0.097	0.0002	0.010	mg/l	MG	0.100		97	85-115	3	20	
Chromium	0.102	0.0002	0.005	"	MG	0.100		102	85-115	1	20	
Iron	0.108	0.002	0.050	"	MG	0.100		108	85-115	0.3	20	
Zinc	0.107	0.0003	0.020	"	MG	0.100		107	85-115	2	20	
Copper	0.106	0.0002	0.010	"	MG	0.100		106	85-115	1	20	
Manganese	0.105	0.0001	0.005	"	MG	0.100		105	85-115	0.1	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0092945												
Duplicate (0092945-DUP1)	S	Source: 20	10383-01RI	E1	Prepared:	09/29/20	Analyzed: (9/30/20				
Barium	0.077	0.0002	0.010	mg/l	MG		0.075			2	20	
Copper	0.862	0.0002	0.010	"	MG		0.846			2	20	
Chromium	ND	0.0002	0.005	"	MG		0.0002				20	
Zinc	0.492	0.0003	0.020	"	MG		0.481			2	20	
Iron	0.021	0.002	0.050	"	MG		0.016			28	20	QR-04, J
Manganese	0.007	0.0001	0.005	"	MG		0.007			6	20	
Matrix Spike (0092945-MS1)	S	Source: 20	10383-01RI	E1	Prepared:	09/29/20	Analyzed: (9/30/20				
Barium	0.185	0.0002	0.010	mg/l	MG	0.100	0.075	109	70-130			
Zinc	0.603	0.0003	0.020	"	MG	0.100	0.481	122	70-130			
Chromium	0.103	0.0002	0.005	"	MG	0.100	0.0002	103	70-130			
Copper	0.979	0.0002	0.010	"	MG	0.100	0.846	134	70-130			QM-4X
Iron	0.115	0.002	0.050	"	MG	0.100	0.016	100	70-130			
Manganese	0.112	0.0001	0.005	"	MG	0.100	0.007	105	70-130			
Matrix Spike (0092945-MS2)	5	Source: 20	10384-01RI	E1	Prepared:	09/29/20	Analyzed: (9/30/20				
Barium	0.108	0.0002	0.010	mg/l	MG	0.100	0.002	106	70-130			
Copper	0.117	0.0002	0.010	"	MG	0.100	0.014	103	70-130			
Manganese	0.107	0.0001	0.005	"	MG	0.100	0.001	105	70-130			
Chromium	0.103	0.0002	0.005	"	MG	0.100	ND	103	70-130			
Iron	0.117	0.002	0.050	"	MG	0.100	0.015	103	70-130			
Zinc	0.385	0.0003	0.020	"	MG	0.100	0.280	104	70-130			
Matrix Spike Dup (0092945-MSD1)	5	Source: 20	10383-01RI	E1	Prepared:	09/29/20	Analyzed: (9/30/20				
Barium	0.178	0.0002	0.010	mg/l	MG	0.100	0.075	103	70-130	4	20	
Zinc	0.592	0.0003	0.020	"	MG	0.100	0.481	112	70-130	2	20	
Copper	0.975	0.0002	0.010	"	MG	0.100	0.846	130	70-130	0.4	20	
Iron	0.113	0.002	0.050	"	MG	0.100	0.016	97	70-130	2	20	
Manganese	0.110	0.0001	0.005	"	MG	0.100	0.007	103	70-130	2	20	
Chromium	0.101	0.0002	0.005	"	MG	0.100	0.0002	101	70-130	2	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0091123								,				
Blank (0091123-BLK1)					Prepared a	& Analyzed	d: 10/05/20					
Ammonia as N	ND	0.02	0.10	mg/l	UM							
LCS (0091123-BS1)					Prepared a	k Analyzed	d: 10/05/20					
Ammonia as N	0.94	0.02	0.10	mg/l	UM	1.00		94	90-110			
LCS Dup (0091123-BSD1)					Prepared a	č Analyzed	d: 10/05/20					
Ammonia as N	0.96	0.02	0.10	mg/l	UM	1.00		96	90-110	1	20	
Duplicate (0091123-DUP1)	s	ource: 20	010262-07		Prepared a	k Analvzed	d: 10/05/20					
Ammonia as N	ND	0.02	0.10	mg/l	UM		ND				20	
Matrix Spike (0091123-MS1)	s	ource: 20	010262-07		Prepared &	k Analyzeo	d: 10/05/20					
Ammonia as N	1.89	0.04	0.20	mg/l	UM	2.00	ND	94	90-110			
Matrix Spike Dup (0091123-MSD1)	s	ource· 20	010262-07		Prenared A	k Analyzeo	d: 10/05/20					
Ammonia as N	1.92	0.04	0.20	mg/l	UM	2.00	ND	96	90-110	2	20	
Batch 0091742												
Duplicate (0091742-DUP1)	s	ource: 20	010454-01		Prepared a	č Analyzed	d: 09/16/20					
pH at 25 deg C	7.52	0.01	0.10	pH Units	1		7.51			0.2	20	
Reference (0091742-SRM1)					Prepared a	k Analyzed	d: 09/16/20					
pH at 25 deg C	6.39	0.01	0.10	pH Units	1	6.39		100	96.87-103.12			
Batch 0091814												
Blank (0091814-BLK1)					Prepared a	k Analyzed	d: 09/17/20					
Sulfate as SO4	ND	1.0	5.0	mg/l	JB							



			Reporting			Spike	Source		%REC		RPD	
Analyte	Result	MDL	Limit	Units	Analyst	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 0091814												
LCS (0091814-BS1)					Prepared	& Analyze	ed: 09/17/20					
Sulfate as SO4	9.0	1.0	5.0	mg/l	JB	10.0		90	80-120			
LCS Dup (0091814-BSD1)					Prepared	& Analyze	ed: 09/17/20					
Sulfate as SO4	8.7	1.0	5.0	mg/l	JB	10.0		87	80-120	3	20	
Duplicate (0091814-DUP1)	s	ource: 2	010485-01		Prepared	& Analyze	ed: 09/17/20					
Sulfate as SO4	1400	100	500	mg/l	JB		1400			0.4	20	
Matrix Spike (0091814-MS1)	s	ource: 2	010485-01		Prepared a	& Analyze	ed: 09/17/20					
Sulfate as SO4	3410	200	1000	mg/l	JB	2000	1400	101	80-120			
Matrix Spike Dup (0091814-MSD1)	s	ource: 2	010485-01		Prepared	& Analyze	ed: 09/17/20					
Sulfate as SO4	3410	200	1000	mg/l	JB	2000	1400	101	80-120	0.1	20	
Reference (0091814-SRM1)					Prepared a	& Analyze	ed: 09/17/20					
Sulfate as SO4	9.0	1.0	5.0	mg/l	JB	9.71		93	75.55-118.52			
Reference (0091814-SRM2)					Prepared of	& Analyze	ed: 09/17/20					
Sulfate as SO4	8.9	1.0	5.0	mg/l	JB	9.71		92	75.55-118.52			
Batch 0091821												
Blank (0091821-BLK1)					Prepared	& Analyze	ed: 09/17/20					
Chloride	ND	0.05	0.05	mg/l	SF							
LCS (0091821-BS1)					Prepared	& Analyze	ed: 09/17/20					
Chloride	180	0.05	0.05	mg/l	SF	200		90	80-120			



Analyte	D14	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Anaryte	Result	MDL	Liiiit	Units)	Level	Kesuit	70KEC	Linits	KFD	Linin	Notes
Batch 0091821												
LCS Dup (0091821-BSD1)					Prenared	& Analyze	d: 09/17/20					
Chloride	190	0.05	0.05	mg/l	SF	200	u. 09/17/20	95	80-120	5	20	
Duplicate (0091821-DUP1)	S	ource: 2	0H0884-03		Prepared	& Analyze	d: 09/17/20					
Chloride	138	0.05	0.05	mg/l	SF		138			0	20	
Matrix Spike (0091821-MS1)	s	ource: 2	0H0884-03		Prepared	& Analyze	d: 09/17/20					
Chloride	320	0.05	0.05	mg/l	SF	200	138	91	80-120			
Matrix Spike Dup (0091821-MSD1)	s	ource: 2	0H0884-03		Prepared	& Analyze	d: 09/17/20					
Chloride	320	0.05	0.05	mg/l	SF	200	138	91	80-120	0	20	
Batch 0091834												
Duplicate (0091834-DUP1)	S	ource: 2	010520-01		Prepared	& Analyze	d: 09/18/20					
Turbidity	0.12	0.05	0.05	NTU	JB		0.12			0	20	
Reference (0091834-SRM1)					Prepared	& Analyze	d: 09/18/20					
Turbidity	3.00	0.05	0.05	NTU	JB	3.22		93	83.8-115			
Batch 0092027												
Blank (0092027-BLK1)					Prepared	& Analyze	d: 09/16/20					
Orthophosphate as P	ND	0.007	0.05	mg/l	UM							
LCS (0092027-BS1)					Prepared	& Analyze	d: 09/16/20					
Orthophosphate as P	0.51	0.007	0.05	mg/l	UM	0.500		102	80-120			



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0092027												
LCS Dup (0092027-BSD1)					Prepared	& Analyze	d: 09/16/20					
Orthophosphate as P	0.49	0.007	0.05	mg/l	UM	0.500		99	80-120	3	20	
Duplicate (0092027-DUP1)	S	ource: 20	010437-01		Prepared	& Analyze	d: 09/16/20					
Orthophosphate as P	0.49	0.007	0.05	mg/l	UM		0.48			1	20	
Matrix Spike (0092027-MS1)	S	ource: 20	010437-01		Prepared	& Analyze	d: 09/16/20					
Orthophosphate as P	0.96	0.007	0.05	mg/l	UM	0.500	0.48	95	80-120			
Matrix Spike Dup (0092027-MSD1)	S	ource: 20	010437-01		Prepared	& Analyze	d: 09/16/20					
Orthophosphate as P	0.97	0.007	0.05	mg/l	UM	0.500	0.48	97	80-120	1	20	
Batch 0092167												
Blank (0092167-BLK1)					Prepared of	& Analyze	d: 09/18/20					
Nitrite as N	ND	0.007	0.05	mg/l	SF							
LCS (0092167-BS1)					Prepared a	& Analyze	d: 09/18/20					
Nitrite as N	0.10	0.007	0.05	mg/l	SF	0.100		98	80-120			
LCS Dup (0092167-BSD1)					Prepared of	& Analyze	d: 09/18/20					
Nitrite as N	0.10	0.007	0.05	mg/l	SF	0.100		100	80-120	2	20	
Duplicate (0092167-DUP1)	s	ource: 20	010536-01		Prepared	& Analyze	d: 09/18/20					
Nitrite as N	0.02	0.007	0.05	mg/l	SF		0.02			6	20	J
Matrix Spike (0092167-MS1)	s	ource: 20	010536-01		Prepared	& Analyze	d: 09/18/20					
Nitrite as N	0.12	0.007	0.05	mg/l	SF	0.100	0.02	99	80-120			



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Allalyte	Kesult	MDL	LIIIII	Units		Level	Result	70KEU	LIIIIIIS	KPD	LIIIII	inotes
Batch 0092167												
Matrix Spike Dup (0092167-MSD1)	S	ource: 2	010536-01		Prepared	& Analyz	ed: 09/18/20					
Nitrite as N	0.11	0.007	0.05	mg/l	SF	0.100	0.02	95	80-120	4	20	
Batch 0092179												
Blank (0092179-BLK1)					Prepared:	09/21/20	Analyzed: (9/23/20				
Total Dissolved Solids	ND	1.0	20.0	mg/l	NP							
Duplicate (0092179-DUP1)	s	ource: 2	010485-01		Prepared:	09/21/20	Analyzed: (9/23/20				
Total Dissolved Solids	6220	1.0	20.0	mg/l	NP		5990			4	20	
Reference (0092179-SRM1)					Prepared:	09/21/20	Analyzed: (9/23/20				
Total Dissolved Solids	310	1.0	20.0	mg/l	NP	305		102	90.16-110.46			
Batch 0092234												
Duplicate (0092234-DUP1)	s	ource: 2	010485-01		Prepared	& Analyz	ed: 09/22/20					
Hydroxide Alkalinity	ND	5	5	mg CaCO3/ L	JB		ND				20	
Bicarbonate Alkalinity	556	5	5	"	JB		556			0	20	
Carbonate Alkalinity	ND	5	5	"	JB		ND				20	
Total Alkalinity	556	5	5	"	JB		556			0	20	
Reference (0092234-SRM1)					Prepared	& Analyz	ed: 09/21/20					
Hydroxide Alkalinity	ND	5	5	mg CaCO3/ L	JB	0.00			0-0			
Carbonate Alkalinity	ND	5	5	"	JB	0.00			0-0			
Bicarbonate Alkalinity	130	5	5	"	JB	138		94	89.8-110.1			
Total Alkalinity	130	5	5	"	JB	138		94	89.8-110.1			



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0092236												
Duplicate (0092236-DUP1)	S	ource: 20	010596-01		Prepared	& Analyz	ed: 09/22/20)				
Specific Conductance (EC)	4950	1.00	1.00	umhos/c m	SF		5050			2	20	
Reference (0092236-SRM1)					Prepared a	& Analyz	ed: 09/22/20)				
Specific Conductance (EC)	344	1.00	1.00	umhos/c m	SF	348		99	89.94-110.06			
Batch 0092257												
Blank (0092257-BLK1)					Prepared:	09/22/20	Analyzed:	09/23/20				
Phosphorus, Total	ND	0.02	0.05	mg/l	UM							
LCS (0092257-BS1)					Prepared:	09/22/20	Analyzed:	09/23/20				
Phosphorus, Total	0.48	0.02	0.05	mg/l	UM	0.500		96	90-110			
LCS Dup (0092257-BSD1)					Prepared:	09/22/20	Analyzed:	09/23/20				
Phosphorus, Total	0.48	0.02	0.05	mg/l	UM	0.500		95	90-110	1	20	
Duplicate (0092257-DUP1)	s	ource: 20	010451-01		Prepared:	09/22/20	Analyzed:	09/23/20				
Phosphorus, Total	ND	0.02	0.05	mg/l	UM		ND				20	
Matrix Spike (0092257-MS1)	s	ource: 20	010451-01		Prepared:	09/22/20	Analyzed:	09/23/20				
Phosphorus, Total	0.94	0.04	0.10	mg/l	UM	1.00	ND	94	90-110			
Matrix Spike Dup (0092257-MSD1)	S	ource: 20	010451-01		Prepared:	09/22/20	Analyzed:	09/23/20				
Phosphorus, Total	0.92	0.04	0.10	mg/l	UM	1.00	ND	92	90-110	3	20	
Batch 0092349												
Blank (0092349-BLK1)					Prepared:	09/22/20	Analyzed:	09/23/20				
Fluoride	ND	0.031	0.100	mg/l	SF							



			Denertin			C. il.	C		%REC		RPD	
Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	Limit	Notes
Batch 0092349												
LCS (0092349-BS1)					Prepared:	09/22/20	Analyzed:	09/23/20				
Fluoride	0.968	0.031	0.100	mg/l	SF	1.00		97	80-120			
LCS Dup (0092349-BSD1)					Prepared:	09/22/20	Analyzed: (09/23/20				
Fluoride	0.982	0.031	0.100	mg/l	SF	1.00		98	80-120	1	20	
Duplicate (0092349-DUP1)	s	ource: 20	010367-01		Prepared:	09/22/20	Analyzed: (09/23/20				
Fluoride	1.12	0.031	0.100	mg/l	SF		1.13			0.4	20	
Matrix Spike (0092349-MS1)	S	ource: 20	010367-01		Prepared:	09/22/20	Analyzed: (09/23/20				
Fluoride	2.17	0.062	0.200	mg/l	SF	1.00	1.13	104	80-120			
Matrix Spike Dup (0092349-MSD1)	S	ource: 20)10367-01		Prepared:	09/22/20	Analyzed: (09/23/20				
Fluoride	2.13	0.062	0.200	mg/l	SF	1.00	1.13	100	80-120	2	20	
Batch 0092422												
Blank (0092422-BLK1)					Prepared of	& Analyze	ed: 09/29/20	1				
Nitrate as N	ND	0.009	0.05	mg/l	UM							
LCS (0092422-BS1)					Prepared a	& Analvze	ed: 09/29/20	1				
Nitrate as N	0.48	0.009	0.05	mg/l	UM	0.500		96	90-110			
LCS Dup (0092422-BSD1)					Prepared a	& Analvze	ed: 09/29/20	1				
Nitrate as N	0.50	0.009	0.05	mg/l	UM	0.500		100	90-110	3	20	
Duplicate (0092422-DUP1)	s	ource: 20	010647-01		Prepared a	& Analvze	ed: 09/29/20	1				
Nitrate as N	1.58	0.04	0.25	mg/l	UM		1.58			0	20	



		Reporting			Spike	Source		%REC		RPD	
Result	MDL	Limit	Units	Analyst	Level	Result	%REC	Limits	RPD	Limit	Notes
S	ource: 2	010647-01		Prepared	& Analyze	ed: 09/29/20					
4.02	0.04	0.25	mg/l	UM	2.50	1.58	98	90-110			
S	ource: 2	010647-01		Prepared	& Analyze	ed: 09/29/20					
4.02	0.04	0.25	mg/l	UM	2.50	1.58	97	90-110	0.2	20	
				Prepared:	09/24/20	Analyzed: (09/30/20				
ND	10	10	mg	NLF							
			CaCO3/ L								
s	ource: 2	0H0575-01		Prepared:	09/24/20	Analyzed: (09/30/20				
561	10	10	mg	NLF		471			18	20	
c	ource.)	000575_02	-	Prenared	09/24/20	Analyzed (09/30/20				
				· ·	09/24/20		J9/30/20			20	
111	10	10	-	NLF		107			4	20	
			L L								
	S 4.02 4.02 ND S 561	Source: 2 4.02 0.04 Source: 2 4.02 0.04 ND 10 Source: 2 561 561 10 Source: 2 50	Result MDL Limit Source: 2010647-01 4.02 0.04 0.25 Source: 2010647-01 4.02 0.04 0.25 ND 10 10 Source: 20H0575-01 561 10 10	Result MDL Limit Units Source: 2010647-01	Result MDL Limit Units Analyst Source: 2010647-01 Prepared 4.02 0.04 0.25 mg/l UM Source: 2010647-01 Prepared 4.02 0.04 0.25 mg/l UM MDL 10 0.25 mg/l UM MDL 0.04 0.25 mg/l UM MDL 0.04 0.25 mg/l UM MDL 10 10 mg NLF CaCO3/ L Prepared: L L Source: 20H0575-01 Prepared: L Source: 20H0575-02 Prepared: L	Result MDL Limit Units Analyst Level Source: 2010647-01 Prepared & Analyze 4.02 0.04 0.25 mg/l UM 2.50 Source: 2010647-01 Prepared & Analyze 4.02 0.04 0.25 mg/l UM 2.50 MDL 10 10 mg NLF CaCO3/L Source: 20H0575-01 Prepared: 09/24/20 561 10 10 mg NLF CaCO3/L L VE VE VE Source: 20H0575-02 Prepared: 09/24/20 111 10 10 mg NLF	Result MDL Limit Units Analyst Level Result Source: 2010647-01 Prepared & Analyzed: 09/29/20 4.02 0.04 0.25 mg/l UM 2.50 1.58 Source: 2010647-01 Prepared & Analyzed: 09/29/20 4.02 0.04 0.25 mg/l UM 2.50 1.58 Source: 2010647-01 Prepared & Analyzed: 09/29/20 4.02 0.04 0.25 mg/l UM 2.50 1.58 MDL 10 10 mg NLF 1.58 1.58 Source: 20H0575-01 Prepared: 09/24/20 Analyzed: 0 561 10 10 mg NLF 471 10 CaCO3/ L L 471 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 <td< td=""><td>Result MDL Limit Units Analyst Level Result %REC Source: 2010647-01 Prepared & Analyzed: 09/29/20 98 4.02 0.04 0.25 mg/l UM 2.50 1.58 98 Source: 2010647-01 Prepared & Analyzed: 09/29/20 97 4.02 0.04 0.25 mg/l UM 2.50 1.58 97 4.02 0.04 0.25 mg/l UM 2.50 1.58 97 MDL 10 0.25 mg/l UM 2.50 1.58 97 MDL 10 mg NLF 1.58 97 MDL 10 mg NLF 471 107 Source: 20H0575-02 Prepared: 09/24/20 Analyzed: 09/30/20 Source: 20H0575-02 Prepared: 09/24/20 Analyzed: 09/30/20 MDL 10 mg NLF 471</td><td>Result MDL Limit Units Analyst Level Result %REC Limits Source: 2010647-01 Prepared & Analyzed: 09/29/20 98 90-110 4.02 0.04 0.25 mg/l UM 2.50 1.58 98 90-110 Source: 2010647-01 Prepared & Analyzed: 09/29/20 97 90-110 4.02 0.04 0.25 mg/l UM 2.50 1.58 97 90-110 MDL 0.04 0.25 mg/l UM 2.50 1.58 97 90-110 MDL 10 ng NLF 90-110</td><td>Result MDL Limit Units Analyst Level Result %REC Limits RPD Source: 2010647-01 Prepared & Analyzed: 09/29/20 </td><td>Result MDL Limit Units Analyst Level Result %REC Limits RPD Limit Source: 2010647-01 Prepared & Analyzed: 09/29/20 </td></td<>	Result MDL Limit Units Analyst Level Result %REC Source: 2010647-01 Prepared & Analyzed: 09/29/20 98 4.02 0.04 0.25 mg/l UM 2.50 1.58 98 Source: 2010647-01 Prepared & Analyzed: 09/29/20 97 4.02 0.04 0.25 mg/l UM 2.50 1.58 97 4.02 0.04 0.25 mg/l UM 2.50 1.58 97 MDL 10 0.25 mg/l UM 2.50 1.58 97 MDL 10 mg NLF 1.58 97 MDL 10 mg NLF 471 107 Source: 20H0575-02 Prepared: 09/24/20 Analyzed: 09/30/20 Source: 20H0575-02 Prepared: 09/24/20 Analyzed: 09/30/20 MDL 10 mg NLF 471	Result MDL Limit Units Analyst Level Result %REC Limits Source: 2010647-01 Prepared & Analyzed: 09/29/20 98 90-110 4.02 0.04 0.25 mg/l UM 2.50 1.58 98 90-110 Source: 2010647-01 Prepared & Analyzed: 09/29/20 97 90-110 4.02 0.04 0.25 mg/l UM 2.50 1.58 97 90-110 MDL 0.04 0.25 mg/l UM 2.50 1.58 97 90-110 MDL 10 ng NLF 90-110	Result MDL Limit Units Analyst Level Result %REC Limits RPD Source: 2010647-01 Prepared & Analyzed: 09/29/20	Result MDL Limit Units Analyst Level Result %REC Limits RPD Limit Source: 2010647-01 Prepared & Analyzed: 09/29/20



Notes and Definitions

W-02 The sample for nitrate analysis was preserved with H2SO4 after the nitrite portion of the analysis was completed to extend the holding time for the sample. Nitrate results are corrected for the nitrite contribution per the method. QR-04 The RPD between the sample and sample duplicate is not valid since both results are below the reporting limit for this analyte. QM-4X The spike recovery was outside of the QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits. QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable. J Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag). HT-15 This sample was received outside of the EPA's recommended 15 minute holding time for this analysis. However, the sample was analyzed immediately upon receipt. ND Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified) NR Not Reported Sample results reported on a dry weight basis (if indicated in units column) dry Relative Percent Difference RPD MDL Method detection limit (indicated per client's request)



NOTE: By relinquishing samples to EMA, Inc., client agrees to pay for the services requested on this COC form and any additional analyses performed on this project. Payment for services is due within 30 days from date of invoice. Samples will be disposed of 7 days after report has been finalized unless otherwise noted. All work is subject to EMA's terms and conditions. of Page Mender 225 4340 Viewridge Ave., Ste. A - San Diego, CA 92123 - Phone (858) 560-7717 - Fax (858) 560-7763 ₹ RECEIV ALA D Cyanide □ COD a BOD Heterotrophic Plate Count (HPC) ∃TM □ n Enterolert Enterococcus, Company: ompañv Signature Signature Company -EnviroMatrix CMA Analytical, Inc. 25 Print hint hint Colifert, T+E.Coli DP/A D Enumeration P2 1.1 Requested Analysis (TM) In Fecal (MTF) In Fecal (MTF) ,miotiloC 9.10.10 Dissolved DATE/TIME u_Z ٩Å ٩d nŊ Cr IN PC D Metals D Organics (RCRA) CAC Title 22/CAM17 Metals a TTLC a STLC Alathan Reyulds for Registred Apalyais CHND NXTD N-ND Situite DNH3 ZDF DEC DISS DIDS (SbruoqmoCompounds) TBT (Organophosphorus Pesticides) 1718 QUISHED BY 2 (Polychlorinated Biphenyls) 2808 / 809 (Organochlorine Pesticides) 1808 / 809 un HAA 🛛 (DOAS) 0228 / 529 224/8260 (VOC) Full BTXE MTBE Oxy Nap sol5 (TPH) D Gas D Diesel D Ext Company: Company: ompany Signature Signature gnatur Fin un Tint Oil & Grease 🗆 413.1 🗆 413.2 🗆 1664 # / Type 20TO485 Container Containers Properly Preseved; Yes No N/A Sampled By: Client EMA Autosampler Reporting Requirements: a Fax a PDF a Excel a Geotracker/EDF a Hard Copy a EDT a CEDEN a SDWIS furn-Around-Time: a Same Day a 1 day a 2 day a 3 day a 4 day a 5 day STD (7-business days) Sample Matrix ţ S þ Sample at il 1220 533 WW = Wastewater, S = Soil, SED = Sediment, SD = Solid, T = Tissue, O = Oii, L = Liquid APEYNOLDS CGGENSIENCE WETEN Matrix Codes: A = Air, DW = Drinking Water, GW = Groundwater, SW = Storm Water Sample Disposal: D By Laboratory D 2Return to Client: P/U or Delivery D Archive Temp @ Receipt. Additional costs may apply. Please note there is a \$35 minimum charge for all clients. Shipped By: a Courier a UPS a FedEx a USPS a Client Drop Off a Other 3 EMA reserves the right to return any samples that do not match our waste profile. Sample 21:6 Date PO #: à.j - 89 11 Fax Sample Integrity CHAIN-OF-CUSTODY RECORD OMUD Paratat 2 Client Sample ID K roject/Sample Location/Address: ustody Seals Intact: Yes No W COC/Labels Agree: (Yes) No N/A Project/Sample Comments: Correct Containers: Ves No N/A ۱ ð 23 906 0 EMA LOG # Billing Address: Samplers(s) Project ID: Project #: Address: Email: Phone: Client: Attn: #0 0 Q ~ œ σ

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EnviroMatrix

Analytical, Inc.

Analytical Services Quotation

GMGP Water Quality 2020 Geoscience Support Services, Inc. Nathan Reynolds

x 2 16 08 J = 2 x1 1258 H2504 Jar 92 RE 100 - 24 41 125 # J - P

> Bid Date: 04/17/2020 **Bid Expires:** 04/17/2021 Prices Expire: 04/17/2021

	and the second			TAT	Unit	Extende
Matrix	Parameters	Method	#	(days)	Price	Price
Water	Aggressive Index (calc)(LAB)	-	5	7	\$5.00	\$25.00
Water	Aikalinity (All Forms)	varies	5	7	\$25.00	\$125.00
Water	Hexavalent Chromium	EPA 218.6	5	7	\$105.00	\$525.00
Water	Langelier Index (Calc)	a	5	7	\$5.00	\$25.00
Water	Barium (Total)	EPA 200.8	6	7	\$10.00	\$50.00
Water	Boron (Total)	EPA 200.7	5	7	\$10.00	\$50.00
Nater	Calcium (Total)	EPA 200.7	5	7	\$10.00	\$50.00
Nater	Chromium (Total)	EPA 200.8	5		\$10.00	\$50.00
Nater	Copper (Total)	EPA 200.8	5	7	\$10.00	\$50.00
Naler	Iron (Total)	EFA 200.8	5		\$10.00	\$50.00
Vater	Magnesium (Total)	EPA 200.7	5	7	\$10.00	\$50.00
Vater	Manganese (Total)	EPA 200.8	5	7	\$10.00	\$50.00
/ater	Potassium (Total)	EPA 200.7	5		\$10.00	\$50.00
Vater	Silicon (Total)	EPA 200.7	5	7	\$35.00	\$175.00
Vater	Sodium (Totai)	EPA 200.7	5		\$10.00	\$50.00
later	Strontium (Total)	EPA 200.7	5	7	\$45.00	\$225.00
/ater	Zinc (Total)	EPA 200.8	5	7	\$10.00	\$50.00
later	Ammonia as N	EPA 350.1	5	7	\$25.001	\$125.00
/ater	Chloride	SM4500 CI C	5.	7	\$15.00	575.00
ater	Fluoride	SM4500 F C	5	7	\$20.00	\$100.00
ater	Hardness	EPA 200.7	5	7	\$15.00	\$75.00
ater	Nitrate as N	EPA 365.1	5	7	\$25.00	\$125.00
ater	Nitrite as N	SM4500 NO2 B	5	7	\$25.00	\$125.00
ater	Orthophasphate as P	SM4500 F E	5	7	\$15.00	\$75.00
aler	pH in water	SM4500-H+ B	÷	7	\$10.00	\$50.00
ater	Specific Conductance (EC)	SM2510 B	5	7	\$15.00	\$75.00
ater	Sulfate	SM4500 SO4 E	5	7	\$15.00	\$75.00
ater	Total Dissolved Solids	SM2640 C	6	7	\$15.00	\$75.00
ater	Total phosphate as P	EPA 365.1	6	7	\$20.00	\$100.00

Mark Allen Rein

 Project Magagerewridge Avenue, Suite A • San Diego, California 92123 • (858) 560-7717 • Fax (858) 560-7763

 EnviroMatrix Analytical, Inc.
 Analytical Chemistry Laboratory
 Page

EnviroMatrix



Analytical, Inc.

27 January 2021

Geoscience Support Services, Inc. Attn: Nathan Reynolds PO Box 220 Claremont, CA 91711 EMA Log #: 20L0030

Project: GMGP Water Quality 2020

Enclosed are the results of analyses for samples received by the laboratory on 12/01/20 12:50. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that this data is in compliance both technically and for completeness.

Kland S. Que

Leland S. Pitt Laboratory Director

CA ELAP Certification #: 2564

PLEASE NOTE OUR NEW LOCATION:

9590 Chesapeake Dr. - San Diego, California 92123 - (858) 560-7717 - Fax (858) 560-7763 Analytical Chemistry Laboratory

EMA Log #: 20L0030

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
P2	20L0030-01	Grnd-Water	12/01/20 09:30	12/01/20 12:50
P11B	20L0030-02	Grnd-Water	12/01/20 10:20	12/01/20 12:50
P11D	20L0030-03	Grnd-Water	12/01/20 10:45	12/01/20 12:50
GUNR	20L0030-04	Grnd-Water	12/01/20 08:40	12/01/20 12:50
Test	20L0030-05	Grnd-Water	12/01/20 12:15	12/01/20 12:50



EMA Log #: 20L0030

Total Metals by EPA 200 Series Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P2 (20L0030-01) Grnd-Water S	Sampled: 12/01/20	09:30 Re	ceived: 12/01/	20 12:50)					
Boron	0.65	0.25	0.50	mg/l	1	ICP	0120337	12/03/20 11:37 12/04/20 13:28	EPA 200.7	
Barium	0.063	0.0004	0.020	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:25	EPA 200.8	
Calcium	624	1.00	5.00	"	10	ICP	0120337	12/03/20 11:37 12/09/20 12:25	EPA 200.7	
Chromium	ND	0.0004	0.010	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:25	EPA 200.8	
Copper	0.004	0.0004	0.020	"	"	icpms	"	12/08/20 15:39 12/09/20 18:25	"	J
Iron	0.283	0.003	0.100	"	"	icpms	"	12/08/20 15:39 12/09/20 18:25	"	
Potassium	4.70	1.00	1.00	"	1	ICP	0120337	12/03/20 11:37 12/04/20 13:27	EPA 200.7	
Magnesium	400	1.00	5.00	"	10	ICP	"	12/03/20 11:37 12/07/20 15:15	"	
Manganese	3.03	0.0002	0.010	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:25	EPA 200.8	
Sodium	1250	0.40	5.00	"	10	ICP	0120337	12/03/20 11:37 12/07/20 15:15	EPA 200.7	
Zinc	0.006	0.0006	0.040	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:25	EPA 200.8	J
P11B (20L0030-02) Grnd-Water	Sampled: 12/01	/20 10:20	Received: 12/	01/20 12	:50					
Boron	0.51	0.25	0.50	mg/l	1	ICP	0120337	12/03/20 11:37 12/04/20 12:17	EPA 200.7	
Barium	0.308	0.0004	0.020	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:27	EPA 200.8	
Calcium	468	0.50	2.50	"	5	ICP	0120337	12/03/20 11:37 12/04/20 12:15	EPA 200.7	
Chromium	0.0005	0.0004	0.010	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:27	EPA 200.8	J
Copper	0.005	0.0004	0.020	"	"	icpms	"	12/08/20 15:39 12/09/20 18:27	"	J
Iron	2.04	0.003	0.100	"	"	icpms	"	12/08/20 15:39 12/09/20 18:27	"	
Potassium	15.6	1.00	1.00	"	1	ICP	0120337	12/03/20 11:37 12/04/20 12:15	EPA 200.7	
Magnesium	383	1.00	5.00	"	10	ICP	"	12/03/20 11:37 12/07/20 14:27	"	



EMA Log #: 20L0030

Total Metals by EPA 200 Series Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P11B (20L0030-02) Grnd-Water	Sampled: 12/01	/20 10:20	Received: 12/	01/20 12	:50					
Manganese	1.91	0.0002	0.010	mg/l	2	icpms	0120857	12/08/20 15:39 12/09/20 18:27	EPA 200.8	
Sodium	976	1.00	12.5		25	ICP	0120337	12/03/20 11:37 12/04/20 12:15	EPA 200.7	
Zinc	0.012	0.0006	0.040	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:27	EPA 200.8	J
P11D (20L0030-03) Grnd-Water	Sampled: 12/01	/20 10:45	Received: 12/	01/20 12	:50					
Boron	ND	0.25	0.50	mg/l	1	ICP	0120337	12/03/20 11:37 12/04/20 13:38	EPA 200.7	
Barium	0.362	0.0002	0.010	"	"	icpms	0120857	12/08/20 15:39 12/09/20 18:07	EPA 200.8	
Calcium	142	1.00	5.00	"	10	ICP	0120337	12/03/20 11:37 12/09/20 12:28	EPA 200.7	
Chromium	0.0002	0.0002	0.005	"	1	icpms	0120857	12/08/20 15:39 12/09/20 18:07	EPA 200.8	J
Copper	0.003	0.0002	0.010	"	"	icpms	"	12/08/20 15:39 12/09/20 18:07	"	J
Iron	1.12	0.002	0.050	"	"	icpms	"	12/08/20 15:39 12/09/20 18:07	"	
Potassium	3.03	1.00	1.00	"	"	ICP	0120337	12/03/20 11:37 12/04/20 13:37	EPA 200.7	
Magnesium	119	1.00	5.00	"	10	ICP	"	12/03/20 11:37 12/07/20 15:19	"	
Manganese	0.450	0.0001	0.005	"	1	icpms	0120857	12/08/20 15:39 12/09/20 18:07	EPA 200.8	
Sodium	474	0.40	5.00	"	10	ICP	0120337	12/03/20 11:37 12/07/20 15:18	EPA 200.7	
Zinc	0.009	0.0003	0.020	"	1	icpms	0120857	12/08/20 15:39 12/09/20 18:07	EPA 200.8	J
GUNR (20L0030-04) Grnd-Water	r Sampled: 12/0	01/20 08:40	0 Received: 12	2/01/20 1	2:50					
Boron	ND	2.50	5.00	mg/l	10	ICP	0120337	12/03/20 11:37 12/04/20 13:41	EPA 200.7	
Barium	0.094	0.0004	0.020	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:29	EPA 200.8	
Calcium	382	1.00	5.00	"	10	ICP	0120337	12/03/20 11:37 12/09/20 12:31	EPA 200.7	
Chromium	ND	0.0004	0.010	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:29	EPA 200.8	



EMA Log #: 20L0030

Total Metals by EPA 200 Series Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
GUNR (20L0030-04) Grnd-Water	Sampled: 12/0)1/20 08:40	Received • 1	2/01/20 1	2:50					
Copper	0.005	0.0004	0.020	mg/l	2	icpms	0120857	12/08/20 15:39 12/09/20 18:29	EPA 200.8	J
Iron	0.185	0.003	0.100	"	"	icpms	"	12/08/20 15:39 12/09/20 18:29	u	
Potassium	16.6	10.0	10.0	"	10	ICP	0120337	12/03/20 11:37 12/04/20 13:39	EPA 200.7	
Magnesium	226	1.00	5.00	"	"	ICP	"	12/03/20 11:37 12/07/20 15:21	"	
Manganese	1.81	0.0002	0.010	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:29	EPA 200.8	
Sodium	652	0.40	5.00	"	10	ICP	0120337	12/03/20 11:37 12/07/20 15:21	EPA 200.7	
Zinc	0.011	0.0006	0.040	"	2	icpms	0120857	12/08/20 15:39 12/09/20 18:29	EPA 200.8	J
Test (20L0030-05) Grnd-Water S	ampled: 12/01/2	20 12:15 R	eceived: 12/0	1/20 12::	50					
Boron	ND	2.50	5.00	mg/l	10	ICP	0120337	12/03/20 11:37 12/04/20 13:43	EPA 200.7	
Barium	0.126	0.0002	0.010	"	1	icpms	0120857	12/08/20 15:39 12/09/20 18:10	EPA 200.8	
Calcium	462	1.00	5.00	"	10	ICP	0120337	12/03/20 11:37 12/09/20 12:34	EPA 200.7	
Chromium	0.0002	0.0002	0.005	"	1	icpms	0120857	12/08/20 15:39 12/09/20 18:10	EPA 200.8	J
Copper	0.002	0.0002	0.010	"	"	icpms	"	12/08/20 15:39 12/09/20 18:10	"	J
Iron	0.881	0.002	0.050	"	"	icpms	"	12/08/20 15:39 12/09/20 18:10	"	
Potassium	40.0	10.0	10.0	"	10	ICP	0120337	12/03/20 11:37 12/04/20 13:42	EPA 200.7	
Magnesium	144	1.00	5.00	"	"	ICP	"	12/03/20 11:37 12/07/20 15:24	"	
Manganese	0.918	0.0001	0.005	"	1	icpms	0120857	12/08/20 15:39 12/09/20 18:10	EPA 200.8	
Sodium	822	0.40	5.00	"	10	ICP	0120337	12/03/20 11:37 12/07/20 15:24	EPA 200.7	
Zinc	0.015	0.0003	0.020	"	1	icpms	0120857	12/08/20 15:39 12/09/20 18:10	EPA 200.8	J



EMA Log #: 20L0030

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P2 (20L0030-01) Grnd-Water	Sampled: 12/01/20	09:30	Received: 12/01	/20 12:50						
Bicarbonate Alkalinity	496	5	5	mg CaCO3/ L	1	SF	0120416	12/03/20 11:00 12/03/20 11:00	SM2320B	
Carbonate Alkalinity	ND	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	
Hydroxide Alkalinity	ND	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	
Total Alkalinity	496	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	
Ammonia as N	0.14	0.02	0.10	mg/l	"	UM	0120745	12/18/20 10:30 12/18/20 13:56	EPA 350.1	
Chloride	2320	0.05	0.05	"	"	SF	0120408	12/02/20 14:00 12/02/20 14:00	SM4500 Cl B	
Specific Conductance (EC)	7800	1.00	1.00	umhos/c m	"	SF	0120837	12/07/20 16:30 12/07/20 16:30	SM2510 B	
Fluoride	0.424	0.031	0.100	mg/l	"	SF	0121451	12/11/20 14:15 12/11/20 14:15	SM4500 F C	
Hardness (Total)	3210	10	10	mg CaCO3/ L		ICP	0120337	12/03/20 11:37 12/07/20 15:15	EPA 200.7	
Nitrate as N	2.05	0.04	0.25	mg/l	5	UM	0121042	12/10/20 15:00 12/10/20 17:05	EPA 353.2	W-02
Nitrite as N	0.30	0.007	0.05	"	1	SF	0120759	12/02/20 11:00 12/02/20 11:00	SM4500 NO2 B	
pH at 25 deg C	7.08	0.01	0.10	pH Units	"	SF	0120328	12/01/20 17:31 12/01/20 17:31	SM4500-H+ B	HT-15
Orthophosphate as P	0.47	0.007	0.05	mg/l	"	UM	0120244	12/02/20 17:30 12/02/20 17:30	SM4500 P E	
Phosphorus, Total	0.50	0.04	0.10	"	2	UM	0120340	12/04/20 10:00 12/04/20 15:44	EPA 365.1	
Total Dissolved Solids	5840	1.0	20.0	"	1	NP	0120246	12/02/20 15:06 12/04/20 15:05	SM2540 C	
Sulfate as SO4	1430	50.0	250	"	50	SF	0120409	12/04/20 10:00 12/04/20 10:00	SM4500 SO4 E	
Turbidity	1.10	0.05	0.05	NTU	1	SF	0120331	12/02/20 09:00 12/02/20 09:00	SM2130 B	
P11B (20L0030-02) Grnd-Wate	er Sampled: 12/01	/20 10:20	Received: 12	/01/20 12:	50					
Bicarbonate Alkalinity	520	5	5	mg CaCO3/	1	SF	0120416	12/03/20 11:00 12/03/20 11:00	SM2320B	

EMA Log #: 20L0030

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P11B (20L0030-02) Grnd-Water	Sampled: 12/01	/20 10:20	Received: 12	/01/20 12:	:50					
Carbonate Alkalinity	ND	5	5	mg CaCO3/ L	1	SF	0120416	12/03/20 11:00 12/03/20 11:00	SM2320B	
Hydroxide Alkalinity	ND	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	
Total Alkalinity	520	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	
Ammonia as N	1.44	0.02	0.10	mg/l	"	UM	0120745	12/18/20 10:30 12/18/20 13:56	EPA 350.1	
Chloride	1790	0.05	0.05	"	"	SF	0120408	12/02/20 14:00 12/02/20 14:00	SM4500 Cl B	
Specific Conductance (EC)	6030	1.00	1.00	umhos/c m	"	SF	0120837	12/07/20 16:30 12/07/20 16:30	SM2510 B	
Fluoride	0.469	0.031	0.100	mg/l	"	SF	0121451	12/11/20 14:15 12/11/20 14:15	SM4500 F C	
Hardness (Total)	2750	10	10	mg CaCO3/ L	"	ICP	0120337	12/03/20 11:37 12/08/20 14:40	EPA 200.7	
Nitrate as N	0.03	0.009	0.05	mg/l	"	UM	0121042	12/10/20 15:00 12/10/20 17:05	EPA 353.2	W-02, J
Nitrite as N	ND	0.007	0.05	"	"	SF	0120759	12/02/20 11:00 12/02/20 11:00	SM4500 NO2 B	
pH at 25 deg C	7.17	0.01	0.10	pH Units	"	SF	0120328	12/01/20 17:34 12/01/20 17:34	SM4500-H+ B	HT-15
Orthophosphate as P	0.51	0.007	0.05	mg/l	"	UM	0120244	12/02/20 17:30 12/02/20 17:30	SM4500 P E	
Phosphorus, Total	0.62	0.04	0.10	"	2	UM	0120340	12/04/20 10:00 12/04/20 15:44	EPA 365.1	
Total Dissolved Solids	4690	1.0	20.0	"	1	NP	0120246	12/02/20 15:06 12/04/20 15:05	SM2540 C	
Sulfate as SO4	1080	25.0	125	"	25	SF	0120409	12/04/20 10:00 12/04/20 10:00	SM4500 SO4 E	
Turbidity	18.0	0.05	0.05	NTU	1	SF	0120331	12/02/20 09:00 12/02/20 09:00	SM2130 B	
P11D (20L0030-03) Grnd-Water	Sampled: 12/01	/20 10:45	Received: 12	2/01/20 12:	:50					
Bicarbonate Alkalinity	390	5	5	mg CaCO3/ L	1	SF	0120416	12/03/20 11:00 12/03/20 11:00	SM2320B	
				L						

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ND

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Carbonate Alkalinity

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SF

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12/03/20 11:00 12/03/20 11:00

EMA Log #: 20L0030

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	D14	MD	Reporting	11	Dilution	Anglast	Batch	Sample Prepared	Moth - J	N-4
Analyte	Result	MDL	Limit	Units	Dilution	Analyst	Batch	Sample Analyzed	Method	Notes
P11D (20L0030-03) Grnd-Water	Sampled: 12/01	/20 10:45	Received: 12	2/01/20 12:	:50					
Hydroxide Alkalinity	ND	5	5	mg CaCO3/ L	1	SF	0120416	12/03/20 11:00 12/03/20 11:00	SM2320B	
Total Alkalinity	390	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	
Ammonia as N	2.17	0.04	0.20	mg/l	2	UM	0120745	12/18/20 10:30 12/18/20 13:56	EPA 350.1	
Chloride	590	0.05	0.05	"	1	SF	0120408	12/02/20 14:00 12/02/20 14:00	SM4500 Cl B	
Specific Conductance (EC)	2810	1.00	1.00	umhos/c m	"	SF	0120837	12/07/20 16:30 12/07/20 16:30	SM2510 B	
Fluoride	0.294	0.031	0.100	mg/l	"	SF	0121451	12/11/20 14:15 12/11/20 14:15	SM4500 F C	
Hardness (Total)	844	10	10	mg CaCO3/ L	"	ICP	0120337	12/03/20 11:37 12/07/20 15:18	EPA 200.7	
Nitrate as N	0.02	0.009	0.05	mg/l	"	UM	0121042	12/10/20 15:00 12/10/20 17:05	EPA 353.2	W-02, J
Nitrite as N	ND	0.007	0.05	"	"	SF	0120759	12/02/20 11:00 12/02/20 11:00	SM4500 NO2 B	
pH at 25 deg C	7.34	0.01	0.10	pH Units	"	SF	0120328	12/01/20 17:35 12/01/20 17:35	SM4500-H+ B	HT-15
Orthophosphate as P	0.37	0.007	0.05	mg/l	"	UM	0120244	12/02/20 17:30 12/02/20 17:30	SM4500 P E	
Phosphorus, Total	0.42	0.04	0.10	"	2	UM	0120340	12/04/20 10:00 12/04/20 15:44	EPA 365.1	
Total Dissolved Solids	1850	1.0	20.0	"	1	NP	0120246	12/02/20 15:06 12/04/20 15:05	SM2540 C	
Sulfate as SO4	376	10.0	50.0	"	10	SF	0120409	12/04/20 10:00 12/04/20 10:00	SM4500 SO4 E	
Turbidity	8.40	0.05	0.05	NTU	1	SF	0120331	12/02/20 09:00 12/02/20 09:00	SM2130 B	
GUNR (20L0030-04) Grnd-Water	r Sampled: 12/0	01/20 08:4	0 Received: 1	12/01/20 1	2:50					
Bicarbonate Alkalinity	330	5	5	mg CaCO3/ L	1	SF	0120416	12/03/20 11:00 12/03/20 11:00	SM2320B	
Carbonate Alkalinity	ND	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	
Hydroxide Alkalinity	ND	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	



EMA Log #: 20L0030

Conventional Chemistry Parameters by Standard/EPA Methods

			Reporting					Sample Prepared		
Analyte	Result	MDL	Limit	Units	Dilution	Analyst	Batch	Sample Analyzed	Method	Notes
GUNR (20L0030-04) Grnd-Water	r Sampled: 12/(01/20 08:40	Received: 1	2/01/20 1	2:50					
Total Alkalinity	330	5	5	mg CaCO3/ L	1	SF	0120416	12/03/20 11:00 12/03/20 11:00	SM2320B	
Ammonia as N	0.22	0.02	0.10	mg/l	"	UM	0120745	12/18/20 10:30 12/18/20 13:56	EPA 350.1	
Chloride	1270	0.05	0.05	"	"	SF	0120408	12/02/20 14:00 12/02/20 14:00	SM4500 Cl B	
Specific Conductance (EC)	4750	1.00	1.00	umhos/c m	"	SF	0120837	12/07/20 16:30 12/07/20 16:30	SM2510 B	
Fluoride	0.277	0.031	0.100	mg/l	"	SF	0121451	12/11/20 14:15 12/11/20 14:15	SM4500 F C	
Hardness (Total)	1880	10	10	mg CaCO3/ L	"	ICP	0120337	12/03/20 11:37 12/07/20 15:21	EPA 200.7	
Nitrate as N	1.73	0.02	0.10	mg/l	2	UM	0121042	12/10/20 15:00 12/10/20 17:05	EPA 353.2	W-02
Nitrite as N	0.01	0.007	0.05	"	1	SF	0120759	12/02/20 11:00 12/02/20 11:00	SM4500 NO2 B	J
pH at 25 deg C	6.77	0.01	0.10	pH Units	"	SF	0120328	12/01/20 17:39 12/01/20 17:39	SM4500-H+ B	HT-15
Orthophosphate as P	0.08	0.007	0.05	mg/l	"	UM	0120244	12/02/20 17:30 12/02/20 17:30	SM4500 P E	
Phosphorus, Total	0.08	0.02	0.05	"	"	UM	0120340	12/04/20 10:00 12/04/20 15:44	EPA 365.1	
Total Dissolved Solids	3330	1.0	20.0	"	"	NP	0120246	12/02/20 15:06 12/04/20 15:05	SM2540 C	
Sulfate as SO4	743	25.0	125	"	25	SF	0120409	12/04/20 10:00 12/04/20 10:00	SM4500 SO4 E	
Turbidity	1.20	0.05	0.05	NTU	1	SF	0120331	12/02/20 09:00 12/02/20 09:00	SM2130 B	
Test (20L0030-05) Grnd-Water	Sampled: 12/01/2	20 12:15 R	eceived: 12/0)1/20 12:5	0					
Bicarbonate Alkalinity	386	5	5	mg CaCO3/	1	SF	0120416	12/03/20 11:00 12/03/20 11:00	SM2320B	
Carbonate Alkalinity	ND	5	5	L "	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	
Hydroxide Alkalinity	ND	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	
Total Alkalinity	386	5	5	"	"	SF	"	12/03/20 11:00 12/03/20 11:00	"	



Client Name:Geoscience Support Services, Inc.Project Name:GMGP Water Quality 2020

EMA Log #: 20L0030

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
Test (20L0030-05) Grnd-Water	Sampled: 12/01/2	20 12:15	Received: 12/	01/20 12:5	50					
Ammonia as N	1.06	0.02	0.10	mg/l	1	UM	0120745	12/18/20 10:30 12/18/20 13:56	EPA 350.1	
Chloride	1340	0.05	0.05	"	"	SF	0120408	12/02/20 14:00 12/02/20 14:00	SM4500 Cl B	
Specific Conductance (EC)	5110	1.00	1.00	umhos/c m	"	SF	0120837	12/07/20 16:30 12/07/20 16:30	SM2510 B	
Fluoride	0.243	0.031	0.100	mg/l	"	SF	0121451	12/11/20 14:15 12/11/20 14:15	SM4500 F C	
Hardness (Total)	1750	10	10	mg CaCO3/ L	"	ICP	0120337	12/03/20 11:37 12/07/20 15:24	EPA 200.7	
Nitrate as N	0.01	0.009	0.05	mg/l	"	UM	0121042	12/10/20 15:00 12/10/20 17:05	EPA 353.2	W-02, J
Nitrite as N	ND	0.007	0.05	"	"	SF	0120759	12/02/20 11:00 12/02/20 11:00	SM4500 NO2 B	
pH at 25 deg C	6.99	0.01	0.10	pH Units	"	SF	0120328	12/01/20 17:42 12/01/20 17:42	SM4500-H+ B	HT-15
Orthophosphate as P	0.27	0.007	0.05	mg/l	"	UM	0120244	12/02/20 17:30 12/02/20 17:30	SM4500 P E	
Phosphorus, Total	0.34	0.02	0.05	"	"	UM	0120340	12/04/20 10:00 12/04/20 15:44	EPA 365.1	
Total Dissolved Solids	3580	1.0	20.0	"	"	NP	0120246	12/02/20 15:06 12/04/20 15:05	SM2540 C	
Sulfate as SO4	746	25.0	125	"	25	SF	0120409	12/04/20 10:00 12/04/20 10:00	SM4500 SO4 E	
Turbidity	6.90	0.05	0.05	NTU	1	SF	0120331	12/02/20 09:00 12/02/20 09:00	SM2130 B	



Client Name:Geoscience Support Services, Inc.Project Name:GMGP Water Quality 2020

EMA Log #: 20L0030

Miscellaneous Physical/Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Analyst	Batch	Sample Prepared Sample Analyzed	Method	Notes
P2 (20L0030-01) Grnd-Water Sa	ampled: 12/01/20	09:30 R	eceived: 12/01	/20 12:50)					
Aggressive Index	13.0	1.00	1.00	N/A	1	MAR	1011366	01/13/21 13:37 01/13/21 13:38	Calculation	
adj-Sodium Adsorption Ratio	12.2	0.100	0.100	Ratio	"	MAR	0120242	12/02/20 10:11 12/02/20 10:12	Suarez-1981	
Langelier Index at 20 deg C	0.97	-3.00	-3.00	N/A	"	MAR	1011369	01/13/21 14:16 01/13/21 14:16	Calculation	
P11B (20L0030-02) Grnd-Water	Sampled: 12/01	/20 10:20	Received: 12/	01/20 12	:50					
Aggressive Index	13.0	1.00	1.00	N/A	1	MAR	1011366	01/13/21 13:37 01/13/21 13:38	Calculation	
adj-Sodium Adsorption Ratio	9.91	0.100	0.100	Ratio	"	MAR	0120242	12/02/20 10:11 12/02/20 10:12	Suarez-1981	
Langelier Index at 20 deg C	0.95	-3.00	-3.00	N/A	"	MAR	1011369	01/13/21 14:16 01/13/21 14:16	Calculation	
P11D (20L0030-03) Grnd-Water	Sampled: 12/01	/20 10:45	Received: 12/	01/20 12	:50					
Aggressive Index	12.5	1.00	1.00	N/A	1	MAR	1011366	01/13/21 13:37 01/13/21 13:38	Calculation	
adj-Sodium Adsorption Ratio	8.37	0.100	0.100	Ratio	"	MAR	0120242	12/02/20 10:11 12/02/20 10:12	Suarez-1981	
Langelier Index at 20 deg C	0.48	-3.00	-3.00	N/A	"	MAR	1011369	01/13/21 14:16 01/13/21 14:16	Calculation	
GUNR (20L0030-04) Grnd-Water	Sampled: 12/0)1/20 08:40	0 Received: 1	2/01/20 1	2:50					
Aggressive Index	12.3	1.00	1.00	N/A	1	MAR	1011366	01/13/21 13:37 01/13/21 13:38	Calculation	
adj-Sodium Adsorption Ratio	8.06	0.100	0.100	Ratio	"	MAR	0120242	12/02/20 10:11 12/02/20 10:12	Suarez-1981	
Langelier Index at 20 deg C	-0.16	-3.00	-3.00	N/A	"	MAR	1011369	01/13/21 14:16 01/13/21 14:16	Calculation	
Test (20L0030-05) Grnd-Water	Sampled: 12/01/2	20 12:15	Received: 12/0	1/20 12:5	50					
Aggressive Index	12.6	1.00	1.00	N/A	1	MAR	1011366	01/13/21 13:37 01/13/21 13:38	Calculation	
adj-Sodium Adsorption Ratio	11.8	0.100	0.100	Ratio	"	MAR	0120242	12/02/20 10:11 12/02/20 10:12	Suarez-1981	
Langelier Index at 20 deg C	0.64	-3.00	-3.00	N/A	"	MAR	1011369	01/13/21 14:16 01/13/21 14:16	Calculation	



Batch 0120337-BLK1) Prepared: 12/03/20 Analyzed: 12/04/20 Boron ND 0.25 0.50 mg/l ICP Magnesium ND 0.100 0.500 " ICP Potassium ND 0.00 " ICP Sodium ND 0.00 " ICP Sodium ND 0.00 0.50 " ICP Calcium ND 0.00 0.50 " ICP Calcium ND 0.10 0.50 " ICP Potassium 9.91 1.00 1.00 mg/l ICP 1.00 99 85-115 Boron 1.11 0.25 0.50 " ICP 1.00 111 85-115 Boron 1.11 0.25 0.50 " ICP 1.00 111 85-115 Calcium 5.36 0.100 0.50 " ICP 5.00 93 85-115 Calcium <t< th=""><th></th><th>mit Notes</th></t<>		mit Notes
Boron ND 0.25 0.50 mg/l ICP Magnesium ND 0.100 0.500 " ICP Potassium ND 1.00 1.00 " ICP Sodium ND 0.100 0.500 " ICP Sodium ND 0.04 0.50 " ICP Calcium ND 0.10 0.50 " ICP LCS (0120337-BS1) Prepared: $12/03/20$ Analyzed: $12/04/20$ Potassium 9.91 1.00 1.00 mg/l ICP 10.0 99 $85-115$ Boron 1.11 0.25 0.50 " ICP 1.00 111 $85-115$ Boron 1.11 0.25 0.50 " ICP 5.00 93 $85-115$ Sodium 5.36 0.04 0.50 " ICP 5.00 103 $85-115$ Calcium 5.15 0.10 0.50 <t< th=""><th></th><th></th></t<>		
Magnesium ND 0.100 0.500 " ICP Potassium ND 1.00 1.00 " ICP Sodium ND 0.04 0.50 " ICP Sodium ND 0.04 0.50 " ICP Calcium ND 0.10 0.50 " ICP Calcium ND 0.10 0.50 " ICP Potassium 9.91 1.00 1.00 mg/l ICP 10.0 99 85-115 Boron 1.11 0.25 0.50 " ICP 1.00 111 85-115 LCS (0120337-BS2) Prepared: 12/03/20 Analyzed: 12/04/20 Prepared: 12/03/20 Analyzed: 12/08/20 Magnesium 4.65 0.100 0.500 mg/l ICP 5.00 93 85-115 Sodium 5.36 0.04 0.50 " ICP 5.00 103 85-115 Calcium 5.15 0.10 0.50 " ICP 5.00 103 85-115 LCS Dup (0120337-BSD1) <		
IndependentIND0.1000.300ICPPotassiumND1.001.00"ICPSodiumND0.040.50"ICPCalciumND0.100.50"ICPDrepared: 12/03/20 Analyzed: 12/04/20Prepared: 12/03/20 Analyzed: 12/08/20Magnesium9.911.001.00mg//ICPICP 1.009.91I.00negred: 12/03/20 Analyzed: 12/04/20Magnesium9.91I.000.500mg//ICPICP 5.009385-115CS (0120337-BSD1)Prepared: 12/03/20 Analyzed: 12/04/20Prepared: 12/03/20 Analyzed: 12/04/20Calcium5.100.101.140.250.50mg//ICPICP 5.0010/0ICP 5.0010/0ICP 5.00<		
Sodium ND 0.04 0.50 " ICP Calcium ND 0.04 0.50 " ICP LCS (0120337-BS1) Prepared: 12/03/20 Analyzed: 12/04/20 Potassium 9.91 1.00 1.00 mg/l ICP 10.0 99 85-115 Boron 1.11 0.25 0.50 " ICP 1.00 111 85-115 LCS (0120337-BS2) Prepared: 12/03/20 Analyzed: 12/08/20 Magnesium 4.65 0.100 0.500 mg/l ICP 5.00 93 85-115 Sodium 5.36 0.04 0.50 " ICP 5.00 103 85-115 Calcium 5.15 0.10 0.50 " ICP 5.00 103 85-115 Calcium 1.14 0.25 0.50 mg/l ICP 5.00 103 85-115 Detassium 10.0 1.00 1.00 " ICP 5.00 103 85-115 Detassium 10.0		
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Potassium9.911.001.00mg/lICP10.09985-115Boron1.110.250.50"ICP1.0011185-115LCS (0120337-BS2)Magnesium4.650.1000.500mg/lICP5.009385-115Sodium5.360.040.50"ICP5.009385-115Calcium5.150.100.50"ICP5.0010785-115Calcium5.150.100.50"ICP5.0010385-115Deron1.140.250.50mg/lICP1.0011485-115Detassium10.01.001.00"ICP1.0010085-115Detassium9.010.100.50mg/lICP1.0011485-115Detassium10.01.001.00"ICP1.0011485-115Detassium1.140.250.50mg/lICP1.0011485-115Detassium10.01.001.00"ICP1.0010085-115Detassium5.100.100.50mg/lICP1.0010085-115Detassium5.100.100.50mg/lICP5.0010285-115Sodium5.100.100.50"I		
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LCS Dup (0120337-BSD1) Prepared: 12/03/20 Analyzed: 12/04/20 Boron 1.14 0.25 0.50 mg/l ICP 1.00 114 85-115 Potassium 10.0 1.00 1.00 " ICP 10.0 100 85-115 LCS Dup (0120337-BSD2) Prepared: 12/03/20 Analyzed: 12/04/20 Prepared: 12/03/20 Analyzed: 12/04/20 Calcium 5.10 0.10 0.50 mg/l ICP 5.00 102 85-115 Magnesium 4.67 0.100 0.500 " ICP 5.00 93 85-115 Sodium 5.73 0.04 0.50 " ICP 5.00 115 85-115		
Boron 1.14 0.25 0.50 mg/l ICP 1.00 114 85-115 Potassium 10.0 1.00 1.00 " ICP 10.0 100 85-115 LCS Dup (0120337-BSD2) Prepared: 12/03/20 Analyzed: 12/04/20 Calcium 5.10 0.10 0.50 mg/l ICP 5.00 102 85-115 Magnesium 4.67 0.100 0.500 " ICP 5.00 93 85-115 Sodium 5.73 0.04 0.50 " ICP 5.00 115 85-115		
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LCS Dup (0120337-BSD2) Prepared: 12/03/20 Analyzed: 12/04/20 Calcium 5.10 0.10 0.50 mg/l ICP 5.00 102 85-115 Magnesium 4.67 0.100 0.500 " ICP 5.00 93 85-115 Sodium 5.73 0.04 0.50 " ICP 5.00 115 85-115	3 2	20
Calcium 5.10 0.10 0.50 mg/l ICP 5.00 102 85-115 Magnesium 4.67 0.100 0.500 " ICP 5.00 93 85-115 Sodium 5.73 0.04 0.50 " ICP 5.00 115 85-115	1 2	20
Magnesium 4.67 0.100 0.500 " ICP 5.00 93 85-115 Sodium 5.73 0.04 0.50 " ICP 5.00 115 85-115		
Magnesium 4.67 0.100 0.300 ICP 5.00 95 65/115 Sodium 5.73 0.04 0.50 " ICP 5.00 115 85-115	1 2	20
	0.6 2	20
	7 2	20
Duplicate (0120337-DUP1) Source: 20L0059-02 Prepared: 12/03/20 Analyzed: 12/04/20		
Calcium 233 0.50 2.50 mg/l ICP 263	12 2	20
Boron 4.88 0.25 0.50 " ICP 6.65	31 2	20 QR-03
Potassium 40.5 1.00 1.00 " ICP 45.9	12 2	20
Magnesium 203 2.50 12.5 " ICP 202	0.6 2	20
Sodium 3600 1.00 12.5 " ICP 4090	13 2	20



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0120337												
Matrix Spike (0120337-MS1)		Source: 2(0L0059-02		Prepared:	12/03/20	Analyzed:	12/04/20				
Sodium	3400	1.00	12.5	mg/l	ICP	1.00	4090	NR	75-125			QM-4X
Calcium	228	2.50	12.5	"	ICP	1.00	263	NR	75-125			QM-4X
Boron	6.75	6.25	12.5	"	ICP	1.00	6.65	10	75-125			QM-05, J
Magnesium	202	2.50	12.5	"	ICP	1.00	202	NR	75-125			QM-4X
Potassium	49.8	25.0	25.0	"	ICP	10.0	45.9	39	75-125			QM-06
Matrix Spike (0120337-MS2)	5	Source: 2()L0030-02		Prepared:	12/03/20	Analyzed:	12/07/20				
Magnesium	390	1.00	5.00	mg/l	ICP	1.00	383	680	75-125			QM-4X
Sodium	914	0.40	5.00	"	ICP	1.00	976	NR	75-125			QM-4X
Calcium	462	1.00	5.00	"	ICP	1.00	468	NR	75-125			QM-4X
Boron	ND	6.25	12.5	"	ICP	1.00	ND		75-125			QM-05
Potassium	29.1	25.0	25.0	"	ICP	10.0	ND	291	75-125			QM-05
Matrix Spike Dup (0120337-MSD1)	5	Source: 2()L0059-02		Prepared:	12/03/20	Analyzed:	12/07/20				
Sodium	3390	1.00	12.5	mg/l	ICP	1.00	4090	NR	75-125	0.1	20	QM-4X
Boron	6.92	6.25	12.5	"	ICP	1.00	6.65	27	75-125	2	20	QM-05, J
Potassium	58.3	25.0	25.0	"	ICP	10.0	45.9	124	75-125	16	20	
Calcium	233	2.50	12.5	"	ICP	1.00	263	NR	75-125	2	20	QM-4X
Magnesium	204	2.50	12.5	"	ICP	1.00	202	148	75-125	1	20	QM-4X
Batch 0120857												
Blank (0120857-BLK1)					Prepared:	12/08/20	Analyzed:	12/09/20				
Barium	ND	0.0002	0.010	mg/l	icpms		-					
Copper	ND	0.0002	0.010	"	icpms							
Zinc	ND	0.0003	0.020	"	icpms							
Iron	ND	0.002	0.050	"	icpms							
Manganese	ND	0.0001	0.005	"	icpms							
Chromium	ND	0.0002	0.005		icpms							



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0120857												
LCS (0120857-BS1)					Prepared:	12/08/20	Analyzed:	12/09/20				
Barium	0.099	0.0002	0.010	mg/l	icpms	0.100		99	85-115			
Chromium	0.101	0.0002	0.005	"	icpms	0.100		101	85-115			
Copper	0.102	0.0002	0.010	"	icpms	0.100		102	85-115			
Manganese	0.102	0.0001	0.005	"	icpms	0.100		102	85-115			
Zinc	0.103	0.0003	0.020	"	icpms	0.100		103	85-115			
Iron	0.105	0.002	0.050	"	icpms	0.100		105	85-115			
LCS Dup (0120857-BSD1)					Prepared:	12/08/20	Analyzed:	12/09/20				
Barium	0.097	0.0002	0.010	mg/l	icpms	0.100		97	85-115	2	20	
Copper	0.102	0.0002	0.010	"	icpms	0.100		102	85-115	0.2	20	
Manganese	0.102	0.0001	0.005	"	icpms	0.100		102	85-115	0.05	20	
Iron	0.107	0.002	0.050	"	icpms	0.100		107	85-115	1	20	
Chromium	0.100	0.0002	0.005	"	icpms	0.100		100	85-115	0.6	20	
Zinc	0.103	0.0003	0.020	"	icpms	0.100		103	85-115	0.08	20	
Duplicate (0120857-DUP1)	5	Source: 2()L0251-01		Prepared:	12/08/20	Analyzed:	12/09/20				
Barium	0.135	0.0002	0.010	mg/l	icpms		0.135			0.6	20	
Zinc	0.130	0.0003	0.020	"	icpms		0.134			3	20	
Manganese	0.003	0.0001	0.005	"	icpms		0.003			7	20	J
Iron	0.143	0.002	0.050	"	icpms		0.142			0.3	20	
Chromium	0.002	0.0002	0.005	"	icpms		0.002			0.5	20	J
Copper	0.079	0.0002	0.010	"	icpms		0.083			4	20	
Matrix Spike (0120857-MS1)	S	Source: 2()L0251-01		Prepared:	12/08/20	Analyzed:	12/09/20				
Barium	0.244	0.0002	0.010	mg/l	icpms	0.100	0.135	109	70-130			
Chromium	0.102	0.0002	0.005	"	icpms	0.100	0.002	100	70-130			
Copper	0.177	0.0002	0.010	"	icpms	0.100	0.083	95	70-130			
Zinc	0.226	0.0003	0.020	"	icpms	0.100	0.134	92	70-130			
Manganese	0.104	0.0001	0.005	"	icpms	0.100	0.003	101	70-130			
Iron	0.229	0.002	0.050	"	icpms	0.100	0.142	87	70-130			



Analyte	Result MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0120857											
Matrix Spike Dup (0120857-MSD1)	Source: 2	0L0251-01		Prepared:	12/08/20	Analyzed:	12/09/20				
Barium	0.238 0.0002	0.010	mg/l	icpms	0.100	0.135	103	70-130	3	20	
Zinc	0.223 0.0003	0.020		icpms	0.100	0.134	88	70-130	2	20	
Copper	0.175 0.0002	0.010		icpms	0.100	0.083	92	70-130	2	20	
Iron	0.238 0.002	0.050		icpms	0.100	0.142	96	70-130	4	20	
Chromium	0.100 0.0002	0.005		icpms	0.100	0.002	98	70-130	2	20	
Manganese	0.101 0.0001	0.005	"	icpms	0.100	0.003	98	70-130	3	20	



			Reporting			Spike	Source		%REC		RPD	
Analyte	Result	MDL	Limit	Units	Analyst	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 0120244												
Blank (0120244-BLK1)					Prepared of	& Analyze	ed: 12/02/20					
Orthophosphate as P	ND	0.007	0.05	mg/l	UM							
LCS (0120244-BS1)					Prepared	& Analyze	ed: 12/02/20					
Orthophosphate as P	0.51	0.007	0.05	mg/l	UM	0.500		101	80-120			
LCS Dup (0120244-BSD1)					Prepared of	& Analyze	ed: 12/02/20					
Orthophosphate as P	0.51	0.007	0.05	mg/l	UM	0.500		102	80-120	0.2	20	
Duplicate (0120244-DUP1)	S	Source: 20	0L0030-04		Prepared of	& Analyze	ed: 12/02/20					
Orthophosphate as P	0.08	0.007	0.05	mg/l	UM	<u> </u>	0.08			4	20	
Matrix Spike (0120244-MS1)	s	Source: 20	0L0030-04		Prepared	& Analyze	ed: 12/02/20					
Orthophosphate as P	0.59	0.007	0.05	mg/l	UM	0.500	0.08	101	80-120			
Matrix Spike Dup (0120244-MSD1)	S	Source: 20	0L0030-04		Prepared of	& Analyze	ed: 12/02/20					
Orthophosphate as P	0.59	0.007	0.05	mg/l	UM	0.500	0.08	101	80-120	0.2	20	
Batch 0120246												
Blank (0120246-BLK1)					Prepared:	12/02/20	Analyzed: 1	2/04/20				
Total Dissolved Solids	ND	1.0	20.0	mg/l	NP		•					
Duplicate (0120246-DUP1)	s	Source: 20	0L0019-05		Prepared:	12/02/20	Analyzed: 1	2/04/20				
Total Dissolved Solids	1930	1.0	20.0	mg/l	NP		1920			0.6	20	
Reference (0120246-SRM1)					Prepared:	12/02/20	Analyzed: 1	2/04/20				
Total Dissolved Solids	400	1.0	20.0	mg/l	NP	425	-	94	89.41-110.58			



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0120328		,		,								
Duplicate (0120328-DUP1)	S	ource: 20	0L0030-05	_	Prepared &	د Analyze	d: 12/01/20	_		_	_	_
pH at 25 deg C	7.02	0.01	0.10	pH Units	-		6.99			0.4	20	
Reference (0120328-SRM1)					Prepared &	λ Analvze	d: 12/01/20					
pH at 25 deg C	6.46	0.01	0.10	pH Units	1	6.39	, 20	101	96.87-103.12			
Batch 0120331												
Duplicate (0120331-DUP1)	S	ource: 20	0L0041-02		Prepared &	ک Analyzed	d: 12/02/20					
Turbidity	0.15	0.05	0.05	NTU	SF		0.15			0	20	
Reference (0120331-SRM1)					Prepared &	č Analyze	d: 12/02/20					
Turbidity	1.70	0.05	0.05	NTU	SF	1.75		97	82.3-120			
Batch 0120337												
Blank (0120337-BLK1)					Prepared:	12/03/20	Analyzed: 12	/07/20				
Hardness (Total)	ND	10	10	mg CaCO3/ L	ICP							
Duplicate (0120337-DUP1)	S	ource: 20	0L0059-02		Prepared:	12/03/20	Analyzed: 12	/08/20				
Hardness (Total)	1420	10	10	mg CaCO3/ L	ICP		1490			5	20	
Batch 0120340												
Blank (0120340-BLK1)					Prepared &	د Analyze	d: 12/04/20					
Phosphorus, Total	ND	0.02	0.05	mg/l	UM							



			Reporting			Spike	Source		%REC		RPD	
Analyte	Result	MDL	Limit	Units	Analyst	Level	Result	%REC	Limits	RPD	Limit	Notes
Batch 0120340												
LCS (0120340-BS1)					Prepared	& Analyze	d: 12/04/20					
Phosphorus, Total	0.50	0.02	0.05	mg/l	UM	0.500		100	90-110			
LCS Dup (0120340-BSD1)					Prepared	& Analyze	d: 12/04/20					
Phosphorus, Total	0.51	0.02	0.05	mg/l	UM	0.500		102	90-110	1	20	
Duplicate (0120340-DUP1)	s	ource: 20	0L0030-05		Prepared a	& Analyze	d: 12/04/20					
Phosphorus, Total	0.34	0.02	0.05	mg/l	UM		0.34			0.9	20	
Matrix Spike (0120340-MS1)	s	ource: 20	0L0030-05		Prepared	& Analyze	d: 12/04/20					
Phosphorus, Total	1.33	0.04	0.10	mg/l	UM	1.00	0.34	99	90-110			
Matrix Spike Dup (0120340-MSD1)	s	ource: 20	0L0030-05		Prepared of	& Analyze	d: 12/04/20					
Phosphorus, Total	1.37	0.04	0.10	mg/l	UM	1.00	0.34	103	90-110	3	20	
Batch 0120408												
Blank (0120408-BLK1)					Prepared a	& Analyze	d: 12/02/20					
Chloride	ND	0.05	0.05	mg/l	SF							
Blank (0120408-BLK2)					Prepared a	& Analyze	d: 12/02/20					
Chloride	ND	0.05	0.05	mg/l	SF							
LCS (0120408-BS1)					Prepared	& Analyze	d: 12/02/20					
Chloride	190	0.05	0.05	mg/l	SF	200		95	80-120			
LCS Dup (0120408-BSD1)					Prepared	& Analyze	d: 12/02/20					
Chloride	200	0.05	0.05	mg/l	SF	200		100	80-120	5	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0120408												
Duplicate (0120408-DUP1)	S	ource: 2	0K0737-02		Prepared	& Analyze	ed: 12/02/20					
Chloride	110	0.05	0.05	mg/l	SF		120			9	20	
Matrix Spike (0120408-MS1)	s	ource: 2	0K0737-02		Prepared	& Analyze	ed: 12/02/20					
Chloride	290	0.05	0.05	mg/l	SF	200	120	85	80-120			
Matrix Spike Dup (0120408-MSD1)	s	ource: 2	0K0737-02		Prepared	& Analyze	ed: 12/02/20					
Chloride	290	0.05	0.05	mg/l	SF	200	120	85	80-120	0	20	
Batch 0120409												
Blank (0120409-BLK1)					Prepared	& Analyze	ed: 12/04/20					
Sulfate as SO4	ND	1.0	5.0	mg/l	SF							
LCS (0120409-BS1)					Prepared	& Analyze	ed: 12/04/20					
Sulfate as SO4	9.0	1.0	5.0	mg/l	SF	10.0		90	80-120			
LCS Dup (0120409-BSD1)					Prepared	& Analyze	ed: 12/04/20					
Sulfate as SO4	10.2	1.0	5.0	mg/l	SF	10.0		102	80-120	13	20	
Duplicate (0120409-DUP1)	S	ource: 2	0L0136-03		Prepared	& Analyze	ed: 12/04/20					
Sulfate as SO4	ND	1.0	5.0	mg/l	SF	2	ND				20	
Matrix Spike (0120409-MS1)	S	ource: 2	0L0136-03		Prepared	& Analyze	ed: 12/04/20					
Sulfate as SO4	9.4	1.0	5.0	mg/l	SF	10.0	ND	94	80-120			
Matrix Spike Dup (0120409-MSD1)	S	ource: 2	0L0136-03		Prepared	& Analyze	ed: 12/04/20					
Sulfate as SO4	9.6	1.0	5.0	mg/l	SF	10.0	ND	96	80-120	2	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0120416												
Duplicate (0120416-DUP1)	S	ource: 2	0L0058-01		Prepared a	& Analyze	d: 12/03/20					
Carbonate Alkalinity	ND	5	5	mg CaCO3/ L	SF		ND				20	
Bicarbonate Alkalinity	110	5	5	"	SF		110			0	20	
Hydroxide Alkalinity	ND	5	5	"	SF		ND				20	
Total Alkalinity	110	5	5	"	SF		110			0	20	
Reference (0120416-SRM1)					Prepared a	& Analyze	d: 12/03/20					
Carbonate Alkalinity	ND	5	5	mg CaCO3/ L	SF	0.00			0-0			
Hydroxide Alkalinity	ND	5	5	"	SF	0.00			0-0			
Bicarbonate Alkalinity	42	5	5	"	SF	46.0		91	90-110			
Total Alkalinity	42	5	5	"	SF	46.0		91	90-110			
Batch 0120745												
Blank (0120745-BLK1)					Prepared a	& Analyze	d: 12/18/20					
Ammonia as N	ND	0.02	0.10	mg/l	UM							
LCS (0120745-BS1)					Prepared a	& Analyze	d: 12/18/20					
Ammonia as N	0.97	0.02	0.10	mg/l	UM	1.00		97	90-110			
LCS Dup (0120745-BSD1)					Prepared a	& Analyze	d: 12/18/20					
Ammonia as N	0.99	0.02	0.10	mg/l	UM	1.00		99	90-110	2	20	
Duplicate (0120745-DUP1)	S	ource: 2	0L0030-01		Prepared a	& Analyze	d: 12/18/20					
Ammonia as N	0.14	0.02	0.10	mg/l	UM		0.14			5	20	
Matrix Spike (0120745-MS1)	S	ource: 2	0L0030-01		Prepared a	& Analyze	d: 12/18/20					
Ammonia as N	2.24	0.04	0.20	mg/l	UM	2.00	0.14	105	90-110			



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0120745												
Matrix Spike Dup (0120745-MSD1)	S	ource: 20	0L0030-01		Prepared	& Analyze	ed: 12/18/20					
Ammonia as N	2.24	0.04	0.20	mg/l	UM	2.00	0.14	105	90-110	0.09	20	
Batch 0120759												
Blank (0120759-BLK1)					Prepared	& Analyze	ed: 12/01/20					
Nitrite as N	ND	0.007	0.05	mg/l	SF							
LCS (0120759-BS1)					Prepared	& Analyze	ed: 12/01/20					
Nitrite as N	0.10	0.007	0.05	mg/l	SF	0.100		99	80-120			
LCS Dup (0120759-BSD1)					Prepared	& Analyze	ed: 12/01/20					
Nitrite as N	0.10	0.007	0.05	mg/l	SF	0.100		99	80-120	0	20	
Duplicate (0120759-DUP1)	s	ource: 20	DL0019-05		Prepared	& Analvze	ed: 12/01/20					
Nitrite as N	0.02	0.007	0.05	mg/l	SF	j	0.02			6	20	J
Matrix Spike (0120759-MS1)	S	ource: 20	0L0019-05		Prepared	& Analyze	ed: 12/01/20					
Nitrite as N	0.11	0.007	0.05	mg/l	SF	0.100	0.02	94	80-120			
Matrix Spike Dup (0120759-MSD1)	S	ource: 20	0L0019-05		Prepared	& Analyze	ed: 12/01/20					
Nitrite as N	0.11	0.007	0.05	mg/l	SF	0.100	0.02	95	80-120	0.9	20	
Batch 0120837												
Duplicate (0120837-DUP1)	s	ource: 20	0K0824-01		Prepared	& Analyze	ed: 12/07/20					
Specific Conductance (EC)	5250	1.00	1.00	umhos/c m	SF		5220			0.6	20	



Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Kesult	MDL	Liiiit	Units		Level	Kesun	/0KEC	Linits	KFD	Liiiit	Notes
Batch 0120837												
Duplicate (0120837-DUP2)	S	Source: 20	DL0207-01		Prepared of	& Analyze	d: 12/07/20					
Specific Conductance (EC)	2150	1.00	1.00	umhos/c m	SF		2110			2	20	
Reference (0120837-SRM1)					Prepared a	& Analyze	d: 12/07/20					
Specific Conductance (EC)	435	1.00	1.00	umhos/c m	SF	466		93	89.91-110.08			
Batch 0121042												
Blank (0121042-BLK1)					Prepared of	& Analyzed	d: 12/10/20					
Nitrate as N	ND	0.009	0.05	mg/l	UM							
LCS (0121042-BS1)					Prepared of	& Analyze	d: 12/10/20					
Nitrate as N	0.49	0.009	0.05	mg/l	UM	0.500		98	90-110			
LCS Dup (0121042-BSD1)					Prepared of	& Analyze	d: 12/10/20					
Nitrate as N	0.49	0.009	0.05	mg/l	UM	0.500		97	90-110	0.4	20	
Duplicate (0121042-DUP1)	S	Source: 20)K0362-01		Prepared of	& Analyzed	d: 12/10/20					
Nitrate as N	0.02	0.009	0.05	mg/l	UM		0.02			6	20	J
Matrix Spike (0121042-MS1)	S	Source: 20)K0362-01		Prepared a	& Analyze	d: 12/10/20					
Nitrate as N	0.98	0.02	0.10	mg/l	UM	1.00	0.02	96	90-110			
Matrix Spike Dup (0121042-MSD1)	S	Source: 20)K0362-01		Prepared a	& Analyze	d: 12/10/20					
Nitrate as N	0.99	0.02	0.10	mg/l	UM	1.00	0.02	97	90-110	1	20	
Batch 0121451												
Blank (0121451-BLK1)					Prepared	& Analyze	d: 12/11/20					
Fluoride	ND	0.031	0.100	mg/l	SF							



			Departing			Smiles	Course		%REC		RPD	
Analyte	Result	MDL	Reporting Limit	Units	Analyst	Spike Level	Source Result	%REC	Limits	RPD	Limit	Notes
Batch 0121451												
LCS (0121451-BS1)					Prepared	& Analyze	d: 12/11/20					
Fluoride	0.965	0.031	0.100	mg/l	SF	1.00		96	80-120			
LCS Dup (0121451-BSD1)					Prepared	& Analyze	ed: 12/11/20					
Fluoride	0.974	0.031	0.100	mg/l	SF	1.00		97	80-120	0.9	20	
Duplicate (0121451-DUP1)	S	Source: 2	0L0019-05		Prepared	& Analyze	d: 12/11/20					
Fluoride	0.384	0.031	0.100	mg/l	SF		0.391			2	20	
Matrix Spike (0121451-MS1)	5	Source: 2	0L0019-05		Prepared	& Analyze	ed: 12/11/20					
Fluoride	1.34	0.062	0.200	mg/l	SF	1.00	0.391	95	80-120			
Matrix Spike Dup (0121451-MSD1)	S	Source: 2	0L0019-05		Prepared	& Analyze	ed: 12/11/20					
Fluoride	1.36	0.062	0.200	mg/l	SF	1.00	0.391	96	80-120	0.9	20	



Client Name:Geoscience Support Services, Inc.Project Name:GMGP Water Quality 2020

Notes and Definitions

- W-02 The sample for nitrate analysis was preserved with H2SO4 after the nitrite portion of the analysis was completed to extend the holding time for the sample. Nitrate results are corrected for the nitrite contribution per the method.
- QR-03 The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference.
- QM-4X The spike recovery was outside of the QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
- QM-06 Due to noted non-homogeneity of the QC sample matrix, the MS/MSD did not provide reliable results for accuracy and precision. Sample results for the QC batch were accepted based on LCS/LCSD percent recoveries and RPD values.
- QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
- J Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag).
- HT-15 This sample was received outside of the EPA's recommended 15 minute holding time for this analysis. However, the sample was analyzed immediately upon receipt.
- ND Analyte NOT DETECTED at or above the reporting limit (or method detection limit when specified)
- NR Not Reported
- dry Sample results reported on a dry weight basis (if indicated in units column)
- RPD Relative Percent Difference
- MDL Method detection limit (indicated per client's request)



CHAIN-OF-CUSTODY RECORD 20 L003 D	- EnviroMatrix E A	Analytical, Inc. ——	Page_L of /
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¹ Additional costs may apply. Please note there is a \$35 minimum charge for all clients. ² EMA reserves the right to return any samples that do not match our wave model.			
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NOTE: By relinquishing samples to EMA, Inc., client agrees to pay for the services requested on this COC form and any additional analyses performed on this project. Payment for services is due within 30 days from date of invoice. Samples will be disposed of 7 days after report has been finalized unless otherwise noted. All work is subject to EMA's terms and conditions.

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EnviroMatrix

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Analytical, Inc.

Analytical Services Quotation

GMGP Water Quality 2020 Geoscience Support Services, Inc. Nathan Reynolds

12 12 12 5 1 H G C & P 40 41 1258 J- D

> Bid Date: 04/17/2020 Bid Expires: Prices Expire:

04/17/2021 04/17/2021

Matrix	Decessory of the second	Í		TAT	Unit	Extended	
Water	Parameters	Method	*	(days)	Price	Price	
Water	Aggressive Index (calc)(LAE		5	7	\$5.00	\$25.00	
Water	Aikalinity (All Forms)	varies	5	7	\$25.00	\$125.00	
	Hexavalent Chromium	EPA 218.6	5	7	\$105.00	\$525.00	ſ.,
Water	Langelier Index (Calo)	t au	5	7	\$5 00	\$25.00	
Water	Barium (Total)	EPA 200.8	5	7	\$10.00	\$50.00	
Water	Boron (Total)	EPA 200.7	5	7	\$10.00	#F9 001	2
Water	Calcium (Total)	EPA 200.7	5	7	\$10.00	\$50.00	
Water	Chromium (Total)	EPA 200.8	5	1 7 1	\$10.00	\$50.00	[~~ ~
Water	Copper (Total)	EPA 200.8	5	7	\$10.00	200.00	··
Waler	Iron (Total)	EFA 200.8	5		\$10.00		میں کی میں میں کی میں
Nater	Magnesium (Total)	EPA 200.7	5	7	\$10.00	\$50.00	
Nater	Mangenese (Total)	EPA 200.8	5	7	\$10.00	\$50.00	1
Väter	Potassium (Totai)	EPA 200.7	5		\$10.00	\$50.00	And a second sec
Vater	Silicon (Total)	EPA 200.7	5	7		350.00	<u> </u>
Valei	Sodium (Totai)	EPA 200.7	5	7	\$35.00	\$175.00	2
Vater	Strontium (Total)	EPA 200.7	5	7	\$10.00	\$50.00	
Vater	Zinc (Total)	EPA 200.8	5	7	\$45.00	\$225.00	ł
/ater	Ammonia as N	EFA 350.1	5		\$10.00	\$50.00	, 1 , 1
/ater	Chloride	SM4500 CI C	5	7	\$25.00	\$125.00	}
/ater	Fluoride	SM4500 F C	1	7	\$15.00	575.00	۶ م ^{را}
ater	Hardness	EPA 200.7	5	7	\$20.00	\$100.00	,
ater	Nitrate as N	EPA 365.1	5	7	\$15.00	\$75.00	•
ater	Nitrite as N	SM4500 NO2 B	5	7	\$25.00	\$125.00	
ater	Orthophosphate as P	SM4500 F E	5	7	\$25.00	\$125.00	
aler	pH in water		5	7	S15 00	\$75.00	
ater	Specific Conductance (EC)	SM4500-H+ 5	ð	7	510.00	\$50.00	
ater	Sulfate	SM2510 B	5	7	\$15.00	\$75.00	
ater	Total Dissolved Solids	SM4500 SO4 E	5	7	\$15.00	\$75.00	
eter	Total phosphate as P	SM2540 C	õ	7	\$13.00 	\$75.00	
~ * ****	LEADER CONTRACTOR OF A	EPA 365.1	5	7	\$20.00]	\$100.001	

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Mark Allen Rein

Project Manager EnviroMatrix Analytical, Inc. A • San Diego, California 92423 • (858) 560-7717 • Fax (858) 560-7763 Analytical Chemistry Laboratory Page Page 1 of 2 APPENDIX J

Conversion of Transducer Pressure Measurements to Groundwater Elevations

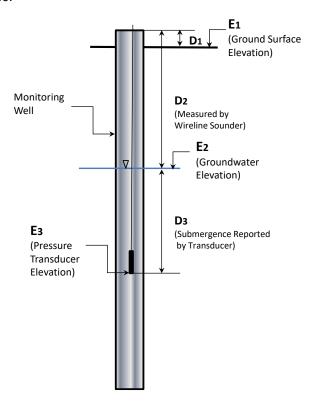


Pressure transducer readings were converted to groundwater elevation values (expressed as ft NAVD88¹) using the setting depth of the pressure transducer and the ground surface elevation at the monitoring well site (see inset). After initially setting a pressure transducer in the well, and after each time a transducer is removed from a well, the depth to water is determined using an electrical wire line sounder. The transducer elevation is then determined as follows:

Transducer Elevation (E3) = E1 + D1 - D2 - D3Once the transducer elevation has been established, groundwater elevations in ft NAVD88 are calculated from transducer submergence readings (D3) (psi converted to ft) and depth to water measurements (D2) as follows:

Groundwater Elevation (E2) = E3 + D3

Measurements of depth to water were made with an electric wireline water level indicator during each transducer download event. The Desalter Test Well, Surf Cup #1, Surf Cup #1 (abandoned), Surf Cup #2, Morgan Run #3 Green North, Morgan Run GunR, Valley 7 Well, Morgan Run Test Well, and Morgan Run P-11A reference point elevations (RP) were surveyed on February 18, 2020. Morgan Run P-1, P-2, P-4D, P-7, P-11A, and P-11D RP elevations were surveyed on August 25, 2020. All elevations are in ft NAVD88 and summarized in Table 1.



The Baro-Diver[®] and In-Situ BaroTroll were used to manually compensate groundwater elevation data. The following formula was used to manually compensate transducer submergence: (Transducer Submergence ft - (Barometric Pressure psi * 2.28 ft/psi)).

¹ Elevations reported in North American Vertical Datum of 1988 (NAVD88)

APPENDIX K

Estimating Total Dissolved Solids from Electrical Conductivity (EC) Measurements



ESTIMATING TOTAL DISSOLVED SOLIDS FROM ELECTRICAL CONDUCTIVITY (EC) MEASUREMENTS

Estimation of TDS from EC utilizes a conversion factor that is specific to a given water chemistry. Based on the normalized EC value (corrected to 25° C), an EC conversion factor may be used to estimate TDS from the product of the temperature-corrected EC value and the TDS:EC correction factor. The factor is calculated by dividing the laboratory measured EC by the laboratory measured TDS using the gravimetric calculated TDS.

Accuracy of the TDS:EC conversion factor is improved through collection of on-going direct measurements of TDS in groundwater samples using laboratory gravimetric methods. The equation of which may be used as a general estimate of TDS from measured EC.

APPENDIX L

Desalter Test Well

Pump Design Technical Specifications



THE SITE.

THIS TECHNICAL SPECIFICATION HAS BEEN PREPARED FOR THE OLIVENHAIN MUNICIPAL WATER DISTRICT BY OR UNDER THE DIRECTION OF THE FOLLOWING DESIGN PROFESSIONALS LICENSED BY THE STATE OF CALIFORNIA. THEY ARE BASED ON THE MOST RECENT AVAILABLE INFORMATION REGARDING SITE CONDITIONS, DRILLING METHODS AND MATERIALS TO BE USED. HOWEVER, SHOULD THE CONTRACTOR TAKE EXCEPTION TO ANY PART OF THESE SPECIFICATIONS OR PUMP DESIGN, AND IS NOT PREPARED TO FOLLOW THE SPECIFICATIONS AS INCLUDED HEREIN, THE CONTRACTOR WILL NOTIFY THE OWNER OR THE

OWNER'S REPRESENTATIVE IN WRITING BEFORE MOBILIZING TO

Mark D. Williams, Ph.D., P.E. Principal Engineer RCE No. 68138

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Olivenhain Municipal Water District

EQUIPPING THE SAN DIEGUITO VALLEY DESALINATION TEST WELL WITH A DEEPWELL, VERTICAL LINESHAFT TURBINE PUMP

TABLE OF CONTENTS

DETAILED TECHNICAL SPECIFICATIONS

SECTION	DESCRIPTION
11217	SUBMERSIBLE VERTICAL TURBINE-TYPE WELL PUMP

FIGURE	DESCRIPTION
1	PUMP PROFILE AND DETAILS

<u>APPENDIX</u>	DESCRIPTION
А	PUMP CURVE
В	RESPONSES TO QUESTIONS AND COMMENTS ON 90% DESIGN





SECTION 11217

SUBMERSIBLE VERTICAL TURBINE-TYPE WELL PUMP

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Furnish complete, tested and operating, the equipment as shown on the Figure 1, and as specified herein.
- B. Work Included in This Section:
 - 1. Submersible vertical turbine type pump assembly for installation in an existing well casing complete with electric submersible motor, power cable, intake screen, pump bowls, column and pump appurtenances as specified herein.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings in the Product Review category for favorable review of the Pump. Include sufficient data to show that equipment conforms to Specification requirements, including prototype pump performance curves and motor data. Submit all items of equipment in complete initial package.
- B. Performance Testing: Certified non-witnessed factory performance tests in accordance with Hydraulics Institute Standards are required for each pump. Obtain favorable review from the Engineer prior to shipment of the pumps.
- C. Manuals: Furnish manufacturer's installation, lubrication, operation and maintenance manuals, bulletins, and parts lists.
- D. Affidavits: Furnish affidavits from the manufacturer stating that the equipment has been properly installed, adjusted and tested and is ready for full time operation.

1.03 QUALITY ASSURANCE

- A. All equipment furnished under this Section shall: (1) be of a single manufacturer who has been regularly engaged in the design and manufacture of the equipment for at least five years; and (2) be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by those manufacturers specifically named herein.
- B. All parts of the submersible well pump furnished under this Specification Section shall be of a single pump manufacturer.





1.04 SEISMIC CERTIFICATION

A. Seismic anchorage certifications and descriptions shall not be required.

PART 2 - PRODUCTS

2.01 SUBMERSIBLE TURBINE TYPE PUMPS

- A. General: Provide submersible vertical turbine type well pump for this project.
- B. Pump Schedule: The required pump characteristics shall be as follows:

Design Operating Point	200 gpm @ 200 ft TDH
Speed	3,500 rpm
Maximum Motor Horsepower	20 HP
Minimum Pump Efficiency	
@ Design Operating Point	70 Percent
Shut Off Head, 0 GPM @	310 ft ± 5 ft
Motor Data (speed/phase/volts)	3,500 rpm, 3-phase, 460 volts

- C. Pump Types:
 - 1. The pump shall be water lubricated submersible vertical turbine type pumps including bowl assembly, column, pump suction barrel, well seal, discharge head and submersible electric motor.
 - 2. Manufacturers:
 - a. 1st Manufacturer Grundfos SP 230S
 - b. 2nd Manufacturer Or Equal

D. Pump Construction:

- 1. Bowl Assembly:
 - a. Provide pump bowls of stainless steel or bronze.
 - b. The impeller shaft shall be stainless steel (not less than 12% chrome content) and shall be supported by bronze and/or neoprene bearings located on both sides of each impeller.
 - c. The impellers shall be of the enclosed type and shall be of stainless steel, of heavy construction, accurately fitted, statically and dynamically balanced. The impellers shall be preadjusted at the factory.
- 2. Discharge Column Assembly:
 - a. Contractor shall supply approximately 100 feet pump column pipe. The column pipe shall be Schedule 40 stainless steel, not less than 3 inches inside diameter. The pipe shall be furnished in interchangeable sections and shall be connected with threaded sleeve type couplings.
- 3. Discharge Head: Weld flange to top of the well casing and install pre-fabricated stainless steel well seal with one 3-inch diameter hole for water column pipe, and





molded rubber for watertight closure. Provide 4 bolts, nuts and washers and secure casing seal.

- E. Motors and Cable:
 - 1. Duty conditions
 - a. Submersible duty
 - b. Suitable for inverter duty
 - 2. Nominal horsepower rating: 20 HP
 - 3. Supply Voltage: 460 volts, 3-phase, 60-Hz
 - 4. Manufacturer's cable shall be continuous and without splices

2.02 PUMP CONTROLS

- A. Contractor shall connect the pump to the existing Variable Frequency Motor Controller.
- B. It is essential that the pump provided are capable of complete and stable operation over the entire range of the pump curve, from maximum flow rate operating point all the way to shut off.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install equipment in strict conformance with manufacturer's installation instructions. Check pump and motor alignment according to the Standards of the Hydraulics Institute after pump and motor have been installed.

3.02 FIELD SERVICE

A. Contractor shall thoroughly check and inspect the pump after installation, place the pump in operation and make necessary adjustments.

3.03 FIELD TESTING

- A. Perform field testing, observed by the Engineer, to demonstrate that the installed pump equipment provides the hydraulic performance determined by factory tests and that the equipment runs smoothly and is free from excessive noise and vibrations. Hydraulic Institute vibration limits shall govern.
- B. Measure the following parameters in 15-minute increments:
 - 1. Input voltage (phase to phase to VFD)
 - 2. Phase current to VFD





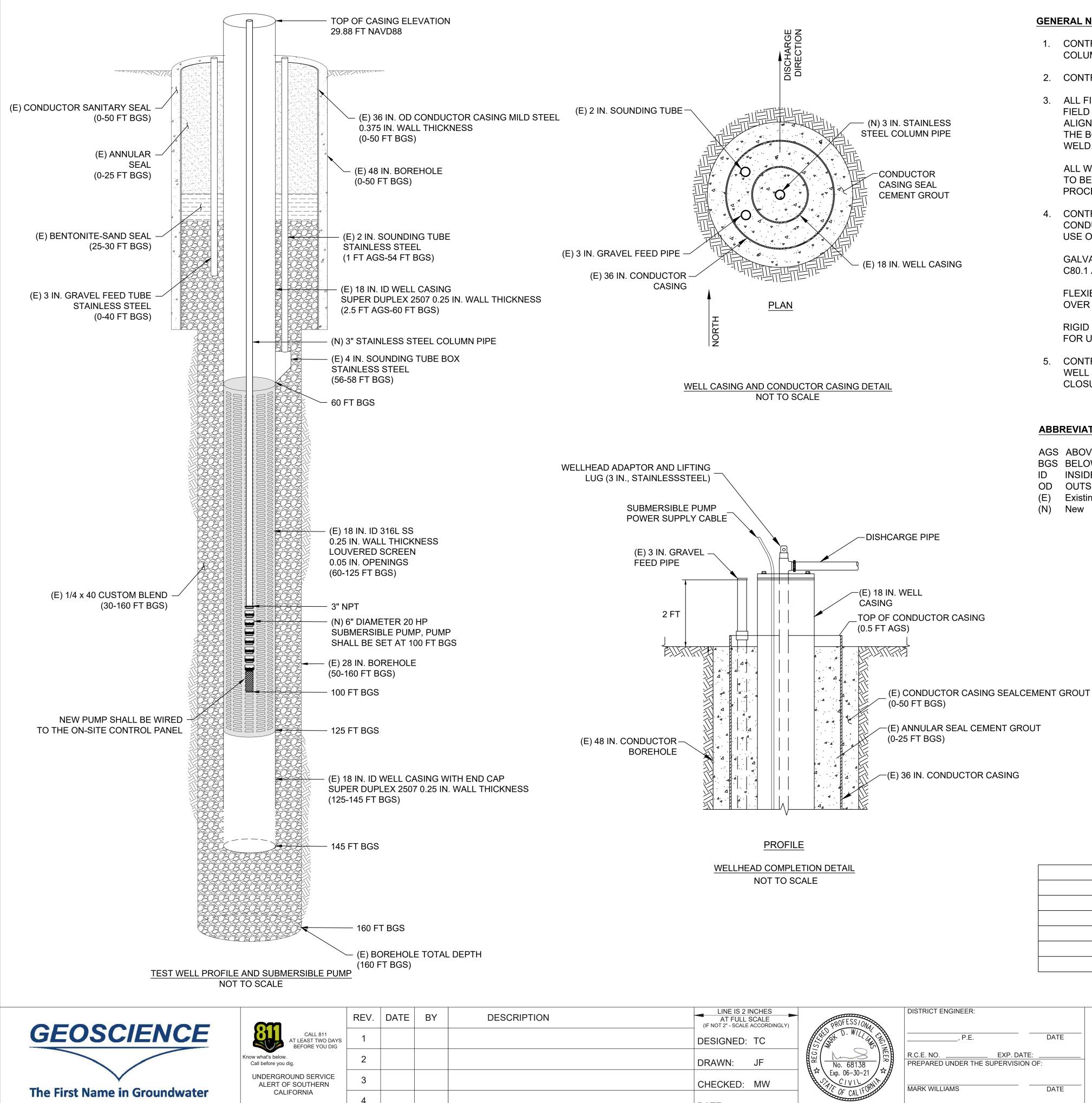
- 3. Power Factor incoming to VFD
- 4. Suction Hydraulic Grade Line
- 5. Discharge Hydraulic Grade Line
- C. Test Duration: Over a maximum 8-hour period, until the suction Hydraulic Grade Line stabilizes within a 10 feet allowance.

END OF SECTION





FIGURES



X:\Projects\CAD\Pump Design\OMWD\Test Well Pump\OMWD - Test Well - 01_Well Profile_recover.dwg, 1/26/2021

GENERAL NOTES:

- COLUMN SHOWN ON FIGURE 01.
- 2. CONTRACTOR SHALL LEAVE THE TOP OF WELL CASING AS HIGH AS POSSIBLE.
- WELD. THOROUGHLY CLEAN EACH PASS, EXCEPT THE FINAL ONE, OF DIRT,

ALL WELDING SHALL BE DONE BY EXPERIENCED, SKILLED OPERATORS FAMILIAR WITH THE METHODS AND MATERIALS TO BE USED. HAND WELDING WILL BE DONE ONLY BY WELDERS QUALIFIED UNDER THE STANDARD QUALIFICATION PROCEDURE OF SECTION IX OF THE ASME BOILER AND PRESSURE VESSEL CODE.

GALVANIZED RIGID STEEL CONDUIT (GRS) SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION, CONFORMING TO ANSI C80.1 AND UL 6. COUPLINGS SHALL BE THREADED TYPE.

FLEXIBLE METAL CONDUIT SHALL BE LIQUID-TIGHT, SHALL HAVE A MOISTURE- AND OIL-PROOF PVC JACKET EXTRUDED OVER A GALVANIZED, FLEXIBLE STEEL CONDUIT, AND SHALL CONFORM TO UL 360.

RIGID NONMETALLIC CONDUIT SHALL BE PVC SCHEDULE 40 (PVC-40) CONDUIT APPROVED FOR UNDERGROUND USE AND FOR USE WITH 90°C WIRES, AND SHALL CONFORM TO UL 651.

ABBREVIATIONS LIST:

AGS ABOVE GROUND SURFACE BGS BELOW GROUND SURFACE

- ID INSIDE DIAMETER
- OD OUTSIDE DIAMETER
- (E) Existing
- New

TOTAL MOTOR COLUMN COLU

DRAWN: JF No. 68138 Exp. 06-30-21 OF CALIFORM	, P.E. DATE	OLIVENHA Municipal Water Dis
DATE.	PE NO. 00130 EXP. DATE: 0/30/21	

1. CONTRACTOR SHALL REMOVE THE EXISTING PUMP, PIPE COLUMN AND WELL CAP, AND INSTALL NEW PUMP, PIPE

3. ALL FIELD AND SHOP WELDING SHALL BE DONE BY THE ELECTRIC ARC PROCESS UNLESS OTHERWISE SPECIFIED. ALL FIELD WELDING SHALL BE DONE IN PASSES NOT THICKER THAN ¹/₄-INCH. GIVE PARTICULAR ATTENTION TO THE ALIGNMENT OF EDGES TO BE JOINED, SO THAT COMPLETE FUSION AND PENETRATION WILL BE EFFECTED THROUGHOUT THE BOTTOM OF THE WELD. WELDS SHALL CONTAIN NO VALLEYS OR UNDERCUTS IN THE CENTER OR EDGES OF THE

4. CONTRACTOR SHALL WIRE THE NEW SUBMERSIBLE PUMP TO THE EXISTING CONTROL PANEL ON-SITE. RIGID STEEL CONDUIT SHALL BE USED IN ALL CONDUIT SYSTEMS, EXCEPT WHERE FLEXIBLE CONDUIT IS REQUIRED, OR ALLOW THE USE OF POLYVINYL CHLORIDE (PVC) CONDUIT. THE MINIMUM SIZE RACEWAY SHALL BE 3/4-INCH.

CONTRACTOR SHALL WELD FLANGE TO TOP OF THE WELL CASING AND INSTALL PRE-FABRICATED STAINLESS STEEL WELL SEAL WITH ONE 3-INCH DIAMETER HOLE FOR WATER COLUMN PIPE, AND MOLDED RUBBER FOR WATERTIGHT CLOSURE. PROVIDE 4 BOLTS, NUTS AND WASHERS AND SECURE CASING SEAL.

SUBMERS	IBLE PUMP DESIGN
DYNAMIC HEAD (FT.)	200
MOTOR VOLTS (V)	460
R HORSE POWER (HP)	20
PUMP MATERIAL	304 STAINLESS STEEL
N PIPE DIAMETER (IN.)	3
UMN PIPE MATERIAL	316L STAINLESS STEEL



OLIVENHAIN MUNICIPAL WATER DISTRICT SAN DIEGUITO VALLEY DESALINATION PROJECT TEST WELL AT SURF CUP SPORTS FIELDS DRAWING NO.

01 SHEET NO. 01 OF 01

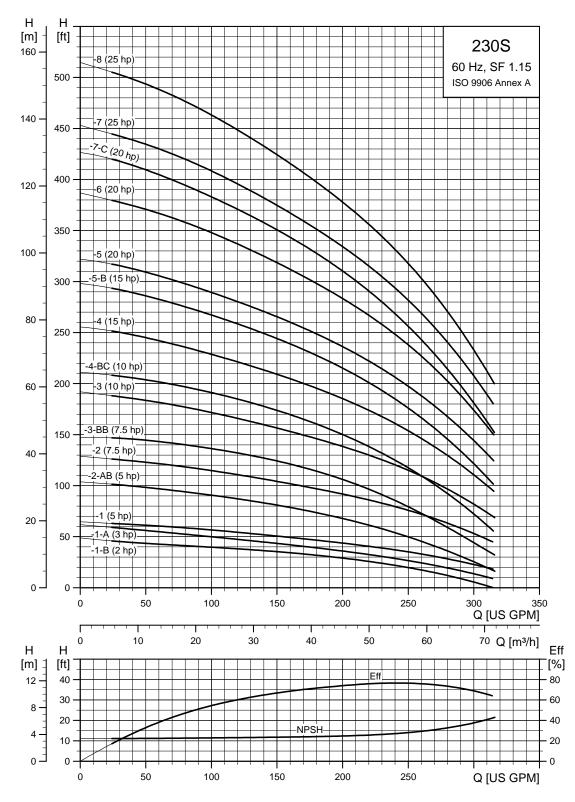
WELL PROFILE AND SUBMERSIBLE PUMP

APPENDIX A PUMP CURVE



6" and larger wells - continued

SP 230S (230 gpm)



6

TM05 0243 1812

6" and larger wells - continued

208

230 5 ۸ 3510

460 5

230 7.5

230 7.5

460

230

460 15

230 15

230 20

460 20

230 20 3462

3

3

3

3

3

3

3

87 3

87 3 460 7.5 3505

111

111 3 460 7.5 ۸ 3488

129 3 230 10 3474

130

141

143 3 460 10

176 3 230 15 3491

176

202

202 3 460 15 ▲ 3476

222

224 3 460 20

248 3 230 20

252

288

291 3 460 20

5 ▲ 3480

3500

3496

3477

3486

3472

3495

3499

3508

3476

3488

3475

43.47 (1104)

43.47 (1104)

47.92 (1217)

47.92 (1217)

49.10 (1247)

49.10 (1247)

53.55 (1360)

53.55 (1360)

55.91 (1420)

55.91 (1420)

60.36 (1533)

60.36 (1533)

62.92 (1598)

62.92 (1598)

67.37 (1711)

67.37 (1711)

71.82 (1824)

71.82 (1824)

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▲

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▲ 3470

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SP 230S (230 gpm) pump with 4", 6" motor

Pump model	Nom. head			Motor				Dime	nsions [in (mm)]		Net weight (complete
		[ft]	Ph	Volts [V]	[Hp]		[rpm]	A	В	С	D	E
		230	S - Mot	tor dia	met	er 4-ind	ch, 3-wire moto	r, 60 Hz, rated	d flow rate 230	gpm (3" NP1	Г)	
	32	1	230	2	٠	3434	34.45 (875)	19.57 (497)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
230S20-1B	32	3	230	2		3432	30.12 (765)	15.24 (387)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	32	3	460	2		3432	30.12 (765)	15.24 (387)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	38	1	230	3	٠	3459	37.60 (955)	22.72 (577)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
230S30-1A	38	3	230	3	٠	3460	32.84 (834)	17.96 (456)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	39	3	460	3	٠	3489	32.84 (834)	17.96 (456)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	46	1	230	5	٠	3516	41.54 (1055)	26.66 (677)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
230S50-1	46	3	230	5	٠	3528	37.56 (954)	22.68 (576)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	46	3	460	5	٠	3527	37.56 (954)	22.68 (576)	14.89 (378)	3.75 (95)	5.75 (146)	49.5
	71	1	230	5	٠	3459	45.99 (1168)	26.66 (677)	19.34 (491)	3.75 (95)	5.75 (146)	49.5
230S50-2AB	71	3	230	5	٠	3487	42.01 (1067)	22.68 (576)	19.34 (491)	3.75 (95)	5.75 (146)	79.2
	71	3	460	5	٠	3484	42.01 (1067)	22.68 (576)	19.34 (491)	3.75 (95)	5.75 (146)	79.2
230\$75-2	86	3	230	7.5	٠	3488	45.95 (1167)	26.62 (676)	19.34 (491)	3.75 (95)	5.75 (146)	79.2
230375-2	86	3	460	7.5	٠	3488	45.95 (1167)	26.62 (676)	19.34 (491)	3.75 (95)	5.75 (146)	79.2
230S75-3BB	110	3	230	7.5	٠	3468	50.40 (1280)	26.62 (676)	23.78 (604)	3.75 (95)	5.75 (146)	126.0
2303/3-308	110	3	460	7.5	٠	3468	50.40 (1280)	26.62 (676)	23.78 (604)	3.75 (95)	5.75 (146)	126.0
230S100-3	129	3	460	10	٠	3472	54.34 (1380)	30.56 (776)	23.78 (604)	3.75 (95)	5.75 (146)	126.0
230S100-4BC	141	3	460	10	•	3456	58.78 (1493)	30.56 (776)	28.23 (717)	3.75 (95)	5.75 (146)	144.9

23.51 (597)

23.51 (597)

23.51 (597)

23.51 (597)

23.51 (597)

23.51 (597)

23.51 (597)

24.69 (627)

24,69 (627)

24.69 (627)

24.69 (627)

27.05 (687)

27.05 (687)

27.05 (687)

27.05 (687)

29.61 (752)

29.61 (752)

29.61 (752)

29.61 (752)

29.61 (752)

29.61 (752)

28.86 (733)

28.86 (733)

28.86 (733)

28.86 (733)

33.31 (846)

33.31 (846)

33.31 (846)

33.31 (846)

37.76 (959)

37,76 (959)

42.21 (1072)

42.21 (1072)

5.52 (140)

5.52 (140)

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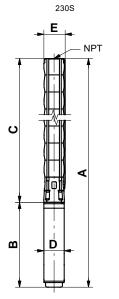
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TM00 0961 1196

80.0 5.50 (139.5) 80.0 5.50 (139.5) 5.50 (139.5) 80.0 19.97 (507) 5.52 (140) 5.79 (147) 111.6 19.97 (507) 5.52 (140) 5.79 (147) 111.6 24.41 (620) 5.52 (140) 5.79 (147) 131.4 24.41 (620) 5.52 (140) 5.79 (147) 131.4 24.41 (620) 5.52 (140) 5.79 (147) 126.0 24.41 (620) 5.52 (140) 5.79 (147) 126.0

144.9

144.9

144.9

144.9

161.1

161.1

161.1

161.1

167.4

167.4

181.8

181.8

5.79 (147)

5.79 (147)

5.79 (147)

5.79 (147)

5.79 (147)

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6

230S75-2

230S75-3BB

230S100-3

230S150-4

230S150-5B

230S200-5

230S200-6

230S200-7C

230S100-4BC

Notes: Control box is required for 3-wire, single-phase applications. Data does not include control box. Performance conforms to ISO 9906. 1999 (E) Annex A. Minimum submergence is 8 ft (2.4 m).

MS 402 motor.

MS 4000 motor.

MS 6000C motor.

E = Maximum diameter of pump including cable guard and motor. APPENDIX B RESPONSES TO QUESTIONS AND COMMENTS ON 90% DESIGN



Technical Memorandum



Subject:	Responses to Comments and Questions on 90% Design for OMWD-Owned Pump in Test Well	
Date:	January 19, 2021	
From:	Principal Engineer GEOSCIENCE Support Services, Inc.	Project Manager GEOSCIENCE Support Services, Inc.
То:	Mr. Jason Hubbard, P.E. Engineering Manager Olivenhain Municipal Water District 1966 Olivenhain Rd Encinitas, CA 92024 Mark Williams, Ph.D., PE Tim Chen	

QUESTION NO. 1: TOTAL DYNAMIC HEAD CALCULATIONS – PROVIDE THE TDH CALCULATIONS INCLUDING THE STATIC LIFT, MINOR LOSSES THROUGH FITTINGS, PIPELINE LOSSES, AND OTHER LOSSES. THE MOST LIKELY OPERATING CONDITION IS PUMPING THROUGH APPROXIMATELY 1,200 FEET OF 4-INCH PVC PIPE TO THE SURF CUP SPORTS POND. UNDER THIS CONDITION, WHAT IS THE PUMP EFFICIENCY?

Table 1 below shows the hydraulic calculations. The static lift, friction loss, and minor loss are approximately 90 feet, 40 feet and 1 foot, respectively. The total dynamic head will be 191 feet. Assuming a pump efficiency of 60%, 20 horsepower will be required for the submersible pump.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Pipeline	Length		imum ow	Pipe Size	I.D.	Velocity	Static Lift	Friction Head Loss	Minor Head Loss	Total Head Loss	Contingency for Additional Head Loss in Pump Column	Required TDH
Description	ft	gpm	cfs	in	in	fps	ft	ft	ft	ft	ft	ft
Well to Surf Cup Pond	1,270	200	0.45	4.00	4.00	5.11	- 90	40	1.0	41	60	191

Table 1 Hydraulic Calculations (Using Hazen-Williams)

Notes:

[1] Measured from Google Earth.

[2] Assumed well capacity is 250 gpm.

[3] Selected from standard pipe sizes.

[4] Based on JM Eagle Pressure-Rated PVC C900 Pipelines, pressure class 100 psi (DR 41).

[5] Calculated from [2] and [4].

[6] From groundwater level to the surface elevation at Surf Cup Pond.

[7] Calculated from [1], [2] and [4] using Hazen-Williams Equation.

[8] Calculated using the equivalent length method, and assuming additional 20% as the safety factor.

[9] = [7] + [8]

[10] Based on potential head loss in the pump column caused by iron and manganese deposits.

[11] = [6] + [9] + [10]

COMMENT NO. 1: GSSI WILL CONTACT THE PUMP MANUFACTURER TO MAKE SURE THE PUMP IS SUITABLE FOR THE LOCAL GROUNDWATER QUALITY, AND IN PARTICULAR POTENTIAL IRON AND MANGANESE DEPOSITS, AND IMPLEMENT MANUFACTURER RECOMMENDATIONS.

The presence of high levels of dissolved iron and manganese in groundwater is driving the accumulation of "Iron and Manganese" deposits through biologically-catalized oxidation. This is occurring as air is introduced most likely in the well casing during well pumping, and this then drives the formation of the deposits seen in the discharge piping. Therefore, the material requirements of this pump need to 1) Minimize corrosion of pump impellers/bowels during operating cycles, which expose the pump to oxidative/scaling conditions and off cycles where the pump is then exposed to reducing conditions; and 2) withstand mild acidification if the pump required de-scaling during service to remove iron an manganese scaling. For these requirements we recommend minimum 304 stainless steel pump bowls, impellers and other wetted internals. We have confirmed with one pump manufacture (Grundfos) that stainless pump components would be the best selection given the aforementioned requirements.

APPENDIX M

Woodard & Curran

Refined Manganese Treatment Design Criteria Report



TECHNICAL MEMORANDUM

	TO:	Joseph Randall, Olivenhain Municipal Water District				
	CC:	Brian Villalobos, Geoscience Support Services, Inc.				
	PREPARED BY:	Leslie Dumas and Martha de Maria y Campos, Woodard & Curran				
WOODARD	REVIEWED BY:	Kraig Erickson, Woodard & Curran				
& CURRAN	DATE:	August 26, 2020				
	RE:	San Dieguito Valley Brackish Groundwater Desalination Design Pilot – Refined Manganese Treatment Design Criteria Report				

The goal of this technical memorandum is to refine pre-treatment and reverse osmosis design criteria to support Olivenhain Municipal Water District's San Dieguito Valley Brackish Groundwater Desalination Design Pilot. This memorandum is based on site specific data generated from the operation of the pilot test well and field testing of the manganese pre-treatment system in June 2020.

1. PROJECT BACKGROUND

Olivenhain Municipal Water District (OMWD) relies on purchased water for its potable water needs with limited local water supply options available. Faced with rising costs, decreasing availability, and uncertain future reliability of this purchased water supply, OMWD is focusing on developing a reliable local potable water supply through implementation of the San Dieguito Valley Brackish Groundwater Desalination Project (Project).

The full-scale project will increase OMWD's potable water supply by 1,120 AFY. As both of San Diego County's major sources of potable water—the State Water Project and the Colorado River—are facing significant challenges, local, drought-proof supplies, such as desalinated groundwater, are imperative to maintaining a \$222 billion regional economy that is dependent upon a reliable source of water. The development of a new water supply will improve local water supply reliability and resiliency to drought or other emergencies and benefit OMWD's 84,000 customers with improved water supply reliability and water rate stability. The full-scale project will also decrease the San Diego region's reliance on imported water.

The San Dieguito Valley Brackish Groundwater Desalination Study that was conducted in 2017 evaluated if 1.0 million gallons per day (mgd) of potable water could be produced from brackish groundwater in the San Dieguito Valley Groundwater Basin. The study evaluated numerous project considerations including production wells, conveyance pipelines, desalination treatment facilities, brine management, as well as project alternatives and costs, environmental and regulatory considerations, and implementation plans.

As an outcome of the feasibility study, OMWD secured additional funding from the State of California's Depart of Water Resources (DWR) Water Desalination Grant program to pilot a new potable water supply from the San Dieguito Valley Groundwater Basin. The objectives of the design pilot are to:

- 1) Verify test well locations with pilot borings,
- 2) Verify water balance of San Dieguito Valley Groundwater Basin test wells,
- 3) Verify water quality from test wells for required desalination treatment, and
- 4) Verify manganese treatment by piloting pre-treatment technologies.



The San Dieguito Valley Brackish Groundwater Desalination Design Pilot constructed a test well in April 2019. In June 2020, field testing of treatment technologies was completed to refine treatment design criteria prior to construction of a full-scale project. Results will confirm the most beneficial and cost-effective approach to increase potable water supplies. The design pilot will increase OMWD's knowledge base regarding brackish desalination and sustainability of the local groundwater basin. Long-term monitoring and pumping of test well(s) will examine and confirm water quality and water balance in the project area, which will contribute to water quality improvements and water supply enhancements in the full-scale project. Data from long-term testing will be used to refine and recalibrate the groundwater model and field test greensand filtration equipment to develop site specific design criteria for manganese pre-treatment, offering research benefits in groundwater modeling, coastal basin response, and innovative water quality treatment technology. Continued outreach and involvement efforts will benefit public understanding and support of brackish desalination.

2. PILOT TREATMENT STUDY

Documented in the 2017 feasibility study, feed water for the proposed RO system will have first undergone pretreatment for manganese removal via greensand filtration. Design source water quality exceeds the California Secondary Maximum Contaminant Levels (SMCLs) for manganese (Mn) as well as total dissolved solids (TDS) of 0.05 mg/L and 500 mg/L, respectively. Secondary standards affect the aesthetic quality of the water (color, odor, and taste). More importantly, high Mn levels will adversely impact the reverse osmosis membranes of the desalination system by increasing cleaning requirements (i.e., greater system downtime), potentially shortening membrane life, and limiting the recovery of product water. The design Mn concentration in the feed water to the desalination process is 1.75 mg/L, which is based on the 2016 Morgan Run well site water quality data and is slightly above the average for the recent water quality data for the region. This value is 35 times higher than 0.05 mg/L, which is both the California SMCL for Mn and the upper limit recommended by manufacturers for waters to be treated by reverse osmosis membranes. Thus, it is important to reduce Mn upstream of the reverse osmosis membranes with a pretreatment process. The recommended pretreatment process is greensand filtration.

A filtration system pilot study was conducted in June of 2020 to evaluate the removal of iron (Fe) and manganese (Mn) from groundwater extracted from an existing well to be used as source water for the San Dieguito Valley Brackish Groundwater Desalination Project. The resulting filtration system would be a pretreatment step to remove these constituents prior to the reverse osmosis (RO) desalination process.

Groundwater from the existing supply well used as the water source for the pilot test has significant iron and manganese content that exceed the California Secondary Maximum Contaminant Levels (SMCLs) levels, and therefore can detrimentally affect anticipated membrane treatment processes. Iron levels in the subject raw well water averaged 0.97 mg/L and manganese concentration averaged 0.94 mg/L in laboratory samples. The project specifications require that the finished water from the proposed iron and manganese treatment system satisfy U.S. Environmental Protection Agency (EPA) and California State secondary drinking water regulations and standards. The California SMCL limits the concentration of iron to 0.30 mg/L and manganese to 0.05 mg/L. The pilot test contaminant removal goals were therefore treated water concentrations of less than SMCL values.

2.1 Pilot Study

A pilot treatment study was conducted to identify the most appropriate treatment methodology for the removal of iron, manganese and arsenic, the three most common naturally-occurring constituents in groundwater in California. Assessing the removal these three constituents together is required as many treatment processes will concurrently remove these constituents and it is possible for one constituent, even at concentrations below the MCL, to affect the removal of another. Objectives of the pilot study were to test and evaluate the performance of filtration media, to determine reagent chemicals required and chemical consumption rates, and to project the length of filter run times in



service and backwash waste volume as a percentage of production. With input from WRT/Loprest Division, two water treatment media systems were selected for testing that have demonstrated effective removal of iron and manganese from groundwater sources to manage these contaminants below SMCL concentrations. The medias tested were Inversand's GreensandPlus[®] with an anthracite media cap, and Mang-Ox[®] manganese dioxide media. GreensandPlus[®] is a manganese dioxide coated media with a silica sand core. It requires oxidant addition ion prior to media contact. Chlorine is the most common oxidant; however other oxidants are effective. The manganese dioxide coating acts as a catalyst in the oxidation process of both iron and manganese. Mang-Ox[®] is an 80% pure manganese dioxide ore, mined and screened for potable water use. In waters with a positive oxidation/reduction potential (ORP), it can work without the use of an oxidant; however, for this pilot study, all feed water to the two columns were conducted using the recommended hypochlorite feed rates for the raw water for full oxidation and removal of iron and manganese.

The pilot study was conducted near the test well site in Del Mar, California, and used raw groundwater extracted from OMWD test well constructed in April 2019. The pilot study ran 10 to 12 hours per day for two days with the each of the media type in separate columns operated simultaneously in parallel testing with individual backwash settings for each column. **Figure 1** is a photograph of the pilot study setup; the Filtration System Pilot Study Description is included in **Appendix A**, and the study report is included in **Appendix B**.



Figure 1: Filter Test Column Setup

The first media system tested, designated column F1 in the pilot study, included the mixed media of Inversand's GreensandPlus[®] with an anthracite media cap to assist in solids filtration capacity and solids backwash removal. This media system was operated using a hypochlorite reagent feed for available free chlorine as an oxidant as pretreatment. The second media system type, designated column F2, was a mono bed (single treatment media type) of Mang-Ox[®] manganese oxide granular media operated in a similar filtration manner using available free chlorine as an oxidant for pretreatment. Free chlorine oxidant addition rates were adjusted to maintain a level between 1.0 and 1.2 mg/L residual in the finished water.

Two runs for each media type were conducted to demonstrate iron and manganese removal capability. The filter columns were operated continuously for an extended service cycle exceeding the typical backwash frequency to

FINAL



assess actual pressure loss and contaminant removal performance to media contaminant leakage or elevated pressure loss of 8 psid. The filter runs were separated using a backwash cycle between runs. The backwash cycle was completed in two steps:

- Backwash and surface wash combined for 4 minutes at a flow rate of 2 gpm/ft² for surface wash for each media type. A backwash flow rate of 12 gpm/ft² kwas used for the Manganese GreensandPlus[®] media column (F1) and a backwash flow rate of 20 gpm/ft² was used for the Mang-Ox[®] media column (F2).
- 2. A backwash-only step for 4 minutes and a final rinse to waste at the service flow rate.

The surface wash was conducted with the backwash water to improve media surface cleaning efficiency. Effluent water was accumulated for use as backwash supply water.

During each filter run, the following parameters were measured and recorded at the indicated intervals for each run:

- 1. Filter flow rate (gpm)
- 2. Filter inlet and effluent free chlorine (mg/L)
- 3. Iron in filter influent (mg/L)
- 4. Iron in filter effluent (mg/L)
- 5. Manganese in filter influent (mg/L)
- 6. Manganese in filter effluent (mg/L)
- 7. Chemical feed pump speed (strokes/minute)

Water quality analyses was performed at a State-certified analytical laboratory for the following constituent:

- Total iron via EPA Method 200.7
- Total Manganese via EPA Method 200.7
- Arsenic (As) via EPA Method 200.8

Free chlorine, manganese, iron and pH were tested onsite.

2.2 Pilot Study Results

Groundwater from the test well was run through the pilot study columns to simulate treatment, with water quality samples collected and analyzed in the field to assess contaminant removal. Water quality samples were also collected and sent to a State-certified analytical laboratory as a quality control check against the field measurements. The resultant water quality data were then used to assess media performance. One key parameter used in this analysis is the contaminant leakage threshold or break-through point, defined as the point where the media's capability for treatment has been exceeded and, in an operational scenario, would need to be replaced.

Water quality produced from the column containing GreensandPlus[®] (F1) removed iron and manganese to less than target SMCL values in laboratory samples and regularly tested less than 0.20 mg/L iron and less than 0.05 mg/L manganese in field samples of the treated water for 6 hours of service run time at standard flow rate. At reduced flow rate in the service run no. 2, similar removal results were obtained through 10 hours of service. The column containing Mang-Ox[®] (F2) produced acceptable contaminant removal with iron and manganese effluent levels below 0.20 mg/L and 0.050 mg/L through 10 hours of service run length at standard flow rate. At the reduced flow rate in service run no. 2, these effluent results were extended to 12 hours of service operation. **Table 1** provides a summary of analytical results from the two runs.

Sample	Fe (mg/L) Field	Fe (mg/L) Laboratory	Mn (mg/L) Field	Mn (mg/L) Laboratory	As (µg/L) Laboratory
MCL	C	.3	0.	05	10
RUN #1 @ 8 GPM / FT ²					
Raw (average)	0.	.92	0.	94	5.8
F1 09:30	0.01	<0.02	0.04	0.0033	2.7
F2 09:30	0.05	0.02	0.024	0.012	2.2
F1 15:30	0.29	0.28	0.102	0.088	3.4
F2 15:30	0.15	0.16	0.062	0.022	2.6
F1 17:30	0.45	0.4	0.134	0.24	3.8
F2 17:30	0.18	0.2	0.041	0.029	2.8
RUN #2 @ 6 GPM / FT ²					
Raw (average)	C	.9	0.	95	5
F1 06:45	0.03	<0.02	0.077	0.15	3
F2 06:45	0.03	<0.02	0.032	0.0089	2
F1 14:00	0.02	<0.02	0.027	0.34	<1.0
F2 14:00	<0.02	<0.02	0.047	0.0032	<1.0
F1 18:00	0.19	0.4	0.086	0.49	3.8
F2 18:00	0.06	0.16	0.062	0.022	3.5
F1 backwash - bucket (Total)		20		3.1	56
F1 backwash - bucket (Dissolved)		0.11		0.83	3.8
F2 backwash - bucket (Total)		27		6.1	73
F2 backwash - bucket (Dissolved)		0.12		0.39	4

Table 1: Pilot Study Analytical Test Results

Notes:

SHADING indicates exceedance of the MCL

• F1 – GreensandPlus®

• F2 – Mang-Ox®

A general contaminant leakage threshold was observed at 8-hour service in column F1 (GreensandPlus[®]) and at 10 hours service in column F2 (Mang-Ox[®]) during run no. 1 with service conditions of 8 gpm/ft². In run no. 2, at a service flow rate of 6 gpm/ft², a contaminant leakage appears at approximately 10 hours of service in both columns. The pressure loss increases over for each media through the service test runs averaged 2.0 and 2.5 psid in columns F1 and F2 respectively. Starting clean pressure loss averaged 1.8 psid for column F1 and was 1.4 psid for column F2. Pressure loss results through each filter column and media type never exceeded recommended backwash initiation points through the extended service test periods in either test run.



3. DESIGN CRITERIA

3.1 Design Source Water Quality

As previously documented in the San Dieguito Valley Brackish Groundwater Desalination Study (February 2017), the design of the desalination process was based on source water quality representative of the recommended project area. **Table 2** compares the original design source water quality from the feasibility study to the updated design source water quality from the new OMWD test well sampled on May 22, 2019.

Parameter	Unit	Original Value (2017 Study)	Test Well (May 2019)
Alkalinity, Total	mg/L as CaCO3	340	380
Ammonia as N	mg/L	ND-0.13	No data
Barium	mg/l	0.08	0.13
Calcium	mg/L	305	400
Chloride	mg/L	1160	1300
Fluoride	mg/L	0.341	0.27
Hardness	mg/L as CaCO3	1475	1400
Iron	mg/L	ND	0.63
Magnesium	mg/L	167	100
Manganese	mg/L	1.75	1.1
Nitrate as N	mg/L	1.485	No data
pH (lab)		7.2	7.8
Phosphorus, Total	mg/L	0.1	No data
Potassium	mg/L	ND-9.56	39
Silica (as SiO2)	mg/L	31	31
Sodium	mg/L	622	620
Strontium	mg/l	ND	No data
Sulfate as SO4	mg/L	822	730
TDS	mg/L	3105	3200
Turbidity	NTU	0.31	5.4

Table 2: Updated Design Source Water Quality

3.2 Manganese Pretreatment

The design source water quality exceeds the California SMCL for manganese (Mn) and total dissolved solids (TDS) of 0.05 mg/L and 500 mg/L, respectively. Secondary standards affect the aesthetic quality of the water (color, odor, and taste). More importantly, high manganese levels will adversely impact the reverse osmosis membranes of the desalination system by increasing cleaning requirements (i.e., greater system downtime), potentially shortening membrane life, and limiting the recovery of product water. The design Mn concentration in the feed water to the desalination process is 1.1 mg/L, which is based on the recent test well site water quality data. This value is 22 times higher than 0.05 mg/L, which is both the California SMCL for manganese and the upper limit recommended by



manufacturers for waters to be treated by reverse osmosis membranes. Thus, it is important to reduce manganese concentrations upstream of the reverse osmosis membranes with a pretreatment process.

The recommended pretreatment process is the use of Mang-Ox[®], a manganese dioxide media for filtration. The manganese dioxide acts as a catalyst in the oxidation of both iron and manganese, converting the soluble forms of the mineral (Fe^{+2} or ferrous ion and Mn^{+2} or manganous ion) to insoluble forms (Fe^{+3} , ferric ion and Mn^{+4} , tetravalent manganese ion) for removal by filtration. Chlorine, formed from the addition of sodium hypochlorite, acts an oxidant in the process. After the ionic conversion, the Mn^{4+} reacts with the dissolved oxygen in the water to form MnO_2 , precipitate out of solution as a solid, and become trapped in the media bed. The MnO_2 that accumulate in the filter bed are removed through periodic backwashing of the media.

Feed water for the reverse osmosis system will have first undergone pretreatment for manganese removal via oxidation and filtration, the anticipated iron and manganese design criteria for the RO system is shown in **Table 3**.

Parameter	Unit	Test Well (May 2019)	Mang-Ox [©] (June 2020)
Iron	mg/L	0.63	0.135
Manganese	mg/L	1.1	0.016

Table 3: Revised Iron and Manganese Design Water Quality

For the purposes of this design, it is assumed that hypochlorite is fed into the raw groundwater prior to the Mang-Ox[®] pretreatment to act as an oxidant for removal of iron and manganese; however, this assumption should be reconsidered as part of the final to design to determine if chemical oxidant addition is necessary for treatment of raw water using Mang-Ox[®].

3.3 Reverse Osmosis

To produce 1.0 mgd of desalinated water, the San Dieguito Valley Brackish Groundwater Desalination Study recommended a reverse osmosis (RO) skid. RO skids come completely equipped with cartridge filters (needed as a protective measure to prevent solids, such as sand or silt, from fouling the RO membranes), feed pumps, piping, pressure vessels, RO membranes, instrumentation and controls, and a clean-in-place system. A clean-in-place system is needed to chemically clean and remove foulants (e.g. particles, mineral scale and biological components) from the RO membranes. Foulants result in additional head loss and increased energy requirements to maintain production flow rates. Additionally, foulants may result in a deterioration in permeate water quality.

The updated design water quality parameters shown in **Table 2** were used in manufacturer-provided modeling software to project the RO system recovery. The first iteration of the model results reduced the recovery rate to 73 percent from the original 81 percent documented in the *San Dieguito Valley Brackish Groundwater Desalination Study*. A second iteration of the model was run to determine the sensitivity to pH. The results indicate that a recovery of 81 percent is possible with pH adjustment to 7.4 or lower. The modeling software recommended antiscalant addition to reduce the corrosivity of the permeate and prolong the life of the membranes. The results of both model runs can be found in **Appendix C**.

High pressure membrane processes such as RO provide a barrier for rejecting constituents such as TDS and hardness. The RO process uses a semi-permeable thin film composite (TFC) membrane to separate water from ions and large molecular weight molecules dissolved in the water, thus reducing the TDS concentration. Brine is a byproduct of the RO process that must be disposed of. Operationally, raw water is introduced to the feed side of the RO membrane under pressure. When the applied pressure exceeds the osmotic pressure of the membrane, water on the feed side begins to pass through as permeate, or product water, which has a very low TDS concentration. The bulk of the TDS



present in the raw water cannot pass through and is left to concentrate in the water remaining on the feed side of the membrane until it exits the treatment process as a brine waste stream.

3.4 Groundwater Desalter Process Design

The groundwater desalter process includes several elements: a pretreatment process, the RO system with a bypass, and a product water blending tank, as depicted in **Figure 2**. The bypass and product water blending tank are important to produce water that closely matches the quality of the potable water in OMWD's existing distribution system. The bypass and blending tank allow the pretreated source water to mix with the water treated by reverse osmosis.

The pretreatment filters require sodium hypochlorite (chlorine) addition as an oxidant for manganese removal; then ammonia is required to remove chlorine prior to the RO membranes. The planning-level equipment quantities and design criteria presented in the *San Dieguito Valley Brackish Groundwater Desalination Study* remained the same if pH adjustment is implemented before the RO system. The design criteria are summarized in **Table 4**. Based on the schematic layout plan (Figure 2) and design criteria for the facility, planning-level footprint requirements are summarized in **Table 5**. For property acquisition planning purposes, these layouts provide a suitable basis for determining the required parcel size for the treatment site, approximately 0.5 acres

Excility Description	Design Criteria
Facility Description	Design Criteria
Influent Pump Station	1.2 mgd
	2 pumps (1 duty, 1 standby)
Pretreatment Filters	1.19 mgd effluent
	3 units (3 duty)
Destroctment Effluent Text	50,000 gallons
Pretreatment Effluent Tank	16-foot diameter
RO Skid System (81% recovery with pH adjustment to 7.4 or lower)	0.81 mgd effluent
With feed pump, cartridge filters,	1 unit
Clean-in-place system	
Brine Production	0.19 mgd
Chemical storage and feed facilities	
Sodium Hypochlorite tank	400 gallon, 3.75-foot diameter
Ammonium Hydroxide storage	Two (2) 50 gallon barrels
Calcium Chloride tank	2,000 gallons; 7.5-foot diameter
Sodium Hydroxide tank	1,500 gallons, 7.2-foot diameter
Sodium Fluoride storage	Four (4) 50-pound bags
RO Antiscalant storage	Two (2) 50 gallon barrels
	42,000 gallons
Product Water Tank	15-foot diameter
	1.0 mgd
Product Water Pumps	2 pumps (1 duty, 1 standby)

Table 4: G	roundwater [Desalter	Revised	Desian	Criteria
		Doodito		D O O I MIII	

Table 5. Oroundwater Desaiter i ootprint Requirements						
Facility Description	Footprint					
Influent Pump Station	15' x 7'					
Pretreatment Filter	42' x 22'					
Pretreatment Effluent Tank	16' dia. tank					
Process Building	54' x 48'					
RO membrane system	48' x 29'					
Electrical	15' x 25'					
Staff Facilities	15' x 20'					
RO clean-in-place system	16' x 15'					
Product Water Tank	15' dia.					
Product Water Pumps	15' x 7'					
Chemical storage and feed facilities						
Sodium Hypochlorite	14' x 10' containment area					
Ammonium Hydroxide	15' x 10' containment area					
Calcium Chloride	16' x 15' containment area					
Sodium Hydroxide	16' x 15' containment area					
Sodium Fluoride	14' x 10' containment area					
RO Antiscalant	15' x 10' containment area					

Table 5: Groundwater Desalter Footprint Requirements

FINAL



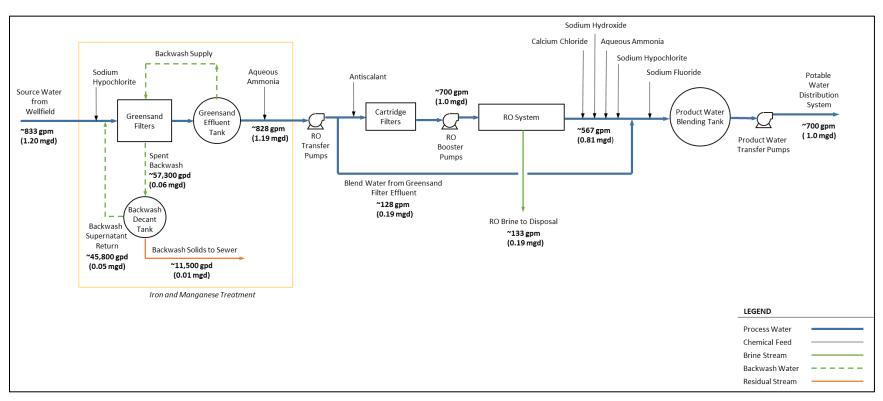


Figure 2: Groundwater Desalter Process Flow Diagram



APPENDIX A – FILTRATION SYSTEM PILOT STUDY DESCRIPTION



Filtration System Pilot Study Description

for

Olivenhain Municipal Water District Olivenhain, CA San Dieguito Valley Brackish Groundwater Desalination Project PWS ID# CA-3710029

Pilot Study Objective Pilot Study Description Introduction and Process Overview Equipment Description Installation Instructions Safety Procedures Description of Pilot Operation Pilot Operating Procedures Equipment Maintenance Sampling and Testing Protocol Pilot Study Conclusion Operation Log (Appendix A)

> Job No. L33653 March 20, 2020





Pilot Study Objectives

- 1. Test and evaluate the performance of filtration media for the removal of iron, manganese and arsenic. The medias to be tested are: Inversand's Greensand Plus with anthracite media cap and Mang-Ox manganese dioxide media.
- 2. Determine reagent chemicals required and chemical consumption rates.
- 3. Project the length of filter run times in service, and backwash waste volume as a percentage of production.





Pilot Study Description

Job Name: Olivenhain Municipal WD, CA Job Number: <u>L33653</u>

Job Location: <u>San Dieguito Valley Desal. Proj.</u> Start Date: <u>April 2020</u>

System Configuration	Trailer mounted Pilot unit
System Serial #	None
Number of Columns	3 (Two columns used for this testing)
Column Height	40 inches
Column Diameter	6-inch
Media Bed Depth per Column	30 inches GS+/anthracite, 30 inches MnO ₂
Design Flow Rate	8 to 10 GPM/sq.ft. Nominal: 1.5 GPM (8.0 GPM/sq ft)
Pump Size and Model	Not required.
Reagent Injection Pump	Electronic solenoid operated w/ stroke adjustment and flow-paced frequency adjustment.
Filtration Column Operation	Push-button initiated automatic backwash and rinse to solids settling tank (if required for waste disposal).

Pilot Site Description

The pilot unit will be located at San Dieguito Valley Desalination Project Site in Delmar, California. Source water for the pilot will be raw well water, taken prior to chemical treatment at the well supply facility to the desalination process. Raw water sample is a representative blend of the well pumping rates. The pilot system is automated to operate while raw water supply is available. Well water pumps will be operated for 10 to 12 hours per day to provide test water for the pilot test. The pilot test arrangement includes multiple columns for simultaneous parallel testing of each media type with individual backwash settings for each column. Sample valves are provided for effluent sampling for each test column.

Discharge water from the pilot unit will be released to a wastewater treatment collection line for disposal.



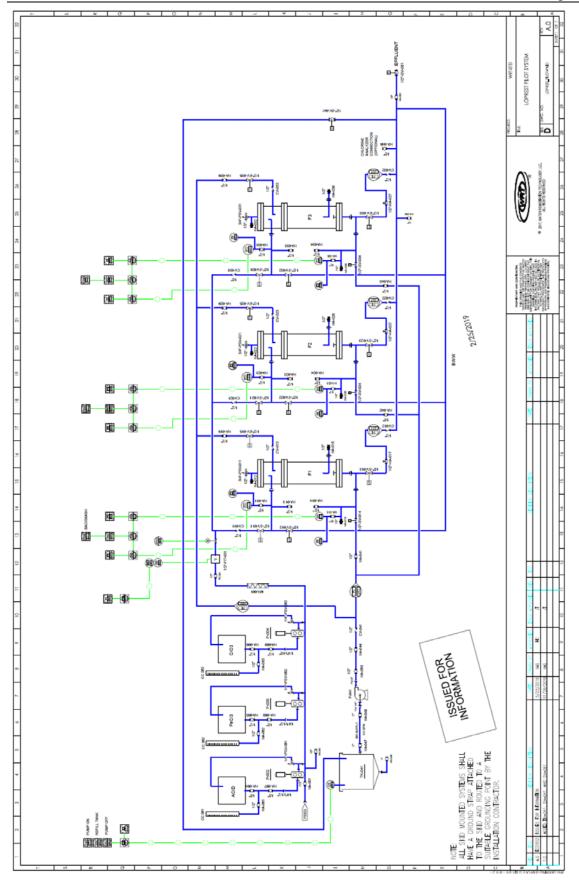
Introduction and Process Overview

Introduction to WRT/Loprest's Filtration System

This filtration system removes iron, manganese, and arsenic contaminants from drinking water in a downflow filtration media process using chemical oxidation and media filtration. The process has been designed for simplicity of operation, minimal maintenance, and reliable operation. Oxidized metal contaminants are collected within the packed media bed and safely removed during a backwash operation. The backwash wastewater from the filter is directed to an on-site collection tank.

The filtration system is designed to meet the water production requirements of a specific treatment facility. The process flow diagram for the pilot filtration system is shown on the following page.







Equipment Description

WRT/Loprest division's filter pilot test equipment is installed in a 16 ft. x 8 ft. trailer. The pilot test components are installed and pre-plumbed in the trailer for single-point supply and discharge connection at the test site. The following equipment is installed in the trailer unit:

- Three (3) Pulsafeeder metering pumps, with a maximum injection flow rate of 3.0 GPD, each with a dedicated solution tank and a 100 mL calibration cylinder. One pump will be used to inject sodium hypochlorite oxidizing reagent, and the second pump will be used to inject ferric chloride. A third chemical injection pumping system is provided for pH control acid addition should this be required. Two chemical reagent metering pumps are required for this pilot test.
- Three (3) vertical pressure filter vessels constructed of Sch 40 PVC pipe, nominal 6-inch outside diameter (6.03 inches inside diameter) by 65-1/2 inches straight side height, cross sectional area of 0.1963 sq. ft. including flow distribution internal piping, manual and automatically controlled valves, instrumentation and controls, and filtration media bed as follows:
 - Slotted stainless steel strainer underdrain laterals
 - o Upper surface wash header/distributor
 - o 30 to 36 inches of 20 x 60 mesh prewashed filtration media
 - o 6 inches of 1/8-inch x 1/4-inch washed gravel subfill
 - Automatic and separate manually operated valves to control filtration, rinse to waste, surface wash and backwash flow sequences
 - Pressure indicators on inlet and outlet flow piping
 - o Vessel-mounted air release valve
 - o Inlet and outlet valve sample ports
 - Rate of flow indicators for the service inlet, backwash, and surface wash flow streams
- A surface wash system is included.
- A 200-gallon polyethylene storage tank and backwash pump. The storage tank is used to store filtered water for filter backwash operations.
- PLC-based control panel, which automatically controls the filter control valves, subsurface wash and backwash pump during filter cleaning sequences. Filter cleaning sequence initiation can be controlled using elapsed service time, filter differential pressure, or manually. It is anticipated that pressure filter differential pressure will be used as the primary filter cleaning sequence initiation followed by elapsed service time initiation during this pilot testing.
- Additional portable test equipment as follows:
 - Hach DR 900 Portable Colorimeter and accompanying reagent packs for free chlorine measurement, as well as iron and manganese measurements.
 - Industrial Test Systems, Inc., Quick Arsenic II arsenic test kit for arsenic III and arsenic V analytical measurements.
 - LaMott DC1500 free chlorine test kit for free chlorine analysis.



• Portable handheld probe and analyzer for pH

Installation Instructions

Installation of Filtration Equipment

Installation of the Filtration Equipment requires a minimum of effort as the system arrives at the site, with all equipment fully assembled and tested prior to arrival. The filtration system is installed by trained WRT technicians.

The filtration system is self-contained and requires a minimum amount of plumbing and electrical connections. Setup of the filtration equipment consists of the following steps:

- 1. Locating and placing the pilot trailer unit at the site.
- 2. Connecting the raw water source tank supply pump to the pilot inlet connection.
- 3. Connecting the discharge line (effluent) on the filtration pilot unit to the appropriate discharge point.
- 4. Connect electrical power to standard unswitched convenience outlet.

The pilot trailer unit should be located as close to the source well as possible to minimize inlet piping run length.

Installation Responsibility

WRT personnel or trained representatives will complete all necessary work to put the system into operation.

The Utility will need to provide a single 120VAC, 20 amp, GFI power source for the pilot system, an access point for source water and a discharge point for treated water.

Securing the filtration unit

The self-contained filtration pilot unit should be strategically placed and leveled to ensure maximum operating efficiency and ease of access. The trailer unit should be properly secured to avoid outside tampering.

Plumbing Connections

Feed

The pilot unit comes equipped with fittings for connecting to the water supply. Care should be exercised in making fitting connections to prevent water leaks. All connections should maintain proper alignment to avoid improper loading on any connection.



Discharge

The pilot unit also comes equipped with discharge fittings. A discharge line needs to be installed to route the treated water to a discharge location. The pilot system discharge rate is less than 2 gpm continuous flow and 3 gpm intermittent backwash flow rate.

<u>Pump</u>

If the utilities water system does not have approximately 15 PSI available, a supply pump requiring a source of 120VAC electrical power will be used. The pump (if required) will be provided with the pilot unit. The supply pump power is interlocked with the raw water source tank level control to automatically shut down upon low water level.

Flow Control

A flow control mechanism is provided to regulate the influent flow to the filtration system.

Chlorine reagent supply system

A pre-mixed reagent supply tank is provided containing a pre-determined concentration of reagent for approximately the mid-range stroke setting of the reagent injection pump at the pilot system service flow rate. The reagent pump unit operation is automated, and the injection rate is flow-paced using internal PLC generated PID control system. When the service flow is interrupted, the reagent supply system remains energized but the injection process shuts off. Reagent addition is automatically restarted once the service flow is restored.

Initial stock solution concentration is 0.5 gallons 10% NaOCI per 10 gallons water. Adjustments to stock solution concentration may be modified to best approximate mid-range injection pump settings.

Electrical Connections

The filtration system may require a 120VAC, 20 amp, GFI electrical power source for operation of a pump, if required. <u>Typical precautions should be taken when installing electrical power around a source of water. It is recommended that electrical connections be made only after equipment is fully installed. Electrical connections should be performed by a certified electrician.</u>

Filtration Treatment Media

The media will be installed into the treatment columns prior to arrival at the test site. The media will remain in the columns during the course of the test. Upon completion of the pilot study, the media will be removed from the site and properly disposed of by WRT.



Additional media testing will commence upon a new media column fill and full backwash.

All Filtration Removal Media is NSF, Standard 61 certified for use in drinking water applications.



Safety Procedures

Safety Procedures

The filtration system is simple to use and requires a minimum of day-to-day operator interface. Pilot system setup chemical reagent replenishment and replacement of media, if required, will be performed by trained WRT representatives so that a minimum of system interface is required by utility personnel. However, when working with the filtration equipment the following precautions should be adhered to:

- To reduce risk of electrical shock, this equipment must be properly grounded.
- Inspect equipment thoroughly before connecting electrical power.
- Qualified personnel or a certified electrician should perform power connections.
- Always disconnect power before servicing equipment.
- This equipment should be used only for the purpose and function for which it was designed.
- Safety equipment should be used when performing any checks or service maintenance on or near the top of the process columns.



Description of Pilot Operations

Water will be provided from the well for testing. The pilot system will be operated at least 7 to 10 hours per day during weekdays. A pressure reducing valve to limit the pressure delivered to the trailer to 30 psi will be installed on the inlet. Chlorine will be injected into the raw water upstream of the pilot filter with an inline static mixer.

Following a rapid reaction and oxidation process, the chemically treated raw water will pass through the pilot filter and the filtered water will be directed via piping to a 200-gallon storage tank, which is used for backwash supply to the filter. The rate of flow during filtration will be approximately 1.0 gpm based on an 5.0 gpm/ft² loading rate. Filtered water will be directed into the top of the 200-gallon storage tank. When backwash supply tank is full, filtered water will instead be routed to the effluent drain collection.

When backwashing the filter is required, water will be pumped from the 200-gallon storage tank. Backwash water will be discharged to onsite drainage. Samples will be collected for characterization of the backwash water and sludge prior to discharge.

Pilot Unit Start-Up Procedure

- Check to make sure all sample valves are open, and any pilot unit discharge valves are open.
 - As the column fills with water, close the sample valve and proceed to the next column.
- After all of the columns are filled with water, slowly ramp up the flow to the predetermined flow rate.
 - Tap the sides of the column with a rubber mallet to remove any large air bubbles.
- Monitor column flow, pressures, and pressure differentials on the touch screen interface control consol. All operations parameters are displayed and accessible from this panel. A large overall pressure or a large pressure differential between columns is indicative of a plugged discharge screen or an air lock somewhere in the system.
 - Depending on the size and height of the columns, the pressure drop per column ranges from two to three psi per column.
- If pressures are not normal, shut down the flow and bleed the pressure off through one of the sample ports.
 - Usually, restarting the flow will eliminate the plugging problem.



Pilot Unit Operating Procedures

This section describes the steps and procedures that will be followed during the study for each media that is being tested.

1. Preparation of Chemical Solutions

Sodium hypochlorite (10%) concentrate is used to prepare the chlorine solution. The dilution factors for the chlorine solution is 2,000 mls into 10 gallons of water.

2. Target Chemical Dosing

Oxidant chlorine target dosages is between 2 and 4 ppm to maintain final effluent chlorine concentration of 0.5 to 1.0 ppm free chlorine. Addition of chlorine will initially be set at 1 ppm and adjusted accordingly. To confirm the desired chlorine dosage, the chlorine residual will be measured on the filter influent and effluent multiple times during each test run. The chlorine residual on the filter effluent will be maintained at or above 0.5 ppm at all times during all runs.

3. Operating Procedure

The pilot filter column was backwashed at WRT's facility. The source of water for the first backwash was potable water from the local potable water distribution system at WRT's facility. After the first backwash, the filtered water from the pilot unit is used for backwashing.

Two runs for will be conducted to demonstrate iron and manganese removal capability and media capacity (estimated at 20 hrs). Chemical feed rates will be noted in the attached data log.

Two separate backwash cycles are used for each of the media ypes being tested. The backwash cycle for manganese oxide media is conducted in three steps: 1) backwash and surface wash combined for 4 minutes at a flow rate of 20 gpm/ft² for backwash and 2 gpm/ft² for surface wash then 2) backwash only for 4 minutes at a flow rate of 20 gpm/ft² then 3) rinse to waste for 4 minutes at the service flow rate.

The backwash cycle for Greensand/anthracite media is conducted in three steps: 1) backwash and surface wash combined for 4 minutes at a flow rate of 12 gpm/ ft^2 and 2 gpm/ ft^2 for surface wash then 2) backwash only for 4 minutes at a flow rate of 12 gpm/ ft^2 then 3) rinse to waste for 4 minutes at the service flow rate. Effluent water is accumulated for use as backwash supply water.

During each filter run, the following parameters are measured and recorded at the indicated intervals for each run:

- 1. filter rate of flow, gpm
- 2. filter inlet and effluent free chlorine, mg/L
- 3. pH at filter influent,
- 4. pH, color and alkalinity in filter effluent, mg/L
- 5. iron and manganese in column inlet, (mg/l), once at the start of each run
- 6. iron and manganese in filter effluents, mg/l
- 7. Sodium hypochlorite chemical feed pump speed, strokes per minute.



The above data will be recorded on pilot test log sheets, which are included in the Appendix A.

Measured on-site effluent water quality tests are conducted every 2 hours of continuous service run.

Effluent water will be accumulated for use as backwash supply water. The volume of water used for backwashing and filter to waste will be recorded for use in calculating the backwash volume to filtration volume ratio. The volume of water produced during filtration will be calculated based on the length of the filter run and the filter rate of flow. During backwash operation, the raw water source pump is de-energized.



Equipment Maintenance

The filtration system requires minimal maintenance to perform properly. Upon installation, it is recommended that the system be monitored closely to ensure that any pumps, flow meters, and valves are operating properly. The flow meter located in the source water line should be checked at least once per day to ensure that the system is achieving the designed flow rate. *Please refer to pump, control system, and motor manufacturer's operation and maintenance instructions for proper maintenance on peripheral equipment.*

Daily Maintenance

- 1. <u>CHECK FEED WATER FLOW RATE</u> The feed water volume through the flow meter should maintain the designed flow rate as noted in the pilot study log book.
- 2. CHECK RAW WATER CHEMICAL REAGENT CONTROL SYSTEM FOR PROPER OPERATION

The chemical reagent injection system requires routine dosing checks.

- Refer to manual to clean, purge and prime the injection metering pump.
- Check chemical reagent day tank carboy level and if necessary replace the carboy with a full reagent supply as required. If necessary, refer to manual for reagent refill procedure.
- 3. CHECK FOR AIR ENTRAINMENT

The media columns can collect gas entrained from the raw water when the pressure is reduced. Automatic air vent valves are included on each media column but may inadequately purge air from the system. Air bubble formation in the media filter bed interferes with filtration of solid particulate material from the water.

- If air bubbles are formed in the media columns, there may be insufficient back pressure on the treated discharge water line to prevent formation.
- Slowly close the discharge metering valve to increase the operating pressure of the media filter vessel. 7 to15 psig is generally required to mitigate air formation in the media columns.
- 4. CHECK FOR LEAKS
 - Ensure that all lines and fittings are free of any leaks. Tighten any connections that are leaking. Teflon tape or paste may be required.
 - Check the pump fittings regularly to ensure that there are no leaks.
- 5. <u>REFILL CHEMICAL FEED TANKS (if required)</u>



Weekly Maintenance when required for long-term pilot testing

- 1. <u>CHECK POWER</u> Verify that AC voltage is correct.
- 2. CHECK FILTERS

Check filters located on the bulkhead (top) of each process column. Check filters to ensure that there is not a buildup of media particulates that would reduce flow.



Sampling and Testing Protocol

The pilot test consisted of two separate test runs.

The pilot study is typically completed in one week onsite. The operation of the pilot study is conducted by Loprest Division of WRT personnel.

Spot water samples are drawn during the prescribed sampling time and provided to the Owner for offsite laboratory testing.

Sample Tests

Chlorine, arsenic, manganese, iron and pH is tested onsite using the instruments and procedures described in the following section. Each filter influent and effluent sample is taken in sufficient volume to provide the required sample volume for each parameter to be tested. Sample volumes drawn are per testing laboratory recommendation to provide a sample for offsite testing. The Owner's representative will collect samples for the Owner's independent lab analysis.

Onsite Test Equipment, Procedures, and Methods

Field testing for chlorine, iron, and manganese are performed with a Hach DR 900. With this instrument, packets of reagents specific for each constituent are added to a pair of sample cylinders, which are then inserted into the test instrument in two steps. One sample is called the blank, which is inserted into the DR 900 first, and the instrument is zeroed. The DR 900 measures the amount of light passing through the blank sample and stores the result. Next, the second prepared sample is inserted, and the value is read by the DR 900. The instrument compares the stored value for the blank to the value for the prepared sample and displays the results for the constituent being tested.

For manganese, the blank is prepared with deionized water. The iron and chlorine test blanks are prepared with water from the filter effluent. The test results are displayed on the digital readout. For iron, the Total Iron, FerroVer test Method 8008 was used. For chlorine, the Free Chlorine DPD method was used. For manganese, Method 8149 was used.

pH is measured using an Oakton pH6 Acorn Series meter with a range of 0.0 - 14.0 pH. The probe was calibrated daily using a 7.0 pH buffer solution.

During each filter run, the following parameters will be measured and recorded at two-hour intervals for 5-6 hours each day during operation using the equipment listed in Equipment Description:

- 1. Filter inlet and outlet pressure
- 2. Differential pressure across the filter
- 3. Filter influent and effluent chlorine (offline measurement)
- 4. Iron in filter influent and effluent (ppm) (offline measurement)
- 5. Manganese in filter effluent (ppm) (offline measurement)
- 6. Arsenic in filter effluent (ppb) (offline measurement)
- 7. Filter influent and effluent pH (offline measurement)



At the start of each run, the chemical feed rates in ppm will be recorded, along with the influent concentrations of iron and manganese post chemical injection.

Samples will be collected from the influent and effluent for verification twice per filter run for each media (once at the middle of the run and once toward the end of the run). Analytical testing will be performed by a qualified, independent lab, approved and agreed upon by the Utility and Loprest prior to beginning the pilot study.

Each process column is equipped with a valve for sampling the effluent water for analytical metal content level tests. When a sample is required, the sampling valve should be opened and water should be allowed to slowly flow for approximately thirty (30) seconds before filling the sample container. Avoid abrupt changes in flow conditions to obtain the most representative sample. Typical test sample volume is about 250 mL for metals analysis. Fill the sample container slowly avoiding aeration and sample splashing. Both containers must be preserved with 1:1 Nitric acid. Close the valve when an adequate amount of sample water has been taken. Specific sampling procedures for metal speciation will be provided by the testing laboratory. All sampling will be performed by the Utility personnel.

Analytical testing will be performed by a qualified, independent lab, approved and agreed upon by the Utility and HDR prior to beginning the pilot study.

Methods of analysis to be used are:

Manganese	EPA Method M200.7 ICP-MS
Iron (total)	EPA Method M200.8 ICP-MS
Arsenic (total)	EPA Method M200.8 ICP-MS

The proposed test protocol is shown below in Table 1.

An Operation Log will be completed during the course of the pilot study. This will include all field observations, adjustments, flow and totalizer data, onsite analytical field test results, date, operator identification and other relevant information. A copy of the Operation Log sheet is attached for reference as Appendix A.

The proposed length of this pilot study is up to 4 days. Based on the test protocol, this will provide a total of up to 2 sets comparative metal removal data for each filter service run period comparing feed and treated water for each media type tested.



Table 1. TEST PROTOCOL – Water Samples

Iron, Manganese and Arsenic Pilot Test Day Sampled

Sample Point	Day 1	Day 2			
Feed	Х	Х			
Media Filter					
discharge	Х	Х			

Sampling of inorganic water quality parameters in both the combined feed and discharge water from each test column will be conducted once per filter run. These will include: METALS - iron, manganese and arsenic.

On-site colorimetric and spectrophotometric testing of iron and manganese and ppb level testing for arsenic is conducted periodically through the pilot testing period to monitor the filter's performance. The results are recorded in the operational log record.

Sample frequency will be adjusted, if necessary, as the piloting proceeds, based upon results from previous tests.



WRT Metals and Radionuclide Removal Experience

WRT has completed over 80 radionuclide and metals removal pilot studies in 17 states, with additional pilot studies underway. WRT has more than 150 licensed and permitted full scale metal contaminant removal and radionuclide removal installations in operation in 19 states with additional systems under construction.



Pilot Study Conclusion

Upon completion of the pilot study, a Pilot Study Report will be written by WRT. This report will include the analytical data, operation log and other information collected during the pilot study including post pilot test results of all waste material solids characterization testing. This data will be analyzed and presented in tabulated form where applicable, and observations and conclusions will be presented. This completed Pilot Study Report will be delivered to the Utility.



Appendix A

Operation Log sheet

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APPENDIX B – FILTRATION SYSTEM PILOT STUDY REPORT



Pilot Study Report

on

WRT/Loprest Div. Filtration System for Iron/Manganese Removal



conducted by

Loprest, a division of WRT Westminster, Colorado

for the

Olivenhain Municipal Water District San Dieguito Valley Brackish Groundwater Desalination Project Job # L33653 Olivenhain, CA June 26, 2020



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1.0 EXECUTIVE SUMMARY/CONCLUSIONS

The Olivenhain Municipal Water District is planning to add iron and manganese removal treatment to an existing well water source as part of the San Dieguito Valley Brackish Groundwater Desalination Project as RO pretreatment. The Water District asked WRT/Loprest Division to complete a pilot study for a water treatment system for iron and manganese contaminant removal. The pilot study is conducted to evaluate two different types of oxidation and filtration media systems.

The subject well water source has significant iron and manganese content that can detrimentally affect anticipated membrane treatment processes testing much higher than secondary MCL levels. The Water District with input from WRT/Loprest Division selected two water treatment media systems for testing that have demonstrated effective removal of iron and manganese from groundwater sources to manage these contaminants below Secondary MCL concentrations. The iron levels in the subject raw well water averaged 0.97 mg/L during testing. The measured manganese concentration averaged 0.94 mg/L in laboratory samples. The project specifications require that the finished water from the proposed treatment system shall satisfy the EPA and California State secondary drinking water regulations and standards. The California State Water Resources Board maximum containment level (MCL) limits the concentration of iron at 0.30 mg/L and manganese at 0.05 mg/L. The pilot test contaminant removal goals are treated water concentrations of less than secondary MCL values.

To fully test the effectiveness of these media system types on water source at this well site, the pilot study was conducted in two filter service runs for each media type. The first filter run is conducted using recommended hypochlorite feed rates to the raw water for full oxidation and removal of iron and manganese metal contaminants for a service period of nominally 8 hours continuous run at a standard hydraulic flow rate of 8 gpm/ft². The second service runs are conducted at a lower hydraulic flow rate of 6 gpm/ft² to assess the performance differences for the media types. Iron and manganese levels are the above the MCL limits and removal of these metal contaminants is the primary objective of the testing. Free chlorine oxidant addition rates were adjusted to maintain a level between 1.0 and 1.2 mg/L residual in the finished water.

The first media system tested, designated column F1, includes a mixed media of Inversand's GreensandPlus[®].and an anthracite media cap to assist in solids filtration capacity and solids backwash removal. This media system is operated using a hypochlorite reagent feed for available free chlorine as an oxidant as pretreatment. Water quality produced from this column removed iron and manganese to less than target MCL values in laboratory samples and regularly tested less than 0.20 mg/L iron and less than 0.05 mg/L manganese in field samples of the treated water for 6 hours of service run time at standard flow rate. At reduced flow rate in the service run no. 2 similar removal results were obtained through 10 hours of service. Media system type, designated column F2, is a mono bed of Mang-Ox[®] manganese oxide granular media operated in a similar filtration manner using available free chlorine as an oxidant for pretreatment. This media system produced



acceptable contaminant removal with iron and manganese effluent levels below 0.20 mg/L and 0.050 mg/L through 10 hours of service run length at standard flow rate. At reduced flow rate these effluent results were extended to 12 hours of service operation. The pressure loss increases over for each media through the service test runs averaged 2.0 and 2.5 psid in columns F1 and F2 respectively. Starting clean pressure loss for column F1 averaged 1.8 psid and for column F2, 1.4 psid. Pressure loss results through each filter column and media type never exceeded recommended backwash initiation points through the extended service test periods in either test run.

The Olivenhain Municipal Water District well water can be effectively treated for iron and manganese removal using either of these media types and will produce acceptable water within USEPA and California state secondary MCL values for both iron and manganese. A greater iron and manganese removal capacity during this test is seen in the column F2 media type which resulted in extended service runs to the contaminant leakage endpoint over that of the F1 media type. The difference may be explained by the limitations of the GreensandPlus[®] media when treating higher TDS water types. It can also be noted that some of column F1 treatment media is displaced to accommodate the anthracite cap filtration media. Either of these differences may account for the reduced performance of the column F1 media type over the column F2 media. The pressure loss rise over the course of the extended filter runs were consistent and did not rise substantially before iron and contaminant leakage signaled the end of the service period. Therefore, service run times will be best terminated based upon filter throughput volume or service time. The test results and service run times are significantly less than the calculated theoretical capacities of the column F1 media type as tested and are much less than 1,000 gr./sq. ft. of filter area.

2.0 THE WRT/LOPREST FILTRATION SYSTEM AND STUDY OVERVIEW

The WRT/Loprest filtration system removes iron and manganese contaminants from drinking water in a downflow filtration media process using chemical oxidation and coprecipitation. Solid phase metal oxide contaminants are physically separated from the water stream, collected within a packed media bed and safely removed during a backwash operation. The backwash wastewater from the filter is directed to an on-site collection and retention basin. The process has been designed for simplicity of operation, minimal maintenance, and reliable operation. The filtration system is designed to meet the water production requirements of a specific treatment facility.

Several media types have demonstrated effective catalytic oxidation properties and can be used to facilitate the oxidation process. Depending upon the specific water conditions and corresponding water quality, oxidative media types will perform differently on varying water types. This pilot study is conducted using two selected media types for side-by-side comparative assessment of the iron and manganese removal performance following media contact for treating this raw ground water source. A manganese dioxide media trade named



Mang-Ox[®] and a proprietary product from Inversand Co. trademarked GreensandPlus[®] are tested in two 40-inch tall parallel filter columns.

2.1 Iron and Manganese Removal

The most common method of removing iron and manganese from water involves the oxidation of soluble iron (Fe⁺², or ferrous ion) and manganese (Mn^{+2} , or manganous ion) to insoluble forms (Fe⁺³, ferric ion, and Mn^{+4} , tetravalent manganese ion), and subsequent removal of the precipitates formed by filtration.

GreensandPlus[®] is a manganese dioxide coated media with a silica sand core. It requires oxidant addition ion prior to media contact. Chlorine is the most common oxidant; however other oxidants are effective. The manganese dioxide coating acts as a catalyst in the oxidation process of both iron and manganese.

Mang-Ox[®] is an 80% pure manganese dioxide ore, mined and screened for potable water use. In waters with a positive oxidation/reduction potential (ORP), it can work without the use of an oxidant. Other manganese dioxide ore materials mixed with a variety of sand materials are available under various trade names.

These medias are evaluated in this testing. F1 filter column contained GreensandPlus[®] media and F2 filter column contained Mang-Ox[®] media.

3.0 TEST EQUIPMENT DESCRIPTION

WRT/Loprest division's filter pilot test equipment is installed in a 16 ft. x 8 ft. trailer. The pilot test components are installed and pre-plumbed in the trailer for single-point supply and discharge connection at the test site. The filtration equipment includes two test media filtration columns, chlorination and chemical feed addition, and all automated filtration backwash piping valves and instrumentation and process control equipment. Refer to Figure 1 for the pilot equipment general process flow diagram. The following equipment is installed in the trailer unit:

- Three (3) Pulsafeeder metering pumps, with a maximum injection flow rate of 3.0 GPD, each with a dedicated solution tank and a 100 mL calibration cylinder. One pump will be used to inject sodium hypochlorite oxidizing reagent, and the second pump will be used to inject ferric chloride (if required). A third chemical injection pumping system is provided for pH control acid addition should this be required for the finished water quality. One chemical reagent metering pump is required for this pilot test.
- Three (3) vertical pressure filter vessels constructed of Sch 40 PVC pipe, nominal 6-inch outside diameter (6.03 inches inside diameter) by 65-1/2 inches straight side height, cross sectional area of 0.1963 sq. ft. including flow distribution internal piping, manual and automatically controlled valves, instrumentation and controls, and filtration media bed as follows:
 - Slotted stainless steel strainer underdrain laterals



- Upper surface wash header/distributor
- o 30 to 36 inches of 20 x 60 mesh prewashed filtration media
- o 6 inches of 1/8-inch x 1/4-inch washed gravel sub fill
- Automatic and separate manually operated valves to control filtration, rinse to waste, surface wash and backwash flow sequences
- o Pressure indicators on inlet and outlet flow piping
- Vessel-mounted air release valve
- o Inlet and outlet valve sample ports
- Rate of flow indicators for the service inlet, backwash, and surface wash flow streams
- An air-scour wash system is included for media cleaning backwash.
- A 200-gallon polyethylene storage tank and backwash pump. The storage tank is used to store filtered water for filter backwash operations.
- PLC-based control panel, which automatically controls the filter control valves, subsurface wash and backwash pump during filter cleaning sequences. Filter cleaning sequence initiation can be controlled using elapsed service time, filter differential pressure, or manually. It is anticipated that pressure filter differential pressure will be used as the primary filter cleaning sequence initiation followed by elapsed service time initiation during this pilot testing.
- Additional portable test equipment as follows:
 - Hach DR 900 Portable Colorimeter and accompanying reagent packs for free chlorine measurement, ammonia as well as iron and manganese measurements.
 - o LaMott DC1500 free chlorine test kit for free chlorine analysis.
 - o Portable handheld probe and analyzer for pH

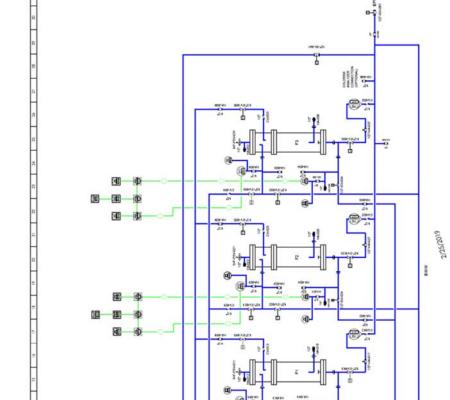
The source water enters the pilot test unit from a connection to the raw water pressurized supply line through a hose connection to the WRT/Loprest filtration system trailer. Raw water sampling occurs at this location referred to as SP1 on the process flow diagram. The water is first directed to the filter column service inlet piping where oxidant (sodium hypochlorite) reagent is added to the raw water. The pretreated water then enters the top of each media treatment column. The treated water exits the bottom of each treatment column where it is directed to the main discharge piping and out through the outlet connection on the trailer. Each treatment column is equipped with a valved effluent sample connection labeled SP2, SP3 and SP4.

The media filter columns are backwashed automatically using one of several backwash trigger points set at the PLC controller. Set points for filter backwash can be initiated manually, by operating time interval, by filter differential pressure loss or by filtered water discharge conditions. Based upon the filter run requirements and the testing protocol for the test(s) a filter backwash frequency is selected. Backwashing of the filter units is accomplished by directing treated and finished water from the integrated treated water collection tank. Backwash water supply is directed automatically to each filter column sequentially up flow through the media column to expand the media bed and release the



collected solids to exit the out of the top of the filter media column. The backwashed liquid and solids are sent to the wastewater discharge connection on the trailer and directed to an onsite wastewater retention basin.





3.1 Pilot Study Equipment and Process Flow Diagram

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Photo 2. Filter backwash water collection tank.

Photo 1. Filter test column units



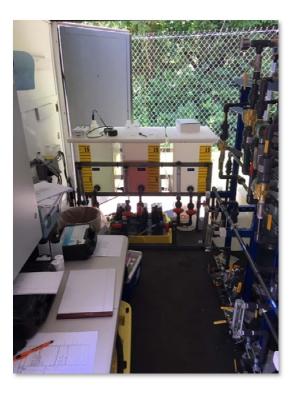


Photo 3. Reagent chemical pumping system

3.2 WRT/Loprest Pilot Study Equipment Photos

4.0 RAW WATER ANALYTICAL DATA

A comparison of the raw water constituent levels presented in the project specifications vs. those measured onsite are summarized below. All analytical results can be found in Appendix A of this report.

Constituent	Raw Well	Owner					
	Water	Provided Data					
Iron, total, mg/L	0.97 (avg.)	0.63					
Manganese, mg/L	0.95 (avg.)	1.10					

TABLE 1RAW FEED WATER CHARACTERISTICS

4.1 Statement of Purpose

The iron and manganese levels in water collected from the Desalination Project well water exceed the USEPA and California Water Resources Board Drinking Water Div. secondary drinking water MCL values for iron (0.30 mg/L) and manganese (0.050 mg/L). Previously reported and pilot test raw water iron and manganese levels were well above the secondary MCL values.

The purposes of this study are to evaluate the removal performance of iron and manganese from the raw water supply for each media type for purposes of full-scale treatment implementation.

5.0 PILOT TEST PROTOCOL

The pilot test consisted of two separate full service runs for each media type. The flow rate was 1.5 gpm for an 8 gpm/sq. ft. treatment rate for the first filter run. A reduced flow rate of 1.1 gpm for a 6gpm/sq. ft. treatment rate is used during the second filter run.

5.1 Operating Procedures and Performance Testing

This section describes the steps and procedures that were followed during the onsite pilot study. One of the first steps was the preparation of chemical feed stock solutions.

5.1.1 Preparation of Chemical Solutions

Sodium hypochlorite (10%) was used to prepare the chlorine solution. The dilution factors for the chlorine solution was 2.0 liters of 10.0 percent sodium hypochlorite into 10 gals of water.



5.1.2 Operating Procedure

The pilot filter columns were initially contacted with chlorine oxidant and backwashed at the WRT/Loprest facility. The source of water for the first backwash was potable water from the local potable water distribution system at WRT's facility. After the first backwash, the filtered water from the pilot unit was used for backwashing.

Two runs for each media type were conducted to demonstrate iron and manganese removal capability. The filter columns were operated continuously for an extended service cycle exceeding the typical backwash frequency to assess actual pressure loss and contaminant removal performance to media contaminant leakage or elevated pressure loss of 8 psid. The filter runs are separated using a backwash cycle. Chemical feed rates were noted in the attached data log.

	Media Type	Raw Water Source
Filter Run No. 1	Manganese Greensand +®	Project Well Water
	Mang-Ox [®]	Project Well Water
Filter Run No. 2	Manganese Greensand +®	Project Well Water
	Mang-Ox [®]	Project Well Water

The backwash cycle was completed in two steps: 1) backwash and surface wash combined for 4 minutes at a flow rate of 2 gpm/ft² for surface wash for each media type. 12 gpm/ft² backwash is used for the Manganese Greensand+[®] media column and 20 gpm/ft² is used for the Mang-O[®]x media column. 2) A backwash only step for 4 minutes and a final rinse to waste at the service flow rate. The surface wash with the backwash water is used to improve media surface cleaning efficiency. Effluent water was accumulated for use as backwash supply water.

During each filter run, the following parameters were measured and recorded at the indicated intervals for each run:

- 1. filter rate of flow, gpm
- 2. filter inlet and effluent free chlorine, mg/L
- 3. iron in filter influent, mg/L
- 4. iron in filter effluent, mg/L
- 5. manganese in raw water, $(\mu g/L)$, once at the start of each run
- 6. manganese in filter effluents, $\mu g/L$
- 7. chemical feed pump speed strokes per minute

The above data was recorded on pilot test log sheets, which are included in the Appendix B of this report.



5.1.3 Sampling Protocol

All inorganic water analyses were performed an external laboratory certified by the National Environmental Laboratory Accreditation Program. All samples are drawn into clean sample containers and preserved for metal analysis. Chain of custody documentation is completed, and samples transported to the laboratory for immediate analysis. Test samples are submitted to Eurofins Eaton Analytical in Monrovia, California for analysis using USEPA and California state recognized testing methods for drinking water. Methods for analysis are:

Total Iron	EPA 200.7
Total Manganese	EPA 200.7
Arsenic	EPA 200.8

5.1.4 Sample Tests

Free chlorine, manganese, iron and pH were tested onsite using the instruments and procedures described in the following section. Each filter influent and effluent sample was taken in enough volume to provide the required sample volume for each parameter to be tested. Sample volumes were sufficient to provide a sample for offsite testing. The Owner's representative collected samples for the off-site independent lab analysis.

5.1.5 Onsite Test Equipment, Procedures, and Methods

Field testing for iron, and manganese and ammonia nitrogen are performed with a Hach DR 900. With this instrument, packets of reagents specific for each constituent are added to a pair of sample cylinders, which are then inserted into the test instrument in two steps. One sample is called the blank, which is inserted into the DR 900 first, and the instrument is zeroed. The DR 900 measures the amount of light passing through the blank sample and electronically stores the result. Next, the second prepared sample is inserted, and the value is read by the DR 900. The instrument compares the stored value for the blank to the value for the prepared sample and displays the results for the constituent being tested.

For manganese, the blank is prepared with deionized water. The iron test blanks are prepared with water from the filter effluent. The test results are displayed on the digital readout. For iron, the Total Iron, FerroVer test Method 8008 is used. For manganese, Method 8149 is used.

Chlorine analysis is performed on a Lamotte DC1500 using the DPD Method. This test is equivalent to Standard Method 4500-C1 G.

pH is measured using an Oakton pH Acorn Series Pocket pH Tester with a range of 0.0 - 10.0 pH. The probe was calibrated daily using a 7.0 pH buffer solution.

6.0 TREATMENT PERFORMANCE EVALUATION

This section provides a performance summary of the equipment and media types evaluated during the pilot test. Refer to Section 3.0 for a complete description and specification of the pilot test equipment and field analysis test equipment.

6.1 Breakpoint Chlorination Testing

A breakpoint chlorination test on the raw water performed at the start of testing provides some indication of chlorine demand from the water constituents that consume the oxidant. A simple test using calculated hypochlorite addition rates versus measured raw water free chlorine content is performed. The test revealed the following results:

Metering Pump Setting, percent of full stroke rate	Addition rate, mL/min	Addition rate, mg NaOCl/L	Free Chlorine remaining, mg Cl ₂ /L
10	2.0	1.02	0.0
15	3.0	2.30	0.0
17	3.5	2.69	0.19
20	4.0	3.07	0.56
25	6.5	4.99	0.72
30	7.0	5.37	0.96
35	9.0	6.91	1.16
40	10.0	7.68	1.41
45	11.0	8.44	1.62
50	12.0	9.21	1.89
55	13.5	10.4	2.20
60	15.0	11.5	2.31
65	17.0	13.1	2.42
70	18.0	13.8	2.88
75	19.0	14.6	3.03



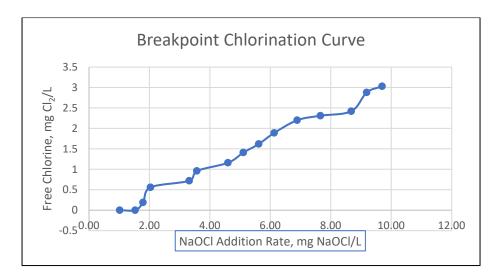


Figure 2. Graphical depiction of chlorination breakpoint for free chlorine residual.

The data obtained shows a general hypochlorite addition rate of 3.0 mg/L NaOCl attains breakpoint of free chlorine demand for the raw water. Addition rates of hypochlorite above this value will yield proportional increases in free chlorine content in the finished water.

6.2 Filter Headloss

The pressure differential across the filter during the various runs increased uniformly in a predictable manner throughout each filter run for each media type. No sharp increases in pressure loss was observed in each of the two filter runs. A clean pressure loss for filter column F1 measured 2.0 and 1.6 psid at the start of each successive filter run. Pressure loss increased an average 2.0 psid over the 10-hour service run period in each filter run. Filter column F2 provided a lower overall clean pressure loss of 1.7 and 1.3 for each filter run with a higher average increase in pressure loss of 2.5 psid over a 10-hour service period. Both filter columns returned to previous clean pressure loss values following the prescribed surface wash scour and backwash cleaning cycle. During all testing for all filter runs, the filter differential pressure loss did not exceed 4.8 psid and gained approximately 0.2 and 0.28 psid per hour of service time for filter columns F1 and F2 respectively. Precise measurements of filter pressure loss given the pilot test instrumentation and variations in flow conditions is not possible, however the general increase in pressure loss over the course of each filter run is expected. A general contaminant leakage threshold is observed at 8-hour service in column F1 and at 10 hours service in column F2 at the Run no. 1 service conditions of 8 gpm/ft². At Run no. 2 flow rate of 6 gpm/ft² a contaminant leakage appears at approximately 10 hours of service in both columns. Based upon this data, service run length or service volume throughput may be best used to terminate the length of a filter service run rather than differential pressure. Due to the relatively high contaminant iron and manganese inlet concentrations, the theoretical capacity of the media will be reached within an average 8 hour service cycle and as was observed, a head loss of 8 to 10 psid



normally used as a terminal service end point will most likely not be obtained before the treated water exceeds acceptable iron and manganese levels.

6.3 Iron and Manganese Treatment

A summary of the influent and filtered water values for iron and manganese is presented in Tables 2 through 5. The test results noted "field" are test results from the Hach DR 900 and field test kits, and those noted Lab are from Eurofins Test Laboratories off-site analysis.

TABLE 2 IRON AND MANGANESE TEST RESULTS Desal Project Well Water, MEDIA #F1 RUN #1 June 2, 2020

	Hours of Service							
ANALYTE	0	1	2	4	6	8	10	
Fe in, mg/L, field (raw)		0.96	0.96	0.97	0.97	0.96	0.93	
Fe in, mg/L, Lab (raw)			0.92					
Fe out, mg/L, field		0.03	0.01	0.08	0.17	0.29	0.45	
Fe out, mg/L, Lab			< 0.020			0.28	0.40	
Mn in, mg/L, field		0.313	0.295	0.327	0.309	0.320	0.391	
Mn in, mg/L, Lab			0.94					
Mn out, mg/L, field		0.040	0.040	0.074	0.082	0.102	0.134	
Mn out, mg/L, Lab			0.0033			0.088	0.240	
As in, µg/L, Lab			5.8					
As out, µg/L, Lab			2.7			3.4	3.8	
, psid	2.0	2.2	2.9	3.2	3.5	3.9	4.4	

NOTES: Media = F1 Manganese Greensand+ $^{\textcircled{R}}$ Flow = 1.5 GPM

TABLE 3 **IRON AND MANGANESE TEST RESULTS** Desal Project Well Water, MEDIA #F2 RUN #1 June 2, 2020

		Hours of Service								
ANALYTE	0	1	2	4	6	8	10			
Fe in, mg/L, field		0.96	0.96	0.97	0.97	0.96	0.93			
Fe in, mg/L, Lab (raw)			0.92							
Fe out, mg/L, field		0.00	0.05	0.02	0.09	0.15	0.18			
Fe out, mg/L, Lab			0.020			0.16	0.20			
Mn in, mg/L, field		0.313	0.295	0.327	0.309	0.320	0.391			
Mn in, mg/L, Lab			0.94							
Mn out, mg/L, field		0.020	0.024	0.053	0.046	0.062	0.041			
Mn out, mg/L, Lab		< 0.0020	0.012			0.022	0.029			
As in, µg/L, Lab			5.8	0.28						
As out, µg/L, Lab			2.2			2.6	2.8			
DP, psid	1.7	1.8	2.7	3.3	3.8	4.2	4.7			
NOTES: Media = F2 Mang- $Ox^{\text{\tiny R}}$ Flow = 1.5 GPM										

NOTES: Media = F_2 Mang-Ox⁵

FIOW = 1.3 GPM



TABLE 4 **IRON AND MANGANESE TEST RESULTS** Desal Project Well Water, MEDIA #F1 RUN #2 June 3, 2020

	Hours of Service							
ANALYTE	0	1	2	4	6	8	10	12
Fe in, mg/L, field		0.98	1.04	1.03	0.99	0.94	1.00	0.94
Fe in, mg/L, Lab (raw)		0.90						
Fe out, mg/L, field		0.03	< 0.010	0.02	< 0.010	0.02	0.12	0.19
Fe out, mg/L, Lab		< 0.020				< 0.020		0.40
Mn in, mg/L, field		0.321	0.303	0.285	0.316	0.309	0.306	0.309
Mn in, mg/L, Lab		0.95	0.097			0.26		
Mn out, mg/L, field		0.077	0.049	0.042	0.035	0.027	0.068	0.086
Mn out, mg/L, Lab		0.15				< 0.0020		0.49
As in, µg/L, Lab		5.0						
As out, µg/L, Lab		3.0				<1.0		3.8
DP, psid	1.6	1.6	1.8	1.9	2.0	2.3	2.6	2.7

NOTES: Media = F1 Manganese Greensand+[®] Flow = 1.1 GPM

TABLE 5 **IRON AND MANGANESE TEST RESULTS** Desal Project Well Water, MEDIA #F2 RUN #2 June 3, 2020

	Hours of Service							
ANALYTE	0	1	2	4	6	8	10	12
Fe in, mg/L, field		0.98	1.04	1.03	0.99	0.94	1.00	0.94
Fe in, mg/L, Lab (raw)		0.90						
Fe out, mg/L, field		0.03	< 0.010	0.08	0.02	< 0.010	0.07	0.06
Fe out, mg/L, Lab		< 0.020				< 0.020		0.16
Mn in, mg/L, field		0.321	0.303	0.285	0.316	0.309	0.306	0.309
Mn in, mg/L, Lab		0.95	0.097			0.26		
Mn out, mg/L, field		0.032	0.013	0.025	0.027	0.047	0.047	0.062
Mn out, mg/L, Lab		0.0089				0.0032		0.022
As in, µg/L, Lab		5.0						
As out, µg/L, Lab		2.0				<1.0		3.5
DP, psid	1.3	1.5	1.7	2.1	2.3	2.8	3.1	3.4
NOTES: Madia = E1 Mana $Oy^{\text{@}}$ Elaw = 1.1 CDM								

NOTES: Media = F1 MangOx[®] Flow = 1.1 GPM

7.0 PERFORMANCE EVALUATION NOTES

Run 1 was conducted at 8 gpm/ft² with a nominal 1.2 to 1.4 mg/L free chlorine in the inlet flow to each filter column. Sodium hypochlorite was fed at a rate of 7.5 mg/l (calculated) to maintain a chlorine residual in the treated effluent water above 1.0 mg/l as free chlorine. Effluent free chlorine levels were measured with field instruments. Ammonia nitrogen when present in the raw water can reduce finished water free chlorine residual. Also, higher levels of iron and hydrogen sulfide will also contribute to higher chlorine oxidant demand. Measured ammonia nitrogen in the effluent treated water may indicate less available free chlorine in the downstream water distribution system than what is measured at the treatment column outlet. Therefore, ammonia nitrogen measurements were taken to assess the filter medias' capability to provide oxidative benefit to the raw water ammonia present. Measured raw water ammonia values were 0.63 mg/L ammonia nitrogen in field tests. At the start of the first filter run, the medias provided a nominal 40 to 50 percent reduction in ammonia through each column. In addition, the pilot test technician noted a strong hydrogen sulfide odor from the raw untreated well water. Although actual hydrogen sulfide concentrations were not measured, its presence in the raw water will increase the oxidant demand and affect the residual measured free chlorine in the filter effluent water. This may explain the unusually high oxidant dosing rate to provide the required free chlorine residual in the treated water.

To effectively provide full oxidation of the target contaminant metals iron and manganese, free chlorine levels were always maintained in the treated effluent water at a 1.0 to 1.2 mg/L setpoint. The field tests confirm that iron and manganese can be removed to below secondary MCL values using either media type. At the standard service flow rate of 8 gpm/ft² the F1 media type appears to reach effluent breakthrough for iron and manganese secondary MCL levels at 6 hours of service. Column F2 media demonstrated iron removal capability for the full 10 hours of service and provided manganese removal through 8 hours of service operation in standard flow rate. Manganese effluent levels quickly increased after 8 hours service operation. These water test conditions illustrate a better iron and manganese removal performance with the column F2 media. Although variations in field tests and laboratory analysis are illustrated in the data set, the general trend in breakthrough performance for iron and manganese results are consistent.

Run No. 2 was performed at a reduced service flow rate corresponding to 6 gpm/ft² using the same proportional sodium hypochlorite feed rates as is used in Run No. 1 to maintain approximately 1 mg/L free chlorine in the treated water. The results for iron and manganese removal is very predictable and essentially trend identically to the run no, 1 test. A 25 percent reduction in flow rate through the media should extend the service term by approximately this equivalent time. The data obtained reflect this result. Both media types reach terminal iron and manganese capacity about 2 to 3 hours beyond that obtained in the standard service flow rate test. Column F2 media performed iron and manganese removal below secondary MCL levels through the full length of test of 12



hours. The column F1 media provided better iron and manganese effluent results below the secondary MCL values at the reduced flow rate than in the previous standard flow rate test to 10 hours of service. Pressure loss data for both media types suggest very little discernable difference in performance through the service periods.



APPENDIX A

Analytical Test Results Page 19 - 42

750 Royal Oaks Drive, Suite 100 Monrovia, California 91016-3629 Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)



Laboratory Report

for

David C. McCollum Water Treatment Plant 1966 Olivenhain Rd. Encinitas, CA 92024 Attention: Tom Arellano Fax: 760-740-1702

Date of Issue 3/17/202 **EUROFINS EATON ANALYTICAL, LLC**

YOM: Yolanda O Martin

Project Manager

Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

* Accredited in accordance with TNI 2016 and ISO/IEC 17025:2017.

- * Laboratory certifies that the test results meet all TNI 2016 and ISO/IEC 17025:2017 requirements unless noted under the individual analysis.
- * Following the cover page are State Certification List, ISO 17025 Accredited Method List, Acknowledgement of Samples Received, Comments, Hits Report,
- Data Report, QC Summary, QC Report and Regulatory Forms, as applicable.
- * Test results relate only to the sample(s) tested.
- * Test results apply to the sample(s) as received, unless otherwise noted in the comments report (ISO/IEC 17025:2017).
- * This report shall not be reproduced except in full, without the written approval of the laboratory.
- * This report includes ISO/IEC 17025 and non-ISO 17025 accredited methods.





STATE CERTIFICATION LIST

State	Certification Number	State	Certification Number
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Arizona	AZ0778	Nebraska	Certified
Arkansas	Certified	Nevada	CA000062018
California	2813	New Hampshire *	2959
Colorado	Certified	New Jersey *	CA 008
Connecticut	PH-0107	New Mexico	Certified
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Florida *	E871024	North Carolina	06701
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Illinois *	200033	Rhode Island	LAO00326
Indiana	C-CA-01	South Carolina	87016
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Kansas *	E-10268	Tennessee	TN02839
Kentucky	90107	Texas *	T104704230-18-15
Louisiana *	LA180000	Utah (Primary AB) *	CA00006
Maine	CA0006	Vermont	VT0114
Maryland	224	Virginia *	460260
Commonwealth of Northern Marianas Is.	MP0004	Washington	C838
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* NELAP/TNI Recognized Accreditation Bodies

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ISO/IEC 17025 Accredited Method List

The tests listed below are accredited and meet the requirements of ISO/IEC 17025 as verified by the ANSI-ASQ National Accreditation Board/A2LA. Refer to Certificate and scope of accreditation (5890) found at: https://www.eurofinsus.com/Eaton

		Environ-	Environ-			-	Environ-	Environ-	
SPECIFIC TESTS	METHOD OR TECHNIQUE USED	mental (Drinking Water)	mental (Waste Water)	Water as a Component of Food and Bev/Bev/ Bottled Water	SPECIFIC TESTS	METHOD OR TECHNIQUE USED	mental (Drinking Water)	mental (Waste Water)	Water as a Component of Food and Bev/Bev/ Bottled Water
1,2,3-TCP (5 PPT & 0.5 PPT)	CA SRL 524M-TCP	x		x	Hexavalent Chromium	EPA 218.7	x		x
1,4-Dioxane	EPA 522	х		x	Hexavalent Chromium	SM 3500-Cr B		х	
2.3.7.8-TCDD	Modified EPA 1613B	x		x	Hormones	EPA 539	х	~	x
Acrylamide	In House Method (2440)	x		x	Hydroxide as OH Calc.	SM 2330B	х		х
Algal Toxins/Microcystin	In House Method (3570)				Kjeldahl Nitrogen	EPA 351.2		х	
Alkalinity	SM 2320B	x	х	x	Legionella	Legiolert	х		х
Ammonia	EPA 350.1		х	х	Mercury	EPA 200.8	х		х
Ammonia	SM 4500-NH3 H		х	х	Metals	EPA 200.7 / 200.8	х	х	х
Anions and DBPs by IC	EPA 300.0	х	х	х	Microcystin LR	ELISA (2360)	x		х
Anions and DBPs by IC	EPA 300.1	х		х	Microcystin, Total	EPA 546	х		х
Asbestos	EPA 100.2	x	х		NDMA	EEA/Agilent 521.1	x		x
		~				In house method (2425)			
BOD / CBOD	SM 5210B		х	x	Nitrate/Nitrite Nitrogen	EPA 353.2	х	х	х
Bromate	In House Method (2447)	x		x	OCL, Pesticides/PCB	EPA 505	х		x
Carbamates	EPA 531.2	х		x	Ortho Phosphate	EPA 365.1	х	х	x
Carbonate as CO3	SM 2330B	х	х	x	Ortho Phosphorous Oxyhalides Disinfection	SM 4500P E	х		х
Carbonyls	EPA 556	x		x	Byproducts	EPA 317.0	х		x
COD	EPA 410.4 / SM 5220D	t	x		Perchlorate	EPA 331.0	x		x
Chloramines	SM 4500-CL G	x	x	x	Perchlorate (low and high)	EPA 314.0	x		x
Chlorinated Acids	EPA 515.4	x		x	Perfluorinated Alkyl Acids	EPA 537	x		x
Chlorinated Acids	EPA 555	x	1	x	Perfluorinated Polutant	In house Method (2434)	x		x
Chlorine Dioxide	SM 4500-CLO2 D Palin Test	x		x	рН	EPA 150.1	x		
Chlorine -Total/Free/ Combined Residual	SM 4500-Cl G	x	x	x	рН	SM 4500-H+B	x	x	x
Conductivity	EPA 120.1	1	x		Phenylurea Pesticides/ Herbicides	In House Method, based on EPA 532 (2448)	x		x
Conductivity	SM 2510B	x	x	x	Herbicides Pseudomonas	532 (2448) IDEXX Pseudalert (2461)	x		x
Corrosivity (Langelier Index)	SM 2330B	x	~	x	Radium-226	GA Institute of Tech	x		x
Cyanide, Amenable	SM 4500-CN G	x	x		Radium-228	GA Institute of Tech	x		x
Cyanide, Free	SM 4500-CN G	x	x	x	Radon-222	SM 7500RN	x		x
Cyanide, Total	EPA 335.4	x	x	x	Residue, Filterable	SM 2540C	x	x	x
Cyanogen Chloride (screen)	In House Method (2470)	x	~	x	Residue, Non-filterable	SM 2540D	~	x	~
Diquat and Paraquat	EPA 549.2	x		x	Residue, Total	SM 2540B		x	x
DBP/HAA	SM 6251B	x		x	Residue, Volatile	EPA 160.4		x	~
Dissolved Oxygen	SM 4500-O G		х	x	Semi-VOC	EPA 525.2	x		x
DOC	SM 5310C	x		х	Silica	SM 4500-Si D	х	х	
E. Coli	(MTF/EC+MUG)	х		х	Silica	SM 4500-SiO2 C	х	х	
	· · · · · ·						~		-
E. Coli	CFR 141.21(f)(6)(i)	x		x	Sulfide	SM 4500-S ⁼ D		х	
E. Coli	SM 9223		х		Sulfite	SM 4500-SO ³ B	х	х	x
E. Coli (Enumeration)	SM 9221B.1/ SM 9221F	х		х	Surfactants	SM 5540C	x	х	х
E. Coli (Enumeration)	SM 9223B	х		х	Taste and Odor Analytes	SM 6040E	х		х
EDB/DCBP	EPA 504.1	х			Total Coliform (P/A)	SM 9221 A, B	х		х
EDB/DBCP and DBP	EPA 551.1	x		x	Total Coliform (Enumeration)	SM 9221 A, B, C	x		x
EDTA and NTA	In House Method (2454)	x		x	Total Coliform / E. coli	Colisure SM 9223	x		x
Endothall	EPA 548.1	x		×	Total Coliform	SM 9221B	^	х	^
Endothall	In-house Method (2445)	x		х	Total Coliform with Chlorine Present	SM 9221B		x	
Enterococci	SM 9230B	x	х		Total Coliform / E.coli (P/A and Enumeration)	SM 9223	x		x
Fecal Coliform	SM 9221 E (MTF/EC)	x			TOC	SM 5310C	x	x	x
Fecal Coliform	SM 9221C, E (MTF/EC)		x		TOX	SM 5320B		x	1
Fecal Coliform	SM 9221E, E (MTF/EC)	x		x	Total Phenols	EPA 420.1		x	
(Enumeration) Fecal Coliform with	SM 9221E		x		Total Phenols	EPA 420.4	x	x	x
Chlorine Present Fecal Streptococci	SM 9221E	x	×		Total Phosphorous	SM 4500 P E	^	x	^
Fluoride	SM 4500-F C	x	x	x	Triazine Pesticides &	In House (3617)	x		x
Glyphosata	EPA 547	v		×	Degradates	EDA 190 1	v	v	v
Glyphosate AMPA		x		×	Turbidity Turbidity	EPA 180.1	x	x	X
Glyphosate + AMPA Gross Alpha/Pata	In House Method (3618)	x	~	x	Turbidity	SM 2130B	X	х	~
Gross Alpha/Beta Gross Alpha Coprecipitation	EPA 900.0 SM 7110 C	x	x	x	Uranium by ICP/MS UV 254	EPA 200.8 SM 5910B	x		x
Hardness	SM 2340B	х	x	x	VOC	EPA 524.2	x		х
Heterotrophic Bacteria	In House Method (2439)	х		x	VOC	In House Method (2411)	х		x
Heterotrophic Bacteria	SM 9215 B	х		x	Yeast and Mold	SM 9610	х		х
Hexavalent Chromium	EPA 218.6	х	х	х	Field Sampling	N/A			1

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🚯 eurofins	5			
	Eaton Analytical	Acknowledgement of San	nples Received	
A alalas I		-	Client ID: OLIVENH	A 1N1
	David C. McCollum Water Trea 1966 Olivenhain Rd.	atment Plant	Folder #: 874995	AIN
	Encinitas, CA 92024		Project: WOODAR	D
			Sample Group: OMWD De	esal Pilot Test
Attn:	Tom Arellano		Project Manager: Yolanda C	Martin
Phone:	760-740-1385 x183		Phone: (626)-386-	1104
listed bel	÷ .	-	6 . They have been scheduled for your service representative. The	
Sample #	Sample ID			Sample Date
202006050429	RAW			06/02/2020 0930
	Arsenic Total ICAP/MS	Iron Total ICAP	Manganese Total ICAP	
	Metals digestion performed.	RUSH Sample Kit		
202006050430	F1			06/02/2020 0930
	Arsenic Total ICAP/MS	Iron Total ICAP	Manganese Total ICAP	
	Metals digestion performed.			
202006050431	F2			06/02/2020 0930
	Arsenic Total ICAP/MS	Iron Total ICAP	Manganese Total ICAP	
	Metals digestion performed.			
202006050432	F1			06/02/2020 1530
	Arsenic Total ICAP/MS	Iron Total ICAP	Manganese Total ICAP	
	Metals digestion performed.			
202006050433	F2			06/02/2020 1530
	Arsenic Total ICAP/MS	Iron Total ICAP	Manganese Total ICAP	
	Metals digestion performed.			
<u>202006050434</u>	F1			06/02/2020 1730
	Arsenic Total ICAP/MS	Iron Total ICAP	Manganese Total ICAP	
	Metals digestion performed.		, and the second s	
<u>202006050435</u>	F2			06/02/2020 1730
	Arsenic Total ICAP/MS	Iron Total ICAP	Manganese Total ICAP	
	Metals digestion performed.			
<u>202006050436</u>	RAW			06/03/2020 0645
	Arsenic Total ICAP/MS	Iron Total ICAP	Manganese Total ICAP	
	Metals digestion performed.			
202006050437	F1			06/03/2020 0645
	Arsenic Total ICAP/MS	Iron Total ICAP	Manganese Total ICAP	
	Metals digestion performed.		Mangahooo Pota Por	
202006050438	F2			06/03/2020 0645
	Arsonic Total ICAP/MS	Iron Total ICAD	Manganaga Tatal ICAD	
	Arsenic Total ICAP/MS Metals digestion performed.	Iron Total ICAP	Manganese Total ICAP	

Reported: 06/17/2020

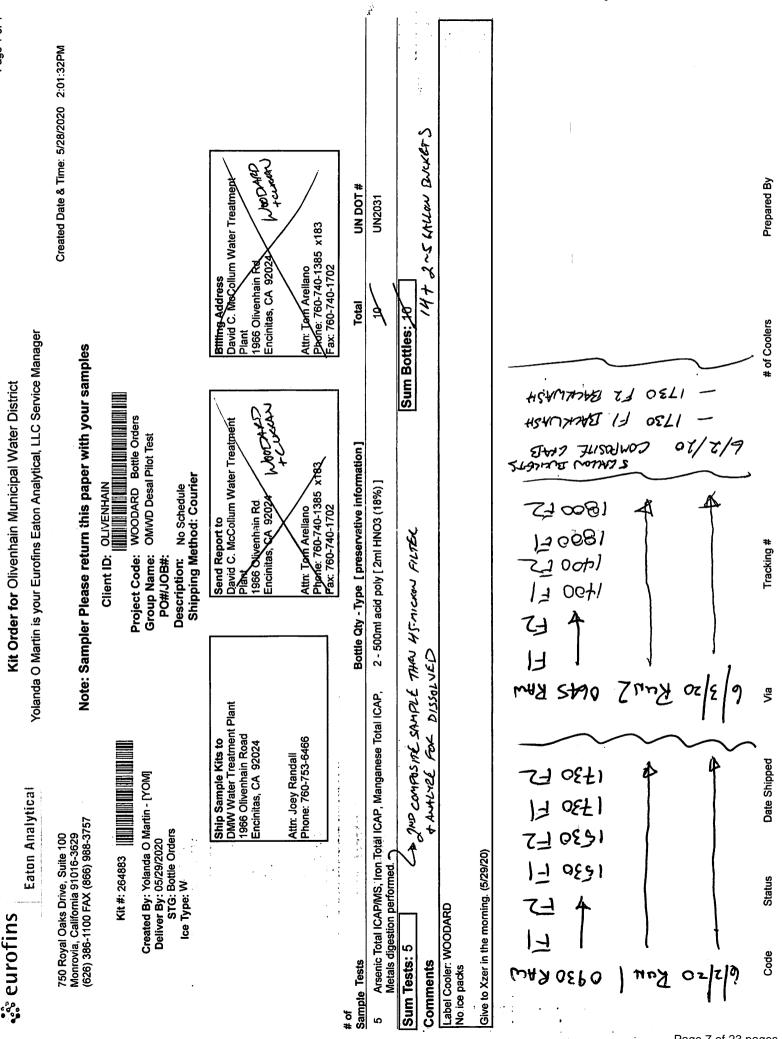
Page 1 of 2

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	A A A A A A A A A A A A A A A A A A A	Acknowledgement of Sa	mples Received
	David C. McCollum Water Trea 1966 Olivenhain Rd. Encinitas, CA 92024	tment Plant	Client ID: OLIVENHAIN Folder #: 874995 Project: WOODARD Sample Group: OMWD Desal Pilot Test
,	Tom Arellano 760-740-1385 x183		Project Manager: Yolanda O Martin Phone: (626)-386-1104
listed bel		-	16 . They have been scheduled for the tests ct your service representative. Thank you for
Sample #	Sample ID		Sample Date
202006050439	F1		06/03/2020 1400
	Arsenic Total ICAP/MS Metals digestion performed.	Iron Total ICAP	Manganese Total ICAP
202006050440	F2		06/03/2020 1400
	Arsenic Total ICAP/MS Metals digestion performed.	Iron Total ICAP	Manganese Total ICAP
202006050441	F1		06/03/2020 1800
	Arsenic Total ICAP/MS Metals digestion performed.	Iron Total ICAP	Manganese Total ICAP
02006050442	F2		06/03/2020 1800
	Arsenic Total ICAP/MS Metals digestion performed.	Iron Total ICAP	Manganese Total ICAP
202006080150	F1 backwash - bucket (Total)		06/02/2020 1730
	Arsenic Total ICAP/MS Metals digestion performed.	Iron Total ICAP	Manganese Total ICAP
202006080151	F1 backwash - bucket (Dissol	ved)	06/02/2020 1730
	Arsenic dissolved ICAP/MS Metals digestion performed.	Iron Dissolved ICAP	Manganese Dissolved ICAP
202006080152	F2 backwash - bucket (Total) Arsenic Total ICAP/MS	Iron Total ICAP	06/02/2020 1730 Manganese Total ICAP
202006080153	Metals digestion performed. F2 backwash - bucket (Dissol ⁱ		06/02/2020 1730
	Arsenic dissolved ICAP/MS Metals digestion performed.	Iron Dissolved ICAP	Manganese Dissolved ICAP
202006050443	COURIER CHARGE		06/05/2020 0000

eurofins		CHAIN C	DF CUSTO	CHAIN OF CUSTODY RECORD		١
Eaton Analytical	EUROFINS EATON ANALYTICAL USE ONLY:	ICAL USE ONLY:			36448	
750 Royal Oaks Drive, Suite 100	LOGIN COMMENTS:	1-	2 Seally	A SAMPLES CHECK	SAMPLES CHECKED AGAINST COC BY:	
		Valetiers	Anton &			(check for yes)
Phone: 626 386 1100 Fax: 626 386 1101	(Other)	IR Gun ID =	(Observation=	°C) ((leot ioi
800 566 LABS (800 566 5227)	Compliance Accontance Criteria: (Chamience	IR Gun ID = (a)	(Observation=	CORFACTOR	$\mathcal{O} \subset \mathcal{O}$ (Final = $\mathcal{O} \neq \mathcal{O}$ °C)	1
Website: <u>www.EatonAnalytical.com</u>	TYPE OF ICE: Real	Synthetic End. Pick-Up	No Ice CONDITIC	OF ICE: Real Synthetic No Ice CONDITION OF ICE: Frozen Partially Frozen METHOD OF SHIPMENT: Pick-Up / Walk-In / FedEx / UPS / DHL / Area Fast / Top Line / Other	Partially Frozen Thawed N/A	X
TO BE COMPLETED BY SAMPLEP.				(check for vec)	(check for use)	00)
COMPANYIAGENCY NAME: WOODARD & CURRAN /OMWD	PROJECT CODE:		- Re		CE SAMPL VOLVED:	
			Type of samples (circle one):	rcle one): ROUTINE SPECIAL C	RMATION	DES, etc.)
EEA CLIENT CODE: COC ID:	SAMPLE GROUP:	DESAL PILOT TEST	SEE ATTACHEL	SEE ATTACHED KIT ORDER FOR ANALYSES List ALL ANALYSES REQUIRED (enter number of bot	IEE ATTACHED KIT ORDER FOR ANALYSES (check for yes), <u>OR</u> List ALL ANALYSES REQUIRED (enter number of bottles sent for each test for each sample)	ample)
TAT requested: rush by adv notice only	STD X 1 wk 3 day	_ 2 day 1 day				
SAMPLE DATE SAMPLE IME SAMPLE D	CLIENT LAB ID	• XIRTAM ATAO OJEIF ATAO OJEIF	WHATCHED Iton Vurenic		SAMPLER COMMENTS	S S
G/2 0930 RAW		Row				
<i>F</i> I		FW				
\$ F2	_	FW				
1530 F1		FW				
1530 F2		Fw				
1730 F1 + CONPUSITE		FW			turiburte P	FILTERED
+ 1730 F2 + COMPOSITE		FW			+conp. Fush	GURREN
6/3 0645 RAW + FI + FZ	N N	RGW				
1 1400 FI +FZ		FW				
\$ 1800 FIFEZ		FW				
* MATRIX TYPES: RSW = Raw Surface Water RGW = Raw Ground Water	CFW = Chlor(am)inated Fini FW = Other Finished Water	d Finished Water /ater	SEAW = Sea Water WW = Waste Water	BW = Bottled Water SW = Storm Water	SO = Soil 0 = Other - Please Identify SL = Sludge	Identify
SIGNATURE		PRINT NAME			DATE	TIME
SAMPLED BY DAVID JONES / 82	CINE (JONES /	Kenc ELICIÓN L	CODARD+ CURRAN	6/2-6/3 0930	30
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David C. McCollum Water Treatment Plant Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Flags Legend:

D1 - Sample required dilution due to matrix.



Laboratory Hits

Samples Received on:

06/05/2020 1616

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

0200050429 RAM SAM SAM UN UN 06011202 21.0 Amain Todal (GAPMS) 6.8 0.3 mgL 0.202 06080202 0.30 Manganese Todal (GAP 0.92 0.92 mgL 0.0202 06080202 0.30 Maral agaessor Todal (GAPMS) 0.94 0.95 mgL 0.0202 06080202 0.30 Manganese Todal (GAPMS) 2.7 10 ugL 0.0202 06080202 0.30 Manganese Todal (GAPMS) 2.7 10 ugL 0.0202 06080202 0.30 Manganese Todal (GAPMS) 2.7 10 ugL 0.0202 06080202 0.30 Manganese Todal (GAPMS) 2.2 10 ugL 0.202 06090202 1.71 Manganese Todal (GAPMS) 0.012 0.30 mgL 0.202 06090202 1.71 Manese Todal (GAPMS) 1.0 ugL 0.202 06090202 1.42 Manese Todal (GAPMS) 3.4 1.0 ugL 0.202 06090202 1.42 Manese Todal (GAPMS) 3.4	Analyzed	Analyte S	Sample ID	Result	Federal MCL	Units	MRL
00002020 15.02 Iron Total ICAP 0.92 0.3 mgl. 0.020 00002020 0.03 Metali digestion performed. 0.04 0.05 mgl. 0.020 001112020 23.18 Arsenic Total ICAPINS 2.7 10 ug/L 1.0 00002020 12.14 Manganese Total ICAP 0.0033 0.05 mgl. 0.020 0000200 12.14 Manganese Total ICAP 0.0033 0.05 mgl. 0.020 0000200 12.31 Manganese Total ICAP 0.0033 0.05 mgl. 0.020 0000200 12.41 Arsenic Total ICAPINS 2.2 10 ug/L 1.0 00000200 12.47 Manganese Total ICAP 0.020 0.3 mgl. 0.020 00000200 12.47 Manganese Total ICAP 0.012 0.02 mgl. 0.020 00000200 12.47 Manganese Total ICAP 0.020 0.3 mgl. 0.020 00000200 12.44 Arsenic Total ICAPINS 0.41 0.020 0.020 00000200 12.44 Manganese Total ICAP 0.020 0.020 0.020 00000200 12.44 Montotal ICAP 0.080 0.05 mgl		202006050429	RAW				
96108/2020 15.02 Manganese Total ICAP 0.94 0.95 mg/L 0.020 96108/2020 12.13 Arsenic Total ICAP/MS 2.70 10 ug/L 1.0 06109/2020 12.34 Manganese Total ICAP 0.0033 0.05 mg/L 0.0020 06109/2020 12.43 Marganese Total ICAP 0.003 0.05 mg/L 0.020 06009/2020 12.47 Iconot Total ICAP 2.27 10 ug/L 1.0 06009/2020 12.47 Iconot Total ICAP 2.20 10 mg/L 0.020 06009/2020 12.47 Iconot Total ICAP 0.020 0.3 mg/L 0.020 06009/2020 12.47 Iconot Total ICAP 0.020 0.3 mg/L 0.020 06009/2020 12.47 Iconot Total ICAP 0.020 0.3 mg/L 0.020 06009/2020 12.43 Iconot Total ICAP/MS 3.4 10 ug/L 0.020 06009/2020 12.44 Arsenic Total ICAP/MS 2.8 0.3 mg/L 0.020 06009/2020 12.45 Arsenic Total ICAP/MS 2.6 10 ug/L 1.0 06009/2020 12.45 Arsenic Total ICAP/MS <td< td=""><td>06/11/2020 23:15</td><td>Arsenic Total ICAP/MS</td><td></td><td>5.8</td><td>10</td><td>ug/L</td><td>1.0</td></td<>	06/11/2020 23:15	Arsenic Total ICAP/MS		5.8	10	ug/L	1.0
96192020 96.39 Maila digation performed. NO Yeakol 06111202 21.30 Arcenic Total (AP/MS 2.7.0 10.4 ugl. 1.0 060102020 10.40 Magnes Total (AP/MS 2.7.0 10.4 ugl. 1.0 060102020 10.40 Magnes Total (AP/MS 0.020 Veskol Veskol 060102020 12.71 Magnes Total (AP/MS 2.2 10 ugl. 1.0 06002020 12.71 Magnes Total (AP/MS 2.2 0.05 mgl. 0.020 06002020 12.71 Magnes Total (AP/MS 0.012 0.05 mgl. 0.020 0600202 12.71 Magnes Total (AP/MS 0.012 0.05 mgl. 0.020 0600202 12.71 Magnes Total (AP/MS 0.02 mgl. 0.020 0600202 12.42 Inortoal (AP/MS 0.02 mgl. 0.020 0600202 12.42 Inortoal (AP/MS 0.08 0.05 mgl. 0.020 0600202 12.43 Magnes Total (AP/MS 0.02 0.02 0.020 0600202 12.43 Magnes Total (AP/MS 0.02 0.02 0.020 06010202 12.43 Magnes Total (06/08/2020 15:02	Iron Total ICAP		0.92	0.3	mg/L	0.020
Partic Total ICAP/MS 2,7 0 ug/L 1.0 06/03/2020 0/3 Ansenic Total ICAP/MS 2,7 0 ug/L 1.0 06/03/2020 0/3 Manganese Total ICAP/MS 0.0033 0.05 mg/L 0.0020 06/03/2020 0/3 Masta digestion performer. 0.0033 0.05 mg/L 0.0020 06/01/2020 2:17 Kansein Total ICAP/MS 2.2 10 ug/L 1.0 06/03/2020 1:27 Kansein Total ICAP/MS 2.2 10 ug/L 0.020 06/03/2020 1:27 Kansein Total ICAP/MS 2.2 10 ug/L 0.0020 06/03/2020 1:27 Kansein Total ICAP/MS 2.2 10 ug/L 0.0020 06/03/2020 0:32 Maganese Total ICAP/MS 2.2 10 ug/L 1.0 06/03/2020 0:34 Kanein Total ICAP/MS 3.4 10 ug/L 1.0 06/03/2020 1:42 Kanganese Total ICAP/MS 0.20 0.3	06/08/2020 15:02	Manganese Total ICAP		0.94	0.05	mg/L	0.0020
Op/11/2020 23.18 Arsenic Total ICAP Maganese Total ICAP 0.0033 0.05 mg/L 0.0020 06/03/2020 03.93 Metals digestion performed. No vers/No vers/No 06/03/2020 03.93 Metals digestion performed. No vers/No vers/No 06/03/2020 02.17 Iron Total ICAP/INIS 2.2 10 ug/L 1.0 06/03/2020 12.17 Iron Total ICAP 0.020 0.3 mg/L 0.020 06/03/2020 0.39 Metals digestion performed. NO vers/No vers/No 06/03/2020 0.39 Metals digestion performed. NO <td< td=""><td>06/08/2020 09:39</td><td>Metals digestion performed</td><td>d.</td><td>NO</td><td></td><td>Yes/No</td><td></td></td<>	06/08/2020 09:39	Metals digestion performed	d.	NO		Yes/No	
06/09/2020 12:10 Manganese Total ICAP 0.0033 0.05 mgL 0.0020 06/09/2020 23:37 Marsanic Total ICAP 2.2 10 mgL 0.02 06/01/2020 23:37 Marsanic Total ICAP 2.2 10 mgL 0.020 06/09/2020 12:17 Marsanic Total ICAP 0.20 0.20 mgL 0.020 06/09/2020 12:17 Manganese Total ICAP 0.20 0.02 mgL 0.020 06/09/2020 12:17 Marsanic Total ICAP 0.20 0.02 mgL 0.020 06/09/2020 12:17 Marsanic Total ICAP 0.20 0.02 mgL 0.020 06/09/2021 12:18 Marsanic Total ICAP 0.20 0.20 mgL 0.020 06/09/2021 12:42 Marsanic Total ICAP 0.28 0.36 mgL 0.020 06/09/2021 12:42 Marsanic Total ICAP 0.28 0.55 mgL 0.020 06/09/2021 14:24 Marsanic Total ICAP 0.68 0.55 mgL 0.020 06/09/2021 14:24 Marsanic Total ICAP 0.61 0.30 mgL 0.020 06/09/2021 14:27 Marsanic Total ICAP <t< td=""><td></td><td>202006050430</td><td><u>F1</u></td><td></td><td></td><td></td><td></td></t<>		202006050430	<u>F1</u>				
0008/0202 09.39 Meak sidgestion performed. NO Yes/No 06/11/2002 23.21 Arsenic Total ICAP/MS 2.2 10 ug/L 1.0 06/09/202 12.17 Ino Total ICAP 0.020 0.3 mg/L 0.020 06/09/202 12.17 Ino Total ICAP 0.012 0.50 mg/L 0.002 06/09/202 12.17 Maganese Total ICAP 0.012 0.50 mg/L 0.002 06/09/202 12.17 Maganese Total ICAP 0.012 0.50 mg/L 0.002 06/09/202 0.342 Arsenic Total ICAP/MS 3.4 10 ug/L 1.0 06/09/202 14.28 Ino Total ICAP 0.028 0.35 mg/L 0.0020 06/09/202 0.34 Arsenic Total ICAP 0.088 0.35 mg/L 0.020 06/09/202 0.34 Arsenic Total ICAP 0.020 0.3 mg/L 0.020 06/09/202 0.34 Arsenic Total ICAP 0.020 0.5 mg/L 0.020 06/09/202 0.34 Maganese Total ICAP <t< td=""><td>06/11/2020 23:18</td><td>Arsenic Total ICAP/MS</td><td></td><td>2.7</td><td>10</td><td>ug/L</td><td>1.0</td></t<>	06/11/2020 23:18	Arsenic Total ICAP/MS		2.7	10	ug/L	1.0
Participant F2 06/11/2020 23.21 Arsenic Total ICAP/MS 2.2 10 ug/L 1.0 06/09/2020 12.17 Iton Total ICAP 0.020 0.3 mg/L 0.020 06/09/2020 12.17 Manganese Total ICAP 0.012 0.05 mg/L 0.0020 06/09/2020 03.93 Metals digestion performed. 0.012 0.05 mg/L 0.0020 06/09/2020 03.93 Metals digestion performed. 0.012 0.05 mg/L 0.0020 06/09/2020 03.42 Arsenic Total ICAP/MS 3.4 10 ug/L 1.0 06/09/2020 03.42 Iton Total ICAP 0.08 0.05 mg/L 0.020 06/09/2020 03.43 Manganese Total ICAP 0.08 0.05 mg/L 0.020 06/09/202 03.42 Arsenic Total ICAP 0.08 0.5 mg/L 0.020 06/09/202 03.44 Arsenic Total ICAP 0.02 0.020 0.020 06/09/202 </td <td>06/09/2020 12:16</td> <td>Manganese Total ICAP</td> <td></td> <td>0.0033</td> <td>0.05</td> <td>mg/L</td> <td>0.0020</td>	06/09/2020 12:16	Manganese Total ICAP		0.0033	0.05	mg/L	0.0020
06/14/200 23:21 Asenic Total ICAP 2.2 10 ug/L 1.0 06/09/200 12.17 Ino Tatal ICAP 0.020 0.30 mg/L 0.202 06/09/200 12.17 Maganese Total ICAP 0.020 0.020 mg/L 0.020 06/09/200 12.17 Maganese Total ICAP 0.020 mg/L 0.020 06/09/200 14.28 Asenic Total ICAP 54 0.30 mg/L 1.0 06/09/200 14.28 Ansenic Total ICAP 54 0.30 mg/L 0.020 06/09/200 14.28 Maganese Total ICAP 0.48 0.50 mg/L 0.020 06/09/200 14.28 Maganese Total ICAP 0.88 0.50 mg/L 0.020 06/09/200 14.28 Maganese Total ICAP 0.68 0.50 mg/L 0.020 06/09/200 14.29 Ino Total ICAP 2.64 1.0 mg/L 0.020 06/09/200 14.29 Ino Total ICAP 0.22 0.22 mg/L 1.0 06/09/200 10.34 Inotal ICAP	06/08/2020 09:39	Metals digestion performed	d.	NO		Yes/No	
No 12:17In ro Indial GAP0.0200.0200.020mg/.0.02006/09/20212:17Maganese Total ICAP0.0120.05mg/.0.002006/09/2020:39Metals digestion performed.NOYes/NoYes/No06/07/2020:342Arsenic Total ICAP/MS3.410ug/.1.006/08/20214.28Ion Total ICAP0.280.30mg/.0.20206/08/20214.28Ionagese Total ICAP0.800.80mg/.0.20206/08/20214.28Maganese Total ICAP0.800.80mg/.0.20206/08/20214.28Karsini Total ICAP0.800.60mg/.0.20206/08/20214.29Maganese Total ICAP0.020.60mg/.0.20206/08/20214.29Karsini Total ICAP0.020.62mg/.0.02006/08/20214.29Ion Total ICAP0.620.63mg/.0.02006/08/20214.29Ion Total ICAP0.020.63mg/.0.02006/08/20214.29Ion Total ICAP0.410.420.4206/08/20214.29Iona IcaP/MS0.420.420.4206/08/20214.59Iona IcaP/MS0.420.420.4206/08/20214.59Iona IcaP/MS0.420.420.4206/08/20214.59Iona IcaP/MS0.420.420.4206/08/20214.59Iona IcaP/MS0.420.42 </td <td></td> <td>202006050431</td> <td>F2</td> <td></td> <td></td> <td></td> <td></td>		202006050431	F2				
06/09/202 12:17 Maganese Total ICAP 0.012 0.05 mgL 0.0020 06/08/202 09:39 Metals digestion performed. NO Yes/No Yes/No 06/09/202 03:42 Arsenic Total ICAP/MS 3.4 10 ug/L 1.0 06/09/202 14:28 Ion Total ICAP 0.28 0.3 mgL 0.020 06/08/202 14:28 Maganese Total ICAP/MS 0.88 0.5 mgL 0.020 06/08/202 14:28 Maganese Total ICAP/MS 0.88 0.5 mgL 0.020 06/08/202 04:39 Tesnic Total ICAP/MS 2.6 10 ug/L 1.0 06/08/202 14:27 Maganese Total ICAP/MS 0.022 0.5 mg/L 0.020 06/08/202 14:27 Maganese Total ICAP/MS 0.022 0.5 mg/L 0.020 06/08/202 14:27 Maganese Total ICAP/MS 0.62 0.5 mg/L 0.020 06/08/202 14:27 Maganese Total ICAP/MS 0.40 0.3 mg/L 0.020 06/08/202 14:58	06/11/2020 23:21	Arsenic Total ICAP/MS		2.2	10	ug/L	1.0
Media digestion performed NO YerNo 06/09/2020 03:42 Arsenic Total ICAP/MS 3.4 10 ug/L 1.0 06/09/2020 14:28 Iron Total ICAP 0.28 0.32 mg/L 0.020 06/09/2020 14:28 Maganese Total ICAP 0.088 0.05 mg/L 0.020 06/09/2020 14:28 Maganese Total ICAP 0.088 0.05 mg/L 0.020 06/09/2020 14:28 Maganese Total ICAP/MS 0.088 0.05 mg/L 0.020 06/09/202 09:39 Metals digestion performed D	06/09/2020 12:17	Iron Total ICAP		0.020	0.3	mg/L	0.020
Variability Pione 06/10/202 03/42 Arsenic Total ICAP/MS 3.4 10 ug/L 1.0 06/08/202 14.28 Iron Total ICAP 0.28 0.3 mg/L 0.202 06/08/202 14.28 Manganese Total ICAP 0.088 0.05 mg/L 0.0020 06/08/202 03.39 Metals digestion performed. NO Yes/No Yes/No 06/08/202 03.45 Arsenic Total ICAP/MS 2.6 10 ug/L 0.020 06/08/202 14.27 Iron Total ICAP 0.16 0.3 mg/L 0.202 06/08/202 14.27 Iron Total ICAP 0.022 0.05 mg/L 0.020 06/08/202 14.27 Manganese Total ICAP 0.022 0.05 mg/L 0.020 06/08/202 14.29 Manganese Total ICAP 0.022 0.55 mg/L 0.020 06/08/202 14.29 Iron Total ICAP/MS 3.8 10 0.020 0.020 06/08/202 1	06/09/2020 12:17	Manganese Total ICAP		0.012	0.05	mg/L	0.0020
06/10/20203:42Arsenic Total ICAP/MS3.410ug/L1.006/08/20214:28Iron Total ICAP0.280.3mg/L0.02006/08/20214:28Maganese Total ICAP0.0880.5mg/L0.002006/08/20209:39Metals digestion performanceNOYes/NoYes/No06/10/20203:45Arsenic Total ICAP/MS 2.6 10ug/L1.006/08/20214:27Iron Total ICAP 2.6 0.3mg/L0.02006/08/20214:27Iron Total ICAP0.0220.5mg/L0.02006/08/20214:27Maganese Total ICAP0.0220.5mg/L0.02006/08/20214:32Maganese Total ICAPNOYes/NoYes/No06/08/20214:32Maganese Total ICAP0.020.05mg/L0.02006/08/20203:38Arsenic Total ICAP/MS3.810ug/L1.006/08/20214:58Iron Total ICAP1.40.400.3mg/L0.02006/08/20214:58Iron Total ICAPIron1.40.400.5mg/L0.02006/08/20214:58Iron Total ICAPIronIronIronIronIronIron06/08/20214:58Iron Total ICAPIronIronIronIronIronIron06/08/20214:58Iron Total ICAP/MSIronIronIronIronIronIron06/08/	06/08/2020 09:39	Metals digestion performed	d.	NO		Yes/No	
06/08/20214.28Ion Total ICAP0.280.3mg/L0.20206/08/20214.28Maganese Total ICAP0.0880.05mg/L0.02006/08/20209.39Metals digestion performed.NOYes/NoYes/NoD2000050433P206/10/20203.45Arsenic Total ICAP/MS2.610ug/L1.006/08/20214.27Ion Total ICAP0.0220.05mg/L0.02006/08/20214.27Kanganese Total ICAP0.0220.05mg/L0.02006/08/20214.27Maganese Total ICAP0.0220.05mg/L0.02006/08/20214.27Kanganese Total ICAP0.020.05mg/L0.02006/08/20214.38Arsenic Total ICAP/MS3.810ug/L1.006/08/20214.58Ion Total ICAP0.400.3mg/L0.02006/08/20214.58Ion Total ICAP0.400.3mg/L0.02006/08/20214.58Ion Total ICAP0.240.05mg/L0.02006/08/20214.58Ion Total ICAP/MS2.810ug/L1.006/08/20214.59Arsenic Total ICAP/MS2.810ug/L1.006/08/20214.59Ion Total ICAP/MS2.81.00.0200.02006/08/20214.59Ion Total ICAP/MS0.0200.3mg/L0.02006/08/20214.59Ion Total ICAP/MS0.0200		202006050432	<u>F1</u>				
06/08/202 14:28 Maganese Total ICAP 0.088 0.05 mg/a 0.020 06/08/202 03:39 Metals digestion performed. NO Yes/No Yes/No 06/08/202 03:45 Arsenic Total ICAP/MS 2.6 10 ug/L 1.0 06/08/202 14:27 Iron Total ICAP/MS 0.020 0.16 0.3 mg/L 0.020 06/08/202 14:27 Iron Total ICAP 0.020 0.022 0.05 mg/L 0.020 06/08/202 14:27 Maganese Total ICAP 0.020 0.022 0.05 mg/L 0.020 06/08/202 14:27 Maganese Total ICAP P Yes/No Yes/No Yes/No 06/08/202 03:48 Arsenic Total ICAP/MS 3.8 10 ug/L 1.0 06/08/202 14:58 Iron Total ICAP 0.40 0.36 mg/L 0.020 06/08/202 14:58 Iron Total ICAP 0.02 0.40 0.50 mg/L 0.020 06/08/202 14:58 Iron Total ICAP E Yes/No Yes/No Yes/No <td>06/10/2020 03:42</td> <td>Arsenic Total ICAP/MS</td> <td></td> <td>3.4</td> <td>10</td> <td>ug/L</td> <td>1.0</td>	06/10/2020 03:42	Arsenic Total ICAP/MS		3.4	10	ug/L	1.0
no no yes/No 06/08/2020 09:39 Media digestion performed. NO Yes/No 06/10/2020 03:45 Arsenic Total ICAP/MS 2.6 10 ug/L 1.0 06/08/2020 14:27 Iron Total ICAP 0.16 0.3 mg/L 0.020 06/08/202 14:27 Manganese Total ICAP 0.022 0.55 mg/L 0.020 06/08/202 14:27 Manganese Total ICAP 0.022 0.55 mg/L 0.020 06/08/202 14:27 Manganese Total ICAP 0.022 0.05 mg/L 0.020 06/08/202 03:48 Arsenic Total ICAP/MS 3.8 10 ug/L 1.0 06/08/202 14:58 Iron Total ICAP 0.40 0.3 mg/L 0.020 06/08/202 14:58 Manganese Total ICAP 0.40	06/08/2020 14:28	Iron Total ICAP		0.28	0.3	mg/L	0.020
bit bit 06/10/202 0.345 Arsenic Total ICAP/MS 2.6 10 ug/L 1.0 06/08/202 14.27 Icon Total ICAP 0.16 0.3 mg/L 0.020 06/08/202 14.27 Manganese Total ICAP 0.022 0.05 mg/L 0.020 06/08/202 14.27 Manganese Total ICAP 0.022 0.05 mg/L 0.020 06/08/202 0.39 Metals digestion performed. NO Yes/No Yes/No 06/08/202 0.348 Arsenic Total ICAP/MS 3.8 10 ug/L 1.0 06/08/202 0.348 Inon Total ICAP 0.404 0.30 mg/L 0.020 06/08/202 14.58 Ion Total ICAP 0.404 0.40 0.30 mg/L 0.020 06/08/202 14.58 Manganese Total ICAP 0.404 0.45 mg/L 0.020 06/09/202 19.39 Metals digestion performed. NO Yes/No Yes/No Yes/No 06/09	06/08/2020 14:28	Manganese Total ICAP		0.088	0.05	mg/L	0.0020
0610/2020 03:45 Arsenic Total ICAP/MS 2.6 10 ug/L 1.0 06/08/2020 14:27 Kon Total ICAP 0.16 0.3 mg/L 0.020 06/08/2020 14:27 Maganese Total ICAP 0.022 0.05 mg/L 0.020 06/08/2020 14:39 Metals digestion performance NO Yes/No Yes/No 06/08/2020 03:48 Arsenic Total ICAP/MS S.8 10 ug/L 1.0 06/08/2020 14:58 Ion Total ICAP/MS S.8 1.0 ug/L 0.020 06/08/2020 14:58 Ion Total ICAP/MS S.8 1.0 ug/L 0.020 06/08/2020 14:58 Ion Total ICAP/MS S.4 0.40 0.3 mg/L 0.020 06/08/2020 14:58 Maganese Total ICAP/MS NO Yes/No Yes/No Yes/No 06/08/2020 05:39 Metals digestion performance S.8 10 ug/L 1.0 06/08/2020 05:39 Metals digestion performance S.8 1.0 Ug/L 1.0 06/08/2020<	06/08/2020 09:39	Metals digestion performed	d.	NO		Yes/No	
06/08/202014:27Iron Total ICAP0.160.3 mg/L 0.02006/08/202014:27Manganese Total ICAP0.0220.05 mg/L 0.002006/08/202009:39Metals digestion performanceNOYes/NoYes/No 202006050434F1 06/10/202003:48Arsenic Total ICAP/MS3.810ug/L1.006/08/20214:58Iron Total ICAP0.220.240.35mg/L0.02006/08/202014:58Manganese Total ICAP/MS0.240.35mg/L0.0200.02006/08/202014:58Manganese Total ICAPDNOYes/NoYes/NoOfficial Gap/MS F2 Total ICAP0.240.16ug/L1.0Official Gap/MS F2 Total ICAP0.200.200.200.200.200.20Official ICAP/MS F2 Total ICAP0.200.200.200.200.200.20Official ICAP/MS F2 Total ICAP0.200.200.200.200.200.200.200.200.200.2006/10/20200.351Arsenic Total ICAP/MS F2 Total ICAP0.200.200.200.200.200.200.2006/08/202014:59Ion Total ICAP/MS F2 Total ICAP0.200.200.200.200.200.200.20Official ICAP/MS		202006050433	<u>F2</u>				
06/08/20214:27Manganese Total ICAP0.0220.05mg/L0.02006/08/20209:39Metals digestion performed.NONOYes/NoYes/NoD02006050434 $\underline{F1}$ 06/10/20203:48Arsenic Total ICAP/MS3.810ug/L1.006/08/20214:58Inon Total ICAP0.400.3mg/L0.02006/08/20214:58Manganese Total ICAP0.400.5mg/L0.02006/08/20214:58Manganese Total ICAP0.240.5mg/L0.02006/08/20209:39Metals digestion performed.NOYes/NoYes/NoYes/No06/08/20209:39Metals digestion performed.NOYes/NoYes/NoYes/No06/08/20219:39Metals digestion performed.NOYes/NoYes/NoYes/No06/08/20219:39Metals digestion performed.NOYes/NoYes/NoYes/No06/09/20219:39Metals digestion performed.2.810ug/L1.006/08/20214:59Iron Total ICAP2.90.200.3mg/L0.02006/08/20214:59Manganese Total ICAP0.0200.200.3mg/L0.02006/08/20214:59Manganese Total ICAPIron Total ICAP0.0200.05mg/L0.02006/08/20214:59Manganese Total ICAPIron Total ICAPIron Total ICAPIron Total ICAPIron Total ICAPIron Total	06/10/2020 03:45	Arsenic Total ICAP/MS		2.6	10	ug/L	1.0
06/08/20209:39Metal digestion performanceNOYes/No06/08/20203:48Arsenic Total ICAP/MS53001.006/08/20214:58Arong Total ICAP0.400.30.0200.02006/08/20214:59Maganese Total ICAP0.240.50.0200.02006/08/20214:59Maganese Total ICAP0.240.50.0200.02006/08/20214:59Maganese Total ICAP0.240.50.0200.02006/08/20203:51Arsenic Total ICAP/MSE10101006/08/20214:59Arsenic Total ICAP2.8100.120.20206/08/20214:59Ion Total ICAP2.020.2030.30.120.20206/08/20214:59Maganese Total ICAP0.2020.2030.0200.0200.02006/08/20214:59Ion Total ICAPI0.0200.0200.0200.02006/08/20214:59Maganese Total ICAPI0.0200.0200.02006/08/20214:59Maganese Total ICAPI0.0200.0200.02006/08/20214:59Maganese Total ICAPI0.0200.0200.02006/08/20214:59Maganese Total ICAPI0.0200.0200.02006/08/20214:59Maganese Total ICAPIIII06/08/20214:59Maganese Total ICAPIIII <t< td=""><td>06/08/2020 14:27</td><td>Iron Total ICAP</td><td></td><td>0.16</td><td>0.3</td><td>mg/L</td><td>0.020</td></t<>	06/08/2020 14:27	Iron Total ICAP		0.16	0.3	mg/L	0.020
202006050434 F1 06/10/2020 03:48 Arsenic Total ICAP/MS 3.8 10 ug/L 1.0 06/08/2020 14:58 Iron Total ICAP 0.40 0.30 mg/L 0.020 06/08/2020 14:58 Manganese Total ICAP 0.24 0.05 mg/L 0.020 06/08/2020 09:39 Metals digestion performed. NO Yes/No Yes/No 06/08/2020 09:39 Metals digestion performed. 2.8 10 ug/L 1.0 06/08/2020 03:51 Arsenic Total ICAP/MS 2.8 10 ug/L 1.0 06/08/2020 14:59 Iron Total ICAP 0.202 0.203 1.0 1.0 06/08/2020 14:59 Iron Total ICAP/MS 2.8 10 ug/L 1.0 06/08/2020 14:59 Iron Total ICAP 0.202 0.33 mg/L 0.202 06/08/2020 14:59 Manganese Total ICAP 0.202 0.203 0.35 mg/L 0.202	06/08/2020 14:27	Manganese Total ICAP		0.022	0.05	mg/L	0.0020
06/10/202 03:48 Arsenic Total ICAP/MS 3.8 10 ug/L 1.0 06/08/202 14:58 Iron Total ICAP 0.40 0.3 mg/L 0.020 06/08/202 14:58 Manganese Total ICAP 0.24 0.05 mg/L 0.020 06/08/202 09:39 Metals digestion performation NO Yes/No Yes/No Point Participant Provide Partipant Provide Participant Provide Participan	06/08/2020 09:39	Metals digestion performed	d.	NO		Yes/No	
06/08/202 14:58 Iron Total ICAP 0.40 0.3 mg/L 0.020 06/08/202 14:58 Manganese Total ICAP 0.24 0.05 mg/L 0.020 06/08/202 09:39 Metals digestion performed. NO Yes/No Yes/No 202006050435 F2 06/08/202 14:59 Iron Total ICAP/MS 2.8 10 ug/L 1.0 06/08/202 14:59 Iron Total ICAP 0.20 0.20 0.30 mg/L 0.020 06/08/202 14:59 Iron Total ICAP 0.20 0.20 0.30 mg/L 0.020 06/08/202 14:59 Iron Total ICAP 0.020 0.029 0.05 mg/L 0.020		202006050434	<u>F1</u>				
06/08/202 14:58 Manganese Total ICAP 0.24 0.05 mg/L 0.0020 06/08/202 09:39 Metals digestion performed. NO Yes/No Yes/No 202006050435 <u>F2</u> 06/08/202 14:59 Arsenic Total ICAP/MS 2.8 10 ug/L 1.0 06/08/202 14:59 Iron Total ICAP 0.20 0.33 mg/L 0.020 06/08/202 14:59 Manganese Total ICAP 0.20 0.29 0.35 mg/L 0.020	06/10/2020 03:48	Arsenic Total ICAP/MS		3.8	10	ug/L	1.0
O6/08/2020 O9:39 Metals digestion performed. NO Yes/No 202006050435 F2 06/10/2020 03:51 Arsenic Total ICAP/MS 2.8 10 ug/L 1.0 06/08/2020 14:59 Iron Total ICAP 0.20 0.3 mg/L 0.020 06/08/2020 14:59 Manganese Total ICAP 0.029 0.05 mg/L 0.0020	06/08/2020 14:58	Iron Total ICAP		0.40	0.3	mg/L	0.020
202006050435 F2 06/10/2020 03:51 Arsenic Total ICAP/MS 2.8 10 ug/L 1.0 06/08/2020 14:59 Iron Total ICAP 0.20 0.3 mg/L 0.020 06/08/2020 14:59 Manganese Total ICAP 0.029 0.05 mg/L 0.020	06/08/2020 14:58	Manganese Total ICAP		0.24	0.05	mg/L	0.0020
06/10/2020 03:51 Arsenic Total ICAP/MS 2.8 10 ug/L 1.0 06/08/2020 14:59 Iron Total ICAP 0.20 0.30 mg/L 0.20 06/08/2020 14:59 Manganese Total ICAP 0.029 0.05 mg/L 0.020	06/08/2020 09:39	Metals digestion performed	d.	NO		Yes/No	
06/08/2020 14:59 Iron Total ICAP 0.20 0.3 mg/L 0.020 06/08/2020 14:59 Manganese Total ICAP 0.029 0.05 mg/L 0.0020		202006050435	<u>F2</u>				
06/08/2020 14:59 Manganese Total ICAP 0.029 0.05 mg/L 0.0020	06/10/2020 03:51	Arsenic Total ICAP/MS		2.8	10	ug/L	1.0
	06/08/2020 14:59	Iron Total ICAP		0.20	0.3	mg/L	0.020
06/08/2020 09:39 Metals digestion performed. NO Yes/No	06/08/2020 14:59	Manganese Total ICAP		0.029	0.05	mg/L	0.0020
	06/08/2020 09:39	Metals digestion performed	d.	NO		Yes/No	



Laboratory Hits

Samples Received on:

06/05/2020 1616

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

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David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024 Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

Analyzed	Analyte	Sample ID	Result	Federal MCL	Units	MRL
	202006050436	RAW				
06/10/2020 03:54	Arsenic Total ICAP/MS		5.0	10	ug/L	1.0
6/08/2020 14:49	Iron Total ICAP		0.90	0.3	mg/L	0.020
6/08/2020 14:49	Manganese Total ICAP		0.95	0.05	mg/L	0.0020
6/08/2020 09:39	Metals digestion perform	ed.	NO		Yes/No	
	202006050437	<u>F1</u>				
6/10/2020 03:57	Arsenic Total ICAP/MS		3.0	10	ug/L	1.0
06/08/2020 14:29	Manganese Total ICAP		0.15	0.05	mg/L	0.0020
6/08/2020 09:39	Metals digestion perform	ed.	NO		Yes/No	
	202006050438	<u>F2</u>				
06/11/2020 23:09	Arsenic Total ICAP/MS		2.0	10	ug/L	1.0
06/08/2020 14:36	Manganese Total ICAP		0.0089	0.05	mg/L	0.0020
06/08/2020 09:39	Metals digestion perform	ed.	NO		Yes/No	
	202006050439	<u>F1</u>				
6/08/2020 15:01	Manganese Total ICAP		0.34	0.05	mg/L	0.0020
6/08/2020 09:39	Metals digestion perform	ed.	NO		Yes/No	
	202006050440	<u>F2</u>				
6/08/2020 15:00	Manganese Total ICAP		0.0032	0.05	mg/L	0.0020
6/08/2020 09:39	Metals digestion perform	ed.	NO		Yes/No	
	202006050441	<u>F1</u>				
06/11/2020 23:30	Arsenic Total ICAP/MS		3.8	10	ug/L	1.0
6/09/2020 12:18	Iron Total ICAP		0.40	0.3	mg/L	0.020
06/09/2020 12:18	Manganese Total ICAP		0.49	0.05	mg/L	0.0020
6/08/2020 09:39	Metals digestion perform	ed.	NO		Yes/No	
	202006050442	<u>F2</u>				
06/11/2020 23:51	Arsenic Total ICAP/MS		3.5	10	ug/L	1.0
06/09/2020 12:19	Iron Total ICAP		0.16	0.3	mg/L	0.020
06/09/2020 12:19	Manganese Total ICAP		0.022	0.05	mg/L	0.0020
6/08/2020 09:39	Metals digestion perform	ed.	NO		Yes/No	
	202006080150	<u>F1 backwash - bucket (Total)</u>				
6/12/2020 15:57	Arsenic Total ICAP/MS		56	10	ug/L	1.0
6/15/2020 14:10	Iron Total ICAP		20	0.3	mg/L	0.20
06/15/2020 13:52	Manganese Total ICAP		3.1	0.05	mg/L	0.0020
06/11/2020 09:58	Metals digestion perform	ed	YES		Yes/No	



Laboratory Hits

Samples Received on:

06/05/2020 1616

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Analyzed	Analyte	Sample ID	Result	Federal MCL	Units	MRL
	202006080151	<u>F1 backwash - bucket (Dissolve</u>	<u>ed)</u>			
06/15/2020 18:06	Arsenic dissolved ICAP	/MS	3.8		ug/L	1.0
06/13/2020 12:49	Iron Dissolved ICAP		0.11		mg/L	0.020
06/13/2020 12:49	Manganese Dissolved I	CAP	0.83		mg/L	0.0020
06/10/2020 09:22	Metals digestion perform	ned.	NO		Yes/No	
	202006080152	<u>F2 backwash - bucket (Total)</u>				
06/12/2020 15:59	Arsenic Total ICAP/MS		73	10	ug/L	1.0
06/15/2020 14:11	Iron Total ICAP		27	0.3	mg/L	0.20
06/15/2020 13:53	Manganese Total ICAP		6.1	0.05	mg/L	0.0020
06/11/2020 09:58	Metals digestion perform	ned.	YES		Yes/No	
	202006080153	F2 backwash - bucket (Dissolve	<u>ed)</u>			
06/15/2020 18:08	Arsenic dissolved ICAP	MS	4.0		ug/L	1.0
06/13/2020 12:52	Iron Dissolved ICAP		0.12		mg/L	0.020
06/13/2020 12:52	Manganese Dissolved I	CAP	0.39		mg/L	0.0020
06/10/2020 09:22	Metals digestion perform	med.	NO		Yes/No	



Laboratory Data

Samples Received on:

06/05/2020 1616

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant

Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
RAW (2	02006050429)				Sam	oled on 06/02/2	2020 093	0
		EDA 200 9	- ICPMS Metals						
06/08/20	06/11/20 23:15	1253632	1254476	(EPA 200.8)	Arsenic Total ICAP/MS	5.8	ug/L	1.0	1
		EPA 200 P	rep - Metals dig	. ,	ned.		Ū.		
	06/08/20 09:39		1253642	(EPA 200 Prep)	Metals digestion performed.	NO	Yes/No		1
		EPA 200.7	- ICP Metals						
06/08/20	06/08/20 15:02	1253632	1253707	(EPA 200.7)	Iron Total ICAP	0.92	mg/L	0.020	1
06/08/20	06/08/20 15:02	1253632	1253707	(EPA 200.7)	Manganese Total ICAP	0.94	mg/L	0.0020	1
<u>F1 (202</u>	<u>006050430)</u>					Sam	oled on 06/02/	2020 093	D
06/08/20	06/11/20 23:18	1253632	 ICPMS Metals 1254476 	(EPA 200.8)	Arsenic Total ICAP/MS	2.7	ug/L	1.0	1
00,00,20	00/11/20 20:10		rep - Metals dig	. ,		_ .,	ug, L	1.0	
	06/08/20 09:39		1253642	(EPA 200 Prep)	Metals digestion performed.	NO	Yes/No		1
		EPA 200.7	- ICP Metals						
06/08/20	06/09/20 12:16	1253632	1253893	(EPA 200.7)	Iron Total ICAP	ND	mg/L	0.020	1
06/08/20	06/09/20 12:16	1253632	1253893	(EPA 200.7)	Manganese Total ICAP	0.0033	mg/L	0.0020	1
F2 (202	<u>006050431)</u>					Sam	oled on 06/02/2	2020 093	D
00/00/00			- ICPMS Metals						
06/08/20	06/11/20 23:21	1253632	1254476	(EPA 200.8)	Arsenic Total ICAP/MS	2.2	ug/L	1.0	1
	06/08/20 09:39	EPA 200 PI	rep - Metals dig 1253642	(EPA 200 Prep)	Metals digestion performed.	NO	Yes/No		1
	00/00/20 09.39	EDA 200 7	- ICP Metals	(EFA 200 Flep)	Metals digestion performed.	NO	163/110		I
06/08/20	06/09/20 12:17	1253632	1253893	(EPA 200.7)	Iron Total ICAP	0.020	mg/L	0.020	1
06/08/20	06/09/20 12:17	1253632	1253893	(EPA 200.7)	Manganese Total ICAP	0.012	mg/L	0.0020	1
F1 (202	006050432)				0	Sami	oled on 06/02/2	2020 153	n
<u> (= • = </u>	<u>,</u>					Cam			-
		EPA 200.8	- ICPMS Metals						
06/08/20	06/10/20 03:42	1253632	1254057	(EPA 200.8)	Arsenic Total ICAP/MS	3.4	ug/L	1.0	1
		EPA 200 P	rep - Metals dig	•					
	06/08/20 09:39		1253642	(EPA 200 Prep)	Metals digestion performed.	NO	Yes/No		1
06/08/00	06/09/20 14-20		- ICP Metals		Iron Total ICAD	0.28	ma/l	0.000	1
06/08/20	06/08/20 14:28 06/08/20 14:28	1253632 1253632	1253649 1253649	(EPA 200.7)	Iron Total ICAP	0.28 0.088	mg/L	0.020 0.0020	-
		1200032	1200049	(EPA 200.7)	Manganese Total ICAP		mg/L		
F2 (202	<u>006050433)</u>					Sam	oled on 06/02/	2020 153	U

Rounding on totals after summation.

(c) - indicates calculated results. Analysis is a calculated result. Reported results are not rounded until the final step before reporting. Therefore methods that use a test result with further calculation may have slight differences in final result than the component analyses.

EPA 200.8 - ICPMS Metals



Laboratory Data

Samples Received on:

06/05/2020 1616

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Prepped Analyzed Prep Batch Analytical Batch Method Analyte Result Units MRL Dilution Arsenic Total ICAP/MS 06/08/20 06/10/20 03:45 1253632 1254057 (EPA 200.8) 2.6 1.0 1 ug/L EPA 200 Prep - Metals digestion performed. 06/08/20 09:39 1253642 Metals digestion performed. NO Yes/No (EPA 200 Prep) 1 EPA 200.7 - ICP Metals 1253632 0.16 0.020 06/08/20 06/08/20 14.27 1253649 Iron Total ICAP (EPA 200.7) mg/L 1 06/08/20 06/08/20 14:27 1253632 1253649 Manganese Total ICAP 0.022 0.0020 (EPA 200.7) ma/L 1 F1 (202006050434) Sampled on 06/02/2020 1730 EPA 200.8 - ICPMS Metals 1254057 Arsenic Total ICAP/MS 06/08/20 06/10/20 03:48 1253860 (EPA 200.8) 3.8 ug/L 1.0 1 EPA 200 Prep - Metals digestion performed. 06/08/20 09:39 1253642 (EPA 200 Prep) Metals digestion performed. NO Yes/No 1 EPA 200.7 - ICP Metals 06/08/20 06/08/20 14:58 1253707 Iron Total ICAP 0.40 1253860 (EPA 200.7) mg/L 0.020 1 06/08/20 06/08/20 14:58 1253860 1253707 (EPA 200.7) Manganese Total ICAP 0.24 mg/L 0.0020 1 F2 (202006050435) Sampled on 06/02/2020 1730 EPA 200.8 - ICPMS Metals 06/08/20 06/10/20 03:51 1253860 1254057 (EPA 200.8) Arsenic Total ICAP/MS 2.8 ug/L 1.0 1 EPA 200 Prep - Metals digestion performed. 06/08/20 09:39 1253642 NO (EPA 200 Prep) Metals digestion performed. Yes/No 1 EPA 200.7 - ICP Metals 06/08/20 06/08/20 14:59 1253860 1253707 (EPA 200.7) Iron Total ICAP 0.20 mg/L 0.020 1 06/08/20 06/08/20 14:59 1253860 1253707 0.029 0.0020 (EPA 200.7) Manganese Total ICAP mg/L 1 Sampled on 06/03/2020 0645 RAW (202006050436) EPA 200.8 - ICPMS Metals 06/08/20 06/10/20 03:54 1253632 1254057 Arsenic Total ICAP/MS 1.0 (EPA 200.8) 5.0 ug/L 1 EPA 200 Prep - Metals digestion performed. 06/08/20 09:39 1253642 NO (EPA 200 Prep) Metals digestion performed. Yes/No 1 EPA 200.7 - ICP Metals 06/08/20 06/08/20 14:49 1253632 1253707 (EPA 200.7) Iron Total ICAP 0.90 mg/L 0.020 1 1253707 0.95 06/08/20 06/08/20 14:49 1253632 (EPA 200.7) Manganese Total ICAP mg/L 0.0020 1 F1 (202006050437) Sampled on 06/03/2020 0645 EPA 200.8 - ICPMS Metals 06/08/20 06/10/20 03:57 1253632 1254057 (EPA 200.8) Arsenic Total ICAP/MS 3.0 ug/L 1.0 1 EPA 200 Prep - Metals digestion performed. 06/08/20 09:39 1253642 (EPA 200 Prep) Metals digestion performed. NO Yes/No 1 Rounding on totals after summation

(c) - indicates calculated results. Analysis is a calculated result. Reported results are not rounded until the final step before reporting. Therefore methods that use a test result with further calculation may have slight differences in final result than the component analyses.



Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

Samples Received on:

06/05/2020 1616

Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant Tom Arellano 1966 Olivenhain Rd. Encinitas. CA 92024

Prepped Analyzed Prep Batch Analytical Batch Method Analyte Result Units MRL Dilution EPA 200.7 - ICP Metals 06/08/20 06/08/20 14:29 1253632 1253649 Iron Total ICAP ND 0 0 2 0 (EPA 200.7) mg/L 1 1253632 1253649 (EPA 200.7) Manganese Total ICAP 0.15 mg/L 0.0020 06/08/20 06/08/20 14:29 1 F2 (202006050438) Sampled on 06/03/2020 0645 EPA 200.8 - ICPMS Metals 06/08/20 06/11/20 23:09 1253632 1254476 (EPA 200.8) Arsenic Total ICAP/MS 2.0 ug/L 1.0 1 EPA 200 Prep - Metals digestion performed. 06/08/20 09:39 1253642 (EPA 200 Prep) Metals digestion performed. NO Yes/No 1 EPA 200.7 - ICP Metals 06/08/20 06/08/20 14:36 1253632 1253707 (EPA 200.7) Iron Total ICAP ND mg/L 0.020 1 06/08/20 06/08/20 14:36 1253632 1253707 (EPA 200.7) Manganese Total ICAP 0.0089 0.0020 mg/L 1 F1 (202006050439) Sampled on 06/03/2020 1400 EPA 200.8 - ICPMS Metals 06/08/20 06/11/20 23:24 1253632 1254476 (EPA 200.8) Arsenic Total ICAP/MS ND (D1) ug/L 5.0 5 EPA 200 Prep - Metals digestion performed. 06/08/20 09:39 1253642 NO (EPA 200 Prep) Metals digestion performed. Yes/No 1 EPA 200.7 - ICP Metals 06/08/20 06/08/20 15:01 1253632 1253707 (EPA 200.7) Iron Total ICAP ND mg/L 0.020 1 06/08/20 06/08/20 15:01 1253632 1253707 Manganese Total ICAP 0.34 (EPA 200.7) mg/L 0.0020 1 F2 (202006050440) Sampled on 06/03/2020 1400 EPA 200.8 - ICPMS Metals 06/11/20 23:27 Arsenic Total ICAP/MS 1253632 1254476 (EPA 200.8) ND (D1) ug/L 5.0 5 EPA 200 Prep - Metals digestion performed. 06/08/20 09:39 1253642 NO (EPA 200 Prep) Metals digestion performed. Yes/No 1 EPA 200.7 - ICP Metals 06/08/20 15:00 1253632 1253707 (EPA 200.7) Iron Total ICAP ND mg/L 0.020 1 06/08/20 15:00 1253632 1253707 (EPA 200.7) Manganese Total ICAP 0.0032 mg/L 0.0020 1 F1 (202006050441) Sampled on 06/03/2020 1800 EPA 200.8 - ICPMS Metals 06/08/20 06/11/20 23:30 1253632 1254476 (EPA 200.8) Arsenic Total ICAP/MS 3.8 ug/L 1.0 1 EPA 200 Prep - Metals digestion performed. 06/08/20 09:39 1253642 (EPA 200 Prep) Metals digestion performed. NO Yes/No 1 EPA 200.7 - ICP Metals 06/08/20 06/09/20 12:18 1253632 1253893 (EPA 200.7) Iron Total ICAP 0.40 mg/L 0.020 1

Rounding on totals after summation.

(c) - indicates calculated results. Analysis is a calculated result. Reported results are not rounded until the final step before reporting. Therefore methods that use a test result with further calculation may have slight differences in final result than the component analyses.



Laboratory Data

Samples Received on:

06/05/2020 1616

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant Tom Arellano 1966 Olivenhain Rd.

Encinitas, CA 92024

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
06/08/20	06/09/20 12:18	1253632	1253893	(EPA 200.7)	Manganese Total ICAP	0.49	mg/L	0.0020	1
<u>F2 (2020</u>	<u>006050442)</u>					Sam	pled on 06/03/	2020 180	0
		EPA 200.8	- ICPMS Metals	5					
06/08/20	06/11/20 23:51	1253632	1254477	(EPA 200.8)	Arsenic Total ICAP/MS	3.5	ug/L	1.0	1
		EPA 200 P	rep - Metals dig	jestion perform	ned.				
	06/08/20 09:39		1253642	(EPA 200 Prep)	Metals digestion performed.	NO	Yes/No		1
		EPA 200.7	- ICP Metals						
06/08/20	06/09/20 12:19	1253632	1253893	(EPA 200.7)	Iron Total ICAP	0.16	mg/L	0.020	1
06/08/20	06/09/20 12:19	1253632	1253893	(EPA 200.7)	Manganese Total ICAP	0.022	mg/L	0.0020	1
F1 back	wash - buck	et (Total) (2	<u>02006080150)</u>			Sam	pled on 06/02/2	2020 173	0
		EPA 200.8	- ICPMS Metals	6					
06/10/20	06/12/20 15:57	1254360	1254545	(EPA 200.8)	Arsenic Total ICAP/MS	56	ug/L	1.0	1
		EPA 200 P	rep - Metals dig	gestion perform	ned.				
	06/11/20 09:58		1254548	(EPA 200 Prep)	Metals digestion performed.	YES	Yes/No		1
		EPA 200.7	- ICP Metals						
06/10/20	06/15/20 14:10	1254360	1255267	(EPA 200.7)	Iron Total ICAP	20	mg/L	0.20	10
06/10/20	06/15/20 13:52	1254360	1255267	(EPA 200.7)	Manganese Total ICAP	3.1	mg/L	0.0020	1
F1 back	wash - buck	et (Dissolve	ed) (202006080 ⁻	<u>151)</u>		Sam	pled on 06/02/2	2020 173	0
		EPA 200 8	- ICPMS Metals	2					
06/10/20	06/15/20 18:06	1254202	1255354	(EPA 200.8)	Arsenic dissolved ICAP/MS	3.8	ug/L	1.0	1
		EPA 200 P	rep - Metals dig	. ,	ned.		Ū.		
	06/10/20 09:22		1254840	(EPA 200 Prep)	Metals digestion performed.	NO	Yes/No		1
		EPA 200.7	- ICP Metals						
06/10/20	06/13/20 12:49	1254202	1255060	(EPA 200.7)	Iron Dissolved ICAP	0.11	mg/L	0.020	1
06/10/20	06/13/20 12:49	1254202	1255060	(EPA 200.7)	Manganese Dissolved ICAP	0.83	mg/L	0.0020	1
F2 back	wash - buck	et (Total) (2	<u>02006080152)</u>			Sam	pled on 06/02/	2020 173	0
		EPA 200.8	- ICPMS Metals						
06/10/20	06/12/20 15:59		1254545	(EPA 200.8)	Arsenic Total ICAP/MS	73	ug/L	1.0	1
		EPA 200 P	rep - Metals dig	estion perform	ned.				
	06/11/20 09:58		1254548	(EPA 200 Prep)	Metals digestion performed.	YES	Yes/No		1
		EPA 200.7	- ICP Metals						
06/10/20	06/15/20 14:11	1254360	1255267	(EPA 200.7)	Iron Total ICAP	27	mg/L	0.20	10
06/10/20	06/15/20 13:53	1254360	1255267	(EPA 200.7)	Manganese Total ICAP	6.1	mg/L	0.0020	1
F2 back	wash - buck	et (Dissolve	ed) (202006080 ⁻	<u>153)</u>		Sam	pled on 06/02/	2020 173	0

Rounding on totals after summation.

(c) - indicates calculated results. Analysis is a calculated result. Reported results are not rounded until the final step before reporting. Therefore methods that use a test result with further calculation may have slight differences in final result than the component analyses.



Laboratory Data

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227) Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant Tom Arellano 1966 Olivenhain Rd. Encinitas, CA 92024

Samples Received on: 06/05/2020 1616

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
		EPA 200.8	- ICPMS Metals	3					
06/10/20	06/15/20 18:08	1254202	1255354	(EPA 200.8)	Arsenic dissolved ICAP/MS	4.0	ug/L	1.0	1
		EPA 200 Pr	rep - Metals dig	gestion perform	ied.				
	06/10/20 09:22		1254840	(EPA 200 Prep)	Metals digestion performed.	NO	Yes/No		1
		EPA 200.7	- ICP Metals						
06/10/20	06/13/20 12:52	1254202	1255060	(EPA 200.7)	Iron Dissolved ICAP	0.12	mg/L	0.020	1
06/10/20	06/13/20 12:52	1254202	1255060	(EPA 200.7)	Manganese Dissolved ICAP	0.39	mg/L	0.0020	1
06/10/20	06/13/20 12:52	1254202	1255060	(EPA 200.7)	Manganese Dissolved ICAP	0.39	mg/L	0.0020	1



Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

David C. McCollum Water Treatment Plant

etals digestion performed.	
Analytical Batch: 1253642	Analysis Date: 06/08/2020
202006050429 RAW	Analyzed by: YP3Q
202006050430 F1	Analyzed by: YP3Q
202006050431 F2	Analyzed by: YP3Q
202006050432 F1	Analyzed by: YP3Q
202006050433 F2	Analyzed by: YP3Q
202006050434 F1	Analyzed by: YP3Q
202006050435 F2	Analyzed by: YP3Q
202006050436 RAW	Analyzed by: YP3Q
202006050437 F1	Analyzed by: YP3Q
202006050438 F2	Analyzed by: YP3Q
202006050439 F1	Analyzed by: YP3Q
202006050440 F2	Analyzed by: YP3Q
202006050441 F1	Analyzed by: YP3Q
202006050442 F2	Analyzed by: YP3Q
P Metals	
Prep Batch: 1253632 Analytical Batch: 1253649	Analysis Date: 06/08/2020
202006050432 F1	Analyzed by: NINA
202006050433 F2	Analyzed by: NINA
202006050437 F1	Analyzed by: NINA
P Metals	
Prep Batch: 1253632 Analytical Batch: 1253707	Analysis Date: 06/08/2020
202006050429 RAW	Analyzed by: NINA
202006050434 F1	Analyzed by: NINA
202006050435 F2	Analyzed by: NINA
202006050436 RAW	Analyzed by: NINA
202006050438 F2	Analyzed by: NINA
202006050439 F1	Analyzed by: NINA
202006050440 F2	Analyzed by: NINA
P Metals	
Prep Batch: 1253632 Analytical Batch: 1253893	Analysis Date: 06/09/2020
202006050430 F1	Analyzed by: NINA
202006050431 F2	Analyzed by: NINA
202006050441 F1	Analyzed by: NINA
202006050442 F2	Analyzed by: NINA
PMS Metals	
Prep Batch: 1253632 Analytical Batch: 1254057	Analysis Date: 06/10/2020
202006050432 F1	Analyzed by: AZS
202006050433 F2	Analyzed by: AZS
202006050434 F1	Analyzed by: AZS
202006050435 F2	Analyzed by: AZS
202006050436 RAW	Analyzed by: AZS
202006050437 F1	Analyzed by: AZS

Laboratory QC Summary

Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test



Eaton Analytical

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

David C. McCollum Water Treatment Plant

ICPMS Metals

Prep Batch: 1253632 A	Analytical Batch: 1254476	Analysis Date: 06/11/2020
202006050429	RAW	Analyzed by: AZS
202006050430	F1	Analyzed by: AZS
202006050431	F2	Analyzed by: AZS
202006050438	F2	Analyzed by: AZS
202006050439	F1	Analyzed by: AZS
202006050440	F2	Analyzed by: AZS
202006050441	F1	Analyzed by: AZS
ICPMS Metals		
-	Analytical Batch: 1254477	Analysis Date: 06/11/2020
202006050442	F2	Analyzed by: AZS
ICPMS Metals		
Prep Batch: 1254360 A	Analytical Batch: 1254545	Analysis Date: 06/12/2020
202006080150	F1 backwash - bucket (Total)	Analyzed by: DHX7
202006080152	F2 backwash - bucket (Total)	Analyzed by: DHX7
Metals digestion performed		
Analytical Batch: 12545	548	Analysis Date: 06/11/2020
202006080150	F1 backwash - bucket (Total)	Analyzed by: YP3Q
202006080152	F2 backwash - bucket (Total)	Analyzed by: YP3Q
Metals digestion performed		
Analytical Batch: 12548	40	Analysis Date: 06/10/2020
202006080151	F1 backwash - bucket (Dissolved)	Analyzed by: YP3Q
202006080153	F2 backwash - bucket (Dissolved)	Analyzed by: YP3Q
ICP Metals		
Prep Batch: 1254202 A	Analytical Batch: 1255060	Analysis Date: 06/13/2020
202006080151	F1 backwash - bucket (Dissolved)	Analyzed by: NINA
202006080153	F2 backwash - bucket (Dissolved)	Analyzed by: NINA
ICP Metals		
Prep Batch: 1254360 A	Analytical Batch: 1255267	Analysis Date: 06/15/2020
202006080150	F1 backwash - bucket (Total)	Analyzed by: NINA
202006080152	F2 backwash - bucket (Total)	Analyzed by: NINA
ICPMS Metals	· · ·	
Prep Batch: 1254202 A	Analytical Batch: 1255354	Analysis Date: 06/15/2020
202006080151	F1 backwash - bucket (Dissolved)	Analyzed by: DHX7
202006080153	F2 backwash - bucket (Dissolved)	Analyzed by: DHX7

Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test



Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant

ICP Metals by EV-LVShafted is a specific of the specific of t	QC Type	Analyte	Native	Spiked	Recovered	Units	Yield(%)	Limits (%)	RPD Limit(%)	RPD%
LCS1 Ion Total ICAP 5 5 5 6 6 101 68-15 6 LGS2 Ion Total ICAP 5 5 6 mgL 101 68-15 20 12 MEL, CHK Ion Total ICAP 0.02 0.010 mgL 99 (70-130) 20 0.10 MS2_20206040244 Ion Total ICAP 0.026 5 5.01 mgL 101 (70-130) 20 0.80 MS2_20206040244 Ion Total ICAP 0.026 5 5.01 mgL 101 (70-130) 20 0.80 MS2_20206040244 Ion Total ICAP 0.026 5 5.01 mgL 101 (85-15) 20 0.80 MS2_2020640244 Manganese Total ICAP 0.02 2014 mgL 101 (85-15) 20 0.91 MS2_2020640244 Manganese Total ICAP 0.05 2 20 mgL mgL 101 (70-13) 20 20 MS2_2020640244 M	ICP Metals by EPA	A 200.7								
LG22Ion Total ICAP5660mpl10110110101010MRL, GH4Ion Total ICAP0.0250.09mgl90(70-13)1MS2,020060024Ion Total ICAP0.0255.12mgl0.01(70-13)20130MS2,020060024Ion Total ICAP0.0255.02mgl0.01(70-13)20130MS2,020060024Ion Total ICAP0.0255.02mgl0.01(70-13)20130LG2Magnese Total ICAP0.0222.03mgl0.01(70-13)20130LG2Magnese Total ICAP0.022.01mgl101(8-115)10101MS2,020060424Magnese Total ICAP0.022.02mgl101(8-115)10101MS2,020060424Magnese Total ICAP0.022.02mgl101(9-13)2012MS2,020060424Magnese Total ICAP0.0422.04mgl101(9-13)2012MS2,020060424Magnese Total ICAP0.0422.01mgl101(9-13)2012MS2,020060424Magnese Total ICAP0.0422.02mgl101(8-115)212MS2,020060424Magnese Total ICAP0.0422.02mgl101(8-115)212MS2,020060424Magnese Total ICAP00.0210 <t< td=""><td>Analytical B</td><td>atch: 1253649</td><td></td><td></td><td></td><td></td><td>Analysis D</td><td>ate: 06/08/</td><td>2020</td><td></td></t<>	Analytical B	atch: 1253649					Analysis D	ate: 06/08/	2020	
MBLCM MRL_CHMIon Total ICAP-0.020.0199mg/L9.9(50-15)MS_202006040244Ion Total ICAP0.02654.96mg/L9.9(70-130)2.00.89MS2_202006040244Ion Total ICAP0.02655.01mg/L(70-130)2.00.89MSD_202006040244Ion Total ICAP0.02655.01mg/L(70-130)2.00.89MSD_202006040244Ion Total ICAP0.02655.02mg/L(70-130)2.00.89MSD_202006040244Ion Total ICAP0.02655.02mg/L(85-115)2.00.91LCS1Manganese Total ICAP0.0520.0140mg/L(85-115)2.00.91MRL_CHKManganese Total ICAP0.04520.0140mg/L(70-130)2.00.91MS_202006040244Manganese Total ICAP0.04520.0140mg/L(70-130)2.00.71MS_202006040244Manganese Total ICAP0.0392.00.0140mg/L(70-130)2.00.71MS_202006040244Manganese Total ICAP0.0392.00.0140mg/L(70-130)2.00.71MS_202006040244Manganese Total ICAP0.0392.00.0140mg/L(70-130)2.00.71MS_202006060434Manganese Total ICAP0.04520.020mg/L1.01(85-15)1.01MS_202006060434Ion Disolved ICAP00.02	LCS1	Iron Total ICAP		5	5.12	mg/L	102	(85-115)		
MR_CHK MS_20200640244Ino Total ICAP0.0280.0280.0390.0310.03 </td <td>LCS2</td> <td>Iron Total ICAP</td> <td></td> <td>5</td> <td>5.06</td> <td>mg/L</td> <td>101</td> <td>(85-115)</td> <td>20</td> <td>1.2</td>	LCS2	Iron Total ICAP		5	5.06	mg/L	101	(85-115)	20	1.2
Name SubscriptionNom Construction <th< td=""><td>MBLK</td><td>Iron Total ICAP</td><td></td><td></td><td><0.01</td><td>mg/L</td><td></td><td></td><td></td><td></td></th<>	MBLK	Iron Total ICAP			<0.01	mg/L				
MS2_202006040244Iron Total ICAP0.00555.12mgL101(70-130)2.00.83MSD_202006040244Iron Total ICAP0.00555.01mgL0.99(70-130)2.00.91MSD_202006040244Iron Total ICAP0.05522.03mgL0.91(85-115)2.00.91LCS1Manganese Total ICAP22.01mgL0.91(85-115)2.00.91MRLManganese Total ICAP0.022.010mgL0.93(7.0130)2.00.91MS2_202006040244Manganese Total ICAP0.0322.02mgL0.01(7.0130)2.00.73MS2_202006040244Manganese Total ICAP0.0322.04mgL0.01(7.0130)2.00.73MS2_202006040244Manganese Total ICAP0.0322.04mgL0.01(7.0130)2.00.73MS2_202006040244Manganese Total ICAP0.0322.01mgL0.01(7.0130)2.00.75MS2_202006040244Manganese Total ICAP0.0322.01mgL0.01(8.0130)2.00.75MS2_202006040244Manganese Total ICAP0.0325.03mgL0.01(8.0130)2.00.75MS2_202006040244Manganese Total ICAP0.0355.03mgL0.01(8.0130)1.01(8.0130)1.01MS2_202006040244Ino Dissolved ICAP10.020.02<	MRL_CHK	Iron Total ICAP		0.02	0.0199	mg/L	99	(50-150)		
MSD_202006040244Iron Total ICAP0.02655.01mg/L100(70.130)2.00.39MSD_202006040243Iron Total ICAP0.0555.02mg/L0.99(70.130)2.01.9LCS1Manganese Total ICAP22.01mg/L101(85.115)MSLManganese Total ICAP.2.001mg/L101(85.115)MRL_CHKMaganese Total ICAP.0.020.0146mg/L9.9(70.130)MS_202006040244Maganese Total ICAP0.0452.00.0146mg/L9.9(70.130)	MS_202006040244	Iron Total ICAP	0.026	5	4.96	mg/L	99	(70-130)		
MSD2_202006040243Iron Total ICAP0,05556990(0.10)900.1090900.1090 <td>MS2_202006040248</td> <td>Iron Total ICAP</td> <td>0.055</td> <td>5</td> <td>5.12</td> <td>mg/L</td> <td>101</td> <td>(70-130)</td> <td></td> <td></td>	MS2_202006040248	Iron Total ICAP	0.055	5	5.12	mg/L	101	(70-130)		
LCSManganese Total ICAP22.03m/L101(85-115)2.00.99MELKManganese Total ICAP22.01mg/L101(85-115)2.00.99MELManganese Total ICAP0.0020.001mg/L7.3(50-150)1.0MS_20200604024Manganese Total ICAP0.0042.0mg/L101(70-130)1.0MS_20200604024Manganese Total ICAP0.0042.02.04mg/L100(70-130)2.00.75MS2_20200604024Manganese Total ICAP0.0452.02.04mg/L100(70-130)2.00.75MS2_20200604024Manganese Total ICAP0.0452.02.04mg/L100(70-130)2.00.75MS2_20200604024Manganese Total ICAP0.0452.02.01mg/L100(70-130)2.00.75MS2_20200604024Manganese Total ICAP0.0392.05.07mg/L101(85-115)2.00.75MS2_20200604024Inon Dissolved ICAP5.05.07mg/L101(85-115)2.00.75MS2_20200605438Inon Dissolved ICAP0.025.05.78mg/L100(70-130)2.00.75MS2_20200605438Inon Dissolved ICAP0.05.05.78mg/L101(85-115)0.00.00.00.0MS2_20200605438Inon Dissolved ICAP0.05.05.78mg/L101(85-115)	MSD_202006040244	Iron Total ICAP	0.026	5	5.01	mg/L	100	(70-130)	20	0.89
LCS2Marganeses Total ICAP22.01mg/L101(85-17)2.00.99MBLKMarganeses Total ICAP0.0020.00146mg/L7.3(50-150)-MS_202006040244Marganeses Total ICAP0.0022.02mg/L9.01(70-130)-MS2_20206040244Marganeses Total ICAP0.00322.04mg/L100(70-130)2.00.75MS2_20206040244Marganeses Total ICAP0.03922.01mg/L9.8(70-130)2.00.75MS2_20206040244Marganeses Total ICAP0.03922.01mg/L100(70-130)2.00.75MS2_20206040244Marganeses Total ICAP0.03922.01mg/L100(70-130)2.00.75MS2_20206040244Marganeses Total ICAP0.03922.01mg/L101(85-15)2.00.75MS2_20206040244Iron Dissolved ICAP55.07mg/L101(85-15)2.00.75MS2_20206050438Iron Dissolved ICAP0.020.200mg/L100(70-130)2.01.75MS2_20206050438Iron Dissolved ICAP0.955.78mg/L9.8(70-130)2.01.75MS2_20206050438Iron Dissolved ICAP0.955.78mg/L9.7(70-130)2.01.75MS2_20206050438Iron Dissolved ICAP0.055.07mg/L101(85-15)2.01.75 <td>MSD2_202006040248</td> <td>Iron Total ICAP</td> <td>0.055</td> <td>5</td> <td>5.02</td> <td>mg/L</td> <td>99</td> <td>(70-130)</td> <td>20</td> <td>1.9</td>	MSD2_202006040248	Iron Total ICAP	0.055	5	5.02	mg/L	99	(70-130)	20	1.9
Maganese Total ICAP -0.001 mg/L	LCS1	Manganese Total ICAP		2	2.03	mg/L	101	(85-115)		
MR_CHK Maganese Total ICAP 0.002 0.00146 mg/L 73 (50-150) MS_202006040244 Manganese Total ICAP 0.045 2 2.02 mg/L 99 (70-130) V MS2_202006040244 Manganese Total ICAP 0.045 2 2.06 mg/L 101 (70-130) 20 0.75 MSD_202006040244 Manganese Total ICAP 0.035 2 2.01 mg/L 100 (70-130) 20 0.75 MSD_202006040244 Manganese Total ICAP 0.035 2 2.01 mg/L 101 (70-130) 20 0.75 MSD_202006040244 Manganese Total ICAP 0.035 2 2.01 mg/L 101 (85-115) 20 0.75 MSD_20200604024 Iron Dissolved ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MSL_CHK Iron Dissolved ICAP 0.02 0.200 mg/L 100 (70-130) 20 0.79 MSL_20200605043 Iron Dissolved ICAP 0.9 5 5.78 mg/L 97 (70-130)	LCS2	Manganese Total ICAP		2	2.01	mg/L	101	(85-115)	20	0.99
No Organese Total ICAP 0.045 2 2.02 mg/L 99 (70-130) MS2_202006040244 Manganese Total ICAP 0.039 2 2.06 mg/L 101 (70-130) 20 0.75 MSD_202006040244 Manganese Total ICAP 0.045 2 2.04 mg/L 100 (70-130) 20 0.75 MSD_202006040244 Manganese Total ICAP 0.039 2 2.01 mg/L 100 (70-130) 20 0.75 MSD_202006040244 Manganese Total ICAP 0.039 2 2.01 mg/L 100 (85-115) 20 0.79 LCS1 Iron Dissolved ICAP 5 5.07 mg/L 101 (85-115) 20 0.79 MSL Iron Dissolved ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MSL Iron Dissolved ICAP 5 5.03 mg/L 100 (70-130) 20 0.79 MS2_020006050438 Iron Dissolved ICAP	MBLK	Manganese Total ICAP			<0.001	mg/L				
MS2_202006040248Manganese Total ICAP0.03922.06mg/L101(70-130)200.75MSD_202006040244Manganese Total ICAP0.03922.01mg/L98(70-130)202.4ICP Metals by EV=7 Mangitical Byter 1253707Standing and total ICAPStanding and total ICAPStanding and total ICAPICS1In Dissolved ICAPStanding and total ICAPStanding and total ICAPStanding and total ICAPMSL_202006050438Iron Dissolved ICAP55.07mg/L101(85-115)200.79MSL_202006050438Iron Dissolved ICAP0.020.0200mg/L100(50-150)-100MS_202006050438Iron Dissolved ICAP0.955.78mg/L98(70-130)200.79MS2_202006050438Iron Dissolved ICAP0.955.78mg/L97(70-130)200.79MS2_202006050438Iron Dissolved ICAP0.955.78mg/L97(70-130)200.79MS2_202006050438Iron Dissolved ICAP0.955.74mg/L97(70-130)200.79ICS1Iron Total ICAP0.955.78mg/L97(70-130)200.79ICS2Iron Total ICAP0.955.74mg/L97(70-130)200.79ICS1Iron Total ICAP0.9 <td>MRL_CHK</td> <td>Manganese Total ICAP</td> <td></td> <td>0.002</td> <td>0.00146</td> <td>mg/L</td> <td>73</td> <td>(50-150)</td> <td></td> <td></td>	MRL_CHK	Manganese Total ICAP		0.002	0.00146	mg/L	73	(50-150)		
MSD_202006040244Manganese Total ICAP0.04522.04mg/L100(70-130)200.75MSD2_20200604024Manganese Total ICAP0.03922.01mg/L98(70-130)202.0 CP Metals by EP-VD: Analytical B-tr: 1253707knalytical B-tr: 1253707S 5.07mg/L101(85-115)200.79LCS1ion Disolved ICAP55.03mg/L101(85-115)200.79MBLKion Disolved ICAP0.020.0200mg/L100(50-150)MS_202006050438ion Disolved ICAP0.020.0200mg/L100(70-130)200.79MS_202006050438ion Disolved ICAP0.955.78mg/L98(70-130)200.71MS_202006050438ion Disolved ICAP0.955.74mg/L97(70-130)200.71MS_202006050438ion Disolved ICAP0.955.74mg/L97(70-130)200.71MS_202006050438ion Total ICAP0.955.74mg/L100(85-115)10101LCS1ion Total ICAP55.07mg/L101(85-115)10101 <t< td=""><td>MS_202006040244</td><td>Manganese Total ICAP</td><td>0.045</td><td>2</td><td>2.02</td><td>mg/L</td><td>99</td><td>(70-130)</td><td></td><td></td></t<>	MS_202006040244	Manganese Total ICAP	0.045	2	2.02	mg/L	99	(70-130)		
MSD2_202006040248Manganese Total ICAP0.03922.01mg/L98(70.10)202.4ICP Metals by EP 20.7 Analytical Birth: 1253707kite in Dissolved ICAPkite in Dissolved ICAPsss<	MS2_202006040248	Manganese Total ICAP	0.039	2	2.06	mg/L	101	(70-130)		
In the set of the set o	MSD_202006040244	Manganese Total ICAP	0.045	2	2.04	mg/L	100	(70-130)	20	0.75
Analytical E:: 1253707Start B:Examination B:Start B:Star	MSD2_202006040248	Manganese Total ICAP	0.039	2	2.01	mg/L	98	(70-130)	20	2.4
LCS1Iron Disolved ICAP55.07mg/L10168-115LCS2Iron Disolved ICAP55.03mg/L101(85.115)200.79MBLKIron Disolved ICAP-0.020.020mg/L100(50.15)200.79MS_202006050438Iron Disolved ICAP0.020.200mg/L100(50.150)MS_202006050438Iron Disolved ICAPND55.02mg/L100(70.130)203.1MS2_20200605043Iron Disolved ICAP0.955.78mg/L97(70.130)203.1MSD_20200605043Iron Disolved ICAP0.955.74mg/L97(70.130)2.03.1MSD_20200605043Iron Disolved ICAP0.955.74mg/L101(85.115)2.00.79LCS1Iron Total ICAP55.03mg/L101(85.115)2.00.79MSLKIron Total ICAP55.03mg/L101(85.115)2.00.79MSLKIron Total ICAP55.03mg/L101(85.115)2.00.79MSLIron Total ICAPIron Total ICAP<	ICP Metals by EPA	A 200.7								
LCS2 Iron Dissolved ICAP 5 5.03 mg/L 101 0.1	Analytical B	atch: 1253707					Analysis D	ate: 06/08/	2020	
MBLK Iron Dissolved ICAP <0.01 mg/L 100 (50-150) MRL_CHK Iron Dissolved ICAP 0.02 0.0200 mg/L 100 (50-150) 100 MS_202006050438 Iron Dissolved ICAP ND 5 5.02 mg/L 100 (70-130) 100 (70-130) MS2_202006050438 Iron Dissolved ICAP 0.9 5 5.78 mg/L 98 (70-130) 20 3.1 MSD2_202006050438 Iron Dissolved ICAP ND 5 5.74 mg/L 97 (70-130) 20 0.79 LCS1 Iron Total ICAP 5 5.07 mg/L 101 (85-115) 20 0.79 MSLK Iron Total ICAP 5 5.07 mg/L 101 (85-115) 20 0.79 MSL Iron Total ICAP 5 5.07 mg/L 101 (85-115) 20 0.79 MSL_202006050438 Iron Total ICAP Iron Total ICAP 0.020 Ing/L 100 (70	LCS1	Iron Dissolved ICAP		5	5.07	mg/L	101	(85-115)		
MRL_CHK Iron Dissolved ICAP 0.02 0.0200 mg/L 100 (50-150) MS_202006050438 Iron Dissolved ICAP ND 5 5.02 mg/L 100 (70-130) MSD_202006050438 Iron Dissolved ICAP 0.9 5 5.78 mg/L 98 (70-130) 20 3.1 MSD_202006050438 Iron Dissolved ICAP ND 5 5.78 mg/L 97 (70-130) 20 3.1 MSD_202006050438 Iron Dissolved ICAP 0.9 5.74 mg/L 97 (70-130) 20 0.79 LCS1 Iron Total ICAP 5 5.07 mg/L 101 (85-115) 20 0.79 MSLK Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MSL_202006050438 Iron Total ICAP Iron Total ICAP Iron Total ICAP 10.02 100 (50-150) Iron Total ICAP	LCS2	Iron Dissolved ICAP		5	5.03	mg/L	101	(85-115)	20	0.79
MS_202006050438 Iron Dissolved ICAP ND 5 5.02 mg/L 100 (70-130) MS2_202006050436 Iron Dissolved ICAP 0.9 5 5.78 mg/L 98 (70-130) 20 3.1 MSD_202006050438 Iron Dissolved ICAP ND 5 5.78 mg/L 97 (70-130) 20 3.1 MSD_202006050436 Iron Dissolved ICAP ND 5 5.74 mg/L 97 (70-130) 20 0.79 LCS1 Iron Total ICAP 5 5.02 mg/L 101 (85-115) 20 0.79 MSLK Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MRL_CHK Iron Total ICAP 5 5.03 mg/L 101 (85-15) 20 0.79 MS_202006050438 Iron Total ICAP 0.20 0.0200 mg/L 100 (50-150)	MBLK	Iron Dissolved ICAP			<0.01	mg/L				
MS2_202006050436 Iron Dissolved ICAP 0.9 5 5.78 mg/L 98 (70-130) 20 3.1 MSD_202006050436 Iron Dissolved ICAP ND 5 4.87 mg/L 97 (70-130) 20 3.1 MSD_202006050436 Iron Dissolved ICAP 0.9 5 5.74 mg/L 97 (70-130) 20 0.79 LCS1 Iron Total ICAP 5 5.07 mg/L 101 (85-115) 20 0.79 LCS2 Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MBLK Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MSL_202006050438 Iron Total ICAP 6.02 0.200 mg/L 100 (50-150) 100 101 (50-150) 101 10	MRL_CHK	Iron Dissolved ICAP		0.02	0.0200	mg/L	100	(50-150)		
MSD_202006050438 Iron Dissolved ICAP ND 5 4.87 mg/L 97 (70-130) 20 3.1 MSD_202006050436 Iron Dissolved ICAP 0.9 5 5.74 mg/L 97 (70-130) 20 0.79 LCS1 Iron Total ICAP 5 5.07 mg/L 101 (85-115) 20 0.79 LCS2 Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MBLK Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MSL_202006050438 Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MS_202006050438 Iron Total ICAP 5 5.02 mg/L 100 (50-150) 101 100 (50-150) 101	MS_202006050438	Iron Dissolved ICAP	ND	5	5.02	mg/L	100	(70-130)		
MSD2_202006050436 Iron Dissolved ICAP 0.9 5 5.74 mg/L 97 (70-130) 20 0.79 LCS1 Iron Total ICAP 5 5.07 mg/L 101 (85-115) 20 0.79 LCS2 Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MBLK Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MBLK Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MBLK Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MS_202006050438 Iron Total ICAP 5 5.02 mg/L 100 (50-150) 5 5.74 100 (70-130) 101	MS2_202006050436	Iron Dissolved ICAP	0.9	5	5.78	mg/L	98	(70-130)		
LCS1 Iron Total ICAP 5 5.07 mg/L 101 (85-115) 20 0.79 LCS2 Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MBLK Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MBLK Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MRL_CHK Iron Total ICAP 5 5.03 mg/L 100 (50-150) 100 (50-150) 100 (50-150) 100 (50-150) 100 (50-150) 100 (70-130) 20 0.79 MS2_202006050436 Iron Total ICAP ND 5 5.02 mg/L 100 (70-130) 20 3.1 MS2_202006050436 Iron Total ICAP ND 5 5.78 mg/L 98 (70-130) 20 3.1 MSD_202006050438 Iron Total ICAP ND 5 4.87 mg/L 97 (70-130) 20 3.1	MSD_202006050438	Iron Dissolved ICAP	ND	5	4.87	mg/L	97	(70-130)	20	3.1
LCS2 Iron Total ICAP 5 5.03 mg/L 101 (85-115) 20 0.79 MBLK Iron Total ICAP <0.01 mg/L 100 (50-150)	MSD2_202006050436	Iron Dissolved ICAP	0.9	5	5.74	mg/L	97	(70-130)	20	0.79
MBLK Iron Total ICAP <0.01 mg/L MRL_CHK Iron Total ICAP 0.02 0.0200 mg/L 100 (50-150) MS_202006050438 Iron Total ICAP ND 5 5.02 mg/L 100 (70-130) MS2_20206050436 Iron Total ICAP 0.90 5 5.78 mg/L 98 (70-130) 20 3.1 MSD_20206050438 Iron Total ICAP ND 5 4.87 mg/L 97 (70-130) 20 3.1	LCS1	Iron Total ICAP		5	5.07	mg/L	101	(85-115)		
MRL_CHK Iron Total ICAP 0.02 0.0200 mg/L 100 (50-150) 100 10	LCS2	Iron Total ICAP		5	5.03	mg/L	101	(85-115)	20	0.79
MS_202006050438 Iron Total ICAP ND 5 5.02 mg/L 100 (70-130) MS2_202006050436 Iron Total ICAP 0.90 5 5.78 mg/L 98 (70-130) MSD_202006050438 Iron Total ICAP ND 5 4.87 mg/L 97 (70-130) 20 3.1	MBLK	Iron Total ICAP			<0.01	mg/L				
MS2_202006050436 Iron Total ICAP 0.90 5 5.78 mg/L 98 (70-130) MSD_202006050438 Iron Total ICAP ND 5 4.87 mg/L 97 (70-130) 20 3.1	MRL_CHK	Iron Total ICAP		0.02	0.0200	mg/L	100	(50-150)		
MSD_202006050438 Iron Total ICAP ND 5 4.87 mg/L 97 (70-130) 20 3.1	MS_202006050438	Iron Total ICAP	ND	5	5.02	mg/L	100	(70-130)		
	MS2_202006050436	Iron Total ICAP	0.90	5	5.78	mg/L	98	(70-130)		
MSD2_202006050436 Iron Total ICAP 0.90 5 5.74 mg/L 97 (70-130) 20 0.79	MSD_202006050438	Iron Total ICAP	ND	5	4.87	mg/L	97	(70-130)	20	3.1
	MSD2_202006050436	Iron Total ICAP	0.90	5	5.74	mg/L	97	(70-130)	20	0.79

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Eaton Analytical

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield(%)	Limits (%)	RPD Limit(%)	RPD%
LCS1	Manganese Dissolved ICAP		2	2.02	mg/L	101	(85-115)		
LCS2	Manganese Dissolved ICAP		2	2.00	mg/L	100	(85-115)	20	1
MBLK	Manganese Dissolved ICAP			<0.001	mg/L				
MRL_CHK	Manganese Dissolved ICAP		0.002	0.00200	mg/L	100	(50-150)		
MS_202006050438	Manganese Dissolved ICAP	0.0089	2	1.98	mg/L	99	(70-130)		
MS2_202006050436	Manganese Dissolved ICAP	0.95	2	2.86	mg/L	96	(70-130)		
MSD_202006050438	Manganese Dissolved ICAP	0.0089	2	1.94	mg/L	96	(70-130)	20	2.3
MSD2_202006050436	Manganese Dissolved ICAP	0.95	2	2.86	mg/L	95	(70-130)	20	0.032
LCS1	Manganese Total ICAP		2	2.02	mg/L	101	(85-115)		
LCS2	Manganese Total ICAP		2	2.00	mg/L	100	(85-115)	20	1
MBLK	Manganese Total ICAP			<0.001	mg/L				
MRL_CHK	Manganese Total ICAP		0.002	0.00200	mg/L	100	(50-150)		
MS_202006050438	Manganese Total ICAP	0.0089	2	1.98	mg/L	99	(70-130)		
MS2_202006050436	Manganese Total ICAP	0.95	2	2.86	mg/L	96	(70-130)		
MSD_202006050438	Manganese Total ICAP	0.0089	2	1.94	mg/L	96	(70-130)	20	2.3
MSD2_202006050436	Manganese Total ICAP	0.95	2	2.86	mg/L	95	(70-130)	20	0.032
ICP Metals by EPA	200.7								
	atch: 1253893					Analysis D	ate: 06/09/	2020	
LCS1	Iron Total ICAP		5	5.15	mg/L	103	(85-115)		
LCS2	Iron Total ICAP		5	5.09	mg/L	102	(85-115)	20	1.2
MBLK	Iron Total ICAP			<0.01	mg/L				
MRL_CHK	Iron Total ICAP		0.02	0.0207	mg/L	104	(50-150)		
MS_202006010625	Iron Total ICAP	ND	5	5.18	mg/L	103	(70-130)		
MS2_202006050116	Iron Total ICAP	1.1	5	6.34	mg/L	104	(70-130)		
MSD_202006010625	Iron Total ICAP	ND	5	5.20	mg/L	104	(70-130)	20	0.47
MSD2_202006050116	Iron Total ICAP	1.1	5	6.25	mg/L	103	(70-130)	20	1.4
LCS1	Manganese Total ICAP		2	2.04	mg/L	102	(85-115)		
LCS2	Manganese Total ICAP		2	2.02	mg/L	101	(85-115)	20	0.99
MBLK	Manganese Total ICAP			<0.001	mg/L				
MRL_CHK	Manganese Total ICAP		0.002	0.00143	mg/L	72	(50-150)		
MS_202006010625	Manganese Total ICAP	0.0026	2	2.02	mg/L	101	(70-130)		
MS2_202006050116	Manganese Total ICAP	0.12	2	2.19	mg/L	104	(70-130)		
MSD_202006010625	Manganese Total ICAP	0.0026	2	2.04	mg/L	102	(70-130)	20	0.74
MSD2_202006050116	Manganese Total ICAP	0.12	2	2.13	mg/L	100	(70-130)	20	3.0
ICPMS Metals by E	EPA 200.8								
Analytical Ba	atch: 1254057				1	Analysis D	ate: 06/10/	2020	
LCS1	Arsenic Total ICAP/MS		50	46.9	ug/L	94	(85-115)		
Spike recovery is already correct					5		. ,		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield(%)	Limits (%)	RPD Limit(%)	RPD%
LCS2	Arsenic Total ICAP/MS		50	47.9	ug/L	96	(85-115)	20	2.1
MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1	0.806	ug/L	81	(50-150)		
MS_202006050167	Arsenic Total ICAP/MS	ND	50	50.8	ug/L	101	(70-130)		
MS2_202006050437	Arsenic Total ICAP/MS	3.0	50	46.7	ug/L	87	(70-130)		
MSD_202006050167	Arsenic Total ICAP/MS	ND	50	49.2	ug/L	98	(70-130)	20	3.2
MSD2_202006050437	Arsenic Total ICAP/MS	3.0	50	48.5	ug/L	91	(70-130)	20	3.9
ICPMS Metals by I	EPA 200.8								
Analytical B	atch: 1254476					Analysis D	ate: 06/11/	2020	
LCS1	Arsenic Total ICAP/MS		50	49.0	ug/L	98	(85-115)		
LCS2	Arsenic Total ICAP/MS		50	49.5	ug/L	99	(85-115)	20	1.0
MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1	1.00	ug/L	100	(50-150)		
MS_202006090433	Arsenic Total ICAP/MS	2.1	50	55.0	ug/L	106	(70-130)		
MS2_202006050170	Arsenic Total ICAP/MS	ND	50	53.2	ug/L	105	(70-130)		
MSD_202006090433	Arsenic Total ICAP/MS	2.1	50	54.6	ug/L	105	(70-130)	20	0.54
MSD2_202006050170	Arsenic Total ICAP/MS	ND	50	54.3	ug/L	108	(70-130)	20	2.0
ICPMS Metals by I	EPA 200.8								
Analytical B	atch: 1254477					Analysis D	ate: 06/11/	2020	
LCS1	Arsenic Total ICAP/MS		50	49.4	ug/L	99	(85-115)		
LCS2	Arsenic Total ICAP/MS		50	50.3	ug/L	101	(85-115)	20	1.8
MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1	0.990	ug/L	99	(50-150)		
MS_202006050442	Arsenic Total ICAP/MS	3.5	50	52.2	ug/L	97	(70-130)		
MS2_202006080658	Arsenic Total ICAP/MS	1.3	50	50.9	ug/L	99	(70-130)		
MSD_202006050442	Arsenic Total ICAP/MS	3.5	50	56.6	ug/L	106	(70-130)	20	8.2
MSD2_202006080658	Arsenic Total ICAP/MS	1.3	50	54.0	ug/L	105	(70-130)	20	6.0
ICPMS Metals by B	EPA 200.8								
Analytical B	atch: 1254545				1	Analysis D	ate: 06/12/	2020	
LCS1	Arsenic Total ICAP/MS		50	54.0	ug/L	108	(85-115)		
LCS2	Arsenic Total ICAP/MS		50	52.5	ug/L	105	(85-115)	20	2.8
MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1	1.09	ug/L	109	(50-150)		
MS_202006090439	Arsenic Total ICAP/MS	ND	50	55.0	ug/L	110	(70-130)		
MS2_202006100400	Arsenic Total ICAP/MS	ND	50	55.0	ug/L	110	(70-130)		
MSD_202006090439	Arsenic Total ICAP/MS	ND	50	54.3	ug/L	109	(70-130)	20	1.2

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield(%)	Limits (%)	RPD Limit(%)	RPD%
MSD2_202006100400	Arsenic Total ICAP/MS	ND	50	54.2	ug/L	108	(70-130)	20	1.6
ICP Metals by EPA	200.7								
Analytical Ba	atch: 1255060					Analysis D	ate: 06/13/	2020	
LCS1	Iron Dissolved ICAP		5	5.05	mg/L	101	(85-115)		
LCS2	Iron Dissolved ICAP		5	5.06	mg/L	101	(85-115)	20	0.20
MBLK	Iron Dissolved ICAP			<0.01	mg/L				
MRL_CHK	Iron Dissolved ICAP		0.02	0.0210	mg/L	105	(50-150)		
MS_202006080151	Iron Dissolved ICAP	0.11	5	5.15	mg/L	101	(70-130)		
MSD_202006080151	Iron Dissolved ICAP	0.11	5	5.16	mg/L	101	(70-130)	20	0.27
LCS1	Manganese Dissolved ICAP		2	2.01	mg/L	100	(85-115)		
LCS2	Manganese Dissolved ICAP		2	2.01	mg/L	100	(85-115)	20	0.0
MBLK	Manganese Dissolved ICAP			<0.001	mg/L				
MRL_CHK	Manganese Dissolved ICAP		0.002	0.00200	mg/L	100	(50-150)		
MS_202006080151	Manganese Dissolved ICAP	0.83	2	2.82	mg/L	100	(70-130)		
MSD_202006080151	Manganese Dissolved ICAP	0.83	2	2.82	mg/L	99	(70-130)	20	0.11
ICP Metals by EPA	200.7								
Analytical Ba	atch: 1255267					Analysis D	ate: 06/15/	2020	
LCS1	Iron Total ICAP		5	5.07	mg/L	101	(85-115)		
LCS2	Iron Total ICAP		5	5.13	mg/L	103	(85-115)	20	1.2
MBLK	Iron Total ICAP			<0.01	mg/L				
MRL_CHK	Iron Total ICAP		0.02	0.0211	mg/L	106	(50-150)		
MS_202006080247	Iron Total ICAP	0.10	5	5.14	mg/L	101	(70-130)		
MS2_202006090134	Iron Total ICAP	0.20	5	5.20	mg/L	100	(70-130)		
MSD_202006080247	Iron Total ICAP	0.10	5	5.33	mg/L	105	(70-130)	20	3.6
MSD2_202006090134	Iron Total ICAP	0.20	5	5.37	mg/L	103	(70-130)	20	3.1
LCS1	Manganese Total ICAP		2	2.02	mg/L	101	(85-115)		
LCS2	Manganese Total ICAP		2	2.05	mg/L	102	(85-115)	20	0.98
MBLK	Manganese Total ICAP			<0.001	mg/L				
MRL_CHK	Manganese Total ICAP		0.002	0.00117	mg/L	59	(50-150)		
MS_202006080247	Manganese Total ICAP	0.051	2	2.06	mg/L	100	(70-130)		
MS2_202006090134	Manganese Total ICAP	0.0084	2	2.00	mg/L	100	(70-130)		
MSD_202006080247	Manganese Total ICAP	0.051	2	2.14	mg/L	104	(70-130)	20	4.0
MSD2_202006090134	Manganese Total ICAP	0.0084	2	2.08	mg/L	103	(70-130)	20	3.9
ICPMS Metals by E	PA 200.8								
Analytical Ba	atch: 1255354				1	Analysis D	ate: 06/15/	2020	
LCS1	Arsenic dissolved ICAP/MS		50	51.2	ug/L	102	(85-115)		

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



Laboratory QC

Tel: (626) 386-1100 Fax: (866) 988-3757 1 800 566 LABS (1 800 566 5227)

Report: 874995 Project: WOODARD Group: OMWD Desal Pilot Test

David C. McCollum Water Treatment Plant

QC Туре	Analyte	Native	Spiked	Recovered	Units	Yield(%)	Limits (%)	RPD Limit(%)	RPD%
LCS2	Arsenic dissolved ICAP/MS		50	51.0	ug/L	102	(85-115)	20	0.39
MBLK	Arsenic dissolved ICAP/MS			<0.5	ug/L				
MBLK	Arsenic dissolved ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic dissolved ICAP/MS		1	1.04	ug/L	103	(50-150)		
MS_202004300036	Arsenic dissolved ICAP/MS	1.7	50	53.6	ug/L	104	(70-130)		
MS2_202006120099	Arsenic dissolved ICAP/MS	ND	50	53.6	ug/L	107	(70-130)		
MSD_202004300036	Arsenic dissolved ICAP/MS	1.7	50	55.3	ug/L	107	(70-130)	20	3.1
MSD2_202006120099	Arsenic dissolved ICAP/MS	ND	50	52.0	ug/L	104	(70-130)	20	3.1
LCS1	Arsenic Total ICAP/MS		50	51.2	ug/L	102	(85-115)		
LCS2	Arsenic Total ICAP/MS		50	51.0	ug/L	102	(85-115)	20	0.39
MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1	1.04	ug/L	103	(50-150)		
MS_202004300036	Arsenic Total ICAP/MS	1.7	50	53.6	ug/L	104	(70-130)		
MS2_202006120099	Arsenic Total ICAP/MS	ND	50	53.6	ug/L	107	(70-130)		
MSD_202004300036	Arsenic Total ICAP/MS	1.7	50	55.3	ug/L	107	(70-130)	20	3.1
MSD2_202006120099	Arsenic Total ICAP/MS	ND	50	52.0	ug/L	104	(70-130)	20	3.1

Spike recovery is already corrected for native results. Spikes which exceed Limits and Method Blanks with positive results are highlighted by <u>Underlining.</u> Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

RPD not calculated for LCS2 when different a concentration than LCS1 is used. RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).



APPENDIX B

Pilot Test Daily Operations Log Page 43 - 45

Lopres	<u>st Pilot</u> st Trailer est Data				Job Nan Job Nun Well # Sheet #		enhain CA 653						Media T Media T Media T	ype F2:	MAN	<u>16</u> -	HTH XO	<u>R</u> PEC() - -	ē			Backwas	h Rate: 12	Rate: 8 gpr 2 gpm/sf (2) gpm/sf (3	4 gpm)	pm per filter	, tz	4 mil	4 2 n 3 n 3	1940	39 =	4,3			
Line # Date (2020)	Time 24:00	Initials	Flow Rate digital	Flow Filter 1 rota	Flow Filter 2 rota	Flow Filte 3 rota	F Ci Rato cal colm		Cl Free Out Filter 1	Cl Free Out Filter 2 mg/l	CI Free Out Filter 3 mg/l	Fo Rate cal coim mL/min	Fe (total) In mg/l	Fe (total) Out Filter 1 mg/l	Fe (total) Out Filter 2 mg/l	Fe (total) Out Filter 3 mg/l	Mn (totai In mg/l	Mn (tota Out Filter 1) Mn (total) Out Filter 2			Out	1	Flt 2 gaug			Pressure In Fit 3 gauge	Pressure Out Fit 3 gauge	Dif Pros	pH In/Out	Turbidity In/Out	Current RunTime	Total Treated Galions	Pull Lab Samples? (1/day)	Notes
	07r5	-30	3.1	(.5	1.5		9,5		1 17(2)	119/	тдл		mgn	i ng/i	niĝ <i>u</i>	mg/i	mg/l		mg/l	mg/l	2 4	22	2	zę.3	22.6	f,) a	psi		psid		NTU	hours	gat (yosino	START
	0800	1	3.1	1.5	(.5		10.0			0.70 0.82			0.96	0.03	0.00		0.313	, 0.04	10.02		24Ko	≈2.√	2.2	243	23.0	1.8							ાલાંબ		NH3-H <u>R F1 F2</u> 063 0.42 0.35
	0930	1	3.1	1.5	1.5		-		1	0,37			0.90	0,0}	৯.০৩		0.29%	6.04	0.02	1	24,9	72,0	2.9	25,0	22.1	2.7							496		SAMPle
	1(30		3,1	1.5	1.5		9.5	135	61,1	0.87			୦ନମ	o.08	0.02	:	0.3Z4	007	10.053		25.2	z1. 9	3.2	25.1	21.8	3.3				7.17 7.21	1.87		772		
	1330		3,0	1.5	15		6.0	137	1.08	0.99			Q97	0,17	0.09		0,309	0.082	0 29,50		25,3	217	3.5	25,3	21.5	5 3,8					1.8/		1147		
	1530		3,1	1.5	1.5		C,0]	1.30	1,13	0.96		4	0.96	029	0,15		9.3zc	0,10	2 0,0%	1. 	25.4	21.6	3,9	25.5	~ 21,2	- 4.2					1.83		1442	Y	s Ample
	1730		30	1.5	1.5		10,0	ात्प	1.07	0.93			0.93	0.45	0,18		0A	0,134	0.04		2516	21.4	4.3	25,7	21.0	9 4.7							1810		SAMPLE STOP RWN *1
																																			BACKWASH
Notes:																																			

- Record action taken during pilot in Notes or in space below - Send picture of Log Sheets at end of every day - Calibration Column Level is "upside down". 200 mL is empty. 0 mL is near full

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4 min 2.4 +0.39 = 2.0 4 min 2.4

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<u>Loprest Pilot</u> Loprest Trailer Pilot Test Data Log

Log Pm/ F7 2 Hydraulic Loading Rate: 8 gpm/sf (1.5 gpm per filter) Backwash Rate: 12 gpm/sf (2.4 gpm) Backwash Rate: 20 gpm/sf (3.9 gpm)

Line #	Date	Time	Initials	Flow Rate	Flow Filter	r Flow Filter 2	Flow Filte	Ci Rate	Ci Free In	CI Free Out	Cl Free Out	CI Free Out	Fe Rate	Fe (total) In	Fe (total) Out	Fe (total) Out	Fe (total) Out	Mn (total) In	Mn (total) Out	Mn (total) Out	Mn (totai) Out	Pressure In	Pressure Out	Dif Pres	Pressure In	Pressure Out	Dif Pres	Pressure in	Pressure Out	Dif Pros	рН	Turbidity	Gurrent Tr RunTime C	otal Pr rated Sa llons (*	ill Lab πples? /day}	Notes
				digital	rota	rota	rota	cal colm		Filter 1	Filter 2	Filter 3	cal coim		Filter 1	Filter 2	Filter 3		Filter 1	Filter 2		Flt 1 gauge	Fit 1 gauge	DP 1	Fit 2 gauge		DP 2	Fit 3 gauge		DP 3	in/Out	ín/Out	G	llons ('	/day}	
	(2020)			gpm	gpm	gpm	gpm	mUmin	mg/l	mg/l	mg/l	mg/l	mL/min	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	psi	psi	psid	ieq	psi	psid	psi	psi	psid		טדא	hours	gal y	oslno	
	6/3/2.0	0605	108	2.3	1.2	1.2		7.0														2 3 ,9	27.1	4.1	28.7	27.Y	1.3						-4	9		START
		0645		2.2	Angewer 1	*******		7.5	1.12	0.87	०२३			093	0.03	0.03		0,321	0.077	0,032	-	29,2	27.5	1.6	29.2	27.구	۱.5						8	3 Y	/	Sample
		0315		2.(1.	1.		1.5	127	૦.૧૧	0.%			1.04	0,00	0 <i>,0</i>)		0,333	o . ০৭ঀ	0.0/3		29:2	27.5	1.8	29.3	27.5	行					1.71/ /1.19		39		
		1000		2.2	1.1	[,]		7.0	1.25	1,09	6,97	1		1,03	0,02	0.09		0,28:	- 0.042	0,025	-	29.3	27.4	1.9	29.4	273	2.1				e e e e e e e e e e e e e e e e e e e	0.90 6.35	52	2		
		1200		2.2		1.1		7.5	(.37	1.06	6.91			0.99	0,00	0.02		0.3K	0,035	0.027	*	29,4	27.4	2.0	29.5	27.2	2.3					1.32/ /0.64	, 7	53		
		cop)		2.2	[1]	(.(6.F	1.43	1.03	0,92			0,94	0.02	0,00		0,309	0.027	0.047		29.5	27.2	2:3	2916	26,8	2.3					0.65	((6)	Y	Sample
		1600		2.2	(, ((, (7.6	1.14	1.08	૦ .૧૫			1,00	0,12	0.07		0,3do	9. <i>06</i> 3	0047		29,6	27.0	2.16	2.9,6	26.5	3.(0,32	(2	64		
		1800		2.2	1. /	(.)		7.5	140	1.15	6,92			0.94	0.19	0. <i>d</i> p.0		0.3 <i>5</i> 9	0.030	5.0 <u>6</u> 2		29.6	26,9	27	Z9.7	26,3	3.4				7.22	,	****	oz '	f	Somple
Notes:																																				

Notes:

Record action taken during pilot in Notes or in space below
 Send picture of Log Sheets at end of every day
 Calibration Column Level is "upside down". 200 mL is empty. 0 mL is near full



APPENDIX C – REVERSE OSMOSIS MODEL RESULTS



							Perr	neate Blend	ling					
Project	name			OMWD_F	ilot Res	ults							F	Page : 1/7
Calculat	ted by			N	1artha			Pe	ermeate t	flow/train			0.810 n	ngd
HP Pun	np flow					694	.44 gpm	ı R	aw water	flow/train			1.190 n	ngd
Feed pr	essure					18	6.4 psi	Pe	ermeate i	recovery			81.00 %	6
Feed ter	mperature	•				2	0.0 °C(6	68.0°F) BI	ended flo	w			1.000 n	ngd
Feed wa	ater pH					7	.40	, EI	ement ad	ae			0.0 y	•
	lose, mg/l	100 %				1	7.2 H2S			e %, per y	ear		5.0	
Specific		,					.46 kwh		ouling fac				1.00	
Pass N	•••						5.5 psi	•		se, per vea	r		7.0	0/_
	e flux rate						3.7 gfd			pipe loss			0.000 p	
Average	e nux rate					1.	3.7 yiu		ed type	pipe ioss		Brackish Well		
									21					0
Pass -	Perm.		Vessel	Flux	DP	Flux	Beta	•	wise Pres		Perm.	Element	Element	PV# x
Stage	Flow	Feed	Conc			Max		Perm.	Boost	Conc	TDS	Туре	Quantity	Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	499.1	49.6	14	18.3	12.8	24	1.2	0	0	173.6	49.5	ESPA2-LD	98	14 x 7M
1-2	63	27.9	18.9	4.6	7.4	8.7	1.09	0	0	166.2	580	ESPA2-LD	49	7 x 7M
lon (mg/l)					Raw W	ater	Feed Water	Perme	ate Water	Concentrate 1	Concentrate 2	Blende	d Product
Hardnes	s, as CaC0	D3				1	409.84	1409.84	1	1.559	5009.0	7388.	3	269.13
Ca							400.00	400.00		0.442	1421.2			76.36
Mg							100.00	100.00		0.111	355.3			19.09
Na							620.00	620.00		35.330	2162.5			146.42
к							39.00	39.00		2.516	135.7			9.45
NH4							0.00	0.00		0.000	0.0			0.00
Ba							0.130	0.130		0.001	0.5			0.03
Sr H							0.000	0.000		0.000	0.0			0.00
CO3							3.06	1.17		0.001	20.1	45.		0.00
НСОЗ							463.60	445.64		24.065	1547.2			108.11
SO4							730.00	746.82		5.719	2647.7			143.33
CI							300.00	1300.00		39.420	4574.8			278.93
F							0.27	0.2		0.016	0.9			0.06
NO3							1.48	1.48		0.309	4.9			0.53
PO4							0.10	0.10)	0.001	0.4	0.	5	0.02
ОН							0.01	0.00)	0.000	0.0	0.)	0.00
SiO2							31.00	31.00)	0.951	109.1	158.	6	6.66
В							0.00	0.00)	0.000	0.0	0.)	0.00
CO2							10.14	24.48		24.48	24.48			21.76
NH3							0.00	0.00		0.00	0.00			0.00
TDS						3	688.64	3685.6		108.88	12980.12			789.57
рН							7.80	7.40		6.21	7.89	8.0	5	6.88
Satura							Raw Wa	ater	Feed		Conce		Limi	
	/ ksp * 10						29		3		23		400	
	/ ksp * 10						0)	0		120	
	/ ksp * 10	,					906		92		610		1000	
	aturation,						25		2		12		14(
	ksp * 100						2			2	15		5000	
•	04)2 satu	ration inde	∋x				0.3			.2	1.		2.4	
CCPP,	0						169.4			3.42	1448		850	
•	er saturat	ion index					1.24		0.		2.7		2.8	\$
lonic st	rength						0.08		0.	08	0.4	1		
• • •														

Product performance calculations are based on nominal element performance when operated on a feed water of acceptable quality. The results shown on the printouts produced by this program are estimates of product performance. No guarantee of product or system performance is expressed or implied unless provided in a separate warranty statement signed by an authorized Hydranautics representative. Calculations for chemical consumption are provided for convenience and are based on various assumptions concerning water quality and composition. As the actual amount of chemical needed for pH adjustment is feedwater dependent, Hydranautics does not warrant chemical consumption. If a product system warranty is required, please contact your Hydranautics representative. Non-standard or extended warranties may result in different pricing than previously quoted. Version : 2.228.87 %

30.9

31.0

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Osmotic pressure, psi

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157.4



							Perm	eate Blen	ding						
Project i	name		ON	/WD Pilo	t Res	sults								Pa	age : 2/7
Calcula	ted by			Ma	rtha				Permeat	e flow/train				0.810 (mgd
HP Pur	np flow					6	94.44 gpr	n	Raw wat	er flow/train	1			1.190 (mgd
Feed pr	essure						186.4 psi		Permeat	e recovery				81.00	%
Feed te	mperature						20.0 °C(68.0°F)	Blended	flow				1.000 (mgd
Feed w	ater pH						7.40		Element	age				0.0	years
Chem c	lose, mg/l,	100 %					17.2 H2	SO4	Flux dec	line %, per	year			5.0	
Specific	c energy						2.46 kwł	n/kgal	Fouling f	actor				1.00	
Pass N	DP						115.5 psi		SP incre	ase, per ye	ar			7.0	%
Average	e flux rate						13.7 gfd		Inter-sta	ge pipe loss	6			0.000	psi
									Feed typ	е		Brac	kish Well	Non-Foulir	ng
Pass -	Perm.	Flow / V	essel	Flux	DP	Flux	Beta	Stag	ewise Pres	sure	Perm.	Eleme	ent E	Element	PV# x
Stage	Flow	Feed	Conc			Max		Perm.	Boost	Conc	TDS	Тур	e (Quantity	Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l				
1-1	499.1	49.6	14	18.3	12.8	24	1.2	0	0	173.6	49.5	ESPA2	2-LD	98	14 x 7M
1-2	63	27.9	18.9	4.6	7.4	8.7	1.09	0	0	166.2	580	ESPA2	2-LD	49	7 x 7M
							Dermeste	Permeate							
Pass -	Element	Feed	Pressure	e Conc	;	NDP	Water	Water	Beta		Permeat	e (Stagev	vise cumu	lative)	
Stage	no.	Pressure	Drop	Osmo) .		Flow	Flux		TDS	Ca	Mg	Na	CI	
U		psi	psi	psi		psi	gpm	gfd				Ũ			
1-1	1	186.4	3.36	35.7		152.9	6.7	24	1.13	16.3	0.065	0.016	5.304	5.857	
1-1	2	183	2.72	41.7		143.2	6.2	22.4	1.15	19.1	0.076	0.019	6.225	6.878	
1-1	3	180.3	2.16	49.4		134	5.8	20.8	1.16	22.8	0.091	0.023	7.425	8.208	
1-1	4	178.1	1.68	59.5		123.3	5.3	19	1.18	27.2	0.109	0.027	8.876	9.819	
1-1	5	176.5	1.27	72.5		110.3	4.7	16.8	1.19	32.7	0.131	0.033	10.658	11.801	
1-1	6	175.2	0.93	89.1		94.4	3.9	14.2	1.2	39.9	0.16	0.04	12.985	14.391	
1-1	7	174.3	0.67	108.6	3	75.5	3.1	11.2	1.2	49.5	0.199	0.05	16.108	17.873	
1-2	1	173.6	1.44	118.6	3	60	2.4	8.7	1.09	236.9	0.96	0.24	76.918	85.701	
1-2	2	172.2	1.25	128.1	1	48.9	1.9	7	1.08	277.5	1.126	0.281	90.082	100.438	
1-2	3	170.9	1.11	136.6	6	38.8	1.5	5.5	1.07	325	1.32	0.33	105.451	117.663	
1-2	4	169.8	1	143.9	9	29.9	1.2	4.2	1.05	379.4	1.543	0.386	123.04	137.405	
1-2	5	168.8	0.92	149.7	7	22.5	0.9	3.1	1.04	440.3	1.793	0.448	142.751	159.562	
1-2	6	167.9	0.86	154.2	2	16.5	0.6	2.3	1.03	507.4	2.07	0.517	164.43	183.972	
1-2	7	167	0.82	157.4	1	11.9	0.5	1.6	1.02	580	2.37	0.592	187.841	210.38	

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Permeate Blending

Project name	OMWD_Pilot Results			Page : 3/7
Calculated by	Martha		Permeate flow/train	0.810 mgd
HP Pump flow		694.44 gpm	Raw water flow/train	1.190 mgd
Feed pressure		186.4 psi	Permeate recovery	81.00 %
Feed temperature		20.0 °C(68.0°F)	Blended flow	1.000 mgd
Feed water pH		7.40	Element age	0.0 years
Chem dose, mg/l, 100 %		17.2 H2SO4	Flux decline %, per year	5.0
Specific energy		2.46 kwh/kgal	Fouling factor	1.00
Pass NDP		115.5 psi	SP increase, per year	7.0 %
Average flux rate		13.7 gfd	Inter-stage pipe loss	0.000 psi
			Feed type	Brackish Well Non-Fouling

THE FOLLOWING PARAMETERS EXCEED RECOMMENDED DESIGN LIMITS

Concentrate CCPP (1448.0) is higher than limit (850).

The above saturations limits only apply when using effective scale inhibitor or dispersant. Without scale inhibitor or dispersant, the saturation and precipitation limit of the contaminant should not exceed its solubility in solution.

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Permeate Blending OMWD_Pilot Results Page : 4/7 Project name Temperature : 68.0 °F Element age, P1 : 0.0 years (2) NaOH, Ca(OH)2 H2SO4 dosing (10) 8 9 6 7

Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	рН	Econd (µs/cm)
1	826	0	3689	7.80	6197
2	132	0	3689	7.80	6197
3	694	0	3689	7.80	6197
4	694	186	3686	7.40	6205
5	694	186	3686	7.40	6205
6	195	174	12980	7.89	19813
7	132	166	18873	8.03	28157
8	499	0	49.5	5.88	89.5
9	63.0	0	580	6.92	1096
10	563	0	109	6.21	196
11	694	0	790	6.88	1554
12	694	0	837	9.49	1649

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							Perme	eate Ble	nding					
Project na	ame		C	MWD_Pi	ot Resul	ts							Pa	age : 5/7
Calculat	ied by			Mar	tha				Permeate fle	ow/train			0.810 r	ngd
HP Purr	np flow					694.	44 gpm		Raw water f	low/train			1.190 r	ngd
Feed pre	essure					186	5.4 psi		Permeate re	ecovery		81.00 %		
Feed ter	mperature	•				20	0.0 °C(68	3.0°F)	Blended flow	N	1.000 mgd			
Feed wa	ater pH					7.	40		Element age			0.0 years		
Chem d	ose, mg/l	, 100 %				17.2 H2SO4 Flux decline %, per ye				ar	5.0			
Specific	energy					2.46 kwh/kgal Fouling factor					1.00			
Pass NI	DP					115.5 psi SP increase, per year					7.0 %			
Average	flux rate					13.7 gfd Inter-stage pipe loss					0.000 psi			
									Feed type			Brackish We	ell Non-Foulin	g
Pass -	Perm.	Flow /	Vessel	Flux	DP	Flux	Beta	Sta	agewise Pres	sure	Perm.	Element	Element	PV# x
Stage	Flow	Feed	Conc			Max		Perm.	Boost	Conc	TDS	Туре	Quantity	Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	499.1	49.6	14	18.3	12.8	24	1.2	0	0	173.6	49.5	ESPA2-LD	98	14 x 7M
1-2	63	27.9	18.9	4.6	7.4	8.7	1.09	0	0	166.2	580	ESPA2-LD	49	7 x 7M

CALCULATION OF POWER REQUIREMENT

	Pass 1	Total system power
Pump/Boost pressure, psi	186.4	
Product flow, mgd	0.8	0.9999999
Pump flow, mgd	1.0	
Pump efficiency, %	75.0	
Motor efficiency, %	93.0	
VFD efficiency, %	97.0	
Pumping power, BHP	111.4	
Pumping power, kw	83.1	83.1
Pumping energy, kwh/kgal		2.46

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Nitto Manautics

Project na	ame			OMWD_Pi	lot Resul	ts							Р	age : 6/7
Calculated by Martha					Permeate flow/train					0.810 mgd				
HP Pump flow				694.44 gpm			Raw water flow/train			1.190 mgd				
Feed pre	ssure					1	86.4 psi		Permeate re	ecovery		81.00 %		
Feed terr	nperature						20.0 °C(6	58.0°F)	Blended flow			1.000 mgd		
Feed wat	ter pH					7.40			Element age			0.0 years		
Chem do	se, mg/l,	100 %				17.2 H2SO4			Flux decline %, per year			5.0		
Specific energy				2.46 kwh/kgal			Fouling factor			1.00				
Pass NDP				115.5 psi			SP increase, per year			7.0 %				
Average flux rate				13.7 gfd			Inter-stage pipe loss			0.000 psi				
									Feed type			Brackish W	ell Non-Fou	ling
Pass -	Perm.	Flow /	Vessel	Flux	DP	Flux	Beta	Sta	agewise Pres	sure	Perm.	Element	Element	PV# x
Stage	Flow	Feed	Conc			Max		Perm.	Boost	Conc	TDS	Туре	Quantity	Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	499.1	49.6	14	18.3	12.8	24	1.2	0	0	173.6	49.5	ESPA2-LD	98	14 x 7M
1-2	63	27.9	18.9	4.6	7.4	8.7	1.09	0	0	166.2	580	ESPA2-LD	49	7 x 7M

Permeate Blending

CALCULATION OF INVESTMENT AND WATER COST

Plant capacity as permeate	0.810	mgd
Specific investment	3,493,550.00	USD/mgd
Investment	2,829,775.00	USD
Plant life	15.0	years
Membrane life	5.0	years
Interest rate	4.5	%
Membrane cost	500.00	USD/element
Plant factor	90.0	%
Number of elements	147.0	
Power cost	0.200	USD/kwhr
Inhibitor cost	2.20	
Power consumption	2.46	kwhr/kgal
Inhibitor dosing	3.0	mg/l
Maintenance(as % of investment)	3.0	%
Acid cost	1.50	
Acid dosing	17.17	mg/l

CALCULATION RESULTS

Capital cost	0.66 USD/kgal
Power cost	0.49 USD/kgal
Chemicals cost	0.15 USD/kgal
Membrane replacement costs	0.06 USD/kgal
Maintenance	0.32 USD/kgal
Total water cost	1.68 USD/kgal

Product performance calculations are based on nominal element performance when operated on a feed water of acceptable quality. The results shown on the printouts produced by this program are estimates of product performance. No guarantee of product or system performance is expressed or implied unless provided in a separate warranty statement signed by an authorized Hydranautics representative. Calculations for chemical consumption are provided for convenience and are based on various assumptions concerning water quality and composition. As the actual amount of chemical needed for pl adjustment is fedwater dependent, Hydranautics does not warrant chemical consumption. If a product or system warranties may result in different pricing than previously quoted. Version : 2.228.87 %

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Project na	ame		C	MWD_Pi	ot Resul	ts							Pa	ige : 7/7
Calculat	ed by			Mar	tha				Permeate fl	ow/train			0.810 m	gd
HP Pum	HP Pump flow				694	.44 gpm		Raw water	flow/train		1.190 mgd			
Feed pre	essure					18	6.4 psi		Permeate recovery			81.00 %		
Feed ter	nperature	9				2	0.0 °C(68	3.0°F)	Blended flo	w			1.000 m	gd
Feed wa	ater pH					7.	.40		Element ag	e			0.0 ye	ars
Chem do	ose, mg/l	, 100 %				1	7.2 H2SC	D4	Flux decline	e %, per yea	ar		5.0	
Specific	energy					2	.46 kwh/ł	kgal	Fouling fact	tor			1.00	
Pass NDP			11	5.5 psi		SP increase, per year				7.0 %				
Average flux rate				1:	3.7 gfd		Inter-stage	Inter-stage pipe loss				i		
									Feed type			Brackish W	ell Non-Foul	ing
Pass -	Perm.	Flow /	Vessel	Flux	DP	Flux	Beta	St	agewise Pres	sure	Perm.	Element	Element	PV# x
Stage	Flow	Feed	Conc			Max		Perm.	Boost	Conc	TDS	Туре	Quantity	Elem #
1-1	499.1	49.6	14	18.3	12.8	24	1.2	0	0	173.6	49.5	ESPA2-LD	98	14 x 7M
1-2	63	27.9	18.9	4.6	7.4	8.7	1.09	0	0	166.2	580	ESPA2-LD	49	7 x 7M

Permeate Blending

*********CALCULATION OF CHEMICAL COST********

	Solution Conc., %	Specific Gravity	Solution Cost, USD/I	Dose, 100% basis	Consumption, kg/h
SMBS	10.0	1.10	0	0	0
Anti scalant	40.0	1.00	0	0	0
NaOCI	10.0	1.30	0	0	0
H2SO4 - Pass 1	100	1.08	0	17.2	2.71

*********SUMMARY FOR CHEMICAL COST********

	Pass 1 Permeate	Total Product
USD/m3	0.00	0.00
USD/kgal	0.00	0.00
USD/mega litres	0.00	0.00
USD/mega usgal	0.00	0.00
USD/mega m3	0.00	0.00
USD/Acre.ft	0.00	0.00

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